United Nations Development Programme

Project Document template for projects financed by the various GEF Trust Funds

<table>
<tr><td colspan="3">Project title: Developing National Capacity of Turkmenistan through Improving Regulatory Environment towards Energy Efficient and Sustainable Building Sector (TEESB)</td></tr>
<tr><td>Country: Turkmenistan</td><td>Implementing Partner (GEF Executing Entity): Ministry of Environmental Protection</td><td>Execution Modality: CO Full Support to National Implementation Modality (Support NIM)</td></tr>
<tr><td colspan="3">Related UNDP Strategic Plan Outcome 3 – By 2025, there is effective design and implementation of disaster risk reduction and climate adaptation and mitigation measures, enabling a more rational use of resources, increased resilience, and a 'green' economy transition.
Output 3.2: Strategic plans and investments are designed and implemented to promote water efficiency, sustainable land use, conservation of biodiversity, ecosystem management, restoration of degraded lands, disaster risk reduction;
Output 3.3. Green economy, climate and disaster risk reduction awareness and knowledge are increased through educational programmes</td></tr>
<tr><td colspan="2">UNDP Social and Environmental Screening Category:
Moderate</td><td>UNDP Gender Marker: GEN2</td></tr>
<tr><td colspan="2">Quantum Award ID: 1255804</td><td>Quantum Project/Output ID: 01002480</td></tr>
<tr><td colspan="2">UNDP-GEF PIMS ID number: 6692</td><td>GEF Project ID number: 10996</td></tr>
<tr><td colspan="3">LPAC[1] meeting date: 05 April 2024</td></tr>
<tr><td colspan="3">Last possible date to submit to GEF: 23 June 2023</td></tr>
<tr><td colspan="3">Latest possible CEO endorsement date: 23 December 2023</td></tr>
<tr><td colspan="3">Project duration in months: 60 months</td></tr>
<tr><td colspan="2">Planned start date: 1 May 2024
Project document signature must occur no later than 6 months of GEF CEO endorsement of this project.
Once the project document is signed, the project start date is to be recorded in the relevant systems as the actual date of project document signature</td><td>Planned end date: 30 April 2029
Once the project document is signed, the project completion date is to be recorded in the relevant systems as the actual date of project document signature plus project duration.</td></tr>
<tr><td colspan="2">Expected date of Mid-Term Review:
20 June 2027
This must be at the mid-point of the project but no later than 48 months after CEO Endorsement.</td><td>Expected date of Terminal evaluation:
23 February 2029
TE must be submitted within 6 months of the Completion Date – this is a hard deadline that, if not met, can only be extended through a formal extension request.</td></tr>
</table>

[1] Local Project Appraisal Committee, consisting of Country Office, Implementation Partner and key country and development partners, convened just before endorsement as a final step to ensure alignment.

Expected Operational Closure Date: 30 April 2029	**Expected Financial Closure Date:** 30 October, 2029

Brief project description:

The proposed UNDP-GEF project will reduce greenhouse gas emissions by improving energy management, reducing energy consumption and introducing renewable energy (solar PV) in the buildings sector in Turkmenistan. The project will strengthen incentives and capacity to build Nearly-Zero Energy Buildings (NZEB) and develop the capacity of three Ministries involved (and other stakeholders) to identify NZE options in the multi-family and public building stock, implement NZEB investments, improve highly-efficient design measures to institutes as well as major housing designers and developers, and replicate these measures through protocols (e.g. update building codes to encompass NZE features) and through mainstreaming NZEB into state construction and housing policies and programs.

The project will result in a direct lifetime emission reduction of 86.91 $ktCO_2$ and indirect emission reduction of 760.51 $ktCO_2$, increased installed RE capacity of 2.1 MW and energy savings of 438,947 MWh (1,580 TJ) over 20 years of the pilot building and other NZE investments. The number of expected direct beneficiaries is at least 8440 (building occupants and office workers as well as trained beneficiaries).

FINANCING PLAN	
GEF Trust Fund grant	USD 2,066,333
UNDP TRAC resources	USD 90,000
(1) Total Budget administered by UNDP	**USD 2,156,333**
(2) Total confirmed co-financing to this project not administered by UNDP	**USD 42,885,713**
(3) Grand Total Project Financing (1)+(2)	**USD 45,042,046**

SIGNATURES:		
Signature: Charygeldi Babamyradov	**Agreed by** Ministry of Environmental Protection (MEP)	**Date/Month/Year:** 20.02.2025
Signature: Narine Sahakyan	**Agreed by** UNDP	**Date/Month/Year:** 20.02.2025

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LIST OF BOXES

LIST OF ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AHC	Automated heat control
BAS	Building automation system
BAU	Business as usual
Bcm	billion cubic meters
CAPEX	Capital expenditure
CO_2(-eq)	Carbon dioxide (equivalent)
CDR	Combined Delivery Report
CEO	Chief Executive Officer
CO	Country Office
CPD	Country Programme Document (UNDP)
CSO	Civil society organization
DHW	Domestic hot water
EE	Energy efficiency
EBRD	European Bank for Reconstruction and Development
EERB	Energy Efficient Residential Buildings sector
EoP	End of Project
EMIS	Energy management information system
ERC	Evaluation Resource Center (of UNDP)
ESIA	Environmental and social impact assessment
EU	European Union
EUR	Euro
GAP	Gender Action Plan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gas
GJ	Gigajoule
GoT	Government of Turkmenistan
GSHP	Ground-source heat pump
GWh	Gigawatt-hour (10^{9-} = billion watt-hours)
ha	Hectare
K	Kelvin
km	Kilometre
kW	Kilowatt
kWh	Kilowatt-hour
M&E	Monitoring and evaluation
m^2	Square meter
MEP	Ministry of Environmental Protection
MCA	Ministry of Construction and Architecture
MOE	Ministry of Energy
MJ	Megajoule (=10^6 = million Joules)
$MtCO_2$	Million tons of CO_2
Mtoe	Million tons of oil equivalent
MTR	Mid-Term Review
MVE	Monitoring, verification and enforcement
MVHR	Mechanical ventilation with heat recovery
MW	Megawatt (million watts)
MWh	Megawatt-hour
NDC	Nationally Determined Contributions

NGO	Non-governmental organization
NIM	Nationally Implementation modality
NPD	National Project Director
NZE	Nearly zero energy
NZEB	Nearly zero energy building
O&M	Operation and maintenance
OFP	GEF Operational Focal Point
PIR	Project Implementation Review
PJ	Petajoule (= 10^{15} Joules)
PM	Project Manager
PMU	Project Management Unit
PPG	GEF Project Preparation Grant
PSC	Project Steering Committee (Project Board)
PTA	Principal Technical Advisor
PV	Photovoltaics
QAMF	Quality assurance and monitoring framework
RE	Renewable energy
RTA	Regional Technical Advisor
SDG	Sustainable Development Goal
SESP	Social and Environmental Screening Procedure
SNT	Building Code of Turkmenistan
tCO_2	Metric ton of carbon dioxide
TE	Terminal evaluation
TEESB	Turkmenistan Energy Efficient and Sustainable Building sector
TJ	Terajoule (10^{12} = trillion Joules)
TWh	Terawatt-hour
ToC	Theory of change
ToR	Terms of Reference
UNDP	United Nations Development Programme
USD	United States dollar
W_p	Watt-peak

2. DEVELOPMENT CHALLENGE

2.1 Context and global significance

Country context

The population in Turkmenistan was estimated at 6.25 million[1]. The population growth has been declining from 1.74% in 2016 to 1.5% in 2020. The country is also undergoing a steady shift toward greater urbanization with an urban share of 52.5% (3.167 million)[2]. The rapid expansion of the construction sector in the country for the last 10-15 years has led to increased environmental pressure and negative impact – resource consumption, waste, local air and water pollution, and greenhouse gas emissions (GHGs). The sources of these impacts are varied, including expanded housing sector, rising use of private motor vehicles, expansion of public lighting, and consumption of resources and generation of waste. Ashgabat's population increased from about 524,000 in the year 2000 to about 883,000 in 2022[3]. Most of the country is covered by the sparsely populated Karakum Desert.

Energy and electricity

Natural gas and oil

Turkmenistan possesses one of the world's largest reserves[4] of natural gas and this is also the main export product of the country[5]. Production of natural gas went up from only 1.16 billion cubic meters (bcm) in 1965 to 90 bcm in 1989. Following independence, natural gas extraction fell (see Box 1) as Turkmenistan sought export markets but was limited to existing delivery infrastructure under Russian control[6]. The Trans-Asia pipeline to China opened in 2009, exporting some 30-35 bcm of gas to China annually. The East-West pipeline was completed in December 2015, with the intent of delivering up to 30 bcm of natural gas to the Caspian shore for eventual export through the Southern Corridor gas pipeline system[7]. In 2021, production stood at 79.3 bcm (in 2020, 66 bcm) while consumption was 36.7 bcm (28 bcm in 2020) with exports of 42.6 bcm. Oil is produced from wells in the western lowlands and offshore in the Caspian Sea. The country produced 219 thousand barrels a day in 2021 with consumption standing at 146 thousand barrels a day (140 thousand a day in 2020). Oil reserves are an estimated 600 million barrels[8].

Primary energy supply and final demand; electricity

Turkmenistan's power is generated in ten plants, almost solely from natural gas, with 21.18 TWh in 2021 (and 20.1 TWh in 2020, of which almost all from natural gas and 3 GWh from hydropower). With production about 1.5 times consumption (15.09 TWh in 2020), the country is a net exporter to neighbouring countries (about 3.2 TWh)[9]. The installed capacity was 7.4 GW in 2021 (up from 7.0 in 2019). Total production was 3,251 petajoules (PJ) in 2020 of which 67% was exported. Primary supply amounted to 1003 PJ (of which 0.4 PJ biomass. The final energy consumption was 672 PJ in 2020 (see Box 1).

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1 Based on Worldometer, extrapolated fromof the latest United Nations data (2020), 2.05 million

2 Up from 2.872 million (50.7%) in 2016

3 https://www.macrotrends.net/cities/22739/ashgabat/population

4 Estimated at between 7.5 to 19 trillion m^3 (tcm). Source www.worldometers.info/gas/turkmenistan-natural-gas and *CAREC Energy Outlook 2030*. There are numerous oil and natural gas fields spread across the country, including the Galkynysh field, which is the world's second-largest natural gas field.

5 Natural gas: 81.4% in 2019. Crude oil and oil products, 10.0%. Turkmenistan Product Exports (2019) Data Source: BACI - HS6

6 *Türkmenistanyň Geografiýasy* (in Turkmen). Ashgabat: Bilim Ministrligi (2010). www.worldometers.info/gas/turkmenistan-natural-gas/

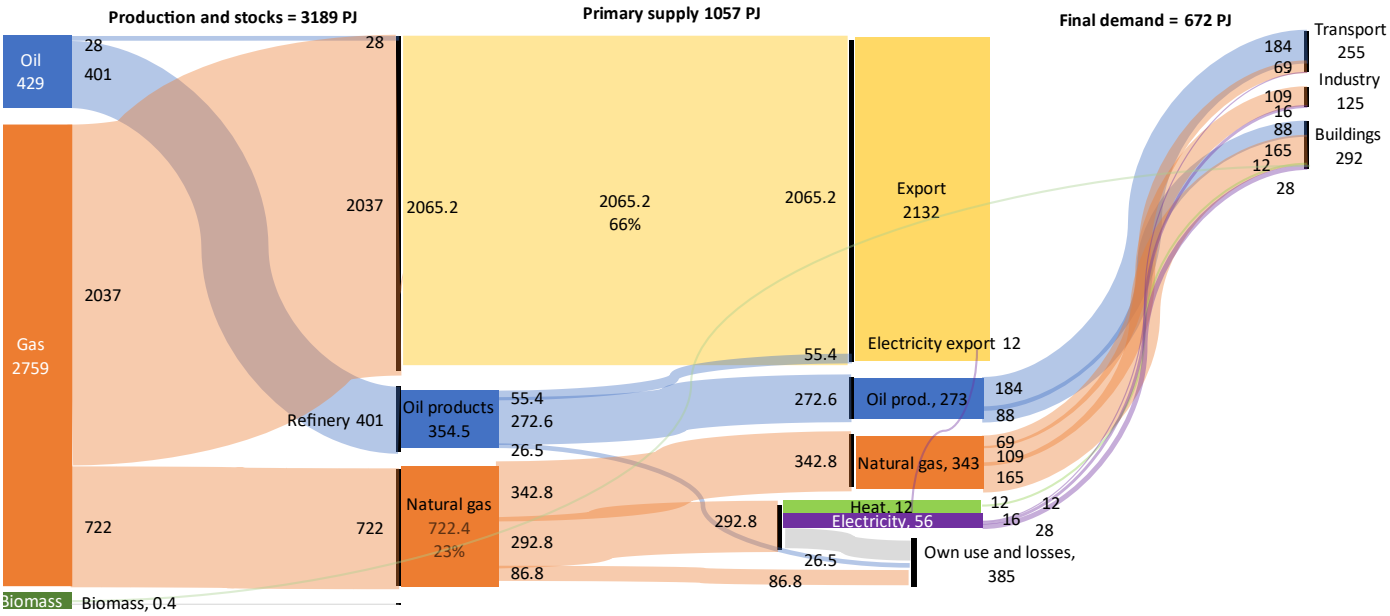
7 The section Azerbaijian-Turkey (South Caucasus pipeline, SCP) began operations in 2020; the Trans-Anatolian pipeline (TANAP) in 2018, and the Transadriatic pipeline (TAP; Turkey-Italy) in 2020. Gas data from bp-stats-review-2022-all-data.xls

8 www.worldometers.info/oil/turkmenistan-oil/#oil-production, based on BP (bp-stats-review-2022-all-data.xls) and US EIA statistics.

9 www.worlddata.info/asia/turkmenistan/energy-consumption.php; and h/ourworldindata.org/grapher/electricity-oil?tab=chart&country=TKM

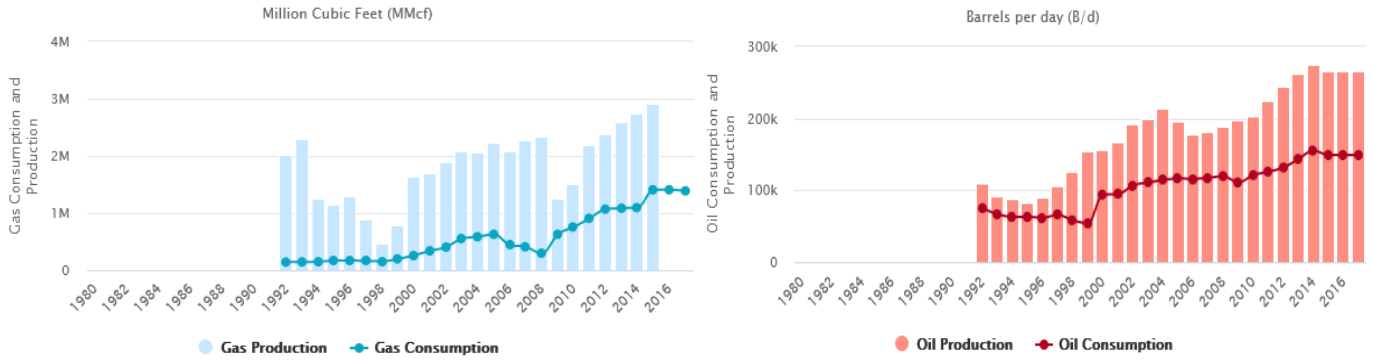
Box 1 Natural gas and oil production and consumption, Turkmenistan

a) Energy production, export and final consumption (2020)



Source: based on data compiled from IEA statistics, BP statistics (websites) and *The value of fast transitioning to a fully sustainable energy system: The case of Turkmenistan,* by Satymov et.al. DOI 10.1109/access .2021.3050817, IEEE.

b) Natural gas and oil production and consumption



Source: worldindata.org

Climate

Greenhouse gas (GHG) emissions from energy were 54.3 million tons of CO_2 ($MtCO_2$) in 2010, 70.9 $MtCO_2$ in 2016 and 94.3 $MtCO_2$ in 2021[10]. The National Strategy on Climate Change the Government of Turkmenistan identifies the housing sector (along with other high GHG emitting sectors) as one of the priority areas for reducing GHG emissions that will help to achieve its commitments within the Paris Agreement.

[10] Source: BP statistics. The Third National Communication (20160 gives a figure of 66.3 $MtCO_2$, of which 85% (56.3 $MtCO_2$) from the energy sector in 2010. Within energy, fugitive emissions (from upstream oil and gas activities) accounted for 36%, buildings (mainly from electricity energy and heating in residential and municipal buildings) 29%, power generation 22% and transport 13%

2.2 Baseline situation

Buildings in the residential sector

Severe climate conditions in Turkmenistan make effective heating and cooling in buildings essential to the well-being of the country's inhabitants. Temperatures range from an average of -6°C in north-eastern Turkmenistan in January to maximum temperatures of 48-50°C in the Central and Southeast Karakum in the summer (see Box 23 in Annex F) or info on average temperatures). For this reason, cooling issues in the housing stock are as important as heating issues.

One- and two-story low-rise cottages (private homes) form about 33% of building stock; often row houses that use some traditional design knowledge about maintaining a comfortable indoor climate. Low-rise cottages often use electric heating and electric air conditioners; although some of these homes, particularly in Ashgabat, receive heat from district heating systems. These buildings have largely been constructed at the initiative of the occupants, and for the very small market segment of residential villas, local companies handle design and construction.

Multi-story buildings provided two-thirds of buildings stock, with 21% three-storey, 36% four-storey, 7.5% five-six storey and the remaining 2.5%, 9-12 storey buildings ([11]. Many multi-story apartment buildings were built between 1960 and 1991 in "micro-districts," which are often owned by municipalities. Construction techniques include low-rise brick and ceramic construction with a plaster façade and no roof or external wall insulation, but they also include high-rise panel construction or reinforced concrete buildings (often based on design templates from other then-Soviet republics). Many of these apartments are heated with district heating (often supplemented by electric heaters where heat delivery is unreliable) and cooled with electric air conditioning units. This group of buildings represent a large potential for future refurbishment and reconstruction.

Urban population growth has triggered a construction boom, the construction of many major residential building projects and the expansion of associated public buildings and related infrastructure. Contemporary, multi-unit, high-rise apartment buildings have been built in the past two decades. These buildings have a reinforced concrete structure and use mineral wool insulation and a marble façade to reduce heat loss. They rely largely on free-standing, building-level, or multi-building gas boilers for heat and hot water, and building-level or multi-building chillers for cooling. The buildings are often constructed by government entities and then apartments are sold individually to prospective dwellers.

Energy demand forecasts

The report *CAREC Energy Outlook 2030* (ADB, 2020) forecasts total final energy demand to increase from the current 16 million tons of oil equivalent (Mtoe)[12] to between 27.8 Mtoe and 30.1 Mtoe by 2030 (depending on the level of energy efficiency improvements adopted). Natural gas will remain Turkmenistan's main source of primary energy supply and continue to dominate the power generation mix.

In the CAREC scenarios, the roll-out of solar plants and wind energy may provide between 2-3% and 1-2% in the power generation mix by 2030. Turkmenistan has tremendous potential for harnessing solar energy. With more than 300 sunny days annually and with an average annual intensity of solar radiation ranging between 700–800 watts per square meter (W/m_2), the total technical potential of solar energy amounts to 655 GW. the country has not yet developed any large-scale solar photovoltaic (PV) projects. However, companies specializing in off-grid systems have entered the market, and some remote regions are using solar installations as a substitute for diesel generators. The development of solar PV (and solar thermal) represents a significant technology transfer opportunity. Because the introduction of solar energy would mitigate the country's reliance on natural gas-powered generation, it would also have a large impact on decarbonization efforts[13].

[11] Estimates made by EERB project (implemented during 2012-2018)

[12] Equivalent to 672 PJ, see Box 1

[13] The technical potential of wind power in Turkmenistan is estimated at 10 GW of capacity. This potential remains unexploited as the country has no large-scale wind power projects to date. Source*: CAREC Energy Outlook 2030*. CAREC: Central Asian Regional Energy Corporation Programme

Energy efficiency

Turkmenistan has considerable potential for energy savings through the implementation of energy efficiency measures on the consumption side. Based on existing inefficiencies and baseline consumption figures, the residential and services sectors were identified as a high priority. As shown in Box 1, the residential and services sectors (using energy to heat and cool buildings and for appliances) accounted for around 43% of the total final energy consumption in Turkmenistan (in 2020).

During 2011-20, UNDP with several Turkmen national partners, led by the state utility Turkmengaz, implemented the project "Improving Energy Efficiency in the Residential Buildings Sector of Turkmenistan (EERB)", seeking to achieve the transformation of the buildings sector towards a more rational use of energy (and correspondingly curtailing greenhouse gas emissions). EERB focused on the renovation of the existing building stock and improve the design of more energy-efficient new buildings. Modernization efforts included the revision of building codes, improved designs (reduced energy loss in basic construction elements, such as roofs, cellars, and walls) and better practices (such as using automatic temperature regulators). By training professionals and demonstrating best practices (in a number of pilot buildings, the EERB Project has helped to improve energy efficiency in the residential buildings sector in Turkmenistan (see also Box 4 and Box 5 as well as a summary of achievements in Box 20 in Annex F). Through updating the regulatory framework, the project introduced revised building codes (SNT, from the Russian-language abbreviation[14]), namely a) SNT "Residential Buildings", SNT "Roofs and Roofing", SNT "Building Climatology" and SNT "Building Thermal Engineering". These were introduced during 2016-2017 and approved in 2020.

However, the Ministry of Construction and Architecture has not approved yet the corresponding "Instruction on the composition and procedures of project documentation for the construction of buildings". Also, the regulations on the rules and procedures for energy audits of residential buildings in Turkmenistan are still under consideration. These limitations shed doubt on how effectively the new energy-related building codes are implemented. The EERB's final evaluation report[15] hints at the replication of EERB's pilot and demonstration activities by means of a larger programme financed by climate financing (such as Green Climate Fund, GCF) or other sources but such a programme has not materialized. One lesson learned by EERB was that for any energy efficiency project to be successful, it has to reach beyond space heating (and heat losses through the building envelope) to address the efficiency of the cooling, lighting and other appliance as well as hot water provision because of their significant roles in residential energy consumption. In 2018, the Government's partnership with UNDP-GEF was expanded by a broader range of issues of sustainable urban development focusing on the related urban infrastructure (such as city public and private transport efficiencies, street lighting energy efficiency, electric grid efficiency and some hotel sector efficiency).

The Ministry of Construction and Architecture is implementing the *Programme of Socio-Economic Development of Turkmenistan for the 2019-2025 period.* This Programme outlines key strategic areas for sustainable development of the country in indicated period by investing among others in the construction of modern urban and rural developments with improved liveable conditions for residents and environmental considerations. The action plan of the Programme also envisages relevant measures to improve policy and regulatory framework to enable successful implementation of the strategic objectives of the programme[16]. Government investment programmes (such as under Decree 116) form a major source of TEESB's co-financing, as the programme goals align fully with the proposed project in the area of building modern, energy-efficient and smart buildings as well as drafting legislation and capacity-building.

Error! Reference source not found. summarizes relevant other UNDP energy-related programmes in Turkmenistan. Other development partners, such as Asian Development Bank (ADB) and European Bank for Reconstruction and Development (EBRD) support or have supported several energy projects. As significant CO_2 emissions reductions can be achieved by reducing energy losses in the electricity and gas networks and by tackling the venting of methane in fossil fuel production,

[14] Building code of Turkmenistan (Строительные Нормы Туркменистана – in Russian)

[15] *Terminal Evaluation* report (P. Janelidze, 2017)

[16] Further to that programme, the President issued Decree No.1160 (March, 2019) decreed the construction of the new Ahal city agglomeration which should feature modern technologies with smart houses, smart buildings and other modern efficient management tools to showcase the achievements of Turkmenistan in line with the global technological developments.

these projects have focussed on supply-side (natural gas, renewable energy) rather than demand-side efficiency (such as building efficiency and energy use).

Box 2 Energy-related UNDP programmes and projects in Turkmenistan

National implementing organization	Title, period of implementation and brief description of the project
Ministry of Environment Protection	**Sustainable Cities in Turkmenistan: Integrated Green Urban Development in Ashgabat and Avaza (GEF Project ID # 9279; UNDP PIMS # 5452) (2018-2024)** The Sustainable Cities project is aimed to promote and implement integrated low-carbon urban systems in Ashgabat and Avaza, thereby reducing GHG emissions and creating other environmental, social, and economic development benefits. Among its outputs relevant to climate change mitigation are the following: a) reduction of waste volumes and increase in the uptake of recycling in Ashgabat, b) reduction of GHG emissions of tourism facilities and infrastructure in Avaza (in hotels), c) reduction of water use and waste volumes in hotels in Avaza, d) improved managerial and technical capacity of planners, officials, and facility managers in Awaza enhanced via training, e) development of policies of integrated and scaled-up green urban practices (such as sustainable transport strategies, energy efficiency and renewable energy laws). The Sustainable Cities project reached its mid-term point in August of 2021. It was instrumental in the formulation of the following laws: - National Strategy of Turkmenistan on Development the Renewable Energy till 2030 (approved by the Decree of the President of Turkmenistan on December 4, 2020) - Law of Turkmenistan "On Renewable Energy Sources (adopted by the Parliament on March 13, 2021) - Draft Law of Turkmenistan "on Energy Efficiency" (under the discussion in the Parliament); - National Strategy of Turkmenistan on Waste Management (a draft has been developed); - A number of draft by-laws on energy efficiency, renewable energy, waste management, air pollution control framework Renewable Energy Law.
State Committee for Water Management of Turkmenistan (SCWM)	**Energy Efficiency and Renewable Energy for Sustainable Water Management in Turkmenistan (GEF Project ID # 5536; UNDP PIMS # 5452) (2015-2022)** The aim of the project was – in line with top country priorities - to reduce water losses and thus water demand in agriculture and water supply industries by the introduction of more efficient technologies and practices, including sustainable land management (SLM) and integrated water resources management (IWRM) planning, and by increasing energy efficiency, thus addressing both climate change adaptation and mitigation. Energy-relevant outputs concerned the energy efficiency of water pumps (mostly diesel) and the introduction of PV-powered water pumping.

2.3 Relevance to national priorities

Institutional setup

The Minister of the Ministry of Environmental Protection (MEP) is the GEF political focal point, while the Head of Department of International Relations and Planning of MEP is the GEF operational and UNFCCC focal point. The state remains a dominant player in the electricity market, in which generation, distribution, and transmission services are controlled by the utility Turkmenenergo. Natural gas markets are dominated by Turkmengaz, which acts as the country's primary developer, supplier, and seller of natural gas. Key institutions often play multiple roles in the housing and energy sector. Several key agencies influence residential construction and energy policy, and at the same time design and manage housing for their employees. The Ministry of Construction and Architecture oversees construction targets, handles building codes and enforcement (through Glavgosexpertiz), but it also commissions, designs, and manages its own housing stock. Turkmengaz also commissions, builds, and manages housing for its employees through several subsidiaries, while its subsidiary Nebitgazkhyzmat is in charge of providing energy to new buildings that are constructed; another subsidiary, Neftegazstroy, serves as a contractor to Turkmengaz and is responsible for constructing employee housing and office buildings.

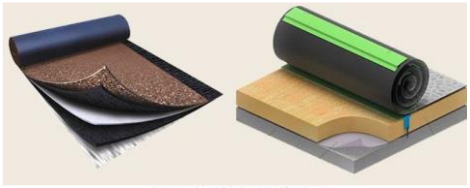
Box 3 Policies and strategies related to energy and electricity

Policy/planning document	Relevance
National Strategy of Socio-Economic Development of Turkmenistan to the year 2030	The National Strategy sets targets for bigger average living space by increasing investment in residential construction (in many cases moving families from single-family dwellings into multi-unit apartment buildings
Law on Electricity	The Law provides an overarching framework for the regulation of the country's electricity generation, appointing the Cabinet of Ministers and the Ministry of Energy as the electricity sector's two main regulators. Moreover, financial incentives for energy efficiency projects are introduced, and accelerating the deployment of renewable energy has been set as an objective
Law on Licensing (2019) Law on Subsoil and the Law on Hydrocarbon Resources (2020)	The Law determines the process for obtaining licenses across all sectors of the economy, including in the energy sector. The power and fossil fuel sectors are dominated by the state-owned utilities Turkmenenergy, Turkmengas and Turkmenoil.
Law on Public-Private Partnerships (2021)	The Law on Public–Private Partnership regulates the process of preparing and implementing public-private partnership projects. Turkmenistan has two separate laws on investment, both of which establish the main rights and duties of investors (Law on Investment Activities in Turkmenistan (1992) and the Law on Foreign Investments (2008)
National Climate Change Strategy of Turkmenistan	The Strategy (adopted in June 2012 and edited in 2019) considers energy efficiency and savings and the increased use of alternative energy sources as the main priorities of the policy, oriented towards the reduction of GHG emissions. According to the Strategy, priorities for developing the housing and municipal services sector include a) improving the performance efficiency of municipal heating supply systems, b) improving the regulatory framework for construction standards and rules towards ensuring energy efficiency and heating supply security of buildings, and c) promoting public awareness raising and motivation activities
National Strategy on Development of Renewable Energy for the period up to 2030 Law on Renewable Energy (2021)	The National Strategy on Renewable Energy was issued in 2021. The Government will develop several legal-regulatory documents that complement and enable the implementation of the Strategy. UNDP jointly with the Ministry of Energy, and the State Energy Institute of Turkmenistan has worked on the development of the new Laws of Turkmenistan "On Renewable Energy Sources" (adopted by the Parliament of Turkmenistan on March 13, 2021) and "On Energy Efficiency and Energy Saving" (under consideration of the Parliament of Turkmenistan). The Law on Renewable Energy (2021) determines legal, organizational, economic and social bases of activities in the field of renewable energy resources and governs the arising relations connected with the use of renewable energy resources. The Law's stipulations include major incentives for renewable energy projects (including easier land leases, and guaranteed purchase of electricity generated from renewable sources).

Turkmenistan's Third National Communication to UNFCCC (2016) stresses that "Implementation of a large-scale urban development program will be continued in the construction sphere. Modern villages will be built in all regions of the country; populated areas will be equipped with modern conveniences and become green; social and cultural objects will be built, as well as major infrastructure facilities of fuel and energy and transport sectors, and others (pg. 89). The importance of energy efficiency is stressed:

- "Throughout the whole period under review, increase in production of high quality, competitive products will be based on introduction of modern energy-saving and environmentally friendly technologies. In this regard, special attention will be paid by the state to energy conservation policy……The introduction of energy-saving, high technology reduces specific energy consumption, increases labour productivity, and provides price and non-price competitiveness of goods and services. For integration into this policy of energy saving incentive mechanisms there will be required a phased reform of the growth in selling prices and energy tariffs"
- Page 94: "Construction of energy efficient buildings using energy efficient materials and technologies, improving of thermal insulation and sealing of buildings, using modern materials and constructions of walls, roofs, doors and windows, as well as high-efficiency heating, ventilation, air conditioning and water heating systems; Installation of electricity, heat, gas and water meters and organization of systematic monitoring, inspection of buildings for heat leak by thermal imagers, and others"

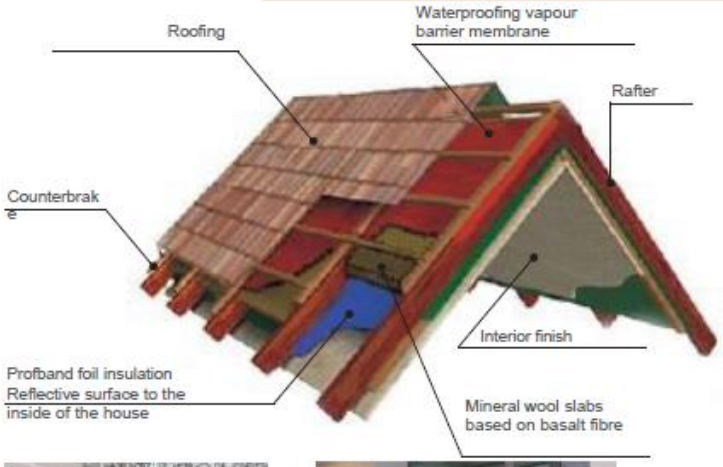
Box 4 Energy-efficient building construction and design



The revision of the building codes of Turkmenistan Norms for Construction (TNC) on "Roofs and Roofing", TNC "Residential Buildings", TNC "Building Heat Engineering" and SNT "Building Climatology". These provide rules and guidelines for the rules design, construction and operation of buildings and structures.

Roofs and roofing

The roof of a building or the roof is the upper structure of the building, which serves as protection against precipitation, rain and melt water. Another main function of the roof is thermal insulation (preservation of heat and protection against overheating). Energy consumption can be reduced by improved thermal insulation of roofs and roofs, and consequently reduced heat losses of the building in winter and heat gains in summer (see picture on the rights, above)

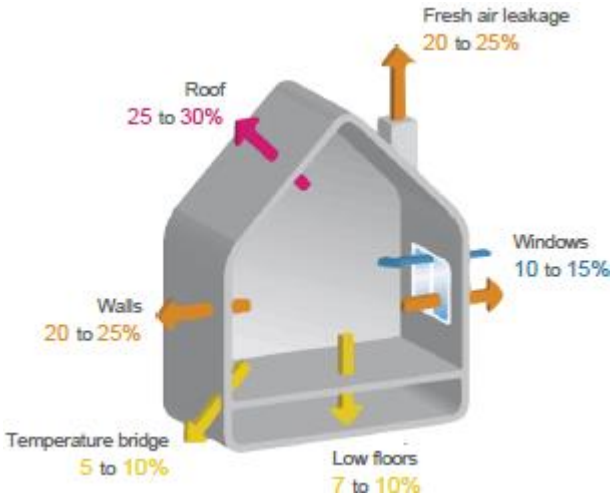


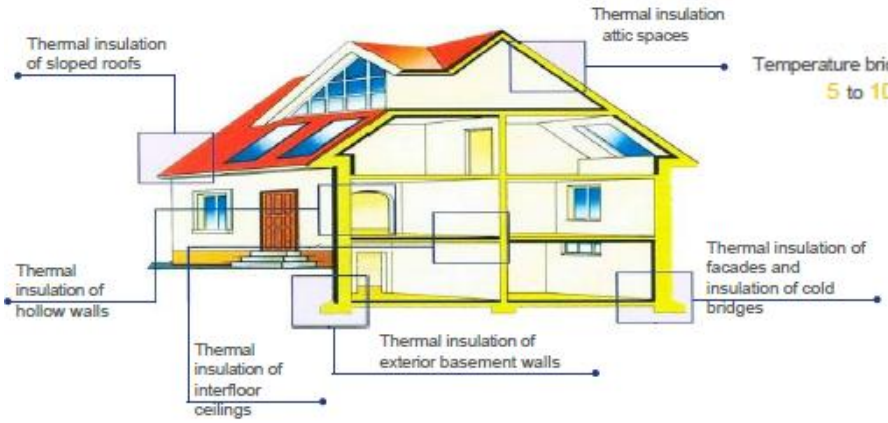
Vestibules in multi-storey buildings

The building code requires the provision of vestibules at all exterior entrances to residential buildings and underground garages (see figure on the right below). It is estimated that this can save up to 4% of energy for heating and cooling. The norms also recommend the use of energy-efficient lighting fixtures with compact fluorescent or LED lamps of 9-11 W in combination with motion sensors for the lighting of stairwells of elevator halls and floor corridors.

Building external envelopes

A building has an external envelope that demarks the volume of the building, while individual rooms or apartments are enclosed by internal envelopes. Examples of exterior envelopes are exterior walls, windows, exterior doors, and roof coverings. Internal building envelopes (load-bearing or non-bearing) separate building volumes with different air temperatures or noise levels. Examples of internal building envelopes are walls and partitions, floors, basement, and attic ceilings. In winter the heat loss in the residential building occurs through the building envelope and through the ventilation system. The same elements are used for heat input to the building in





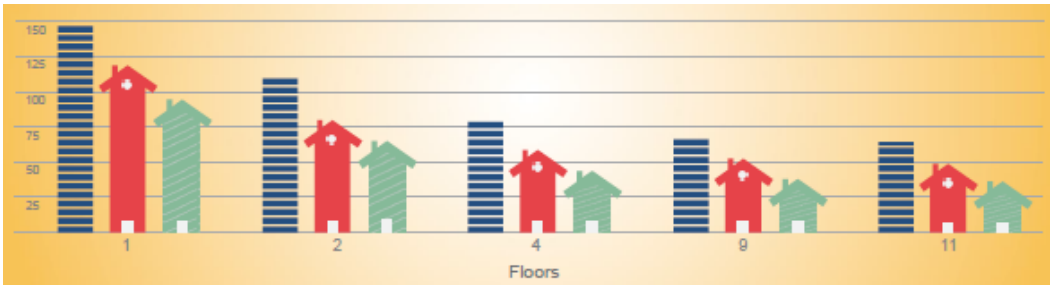
All heat losses (see figure above) and heat gains are compensated by additional energy consumption for heating and ventilation in winter or cooling and ventilation in summer. The more insulated the building envelope is (see figure on the left), the better it protects the interior of the building from the weather.

Source: Revised Building Codes of Turkmenistan “Roofs and Roofing", "Residential Buildings", Construction Climatology", "Construction Thermotechnics", "Construction Thermotechnics” UNDP/GEF EERB project

Box 5 Energy consumption savings in energy-efficient buildings

The norm on 'building heat engineering' foresees the element-by-element of a number of requirements, regarding reduced heat transfer resistance, specific thermal protection characteristics, .air permeability, specific annual energy consumption for heating, cooling and ventilation, protection against moisture, heat absorption of flooring surface and other requirements. The figure on the right shows the impact of the implementation of the norm on buildings on the thermal resistance of the envelop structures.

The amount of heat energy saved (for heating and ventilation) significantly depends on the presence of automatic control in the building heating system. This all translates into norms for specific energy consumption (in kWh per surface area) according to the size of a multi-storey building, as shown in the figure on the left.



It has been estimated that the application of the Turkmenistan Norms for Construction can lead to substantial energy savings in a building in comparison with buildings that do not comply:

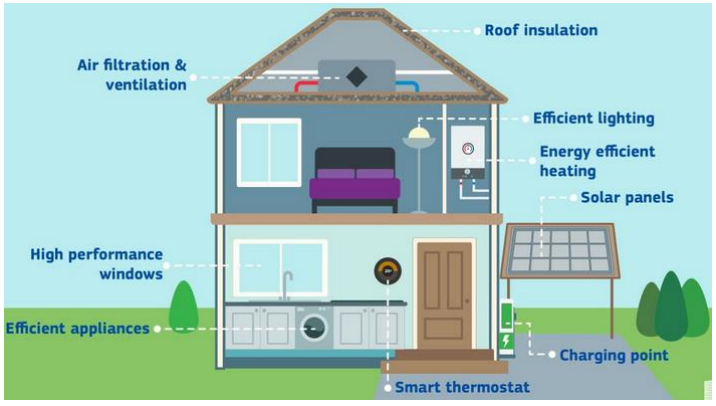
- Heat energy for heating and ventilation in residential buildings of social standard with automatic regulation of the heating system 42-47%, without regulation 26-28% (thus the effect of AHC is about 16-20%);
- Electric energy for cooling and ventilation by residential buildings 14-17%

The EERB project carried out monitoring of three renovated buildings (5-9 floors with 40-45 units with savings after reconstruction of 31.1-32.0% in heat and 55.7-64.9% in electricity and 71.7-81.5% in natural gas. Similarly, the new buildings (9-12 floors with 54-112 units) with heat savings of 28.8-31.5 and electricity savings of 50.2-64.7%.

Nearly-zero emissions buildings (NZEB)

Nearly zero-emission building (NZEB) means a building that has a very high energy performance, while the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby, such as solar photovoltaic, solar water heaters or geothermal energy.

Given the Paris Agreement's push to move towards a net-zero carbon emissions world by 2050, it is essential that Turkmenistan adopts an enforceable NZEB standards for all new buildings. This means the building codes need to be further revised to achieve reductions of at least 50% relative to the standards currently in place while employing on-site renewable energy as well as the installation of an Energy Management Information System (EMIS) in large (public) buildings) that have high energy consumption rates. For example, the European Union Energy Performance of Buildings Directive (EPBD) introduced the NZEB standard as a mandatory requirement for all new buildings in EU countries starting from January 2021 (while for all new public buildings that standard came into force earlier).



Source: Infographic "Improving energy efficiency in the residential building sector of Turkmenistan, EERB project; Revised Building Codes of Turkmenistan "Roofs and Roofing", "Residential Buildings", Construction Climatology", "Construction Thermotechnics", "Construction Thermotechnics" UNDP/GEF EERB project. EU: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/nearly-zero-energy-buildings_en#zero-emission-buildings

2.4 Barriers to energy efficiency and gaps in sustainable building construction

Development problems and solution:

The market for residential buildings has been growing rapidly at about 40% every 6-7 years and this trend will continue. Whereas in the year 2000, the living space per person in Turkmenistan averaged only 7.8 m^2, in 2007 it was 19.9 m^2, in 2020 the figure exceeded 21.1 m^2 and still increasing in new, more luxurious, apartment buildings (see Annex F). The energy consumption in the residential and service sector is likely to more than double by 2030 with a corresponding increase in greenhouse gas emissions.[17]

The long-term solution for a sustainable reduction of GHGs from the buildings sector is to reduce and potentially stop the construction of any new residential and public buildings with significant GHG footprints[18]. Multiple types of savings and economies of scale can be obtained when modern building technologies are utilized in the design and construction to reduce energy losses (see Box 5 and discussion in Annex F). The greenhouse gas emitted from the remaining energy consumption in the building for heating, cooling and ventilation) can be compensated for by using renewable energy, e.g., solar photovoltaics (PV) and solar water heating (SWH) to get a 'near-zero emissions' building (NZEB, see Box 6; for NZEB approaches in the European Union, see Box 7).

The EERB project can be regarded as a first step in the right direction by the first demonstration of energy-efficiency options in building construction and design, formulation of energy-relevant building codes and associated capacity building. Several other UNDP-supported projects deal with sustainable energy and green development (listed in **Error! Reference source not found.**), but none of these however deal with improved legislation governing construction standards. Therefore, no impact is expected in the baseline in terms of improving the climate resilience of the building sector.

Box 6 Definitions of net zero and nearly zero

There are no official definitions, but some common terms are:

- *Net-zero carbon buildings* reduce energy demand as close to zero as possible, with all remaining energy needs satisfied by renewable energy sources, focusing on operational emissions.
- *Net-zero whole-life carbon buildings* minimise on-site embodied carbon and compensate for all residual emissions in the supply chain in addition to the measures targeted by net zero carbon buildings.
- *Nearly-zero carbon building*s are where on-site actions to reduce energy demand and install on-site renewable energy systems have been maximised, but other factors – such as limits to city powers over the electricity grid – mean insufficient offsite renewable energy is available to meet 100% of a building's needs. This typically excludes embodied carbon.
- *Net-zero energy buildings* produce as much renewable energy on-site as the building consumes on an annual basis and are usually highly energy efficient. Unlike net zero carbon buildings, these buildings have not necessarily switched from fossil fuels to electrified equipment and appliances, and this approach typically excludes embodied carbon.
- *Nearly-zero energy buildings* have a very high energy performance, while the low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

Barriers and gaps to the design and construction of high-efficiency buildings (in the residential and services sector)

To achieve a wider replication of the results of the EESB project and move towards NZE construction, several important barriers and gaps remain:

[17] *CAREC Energy Outlook 2030* (ADB, 2021). Final energy demand in residential and service sector will increase from the current 7.5 Mtoe (2020) to about 18.2-20.0 Mtoe by 2030.

[18] Apart from energy consumption for heating, cooling and ventilation, about a quarter of total electricity consumption in the residential and services sector is for major household and electric appliances (including electrical bulbs, air conditioners, washing machines, office equipment) Although regarding electric appliances there is also a significant need for energy efficiency improvements, these are not included as subject of TEESB which focusses on energy losses through the building fabric.

1. Low energy prices and electricity tariffs resulting in excessive payback periods

A long period of provision of free electricity and natural gas for a large share of the population (and low tariffs for those who pay) has led to low awareness of efficiency in energy (and water use). From 1993 to 2017-2019, citizens even received government-provided electricity, water and natural gas almost free of charge. The idea was that by providing subsidized utility services, the population would enjoy a high standard of living. Recently, the government has started implementing gradual tariff reforms to transition and adopt market measures in the management of the national economy and gradually phasing out subsidies for natural gas, electricity, water and table salt to citizens. The Decree prescribing the abolition of the free supply of electricity, gas, potable water, and table salt to citizens was signed in January 2019. However, there is no clear action plan with specific regulations to achieve the full transition to a zero-subsidy regime for fossil fuels.

Thus, there remains the obvious disincentive for end-users to make efforts to reduce energy consumption, due to the very low tariff for heat and electricity in Turkmenistan. In the longer run, there is a clear incentive for the government itself to reduce end-use consumption of natural gas: exports of natural gas provide valuable revenues to the state budget, while internal consumption is financed mostly by the government. Therefore, any natural gas saved through energy efficiency can be exported; the financial gain for the government is the difference between international market prices and having no or having negative revenue (counting the cost of fuel subvention).

2. Energy-relevant building codes are not in line with nearly-zero requirements

Given the Paris Agreement's push to move towards a net-zero carbon emissions world by 2050, Turkmenistan must also move towards enforceable NZEB standards for all new construction. The latest set of energy-efficiency building codes (approved in 2020 and formulated with support from the EERB project; see Box 20) is already in need of being updated for new buildings if the aim is 'nearly-zero energy'. This means that the 2020 building codes need to be further revised to achieve further energy demand reductions of about 50% relative to the energy performance implicated in the standards currently in place (by making the building envelope energy-efficient) to meet the residual demand by using renewable energy sources (such as rooftop solar panels and solar water heaters) as much as possible.

Over the past two decades, the Government of Turkmenistan has ratcheted up residential construction. Significant funds are allocated to flagship projects, such as the construction of Arkadag (in Ahal *velayat*) and the Ashgabat City megaproject, situated north of the capital (see **Error! Reference source not found.** and **Error! Reference source not found.**). In such interventions, the keen to show its achievements by building its infrastructure according to the latest technology requirements. However, for the majority of non-high-profile residential and public buildings, the energy performance situation will be quite different.

3. Lack of institutional capacity for the update, verification and enforcement of energy-efficiency building codes

Most contemporary, multi-unit, high-rise apartment buildings have been built in the past two decades, that is, based on 1998 building codes (and older buildings according to Soviet-era norms and practices). The latest energy-relevant construction norms were updated with support of the UNDP/GEF EERB project and introduced in 2020 (SNT "Residential Buildings", SNT "Roofs and Roofing", SNT "Building Climatology" and SNT "Building Thermal Engineering; see Annex F). However, the Ministry of Construction and Architecture has not approved yet the corresponding "Instruction on the composition and procedures of project documentation for the construction of buildings". However, the regulations on the rules and procedures for energy audits of residential buildings in Turkmenistan are still under consideration. Thus, while the implementation of TNC standards was enforced through a design review and site checks, no actual auditing is required to determine the energy performance of buildings. These limitations shed doubt on how effectively the new energy-related building codes are implemented.

While current regulation calls for building codes to be updated every five years or so, what is lacking is clear legislation (with an action for its implementation) for minimum energy performance codes in particular and for promoting rational use of energy in buildings in general and necessary institutional setup for monitoring, verification and enforcement (MVE). Such plans have been proposed in the past, but in practice face a difficult path to approval by the Cabinet of Ministers of Turkmenistan, in particular when budget commitments are implicated.

While the various government agencies (at the national and local level) have the financial resources to invest in highly energy-efficient, expensive, buildings, they often lack the specific expertise and knowledge to effectively pursue the idea of taking into account high-efficiency or integrating renewable energy in building design and construction. Many staff of the Ministry of Construction and Architecture (and other government entities) have been trained to implement obsolete construction standards before the latest set of norms and standards (promoted in the before-mentioned EESB project) were approved in 2020. These standards did take account of the energy efficiency requirements (in terms of the maximum specific heat consumption per m^2 per degree-day) but they did not consider the energy performance of buildings per se and thus there were no incentives to construct buildings that would exceed those performance requirements. The Government is constrained in its technical capacity to design legislation to enact implementation, verification and enforcement systems to implement the current building codes and to update according to the latest international development, such as norms for nearly-zero buildings.

4. *NZE technologies and measures have not been demonstrated in Turkmenistan, while related knowledge and technical skills need to be improved*

Currently, no building is constructed having NZEB standards in mind and applications of renewable energy (e.g., solar PV or solar thermal) are normally not integrated with building designs. Architects, engineers, and policy-makers have insufficient knowledge and capacities to identify techniques that correspond with requirements on low-carbon or net-zero carbon goals (NZEB). As a result, an innovative market for these types of buildings will not develop with local architects and engineers not up to date in skills and knowledge.

5. *Regulatory and investment barriers to sustainable energy investment*

The primary barriers to doing business in Turkmenistan are the lack of policies and information. Additionally, power plants are ageing, but there is no official power sector modernization plan in place. In 2022, the Ministry of Energy announced a tender for materials for solar panels; in the next few years, more tenders or installation auctions are likely to be held for utility-scale power generation. Renewable energy generation in small and medium-sized installations in remote and sparsely populated areas is planned for the short term. Additional action is required to improve Turkmenistan's appeal to investors, including the establishment of a clear power tariff structure (and higher transparency in the tariff-setting process), shortening the lengthy administrative processes, and opening the electricity generation market. The establishment of special incentive schemes for renewable energy projects, such as feed-in tariffs or a capacity auction on a least-cost basis, would potentially lead to a higher investment inflow. Similarly, the introduction of net metering would help the dissemination of rooftop PV on buildings.

However, in practice, there is little incentive for private or foreign companies to enter the country's energy sector, as it is opaque, and completely controlled by the state with no supportive policy framework in place[19], despite recently introduced legislation of investment and public-private partnerships that establish the rights and duties of investors.

In general, private sector participation in energy generation remains hindered by bureaucratic obstacles. For example, the process of registering a business requires a challenging set of formalities. The business climate suffers from the large role the state plays in the distribution of resources. Access to foreign exchange is highly restricted and private capital is to a large extent held in the parallel economy.

[19] Source: https://global-climatescope.org/markets/tm/

3. STRATEGY

3.1 TEESB's approach to lowering barriers NZEB

The **project objective** is "To support Turkmenistan's low carbon development in the achievement of climate mitigation goals by reducing GHG emissions from multi-family residential (and public) buildings". Thus, TEESB will contribute to the development of an energy-efficient construction sector in Turkmenistan that is environmentally sustainable and supports the country's low-carbon development and climate mitigation plans.

Piloting energy efficient technologies and EMIS in residential and public buildings

The project will demonstrate these NZEB options and technologies in public multi-family residential buildings which will provide capacity-building options to government organizations (see Component 3) and also will create the baseline for the desired standards and regulations to upgrade the current energy-relevant building codes for Turkmenistan (addressed in Component 2).

Location of pilot and demonstration activities

A significant role is attached to the development of the construction in large-scale government programs, with new residential, industrial and transport infrastructure in Ashgabat and regional centres, and new cities are constructed,

Box 7 NZEB requirements in the European Union

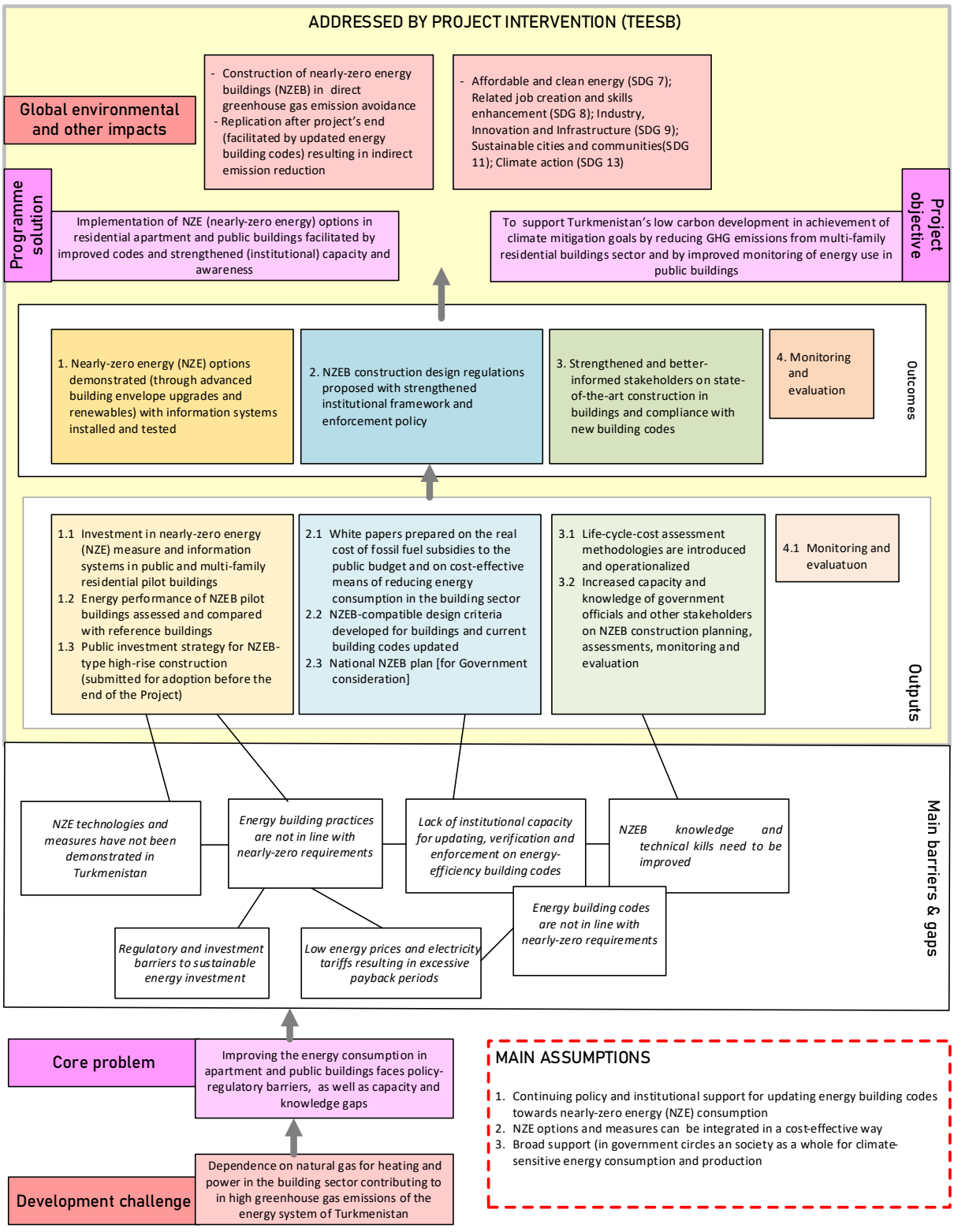
Since the beginning of 2021, all new buildings constructed within the EU must be nearly zero energy buildings (nZEBs), according to Article 9 of the EU Energy Performance of Buildings Directive 2010/31/EU (EPBD). The Directive further stipulates that all new buildings occupied and owned by public authorities constructed after 31 December 2018 must be nZEBs. Clause 3 of EPBD Article 9 requires Member States to define their nZEB requirements in their national plans, including a numerical indicator of primary energy use expressed in kWh/m2 per year. These may be varied for different building typologies within a country based on the climatic zone, heating system, building geometry and other factors. In addition to climatic variations within a country, the European Commission has considered EU-wide climatic zones. In its 2016 nZEB Recommendations, the European Commission published its benchmark thresholds for primary energy across the EU, differentiated according to four main climatic zones: Mediterranean, Oceanic, Continental, and Nordic.

	Net primary energy (kWh/m²/yr)	*Energy supplied from renewable energy (RE) (kWh/m2/yr)*	*Primary energy threshold (incl. RE) (kWh/m2/yr)*	*Mid-point share of RE in primary energy (kWh/m2/yr)*
Single-family house				
- Mediterranean	0-15	50	50-65	87%
- Oceanic	15-30	35	50-65	61%
- Continental	20-40	30	50-70	50%
- Nordic	40-65	35	65-90	32%
Offices				
- Mediterranean	20-30	60	80-90	71%
- Oceanic	40-55	45	85-100	49%
- Continental	40-55	45	85-100	49%
- Nordic	55-70	30	85-100	32%

A number of Member States do not specify kWh/m²/yr value ranges for energy performance for new buildings as part of their nZEB requirements (performance codes). Instead, they are based on minimum performance levels or achievable performance ranges calculated in comparison to reference buildings and considering building typology, U-values, geometry, climatic region, and a range of other factors (prescriptive codes).

Source: *Nearly Zero: A Review of EU Member State Implementation of New Build Requirements,* BPIE (2021)

Box 8 Theory of change: how TEESB's interventions address identified barriers and challenges



including Arkadag (the new city to the west of Ashgabat), the Ashgabat City project, settlements on the territory of the Turkmen Lake Altyn Asyr, and other projects. One example of new modern construction is Arkadag, the new urban development located on the foothills of the Kopetdag Mountains, (in Gökdepe district, about 8 km west of Ashgabat). In its first phase[20], 258 residential buildings (2-, 5-, 7- and 9-storey) have been constructed and about 64 administrative and public buildings (including kindergartens, schools and other specialized educational institutions, healthcare, cultural, commercial and service institutions, sports facilities, administrative buildings, as well as facilities related to transport, communications and engineering infrastructure. The first construction began in 2019 and the city is planned to be officially opened in 2023. The city complex is embarking on a second phase in which it will be expanded to 1002 ha. Once completed, a total of about 11,652 households will live in 368 residential buildings[21] (see Box 18 for location and city layout). Arkadag is intended to be Turkmenistan's first "smart city". The concept of a "smart" city is based on the integration of advanced information and communication technologies, through which a single ecosystem is created that ensures the management of urban structures and services[22]. Apartments in the residential structures in Arkadag will have a 'smart home system', that is built for the occupants' comfort as well as to ensure minimal damage and safety. Residents can use this system to check on the state of their apartments. The system will include the installation of electricity, water (cold and hot), and gas meters with the support of an automatic system for monitoring and managing energy resources with gas leak and water leak sensors.

An even more ambitious construction project is **Ashgabat City**, a large 'city-within-a-city' residential complex, north of the capital Ashgabat. It is planned to build 180 luxury high-rise buildings on the territory of the complex, namely, 12-35-storey buildings of eight types, in which 17 thousand 836 apartments will be located, designed for more than 107 thousand inhabitants. Similar to Arkadag, the new Ashgabat City will have administrative, social, cultural services, sports and other purposes, and educational, preschool and medical institutions (see Box 17), all built like the entire white marble style of the Ashgabat buildings, with green and park areas, and 'smart city' type of services.

The original TEESB project concept (PIF) proposed piloting NZEB-type energy efficiency and sustainable energy options in Arkadag. However, since most of the new province centre will have been constructed (or at least most of the buildings already designed) by the time TEESB officially starts, consideration is given to pioneering modern energy-efficiency buildings in urban developments in and around Ashgabat. The TEESB Project foresees the construction of a residential pilot NZEBs[23] building (with a total floor space area of about 7,020 m^2) and office building (at a total of about 3,600 m^2) with proposed energy efficiency and nearly-zero emission options, such as improved building fabric (with lower energy losses through walls, windows, basement and roofs), heat recovery in the ventilation systems, automated heat and temperature controls with gas, electricity and heat meters in each apartment, heat pumps for heating and cooling, as well as adding renewable energy options, such as solar photovoltaic and solar thermal installations. To monitor and evaluate the performance of the building, energy consumption measurements will be carried out in the two pilot buildings as well as in buildings without the NZEB options (but with similar sizes and construction characteristics).

Demonstrating state-of-the-art EE technologies and practices in (larger) public and multi-family residential buildings will provide capacity-building options to government organizations and also will create a new baseline for the desired standards and regulations for Turkmenistan. By the end of the project, it is assumed that the Ministry of Environmental Protection, the Ministry of Construction and Architecture together with the Ministry of Energy and Ashgabat City Municipality will initiate the replication of the innovative solutions according to an investment strategy of NZEB-type.

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20 With a budget of USD 1.5 billion, on an area covering about 800 hectares (later expanded to 1002 ha)

21 /www.newscentralasia.net/2022/12/26/second-stage-of-arkadag-city-project-presented/

22 Ther elements are transport management with an Intelligent Transport System (ITS) that implements innovative developments for managing vehicle flows, such as 'smart traffic light' system. Buildings will have "smart elevators", an automatic system has been introduced here to control the process of movement of a passenger elevator, taking into account many factors: speed of movement, safety, passenger convenience, waiting time, and others. Source : www.newscentralasia.net/2023/01/16/arkadag-city-more-details-about-the-smart-city/

23 As a reference building, an apartment building with 30 apartments on 4 floors.). The actual size of the building (floor space and volume) will depend on then actual design of the buildings.

Policy, regulations and institutional mechanism for energy efficient buildings sector

In order to assist the Government to rethink the fuel subsidization policy (which is adopted by presidential decrees), the Project will produce a White Paper on fossil fuel subsidization and power tariffs that will argue for the beneficial economic and political nature of a 10-year phase-out of fuel subsidies.

The Project will commission a study on cost-saving options in the existing and new housing stock, including a discussion of these options based on energy savings or substitution potential cost-effectiveness, payback period, and applicability in Turkmenistan. The assessment will form the basis for a white paper on the costs-benefits and impacts of NZEB technologies in Turkmenistan with recommendations for policy actions to bring older existing and new buildings towards a higher-efficiency pathway.

NZEBs are highly efficient buildings with extremely low energy demand, which is met by renewable energy sources. Such buildings produce as much energy as they consume, accounted for annually. To achieve their nearly zero energy goals, NZEBs first sharply reduce energy demand using energy-efficient technologies. This means the building codes need to be further revised to achieve reductions relative to the standards currently in place and then utilize renewable energy sources (RES) to meet the residual demand to approach carbon neutrality.

The European Union Commission as recently as December 2021 issued a proposal to revise the NZEB directive that will transition newbuilds in the EU from the current NZEB to zero-emission building (ZEB) by 2030, aligning the energy performance requirements for new buildings to the longer-term climate neutrality goal of the EU. According to the directive's proposal, a zero-emission building is defined as a building with very high energy performance, with a very low amount of energy (that might still be required) to be fully covered by energy from renewable sources and without on-site carbon emissions from fossil fuels.

The Project will assist the Government of Turkmenistan in justifying that such a standard is economically beneficial to the public budget. Based on the results of the pilots, analysis of the international experiences and NZEB options and the white papers on energy subvention and on the cost and benefits of NZEB options, the current energy-relevant building codes (for new buildings) will be updated towards NZEB achievements. The building codes (for newly constructed buildings) are expected to be proposed for government consideration in the last year of the TEESB project.

The Project will design a 'national action plan' for the introduction of the NZEB-type new building codes. The Project will also make recommendations for strengthening relevant existing (or creation of new) oversight bodies within the current ministerial setup that can revise and update building energy performance standards regularly in line with regional and international best practices. The description of the organizational structure of the MVE system will be elaborated and consider (a) governing structure, the entities involved and their respective roles and responsibilities; and (b) key institutions and entities responsible for administering and enforcing any included regulatory initiatives

Enhanced knowledge sharing and increased capacity

Turkmen authorities currently do not have knowledge of high-efficiency building standards leading to the following misconceptions that 1) incremental cost will be prohibitive and 2) that these will not pay back during the lifetime of the buildings. These misconceptions are exactly the area that the pilot buildings will aim to dispel. The project will demonstrate that the incremental costs are minuscule in net-present-value (NPV) terms over the lifetime of the buildings (even at the tariff inflation scenarios that the Government is currently entertaining), using accessible life-cycle-costing methodologies and case studies. Government staff (of the Ministry of and Environmental Protection, the Ministry of Construction and Architecture, and Ahal district and Ashgabat city administrations) will be trained to prepare economic assessments and feasibility analyses for several building types using these methodologies and to better understand and implement updated regulations for procurement of the relevant materials and equipment.

Similarly, the Project aims at improving the awareness of the business owners and leaders through training and info on techno-economic aspects and relevant legal and regulatory aspects for successful implementation of NZEB programs. Other activities will involve the development and introduction of curricula for students of architecture and construction engineering, including updating training materials on NZEB (materials, design, integration of renewable energy, passive solar

design, green buildings concepts and sustainable water use, etc.) and the packaging of training for the use in post-secondary academic curricula.

3.2 Alignment with GEF priorities

The program is aligned with Objective 1 of the GEF Climate Change Focal Area to "Promote innovation and technology transfer for sustainable energy breakthroughs", principally through CCM 1-3 "Promote innovation and technology transfer for sustainable energy breakthroughs for accelerating energy efficiency adoption". Given the fact that solar PV will address a NZEB's residual energy consumption (after introducing of energy rationalization features). TEESB has also links with CCM 1-1 "Promote innovation and technology transfer for sustainable energy breakthroughs for de-centralized renewable power with energy storage". Although submitted as part of GEF-7, TEESB can be aligned with the GEF-8 Sustainable Cities (Integrated programme) as well as with the CCM's "Pillar I: Promote innovation, technology development and transfer, and enabling policies for mitigation options with systemic impacts" (accelerate the efficient use of energy and materials).

4. RESULTS AND PARTNERSHIPS

4.1 Components and outputs

This Project will build on previous successful experience in implementing projects in cooperation with government agencies in the field of energy efficiency, small-scale renewable energy sources and reducing greenhouse gas emissions in Turkmenistan through a set of measures to stimulate investment in these sectors to achieve socio-economic and environmental results, contributing to building a green economy and achieving the Sustainable Development Goals (SDGs).

Component 1 Piloting energy efficient technologies and EMIS in residential and public buildings

Outcome	***Outputs***
1. Nearly-zero energy (NZE) options demonstrated (through advanced building envelope upgrades and renewables) with information systems installed and tested	1.1 Investment in nearly-zero energy (NZE) measure and information systems in public and multi-family residential pilot buildings 1.2 Energy performance of NZEB pilot buildings assessed and compared with reference buildings
	1.3 Public investment strategy for NZEB-type high-rise construction (submitted for adoption before the end of the Project)

Component overview

Component 1 of the project focuses on the demonstration of the costs involved and the energy efficiency gains to be achieved via the upgrade of the new buildings to a nearly zero-energy (NZE) standard to prove that such a standard is economically beneficial to the public budget during the lifetime of the measures and that the measures can be procured and installed locally. These NZEB pilots will serve as a real example of the proof of concept to raise enough government (and other) financing to scale up the construction of buildings based on NZEB concepts. The tested technologies will subsequently be proposed to be included as part of a new public investment program in the construction of NZEBs.

Apart from the construction cost of the building itself, project developers or owners will cover the additional cost of high-efficiency of the building fabric (supplemented with GEF incremental cost support). These can include (a) optimal insulation of the building envelope (roof, walls, basement), (b) energy-efficient windows, (c) use of efficient boilers and chillers, as well as (d) grey water recycling and re-use, (e) building automation (BAS), heat control (AHC) and other elements of energy information systems (EMIS), (f) heat recovery and adequate measures in ventilation, (g) replace natural gas (for hot water and space heating) by using solar thermal and ground source heat pumps, and (h) the latter, powered by solar PV. GEF incremental support may focus on improvements that are not an integral part of the building structure as such (e.g. thicker wall insulation), but technology that can be added, such as renewable energy (solar PV) or heat recovery in ventilation). However, the exact distribution of investment costs over GEF and co-financing will be decided in the detailed design and business plan of each pilot building, but with the understanding that the total GEF INV for the pilot buildings will not exceed USD 750,000.

As part of the technical assistance, GEF will support adding NZEB elements into the construction feasibility and detailed design studies that, apart from the above-mentioned technology options may include passive building elements, such as (1) optimal wall-to-window ratios in the building; (2) optimized use of daylight and adequate measures to utilize sunlight while maintaining indoor comfort; (3) and other measures (such as shading and improved siting) that consider the relationship between cooling needs and building performance.

The Ministry of Energy will lead the coordination of the implementation of Component 1 on a technical level with UNDP Country Office (CO) support in close collaboration with the Ministry of Construction and Architecture of Turkmenistan.

Output 1.1 Investment in nearly-zero energy (NZE) option in public and multi-family residential pilot buildings with EMIS installed and tested

In line with the 'smart city' idea of new developments in Turkmenistan (such as Arkadag and Ashgabat City) the buildings will come with automatic heat control (AHC) and building automation systems (BAS), while consumption of energy and water in apartments will be metered. In addition, the public buildings will have a more advanced energy information system (EMIS) with fault diagnostic and other IT tools added. Apart from optimizing energy consumption, these information systems will help vital real-time data on the actual energy consumption of the new buildings to enable comparisons with non-NZEBs. Thus, energy measurements and audits will be carried out in reference (non-NZE) residential buildings, two for each of the NZEB pilot (of which one in the same block heated by the same boiler system as the NZEB pilot building, and one in another boiler block) and two non-NZEB office building (that are similar in design and building characteristics).

The project will invest funds in the NZEB-type design and construction of two pilot buildings with a total footage[24] of 16,740 m^2 (of which 11,852 m^2 of occupied space with a) improved energy performance of the building envelope (e.g., high-efficiency and thicker insulation materials in walls, floors and basement, and triple-glazed windows), b) addition of renewable energy generation (via piloting installation solar PV roof-top panels and solar thermal added to the boiler system for pre-heating and hot water use), and c) other green features, such as grey water recycling and use. The approach involves early discussions between the builders, the architects, and heating and cooling engineers to ensure that energy systems can run at an optimal capacity while reflecting construction fabric energy savings (i.e. resulting in using modern heat pumps replacing boilers-chillers in conventional construction). For a description of the location of the pilot buildings, please refer to Annex B (Box 17 and Box 18), while details on NZEB energy-saving and substitution options are explained in Annex F.

At project inception, the sites for the NZEB pilots will be selected (in accordance with the progress in the realization of the Arkadag, Ashgabat city or other urban development projects). The technology demonstrations will represent major advancement (that is, beyond the requirements of current energy-relevant building codes) towards achieving NZEB compliance (showcasing the best available options in building energy efficiency and renewable energy), and ideally, should be introduced in the design of new buildings (rather than added afterwards to already detailed building construction and energy management designs).

Adding to the overall baseline architecture and design of the buildings, feasibility studies of the proposed NZEB interventions in the pre-selected pilot buildings will be carried out and finalized, including comprehensive technical and economic evaluations for the recommended NZEB options. The feasibility analyses will then be reviewed, subject to co-financing commitments by the envisaged partners (Ministry of Construction and Architecture, Ministry of Energy), and then finalized with the recommended NZEB options and final selection of the pilot buildings.

Thereafter, detailed engineering designs with technical specifications will be conducted with support from the Project (GEF TA) and the building developers/owners in which the best available NZEB options and technologies will be considered with technical and economic justifications. The agreed NZEB options will be incorporated into the overall building design and its heating and cooling system for which a business plan will be prepared (that indicates responsibilities of partners, financing and timeline with milestones). The plan will also indicate how (energy) technology providers will be selected transparently and competitively.

The next step is securing the necessary permits, apart from the construction itself, permits for using new construction materials and NZEB technologies (in particular, if these are new, such as putting PV on rooftops). This will be followed by the drafting of the technical specifications for the tender for the design, engineering, supply of materials and implementation of specific EE features in selected demonstration buildings, followed by the construction of the building. All NZEB options and technologies implemented in the pilot building will be done either by the construction company contracted by the Government for constructing the buildings (subject to UNDP procurement policies and standards) or through the UNDP competitive procurement/tendering processes. This will be determined during the first year of the project

[24] In the calculation of Annex F, it is assumed that the pilots consist of one residential complex, (based on building with 30 apartments and total storey with total of 8,100 m^2 floor space (of which 5,308 m^2 apartment space) and one public building with total of 8,640 m^2 floor space (of which 6,544 m^2 office space). However, other combinations may come out of the (pre-)selection after project's start, such as one office building with different heights and floor space and different combinations of floors and apartment space in residential buildings.

implementation based on renewed assessment of implementing partner's procurement capacities (PCAT) and UNDP's rules and regulations.

It should be noted that the GEF investment support (INV) funds for the two buildings will be incremental cost, that is for NZEB improvements (as outlined earlier and detailed in Annex F) in addition to the construction cost of the buildings (according to conventional designs and following current energy performance building codes, approved in 2020). An amount of USD 750,000 is available (plus USD 15,000 for installing measurement and monitoring equipment, see Output 1.2). The exact level of GEF-funded subsidy and its delivery mechanism will be determined during the first year of the project implementation based on technical and financial analyses of the NZEB design and architecture, performed by third-party experts, based on principles of additionality, minimum concessionally and incremental cost. Third-party experts will also independently verify that the total investment cost used for the building to which the GEF-funding will be applied reflects rational cost. The project will use direct payments, or performance-based-payments (PBP) or potentially other methods for the GEF incremental investment. The appropriate mechanism will be identified during the first year of the project based on feasibility studies, national legislation, and the Government procurement system as well as UNDP's rules and regulations.

Lessons learnt from the pilot buildings will be used to scale up the system in the Ashgabat City programme and elsewhere in Turkmenistan (see Output 1.2). Also, the piloting activities will create 'learning-by-doing' capacity-building opportunities for technical and Government staff that will be working on the system (see Outputs 2.2 and 2.3). The activity includes ongoing documentation of the design and renovation approach, including detailed plans and lessons learned. After the construction, the Project will introduce the NZEB technologies to the occupants of the new buildings as well as to facility managers of the office buildings.

Pilots and Social and Environmental Safeguards Planning (SESP)

The NZEB demonstration in pilot buildings funded by GEF INV is required to comply with all the relevant national standards of the country as well as UNDP standards on social and environmental safeguards, gender equity and stakeholder consultation. In support of this, specific guidance and inputs have been developed for the program on SES as well as a Gender Action Plan and Stakeholder Engagement Plan which will accompany this Project Document (see Annex I and Annex J).

The guidance outlined in the SESP will be incorporated and considered in developing the environmental and social impact assessments and management plans for pilot/demonstration projects. One way to ensure a gender balance is to thrive for at least a 25-35% participation of women, who should be involved at various levels of the pilots/demos (decision-making, administrative-financial, operational). A limited ESIA will also be carried out to ensure that issues (such as labour conditions and gender aspects) are planned for. A Code of Conduct will guide conduct in various contexts including governance, accountability, project design and demonstration project execution in ways that address gender needs as well as issues identified in the SESP relating to stakeholder engagement, beneficiary engagement, gender and human rights, local environmental issues and the overall management of risks.

Activities – Output 1.1	*Deliverables*
1.1.1 Identification of sites and pilot buildings 1.1.2 Feasibility analysis and detailed design of pilot project interventions 1.1.3 Installation of NZEB options (as part of the construction of the new building)	1.1A. Design study and feasibility analysis of NZEB additions in residential apartment buildings 1.1B. Design study and feasibility of NZEB additions in high-rise office/public buildings; one seminar presenting feasibility 1.1C. Tender documents for construction with NZEB options specified 1.1D. Application of NZEB measures, including automation and/or EMIS features in Project pilot buildings (one residential apartments and one office/public building) with further applications in all new buildings once relevant building codes are upgraded and adopted. 1.1E. Progress reporting on installation of NZEB interventions in pilot buildings.

Output 1.2 Energy performance of NZEB pilot buildings assessed and compared with reference buildings

Activities include the monitoring and evaluation of building performance (consumption of heat, gas, water and power) to estimate the building energy savings. To be able to estimate energy and GHG savings in the pilot buildings these need to be compared to a baseline. The baseline performance will be based on the energy performance measurement in reference buildings (formed by new buildings constructed in the same city development project but without the NZEB features of the pilot buildings). These will include two residential apartment buildings per residential pilot (one located in the block, heated by the same boiler facility; and another in another block), thus three in total; as well as one public building (similar to each of the pilot NZEBs)[25].

Two case studies will be prepared; one for residential buildings and one for the pilot office buildings. The case studies will cover the technical aspects of the NZEB interventions and energy savings and compare them with the results of similar NZEB implementations in other countries.

Activities – Output 1.2	*Deliverables*
1.2.1 Energy performance measurements in pilot and reference buildings 1.2.2 Case studies and information dissemination	1.2A. Report with measurement of energy performance and energy audits in reference buildings 1.2B. Summary case studies (02) 1.2C. Seminar with a presentation of results of pilots and case studies

Output 1.3 Public investment strategy for new NZEB-type of building construction[26] [submitted to the Government for adoption before the end of the Project]

The Project will assist the Government to develop a suitable NZEB public investment strategy. The program preparation process will feature new procedures, such as feasibility studies justifying longer pay-back horizons by taking into account all building life-cycle costs including energy costs (see Output 3.1) and the techno-economic assessment of NZEB options (Output 2.1). Based on these assessments, as well as the results of the NZEB pilots (monitored and documented energy and monetary savings and GHG reduction), an assessment will be carried out on the viability and inclusion of NZEB options in building design for replication. The assessment will incorporate the results of interviews will be held with government stakeholders and discussions with practising architects, energy efficiency specialists and private and public building developers. Based on comments and feedback, the assessment will result in a set of design recommendations (design protocols) for replication.

Based on the design protocols, an investment strategy for NZEB buildings (in Ashgabat City and/or other urban residential and building projects in the country) will be drafted and discussed with all relevant stakeholders. The activity involves the presentation of the investment plan to the management of relevant government stakeholders (Ministries, Turkmengaz, and others) and the process for endorsement by the envisaged co-financing entities, the Ministry of Construction and Architecture and the Ministry of Energy.

Activities – Output 1.3	*Deliverables*
1.3.1 Development of guidelines (for IT and NZEB options and applications, following proposed NZEB code updates) for the design of a range of residential apartment and office buildings	1.3A Report with assessment and recommendations of protocol for incorporating NZEB features (higher energy performance and renewable energy; passive design) for planned apartment and public building

[25] The assessment will also look at social aspects of energy use by occupants, including indoor temperature and *thermal comfort* as one of the indicators to be measured, linked with overall social-environmental assessments

[26] This strategy will focus on new buildings (as also the NZEB building codes will) and not, in principle, cover retrofitting existing buildings. Existing building may be in future be refurbished to comply with the 2020 energy building codes (elaborated with support of the earlier Energy Efficiency in the Residential Buildings Sector of Turkmenistan (EERB) project, 2011-2018). However, this falls outside of the scope of the proposed TEESB project.

1.3.2 Development, review and submission for endorsement of a NZEB investment strategy by relevant Ministries	1.3B Investment strategy for buildings in Ashgabat and other urban developments submitted to the Government of Turkmenistan 1.3C Seminar/workshops on NZEB plans and investment strategy (02)

Component 2 Policy, regulations and institutional mechanism for energy efficient buildings sector

Outcome	***Outputs***
2. NZEB construction design regulations proposed with strengthened institutional framework and enforcement policy	2.1 White papers prepared on the real cost of fossil fuel subsidies to the public budget and on cost-effective means of reducing energy consumption in the building sector 2.2 NZEB-compatible design criteria developed for buildings and current building codes updated 2.3 National NZEB plan [for Government consideration)

Component Strategy/Context

The designed TEESB will be built on the success of the previous UNDP-GEF EERB which laid a foundation for updated EE building codes (approved in 2020) in Turkmenistan. Component 2 of the Project aims to define and put into operation the necessary policy improvements, standards and regulations as well as an institutional mechanism to scale up energy efficiency in new buildings towards NZEB levels. Incremental GEF assistance is required for detailed assessment and facilitating the adoption of institutional arrangements. The coordination of the implementation of this component on a technical level will be carried out directly by the Ministry of Construction and Architecture of Turkmenistan with UNDP Country Office (CO) support.

Output 2.1 White papers prepared on the real cost of fossil fuel subsidies to the public budget and on cost-effective means of reducing energy consumption in the building sector

The project will produce two white papers for the Government of Turkmenistan. One white paper will include an assessment of the costs of current policies to the national budget and economy (including impact on GDP growth) with a list of alternatives to repurpose direct cash subsidies to residents and other means of reducing the impact of phased-out fuel subsidies. The White Paper will detail the results of similar policy steps across the globe and present conclusions and a step-by-step guide, including draft regulations to effectuate a transition to a zero-subsidy regime for fossil fuels and for more cost-effective electricity tariffs. The white paper will also define a public outreach plan and stakeholder engagement approach to support the Government's transition toward cost-reflective energy pricing.

Based on the results of Output 1.1, incorporating the results of activity 2.2.1 as well as the assessments of Output 2.3, the study will identify and quantify cost-saving options in the existing and new housing stock, including a discussion of these options based on energy savings or substitution potential cost-effectiveness, payback period, and applicability in Turkmenistan. Furthermore, the study will include global environmental impacts (GHG emission reduction or avoidance) as well as development impacts (non-energy benefits such as employment secured, costs saved, income generated, and gender aspects, to name a few).

Only the latest buildings comply with the 2020 energy building codes, thus, most existing buildings are highly inefficient, driving up cities' emissions and energy costs. These buildings will still stand for decades. Many of those buildings fall short of the 2020 energy building standards, let alone NZEB-type performance. In the long run, also existing buildings will need to move to higher efficiency. The EERB project carried out energy audits of energy performance and estimates of the impact of energy performance for various sizes and types of buildings, resulting in an assessment of potential energy savings of modernization of residential building stock. Based on building stock statistics and EERB project results, a sector assessment will be carried out on building characteristics, energy consumption and projections for the coming three decades in scenarios, assuming different levels of penetration of new buildings (according to 2020 SNT building codes and new NZEB standards). Energy surveys with basic audits in selected buildings will be conducted to validate the information. The

assessment will include recommendations for policy actions to bring older buildings at least towards the level of current codes or even set towards a net-zero pathway.

Activities – Output 2.1	*Deliverables*
2.1.1 White paper on the real cost of fossil fuel subsidies to the public budget and national economy 2.1.2 White paper on the costs-benefits and impacts of NZEB technologies to reducing energy consumption or substitute fossil fuels in the residential and public building sector 2.1.3 Assessment of the potential of improving energy efficiency in existing buildings	2.1A White paper on the cost of fossil fuel subsidies 2.1B Overview of energy savings and renewable technologies in buildings applied in Europe or elsewhere 2.1C Study report on the potential for energy savings in existing buildings undergoing capital renovation (i.e. significant remodelling and refurbishment) and higher-energy performance. 2.1D White paper on the costs-benefits and impacts of NZEB technologies in Turkmenistan 2.D Seminars/workshop (02) presenting white papers and options on NZEB application in Turkmenistan

Output 2.2 NZEB-compatible design criteria developed for buildings and current building codes updated

The Project will produce the packages of relevant normative documentation (construction standards, amendments to laws and bylaws) to transpose the tested technologies in both the regulations concerning the modernization of existing buildings and improving climate footprint and resilience of new buildings. The Project will assist the Government in the adoption of state-of-the-art energy-efficiency design requirements (aiming at the level achieved by NZEB norms) for new residential buildings aimed to achieve significant construction and lifecycle cost reductions. For this, the project will support the development of those new design criteria and standards.

First, an overview will be made of NZEB on building code development, best practices, and trends in the CIS and the EU. The same report will present an overview of energy-saving opportunities for both heating, ventilation and cooling options, passive building design and application of renewable energy for realizing them based on internationally acknowledged good practice.

Information on future building plans will be analysed (type, size, characteristics, location, etc.) and future energy consumption will be assessed and calculated, assuming NZEB-type of design protocols (see activity 1.2.1) will be adhered to. The concept of energy passports (introduced as part of the EERB project, see Box 21 in Annex F) will be updated, published in a brochure and disseminated to stakeholders in seminars and workshops (policymakers, enforcement officials, private sector, developers).

The Project will assist the Government of Turkmenistan in justifying that such a standard is economically beneficial to the public budget. Based on the results of the pilots, the international experiences and the NZEB options report of activity 2.3.1 (and in coordination with activity 2.2.2: white paper on cost and benefits of NZEB options), the current energy-relevant building codes (for new buildings) will be updated towards NZEB achievements. The energy building codes (for newly constructed buildings) are expected to be presented to the relevant stakeholders for review and feedback and then submitted to the Government for adoption by the last year of the TEESB project.

The Project will also enhance the capacity of the Ministry of Environmental Protection, Ministry of Energy, and Ministry of Construction and Architecture of Turkmenistan and specialists from the *khyakimliks* of *velayats* and *etraps* (municipalities of provinces and districts) on conducting an expert assessment of energy efficient houses to ensure compliance with new norms and standards (SNT) and minimum energy consumption requirements in the buildings sector. The Project will also work with the national government as well as the administrations of selected municipalities of Turkmenistan to align their long-term building construction and modernization plans to ensure continuity of the tried-and-tested construction/reconstruction technological approaches.

Activities – Output 2.2	*Deliverables*
2.2.1 Compilation report on NZEB-type of building codes development and best NZEB practices in EU and CIS states 2.2.2 Definition of benchmarks for categories of buildings per climatic zone and updated energy passports 2.2.3 Development and presentation of NZEB codes to Ministry of Construction and Architecture	2.2A Report on NZEB initiatives and plans in EU and neighbouring countries 2.2B Report with upgraded benchmarks for categories of buildings per climatic zone and formulation of building energy passports. 2.2C Recommended package of updated or expanded energy codes[27] submitted to the Ministry 2.2D Seminars and workshops on NZEB practices, experiences in other countries and proposed NZEB-relevant updating of building codes in Turkmenistan (03)

Output 2.3 National NZEB plan with enforcement and verification of Turkmenistan's building code

The Project will further assist the Government to set up an institutional mechanism to revise and update building energy performance standards regularly in line with regional and international best practices. The Project will design a 'national action plan' for the introduction of the NZEB-type new building codes. GEF support is requested to develop such a plan for the introduction of new NZEB codes and for setting up and expanding work of the building energy performance MRV structure (see activity 2.3.1). Apart from building codes for new buildings, the plan will also consider the introduction over time of more stringent requirements for the energy performance of groups of existing buildings (based on the assessment of activity 2.1.2) over time (so that all of the building stock will have moved in one way or another towards higher energy performance).

The 'action plan' will feature a description of the mandate of a new building code monitoring, verification and enforcement (MVE) division within the Ministry of Construction and Architecture. Currently, different departments of the Ministry are in charge of monitoring compliance with a variety of building code provisions making it difficult to evaluate the effectiveness of the building code and benchmarks set.

The description of the organizational structure of the MVE system will be elaborated and consider (a) governing structure, the entities involved and their respective roles and responsibilities; and (b) key institutions and entities responsible for administering and enforcing any included regulatory initiatives. The Project can assist the Government in the development of an appropriate institutional structure[28] and roadmap recommendations for a such MRV.

Activities – Output 2.3	*Deliverables*
2.3.1 Support for setting up a MRV unit as part of a dedicated organizational structure of the Ministry of Construction and Architecture 2.3.2 National action plan for the introduction of new NZEB-type building codes	2.3A Plan for setting up appropriate unit/structure and for the upgrading of the bylaws, monitoring and regulations along with the enforcement routines. 2.3b Developed action plan (with budget allocation and milestones; governance setup) for upgrading current building codes 2.3C Seminar/workshops for discussion and presentation of the above action plan (02)

[27] As appropriate, prescriptive. for key elements such as wall and ceiling insulation, window and doors, roofs, foundations, heating and ventilation, air-conditioning, water heating, lighting fixtures, and controls; describing the performance level of energy consumption or intensity for the whole building, as well providing guidelines on the share of renewable energy in energy consumption.

[28] The Project can help the Government in drafting recommendations for the mandate and the staff structure for the MRV unit, including improved organization structures, terms of reference for key staff, staffing standards, capacities and training needs, as well as equipment needs (for audits and measurements).

Component 3 Knowledge sharing and capacity building

Outcome	***Outputs***
3. Strengthened and better-informed stakeholders on state-of-the-art construction in buildings and compliance with new building codes	3.1 Life-cycle-cost assessment methodologies are introduced 3.2 Increased capacity and knowledge of government officials and other stakeholders on NZEB construction planning, assessments, monitoring and evaluation

Component Strategy/Context

Component 3 of the project is structured around capacity building, knowledge management and monitoring. It will target government staff, building owners and users by sharing knowledge with them on the new technologies they will have to deal with in the coming years. The technical coordination of the implementation of Component 3 will be jointly conducted by the Ministry of Construction and Architecture, the Ministry of Energy and the Ministry of Environmental Protection of Turkmenistan with UNDP Country Office support.

GEF funding will also support the capacity development of current and future architects and building engineers on the latest in nearly-zero energy or net-carbon building. At the government level (both local and national), awareness of NZEB norms and construction and building design options is low, while there is a lack of access to the latest information and knowledge. Thus, GEF support is needed to provide capacity building and training, in combination with a study tour abroad to observe best practices and national NZEB programmes. GEF will also fund the development and dissemination of all lessons learned.

Output 3.1 Lifecycle cost and carbon assessment methodologies are introduced

Output 3.1 will be equipping the Government with accessible life-cycle-costing methodologies and case studies, documenting new experiences and lessons learned into targeted messages disseminated to relevant divisions of the Ministry of Construction and Architecture. This will be done through multiple knowledge management platforms, including web-based communication channels, newsletters, lesson notes, case studies, and workshops. The lifecycle assessment methodologies are operationalized within the budget planning procedures of the relevant governmental organizations and their subsidiary design bureaus.

The analysis will also look at 'embodied emissions' and options for cleaner construction (i.e., approaches to improve resource efficiency and reduce emissions in the construction industry). Embodied emissions come from the extraction, manufacturing, transport, construction, maintenance, and of materials used in construction[29]. For example, common construction materials, such as concrete and steel, are high in carbon. The production of cement, a key ingredient in concrete, is alone responsible for 8% of all global CO_2 emissions and also consumes vast amounts of water, as well as sand and gravel. The activity will make an assessment and study of the market to identify building materials and options for cleaner construction materials.

Activities – Output 3.1	*Deliverables*
3.1.1 Life-cycle-cost assessment methodologies are introduced within the budget planning procedures of the relevant governmental organizations	3.1A Report on applying lifecycle cost assessment and methodologies in public budget and procurement
3.1.2 Embodied emissions assessment	3.1B Paper on embodied emissions 3.1C Presentation of results (seminar/workshop)

[29] Embodied emissions account for 20–50% of an average building's whole-life emissions,

Output 3.2 Increased capacity and knowledge of government officials and other stakeholders on NZEB construction planning, assessments, monitoring and evaluation

The project will conduct a capacity assessment of relevant practitioners, including technical personnel working with building developers, contractors, EE technology suppliers, staff of ministries and government agencies, energy auditors as well as local technical individuals (engineers, building designers, architects, etc). Based on the needs assessment, three training packages will be designed for practitioners.

Output 3.2 will specifically address the government's capacity to assess building projects in the area of new construction and energy efficiency. Officers of the Ministry of Environmental Protection and the Ministry of Construction and Architecture will be trained to prepare economic assessments and feasibility analyses for several building types on lifecycle considerations. The staff of the Ministry of Environmental Protection, the Ministry of Construction and Architecture, and city administrations will also be trained to better understand procurement of the relevant materials and equipment based on lifecycle rather than least investment cost considerations. A preferred modality will be "training-of- trainers" to ensure that after the project is over, new staff of the relevant expert and oversight bodies will have human resources to tap into to bring the staff knowledge levels up to the required level of technical expertise[30].

One activity will be the organisation of a study tour to neighbouring countries or Europe to have decision-makers (from government, lead architects and engineers from selected institutes as well as business leaders) exposed to NZEB model buildings and design and implementation of NZEB regulations and advances in NZEB technologies. The destination countries and host organizations will be determined by screening during the implementation phase. The modality of the tours is flexible (with the possibility of virtual events if travel would be restricted).

The output aims at improving the awareness of business owners and leaders. The Project will provide building developers, facility managers, and business owners of the businesses training on techno-economic aspects (e.g., life-cycle cost benefits and return on investment in EE buildings) as well as the relevant legal and regulatory aspects for successful implementation of NZEB programs.).

Another activity will involve the development and introduction of curricula for students of architecture and construction engineering, including updating training materials on NZEB (materials, design, integration of renewable energy, passive solar design, green buildings and water use, etc.) and the packaging of training for the use in post-secondary academic curricula. This will require the training of staff and faculty members along with the preparation of relevant course materials for students.

The knowledge generated from the MRV component will be used for awareness and advocacy for policymakers to showcase the benefits of NZEBs. Awareness activities will include concise but complete information on NZEB and space temperature handling to the prospective apartment occupants and office manager to avoid 'rebound effects' (see risk 3 in the table in Box 13). Various case studies will be prepared including the two NZEB pilot building case studies (see Output 1.2) as well as an info-document on NZEB constructions and socio-economic and environmental impacts. Another activity will help disseminate information to the potential apartment dwellers about the peculiarities of living in NZE buildings. At the end of the Project, a comprehensive end-of-project assessment and lessons learned study will be commissioned (from UNDP co-financing) with detailed recommendations for post-TEESB action. The Project will support the development of a final report' as well as an 'insight brief' capturing (in an accessible format) selected key highlights from the pilot/demo or other successful national project activity as an easy-to-read summary that can cover any activity of the project and take the form of a written brief or video brief

Activities – Output 3.2	*Deliverables*
3.2.1 Conduct need assessment and design of capacity development programs on NZEB	3.2A Needs assessment survey with capacity building recommendations (per target group) in a final report
3.2.2 Capacity strengthening of central and local government officials, and administrations to	3.2B Organization and delivery of training for officers of the Ministry of Construction and Architecture, Ahal district, and

[30] Climate-sensitive planning, which for example plans the construction of new buildings, their height, orientation, and design in relation to cold air corridors, green and blue infrastructure as well as social infrastructure, can contribute significantly to energy and CO2 reduction. Therefore, the project will seek to strengthen links with sustainable urban planning. TEESB will coordinate the project with other ongoing GEF Sustainable Cities project in order to expand the impact of EE project to city-level planning..

conduct feasibility studies and to properly budget for compliant new buildings 3.2.3 International exchange of knowledge and experiences 3.2.4 Knowledge enhancement of construction companies and subcontractors that are providing materiel and equipment 3.2.5 Training of architects, engineers and students in the fields of architecture and engineering trained on NZEB, in particular, integration of renewable energy and passive solar design 3.2.6 General knowledge management and information dissemination	Ashgabat city administration will be trained in the data collection, preparation of feasibility study assessments, and execution of the monitoring and verification work. 3.2C Study tour organized, completed and reporting carried out 3.2D Training of architects, engineers and students in the fields of architecture and engineering trained on NZEB, in particular, integration of renewable energy and passive solar design 3.2E Organization and delivery of training over employees from at least 20 private-sector companies will be trained in the identification of opportunities related to energy efficiency, production, installation, and service of energy-efficient building technologies and IT systems, with at least 35% of them being women. 3.2F Course and guidance materials for training delivery 3.2G KM products (project final report, "insight" report with selected case studies; high-level policymakers' brief; lessons learned material 3.2H Workshops and seminars (03) on international experiences, lessons learned and results of TEESB project

Component 4 Monitoring and evaluation

Outcome	***Outputs***
4. Monitoring and evaluation	4.1 Mandatory monitoring, reporting and evaluation (see Section 6)

This Component will ensure compliance with all mandatory monitoring and reporting requirements of the GEF, including the following specific outputs (described in more detail in Section 6). The Project will assist the GOT in establishing project oversight and monitoring systems, the Gender Action Plan (GAP), the Mid-Term Review (MTR), and the GEF Terminal Evaluation (TE). The MTR and the TE will consider gender as part of the evaluation criteria in keeping with GEF and UNDP guidelines. Awareness and knowledge of government staff and practitioners on NZEB options and issues will be enhanced. This will be assessed and measured in a survey assessed towards the end of the project, including gender and social inclusion aspects).

4.2 Expected results

This project will result in GHG emissions reductions which will be measured via the GEF-7 Core indicator 6: Greenhouse Gas Emissions Mitigated (see **Error! Reference source not found.**). This indicator captures the amount of GHG emissions expected to be avoided through the project's investment in NZEB options in residential and public building high-rise and will be measured above a baseline value (considering that in the absence of the project, these buildings would be built according to the latest 2020 energy-relevant building codes but without NZEB options). Mitigation benefits include both (i) direct emissions reductions attributable to investments in the two pilot NZE buildings as well as due to an NZEB investment plan (approved towards the end of TEESB), totalled over the lifetime of the investments (20 years), and (ii) Indirect emissions reductions resulting from the increased building according to newly adopted NZEB norms. Annex G describes the methodology used to define targets for direct and indirect GHG emissions mitigated as well as installed renewable energy capacity (rooftop solar photovoltaics). Annex G further indicates how the number of direct beneficiaries disaggregated by gender as a co-benefit of GEF investment) are estimated. In the two pilot buildings, 30 households (120 occupants) and 654 office workers will benefit from living or working in the NZEB. Associated with the direct emission reduction are an additional 32 NZEB constructions (of 26 residential NZEB and 6 public NZEB[31]). Thus, direct beneficiaries are will ultimately 7,821 residents and 4,581 office workers.

[31] Apart from office buildings, these can in principle be any public buildings, such as governmental offices, hospitals, social care institutions, schools, as well as centres of culture and sport)

Box 9 GEF 7 core indicators

Project GEF-7 Core Indicators		Expected at CEO Endorsement
6.2	Greenhouse Gas Emissions Avoided (metric tons of CO2e) – cumulative (20 yrs lifetime)	86,911 (direct) 760,507 (indirect)
6.3	Energy substituted or saved (cumulative, direct)	Savings of 1,580,208,000 MJ of natural gas * 952,866,000 MJ (energy efficiency) * 627,342,00 MJ (substitution of natural gas-generated electricity by solar energy)
	Energy substituted or saved (cum., indirect)	Savings of 13,827,402,000 MJ of natural gas * 8,162,241,000 MJ (energy efficiency) * 5,665,162,000 MJ (substitution by solar energy)
6.4	Increase in installed renewable capacity (in MW) (related to direct GHG ER)	2.10 MW (direct, rooftop PV) 19.00 MW (indirect, rooftop PV)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	Total direct: 8,440 (3,671 women, 44%). TEESB capacity strengthening events: 620 (of which 219 women. Apartment occupants: 3,240 (in 810 apartments); Office workers: 4,580 (in 7 offices). Indirect: 57,370 (31,200 apartment dwellers and 26,170 office workers

The TEESB Project will contribute to the realization of several Sustainable Development Goals, as indicated below.

4.3 Stakeholders, partnerships and co-financing

4.3.1 Stakeholder overview

For optimal impact and contribution to the country, the AMP will rely on collaboration across multiple stakeholders drawing on different capabilities, skill sets and resources (see Box 11 for an overview of stakeholders). Details of partnerships and stakeholder engagement can be found in Annex J (Stakeholder Engagement Plan). This Annex also gives a mobilization and

Box 10 Linkages of sustainable energy in buildings with SDGs

Sustainable Development Goals	Linkage with nearly zero or low-carbon buildings
5: Ensure gender equality	Innovative and new technologies may create new economic opportunities to empower women (business, decision-making)
6: Ensure availability and sustainable management of water and sanitation for all	Improved wastewater treatment and grey water recycling may imply reduce clean water stress levels
7: Ensure access to affordable, reliable, sustainable and modern energy for all	Reduced energy consumption (in heating, cooling, ventilation and water supply) and substitution by renewable energy 9solar) for natural gas, used directly or for power generation
8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Increased investments and income generation (e.g., suppliers of new NZEB technologies; design companies, services and consultancies)
9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.	Different aspects of the industry value chain through technologies to achieve affordability and sustainability (e.g., IT -based)
11: Make cities and human settlements inclusive, safe, resilient and sustainable	Increased efficiency (energy, material, process), electrification, demand optimization (i.e., incentives for demand to meet supply)
12: Ensure sustainable consumption and production patterns	Increased construction materials linked with circular economy
13: Make urgent action to combat climate change and its impacts	Buildings and construction materials used area net-zero or from low-carbon sources. Sustainable construction is part of national energy and policies and plans on climate neutrality

Compiled from *Transforming our World: the 2030 Agenda for Sustainable Development* (UN, 2015), *Linkages between the Sustainable Development Goals; GBEP Sustainability Indicators for Bioenergy (GSI),* International Institute for Sustainability Analysis and Strategy (IINAS), 2018.

communication plan with stakeholders. In addition, the UNDP grievance redress mechanism will be set up per UNDP procedures.

Box 11 Stakeholders in energy efficiency in buildings in Turkmenistan

Stakeholder	Mandate and/or business	Role in the project outcomes
Ministry of Environmental Protection	The Head of the Department of International Relations and Planning of MEP is the GEF operational and UNFCCC focal point. The Ministry assesses the environmental impacts and benefits of projects	MEP Will be overall responsible and will provide guidance on determining local environmental benefits from the project and will ensure coordination with other GEF projects in Turkmenistan.
Ministry of Construction and Architecture	Develops policies and carries out programs in the construction sector. Includes the bureau that is responsible for design review and enforcement of building codes. Commissions, designs, builds and manages housing stock for its employees.	Will provide both technical assistance and investment funds for efficient construction. Ministry staff will participate in training, particularly on code-related issues in Component 1. Will be involved in the design, implementation and co-financing of the pilot NZEVB Will endorse new NZEB-type codes for standard building types.
Ministry of Energy	Among other responsibilities, the Ministry oversees energy policy and energy resource development. Commissions, designs, builds and manages housing stock for its employees.	Will provide both technical assistance and investment funds for efficient construction. Ministry staff will participate in training, particularly on code-related issues in Component 1. Will be involved in the design, implementation and co-financing of the pilot NZEVB
Municipalities (Ashgabat, Arkadag)	Commissions, designs, builds and manages housing. Oversees urban planning and management in Ashgabat, where several other stakeholders have housing stock.	Will be involved in all project components, particularly those affecting new construction and reconstruction and the replication of NZE approach in new construction, and activities on the application of design protocols
Academic and research institutes	• Turkmen State Architecture Construction Institute[32] • Scientific Research Institute of Seismic Construction • State Energy Institute of Turkmenistan Institutes train architects and engineers in the construction profession as well as carrying research on construction and materials	Will enhance curriculum on energy efficiency with NZEB topics and train students under Component 4. Will support the implementation of other capacity-building activities (training, workshops, etc.) of Component 4 as well as provide information or carry out assessments and analysis of Components 2 and 3
Utilities	Turkmengaz and Turkmenergo are vertically integrated state-owned power companies. They determine energy needs for public buildings and provide gas and electricity to residential consumers. The utilities also commission, builds, and also manage housing for its employees through several subsidiaries.	Utilities will be involved in the NZEB investment strategy (Comp 1) and the various assessments of Comp 2.

4.3.2 Project partners and co-financing

Close partnerships are foreseen with a few key players that are formalized through "co-financing letters" (see Annex O). An overview of the role of the main project co-financiers and project partners is given in Box 12. It should be noted that none of these funds will flow through UNDP accounts. A large part of the funds is in form of the construction costs of the two pilot NZEB buildings (Outputs 1.1), for a further description of co-financing, the reader is referred to Section 8) as well as in-kind contributions to support the technical assistance activities in the various Components.

UNDP is not directly accountable but will report the realization of co-financing amounts and realization amounts annually in the GEF PIR, at mid-term and at terminal evaluation. Risk management measures identified will be only those within the

[32] *Türkmen döwlet binagärlik-gurluşyk instituty*, formerly called Turkmen Polytechnic Institute (see, tdbgi.edu.tm)

control of the UNDP project (see section 4.3). Specifically, potential risks associated with co-financing that may affect the Project, (e.g., managing reputational risk) will be considered in safeguards due diligence and the project risk register and monitored accordingly.

Box 12 Co-financing and sources

Co-finance source	Name of Co-financier	Co-financing type	Investment Mobilized	Co-financing amount (USD)	Included in project results	If yes, list the relevant outputs
Government	Ministry of Construction and Architecture	Public Investment	Investment mobilized	13,000,000	Yes	Output 1.1
Government	Ministry of Energy	Public Investment	Investment mobilized	27,096,428	Yes	Output 1.1
Government	Ministry of Energy	In-kind	Recurrent expenditures	1,475,000	No	
Government	Ministry of Environmental Protection (MEP)	In kind	Recurrent expenditures	1,314,285	No	
GEF Agency	UNDP	In kind	Recurrent expenditures	40,000	No	
GEF Agency	UNDP	Grant	Investment mobilized	50,000	No	
	TOTAL			**42,975,713**		

Public investment under the aegis of the "Presidential Programme for socio-economic development of Turkmenistan for the period of 2022-2028" adopted by presidential decree No. 179, dated July 07, 2022. provides relevant co-financing for the construction of pilot NZEB multi-floor residential and office buildings through the Ministries involved. Within the above-mentioned Presidential Programme, the Ministry of Energy plans to make investments into upgrading electricity transformers and transmission lines with the introduction of energy efficient equipment and other interventions for the total amount of 100 mln. Turkmen Manats (TMT), (equiv. of USD 28,571,428 at an official exchange rate of USD 1 = 3.5 TMT). The Ministry of Construction and Architecture is committing USD 13 mln. which is estimated cost of building of one multi-family residential building and one public (kindergarten) building. The Ministry of Environmental Protection is ready to commit 4.6 mln. TMT (equiv. of USD 1,3 mln.) within the above-mentioned Programme intended for various greening interventions around Ashgabat. It should be noted that the commitment was made by the former Ministry of Agriculture and Environmental Protection, the predecessor of the Ministry of Environmental Protection at the time of submission of the project package to the GEF in June, 2023. The co-financing figures provided by the Ministries involved include part of their regular administrative budget, which they are ready to commit (in-kind) co-financing to upgrade buildings codes in Turkmenistan and elaborate corresponding NZEB strategy and planning, as well as incorporating additional staffing aspects (e.g., new officers for MRV and enforcement) relevant to the upgraded codes' application.

The GEF INV (USD 750,000) is meant as a top up NZE investment to already state-of-the-art buildings to reach full 'nearly-zero energy' (NZE) characteristics. It should be noted that during project implementation an investment strategy will be implemented with an estimated value of incremental NZE investment of about USD 11.3 million, leading to an estimated CO2 emission reduction of 81.6 ktCO2 (in addition to the 5.2 ktCO2 of the project-supported two pilot NZEBs.

4.3.3 South-South cooperation

The Project will provide a high degree of interaction, communication and exchange of experience, best practices and lessons learned with other similar projects implemented by UNDP and other donors in the region of Central Asia, Caucasus, Eastern Europe, and in particular, Kazakhstan and Uzbekistan, Armenia (green subsidy), as well as south-eastern Europe. The study tour (an activity of Output 3.1) may offer an excellent opportunity for networking of Turkmen organisations and institutions with counterparts abroad. It is also expected that during the implementation of the Project, representatives of other

countries can meet to share their experiences and discuss how best to implement the recommendations contained in the reports. The Project will support the participation of Turkmenistan in meetings and conferences of the parties on green finance issues to exchange lessons learned.

4.4 Risk and assumptions

The risks faced by the project and the countermeasures that have been proposed to reduce or eliminate them are detailed in the risk log ofAnnex E. The risks include those emanating from the SESP shown in K as well as risks related to COVID-19.

Box 13 summarizes only the various assessed risks. As per standard UNDP requirements, these risks will be monitored quarterly by the Project Manager. The Project Manager will report on the status of the risks to the UNDP Country Office, which will record progress in the UNDP Quantum risk register. Management responses to critical risks will also be reported to the GEF in the annual PIR. Implementation Partner risks identified through PCAT are also covered.

Box 13 Project risks and risk mitigation measures

Description	Level	Mitigation Measures
Social and environmental risks (see also Annex K on SESP)		
1: Construction related to applying energy-saving infrastructure, technologies and equipment may have negative environmental, social and health impacts, if not designed, and constructed properly	Moderate	Following the requirements of the national Law on Environmental Expertise (2014), process of Environmental Impact Assessment will be applied to buildings construction, including the design and application of the energy-saving technologies and solutions. To ensure that the national EIA process adheres to the UNDP SES requirements all construction projects subject to domestic EIA will be screened for the applicable UNDP SES standards, prior to the initiation of each EIA process. Process of the combined national EIA and UNDP ESIA will be described in the ESMF. Environmental and social impact assessment will include recommendations for the mitigation of local environmental and social risks. Besides the other issues, the pilot buildings' ESIAs will include adequate resource efficiency and waste management plan, hazardous materials management and disposal etc. During the building design process (implementation stage), the characteristics of each building will be assessed to identify the possible hazardous materials, as need be. For the construction phase, the ESIA will address good housekeeping, (ii) emissions (including dust, noise, etc.) control, and (iii) proper waste management including hazardous, solid, and construction waste management. It should be noted that air ventilation is an integral part of the NZE design (see Annex F). Concerning new buildings only, asbestos is not used, since its use of is forbidden in Turkmenistan (since 2001 as per Building Code on roofs and rooftops – SNT 2.03.10-01). In any case, the technical design will scrutinize the: impact on health from applying toxic materials, containing volatile organic compounds (VOC) and formaldehyde. During the implementation, the construction companies will be selected through an international tendering process, which will require preparation of the EIA study. r Detailed requirements will be specified in the tenders following international standards and best practices (the most stringent one will be applied). The responsible parties shall confirm that: • Construction projects comply with applicable national construction norms/building codes and standards as well as international best practices. The same applies to electric systems (installation of photovoltaic systems, solar heating systems, and the installation of LED lighting systems inside and outside of buildings). • Works will be implemented and maintained by the legally registered contractor(s) having relevant permits for the relevant works. Proof of experience and track record will be required from the contractor(s) prior to the award of the retrofit work.

Description	Level	Mitigation Measures
		• Contractor(s) will be required to conduct orientation and training for workers on EE building retrofits, particularly multi-apartment buildings and public buildings. The contractors will be required to implement the Code of Conduct (CoC).
2: Occupational health and safety arrangements during the construction works and that the employment opportunities provided by the project may fail to comply with national and international labour standards	Moderate	Responsible party agreements/letter of agreements will include requirement to oblige contractors to comply with the national and international labour and working conditions standards, including the occupational health and safety. Procedures will be put in place after project inception. ESMF will include an Occupational Health Management Protocol f in compliance with the national legislation, complemented by the provisions of the Labour Management Procedure to comply with the SES and International Labour Standards Such requirements should include, but not necessarily be limited to the following: • Provisions for a full occupational safety plan and training in advance of any construction, plus inspections in accordance with and possibly beyond existing national occupational health and safety regulations • Provisions to inform construction workers about what wastes are hazardous and therefore should be handled separately from other waste streams. • Procedures to avoid the working conditions not meeting the national labour laws and international commitments, and in denial of freedom of association and collective bargaining, use of child labour, forced labour, to discrimination against women considering that construction activities are dominated by men labour.
3: Increases of greenhouse gas emissions or other drivers of climate change due to 'rebound effects' s in newly built complexes.	Moderate	Such "rebound effects" (putting appliances at higher cooling or heating levels or using oversized consumer appliances) will be addressed by the Project Team during training sessions with residents and via information campaigns in the media and on-site information boards. Reference to awareness raising and capacity development of the residents too shall be clearly included in the project document, in Output 3.2.
4: Constructions of the buildings might not consider access to the buildings by people with disabilities	Moderate	There is a probability that the design of the four pilot buildings (Output 1.1) might omit the design on the accessibility by persons with disabilities and that the project might exacerbate the problem. The Project team will only have the mandate to improve the energy efficiency qualities of the building's design and will have to leverage over broader buildings design features. During project development and the building design process, the buildings will be screened concerning accessibility by persons with disabilities to ensure that the project does not accentuate this issue in any way
5: Project activity to promote increased participation of women in the construction sector exposes women to increased risks of employment related discrimination and workplace harassment	Low	In its promotion of increased participation of women in the supported construction and maintenance-related project activities, the project will not encourage informal hires, but rather specifically aim at bringing women out from the grey sector into the fully contracted environment with prior know-your-rights training delivered to interested candidates. This will apply both to the pilot buildings and the new urban developments (new Ashgabat city; Arkadag) as a whole, and to related goods/materials and equipment/services supply chains. This risk might apply to all project activities. Gender Analysis (see Annex HHHH) assesses and presents the status of the women working in the public building/construction sector and their capacity to participate in decision-making or other processes. The gender action plan outlines management measures for this and lists any other gender risks as well as opportunities to involve women in/through the project. Standard Codes of Conduct will be adhered to that address measures on prevention of Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH).
6: Project activities involving local/field interventions and close engagement with local communities may inadvertently contribute to the spread of COVID-19,	Low	The risk can be mitigated through adequate safeguards such as: (i) clear procedures in place in case of COVID-19 reinstatement of restrictions, approved during project inception (ii) use of protective equipment, maintaining social distancing and using remote methods of engagement whenever possible (iii) if adequate safeguards cannot be put in place, activities that entail close local communities' engagement will be put on hold if necessary. In general, the work programme/budget will be revised as needed.

Description	Level	Mitigation Measures
while project activities may make it difficult to travel or to implement activities (training, workshops)		Wherever possible, online meeting platforms will be used instead of closed-quarters meetings and training in case of COVID-related urgencies.
7: Activities funded by project co-financing partners may not be carried out in consistency with UNDP SES.	Moderate	For activities funded by co-financing partners that are directly coordinated with the project's activities (i.e., the pilots of output 1.1), any gaps with respect to UNDP SES will be discussed and reviewed regularly, including during the multi-stakeholder coordination platform meetings and Project Board meetings. The Stakeholder Plan identifies the stakeholders and proposes engagement during all phases (preparation and implementation; see Annex J). As a general rule, an agreement will be aimed to be signed with co-financiers (and potentially parallel financiers), outlining that in case of discrepancy/ different policies of the relevant institutions/ financiers, the most stringent Environmental and Social guidelines/ safeguards will be applied.
8: Inequitable or discriminatory distribution of rights to reside in energy-efficient dwellings to people excluding those living in poverty or other marginalized i.e., excluded individuals or groups.	Low	In assigning families and individuals to newly built and more energy-efficient buildings the Government is being guided both by the current sq. footage availability per household member and an institutional link (i.e., by whether rehoused individuals are employed by the agency/ministry sponsoring the construction of a particular block of flats). Poorer families have an equal chance to be relocated subject to them having a work affiliation (via the employment of a family member), particularly if they hail from more crowded households. Although the Project does not partake in the selection of residents for rehousing, it will aim to collect socioeconomic data on all residents rehoused to benchmark their standing against available national and international benchmarks and discuss the findings with the project partners to ensure non-discriminatory/equitable rehousing practices. Also, the project GRM will be available for stakeholders involved in collaborative activities implemented by the project and co-financing partners
9**: I**nvestment plan (2027-2036) for NZEB construction fail to sufficiently address issues of sustainable construction, safe construction materials, adaptation to climate change and indoor environmental quality, potentially hindering the positive effects of the project in terms of GHG emissions reduction, energy saving, waste reduction and health and safety of residents.	Moderate	All mentioned outputs will be screened for the potential risks mentioned under the Risk 9 and where needed, targeted assessments or appropriately scoped SESA will be conducted to minimize the risks and suggest sustainable building criteria (aligned both with the national legal requirements and UNDP SES) to be incorporated in the relevant outputs.
Operational and organizational		
10: Lack of technical, financial and administrative capacities of the Implementing Partners to execute donor-funded projects. Built capacity is lost faster than it can be replenished	Substantial	No local CSOs or NGOs have been identified with the required relevant project execution experience and sufficient capacities to implement as Responsible Part (RP) a donor-funded project of this complexity. Engaging private sector as a Responsible Party also bears a major reputational risk for the UNDP CO. In view of the findings above, the GEF OFP (Environmental Protection) has requested UNDP to provide execution support services listed in the GEF OFP letter (see section 7 on government arrangements). Moreover, all procurement to be done under this component will follow a competitive and transparent bidding and selection process. Supplier contracts shall include clauses for performance monitoring, servicing and training of relevant staff. The preparation of the RFP requirements and the subsequent review and

Description	Level	Mitigation Measures
		assessment of the proposals will include a third-party expert to verify that the costs do not exceed the incremental costs of the standard prices in the market that have similar technical specifications. The PCAT confirms that the Implementation of a stand-alone donor-funded project or programme is beyond the scope and mandate of the MEP. As a government entity, the MEP is constrained by the national legislation and internal regulations. In particular, the MEP would be unable to directly perform the following project implementation services: Financial management and reporting of donor funded projects; Recruitment and HR management; Procurement and administrative support of international standards. UNDP Country Office support has therefore been proposed as project implementation modality (CO-supported NIM) (Subject to GEF approval).
Political and financial		
11: Lack of co-financing for new NZEB builds and buildings beyond the pilot buildings financed by the Project.	High	The project will not disburse any funds until the feasibility studies (to be produced at the initial phase of the Project work) are not assessed by the Government and their conclusions as regards changing the outdated regulations are given the green light. The Project will also develop a phased investment plan that will be starting from not later than Year 4.
12: The Government doesn't pass NZEB regulation legislation during the time frame of the project.	Moderate	The government has demonstrated a strong interest in resource efficiency and climate change mitigation. It understands building codes but also weighs additional investment costs against additional natural gas export revenues. Decision-making can be time-consuming; the EERB building codes were only approved after the project's end and the regulation regarding the submission of documentation of construction according to the building codes is still pending. Hence, the importance in TEESB adhered to lifecycle cost assessment and capacity building of officials and decision-makers, as well as formulating an action plan for NZEB and changes in the legal-regulatory framework
Climate change impacts		
13. Climate change impacts and variability risks (extreme heat and cold events that are expected to be more frequent due to climate change)	Moderate	Climate risks might affect the implementation of the projects due to prolonged periods of extreme heat in the summertime when no installation work might be undertaken due to hostile working conditions for manual labour in an unconditioned environment. This will be taken into account in the SESP/labour management plans of the pilot/demo activities. Buildings are usually designed to maintain continued operation during disasters, through structurally robust walls and roofs that can withstand seismic and extreme weather events. By investing in rainwater harvesting and where suitable enhanced use of grey water, the project can support adaptation to drought (see Annex F for a description)

Climate change and variability

The key aspects of the climate change projects/scenarios at the project location indicate that many of the climate change impacts which are already evident include rising temperatures, intensifying droughts, declining precipitation, increasing salinization, and the heightening prevalence of dust storms. Observed changes in Turkmenistan's climate are well established. Averaged over the 1950-2010 period, average temperatures have been increasing at a rate of about 0.7°C per century. Over the same period, average rainfall in the southern part of the country (where Ashgabat is located) has been decreasing while the number of rainy days has also been decreasing (in 2021, rainfall dropped to as low as 17% of the average annual value). The frequency of dust and sandstorms has also been increasing across Turkmenistan suggesting that within the next ten years, Turkmenistan could witness more sand dust storms per year due to climatic changes within the region, especially decreases in annual rainfall, as well as the drying of marshland areas. Recurrent drought is also common throughout Turkmenistan and has produced enormous economic, environmental, and social impacts.

4.5 Gender mainstreaming and social-environmental risk management

4.5.1 Gender mainstreaming

Gender assessment

Gender considerations will be fully mainstreamed into project implementation. Rapidly expanding towns and cities have created employment for many youths and women. Yet, in the construction sector, more women than men find it difficult to access employment. Women continue to be discriminated against about jobs and pay, promotion and security benefits, capacity building and skills development and are subject to poor occupational health and safety standards. While in other industries, many women have been employed in semi-skilled or skilled jobs, in the construction industry, women are often employed as unskilled labourers. The job of an unskilled worker is more strenuous in the construction industry than in other manufacturing industries. However, difficult work is often assigned to women, not because of their physical capacities as compared to men but on the ground of socially assigned roles. Women also show less eagerness to break the traditional ethics that suppress forms of employment that are "alternative" to the traditional roles.

Human development is a process of enlarging the choices for all people not just for one part of society such a process becomes unjust and discriminatory if most women are excluded from its benefits. Existing sexual stratification in the construction labour market will not go away unless women gain more formal training in such areas as engineering and mechanization. In Turkmenistan, vocational training shows that the share of female students in all technical training facilities seems to be less than a third. Gender discrimination does not start at the point of entry into the labour market but is to large extent pre-determined through unequal division of labour within the home and choices made in education and training systems. Thus, the majority of women are condemned to unskilled work. Often, when men and women enter construction work at the same time, over half of the women will remain as casual workers while only a relatively small fraction of the men remain in that category. It could be alleged therefore that men have more staff development opportunities than women or that men can more easily be promoted to higher positions compared to women. The rigid gender division of labour confines women to a narrower range of income-earning or employment opportunities in the construction industry.

Gender-relevant action in TEESB

The Project will work with the Ministry of Environmental Protection and the Ministry of Construction and Architecture to ensure that big numbers of women are imparted with skills useful to the nascent sector of energy-efficient rehabilitation of the buildings sector. Increased participation of women in the sector will support meaningful employment opportunities for women reducing the extent and intensity of unemployment and poverty. The project will also provide opportunities for women to participate in the design of nearly zero-energy use buildings as well as in the production, supply, delivery, and administration of installation of NZE technologies. Women will also gain access to the capacity building and training, required to understand avenues of participation in the procurement of NZE-related goods and services. The project will ensure that the gender balance is maintained in all project activities (e.g., seminars, and training events).

The Project's Gender Action Plan (see Annex I for details) will be prepared to

- Encourage national partners to ensure women's participation and their equal and active participation ensured in all project-related events including consultation processes, workshops and informative events, at the level of at least 35% of total participants, with a special focus on young women professionals in the field of engineering, including university students and academics. This includes primarily the awareness-raising activities regarding the construction and retrofitting of buildings, as well as end-users of electricity in buildings, on EE regulation and best practices.
- Ensure women's representation within the staff of all working groups and workshops to be provided with adequate technical training to meet job requirements.
- Ensure equal representation for men and women in activities related to capacity development in building codes and standards and technical knowledge in the EE buildings sector

The project will also gather gender-disaggregated data for evaluation purposes and use gender-sensitive indicators) to facilitate planning, implementation, and monitoring; particularly around beneficiaries (building occupants and office workers as well as participants in events and project activities). Implementation strategies to deliver these targets will be

designed and delivered by the project team in conjunction with key project partners. This will be done through the clear setting of targets in project agreements and regular monitoring of progress. Further to that, the capacity of all stakeholders including the project team and government partners will be increased on gender equality as part of the gender action plan.

4.5.2 Procedures for screening, assessment & management of social and environmental risks.

UNDP has adopted an updated version of its Social and Environmental Standards (SES) policy that became effective on January 1, 2021. The objectives of the SES are to:

- Strengthen the quality of programming by ensuring a principled approach
- Maximize social and environmental opportunities and benefits
- Avoid adverse impacts to people and the environment
- Minimize, mitigate, and manage adverse impacts where avoidance is not possible
- Strengthen UNDP and partner capacities for managing social and environmental risks
- Ensure full and effective stakeholder engagement, including through a mechanism to respond to complaints from project-affected people.

The overarching principles and standards set out social and environmental requirements applicable to UNDP supported projects:

Principle:	Human Rights
Principle:	Gender equality and women's empowerment
Principle:	Accountability to stakeholders

Standard 1.	Biodiversity Conservation and Sustainable Natural Resource Management
Standard 2	Climate Change and Disaster Risk
Standard 3	Community Health, Safety and Security
Standard 4	Cultural Heritage
Standard 5	Displacement and Resettlement
Standard 6	Indigenous Peoples
Standard 7	Labour and working conditions
Standard 8	Pollution Prevention and Resource Efficiency

Nine risks were identified in the Social and Environmental Screening Procedure (SESP) (Annex K). The project was categorized as "moderate risk" in relation to investment in constructing new public and multi-family residential pilot buildings with the nearly-zero energy (NZE) options *(Output 1.1)* and to the elaboration of the public investment program for new NZEB-type of building construction, and of the National NZEB plan *(Output 1.3 and 2.3 respectively).* A description of potential risks and suggested assessment and management measures are identified in the SESP in Annex K.

Following the character of the project Outputs related with the moderate risks – buildings' construction and strategic planning in the construction sector, after additional screening during the project implementation, the legally required EIA, combined with respective UNDP SES provisions and the targeted assessment or scoped SESA will be applied. These assessments will address the following UNDP SES standards in particular:

- *Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management*, especially adverse impact to habitats and impacts on soils.
- *Standard 2: Climate Change and Disaster Risks*, in terms of potential impact on GHGs emissions.
- *Standard 3: Community Health, Safety and Security*, especially associated with construction-related impacts (air pollution, noise, traffic, physical hazards, transport, storage, and use and/or disposal of hazardous or dangerous materials, and influx of project workers to project areas.

- *Standard 7: Labour and Working Conditions*, in particular compliance with the national labour laws and international commitments, freedom of association and collective bargaining, indiscriminatory working conditions and/or equal opportunity, and occupational health and safety.

Relevant legislation and regulations that could pertain to certain aspects of project activities

National environmental assessment legal provisions:

- The Law of Turkmenistan "On Nature Protection" (2014)
- The Law "On Environmental Expertise" (2014)
- The State Standard of Turkmenistan TDS 579-2001 "Environmental impact assessment of planned economic and other activities in Turkmenistan" (2001),
- "Regulations on the procedure for State environmental expertise" (1996),
- The Law of Turkmenistan "On environmental information" (2020)
- Law of Turkmenistan "On information and its protection" (2014)
- The Law of Turkmenistan "On Environmental Safety" (2017);
- 19. The Law of Turkmenistan "On Environmental Audit" (2019);
- The Law "On Waste" (2015)
- Forest Code of Turkmenistan (2011);
- The Law of Turkmenistan "On Specially Protected Natural Territories" (2012);
- The Law of Turkmenistan "On the Protection of Atmospheric Air" (2016);

Construction and energy efficiency related legal provisions

- New building codes (SNT, from the Russian-language abbreviation), namely a) SNT “Residential Buildings”, SNT “Roofs and Roofing”, SNT “Building Climatology” and SNT “Building Thermal Engineering”. These were introduced during 2016-2017 (2020).
- Draft “Instruction on the composition and procedures of project documentation for the construction of buildings”.
- Law of Turkmenistan “About architectural activities (2017)
- Draft Law of Turkmenistan “on Energy Efficiency” (under the discussion in the Parliament)

Urban and spatial planning

- Law of Turkmenistan “About town-planning activities” (amended in 2009)
- Law of Turkmenistan on Urban Planning
- The Land Code of Turkmenistan (2004)

Labour protection legal framework

- Labour Code of Turkmenistan (2009)
- Law of Turkmenistan "On Trade Unions, their Rights and guarantees of activity" (2013),

Health services and social protection regulatory framework

- Law of Turkmenistan "On the protection of the health of citizens" (2015)
- Code of Turkmenistan on social protection of the population (2012), also defines measures for the social protection of persons with disabilities

Relevant international legal framework

- EU, Energy Performance in Building Direction (EPBD); under revision
- ILO labour and working conditions standards

A social-environmental safeguards expert will be hired for the project (see Annex I). Such expert will conduct the gap analysis of the leal requirements in relevant sectors and thematic areas and UNDP SES requirements. SE safeguards expert will support the Project Manager, who will be responsible for respecting the applicable UNDP SES Policy. The UNDP Gender Expert will also assess and monitor the project to ensure compliance with applicable UNDP standards for gender equality and women’s empowerment (additional information is provided in the UNDP Gender Analysis and Action Plan).
All project activities that require further assessment (as mentioned above), permitting, etc., will be closely supervised by the SE Safeguards Expert and the Project Manager to ensure that they carry out the necessary actions. Furthermore, project activities will adhere to the following exclusionary criteria; i.e., the Project Board shall not approve project activities that involve any of the following elements:

- Forced evictions of individuals or communities (as prohibited by the SES);
- Any forms of employment or livelihoods that may fail to comply with national and international labour standards;
- Alteration, damage, or removal of cultural heritage;
- Activities that affect the human rights, lands, natural resources, territories, and livelihoods of local resource users in an adverse way.
- Support for extractive industries;

The tables on the next page provides an overview of the management of potential social and environmental risks related to the project. For all outputs that require further safeguards screening, assessment and management, no activities can start until after the required screening has been prepared, and—if necessary for SES compliance—assessments conducted, and management plans are put in place.

Table 1 Risk Management framework for ensuring project's compliance with the relevant UNDP SES and national legal framework

Project components	Applicable UNDP SES Policy	Planned arrangements	Obligations for the implementing entity	UNDP SES Monitoring indicators
Horizontal arrangement for the avoidance of potential adverse impacts on human rights and other adverse impacts on the potentially affected population and individuals (including particularly marginalized groups).	Human Rights Principle Accountability Principle	Throughout all project activities, the principles of participation and inclusion will be applied. All relevant stakeholders will be consulted during preparation of project work plans. Stakeholder groups will be fully represented in the project steering committee, which will have oversight of the project, and provide strategic guidance on project implementation. Relevant stakeholders and means of their engagement are described in the Stakeholder engagement plan, annexed to the Project document. The project will operate a transparent, fair, and free-to-access project-level Grievance Redress Mechanism (GRM), approved by stakeholders, which will be put in place at the start of implementation. Stakeholders will be able to raise a grievance at any time to the Project Management Office, the Executing Agency, Implementing Agency (UNDP), or the GEF.	The Implementing Partner will establish the Grievance Redress Mechanism (GRM) and use the inception phase to clearly communicate its existence to all stakeholders, including residents of the project pilot sites, and how they may communicate concerns or grievances when activities may adversely affect them (see Prodoc Annex J).	GRM established and communicated to relevant stakeholders (information published in project website)
Horizontal arrangement for the advancement of Gender Equality and Women's Empowerment	Gender Equality and Women's Empowerment Principle	Implementation of the Gender Action Plan (GAP), monitored by the UNDP Country Office gender focal point. Gender sensitive approaches and opportunities for tackling women's needs and rights, such as to support women's participation in project activities, meetings and workshops, while following the principles of equal rights for men and women.	The Implementing Partner will implement the Gender Action Plan and will provide UNDP with data on results related to gender mainstreaming.	Level of gender mainstreaming in project implementation and its results
Activity-specific Measures:				
Output 1.1 Investment in nearly-zero energy (NZE) option in public and multi-family residential pilot buildings with EMIS installed and tested	Human Rights Principle Gender Equality and Women's Empowerment Principle Accountability Principle Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management	Selection and installation of the energy-safety solutions and technologies will be part of the new buildings' construction, supported by the project, therefore appropriately scoped Environmental and Social Impact Assessment (ESIA) will have to be carried before any construction is approved. ESIA will be carried out in compliance with the Law of Turkmenistan "On Environmental Expertise" (2014) and will be supplemented by the relevant the UNDP SES requirements, especially those addressing the social issues, as these are not covered by the national EIA legislation.	The Implementing Partner will ensure the construction projects, including for the energy-saving solutions, are screened and ESIAs is conducted before their approval. Implementing entity, responsible for the construction, shall commit to conduct ESIA, following the requirement of national legislation, the written agreement.	Proposed constructions screened through UNDP SES ESIAs for proposed conductions are conducted ESIAs are of the sufficient quality Construction projects will comply with the UNDP Construction Works Policy

Project components	Applicable UNDP SES Policy	Planned arrangements	Obligations for the implementing entity	UNDP SES Monitoring indicators
	Standard 2: Climate Change and Disaster Risks Standard 3: Community Health, Safety and Security Standard 7: Labour and Working Conditions Standard 8: Pollution Prevention and Resource Efficiency	To this end, the new buildings' construction will be screening using the SESP Annex 1 to identify any relevant UNDP SES concerns that need to be either integrated into the relevant EIA process or addressed concurrently during the assessment process. Detailed arrangements for the integration of the UNDP SES assessment requirements vis-à-vis the national framework will be determined during the project inception phase. Construction projects will comply with the UNDP Construction Works Policy and applicable country norms/standards and will be conducted in accordance with international best practices in the respective fields. All design works will be undertaken by, or under the technical oversight of suitably qualified and experienced professionals, certified by appropriate qualified national or international engineers and cleared by the appropriate local planning agency/authority. Construction works will be implemented and maintained by the legally registered contractor(s) having relevant certifications and permits for the relevant works. Proof of experience and track record will be required from the contractor(s) prior to the award of the work. The contractor(s) will be required to conduct orientation training addressing relevant SES issues related to the construction works. Risks related to habitats and soils at the pilot construction sites, potential increase of GHG emissions, to health and safety of affected communities, and to waste generation and chemicals releases will be addressed within the ESIA process, following the respective national legal requirements and standards. See the list of relevant national and international legal framework in the text above. The construction activities will apply national legal framework (Labour Code of Turkmenistan and Law of Turkmenistan "On employment of the population) as well as the respective UNDP SES requirements based on the International Labour Organization (ILO) standards.	UNDP will be involved in the ESIA quality review. Implementing partner will ensure that the relevant UNDP SES requirements, which are not covered by the national EIA law (e.g., labour and working conditions), and the respective management measures, will be addressed in the separate study. The Implementing Partner will ensure the implementation of the Gender Action Plan (GAP) and will provide UNDP with data on results related to gender mainstreaming. As stated in the GAP, it will hire a gender expert to support the mainstreaming process. Implementation of the Stakeholder Engagement Plan will be monitored by the project Steering Committee and by UNDP through the annual PIR. The PMU will keep records of stakeholder consultations and engagement during project implementation. The implementation of the Stakeholder Engagement Plan will be validated by the Terminal Evaluation. The Implementing Partner will also establish the Grievance Redress Mechanism (GRM) and use the inception phase to clearly communicate its existence to all stakeholders and how they may communicate concerns or	and applicable country norms/standards All contracts and agreements for construction are signed under the condition they observe the requirements related to workers' rights, equal employment rights and opportunities and occupational health and safety.

Project components	Applicable UNDP SES Policy	Planned arrangements	Obligations for the implementing entity	UNDP SES Monitoring indicators
		All relevant stakeholders identified in the project Stakeholder Engagement Plan will have access to relevant information and will be engaged in compliance with the public participation provisions in the national EIA legislation, national legislation for access to (environmental) information, and the requirements of the UNDP SES disclosure policy, which requires 60 days for substantial risk projects The project will also ensure implementation of the Gender Action Plan (GAP), monitored by the UNDP Country Office gender focal point. The project will engage women in the development and implementation of activities – including those targeting professionals (such as the active role of women in NZEB planning and formulation of regulations), as well as those targeting non-government stakeholders. This engagement will encourage the inclusion of women as national experts (where possible), recipients of training, and as members of advisory groups. Non-discrimination of women related to employment will be ensured. The project will implement Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) mitigation measures, including a Code of Conduct for workers. The project-level Grievance Redress Mechanism will be in place to address complaints.	grievances when activities may adversely affect them (see Prodoc Annex J).	
Output 1.2. Energy performance of NZEB pilot buildings assessed and compared with reference buildings	No specific SES triggered			
Output 1.3. Public investment program for new NZEB-type of building construction	No specific SES triggered but PIP shall be encouraged to consider the following UNDP SES objectives: Human Rights Principle Gender Equality and Women's Empowerment Principle	Public Investment Programme (further referred to as PIP) for new NZEB-type of building construction is the strategic document potentially setting the framework, scope and scale of future NZEB-type buildings' construction, therefore potential negative and positive SE impacts need to be considered during its design. PIP will be screened for the potential risks using SESP Annex 1. and where needed, targeted assessments or appropriately scoped SESA will be conducted to minimize the risks , where the good quality and suggest sustainable building criteria (aligned both with the national legal requirements and UNDP SES), will be identified and	In case screening indicates the need to conduct targeted assessment or appropriately scoped SESA, to meet UNDP SES requirements, the Implementing partner will agree with the responsible national authority, in writing, that such assessment will be part of the PIP elaboration process.	Screening of PIP against UNDP SES Implementation of targeted assessment/ SESA, if required

Project components	Applicable UNDP SES Policy	Planned arrangements	Obligations for the implementing entity	UNDP SES Monitoring indicators
	Accountability Principle Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management Standard 2: Climate Change and Disaster Risks Standard 3: Community Health, Safety and Security Standard 4: Cultural heritage S 5: Displacement and resettlement Standard 8: Pollution Prevention and Resource Efficiency	responsive provisions and measures will be suggested to decision makers to be incorporated in the applied Investment plan. Currently, there is not legal framework for SE impact assessment of strategic planning processes, in the country, therefore UNDP SES requirements and procedures will apply. All relevant stakeholders identified in the project Stakeholder Engagement Plan will have access to relevant information and will be engaged in compliance with the national legislation for access to (environmental) information, and the requirements of the UNDP SES disclosure policy, which requires 60 days for substantial risk projects. Women needs and active involvement of women in designing the plan and SE impact assessment process will be supported by the provisions included in the Gender Action Plan (GAP), monitored by the UNDP Country Office gender expert. The project team and partners will provide gender-disaggregated data for evaluation purposes and use gender sensitive indicators to facilitate planning, implementation, and monitoring. In addition, the project will establish the project-level Grievance Redress Mechanism in place to address complaints.	UNDP may support targeted assessment / scoped SESA elaboration. UNDP will be involved in the SESA quality review. The Implementing Partner will support the implementation of the project Stakeholder Engagement Plan by ensuring all multi-stakeholder mechanisms include the representation of all relevant stakeholders, including gender considerations. The Implementing Partner will ensure the implementation of the Gender Action Plan (GAP) and will provide UNDP with data on results related to gender mainstreaming.	
Output 2.1 White papers prepared on the real cost of fossil fuel subsidies to the public budget and on cost-effective means of reducing energy consumption in the building sector	No specific SES triggered			
Output 2.2 NZEB-compatible design criteria developed for buildings and current building codes updated	Standard 3: Community Health, Safety and Security Standard 8: Pollution Prevention and Resource Efficiency	Sustainable building criteria shall be applied in the process of, especially, building codes' update to avoid negative impact on future tenants' health and quality of life.	Implementing partner will recommend sustainable building criteria (e.g., defined by the EU Taxonomy for sustainable economic activities) to be considered in building codes' update.	

Project components	Applicable UNDP SES Policy	Planned arrangements	Obligations for the implementing entity	UNDP SES Monitoring indicators
Output 2.3 National NZEB plan with enforcement and verification of Turkmenistan's building code	No specific SES triggered but the national NZEB plan be encouraged to consider the following UNDP SES objectives: Human Rights Principle Gender Equality and Women's Empowerment Principle Accountability Principle Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management Standard 2: Climate Change and Disaster Risks Standard 3: Community Health, Safety and Security Standard 4: Cultural heritage Standard 8: Pollution Prevention and Resource Efficiency	National NZEB plan is the strategic document potentially setting the framework, scope and scale of future NZEB-type buildings' construction, therefore potential negative and positive SE impacts need to be considered during its design. National NZEB plan will be screened using the SESP Annex 1 and where needed, targeted assessments or appropriately scoped SESA will be conducted to minimize the risks, where the good quality and suggest sustainable building criteria (aligned both with the national legal requirements and UNDP SES), will be identified and responsive provisions and measures will be suggested to decision makers to be incorporated in the applied national NZEB plan. Currently, there is no legal framework for assessment of social and environmental impacts of strategic planning processes, in the country, therefore UNDP SES assessment approaches will apply. All relevant stakeholders identified in the project Stakeholder Engagement Plan will have access to relevant information and will be engaged in compliance with the national legislation for access to (environmental) information, and the requirements of the UNDP SES disclosure policy, which requires 60 days for substantial risk projects. Women needs and active involvement of women in designing the plan and SE impact assessment process will be supported by the provisions included in the Gender Action Plan (GAP), monitored by the UNDP Country Office gender expert. The project team and partners will provide gender-disaggregated data for evaluation purposes and use gender sensitive indicators to facilitate planning, implementation, and monitoring. In addition, the project will establish the project-level Grievance Redress Mechanism in place to address complaints.	In case screening indicates the need to conduct targeted assessment or appropriately scoped SESA, to meet UNDP SES requirements, the Implementing partner will agree with the responsible national authority, in writing, that such assessment will be part of the National NZEB plan elaboration process. UNDP may support targeted assessment / scoped SESA elaboration. UNDP will be involved in the SESA quality review. The Implementing Partner will support the implementation of the project Stakeholder Engagement Plan by ensuring all multi-stakeholder mechanisms include the representation of all relevant stakeholders, including gender considerations. The Implementing Partner will ensure the implementation of the Gender Action Plan (GAP) and will provide UNDP with data on results related to gender mainstreaming.	Screening of the national NZEB plan against UNDP SES Implementation of targeted assessment/ SESA, if required
Output 3.2 Increased capacity and knowledge of government officials and other stakeholders on NZEB	No specific SES triggered.			

Project components	Applicable UNDP SES Policy	Planned arrangements	Obligations for the implementing entity	UNDP SES Monitoring indicators
construction planning, assessments, monitoring and evaluation				
Output 4.1 Mandatory monitoring, reporting and evaluation	No specific SES triggered.			

Table 2 Actions of the Safeguards Risk Management Framework

	Actions Taken	Timeframe
1	Project team awareness and training on compliance with UNDP SES and gender guidelines, the monitoring process, the grievance mechanism, and related issues	During the Project Inception phase
2	Awareness and training for key project stakeholders, in particular: a) government partners, and b) municipalities and associated project staff and consultants, with particular reference to any vulnerable groups identified.	During the first year of project implementation, repeating as necessary.
3	Re-assessment of impacts and risks for the project as a whole, reflecting current circumstances.	During the Project inception phase.
4	Screening using the UNDP SESP template for project activities under Outputs 1.2, 1.3 and 2.3 at the appropriate scope (e.g., site-level, activity-level) and reviewed by UNDP for SES due diligence.	During project implementation, specifically during the design of the relevant activities.
5	Project activities under consideration by the Project Board against exclusionary criteria (based on the screening(s) prepared in step 4)	During project implementation, prior to confirmation of the finalization of the design of the relevant activities
6	Appropriate risk assessments and management plans prepared (as required for compliance with the UNDP SES) in line with screenings prepared and validated in previous steps, including public consultations and disclosure.	During project implementation, prior to implementation of the relevant activities
7	Updated reporting on compliance with UNDP SES and gender guidelines and update of the monitoring system	Annually (in the PIR) and as required per any site's SES management plan.
8	Validation of the monitoring and evaluation approach, and reporting with clear and verifiable indicators and means of verification	In the project inception report and at project completion
9	Periodic progress reporting as prescribed in the project M&E plan	Concurrent with scheduled M&E activities
10	Gender Action Plan and assurance of positive impacts and compliance	Ongoing
11	Project M&E activities, including systematic progress monitoring, collection of stakeholder feedback, and reviews	Ongoing
12	Project Board assessment of compliance	Concurrent with Project Board meetings and additionally as required
13	Awareness and establishment of grievance mechanism (in addition to the initial training module at project inception--see Item 1).	At project inception

Table 3 ESMF Budget

ESMF Activity	Cost (US$)
SES and gender specialist in PMU, leading execution of the ESMF/P and gender action plan	35,000.00
ESIAs for two constructions	30,000.00
Contingency reserve for SESAs (investment plan)	20,000.00

4.6 Sustainability, innovativeness and potential for scaling up

Sustainability

- *Institutional*

This project will support the Government in establishing the institutional capacity to scale up clean energy investments in public buildings, which in turn will support the successful implementation of NZEB norms and practices. Strengthening the capacity of the ministries and state institutes to evaluate highly-efficient designs and to systematize enforcement of the energy performance aspects of buildings will provide the ministry with a strategic means for keeping actual building performance higher than it would be otherwise and will give staff the expertise to enforce future, more stringent, versions of the codes. Exposure to the examples in EU countries will help build knowledge on monitoring, implementation, and enforcement of energy-relevant guidelines and codes for buildings.

During implementation, the project team will pay close attention to the likely sustainability of project results, including developing the project exit strategy. Concerning institutional sustainability, the team will ensure the key partner institutions have the individual and technical capacities to support the continuation of project results, including the implementation of a programme of NZEB codes and verification (Component 3) as well as the formulation of an NZEB investment strategy (Component 1)

Close cooperation with the Ministry of Construction and Architecture (MCA), which oversees government-funded construction in the residential sector, will increase the uptake of the techniques that are piloted in the demonstration building in other state-funded construction, and cooperation with municipalities, which oversee many construction projects in the residential sector, will demonstrate results that can be replicated in municipalities across Turkmenistan.

- *Technical and know-how*

The engineering and technical designs will follow Turkmenistan's regulations for new construction while providing some guidelines for upgrading existing buildings. A building energy automation and/or management system will be introduced as an additional tool to monitor and manage the energy consumption of renovated buildings. Regarding technical capacity and skills, practising architects as well as architecture and engineering students will be trained in efficient building techniques. Raising awareness of developers and utilities regarding the economic benefits of more-efficient housing will result in higher demand for more efficient apartments even after the awareness-raising activities have concluded. The development of sustainable energy protocols for prototype buildings will allow for broad replication of NZE measures (whether used for constructing new buildings or retrofitting new ones) and/or bring them to a national audience, and avoid the need to develop these measures individually for each project.

- *Environmental*

Accounting for about one-fifth of the country's total GHG emissions (18%), the housing sector has been identified in the National Strategy on Climate Change and the Nationally Determined Contributions (NDC) of the country as one of the priority sectors (along with oil and gas), where appropriate mitigation measures can help to reduce the country's carbon footprint. Increased NZE will also support climate change adaptation and sustainability in the short and long run, given the useful life of the buildings of 30–50 years. In water-scarce Turkmenistan, it is important to use fresh water efficiently. Reusing greywater can save up to 30-50% of water use in a residential building and this option will be promoted in the TEESB pilots.

Innovativeness

The most conceptually innovative aspect of the Project is a move towards NZEB buildings for a Central Asian country. Such standards have just recently become an accepted and mandatory practice in the EU and few other jurisdictions in the world come close. However, a straightforward transposition of the standard is not possible because the Government has an approved mechanism for "vetting" upgrades of the building codes. This vetting process includes the preparation of detailed feasibility justifications, which currently feature 3-year investment horizons but do not consider building and equipment life-cycle costs. The Project will provide the required policy support to the Government along with template economic justifications based on actual and projected energy prices during the lifetime of the buildings. The introduction of IT solutions

and “smart” technologies for building energy management to monitor building energy use, spot immediate and most cost-effective opportunities and effectively monitor performance and improvement is another innovation that the Government appreciates. Without a good EMIS, it is impossible to move on with any decision-making instruments because the savings are not “visible”.

Potential for scaling-up

With the testing of new and innovative building designs and thermal rehabilitation and climate-proofing methods, in the target pilot district, the project will provide the basis for learning and continuous replication throughout the nation. For example, more stringent requirements could be designed for construction materials procured and for related non-building measurement technologies such as automated/remote-metering and software requirements for electric grids, water and heat utilities.

Because the construction sector has been and remains a key driving force for the economic development of the country, a demonstration of energy saving potential of the project interventions in the building sector is expected to have full government support to facilitate the introduction and further wide-scale adoption of modern standards towards NZE in newly built public and residential buildings.

GHG emission reduction measures in housing and building sectors are seen by the Government as low-hanging fruits in fulfilment of its obligations towards the Paris Agreement by 2030 while providing sufficient time for planning and implementation of long-term concrete measures to reduce the carbon footprint of large income-generating oil and gas sectors. The project’s NZE solutions and results to be tested in the Arkadag, Ashgabat and/or other city mega-projects, will therefore have Government buy-in and significant potential for replication and scaling up in large-scale urban planning deployed throughout the country.

Private sector

There were over 8,100 domestic private enterprises active in Turkmenistan in 2016. They employed about 200,000 persons (including 76,000 individual entrepreneurs) and had revenues equivalent to 15.2% of GDP. Most of them were active in the agriculture, construction, and manufacturing sectors. About 80% were microenterprises, and only 11% were small enterprises (with 9% medium to large, including 581 foreign enterprises)[33].

Construction relies heavily on public procurement and public financing, which is the area targeted by the Project. Lack of information on the new requirements (on goods and types of materials and equipment needed) threatens to impede the private sector’s operation in the construction sector. This includes both the technology side (represented by producers of materials for insulation and windows), the service sector (installation and maintenance services), and the construction side (represented by construction companies). For example, there has been considerable investment in the production of energy-efficient windows nationwide, but these production facilities would have to be upgraded to adapt to more stringent energy performance requirements. Similarly, vendors of insulation materials or metering equipment will have to adapt to new requirements. The Project will assist them in all these adjustment needs, including the provision of training and assisting business owners in spotting public procurement opportunities. For this purpose, the Project will work with relevant industry associations and large international equipment producers.

Tight administrative controls and the public sector’s dominant role in economic activity have hindered private sector development. Despite the growth of the private sector’s share in segments of the economy, public sector and state-owned monopolies continue to govern the economy and the formal labour market[34]. The infrastructure sector (including buildings but also encompassing such facilities as roads, ports, railways, or street lighting) still lacks normative frameworks providing for the return on private investment into NZE technologies from the energy savings delivered to public facility owners or private residents of the public property. However, in the course of implementation, the project will work with the national partners to look at potential opportunities to attract private sector investment, including from large international construction companies active in country.

33 *Turkmenistan Diagnostic*, EBRD (2019)

35 www.worldbank.org/en/country/turkmenistan/overview

The investments in energy efficient air-con, doors, insulation, etc. are not done individually as add-ons later, but are an integral part of the construction as part of the construction contract with the consortium that will be selected as part of the procurement process. The same applies to solar PV, which will be integrated as part of the pilot buildings construction; these will be installed during the construction by the contracting entity (a ministry or other government entity).

Regarding the residential buildings, these are in the end partly funded by public funds and by private construction companies on a shared equity construction basis. Future owners that register for an apartment in a new building, sign an agreement with the construction company and transfer from 10 to 30 % of the cost of the property (apartment flats) in advance payment, and construction company uses this and its own funds to complete the construction and then property owners pay the rest of the cost after receiving the keys of the apartment. Although the residential buildings are thus for a large part paid for by private entities, the Ministry (MCA) is responsible for the investment planning and fully coordinates the process from design through the commissioning until these are fully sold out to private property owners. The process applies to the pilot building; hence MCA has reflected this in its co-financing letter. For the office building, it will depend on who will own office space in the end, a national or local government entity, or private entity.

The same public-private partnership process (and thus the expected role of private sector funding) is followed in the longer term (that is beyond the pilot buildings and post-project). So, indeed a substantial role for the private sector can be attributed in both direct and indirect emission reduction,

SMEs may be subcontracted by such the constructing company on an as-need basis to provide goods, materials, services. The capacity building activities of Component 3 will help getting SMEs up to date to provide NZEB relevant services. Apartment dwellers will be encouraged (through the Project's interventions under the Component 3 for awareness raising) to acquire efficient appliances (efficient fridges, efficient washers, etc.). Although installation of EE home appliances is outside the scope of the Project, this may offer an opportunity to SMEs to sell such high-EE appliances.

Being coordinated by the contracting entity (Ministry), usually public banks are also involved in the process as guarantors of payment between the parties. No engagement with the private financing sector is foreseen currently for NZE pilots. Widening financing tom private sector is an issue that will be addressed in the NZEB investment strategy (Output 1.3). This will include assessment of the role of the banking sector [35]

[35] The banking sector (financial institutions) of Turkmenistan is regulated by the Central Bank of Turkmenistan. There are 11 licensed banks in the country consisting of 6 state, 3 joint stock banks and two branches of foreign banks.

5. PROJECT RESULTS FRAMEWORK

Outcomes are short to medium-term results that the project makes a contribution towards the longer-term objective and that are designed to help achieve it. Achievement of outcomes will be influenced both by project outputs and additional factors (that are outside the direct control of the project).

This project will contribute to the following Sustainable Development Goal (s):
Directly to SDG 7 (sustainable energy) and indirectly to SDGs 5,6,7,8,9,11 and 13 (see **Error! Reference source not found.** for explanatory details)

This project will contribute to the following **Country Program Document** (CPD, 2023-2027) outcomes, outputs and indicators

UNSDCF Outcome 3: By 2025, there is effective design and implementation of disaster risk reduction and climate adaptation and mitigation measures, enabling a more rational use of resources, increased resilience, and a 'green' economy transition.

- Relevant outcome Indicators 3.4.: Number of nationwide, sectoral or community-based plans, investments and/or measures implemented for the sustainable and integrated management of land, water, biological diversity, energy and other natural resources that take into account gender aspects
- **Output 3.1.** Policy and regulatory framework is strengthened to facilitate climate change adaptation and mitigation (*Indicator 3.1.1*: Number of policies, regulatory acts, and monitoring mechanisms developed to promote climate adaptation and mitigation and disaster risk reduction)
- **Output 3.2.** Strategic plans and investments are designed and implemented to promote water efficiency, sustainable land use, conservation of biodiversity, ecosystem management, restoration of degraded lands, disaster risk reduction (*Indicator 3.2.4.* Number of energy efficiency methods and use of renewable practices, technical norms, standards and incentives for energy efficiency for households, industries, and green urban development

	Objective and Outcome Indicators	Baseline (2023)	Mid-term project (2026)	End of Project (EoP) target (2029)
Project objective To support Turkmenistan's low carbon development in the achievement of climate mitigation goals by reducing GHG emissions from multi-family residential (and public) buildings	1) Lifetime greenhouse gas emissions mitigated [tCO-2 lifetime reduction – direct and indirect]	Zero by default	Pilot building (02): direct GHG ER: 5.3 tCO_2	Direct lifetime emission reduction (ER) of 86.9 $ktCO_2$(eq), (pilot buildings and constructions in investment plan) Calculations are provided Annex G). Indirect ER = 760.5 $ktCO_2$.
	2) Projected lifetime energy savings	Zero by default	Pilot buildings: 96,078,000 MJ	Lifetime energy savings (linked with direct GHG ER of 1,580,208,000 MJ of natural gas **
	3) Number of direct beneficiaries (disaggregated) as co-benefit of GEF investment *	Zero, since the project has not yet started	1114 beneficiaries (120pilot building occupants and 654 workers; 340 capacity building)	Total of 8,440 beneficiaries (3,671women) based on (see Annex G): 7,820 direct building beneficiaries and 620 direct beneficiaries of TEESB's capacity-building and awareness activities
	4) Increase in installed solar PV capacity kW -solar – MWh battery]	Negligible PV integration in modern building design	Solar PV on two pilot buildings (0.11 MW)	Solar PV (2.10 MW, associated with direct GHG emission reduction). See Annex G

*) Gender-sensitive indicators. For additional gender-specific indicators, see Annex I

**) Electricity substitution by 16,805 MWh(e) (at plant's gate) and 380.128 MWh(th) resulting from savings in natural direct use and substitution by electricity. Together, these result in total avoided natural gas use due to energy savings of 952,866,000 MJ and avoided use of natural gas (substitution by solar energy) in power generation of 627,342,000 MJ, giving total natural gas energy savings of 1,580,208,000 MJ. Details of calculations and assumptions are provided in Annex G.

Component 1 Piloting energy efficient technologies and EMIS in residential and public buildings				
Outcome 1 Nearly-zero energy (NZE) options demonstrated (through advanced building envelope upgrades and renewables) with information systems installed and tested	5) Number of NZEB designed and constructed with expected energy savings/substitution	No NZEB in Turkmenistan	Two buildings designed and constructed (pilots); one office, one residential	Two pilot NZEB constructed (total floor space of 16,740 m^2) and energy performance measured with combined lifetime natural gas avoidance of 26,688 MWh (direct fuel and avoided power generation)
	6) Total floor space of multi-unit residential and public NZEB planned with expected energy (natural gas) savings	Zero by default	16,740 m^3 (pilot buildings)	NZEB investment strategy in accordance with new (proposed NZEB codes, see Indicator 7) aiming at total floor space (approved to be) constructed of 279,180 m^2 by the end of the project ***
Outputs, Outcome 1	1.1 Investment in nearly-zero energy (NZE) measure and information systems in public and multi-family residential pilot buildings 1.2 Energy performance of NZEB pilot buildings assessed and compared with reference buildings 1.3 Public investment plan for NZEB-type high-rise construction (submitted for adoption to the Government before the end of the Project)			

	Objective and Outcome Indicators	**Baseline (2020/21)**	**Mid-term project (2026)**	**End of Project (EoP) target (2029)**
Component 2 Policy, regulations and institutional mechanism for energy efficient buildings sector				
Outcome 2 NZEB construction design regulations proposed with strengthened institutional framework and enforcement policy	7) Building codes updated towards NZE performance	Current set of energy-relevant buildings (roofs, residential buildings, building thermal engineering, climatology) was formulated during EERB project and approved 2020	Assessment studies for code updating carried out ****	Five codes updated and proposed for endorsement and at least two codes approved***
	8) Developed roadmap for building code revision to mandate more energy-efficient building design	No roadmap for updating and institutionalisation of building code analysis, design and MVE (monitoring, verification and enforcement)	0	One roadmap formulated for implementation of new building codes (updated towards NZE)
	9) Status of the policy-institutional framework for NZEB-type codes and MVE		Unit set up for building code monitoring, updating and MVE	Unit operational for building code monitoring, updating and MVE and roadmap implementation)
Outputs, Outcome 2	2.1 White papers prepared on the real cost of fossil fuel subsidies to the public budget and on cost-effective means of reducing energy consumption in the building sector 2.2 NZEB-compatible design criteria developed for buildings and current building codes updated 2.3 National NZEB plan proposed (including recommended actions for enforcement and verification of Turkmenistan's building code)			

***) For example, energy performance (residential low-rise and high-rise), energy performance (office, public), construction thermal engineering (envelope), climatology, share of renewable energy, etc. Elaboration and implementation of NZEB-relevant building codes is responsible for part of the direct emission reduction (81.6 tCO_2, associated with

262,440 m^3 of NZEB floor space, realized or approved before the end of the Project) and indirect emission reduction (760.5 tCO_2) post-project, in line with the projections of the (proposed) investment strategy (see Indicator 6).

	Objective and Outcome Indicators	Baseline (2023)	Mid-term project (2026)	End of Project (EoP) target (2029)
Component 3 Digital, knowledge management				
Outcome 3 Strengthened and better-informed stakeholders on state-of-the-art construction in buildings and compliance with new building codes	10) Awareness and capacity of government staff and practitioners on NZEB options and benefits are increased *	Existing capacity at R&D and academic institutes. Awareness has been raised and capacity built during EERB project but not on NZE (and the latest technology advances and integration of renewables in buildings)	Gender-sensitive and socially inclusive knowledge plan is updated at project inception. The capacity of targeted recipients is assessed by a survey towards the end of year 2, and an average score of at least 2 is achieved	The awareness and capacity of targeted recipients significantly improved (as assessed by the survey, including gender and social inclusion aspects) towards the end of the project with an average score of at least 4 (out of five)
	11) Number of staff and practitioners participating in capacity building (and % of women) *		340	620 (35% women)
	12) Dedicated website and information repository on green and NZEB buildings	No easy access to NZEB information due to limitations in Internet access	Website established and managed by Institute	Website and online information repository on NZEB and regularly updated. Case studies, technical materials and advocacy messages (including economic, environmental and social benefits) produced and available online.
Outputs, Outcome 3	3.1 Life-cycle-cost assessment methodologies are introduced and operationalized 3.2 Increased capacity and knowledge of government officials and other stakeholders on NZEB construction planning, assessments, monitoring and evaluation			
Component 4	**Monitoring and evaluation (M&E)**			
M&E implemented	13) Status of M&E plan	0	M&E Plan implemented according to timeframe given in Error! Reference source not found.)	M&E Plan implemented according to timeframe given in Box 14)
Output, Outcome 4	4.1 Mandatory M&E and reporting			

*) Gender-sensitive indicators. For additional gender-specific indicators, see Annex I

****) Including assessments NZEB codes and technology options; updated benchmarking

6. MONITORING AND EVALUATION (M&E) PLAN

Project-level monitoring and evaluation will be undertaken in compliance with UNDP requirements as outlined in the UNDP POPP (including guidance on GEF project revisions) and UNDP Evaluation Policy **The UNDP Country Office is responsible for ensuring full compliance with all UNDP project M&E requirements including project monitoring, UNDP quality assurance requirements, quarterly risk management, and evaluation requirements.**

Additional mandatory GEF-specific M&E requirements will be undertaken in accordance with the GEF Monitoring Policy and the GEF Evaluation Policy and other relevant GEF policies[36]. The M&E plan and budget included below will guide the GEF-specific M&E activities to be undertaken by this project.

In addition to these mandatory UNDP and GEF M&E requirements, other M&E activities deemed necessary to support project-level adaptive management will be agreed – including during the Project Inception Workshop - and will be detailed in the Inception Report.

Minimum project monitoring and reporting requirements as required by the GEF:

Inception Workshop and Report: A project inception workshop will be held within 2 months from the First disbursement date, with the aim to:

a. Familiarize key stakeholders with the detailed project strategy and discuss any changes that may have taken place in the overall context since the project idea was initially conceptualized that may influence its strategy and implementation.
b. Discuss the roles and responsibilities of the project team, including reporting lines, stakeholder engagement strategies and conflict resolution mechanisms.
c. Review the results framework and monitoring plan (Annex D).
d. Discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E budget; identify national/regional institutes to be involved in project-level M&E; discuss the role of the GEF OFP and other stakeholders in project-level M&E.
e. Update and review responsibilities for monitoring project strategies, including the risk log; SESP report, Social and Environmental Management Framework (where relevant) and other safeguard requirements; project grievance mechanisms; gender strategy; knowledge management strategy, and other relevant management strategies.
f. Review financial reporting procedures and budget monitoring and other mandatory requirements and agree on the arrangements for the annual audit.
g. Plan and schedule Project Board meetings and finalize the first-year annual work plan. Finalize the TOR of the Project Board.
h. Formally launch the Project.

GEF Project Implementation Report (PIR) The annual GEF PIR covering the reporting period July (previous year) to June (current year) will be completed for each year of project implementation. UNDP will undertake quality assurance of the PIR before submission to the GEF. The PIR submitted to the GEF will be shared with the Project Board. UNDP will conduct a quality review of the PIR, and this quality review and feedback will be used to inform the preparation of the subsequent annual PIR.

GEF Core Indicators:
The GEF Core indicators summarised in **Error! Reference source not found.** (described in detail in Annex G) will be used to monitor global environmental benefits and will be updated for reporting to the GEF prior to MTR and TE. Note that the project team is responsible for updating the indicator status. The updated monitoring data should be shared with MTR/TE consultants prior to required evaluation missions, so these can be used for subsequent ground-truthing. The methodologies to be used in data collection have been defined by the GEF and are available on the GEF website.

[36] See https://www.thegef.org/gef/policies_guidelines

Box 14 Monitoring and evaluation budget for project execution

Monitoring and Evaluation Budget for project execution:
Total budget for the M&E is USD 77,753 and this M&E budget provides a breakdown of costs for M&E activities to be led by the Project Management Unit during project implementation. These costs are equivalent to those of the M&E Component of the Results Framework and TBWP. Other project M&E activities can be added to this budget if they are included under the M&E component of the results framework. The oversight and participation of the UNDP Country Office/Regional technical advisors/HQ Units in these M&E activities and in performing standard UNDP M&E requirements are not included as these are covered by the GEF Fee.

GEF M&E requirements to be undertaken by Project Management Unit (PMU)	**Indicative costs (US$)**	**Time frame**
Inception Workshop and Report	3,500	Inception Workshop within 2 months of the First Disbursement
M&E required to report on progress made in reaching GEF core indicators and project results included in the project results framework	9,963	Annually and at mid-point and closure.
Preparation of the annual GEF Project Implementation Report (PIR)	None	Annually typically between June-August
Monitoring of all risks	None	On-going.
Supervision missions	None	Annually
Learning missions	None	As needed
Independent Mid-term Review (MTR)	30,395	See cover page
Independent Terminal Evaluation (TE):	30,395	See cover page
Final Project Workshop	3,500	Before project closure

Independent Mid-term Review (MTR):
The terms of reference, the review process and the final MTR report will follow the standard UNDP templates and UNDP guidance for GEF-financed projects available on the UNDP Evaluation Resource Center (ERC). The evaluation will be 'independent, impartial and rigorous'. The evaluators that UNDP will hire to undertake the assignment will be independent of organizations that were involved in designing, executing or advising on the project to be evaluated. Equally, the evaluators should not be in a position where there may be the possibility of future contracts regarding the project under review. The GEF Operational Focal Point and other stakeholders will be actively involved and consulted during the evaluation process. Additional quality assurance support is available from the BPPS/NCE-VF Directorate. The final MTR report and MTR TOR will be publicly available in English and will be posted on the UNDP ERC by the date included on the cover page of this project document. A management response to MTR recommendations will be posted in the ERC within six weeks of the MTR report's completion.

Terminal Evaluation (TE):
An independent terminal evaluation (TE) will take place upon completion of all major project outputs and activities. The terms of reference, the evaluation process and the final TE report will follow the standard templates and TE guidance for UNDP-supported GEF-financed projects available on the UNDP Evaluation Resource Center. TE must be submitted to the GEF no later than 6 months after the Completion Date. This is a hard deadline that, if not met, can only be extended through a formal extension request. To meet the submission deadline, final TE reports must be completed and submitted to BPPS NCE team no later than 2 months in advance of the deadline to allow sufficient time for internal review/clearance that is required prior to submission.

Provisions must be taken to complete and submit the TE within the submission deadline. Therefore, TE must start no later than 8 months before the expected date of submission of the TE (or 11 months prior to the estimated operational closure date).

The evaluation will be 'independent, impartial and rigorous'. The evaluator(s) that UNDP will hire to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. Equally, the evaluators should not be in a position where there may be the possibility of future contracts regarding the project being evaluated.

The GEF Operational Focal Point and other stakeholders will be actively involved and consulted during the terminal evaluation process. Additional quality assurance support is available from BPPS NCE.

The final TE report will be publicly available in English and posted on the UNDP ERC by the TE submission date included on cover page of this project document. A management response to the TE recommendations will be posted to the ERC within six weeks of the TE report submission to the GEF.

Per the GEF Terminal Evaluation requirements, for cancelled full-sized projects, Terminal Evaluations are required if the GEF grant expenditure exceeds more than US$ 2 million.

Final Report:

The project's terminal GEF PIR along with the terminal evaluation (TE) report and corresponding management response will serve as the final project report package. The final project report package shall be discussed with the Project Board during an end-of-project review meeting to discuss lessons learned and opportunities for scaling up.

Agreement on intellectual property rights and use of logo on the project's deliverables and disclosure of information**:** To accord proper acknowledgement to the GEF for providing grant funding, the GEF logo will appear together with the UNDP logo on all promotional materials, other written materials like publications developed by the project, and project hardware. Any citation on publications regarding projects funded by the GEF will also accord proper acknowledgement to the GEF. Information will be disclosed in accordance with relevant policies notably the UNDP Disclosure Policy[37] and the GEF policy on public involvement[38].

Monitoring Plan:

The project results, corresponding indicators and mid-term and end-of-project targets in the project results framework will be monitored by the Project Management Unit annually, and will be reported in the GEF PIR every year, and will be evaluated periodically during project implementation. If baseline data for some of the results indicators is not yet available, it will be collected during the first year of project implementation. Project risks, as outlined in the risk register, will be monitored quarterly. The Monitoring Plan is given in Annex D (of indicators in the Results Framework, Section 5, and of the Gender Action Plan).

[37] See http://www.undp.org/content/undp/en/home/operations/transparency/information_disclosurepolicy/

[38] See https://www.thegef.org/gef/policies_guidelines

7. GOVERNANCE AND MANAGEMENT ARRANGEMENTS

Section 1: General roles and responsibilities in the projects' governance mechanism

Implementing Partner and Entities:

The Project will be implemented under the *CO Support to National Implementation Modality* (Supported NIM). During the PIF and PPG stages as well as by the time of the submission of the project package to the GEF in June, 2023 the **Ministry of Agriculture and Environmental Protection (MAEP)** was determined as the Implementing Partner for this project. However, on July 14, 2023, the Government of Turkmenistan has made a decision on separating the MAEP and establishment of two new ministries, the Ministry of Agriculture (MA) and the Ministry of Environmental Protection (MEP) of Turkmenistan. According to the relevant Presidential Decree (Decree of the President of Turkmenistan on the establishment of the Ministry of Agriculture of Turkmenistan and the Ministry of Environmental Protection of Turkmenistan) the newly formed Ministry of Environment Protection of Turkmenistan (MEP) has been designated as the legal successor for environmental protection of the MAEP. Consequently, in the capacity of a legal successor of the former MAEP, the Ministry of Environmental Protection of Turkmenistan is determined as the Implementing Partner for this Project. The Implementing Partner is the entity to which the UNDP Administrator has entrusted the implementation of UNDP assistance specified in this signed project document along with the assumption of full responsibility and accountability for the effective use of UNDP resources and the delivery of outputs, as set forth in this document. To assist with successfully delivering project outcomes and components, MEP is supported by a) the Ministry of Energy, and b) Ministry of Construction and Architecture.

The Implementing Partner is the ultimate responsible for executing this project. Specific tasks of the Implementing Partner include:

- Project planning, coordination, management, monitoring, evaluation and reporting. This includes providing all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes and is aligned with national systems so that the data used and generated by the project supports national systems.
- Overseeing the management of project risks as included in this project document and new risks that may emerge during project implementation.
- Financial management, including overseeing financial expenditures against project budgets.
- Approving and signing the multiyear workplan.
- Approving and signing the combined delivery report at the end of the year; and,
- Signing the financial report or the funding authorization and certificate of expenditures.

Due to lack of IP's capacity to execute international donor funded project and lack of third (responsible) party options for project implementation in the country, the GEF OFP (Ministry of Environmental Protection) has requested UNDP to provide execution support services listed in the GEF OFP letter (attached to the project submission package). The execution support services requested by the Government from and to be provided by UNDP include:

- Transparent and competitive process for procurement of goods, services, and works for the project. The specific procurement cases where UNDP assistance is required will be identified through a detailed annual procurement plan for the project.
- Procurement of goods and services from international and national suppliers (including contracting). Certification for contract performance and acceptance of goods and services as per Project Procurement Plan;
- Identification and/or recruitment of key project personnel (PM, PA and key specialists/component leads with contracts of 12 months and above) and international and national consultants according to UNDP norms and requirements, management of consultant activities.
- Financial services, including the processing of payments under the contracts concluded by UNDP, which includes creating vendors, payment reconciliation, and preparation of expenditure reports (such as CDRs) to partners and donors.
- Equipment and Asset Management services, including IT equipment maintenance, licenses, and ICT support for the project team and project activities.
- Administrative support for the project, including travel support and travel settlement.

Project stakeholders and target groups:
An overview of the main stakeholders and target groups is given in section 4.4, while Annex J provides details on their involvement in the Project.

UNDP:
UNDP is accountable to the GEF for the implementation of this project. This includes overseeing project execution undertaken by the Implementing Partner to ensure that the project is being carried out in accordance with UNDP and GEF policies and procedures and the standards and provisions outlined in the Delegation of Authority (DOA) letter for this project. **The UNDP GEF Executive Coordinator, in consultation with UNDP Bureaus and the Implementing Partner, retains the right to revoke the project DOA, and suspend or cancel this GEF project.** UNDP is responsible for the Project Assurance function in the project governance structure and presents to the Project Board and attends Project Board meetings as a non-voting member.

A firewall will be maintained between the delivery of project oversight and quality assurance performed by UNDP and charged to the GEF Fee and any support to project execution performed by UNDP (as requested by and agreed to by both the Implementing Partner and GEF) and may be charged to the GEF project management costs (only if approved by GEF). The segregation of functions and firewall provisions for UNDP in this case is described in the next section.

UNDP Country Office execution support, in line with UNDP POPP, can only be provided (as requested by Government and subject to agreement with the GEF) by the corresponding authorized Operations staff of UNDP CO in Turkmenistan. To ensure strict separation of execution and oversight functions as required by the GEF and in accordance with the UNDP Internal Control Framework, the above-requested execution services will be delivered by different staff members, i.e., independently from the GEF –specific oversight and quality assurance services.

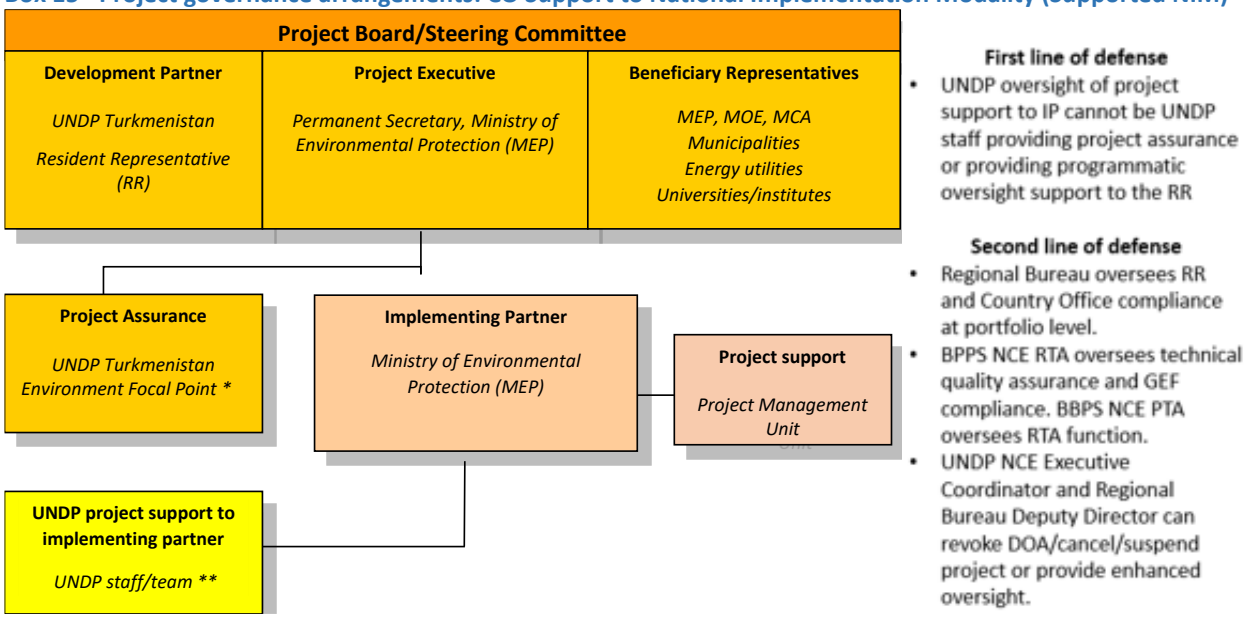
Section 2: Project governance structure

The UNDP Resident Representative assumes full responsibility and accountability for oversight and quality assurance of this Project and ensures its timely implementation in compliance with the GEF-specific requirements and UNDP's Programme and Operations Policies and Procedures (POPP), its Financial Regulations and Rules and Internal Control Framework. A representative of the UNDP Country Office will assume the assurance role and will present assurance findings to the Project Board, and therefore attends Project Board meetings as a non-voting member.

UNDP project support*:* The Implementing Partner and GEF OFP have requested UNDP to provide support services for the full duration of the project. The execution support services – whether financed from the project budget or other sources - have been set out in detail and agreed between UNDP Country Office and the Implementing Partner in a Letter of Agreement (LOA). The draft LOA is attached to this Project Document and will be signed with the Project Document after the CEO Endorsement. DPC amount will be covered by non-GEF resources.

To ensure the strict independence required by the GEF and in accordance with the UNDP Internal Control Framework, these execution services will be delivered independent from the GEF-specific oversight and quality assurance services.

Box 15 Project governance arrangements: CO Support to National Implementation Modality (Supported NIM)



Notes:

* Person/team will not be the same as providing oversight or supporting the RR (on the Project Board)

** Person/team will not be the same as project assurance or providing support to RR

BPPS-NCE: Bureau for Programme and Policy Support (BPPS) - Nature, Climate & Energy (NCE)

MEP: Ministry of Environmental Protection, MOE: Ministry of Energy, MCA: Ministry of Construction and Architecture

Energy utilities: Turkmengaz, Turkmenenergo

The Implementing Partner will designate a high-ranking official as the **National Project Coordinator**. He/She will assume responsibility for the Project on behalf of the National Government. The NPC will be responsible for the overall direction, strategic guidance and timely delivery of the project outputs. The NPC presents the ownership of the project.

Section 3: Segregation of duties and firewalls vis-à-vis UNDP representation on the project board:

As noted in the Minimum Fiduciary Standards for GEF Partner Agencies, in cases where a GEF Partner Agency (i.e. UNDP) carries out both implementation oversight and execution of a project, the GEF Partner Agency (i.e. UNDP) must separate its project implementation oversight and execution duties, and describe in the relevant project document a: 1) Satisfactory institutional arrangement for the separation of implementation oversight and executing functions in different departments of the GEF Partner Agency; and 2) Clear lines of responsibility, reporting and accountability within the GEF Partner Agency between the project implementation oversight and execution functions.

UNDP's implementation oversight role in the project – as represented in the Project Board and via the Project Assurance function – is performed by the UNDP Environmental Focal Point/Programme Analyst (not the same person supporting the RR on the Board). UNDP's execution role in the project is performed by a UNDP staff that will not be the same as project assurance or the person providing support to RR.

Section 4: Roles and Responsibilities of the Project Organization Structure:

a) Project Board: All UNDP projects must be governed by a multi-stakeholder board or committee established to review performance based on monitoring and evaluation, and implementation issues to ensure quality delivery of results. The Project Board (also called the Project Steering Committee) is the most senior, dedicated oversight body for a project.

The two main (mandatory) roles of the project board are as follows:

1) **High-level oversight of the execution of the project by the Implementing Partner** (as explained in the "Provide Oversight" section of the POPP). This is the primary function of the project board and includes annual (and as-needed) assessments of any major risks to the project and decisions/agreements on any management actions or remedial measures to address them effectively. The Project Board reviews evidence of project performance based on monitoring, evaluation and reporting, including progress reports, evaluations, risk logs and the combined delivery report. The Project Board is responsible for taking corrective action as needed to ensure the project achieves the desired results.
2) **Approval of strategic project execution decisions of the Implementing Partner** with a view to assess and manage risks, monitor and ensure the overall achievement of projected results and impacts and ensure long-term sustainability of project execution decisions of the Implementing Partner (as explained in the "Manage Change" section of the POPP).

Requirements to serve on the Project Board:

- ✓ Agree to the Terms of Reference of the Board and the rules on protocols, quorum and minuting.
- ✓ Meet annually; at least once.
- ✓ Disclose any conflict of interest in performing the functions of a Project Board member and take all measures to avoid any real or perceived conflicts of interest. This disclosure must be documented and kept on record by UNDP.
- ✓ Discharge the functions of the Project Board in accordance with UNDP policies and procedures.
- ✓ Ensure highest levels of transparency and ensure Project Board meeting minutes are recorded and shared with project stakeholders.

Responsibilities of the Project Board:

- ✓ Consensus decision-making:
  - The project board provides overall guidance and direction to the project, ensuring it remains within any specified constraints and providing overall oversight of the project implementation.
  - Review project performance based on monitoring, evaluation and reporting, including progress reports, risk logs and the combined delivery report;
  - The project board is responsible for making management decisions by consensus.
  - In order to ensure UNDP's ultimate accountability, Project Board decisions should be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition.
  - In case consensus cannot be reached within the Board, the UNDP representative on the board will mediate to find consensus and, if this cannot be found, will take the final decision to ensure project implementation is not unduly delayed.
- ✓ Oversee project execution:
  - Agree on the Project Manager's tolerances as required, within the parameters outlined in the project document, and provide direction and advice for exceptional situations when the project manager's tolerances are exceeded.
  - Appraise annual work plans prepared by the Implementing Partner for the Project; review combined delivery reports prior to certification by the implementing partner.
  - Address any high-level project issues as raised by the project manager and project assurance;
  - Advise on major and minor amendments to the project within the parameters set by UNDP and the donor and refer such proposed major and minor amendments to the UNDP BPPS Nature, Climate and Energy Executive Coordinator (and the GEF, as required by GEF policies);
  - Provide high-level direction and recommendations to the project management unit to ensure that the agreed deliverables are produced satisfactorily and according to plans.
  - Track and monitor co-financed activities and realisation of co-financing amounts of this project.
  - Approve the Inception Report, GEF annual project implementation reports, mid-term review and terminal evaluation reports.
  - Ensure commitment of human resources to support project implementation, arbitrating any issues within the project.
- ✓ Risk Management:
  - Provide guidance on evolving or materialized project risks and agree on possible mitigation and management actions to address specific risks.
  - Review and update the project risk register and associated management plans based on the information prepared by the Implementing Partner. This includes risks related that can be directly managed by this project, as well as contextual risks that may affect project delivery or continued UNDP compliance and reputation but are outside of the control of the project. For example, social and environmental risks associated with co-financed activities or activities taking place in the project's area of influence that have implications for the project.

- Address project-level grievances.

✓ Coordination:
- Ensure coordination between various donor and government-funded projects and programmes.
- Ensure coordination with various government agencies and their participation in project activities.

Composition of the Project Board: The composition of the Project Board must include individuals assigned to the following three roles:

1. **Project Executive:** This is an individual who represents ownership of the project and chairs (or co-chairs) the Project Board. The Executive usually is the senior national counterpart for nationally implemented projects (typically from the same entity as the Implementing Partner), and it must be UNDP for projects that are direct implementation (DIM). In exceptional cases, two individuals from different entities can co-share this role and/or co-chair the Project Board. If the project executive co-chairs the project board with representatives of another category, it typically does so with a development partner representative. The Project Executive will be a senior official from the *Ministry of Environmental Protection*
2. **Beneficiary Representative(s):** Individuals or groups representing the interests of those groups of stakeholders who will ultimately benefit from the project. Their primary function within the board is to ensure the realization of project results from the perspective of project beneficiaries. Often representatives from civil society, industry associations, or other government entities benefiting from the project can fulfil this role. Represented by senior officials will be *Ministry of Energy; Ministry of Construction and Architecture*, as well as Turkmengaz, and representatives from municipalities were the pilot NZEBs are located[39] and selected state institutes.
3. **Development Partner:** Individuals or groups representing the interests of the parties concerned that provide funding, strategic guidance and/or technical expertise to the project. The Development Partner is represented by the *UNDP Resident Representative or Deputy Resident Representative.*

b) **Project Assurance:** Project assurance is the responsibility of each project board member; however, UNDP has a distinct assurance role for all UNDP projects in carrying out objective and independent project oversight and monitoring functions. UNDP performs quality assurance and supports the Project Board (and Project Management Unit) by carrying out objective and independent project oversight and monitoring functions, including compliance with the risk management and social and environmental standards of UNDP. The Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. Project assurance is totally independent of project execution.

A designated representative of UNDP playing the project assurance role is expected to attend all board meetings and support board processes as a non-voting representative. It should be noted that while in certain cases UNDP's project assurance role across the project may encompass activities happening at several levels (e.g., global, regional), at least one UNDP representative playing that function must, as part of their duties, specifically attend board meeting and provide board members with the required documentation required to perform their duties. The UNDP representative playing the main project assurance function is an official of the UNDP Country Office, Turkmenistan

c) **Project Management – Execution of the Project:** The Project Manager (PM) is the senior most representative of the Project Management Unit (PMU) and is responsible for the overall day-to-day management of the project on behalf of the Implementing Partner, including the mobilization of all project inputs, supervision over project staff, responsible parties, consultants and sub-contractors. The project manager typically presents key deliverables and documents to the board for their review and approval, including progress reports, annual work plans, adjustments to tolerance levels and risk registers.

A designated representative of the PMU is expected to attend all board meetings and support board processes as a non-voting representative. The primary PMU representative attending board meetings is the *Project Manager (PM).* Efforts shall be made to mobilise the project team for the full project tenure to ensure the availability of experts and consultants until the end of the Project. Apart from the PM, the structure of PMU will include a *Pilots and Technical Coordinator* (Deputy Manager) as well as a *Financial-Administrative Officer*. Detailed job descriptions are provided in Annex F. A *Lead Advisor (LA)* will be hired at the start of the project at the same time as the Project Manager (with a specialization in green and low-energy building and construction) on an intermittent basis to support the PMU to recommend actions that focus work plans on

[39] Turkmen State Architecture Construction Institute; Scientific Research Institute of Seismic Construction

achieving key milestones in a timely manner; recommend special expertise to be deployed on the Project to assist in its achievement of key milestones; and provide the interface between Project team and key specialist consultants, both domestic and international when appropriate. A local *Gender and Social Safeguards* expert will be added part-time to the project team. On an as-needed basis, short-term experts and contracted companies will be hired to work on assignments in research, policy development, communications and outreach, and technical assistance of activities in the various project components.

8. FINANCIAL PLANNING AND MANAGEMENT

The total cost of the project is USD **45,042,046**. This is financed through a GEF grant of US USD 2,066,333 administered by UNDP and a USD 50,000 grant and USD 40,000 in kind from UNDP with USD 42,885,713 of other co-financing. UNDP, as the GEF Implementing Agency, is responsible for the oversight of the GEF resources and the cash co-financing transferred to UNDP bank account only.

Confirmed Co-financing: The actual realization of project co-financing amounts will be monitored by the UNDP Country Office and the PMU on an annual basis in the GEF PIF and will be reported to the GEF during the mid-term review and terminal evaluation process as follows:

Box 16 Co-financing and sources

Co-finance source	Name of Co-financier	Co-financing type	Investment Mobilized	Co-financing amount (USD)
Government	Ministry of Construction and Architecture	Public Investment	Investment mobilized	13,000,000
Government	Ministry of Energy	Public Investment	Investment mobilized	27,096,428
Government	Ministry of Energy	In-kind	Recurrent expenditures	1,475,000
Government	Ministry of Environmental Protection (MEP)	In kind	Recurrent expenditures	1,314,285
GEF Agency	UNDP	In kind	Recurrent expenditures	40,000
GEF Agency	UNDP	Grant	Investment mobilized	50,000
	TOTAL			**42,975,713**

Note: The table includes co-financing confirmed by means of a signed cooperation (co-financing) letter attached as Annex O.

Public investment under the aegis of the "Presidential Programme for socio-economic development of Turkmenistan for the period of 2022-2028" adopted by presidential decree No. 179, dated July 07, 2022. provides relevant co-financing for the construction of pilot NZEB multi-floor residential and office buildings through the Ministries involved. Within the above-mentioned Presidential Programme, the Ministry of Energy plans to make investments into upgrading electricity transformers and transmission lines with the introduction of energy efficient equipment and other interventions for the total amount of 100 mln. Turkmen Manats (TMT), (equiv. of USD 28,571,428 at an official exchange rate of USD 1 = 3.5 TMT). The Ministry of Construction and Architecture is committing USD 13 mln. is estimated cost of building of one multi-family residential building and one public (kindergarten) building. The Ministry of Environmental Protection is ready to commit 4.6 mln. TMT (equiv. of USD 1,3 mln.) within the above-mentioned Programme intended for various greening interventions around Ashgabat. The co-financing figures provided by the Ministries involved include part of their regular administrative budget, which they are ready to commit (in-kind) co-financing to upgrade buildings codes in Turkmenistan and elaborate corresponding NZEB strategy and planning, as well as incorporating additional staffing aspects (e.g., new officers for MRV and enforcement) relevant to the upgraded codes' application.

The GEF INV (USD 750,000) is meant as a top up NZE investment to already state-of-the-art buildings to reach full 'nearly-zero energy' (NZE) characteristics. It should be noted that during project implementation an investment strategy will be implemented with an estimated value of incremental NZE investment of about USD 11.3 million, leading to an estimated CO2 emission reduction of 81.6 ktCO2 (in addition to the 5.2 ktCO2 of the project-supported two pilot NZEBs.

Budget Revision and Tolerance: As per UNDP POPP, the project board may agree with the project manager on a tolerance level for each detailed plan under the overall multi-year work plan. The agreed tolerance should be written in the project document or approved project board meeting minutes. It should normally not exceed 10 percent of the agreed annual budget at the activity level, but within the overall approved multi-year workplan at the activity level. Within the agreed tolerances, the project manager can operate without intervention from the project board. Restrictions apply as follows:

Should the following deviations occur, the Project Manager/IP through UNDP Country Office will seek the approval of the BPPS/NCE-VF team to ensure accurate reporting to the GEF. It is **strongly encouraged** to maintain the expenditures within the approved budget at the budgetary account and at the component level:

a) Budget reallocations must prove that the suggested changes in the budget will not lead to material changes in the results to be achieved by the project. A strong justification is required and will be approved on an exceptional basis. Budget re-allocations among the components (including PMC) of the approved Total Budget and Work Plans (TBWP) that represent a value greater than 10% of the total GEF grant.
b) Introduction of new outputs/activities (i.e., budget items) that were not part of the agreed project document and TBWP that represent a value greater than 5% of the total GEF grant. The new budget items must be eligible as per the GEF and UNDP policies.
c) Project management cost (PMC): budget under PMC component is capped and cannot be increased.

UNDP is not in a position to increase the total budget above the amount approved by the donor, therefore any over-expenditure would have to be absorbed from non-GEF resources by the Implementing Partner (GEF Executing Entity)

Project extensions: The UNDP-BPPS-NCE team Executive Coordinator must approve all requests for extension of the Project Completion Date and for other milestone extensions with hard deadlines. All extensions impose additional time and cost burdens at all levels and the GEF project budget cannot be increased beyond its originally approved amount. A single extension may be granted on an exceptional basis and subject to the conditions and maximum durations set out in the UNDP POPP. The project management costs during the extension period must remain within the originally approved amount, and any increase in PMC costs shall be covered by non-GEF resources; the additional UNDP oversight costs during the extension period must be covered by non-GEF resources, in accordance with UNDP's policy as set out in UNDP POPP.

For any extension request, UNDP CO and IP will consult and jointly present a clear plan indicating how and from which specific sources the additional oversight costs that will be incurred by UNDP will be covered during the extended period. The BPPS-NCE Executive Coordinator will consult the Regional Bureaux (RBX) and may reject the extension request if no (external co-financing by the IP or internal UNDP CO resources) can be identified.

All extension requests, along with all supporting documentation, shall be submitted by the IP to the UNDP CO in line with the requirements and within the deadlines set out in the UNDP SOPs and policies in UNDP POPP.

Audit: The project will be audited as per UNDP Financial Regulations and Rules and applicable audit policies. Audit cycle and process must be discussed during the Inception workshop. If the Implementing Partner is an UN Agency, the project will be audited according to that Agencies applicable audit policies. The costs for audit cannot be included under M&E component and budget and must be included under PMC.

Transfer or disposal of assets: In consultation with the Implementing Partner and other parties of the project, UNDP is responsible for deciding on the transfer or other disposal of assets. Transfer or disposal of assets is recommended to be reviewed and endorsed by the project board following UNDP rules and regulations. Assets may be transferred to the government for project activities managed by a national institution at any time during the life of a project, however **must be done before the operational closure date**. In all cases of transfer, a transfer document must be prepared and kept on file[40]. The transfer should be done before Project Management Unit complete their assignments.

Completion Date: The project completion date is the date of Project Document Signature plus project duration. This date can only be extended through a formal extension request. Prior to completion date, all UNDP-financed inputs must be provided and related activities for the Project completed. No activities, except for the final clearance of the Terminal Evaluation Report and the corresponding management response and the end-of-project review Project Board Meeting should take place after the Completion Date.

[40] See https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PPM_Project%20Management_Closing.docx&action=default.

Project Closure: Project closure will be conducted as per UNDP requirements outlined in the UNDP POPP. All costs incurred to close the project must be included in the project closure budget and reported as final project commitments presented to the Project Board during the final project review. The only costs a project may incur following the final project review are those included in the project closure budget.

- **Operational Closure**: **Operational closure must happen within 9 months from project completion date.** Prior to operational closure, the Terminal Evaluation must have been submitted and the corresponding TE management response and the end-of-project review Project Board meeting must have been completed. The Implementing Partner through a Project Board decision will notify the UNDP Country Office when operational closure has been completed. Before Operational Closure, the project must have completed the transfer or disposal of any equipment that is still the property of UNDP.
- **Financial Closure: Financial closure must happen within 6 months of operational closure or after the date of cancellation.** The project will be financially closed when the following conditions have been met: a) the project is operationally completed or has been cancelled; b) the Implementing Partner has reported all financial transactions to UNDP; c) UNDP has closed the accounts for the project; d) UNDP and the Implementing Partner have certified a final Combined Delivery Report (which serves as final budget revision).
  Between operational and financial closure, the implementing partner will identify and settle all financial obligations and prepare a final expenditure report. The UNDP Country Office will send the final signed closure documents including confirmation of final cumulative expenditure and unspent balance to BPPS/NCE for confirmation before the project will be financially closed in Quantum by the UNDP Country Office.

Cancellation and Suspension: All projects considering going through cancellation or suspension must follow UNDP and GEF requirements. Guidance can be found in the UNDP POPP (SOPs for management actions of Vertical Fund projects escalated to the Executive Coordinator and Guidance for GEF project revisions).

Refund to GEF: Should a refund of unspent funds to the GEF be necessary, this will be managed directly by the BPPS/NCE team Directorate in New York. No action is required by the UNDP Country Office on the actual refund from UNDP project to the GEF. Unspent project balance is not permitted to be transferred to any other projects.

9. TOTAL UNDP BUDGET AND WORK PLAN

Total Budget and Work Plan			
Quantum Award ID:	1255804	Quantum Primary Output (Project) ID:	01002480
Quantum Title:	EE & Building Sector FSP		
Quantum Business Unit	TKM10 - Turkmenistan		
UNDP-GEF PIMS No.	6692 - 10996		
Implementing Partner	Ministry of Environmental Protection		

GEF Component / Quantum Activity	Responsible Party (Implementing Agent)	Quantum Fund ID	Donor Name	Budgetary Account Code	Quantum Budget Description	Amount Year 1 (2024-2025) (USD)	Amount Year 2 (2025-2026) (USD)	Amount Year 3 (2026-2027) (USD)	Amount Year 4 (2027-2028) (USD)	Amount Year 5 (2028-2029) (USD)	Total (USD)	Budget Note:
Outcome 1: Nearly-zero energy (NZE) options demonstrated (through advanced building envelope upgrades and renewables) with information systems installed and tested	UNDP	62000	GEF	71200	International consultants	7,500	7,500	5,000	5,000	5,000	30,000	1
				71300	Local consultants	35,800	8,800	7,000	22,500	1,900	76,000	2
				71400	Contract.serv-indiv	22,408	22,408	22,408	22,408	22,408	112,040	3
				71600	Travel	600	750	800	822	154	3,126	4
				72100	Contract.serv. - companies	40,000	405,000	375,000	55,000	0	875,000	5
				72300	Materials and goods			15,000	7,500	0	22,500	6
				74200	Audiovisual-print.prod.costs		1,500	1,500	2,175	0	5,175	7
				75700	Training, workshops & conf.		7,000	7,000	7,000	7,000	28,000	8
					Total, outcome 1	**106,308**	**452,958**	**433,708**	**122,405**	**36,462**	**1,151,841**	
Outcome2: NZEB construction design regulations proposed with strengthened institutional framework and enforcement policy	UNDP	62000	GEF	71200	International consultants		5,000	15,000	15,000	17,500	52,500	9
				71300	Local consultants		8,400	10,000	9,000	11,600	39,000	10
				71400	Contract.serv-indiv.	22,408	22,408	22,408	22,408	22,408	112,040	11
				71600	Travel		800	1,500	1,500	1,153	4,953	12
				72100	Contract.serv. - companies	15,000	15,000	30,000	20,000	0	80,000	13

				72300	Materials and goods	3,750	3,750			0	7,500	14
				72800	Information Techn. Equipm	3,308	3,307			0	6,615	15
				74200	Audiovisual-print.prod.costs	1,000	1,000	1,500	1,500	0	5,000	16
				75700	Training, workshops & conf.		7,000	7,000	7,000	7,000	28,000	17
					Total, outcome 2	**45,466**	**66,665**	**87,408**	**76,408**	**59,661**	**335,608**	
Outcome 3: Strengthened and better-informed stakeholders on state-of-the-art construction in buildings and compliance with new building codes	UNDP	62000	GEF	71200	International consultants	5,000	5,000	8,000	8,000	7,750	33,750	18
				71300	Local consultants	3,250	4,000	4,200	4,500	3,550	19,500	19
				71400	Contract.serv-indiv.	22,408	22,408	22,408	22,408	22,408	112,040	20
				71600	Travel	1,500	8,000	8,000	6,000	1,705	25,205	21
				72100	Contract.serv.-companies	10,000	20,000	30,000	20,000	10,000	90,000	22
				72300	Materials and goods			12,500	12,500	0	25,000	23
				72800	Information Techn. Equipm		3,000	4,500		0	7,500	24
				74200	Audiovisual-print.prod.costs	1025	1,500	1,500	2,500	2,236	8,761	25
				75700	Training, workshops & conf.	7,000	30,000	15,000	15,000	14,000	81,000	26
					Total, outcome 3	**50,183**	**93,908**	**106,108**	**90,908**	**61,649**	**402,756**	
Outcome 4: Monitoring and evaluation (M&E)	UNDP	62000	GEF	71200	International. Consultants			22,500		22,500	45,000	27
				71300	Local consultants			6,500		6,500	13,000	28
				71600	Travel			1,396		1,394	2,790	29
				72100	Contract.serv. - companies				9,963		9,963	30
				75700	Training, workshops & conf.	3,500				3,500	7,000	31
					Total outcome	**3,500**	**0**	**30,396**	**9,963**	**33,894**	**77,753**	
Project management	UNDP	62000	GEF	71400	Contract.serv-indiv.	13,481	13,481	13,481	13,481	13,481	67,405	32
				71600	Travel	475	1,000	1,000	1,000	1,000	4,475	33

				72500	Office supplies	823	1,623	1,623	1,623	803	6,495	34
	UNDP	62000	GEF	74100	Professional services	3,000	3,000	3,000	3,000	3,000	15,000	35
				74500	Misc (bank charges)	1,000	1,000	1,000	1,000	1,000	5,000	36
					Total PM	**18,779**	**20,104**	**20,104**	**20,104**	**19,284**	**98,375**	
					PROJECT TOTAL - GEF	***233,631***	***631,330***	***675,619***	***320,908***	***204,845***	***2,066,333***	
Project management	UNDP	4000	UNDP	71400	Contract.serv-indiv.	9600	9600	9600	9600	9600	48,000	37
	UNDP	4000	UNDP	72200	Equipment & furniture	2000					2,000	38
					Total outcome	**11,600**	**9,600**	**9,600**	**9,600**	**9,600**	**50,000**	
					PROJECT TOTAL - UNDP	***11,600***	***9,600***	***9,600***	***9,600***	***9,600***	***50,000***	

Additional budget information:

Budget note	Description
1	International consultancy (8 weeks @ 3750/week, incl. international travel) for selected pilot/demo selection and design; elaboration of NZEB investment plan and participation in related workshops/events
2	National consultancy to support international consultant (20 weeks @ 1300/week) or selected pilot/demo selection and design; elaboration of NZEB investment plan and participation in related workshops/events. In addition, national consultancy for social-environmental impact assessment of the two pilot buildings (USD 30,000) and social-environmental screening of the investment prospectus (USD 20,000)
3	Tasks of project staff related to technical support Comp.1, including Project manager (19.5% (USD 35,040) of annual salary of USD 179,671), Technical+Pilot Coord (33.3% (USD 50,000) of annual salary of USD 150,000), Social Safeguards and Gender (33.3% (USD 15,000) of total allocation of USD 45,000) - total USD 100,040 as well as Lead Advisor, USD 12,000: (Total related to outputs of Component 1 - USD 112,040)
4	Travel for short-term consultants (and staff but excl. international. ticket of international. experts, in BuLi 71200)
5	Company contract awarded to successful bidders in tendering to incorporate NZEB features in two pilot buildings **(USD 750,000)**. Contracts for preceding design/architecture and feasibility studies **(USD 70,000)** and compilation of investment opportunities in the prospectus **(USD 15,000)**. Contracts for measurements **(USD 40,000)**
6	Materials and goods for auditing and energy performance measurements
7	AV and printing cost (studies, workshops, reports, etc.) in Component 1 (USD 5,175)
8	Workshops and seminars (08 event.days @ USD 3500/day) related to Component 1 activities (all USD 28,000)
9	International consultancy (14 weeks @ 3750/week, incl. international travel) for energy building upgrading to NZEB level and NZEB governance **(**total ***USD 52,500***)
10	Local consultancy (30 weeks @ USD 1300/week) for energy building upgrading to NZEB level and NZEB governance (institutional; enforcement, verification, monitoring) (total USD 39,000)
11	Tasks of project staff related to technical support Comp.1, including Project manager (19.5% (USD 35,040) of annual salary of USD 179,671), Technical+Pilot Coord (33.3% (USD 50,000) of annual salary of USD 150,000), Social Safeguards and Gender (33.3% (USD 15,000) of total allocation of USD 45,000) - total USD 100,040 as well as Lead Advisor, USD 12,000: (Total related to outputs of Component 1 - USD 112,040)Tasks
12	Travel for short-term consultants (and staff but excl. international. ticket of international. experts, in BuLi 71200)
13	Company contracts fort elaboration of NZEB-related white papers (USD 30,000), assessment of socio-econ benefits NZEB technologies and options (USD 25,000) and elaboration of NZEB roadmap (USD 25,000) **(**total ***USD 80,000***)
14	Equipment for research and capacity buildings, Comp. 2
15	Information technology and equipment for project activities
16	AV and printing cost (newsletters, workshops, reports, etc.) in Component 2 (USD 5,000)
17	Workshops and seminars (08 event.days @ USD 3500/day) related to Component 2 activities (all USD 28,000)
18	International consultancy (09 weeks @ 3750/week, incl. international travel) to support lifecycle cost assessments and capacity strengthening activities **(**total ***USD 33,750***)
19	Local consultancy (15 weeks @ USD 1300/week) to support lifecycle cost assessments and capacity strengthening activities (total USD 19,500)
20	Tasks of project staff related to technical support Comp.1, including Project manager (19.5% (USD 35,040) of annual salary of USD 179,671), Technical+Pilot Coord (33.3% (USD 50,000) of annual salary of USD 150,000), Social Safeguards and Gender (33.3% (USD 15,000) of total allocation of USD 45,000) - total USD 100,040 as well as Lead Advisor, USD 12,000: (Total related to outputs of Component 1 - USD 112,040)
21	Travel for short-term consultants (and staff but excl. international. ticket of international. experts, in BuLi 71200) of USD 10,205 as well as USD 15,000 for participation in study tour and for international events (in and outside Turkmenistan)
22	Company contracts for capacity needs assessment (USD 12,000), training design and delivery (government staff, USD 20,000; companies and developers, USD 16,000; academic institutions, USD 21,000) as well as for embodies emissions and lifecycle assessments (USD 21,000) **(**total ***USD 90,000***)
23	Materials and goods on NZEB research and curricula in academic institutions
24	Information Techn equipment for awareness and capacity building activities (Comp 3)
25	AV and printing cost (awareness materials, workshops, reports, etc.) in Component 3
26	Awareness workshop (06 event.days @ USD 3500/day) related to Component 3 activities and budget for three training courses hosted by selected training/academic institutions (all USD 81,000)

27	Budget for consultancy and travel for final evaluation and MTR.) is USD 60,790, which is divided as indicated over budget lines 27 to 29. Budget note 27: international consultancy (USD 45,000)
28	National consultancy for MTR and TE (USD 13,000)
29	Travel MTR and TE (USD 2,790)
30	Contract for measurement of progress indicators (incl. capacity strengthening survey)
31	Inception (and/or final project) workshops (USD 3500 each; **USD 7000 total**)
32	Cost of management & administration tasks (project manager - USD 40,195 = 22.4% of annual salary of USD 179,671 and fin-admin assistant - 27,210=66.6% of annual salary of USD 40,856 - 50% (part time) engagement),. Total USD 67,405
33	Travel project staff
34	Project management cost: office supplies
35	Professional hired services for project auditing (USD 15,000)
36	BL 74500 (for bank charges) at USD 5,000
37	Cost of management & administration tasks (project manager - USD 34,354 = 19.1% of annual salary of USD 179,671 and fin-admin assistant - 13,646=33.4% of annual salary of USD 40,856 - 50% (part time) engagement). Total USD 48,000 will be provided from UNDP TRAC Fund.
38	Equipment and furniture office. **Total USD 2,000** will be provided from UNDP TRAC Fund.

GEF TBWP:

Expenditure Category	**Detailed Description**	**Component (USDeq.)**						**Total (USDeq.)**	**Responsible Entity**
		Component 1	***Component 2***	***Component 3***	***Sub-Total***	***M&E***	***PMC***		**(Executing Entity receiving funds from the GEF Agency)[1]**
		Sub-component 1.1	***Sub-component 2.1***	***Sub-component 3.1***					
Equipment	Materials and goods for auditing and energy performance measurements	22,500			22,500			22,500	UNDP
Equipment	Information technology and equipment for project activities		6,615		6,615			6,615	UNDP
Equipment	Materials and goods on NZEB research and curricula in academic institutions (Com2 and 3)		7,500	25,000	32,500			32,500	UNDP
Equipment	Information Techn equipment for awareness and capacity building activities (Comp 2 and 3)			7,500	7,500			7,500	UNDP
Contractual Services – Company	Company contract awarded to successful bidders in tendering to incorporate NZEB features in two pilot buildings (USD 750,000). Contracts for preceding design/architecture and feasibility studies (USD 70,000) and compilation of investment opportunities in the prospectus (USD 15,000). Contracts for measurements (USD 40,000)	875,000			875,000			875,000	UNDP

Contractual Services – Company	Company contracts fort elaboration of NZEB-related white papers (USD 30,000), assessment of socio-econ benefits NZEB technologies and options (USD 25,000) and elaboration of NZEB roadmap (USD 25,000) (total USD 80,000)		80,000		80,000			80,000	UNDP
Contractual Services – Company	Company contracts for capacity needs assessment (USD 12,000), training design and delivery (government staff, USD 20,000; companies and developers, USD 16,000; academic institutions, USD 21,000) as well as for embodies emissions and lifecycle assessments (USD 21,000) (total USD 90,000)			90,000	90,000			90,000	UNDP
Contractual Services – Company	Contract for measurement of progress indicators (incl. capacity strengthening survey)					9,963		9,963	UNDP
Contractual Services – Individual	Tasks of project staff related to technical support Comp.1, including Project manager (19.5% (USD 35,040) of annual salary of USD 179,671), Technical+Pilot Coord (33.3% (USD 50,000) of annual salary of USD 150,000), Social Safeguards and Gender (33.3% (USD 15,000) of total allocation of USD 45,000) - total USD 100,040 as well as Lead Advisor, USD 12,000: (Total related to outputs of Component 1 - USD 112,040)	112,040			112,040			112,040	UNDP
Contractual Services – Individual	Tasks of project staff related to technical support Comp.1, including Project manager (19.5% (USD 35,040) of annual salary of USD 179,671), Technical+Pilot Coord (33.3% (USD 50,000) of annual salary of USD 150,000), Social Safeguards and Gender (33.3% (USD 15,000) of total allocation of USD 45,000) - total USD 100,040 as well as Lead Advisor, USD 12,000: (Total related to outputs of Component 1 - USD 112,040)		112,040		112,040			112,040	UNDP
Contractual Services – Individual	Tasks of project staff related to technical support Comp.1, including Project manager (18.4% (USD 35,040) of annual salary of USD 179,671), Technical+Pilot Coord (33.3% (USD 50,000) of annual salary of USD 150,000), Social Safeguards and Gender (33.3% (USD 12,000) of total allocation of USD 45,000) - total USD 119,865 as well as Lead Advisor, USD 12,000: (Total			112,040	112,040			112,040	UNDP

	related to outputs of Component 1 - USD 112,040)								
Contractual Services – Individual	Cost of management & administration tasks (project manager - USD 40,195 = 22.4% of annual salary of USD 179,671 and fin-admin assistant - 27,210=66.6% of annual salary of USD 40,856 - 50% (part time) engagement). Total USD 67,405				-		67,405	67,405	UNDP
Sub-contract to executing partner					-			-	UNDP
International Consultants	International consultancy (8 weeks @ 3750/week, incl. international travel) for selected pilot/demo selection and design; elaboration of NZEB investment plan and participation in related workshops/events	30,000			30,000			30,000	UNDP
International Consultants	International consultancy (14 weeks @ 3750/week, incl. international travel) for energy building upgrading to NZEB level and NZEB governance (total USD 52,500)		52,500		52,500			52,500	UNDP
International Consultants	International consultancy (09 weeks @ 3750/week, incl. international travel) to support lifecycle cost assessments and capacity strengthening activities (total USD 33,750)			33,750	33,750			33,750	UNDP
International Consultants	Budget for consultancy and travel for final evaluation and MTR.) is USD 60,790, which is divided as indicated over budget lines 27 to 29. Budget note 27: international consultancy (USD 45,000)					45,000		45,000	UNDP
Local Consultants	National consultancy to support international consultant (20 weeks @ 1300/week) or selected pilot/demo selection and design; elaboration of NZEB investment plan and participation in related workshops/events. In addition, national consultancy for social-environmental impact assessment of the two pilot buildings (USD 30,000) and social-environmental screening of the investment prospectus (USD 20,000)	76,000			76,000			76,000	UNDP

Local Consultants	Local consultancy (30 weeks @ USD 1300/week) for energy building upgrading to NZEB level and NZEB governance (institutional; enforcement, verification, monitoring) (total USD 39,000)		39,000		39,000			39,000	UNDP
Local Consultants	Local consultancy (15 weeks @ USD 1300/week) to support lifecycle cost assessments and capacity strengthening activities (total USD 19,500)			19,500	19,500			19,500	UNDP
Local Consultants	National consultancy for MTR and TE (USD 13,000)					13,000		13,000	UNDP
Trainings, Workshops, Meetings	Workshops and seminars (08 event.days @ USD 3500/day) related to Component 1 activities (all USD 28,000)	28,000			28,000			28,000	UNDP
Trainings, Workshops, Meetings	Workshops and seminars (08 event.days @ USD 3500/day) related to Component 2 activities (all USD 28,000)		28,000		28,000			28,000	UNDP
Trainings, Workshops, Meetings	Awareness workshop (06 event.days @ USD 3500/day) related to Component 3 activities and budget for three training courses hosted by selected training/academic institutions (all USD 81,000)			81,000	81,000			81,000	UNDP
Trainings, Workshops, Meetings	Inception (and/or final project) workshops (USD 3500 each; USD 7000 total)				-	7,000		7,000	UNDP
Travel	Travel for short-term consultants (and staff but excl. international. ticket of international. experts, in BuLi 71200)	3,126			3,126			3,126	UNDP
Travel	Travel for short-term consultants (and staff but excl. international. ticket of international. experts, in BuLi 71200)		4,953		4,953			4,953	UNDP
Travel	Travel for short-term consultants (and staff but excl. international. ticket of international. experts, in BuLi 71200) of USD 10,205 as well as USD 15,000 for participation in study tour and for international events (in and outside Turkmenistan)			25,205	25,205			25,205	UNDP
Travel	Travel MTR and TE (USD 2,790)					2,790		2,790	UNDP
Travel	Travel project staff						4,475	4,475	UNDP
Office Supplies	Project management cost: office supplies						6,495	6,495	UNDP
Other Operating Costs	AV and printing cost (studies, workshops, reports, etc.) in Component 1 (USD 5,175)	5,175			5,175			5,175	UNDP
Other Operating Costs	AV and printing cost (newsletters, workshops, reports, etc.) in Component 2 (USD 5,000)		5,000		5,000			5,000	UNDP

Other Operating Costs	AV and printing cost (awareness materials, workshops, reports, etc.) in Component 3			8,761	8,761			8,761	UNDP
Other Operating Costs	Professional hired services for project auditing (USD 15,000)				-		15,000	15,000	UNDP
Other Operating Costs	BL 74500 (for bank charges) at USD 5,000						5,000	5,000	UNDP
Grand Total		**1,151,841**	**335,608**	**402,756**	**1,890,205**	**77,753**	**98,375**	**2,066,333**	
Contractual Services – Individual	**Cost of management & administration tasks (project manager - USD 34,354 = 19.1% of annual salary of USD 179,671 and fin-admin assistant - 13,646=33.4% of annual salary of USD 40,856 - 50% (part time) engagement). Total USD 48,000 will be provided from UNDP TRAC Fund.**							**48,000**	UNDP
Equipment & furniture	**Equipment and furniture office. Total USD 2,000 will be provided from UNDP TRAC Fund.**							**2,000**	UNDP
Grand Total								**50,000**	

LEGAL CONTEXT

This project document shall be the instrument referred to as such in Article 1 of the Standard Basic Assistance Agreement between the Government of Turkmenistan and UNDP, signed on October 5, 1993. All references in the SBAA to "Executing Agency" shall be deemed to refer to "Implementing Partner."

This project will be implemented by the Ministry of Environmental Protection in accordance with its financial regulations, rules, practices and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. Where the financial governance of an Implementing Partner does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition, the financial governance of UNDP shall apply.

The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations or UNDP concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries.

10. RISK MANAGEMENT

1. Consistent with the Article III of the *Supplemental Provisions to the Project Document*, the responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP's property in the Implementing Partner's custody, rests with the Implementing Partner. To this end, the Implementing Partner shall:

    a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;

    b) assume all risks and liabilities related to the Implementing Partner's security and the full implementation of the security plan.

2. UNDP reserves the right to verify whether such a plan is in place and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the Implementing Partner's obligations under this Project Document.

3. The Implementing Partner agrees to undertake all reasonable efforts to ensure that no UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the United Nations Security Council Consolidated Sanctions List, and that no UNDP funds received pursuant to the Project Document are used for money laundering activities. The United Nations Security Council Consolidated Sanctions List can be accessed via https://www.un.org/securitycouncil/content/un-sc-consolidated-list.

4. The Implementing Partner acknowledges and agrees that UNDP will not tolerate sexual harassment and sexual exploitation and abuse of anyone by the Implementing Partner, and each of its responsible parties, their respective sub-recipients and other entities involved in Project implementation, either as contractors or subcontractors and their personnel, and any individuals performing services for them under the Project Document.

   (a) In the implementation of the activities under this Project Document, the Implementing Partner, and each of its sub-parties referred to above, shall comply with the standards of conduct set forth in the Secretary General's Bulletin ST/SGB/2003/13 of 9 October 2003, concerning "Special measures for protection from sexual exploitation and sexual abuse" ("SEA").

   (b) Moreover, and without limitation to the application of other regulations, rules, policies, and procedures bearing upon the performance of the activities under this Project Document, in the implementation of activities, the Implementing Partner, and each of its sub-parties referred to above, shall not engage in any form of sexual harassment ("SH"). SH is defined as any unwelcome conduct of a sexual nature that might reasonably be expected or be perceived to cause offense or humiliation, when such conduct interferes with work, is made a condition of employment, or creates an intimidating, hostile, or offensive work environment. SH may occur in the workplace or in connection with work. While typically involving a pattern of conduct, SH may take the form of a single incident. In assessing the reasonableness of expectations or perceptions, the perspective of the person who is the target of the conduct shall be considered.

5. a) In the performance of the activities under this Project Document, the Implementing Partner shall (with respect to its own activities), and shall require from its sub-parties referred to in paragraph 4 (with respect to their activities) that they, have minimum standards and procedures in place, or a plan to develop and/or improve such standards and procedures in order to be able to take effective preventive and investigative action. These should include: policies on sexual harassment and sexual exploitation and abuse; policies on whistleblowing/protection against retaliation; and complaints, disciplinary and investigative mechanisms. In line with this, the Implementing Partner will and will require that such sub-parties will take all appropriate measures to:

   i. Prevent its employees, agents, or any other persons engaged to perform any services under this Project Document, from engaging in SH or SEA;

   ii. Offer employees and associated personnel training on prevention and response to SH and SEA, where the Implementing Partner and its sub-parties referred to in paragraph 4 have not put in place its own training regarding the prevention of SH and SEA, the Implementing Partner and its sub-parties may use the training material available at UNDP;

   iii. Report and monitor allegations of SH and SEA of which the Implementing Partner and its sub-parties referred to in paragraph 4 have been informed or have otherwise become aware, and status thereof;

   iv. Refer victims/survivors of SH and SEA to safe and confidential victim assistance; and

   v. Promptly and confidentially record and investigate any allegations credible enough to warrant an investigation of SH or SEA. The Implementing Partner shall advise UNDP of any such allegations received and investigations being conducted by itself or any of its sub-parties referred to in paragraph 4 with respect to their activities under the Project Document, and shall keep UNDP informed during the investigation by it or any of such sub-parties, to the extent that such notification (i) does not jeopardize the conduct of the investigation, including but not limited to the safety or security of persons, and/or (ii) is not in contravention

of any laws applicable to it. Following the investigation, the Implementing Partner shall advise UNDP of any actions taken by it or any of the other entities further to the investigation.

b) The Implementing Partner shall establish that it has complied with the foregoing, to the satisfaction of UNDP, when requested by UNDP or any party acting on its behalf to provide such confirmation. Failure of the Implementing Partner, and each of its sub-parties referred to in paragraph 4, to comply with the foregoing, as determined by UNDP, shall be considered grounds for suspension or termination of the Project.

6. Social and environmental sustainability will be enhanced through the application of the UNDP Social and Environmental Standards (http://www.undp.org/ses) and related Accountability Mechanism (http://www.undp.org/secu-srm).

7. The Implementing Partner shall: (a) conduct project and program-related activities in a manner consistent with the UNDP Social and Environmental Standards, (b) implement any management or mitigation plan prepared for the project or program to comply with such standards, and (c) engage in a constructive and timely manner to address any concerns and complaints raised through the Accountability Mechanism. UNDP will seek to ensure that communities and other project stakeholders are informed of and have access to the Accountability Mechanism.

8. All signatories to the Project Document shall cooperate in good faith with any exercise to evaluate any program or project-related commitments or compliance with the UNDP Social and Environmental Standards. This includes providing access to project sites, relevant personnel, information, and documentation.

9. The Implementing Partner will take appropriate steps to prevent misuse of funds, fraud or corruption, by its officials, consultants, responsible parties, subcontractors, and sub-recipients in implementing the project or using UNDP funds.

10. In the implementation of the activities under this Project Document, UNDP places reasonable reliance upon the Implementing Partner for it to apply its laws, regulations and processes, and applicable international laws regarding anti money laundering and countering the financing of terrorism, to ensure consistency with the principles of then in force the UNDP Anti-Money Laundering and Countering the Financing of Terrorism Policy.

11. The Implementing Partner will ensure that its financial management, anti-corruption, anti-fraud and anti-money laundering and countering the financing of terrorism policies are in place and enforced for all funding received from or through UNDP.

12. The requirements of the following documents, then in force at the time of signature of the Project Document, apply to the Implementing Partner: (a) UNDP Policy on Fraud and other Corrupt Practices and (b) UNDP Office of Audit and Investigations Investigation Guidelines. The Implementing Partner agrees to the requirements of the above documents, which are an integral part of this Project Document and are available online at www.undp.org.

13. In the event that an investigation is required, UNDP has the obligation to conduct investigations relating to any aspect of UNDP projects and programs in accordance with UNDP's regulations, rules, policies, and procedures. The Implementing Partner shall provide its full cooperation, including making available personnel, relevant documentation, and granting access to the Implementing Partner's (and its consultants', responsible parties', subcontractors' and sub-recipients') premises, for such purposes at reasonable times and on reasonable conditions as may be required for the purpose of an investigation. Should there be a limitation in meeting this obligation, UNDP shall consult with the Implementing Partner to find a solution.

14. The signatories to this Project Document will promptly inform one another in case of any incidence of inappropriate use of funds, or credible allegation of fraud or corruption with due confidentiality.

    Where the Implementing Partner becomes aware that a UNDP project or activity, in whole or in part, is the focus of investigation for alleged fraud/corruption, the Implementing Partner will inform the UNDP Resident Representative/Head of Office, who will promptly inform UNDP's Office of Audit and Investigations (OAI). The Implementing Partner shall provide regular updates to the head of UNDP in the country and OAI of the status of, and actions relating to, such investigation.

15. UNDP shall be entitled to a refund from the Implementing Partner of any funds provided that have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document. Such amount may be deducted by UNDP from any payment due to the

Implementing Partner under this or any other agreement. Recovery of such amount by UNDP shall not diminish or curtail the Implementing Partner's obligations under this Project Document.

Where such funds have not been refunded to UNDP, the Implementing Partner agrees that donors to UNDP (including the Government) whose funding is the source, in whole or in part, of the funds for the activities under this Project Document, may seek recourse to the Implementing Partner for the recovery of any funds determined by UNDP to have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document.

Note: The term "Project Document" as used in this clause shall be deemed to include any relevant subsidiary agreement further to the Project Document, including those with responsible parties, subcontractors, and sub-recipients.

16. Each contract issued by the Implementing Partner in connection with this Project Document shall include a provision representing that no fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the proposal, have been given, received, or promised in connection with the selection process or contract execution, and that the recipient of funds from the Implementing Partner shall cooperate with any and all investigations and post-payment audits.

17. Should UNDP refer to the relevant national authorities for appropriate legal action any alleged wrongdoing relating to the project, the Government will ensure that the relevant national authorities shall actively investigate the same and take appropriate legal action against all individuals found to have participated in the wrongdoing, recover and return any recovered funds to UNDP.

18. The Implementing Partner shall ensure that all of its obligations set forth under this section entitled "Risk Management" are passed on to each responsible party, subcontractor, and sub-recipient and that all the clauses under this section entitled "Risk Management Standard Clauses" are included, *mutatis mutandis*, in all sub-contracts or sub-agreements entered into further to this Project Document.

ANNEXES

A. Budget overview
B. Additional budget information
C. Project map and geospatial coordinates of the project area
D. Multi-year work plan
E. Monitoring plan
F. UNDP Quantum Risk register
G. Business cases minigrids
H. GEF indicators and GHG emission reduction details
I. Overview of project staff and technical consultancies
J. Gender analysis and action plan
K. Stakeholder engagement plan
L. Social and environmental safeguards planning (SESP)
M. GEF 7 taxonomy
N. PCAT assessment'
O. UNDP project quality assurance report
P. Agreements (co-financing letters, OFP Letter)
Q. Procurement plan
R. GEF Budget Template (available from BPPS NCE-VF)
S. GEF Execution Support Letter
T. LOA between UNDP and IP requesting UNDP Support Services agreed with IP and to be signed with the Project Document

Annex A. BUDGET OVERVIEW

Project objective: To support Turkmenistan's low carbon development in the achievement of climate mitigation goals by reducing GHG emissions from multi-family residential (and public) buildings						
Project Components	**Type**	**Project outcomes**	**Project outputs**	**Trust fund**	**In USD**	
					GEF project financing	**Co-financing**
1. Piloting energy efficient technologies and EMIS in residential and public buildings	INV TA	1. Nearly-zero energy (NZE) options demonstrated (through advanced building envelope upgrades and renewables) with information systems installed and tested	1.1 Investment in nearly-zero energy (NZE) measure and information systems in public and multi-family residential pilot building 1.2 Energy performance of NZEB pilot buildings assessed and compared with reference buildings 1.3 Public investment strategy for NZEB-type high-rise construction (submitted for adoption before the end of the Project)	GEFTF	765,000 (INV) 386,841 (TA)	39,246,428 (INV) 446,285 (TA)
2. Policy, regulations and institutional mechanism for energy efficient buildings sector	TA	2. NZEB construction design regulations proposed with strengthened institutional framework and enforcement policy	2.1 White papers prepared on the real cost of fossil fuel subsidies to the public budget and on cost-effective means of reducing energy consumption in the building sector 2.2 NZEB-compatible design criteria developed for buildings and current building codes updated 2.3 National NZEB plan [for Government consideration)	GEFTEF	335,608	560,000
3. Knowledge sharing and capacity building	TA	3. Strengthened and better-informed stakeholders on state-of-the-art construction in buildings and compliance with new building codes	3.1 Life-cycle-cost assessment methodologies are introduced 3.2 Increased capacity and knowledge of government officials and other stakeholders on NZEB construction planning, assessments, monitoring and evaluation	GEFTF	402,756	463,000
4. Monitoring and evaluation	TA	4. Project's M&E has been implemented	4.1 Monitoring and evaluation	GEFTF	77,753	110,000
			Subtotal		1,967,958	40,825,713
			Project Management Cost (PMC)	GEFTF	98,375	2,150,000
			TOTAL		**2,066,333**	**42,975,713**

ANNEX B. PROJECT MAP

★ Arkadag is located west of the city limit of Turkmenistan's capital city, Ashgabat, and east of the neighbouring city of Gökdepe at Lat. 38.07 – Long. 58.06

★ The new Ashgabat City development will be located north of the capital Ashgabat at Lat. 37.96 - Long.58.19

Box 17 Artist's view of future new Ashagat City project

Source: www.ashgabatcity.gov.tm

Box 18 Location and layout of Arkadag (Ahal province)

https://www.openstreetmap.org/#map=11/38.0749/58.1853.

ANNEX C. MULTI-YEAR WORK PLAN

Output / Activity (short title only)	Yr1		Yr2		Y3		Yr4		Yr5	
	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2
Component 1 Nearly-zero energy (NZE) options demonstrated (through advanced building envelope upgrades and renewables) with information systems installed										
Output 1.1 Investment in nearly-zero energy (NZE) measure and information systems in public and multi-family residential pilot buildings										
1.1.1 Identification of sites and pilot buildings										
1.1.2 Feasibility analysis and detailed design of pilot project interventions										
1.1.3 Installation of NZEB options (as part of the construction of the new building)										
Output 1.2 Energy performance of NZEB pilot buildings assessed and compared with reference buildings										
1.2.1 Energy performance measurements in pilot and reference buildings										
1.2.2 Case studies and information dissemination										
Output 1.3 Public investment strategy for NZEB-type high-rise construction (submitted for adoption before the end of the Project)										
1.3.1 Development of guidelines (for IT and NZEB options and applications, following proposed NZEB code updates)										
1.3.2 Development, review and submission for endorsement of an investment strategy by relevant Ministries										
Component 2 NZEB construction design regulations proposed with strengthened institutional framework and enforcement policy										
Output 2.1 White papers prepared on the real cost of fossil fuel subsidies to the public budget and on cost-effective means of reducing energy consumption in the building sector										
2.1.1 White paper on the real cost of fossil fuel subsidies to the public budget and national economy										
2.1.2 White paper on the costs-benefits and impacts of NZEB technologies										
2.1.3 Assessment of the potential of improving energy efficiency in existing buildings										
Output 2.2 NZEB-compatible design criteria developed for buildings and current building codes updated										
2.2.1 Compilation report on NZEB-type of building codes development and best NZEB practices										
2.2.2 Definition of benchmarks for categories of buildings per climatic zone and updated energy passports										
2.2.3 Development and presentation of NZEB codes to Ministry of Construction and Architecture										
Output 2.3 National NZEB plan [for Government consideration)										
2.3.1 Support for setting up a MRV unit as part of a dedicated organizational structure of the Ministry of Construction and Architecture										
2.3.2 National action plan for the introduction of new NZEB-type building codes										
Component 3 Strengthened and better-informed stakeholders on state-of-the-art construction in buildings and compliance with new building codes										
Output 3.1 Life-cycle-cost assessment methodologies are introduced										

Output Activity (short title only)	Yr1		Yr2		Y3		Yr4		Yr5	
	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2
3.1.1 Life-cycle-cost assessment methodologies are introduced within the budget planning procedure										
3.1.2 Embodied emissions assessment										
Output 3.2 Increased capacity and knowledge of government officials and other stakeholders on NZEB construction planning, assessments, monitoring and evaluation										
3.2.1 Conduct need assessment and design of capacity development programs on NZEB										
3.2.2 Capacity strengthening of central and local government officials, and administrations to conduct feasibility studies										
3.2.3 International exchange of knowledge and experiences										
3.2.4 Knowledge enhancement of construction companies and subcontractors that are providing materiel and equipment										
3.2.5 Training of architects, engineers and students in the fields of architecture and engineering trained on NZEB										
3.2.6 General knowledge management and information dissemination										
Component 4 Monitoring and evaluation										
4.1 Mandatory monitoring, reporting and evaluation										

ANNEX D. MONITORING PLAN

	Objective and Outcome Indicators	Mid-term project (end 2026)	End of Project (EoP) target (2029)	Frequency and *source*	Means of verification	Assumptions
Project Objective: To support Turkmenistan's low carbon development in the achievement of climate mitigation goals by reducing GHG emissions from multi-family residential (and public) buildings	1) Lifetime greenhouse gas emissions mitigated [tCO2 lifetime reduction – direct and indirect]	Pilot building (02): direct GHG ER: 5.3 tCO_2	Direct lifetime emission reduction (ER) of 86.9 $ktCO_2$-eq, (pilot buildings and constructions in investment strategy) Calculations are provided Annex G). Indirect ER = 760.5 $ktCO_2$.	**Frequency:** Annually **Source***:* Market surveys; investment plan, and/or project data; MTR and TE reports (M&E); Annual Implementation reviews (PIR) **Responsible***:* PMU	Project progress reports: Direct emissions from pilot monitoring; Indirect from partner reports and statistics; Expert assessments and project monitoring (EE performance) and final reports	Direct ER: Pilot/demos are realised as planned and assumptions remain valid. Indirect ER: Willingness and readiness of government authorities to plan and approve NZEB investments
	2) Projected lifetime energy savings	Pilot buildings: 96,078,000 MJ	Lifetime energy savings (linked with direct GHG ER of 1,580,208,000 MJ439,974 MWh of natural gas **	**Frequency:** Annually, PIR; **Source:** Monitoring reports of pilot/demos (Output 2.1); Data provided by developers and institutions Project quarterly reports **Responsible:** PMU	Pilot project reports and monitoring Project digital platform Mid-term and end-of-period survey among beneficiaries in pilot projects (see M&E)	Pilot/demos are realised as planned (assuming the willingness of the Ministries to investment in NZEB options and assumptions of Annexes G and H remain valid. Ministries, building owners and developers are able or willing to share data
	3) Number of direct beneficiaries (disaggregated) as co-benefit of GEF investment *	1114 beneficiaries (120pilot building occupants and 654 workers; 340 capacity building)	Total of 8,441 beneficiaries (3,671women) based on (see Annex G): 7,810 direct building beneficiaries and 620 direct beneficiaries of TEESB's capacity-building and awareness activities			
	4) Increase in installed solar PV capacity kW -solar – MWh battery]	Solar PV on two pilot buildings (0.112 kMW)	Solar PV (2.104 kMW , associated with direct GHG emission reduction). See Annex G			
Outcome 1 Nearly-zero energy (NZE) options demonstrated (through advanced building envelope upgrades and renewables)	5) Number of NZEB designed and constructed with expected energy savings and share RE	Two buildings designed and constructed (pilots); one office, one residential	Two pilot NZEB constructed (total floor space of 16,740 m^2) and energy performance measured with combined lifetime natural gas avoidance of 26,688 MWh	**Source:** Monitoring reports of pilots (Output 1.2); Data provided by developers Project quarterly reports	Building design and architecture with NZEB feasibility studies Product and technology specification; Pilot/demo progress reports	Willingness/ability of building owners (Ministries) to invest/finance and participate in the Project; Access to data, including willingness to

	Objective and Outcome Indicators	Mid-term project (end 2026)	End of Project (EoP) target (2029)	Frequency and *source*	Means of verification	Assumptions
with information systems installed and tested			(direct fuel and avoided power generation)	**Responsible:** PMU and building owners/developers and co-financing partners (Ministries)	Workshop materials	share by the building owners and Ministries and private entities (technology suppliers; construction companies) on investment (plans) and performance and reliability of data;
	6) Total floor space of multi-unit residential and public NZEB planned with expected energy (natural gas) savings	16,740 m^3 (pilot buildings)	NZEB investment strategy in accordance with new (proposed NZEB codes, see Indicator 7) aiming at total floor space (approved to be) constructed of 279,180 m^2 by the end of the project ***			
Outcome 2 NZEB construction design regulations proposed with strengthened institutional framework and enforcement policy	7) Building codes updated towards NZE performance	Assessment studies for code updating carried out	Five codes updated and proposed for endorsement and at least two codes approved***	**Frequency:** Annual and quarterly **Source:** Monitoring reports of pilots (Output 1.2); Assessment and technical studies performed Project quarterly reports; PIR; Stakeholder reports Ministries; academia/ institutes) and official documents **Responsible:** PMU and Ministries, partner organisations	Project progress reports (incl. PIR) Public sector reports and statements (Ministries; institutes); Stakeholder interviews; Official, statements and statistics Project-linked website and course description and curricula (research and training institutes) TEESB final report Workshop and training materials	Government remains committed to upgrading building codes to NZEB level and to sustainable (low-carbon) energy sector interventions in general (incl. reducing fossil fuel subvention) and other energy-relevant plans. Ability and willingness to develop and discuss NZEB building regulations. Access to data (including willingness to share by the public sector) and reliability of data; Interest and willingness of target beneficiaries to participate and attend workshops, meetings and training
	8) Developed road map for building code revision to mandate more energy-efficient building design	0	One roadmap formulated for implementation of new building codes (updated towards NZE)			
	9) Status of the policy-institutional framework for NZEB-type codes and MVE	Unit set up for building code monitoring, updating and MVE	Unit operational for building code monitoring, updating and MVE and roadmap implementation)			
Outcome 3 Strengthened and better-informed stakeholders on state-of-the-art construction in buildings	10) Awareness and capacity of government staff and practitioners on NZEB options and benefits are increased	Gender-sensitive and socially inclusive knowledge plan is updated at project inception. The capacity	The capacity of targeted recipients significantly improved (as assessed by the survey, including gender and social	**Frequency:** Annual, quarterly	Capacity enhancement and awareness increase survey carried out by the project;	Interest and willingness of target beneficiaries (public and private sector) to participate and attend meetings

	Objective and Outcome Indicators	Mid-term project (end 2026)	End of Project (EoP) target (2029)	Frequency and *source*	Means of verification	Assumptions
and compliance with new building codes		of targeted recipients is assessed by a survey towards the end of year 2, and an average score of at least 2 is achieved[41].	inclusion aspects) towards the end of the project with an average score of at least 4 (out of five)	**Source***:* workshop and training agenda and materials Reports from (training and R&D) institutions Project reporting **Responsible:** PMU, MEN, UNDP (for M&E)	Official statements, Internet news and reports Consultancy and technical reports;	(incl. women), workshops, conferences
	11) Number of staff and practitioners participating in capacity building (and % of women) *	340	620 (35% women)			
	12) Dedicated website on green and NZEB buildings	Website established and managed by Institute	Online information repository on NZEB and regularly updated. Case studies, technical materials and advocacy messages (including economic, environmental and social benefits) are produced and available online.	**Frequency:** Annual, quarterly **Source***:* workshop and training agenda and materials Reports from financial institutions Project reporting **Responsible:** PMU, organization/institute that hosts the website	Regular hits by users and expert checks of website or webpages Consultancy and technical reports;	Willingness to share info and maintain the website by counterparty organization(s). Sufficient logistic and IT support by host institutions

* Gender-relevant. More gender-specific progress indicators are given in Annex I

**) Electricity substitution bysavings: 16,805 MWh(e) (at plant's gate) and savings direct use of gas: 380.128 MWh(th) resulting from savings in natural direct use and substitution by electricity. Together, these result in total avoided natural gas use due to energy savings of 952,866,000 MJ and avoided use of natural gas (substitution by solar energy) in power generation of 627,342,000 MJ, giving total natural gas energy savings of 1,580,208,000 MJ. Details of calculations and assumptions are provided in Annex G.

***) For example, energy performance (residential low-rise and high-rise), energy performance (office, public), construction thermal engineering (envelope), climatology, share of renewable energy, etc. Elaboration and implementation of NZEB-relevant building codes is responsible for part of the direct emission reduction (81.6 tCO_2, associated with 262,440 m^3 of NZEB floor space, realized or approved before the end of the Project) and indirect emission reduction (760.5 tCO_2) post-project, in line with the projections of the (proposed) investment strategy (see Indicator 6).

****) Including assessments NZEB codes and technology options; updated benchmarking

[41] Knowledge and communication plan (see Annex J.3). On a scale of 1 to 5, an average score of at least 2 is achieved: in which "1" represents a low level of capacity and "5" represents a strong capacity to understand relevant issues and apply knowledge and skills to find effective solutions. (1)

ANNEX E. UNDP QUANTUM RISK REGISTER

Description	Risk Category	Rating (Impact & Likelihood)	Risk Treatment / Management Measures	Risk Owner
1: Construction related to applying energy-saving infrastructure, technologies and equipment may have negative environmental, social and health impacts, if not designed, and constructed properly	Social and environmental	I=3 L=3	Following the requirements of the national Law on Environmental Expertise (2014), process of Environmental Impact Assessment will be applied to buildings construction, including the design and application of the energy-saving technologies and solutions. To ensure that the national EIA process adheres to the UNDP SES requirements all construction projects subject to domestic EIA will be screened for the applicable UNDP SES standards, prior to the initiation of each EIA process. Process of the combined national EIA and UNDP ESIA will be described in the ESMF. Environmental and social impact assessment will include recommendations for the mitigation of local environmental and social risks. Besides the other issues, the pilot buildings' ESIAs will include adequate resource efficiency and waste management plan, hazardous materials management and disposal etc. During the building design process (implementation stage), the characteristics of each building will be assessed to identify the possible hazardous materials, as need be. For the construction phase, the ESIA will address good housekeeping, (ii) emissions (including dust, noise, etc.) control, and (iii) proper waste management including hazardous, solid, and construction waste management. It should be noted that air ventilation is an integral part of the NZE design (see Annex F). Concerning new buildings only, asbestos is not be used, since its use of is forbidden in Turkmenistan (since 2001 as per Building Code on roofs and rooftops – SNT 2.03.10-01). In any case, the technical design will scrutinize the: impact on health from applying toxic materials, containing volatile organic compounds (VOC) and formaldehyde. During the implementation, the construction companies will be selected through an international tendering process, which will require preparation of the EIA study. r Detailed requirements will be specified in the tenders following international standards and best practices (the most stringent one will be applied). The responsible parties shall confirm that: • Construction projects comply with applicable national construction norms/building codes and standards as well as international best	MEP MCA Project

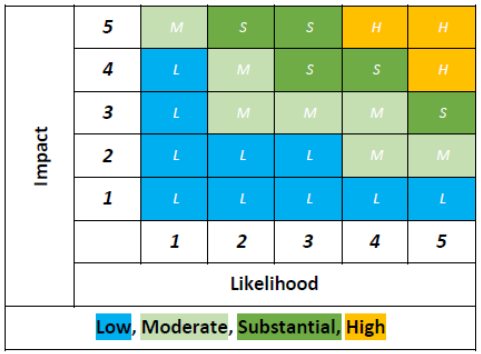
Description	Risk Category	Rating (Impact & Likelihood)	Risk Treatment / Management Measures	Risk Owner
			practices. The same applies to electric systems (installation of photovoltaic systems, solar heating systems, and the installation of LED lighting systems inside and outside of buildings). • Works will be implemented and maintained by the legally registered contractor(s) having relevant permits for the relevant works. Proof of experience and track record will be required from the contractor(s) prior to the award of the retrofit work. • Contractor(s) will be required to conduct orientation and training for workers on EE building retrofits, particularly multi-apartment buildings and public buildings. The contractors will be required to implement the Code of Conduct (CoC).	
2: Occupational health and safety arrangements during the construction works and that the employment opportunities provided by the project may fail to comply with national and international labour standards		I=4 L=2	Responsible party agreements/letter of agreements will include requirement to oblige contractors to comply with the national and international labour and working conditions standards, including the occupational health and safety. Procedures will be put in place after project inception. ESMF will include an Occupational Health Management Protocol f in compliance with the national legislation, complemented by the provisions of the Labour Management Procedure to comply with the SES and International Labour Standards. Such requirements should include, but not necessarily be limited to the following: • Provisions for a full occupational safety plan and training in advance of any construction, plus inspections in accordance with and possibly beyond existing national occupational health and safety regulations • Provisions to inform construction workers about what wastes are hazardous and therefore should be handled separately from other waste streams. • Procedures to avoid the working conditions not meeting the national labour laws and international commitments, and in denial of freedom of association and collective bargaining, use of child labour, forced labour, to discrimination against women considering that construction activities are dominated by men labour.	MEP MCA Project
3: Increases in greenhouse gas emissions or other drivers of climate change due to 'rebound effects' in newly built complexes.		I=3 L=2	Such "rebound effects" (putting appliances at higher cooling or heating levels or using oversized consumer appliances) will be addressed by the Project Team during training sessions with residents and via information campaigns in the media and on-site information boards.	MEP MOE Project

Description	Risk Category	Rating (Impact & Likelihood)	Risk Treatment / Management Measures	Risk Owner
			Reference to awareness raising and capacity development of the residents too shall be clearly included in the project document, in Output 3.2..	
4: The design of building construction might not consider access to the buildings by people with disabilities		I=3 L=3	There is a probability that the design of the four pilot buildings (Output 1.1) might omit the design on the accessibility by persons with disabilities and that the project might exacerbate the problem. The Project team will only have the mandate to improve the energy efficiency qualities of the building's design and will have to leverage over broader buildings design features. During project development and the building design process, the buildings will be screened concerning accessibility by persons with disabilities to ensure that the project does not accentuate this issue in any way.	MEP MCA Project
5: Project activity to promote increased participation of women in the construction sector exposes women to increased risks of employment related discrimination and workplace harassment		I=3 L=3	In its promotion of increased participation of women in the supported construction and maintenance-related project activities, the project will not encourage informal hires, but rather specifically aim at bringing women out from the grey sector into the fully contracted environment with prior know-your-rights training delivered to interested candidates. This will apply both to the pilot buildings and the new urban developments (new Ashgabat city; Arkadag) as a whole, and to related goods/materials and equipment/services supply chains. This risk might apply to all project activities. Gender Analysis (see Annex I in UNDP ProDoc) assesses and presents the status of the women working in the public building/construction sector and their capacity to participate in decision-making or other processes. The gender action plan outlines management measures for this and lists any other gender risks as well as opportunities to involve women in/through the project. Standard Codes of Conduct will be adhered to that address measures on prevention of Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH).	MEP MCA Project
6: Project activities involving local/field interventions and close engagement with local communities may inadvertently contribute to the spread of COVID-19, while project activities may make it difficult to travel or to implement activities (training, workshops)		I=2 L=2	The risk can be mitigated through adequate safeguards such as: (i) clear procedures in place in case of COVID-19 reinstatement of restrictions, approved during project inception (ii) use of protective equipment, maintaining social distancing and using remote methods of engagement whenever possible (iii) if adequate safeguards cannot be put in place, activities that entail close local communities' engagement will be put on hold if necessary. In general, the work programme/budget will be revised as needed. Wherever possible, online meeting platforms will be used instead of closed-quarters meetings and training in case of COVID-related urgencies.	MEP Project

Description	Risk Category	Rating (Impact & Likelihood)	Risk Treatment / Management Measures	Risk Owner
7: Activities funded by project co-financing partners may not be carried out in consistency with UNDP SES.		I=3 L=3	For activities funded by co-financing partners that are directly coordinated with the project's activities (i.e., the pilots of output 1.1), any gaps with respect to UNDP SES will be discussed and reviewed regularly, including during the multi-stakeholder coordination platform meetings and Project Board meetings. The Stakeholder Plan identifies the stakeholders and proposes engagement during all phases (preparation and implementation; see Annex J) As a general rule, an agreement will be aimed to be signed with co-financiers (and potentially parallel financiers), outlining that in case of discrepancy/ different policies of the relevant institutions/ financiers, the most stringent Environmental and Social guidelines/ safeguards will be applied.	MEP MCA MOE Project
8: Inequitable or discriminatory distribution of rights to reside in energy-efficient dwellings to people excluding those living in poverty or other marginalized i.e., excluded individuals or groups.		I=2 L=2	In assigning families and individuals to newly built and more energy-efficient buildings the Government is being guided both by the current sq. footage availability per household member and an institutional link (i.e., by whether rehoused individuals are employed by the agency/ministry sponsoring the construction of a particular block of flats). Poorer families have an equal chance to be relocated subject to them having a work affiliation (via the employment of a family member), particularly if they hail from more crowded households. Although the Project does not partake in the selection of residents for rehousing, it will aim to collect socioeconomic data on all residents rehoused to benchmark their standing against available national and international benchmarks and discuss the findings with the project partners to ensure non-discriminatory/equitable rehousing practices. Also, the project GRM will be available for stakeholders involved in collaborative activities implemented by the project and co-financing partners	MEP Project
9: Investment plan (2027-2036) for NZEB construction fail to sufficiently address issues of sustainable construction, safe construction materials, adaptation to climate change and indoor environmental quality, potentially hindering the positive effects of the project in terms of GHG emissions reduction, energy saving, waste reduction and health and safety of residents.		L=3 I=3	All mentioned outputs will be screened for the potential risks mentioned under the Risk 9 and where needed, targeted assessments or appropriately scoped SESA will be conducted to minimize the risks and suggest sustainable building criteria (aligned both with the national legal requirements and UNDP SES) to be incorporated in the relevant outputs.	**MCA** **MOE**

Description	Risk Category	Rating (Impact & Likelihood)	Risk Treatment / Management Measures	Risk Owner
10: Lack of technical, financial and administrative capacities of the Implementing Partners to execute donor-funded projects. Built capacity is lost faster than it can be replenished	Operational and organizational	I=4 L=4	No local CSOs or NGOs have been identified with the required relevant project execution experience and sufficient capacities to implement as Responsible Part (RP) a donor-funded project of this complexity. Engaging the private sector as a Responsible Party also bears a major reputational risk for the UNDP CO. In view of the findings above, the GEF OFP (Ministry of Environmental Protection) has requested UNDP to provide execution support services listed in the GEF OFP letter (see section 7 on government arrangements).… Moreover, all procurement to be done under this component will follow a competitive and transparent bidding and selection process. Supplier contracts shall include clauses for performance monitoring, servicing and training of relevant EEC staff. The preparation of the RFP requirements and the subsequent review and assessment of the proposals will include a third-party expert to verify that the costs do not exceed the incremental costs of the standard prices in the market that have similar technical specifications. The PCAT confirms that the Implementation of a stand-alone donor-funded project or programme is beyond the scope and mandate of the MAEP. As a government entity, the MAEP is constrained by the national legislation and internal regulations. In particular, the MAEP would be unable to directly perform the following project implementation services: Financial management and reporting of donor funded projects; Recruitment and HR management; Procurement and administrative support of international standards. UNDP country Office support has therefore proposed as project implementation modality (CO-supported NIM)	**MAEP** **MCA** **MOE**
11: Lack of co-financing for new NZEB builds and buildings beyond the pilot buildings financed by the Project.	Financial-political	I=4 L=5	The project will not disburse any funds until the feasibility studies (to be produced at the initial phase of the Project work) are not assessed by the Government and their conclusions as regards changing the outdated regulations are given the green light. The Project will also develop a phased investment plan that will be starting from not later than Year 4.	MEP MCA MOE
12: The Government doesn't pass NZEB regulation legislation during the time frame of the project.		I=3 L=4	The government has demonstrated a strong interest in resource efficiency and climate change mitigation. It understands building codes but also weighs additional investment costs against additional natural gas export revenues. Decision-making can be time-consuming; the EERB building codes were only approved after the project's end and the regulation regarding the submission of documentation of construction according to the building codes is still pending. Hence, the importance in TEESB adhered to lifecycle cost assessment and capacity building of officials and decision-makers, as	MCA MOE

Description	Risk Category	Rating (Impact & Likelihood)	Risk Treatment / Management Measures	Risk Owner
			well as formulating an action plan for NZEB and changes in the legal-regulatory framework	
13. Climate change impacts and variability risks (extreme heat and cold events that are expected to be more frequent due to climate change)	Climate change	I=4 L=2	Climate risks might affect the implementation of the projects due to prolonged periods of extreme heat in the summertime when no installation work might be undertaken due to hostile working conditions for manual labour in an unconditioned environment. This will be taken into account in the SESP/labour management plans of the pilot/demo activities. Buildings are usually designed to maintain continued operation during disasters, through structurally robust walls and roofs that can withstand seismic and extreme weather events. By investing in rainwater harvesting and where suitable enhanced use of grey water, the project can support adaptation to drought (see Annex F for a description)	MEP Project



Determination 'significance' of risk; P: likelihood; I: impact

ANNEX F. NEARLY-ZERO ENERGY INTERVENTIONS IN BUILDINGS

A.1 Results of the EERB project with energy-related construction norms (SNT)

The GEF-supported UNDP-implemented project "Improving Energy Efficiency in the Residential Building Sector of Turkmenistan" (EERB Project) aims to reduce greenhouse gases (GHG) emissions by improving energy management and reducing energy consumption in the residential building sector of Turkmenistan. The EERB Project consisted of four components: (i) Energy efficient building codes and supporting capacity strengthening; (ii) Demand-Side Management partnership with Turkmengaz (the local executing agency of the project); (iii) Improved design measures for major residential consumers; and (iv) Replication through training and support for policies that encourage energy efficiency.

Overall, this EERB Project has had a sustainable effect on the improvement of energy efficiency in the residential buildings sector in Turkmenistan. Through updating the regulatory framework, the project introduced revised building codes (SNT, from the Russian-language[42] abbreviation), namely a) SNT "Residential Buildings", SNT "Roofs and Roofing", SNT "Building Climatology" and SNT "Building Thermal Engineering. These were approved during 2015-2017. Through the implementation of pilots, the project demonstrated the best practices of design, energy performance and energy management in new/renovated residential buildings; and through the capacity building activities and outreach program created a local capacity and capabilities of local dedicated institutions and professionals for replication and scaling up of these activities in a sustainable way. A summary of the main results is given in Box 20 While the project has helped to define the new building codes, unfortunately, the Ministry of Construction and Architecture has not approved yet the corresponding "Instruction on the composition and procedures of project documentation for the construction of buildings". This sheds doubt on how effectively the new energy-related building codes are implemented.

Several audits were carried out as part of the EERB Project, measuring heat and electricity consumption in new residential building complexes and in newly constructed buildings. These were summarised in a project infographics publication (see Box 19 for a summary). The savings (in MWh and kWh/m^2) mentioned for different types of residential buildings have been used to compute the typical energy consumption for heating, ventilation and cooling in a typical 9-storey and a 12-storey apartment building.

Based on EERB project reporting on thermal transmittance and other characteristics of the building envelope in combination with monthly temperature averages, an attempt has been made to calculate the energy losses for a residential building, considered typical as TEESB pilot with 30 apartments on 4 floors) constructed at the current energy building norms and before their introduction. The results (energy consumption of 633 MWh/yr; see Box 22) roughly correspond with the energy consumption of a nine-floor residential apartment building measured in the EERB-supported audits (about 615 MWh per year)[43].

Box 19 Energy demand for heating, cooling and ventilation in new buildings (before introduction of current SNT, building codes)

	Energy consumption			*Energy per floorspace (kWh per m^2)*
	Before SNT norms	*At current SNT norms*		
9-floor (54 apartments)		4,968	m^2	
Space per appartment		92	m^2	
Energy for heating	496	340	MWh/yr	68.4
Energy for cooling	118	75	MW/yr	15.2
12-floor (luxury 72 units)		22,464	m^2	
Space per appartment		312	m^2	
Energy for heating	1,924	1,307	MWh/yr	58.2
Energy for cooling	665	332	MWh/yr	14.8

Data calculated based on I*mprovement, energy efficiency in the residential sector Turkmenistan's construction, Results of energy audits of apartment buildings in Turkmenistan* (UNDP 2017a), *Key Achievements of the UNDP/GEF Project* (project infographics, UNDP, 2017b)

[42] Строительные Нормы Туркменистана (SNT) – Construction Norms of Turkmenistan

[43] The amount does not include the electricity use of electric appliances by the apartment dwellers (but

Box 20 Key achievements of the UNDP/GEF EERB project

Product	Status
- Building code "Residential Buildings" - Building code "Roofs and Roofing" - Building code "Building Climatology" - Building code "Building Thermal Engineering" - Guidance manuals for the above-mentioned building codes and summary report	- Developed and adopted - Developed
Guidance and instructions: - Planning and implementation of energy management for existing residential buildings in Turkmenistan - Methodology for energy audit of residential buildings and provisions on rules and process for energy audit in residential buildings of Turkmenistan - Development, commissioning and operation of the automated heat control/regulation - Software package 'energy passports in buildings'6 - Catalog of materials and assemblies for reducing heat losses in the design of building envelope elements; Assessment of EE benefits - Manual on improving the energy efficiency of residential buildings	Developed
- Building code "Instruction on the composition, procedure for the development, approval and adoption of project documentation for the construction of enterprises, buildings and structures"	In process of adoption
- Building code "Heating, ventilation and air conditioning"	Changes on EE integrated
- Energy audits (with reports and summary report) in 22 pilot residential buildings in 9 cities of Turkmenistan; 6 pilot buildings (3 new for construction, 3 for renovation) in Ashgabat (9-storey 54-apartment house; elite 12-storey 114-apartment residential building; elite 12-storey 66-apartment residential building; 3 pilot reconstructed residential houses . Installation of energy management system and monitoring of energy consumption in 5 pilot buildings in the residential area of Koshi micro-district.	Developed
- National Action Plan for Rational Use of Energy in the Residential Sector - Scenarios for EE renovation of the residential building sector - Financial assessment and investment plan for the renovation of the residential sector	- Under consideration - Developed - Developed
- Revised Curricular program for students of TSIAC - Lecture material and practical work for the section "Energy Saving" - Laboratory works for the section "Energy saving" - Energy Saving Laboratory - Competition for students of TSIAC - Management of the preparation of the diploma theses for students of the TSIAC	- Adopted - Developed - Developed - Equipped - Developed, -Implemented

Compiled from *Terminal Evaluation, Improving Energy Efficiency in the Residential Building Sector of Turkmenistan (EERB),* by P. Janelidze (2017)

In Turkmenistan, building code requirements concern newly constructed buildings. In terms of minimum energy performance requirements, there are none, neither for newbuild nor renovated buildings. However, the current building codes contain prescriptive/element-based criteria for thermal insulation. The overall thermal coefficient of a building (referred to as a global heat transfer coefficient, G [in W/m^3K]) of the heated volume will vary as a function of the number of levels of the building and external area per volume ratio (A/V).

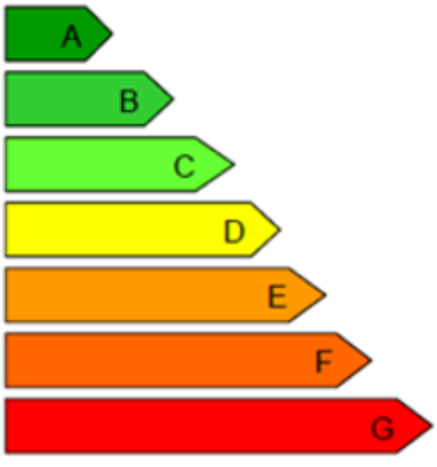
does include as part of 'free heat' the heat generated as a consequence of using these appliances).

Box 21 Building envelope, thermal resistance values and energy passports

Buildings and facilities	Heating Degree-days [°C · day]	Building envelope thermal resistance minimum values R-value [m². K/ W]				
		Wall	Roofs and ceilings above corridors	Attic ceilings, structures above cold basement and underground	Windows and balcony doors	Vestibule and lobby
Residential buildings, hospitals, schools, dormitories	2000	2,1	3,2	2,8	0,3	0,3
	4000	2,8	4,2	3,7	0,45	0,35
	6000	3,5	5,2	4,6	0,6	0,4
	8000	4,2	6,2	5,5	0,7	0,45
	10000	4,9	7,2	6,4	0,75	0,5
	12000	5,6	8,2	7,3	0,8	0,55
Other buildings, office and residential buildings, except for premises with higher indoor humidity	2000	1,6	2,4	2,0	0,3	0,3
	4000	2,4	3,2	2,7	0,4	0,35
	6000	3,0	4,0	3,4	0,5	0,4
	8000	3,6	4,8	4,1	0,6	0,45
	10000	4,2	5,6	4,8	0,7	0,5
	12000	4,8	6,4	5,5	0,8	0,55
Buildings operated in dry and normal conditions	2000	1,4	2,0	1,4	0,25	0,2
	4000	1,8	2,5	1,8	0,3	0,25
	6000	2,2	3,0	2,2	0,35	0,3
	8000	2,6	3,5	2,6	0,4	0,35
	10000	3,0	4,0	3,0	0,45	0,4
	12000	3,4	4,5	3,4	0,5	0,45

Source: CHT 2.01.03-98 Строительная теплотехника – Turkmen Code on Building Thermal Engineering.
Note: U-value = 1 / R-value

Examples of energy passport of buildings



Energy performance (deviation actual heat resistance from indicator value). R_N: new building; R_E: existing building	
Example 1	Example 2
A++ EP < 0.4 R A+ 0.4 R < EP < 0.5 R A 0.5 R < EP < 0.6 R	A: EP < 0.5 R_N
B+ 0.6 R < EP < 0.7 R B 0.7 R < EP < 0.85 R	B: 0.5 R_N < EP < R_N
C+ 0.85 R < EP < 0.95 R C 0.95 R < EP < 1.05 R C- 1.05 R < EP < 1.15 R	C: R_N < EP < 0.5 (R_N+R_E)
D 1.15 R < EP < 1.5 R (existing buildings)	D: 0.5 (R_N+R_E) < EP < R_E
E EP > 1.5 R (existing buildings)	E: R_E < EP < 1.25 R_E
F	F: 1.25 R_E < EP < R_E
G	G: 1.5 R_E < EP

Box 22 Calculation of energy flows (heating, cooling, ventilation) in a 9-floor residential building

Before introduction of current SNTs					At current SNT (EESB project)		At NZE practice (TEESB project)	
Energy transmittance values					*Current values*		*NZEB values*	
	Area (m2)	*U value W/(m2.K)*	*Contribution W/K*		*U-value W/(m2.K)*	*Contribution W/K*	*U-value in NZEB*	*Contribution W/K*
Wall	2055.6	1.0	2055.6	U*area (wall w/o window)	0.6	1233.3	0.2	411.1
Roof	754.3	0.7	528.0	U*area (roof)	0.33	248.9	0.15	113.1
Basement	754.3	1.1	829.7	U*area (basement)	0.67	505.4	0.4	301.7
Window	614.0	2.7	1657.8	U*area (window)	1.7	1043.8	1	614.0
- % of wall	23%			% of wall area				
Envelope	4178.2	*1.214*	5071.1	a (=sum of above)	*0.73*	3031.4	*0.34*	1440.0
Lack of vestibule			425	b; own estimate				
Energy losses/gains								
Degree.hours [K.hr]			2801	q (see footnote)		2801		2801
Energy flow- convection [MWh/yr]			369.5	d=c*(a+b)*24/1.10^6		203.8		96.8
Energy flow - ventilation			144.5	e=n*f*c*V*24/1.106		144.5		144.5
ACH (n)	0.35			n: air exchange per hr			0.35	
air heat flow	0.34			f: 1204*1002/3600				
Heat recovery ventilation			0			0	60%	57.8
Energy flow (MWh/yr)		Total	514.1	h=d+e	Total	348.4		154.6
Heating and cooling needs								
Heating		Heat	415.5	i, see footnote		281.6		125.0
		Free heet	87.1	j, see footnote		87.1		87.1
		Hot water need	123	k, see footnote		123		123
Heating need	18%	w/o AHC	**510.9**	m=(i-j)*(1+20%)+k	w/o AHC, meters	**352.9**	with AHC	**161.3**
Cooling		Heat gain	98.5	c, see footnote		66.8		29.6
		Free heat	33.1	o, see footnote		33.1		33.1
Cooling need	3%	w/o AHC	**136**	p=(n+o)*(1+3%)	w/o AHC, meters	**102.9**	with AHC	**62.8**
Total			***646.5***	MWh/yr		***455.8***		***224.0***
Energy consumption								
Gas consumption						392		179
Efficiency burning, boilerr					90%	1411	90%	645
						51659		23609
						77.6		35.5
Electricity consumption								
IPLV, chiller					3.8	27.1	4.4	14.3
						18.8		9.9
TOTAL emissions						96.4		45.4

The tables provide an example of how gas consumption (for heating) and electricity (for cooling) when building according to current norms (approved in 2020) and to more stringent net-zero energy (NZE) norms in comparison without the situation before the EESB project.

Notes:
- degree hours are taken from item q in Box 21
- free heat (human body heat, heat generated by electric appliances) estimated assuming 6.66 kWh per apartment per day calculated over heating days per year (giving j) and cooling days (giving c); see Box 22
- hot water needs provided with boiler system, consumption assumed at 120 litres per apartment per day (heating difference 40 K), c_{water}= 4.186 KJ/(kg.K)

Data are calculated based on information provided in UNDP EERB reports (see UNDP 2017a and 2017b, as referenced in Box 19); information on internet on ventilation values and heat losses; *Implementing Nearly-Zero Energy Buildings, Romania, Poland* (Buildings Performance Institute, BPIE; 2012)

A.2 Comparison of NZEB options with reference buildings

To analyse the impact of the introduction of 'nearly zero energy building options' (NZEB) two reference buildings are considered in this Annex (and form the basis for the baseline greenhouse gas emission reductions of the proposed TEESB Project.

The first reference building is a 5-floor residential building with 30 apartments and a total floor area of 7,020 m^2 (of which 4,588 m^2 of apartment space on 4 floors). The energy losses/gains through the building envelope and ventilation are calculated similarly to the 9-floor apartment building example, discussed in the preceding paragraph. The roof is flat, and it is assumed the floors are heated to 20.5°C in winter. The heating is assumed to be with an air heat pump system (see Box 25) as an alternative to the assumed base case of using a central system comprised of a chiller (powered by electricity) for cooling and a boiler (powered by natural gas) for heating. Cooling is at a set point of 25°C. The domestic hot water system is linked to the heating system[44]. The second reference is an office building with seven floors and a total floor area of 7,680 m^2 with its boiler system (of which 5,776 m^2 of office space). None of the reference buildings applies renewable energy options. In both reference cases, no automatic heat control system or advanced energy management systems are applied (that can tune to heat supply in real time to the actual outside temperature) and the apartments or office space s do not have individual heat metering in the central boiler-chiller system[45].

It is assumed that the reference buildings are constructed according to the current SNTs (2020 building construction norms). Building requirements (including the minimum thermal performance of building components) are controlled at the stage of construction authorisation (building permit). In principle, the requirements are respected in the design documentation, otherwise, the construction project does not pass the authorisation process. However, in practice, the execution of the work may not be undertaken according to the design as the necessary "Instruction on the composition and procedures of project documentation for the construction of buildings" has not been officially approved yet. Thus, the result may depend on the budget made available by the investor. In addition, the poor execution of details/joints (thermal bridges) can lead to a reduction of the global thermal resistance of the building envelope.

For the NZEB case, a number of energy-saving improvements are considered:

- Construction of an improved building envelope (with a higher U value for its walls, windows, attic and basement)
- Heat recovery module added to the building's (mechanical) ventilation system
- Central system using a ground source heat pump in case of the office building with automated heat control and advanced energy management information system (EMIS)
- Apartment-based air heat pumps in the case of the apartment building with automated heat control (AHC)
- Addition of grey water recycling and re-use system for the office building

Box 21 Monthly average temperatures, Ashgabat/Ahal

Average temperature (°C)			Set point (°C) Heating 20.5	Cooling 25.0
Ashgabat / Ahal area			Temp. difference (K)	
Jan	2.7	31	17.76	
Feb	4.5	28	16.03	
March	10.4	31	10.1	
Apr	17.2	30	3.26	
May	23.3	31		
June	30.0	30		5
July	32.0	31		7
August	30.0	31		5
Sept	25.5	30		0.5
Oct	18.5	31	2	
Nov	11.0	30	9.5	
Dec	4.1	31	16.36	
			K*days	
		Total [K.day]	2801	q
		- heat loss	2264	r
		- heat gain	537	s

Source: based on data provided in worldweatheronline.com and *Revised Building Codes* (UNDP, EERB project, 2017)

[44] It is assumed here that each apartment has an individual system for heating and DHW (domestic hot water) production. Alternatively, there can be heat pump per floor and/or for heating and DHW separately (see Box 25)

[45] In the base case, a gas boiler usually provides heat for a small group of apartment buildings (as a micro district heating system)

In these cases, heating systems provide heating in the winter period and hot water while cooling is needed in the hot summer months. Building space is also heated by 'free heat' gains from the occupant's bodies, lights and appliances as well as passive solar gains (solar radiation penetrating through the windows). Heating (and cooling) is needed to add to (or compensate) for the 'free heat' and energy flows through the building's envelope and keep the temperature in the building at acceptable values. Energy flows in and out through the building fabric (its walls, roof, floor and windows) as well through ventilation (moving the air through the building and eventually inside and outside).

Cutting the building envelope heat losses (in winter, or gains in summer) is using materials that give the wall, roof, floor or window a lower heat flow. This can be expressed by their *U-value (heat transmittance*). The U value is the heat flow per surface area] divided by the temperature difference (outside minus inside temperature) into the units Watt per (Kelvin x square metre, W/(K.m^2). The lower the U-value, the better the insulation performance. In walls, roofs and floors **conduction** is the main mechanism of heat flow and this can be reduced by incorporating one or more of a range of insulating materials. The heat flow is determined by the characteristics of the building and insulation material (thermal conductivity, in [W/(m.K] and the thickness (in metres, [m]). The lower the conductivity and the higher the thickness, the better the insulation. The U-value of a wall or roof is determined by the characteristics of its composite elements (such as brick or concrete, plaster, mineral insulating wool or polystyrene foam, etc.). Windows were traditionally single-glazing with a high U-value of about 4.8). A double-glazed window (argon-filled) has a value of between 2.0 and 1.5, while triple-glazing can have 1.3-0.8 (depending on coating, thickness, and airtightness).

Box 22 Base date used in energy efficiency and renewable energy calculations

Natural gas	36.6	MJ/m3
- heating value	47.1	MJ/kg
- carbon content	55	kgCO2/GJ
Grid factor	0.63	tCO2/MWh
Efficiency power generation from gas	31.4%	
T&D losses	10%	
Lifetime EE and RE	20	yrs
Solar energy - Ashgabat		
Direct normal irradiation	1511	kWh/m2/yr
Global tilted radiation	1918.5	kWh/m2/yr
	4.05	sunhrs/day
Solar PV panel output	1479	kWh/kWp
Watts per area	0.221	kWp/m2
Cost of PV	1250	USD/kWp

Source: power sector data from solar data from project papers produced by the UNDP/GEF GURB project (Integrated Green Urban Development). Heating values from www.engineeringtoolbox.com. Prices of solar PV and SWH based on *Implementing nearly Zero-Energy Buildings* (nZEB) series (BIEE) www.globalsolaratlas.info/map?s=38.02438,58.708989&m=site&c=37.99508,58.539619,11: solar data

Buildings also lose heat by **ventilation**, i.e., the passage of air through them. This normally means the controllable air movement through openable windows, extractor fans, or, in the case of larger buildings, a mechanical ventilation system. Some form of ventilation in a building is essential to remove moisture from kitchens, toilets and bathrooms, and to provide fresh air for occupants and to keep them cool in summer. The key factor in determining the ventilation heat loss in a building is the *ventilation rate*, which can be specified as the number of complete air changes that take place per hour (ACH). A typical rate is 0.5 ACH, meaning that it will take two hours for the air to be completely replaced by new, incoming air. If the volume of a house is V m3, and the air change rate is n ACH, then the total amount of air passing through it per hour will be n × V [m3]. The total ventilation heat loss Qv follows
Qv = 0.33 × n × V × ΔT [in Watts] with the heat capacity of air is 0.33 [Wh/(K.m^3].

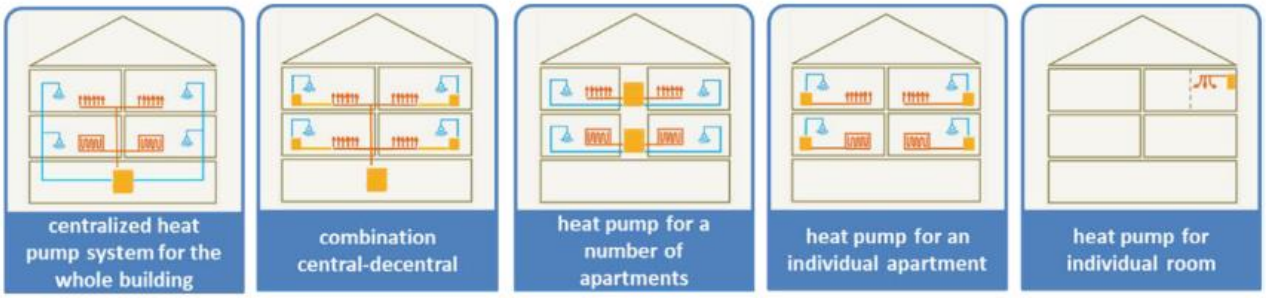
Heat loss can also be reduced by recovering some of the heat from ventilation air before it is released. Many large buildings use mechanical ventilation driven by electric fans. One way of reducing ventilation heat loss is to use mechanical ventilation with heat recovery (MVHR), which involves allowing warm outgoing air to preheat cold incoming air. This can be done by passing both air streams through a heat exchanger. They must be installed in buildings that are airtight to start with, otherwise, any attempt to pump air around the system may just increase the flow of air through unwanted air infiltration paths. Energy-recovery ventilation significantly reduces the energy use the coldest winter months and hottest summer months) owing to the large outdoor-indoor temperature differences.

Box 23 Heat pumps

A Heat pump is a device that uses a small amount of energy to move heat from one location to another. Heat pumps are typically used to pull heat out of the air or ground to heat a home or office building, but they can be reversed to cool the building. One biggest advantages of a heat pump over a standard heating, ventilating and air conditioning (HVAC) units is that there is no need to install separate systems to heat and cool the building. Heat pumps can provide space heating and cooling and hot water heating,

There are various types of heat pumps used in buildings, depending on sources and sinks used. For air source heat pumps (ASHP), air is the fundamental heat source. Air source heat pumps consist of air-to-air or air-to-water heat pumps. Water-source heat pumps (WSHPs) use water as a heat source and include water-to-air and water-to-eater pumps. Water can be groundwater extracted from wells or surface water extracted from ponds, lakes, or rivers. Ground source heat pumps use he ground is widely used as a heat source and sink in heat pumps. During the heating season, a GSHP can move heat taken from the ground and apply it to a building. In the cooling season, this process is reversed, as the building's excess heat is moved back to the ground to provide air conditioning. Water has a higher heat capacity than air, so, WSHP have a higher efficiency (with a COP of up to 3 or 4.5) than ASHP (with COP of 2 to 3.5). Due to the relative stability of ground temperature, geothermal heat pump systems are inherently more efficient than other heat pumps with COP in the range pf 3.8-5.0 *. AHSP have the lowest investment cost (per kW) but heating capacity and COP may decrease under cold climates. WSHPs have higher COP but water availability restricts the use of WHSP. GSHPs have the highest COPs and are more suitable in colder climates, but investment cost is higher.

Apart from type of heat pump, systems can be classified according to the level the integration in the building is realized.



The central heat pump system for the whole building, both for space heating and hot water, or heating and hot water separately. In case of large buildings, more than 1 heat pump may be necessary to meet the required heating capacity (cascade solution). Each of the modalities have their pros and cons. More decentralised systems have higher investment but also lower distribution losses. When retrofiring buildings, some variants may be easier to implement than others.

Sources: a) *Heat Pumps in Multi-Family Buildings for Space Heating and Domestic Hot Water, Annex 50 HPT-TCP, International Energy Agency* (IEA, 2022), b) *How Heat Pumps Work,* https://home.howstuffworks.com/home-improvement/heating-and-cooling/electric-heat-pumps-existing-tech-news.htm, c) *Heating and Cooling With a Heat Pump,* https://natural-resources.canada.ca/energy-efficiency/energy-star-canada/about/energy-star-announcements/publications/heating-and-cooling-heat-pump/6817; d) *The Use of Ground Source Heat Pump to Achieve a Net Zero Energy Building,* by Agostino, D. et.al in: Energies 2020, 13, 3450,

* The COP is defined as the relationship between the power (kW) that is drawn out of the heat pump as cooling or heat, and the power (kW) that is supplied. The COP usually exceeds 1, especially in heat pumps, because, instead of just converting work to heat (which, if 100% efficient, would be a COP of 1), it pumps additional heat from a heat source to where the heat is required. Most air conditioners have a COP of 2.3 to 3.5. Less work is required to move heat than for conversion into heat, and because of this, heat pumps, air conditioners and refrigeration systems can have a coefficient of performance

The TEESB project will promote the use of insulated pipes and ducts. Compared to the use of boilers and chiller option, the use of heat pumps (providing for heating, cooling and hot water) allows for larger energy efficiency. Thus, it is assumed that the baseline of gas boiler (for space and hot water heating) and chiller (for cooling) is replaced by an advanced ground

source heat pump system in the case of the office building and individual air source heat pump system in case of the apartment building[46].

Currently, the apartment occupants are charged per square meter of floor space, irrespective of their energy-for-heating use. Temperature valves need to be installed on room heat radiators (to finetune heat supply to actual demand). In the case of (partly) central systems, apartments or office departments need meters to be installed to be able to measure the heat supplied for each apartment or office department, By using an automated heat control (AHC) system it is possible to use 'compensated' control whereby the circulating water temperature (heated in the central boiler system that serves a group of buildings) is modulated according to the weather, reducing heat output when the weather is mild and increasing it when it is cold[47]. EMIS (energy management information systems) are the broad and rapidly evolving family of tools that monitor, analyse, and control building energy use and system performance. The data generated from EMIS tools enable building owners to operate their buildings more efficiently and with improved occupant comfort by providing visibility into and analysis of the energy consumed by lighting, space conditioning and ventilation, and other end uses. A building automation system (BAS) can be used to control building heating, ventilation, and cooling systems (and in some cases, building lighting and security systems. The BAS controls indoor temperature, humidity, ventilation, and lighting conditions. EMIS tools such as energy information systems (EIS), fault detection and diagnostics systems (FDD), and automated system optimization tools (ASO) supplement the BAS to facilitate analysis and management of building performance, including energy, comfort conditions, and ventilation. An EIS can Track, weather-normalized energy data on an interval basis (and more advanced versions are integrated with the BAS). An ASO continuously analyses and modifies BAS control settings to optimize heating, ventilation and cooling energy usage while maintaining occupant comfort. A FDD identifies abnormalities in the heating, ventilation and cooling systems or equipment performance and in some instances can isolate the root cause of anomalies. In the Project is proposed that EMIS is installed in two (new) pilot office buildings.

All the measures mentioned above (better energy performance of the building envelope, triple-glazing windows, heat recovery in ventilation) will reduce the energy loss, , of the building or contribute to using energy more efficiently, and will reduce the associated greenhouse gas emissions. Energy consumption in Turkmenistan's buildings is based on natural gas, whether direct use or in the form of natural gas used for power generation. The remaining energy consumption (after the implementation of NZEB technologies) must be compensated for by using renewable energy. It is assumed that a PV system can supply (the larger part of) the electricity demand of the heat pump. Thus, the emissions by the remaining gas and electricity are compensated for to a large extent, which leads to having a 'nearly zero emission building',

Box 26 provides the energy-relevant characteristics and an estimate of the energy consumption for heating, ventilation and cooling) of the reference residential building and one with NZEB options and Box 27 presents the reference office building and the case with NZEB options. The boxes show the calculated energy savings that can be obtained for heating (resulting in savings of direct natural gas use) as well as cooling and ventilation (resulting in electricity savings). Since most of all electricity is generated from natural gas, saving power results in savings in natural gas). It should be noted that in cases where the PV can produce more electricity than the energy needed for heating, cooling or ventilation, in which case it is assumed that the access power can be delivered to the grid (and thus the corresponding CO_2 emission reduction can still be accounted as compensation for energy consumption, albeit outside the building).

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44 Ground-source heat pumps are more efficiency than air heat pumps but investment cost is also relatively higher, For an apartment building a range of onions are possible from central to individual, as explained in **Box 25**.

Energy storage systems and the associated energy conversion equipment are not considered here, as they make NZEBs more complex and require additional investment. In cases were peak demand exceeds the capacity of the heatb pump system (e.g. very cold days and/or without sufficient sunshine), the heat is assumed to be provided by the gas boiler systems in the vicinity of the pilot buildings (micro district heating). Electricity will always be guaranteed as all buildings are grid-connected.

47 Air temperature may be sensed either (a) within the room(s) supplied or (b) in the room extract ductwork. Similarly, in cooling with central chillers, the supply of chilled water to the battery, is based on an air temperature measurement from a sensor located (a) within the supplied room space, or (b) in the air extract ductwork. In the EERB project, it was found that the installation of AHC systems yielded heat energy savings of about 18% in heating and 3% in cooling.

Box 24 Calculation of energy flows (heating, cooling, ventilation) in a pilot residential apartment building (reference case and with NZEB options)

Height floor (m)	2.95	Total height	17.7	(4 floors + attic +_basement)		
Area; one floor)	1350	Wall area	3,717	Total floor	8100	m^2
Length (m)	90.0	Entrance	280	Apart.space	5308	m^2 (stairway space is 92 m^2)
Width (m)	15	No. apartments	30	Volume	23895	m^3
Energy transmittance values						
	Area (m2)	*Current values* *U-value W/(m2.K)*	*Contribution W/K*	*NZEB values* *U-value in NZEB*	*Contribution W/K*	
Wall	3,052	0.44	1635.5	0.2	743.4	U*area (wall w/o window)
Roof	1,350	0.33	445.5	0.15	202.5	U*area (roof)
Basement	1,350	0.6	810.0	0.4	540.0	U*area (basement)
Window	385	1.7	654.0	0.86	330.8	U*area (window)
- % of wall	10%					% of wall area
Vestibule	280	2	560	1.0	280	vestibule
Envelope	6,417	*0.64*	4105.0	*0.33*	2096.7	a (=sum of above)
Energy losses/gains						
Degree.hours [K.hr]			2801		2801	q (see footnote)
Energy flow- convection [MWh/yr]			276.0		141.0	$d=c*(a+b)*24/1.10^6$
Energy flow - ventilation			188.4		188.4	e=n*f*c*V*24/1.106
ACH (n)	0.35			0.35		n: air exchange per hr
air heat flow	0.34					f: 1204*1002/3600
Heat recovery ventilation			0	60%	75.4	e2=(1-60%)*e
Energy flow (MWh/yr)		Total	464.4		216.3	
Heating and cooling needs						
Heating	Heat		375.4		174.9	i, see footnote
	Free heet		48.4		48.4	j, see footnote
	Hot water need		114		114	k, see footnote
					0	
Heating need	18%	w/o AHC	**500.1**	with AHC	**240.7**	m=(i-j)*(1+18%)+k
Cooling	Heat gain		89.0		41.5	c, see footnote
	Free heat		18.4		18.4	o, see footnote
Cooling need	3%	w/o AHC	**110.6**	with AHC	**59.9**	p=(n+o)*(1+3%)
Total			***610.8***		***300.6***	MWh/yr
Energy consumption						
Gas consumption			556		0	MWh_{th}
Efficiency burning, boiler		90%	2000	90%	0	GJ
Share heat pump				100%	241	MWh
			73217		0	m3
			110.0		0.0	tCO_2
Electricity consumption						
IPLV, chiller; COP heat pump		3.8	29.1	3.5	85.9	MWhe
			20.2		59.5	tCO_2
Emissions heating, cooling, ventilation			130.2		59.5	tCO_2/yr

Renewable energy (solar)		
Solar PV	298.36	m^2
Size	66	kW
Electr production	97.6	MWh/yr
Net electr production	78.1	MWh/yr
Emissions avoided	54.1	tCO_2/yr

Summary savings and substitution		
EE savings	70.7	tCO_2/yr
	357.0	MWh gas/yr
Substit. PV	54.1	tCO_2/yr
	273.32	MWh gas/yr
Total	124.8	tCO_2/yr
	630.32	MWh gas/yr
Net emissions	5.4	tCO_2/yr

Box 25 Calculation of energy flows (heating, cooling, ventilation) in a pilot office (public) building (reference case and with NZEB options)

Height floor	2.95 m		No. of floors	6	(5 floors plus basement)
Area; one storey	1440 m^2				
Average length	37.9 m		area (m^2)	8640	
Volume	25488 m^3		Office area	6544	(excl. 92 m^2 stairway area)

Energy transmittance values						
		Current values		*NZEB values*		
	Area (m2)	*U-value W/(m2.K)*	*Contribution W/K*	*U-value in NZEB*	*Contribution W/K*	
Wall	1466.3	0.44	645.2	0.2	293.3	U*area (wall w/o window)
Roof	1440	0.33	475.2	0.15	216.0	U*area (roof)
Basement	1440	0.6	864.0	0.4	576.0	U*area (basement)
Window	789.6	1.7	1342.3	0.86	679.0	U*area (window)
- % of wall	35%					% of wall area
Vestibule	280	2	560	1.0	280	vestibule
Envelope	5415.9	*0.72*	3886.6	*0.38*	2044.3	a (=sum of above)
Energy losses/gains						
Degree.hours [K.hr]			2801		2801	q (see footnote)
Energy flow- convection [MWh/yr]			261.3		137.4	d=c*(a+b)*24/1.10^6
Energy flow - ventilation			287.1		287.1	e=n*f*c*V*24/1.106
ACH (n)	0.5			0.5		n: air exchange per hr
air heat flow	0.34					f: 1204*1002/3600
Heat recovery ventilation				60%	114.9	e2=(1-60%)*e
Energy flow (MWh/yr)		Total	548.5		252.3	
Heating and cooling needs						
Heating	Heat		443.3		203.9	i, see footnote
	Free heet		82.4		82.4	j, see footnote
	Hot water need		60		60	k, see footnote
					0	
Heating need	26%	w/o EMIS	**514.7**	w EMIS	**181.4**	m=(i-j)*(1+26%)+k
Cooling	Cooling		105.1		48.4	c, see footnote
	Free heat		47.4		47.4	o, see footnote
Cooling need	12%	w/o EMIS	**170.9**	w EMIS	**95.8**	p=(n+o)*(1+12%)
Total			***685.5***		***277.2***	MWh/yr

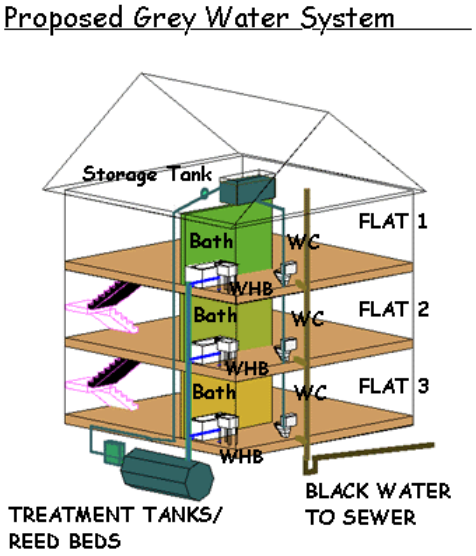
Energy consumption					
Gas consumpption		572		0	MWh_{th}
Efficiency boiler	0.9	2059	90%	0	GJ
Share heat pump			100%	181	MWh_{th}
		75346		0	m^3
		113.2		0.0	tCO_2
Electricity					
IPLV, chiller; COP heat pump	3.8	45.0	4.5	61.6	MWh_e
		31.2		42.7	tCO_2/yr
Emissions heating, cooling, ventilation		144.4		42.7	tCO_2/yr

Renewable energy		
Solar PV	207.95	m^2
Size	46	kW
Electr production	68.0	MWh/yr
Net electr production	54.4	MWh/yr
Emissions avoided	37.7	tCO_2/yr

Savings and substitution		
Savings	101.7	tCO_2/yr
	513.6	MWh gas/yr
Subst PV	37.7	tCO_2/yr
	190.50	MWh gas/yr
TOTALS	139.4	tCO_2/yr
	704.09	MWh gas/yr
Net emissions	5.0	tCO_2/yr

The estimates in this Annex do not include the energy consumption of electric appliances used by households and in offices, such as refrigerators and freezers, washing machines and dryers, lighting products, computers, printers, etc. The introduction of energy-efficient appliances with minimum performance standards and labelling has been the subject of separate GEF-supported projects in many countries.

The main source of water (84%) for Turkmenistan is the Amudarya River, whose water use is controlled by multilateral agreements, which allocate to Turkmenistan 22 billion m^3, or 36% of Amudarya flow per year. The remaining water resources are groundwater (5%) and other rivers (11%). Most of the water is used for irrigation (about two-thirds, but half is lost between delivery and withdrawal) and households use 2%. Efficient water use in rural areas and for agriculture has been the focus of the UNDP/GEF-supported projects, such as 'Energy efficiency and renewable energy for sustainable water management in Turkmenistan' and the recent "Supporting climate resilient livelihoods in agricultural communities in drought-prone areas of Turkmenistan'



Also, in urban areas water can be used more efficiently. One way is by using more water-efficient appliances and devices (toilets, showerheads, efficient dishwashers and washing machines). Another way is to recycle wastewater. There are two kinds of wastewater in domestic buildings: greywater and blackwater. Blackwater comes from toilets, contains harmful pathogens, and cannot be reused unless treated in a dedicated sewage facility. Greywater (typically 50-80% of wastewater in a building) is generated from domestic activities such as laundry, dishwashing, and bathing. It can be recycled and reused for watering the garden or flushing toilets after some form of treatment such as filtering and disinfectant to remove bacteria and other biological material. Reusing greywater can save up to 30-50% of water use in a residential building. In the case of the pilot buildings, the grey water system is assumed to be applied in the office building where building management can more easily absorb the system in comparison with individually owned apartments. However, if the results of the pilot are positive the options could be extended to future NZE apartment buildings.

A.3 Financial analysis of NZEB buildings

The financial impacts of implementing NZEB options have been calculated for the residential apartment building (see Box 26) and the office building (see Box 27) by assuming the *incremental* investment cost of energy efficiency options (e.g. wall insulation with higher thickness and the wall insulation implemented in the reference case; hear pump replacing boiler and chiller) and *add-on* investment cost of implementing heat recovery in ventilation (HRV) and solar energy. The results of the cost estimates are given in Box 28.

It should be noted which option will be applied and to what extent will depend on a detailed design and feasibility analysis as part of the overall building construction design. The numbers on energy savings and investments are indicative only and meant to give the order of magnitude of the energy saving and financial implications to be able to assess the direct emission reduction of the TEESB's pilot buildings and level of GEF and co-financing investment support (discussed in Annex G).

Box 26 Estimated investment cost of the TEESB pilot buildings (residential apartments; public)

		Residential (30 apt.)	Office building	Residential building	Office building
	Incremental cost (USD/unit)	*Incremental cost*		*Full cost*	
Increase U-value, wall	0.6 per m^2/cm	11,151	4,399	34,683	16,662
Increase U-value, roof	0.6 per m^2/cm	9,356	9,936	13,946	16,363
Increase U-value, basement	0.60 per m^2/cm	4,050	4,320	15,296	16,363
Increase U-value, windiw	16 per m^2	6,155	12,633	33,084	67,903
Incremental cost heat pump	See footnote price differenc	89,835	82,314	114,510	127,828
Heat recovery ventilation	15 per m^3/h	106,631	162,486	106,631	162,486
BAS (with AHC), meters		20,000		20,000	
EMIS(with AHC), meters			35,000		35,000
Solar PV	1250 per W_p syst.	82,500	57,500	82,500	57,500
Grey water recycling			35,000		35,000
Vestibule	1700 USD	1700	1700	1700	1700
Contingency and other cost		6,622	6,712	7,651	8,196
Subtotal		**338,000**	**412,000**	**430,000**	**545,000**
GEF INV **TOTAL** (one 5-floor building + one office)			**750,000**		
Co-financing (baseline heating with boiler/chiller; current building codes)				92,000	133,001
Co-financing (construction only)				12,908,000	12,826,999
Co-financing INV (for all construction, incl. baseline energy efficiency and supply)				**13,000,000**	**12,960,000**

Notes for Box 24, Box 25, and Box 26:

- Data on U-values and incremental costs based on NZEB reports Romania and Poland (BPIE, 2012) and www.globalpanel.com, assuming g thickness increase of insulation materials of 5 cm (wall, 11.5 cm (roof), 5 cm (basement) and changing from double to triple glazing. The total full cost of insulation is USD 10.33 per m^2 to which 10% installation cost is added. Source: (https://glavsnab.net/bazaltovaya-vata-rockwool-venti-batts-1000kh600kh100-mm-4-shtuki-v-upakovke.html?specification). Full cost of window id USD 86 per m^2 based on https://1-ok.com.ua/tceny/steklopakety-tceny#!/tproduct/492634085-1663184494269)
- HRV cost based on values mentioned in above-mentioned NZEB reports with m^3/h value = volume building*85%
- Cost of automated heating and cooling control, meters, USD 20,000. Cost of additional EMIS features (energy information system, EIS, and fault detection, diagnostics, FDD, USD 15,000). Based on *Proving the Business Case for Building Analytics,* Lawrence Berkeley National Laboratory (2020)
- Free heat based and residential building hot water needs: see Box . Office hot water needs: 5 litre per person, 654 employees (office space of 10 m^2 per employee).
- For solar PV energy generation and cost data of solar PV systems (per kW), see Box 24
- Grey water recycling and re-use cost is average of prices mentioned in a) *Feasibility and impact of greywater recycling in four types of buildings in Sharjah, United Arab Emirates* (Tayara, et.al., 2020), in IOP Conf. Series: Earth and Environmental Science 725 (2021) 012009; b) *Greywater Reuse System Design and Economic Analysis for Residential Buildings in Taiwan* (Yuan, et.al.; 2016), in: Water 2016, 8, 546; doi:10.3390/w8110546; c) *Feasibility of Recycling Grey-water in Multi-Storey Buildings in Melbourne* (Imteaz & Shanableh; 2012; www.wsforum.org); d) *Feasibility study grey water use* (Jiang et.al., Proceeding 11th Conference on Science and Technology)
- Chiller baseline cost based on data provided in Annex of the UNDP/GEF project document "Super-efficient technologies and thermal comfort in buildings, India" (2021). The cost of a boiler is assumed to be USD 155 and 120 per kW respectively. Including 10% installation cost, this gives USD 27143 for the apartment building and USD 250,0337 for the office building,
- The cost of GSHP (for the central office building system) is based on USD 1200/kW plus 10% installation cost. Data based on comparison of various sources, including a) http://2050-calculator-tool-wiki.decc.gov.uk/, b) www.kensacontracting.com/market-sectors, c) *Implementing Nearly-Zero Buildings (nZEB)*, Romania and Poland reports, BPIE (2012), d) https://www.epa.gov/rhc/rhc-multi-unit-housing. The cost of air heat pump systems for an apartment is based on USD 3,470 plus 10% installation cost. Source: https://limitenergy.ru/sila-am-18-i-evi-invertornyj-teplovoj-nasos/. The incremental cost of the heat pump system is its investment cost minus the cost of the alternative gas boiler-chiller solution.
- To determine co-financing INV, building construction cost are assumed to be USD 1500 per m^2 of total floor space. Assumption based by comparing sources, incl. https://economictimes.indiatimes.com/industry/services/property-/-cstruction/construction-cost-in-mumbai-highest-across-india-chennai-hyderabad-lowest-report/articleshow/81424837.cms; https://proest.com/construction/cost-estimates/apartment-complexes/; https://www.levelset.com/blog/cost-to-build-an-apartment-complex/; and https://www.checkatrade.com/blog/cost-guides/how-much-cost-build-flats/

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ANNEX G. ADDITIONAL INFORMATION ON GHG EMISSION REDUCTIONS CALCULATIONS

The first reference building is a 5-floor residential building with 30 apartments and a total floor area of 7,020 m^2 (of which 4,588 m^2 of apartment space on 4 floors). The energy losses/gains through the building envelope and ventilation are calculated similarly to the 9-floor apartment building example, discussed in the preceding paragraph. The roof is flat, and it is assumed the floors are heated to 20.5°C in winter. The heating is assumed to be with an air heat pump system as an alternative to the assumed base case of using a central system comprised of a chiller (powered by electricity) for cooling and a boiler (powered by natural gas) for heating. Cooling is at a set point of 25°C. The domestic hot water system is linked to the heating system[48]. The second reference is an office building with seven floors and a total floor area of 7,680 m^2 with its boiler system (of which 5,776 m^2 of office space). None of the reference buildings applies renewable energy options. In both reference cases, no automatic heat control system or advanced energy management systems are applied (that can tune to heat supply in real time to the actual outside temperature) and the apartments or office space s do not have individual heat metering in the central boiler-chiller system[49].

It is assumed that the reference buildings are constructed according to the current SNTs (2020 building construction norms). Building requirements (including the minimum thermal performance of building components) are controlled at the stage of construction authorisation (building permit). In principle, the requirements are respected in the design documentation, otherwise, the construction project does not pass the authorisation process. However, in practice, the execution of the work may not be undertaken according to the design as the necessary "Instruction on the composition and procedures of project documentation for the construction of buildings" has not been officially approved yet. Thus, the result may depend on the budget made available by the investor. In addition, the poor execution of details/joints (thermal bridges) can lead to a reduction of the global thermal resistance of the building envelope.

For the NZEB case, a number of energy-saving improvements are considered:

- Construction of an improved building envelope (with a higher U value for its walls, windows, attic and basement)
- Heat recovery module added to the building's (mechanical) ventilation system
- Central system using a ground source heat pump in case of the office building with automated heat control and advanced energy management information system (EMIS)
- Apartment-based air heat pumps in the case of the apartment building with automated heat control (AHC)
- Addition of grey water recycling and re-use system for the office building

In these cases, heating systems provide heating in the winter period and hot water while cooling is needed in the hot summer months. Building

Box 27 Monthly average temperatures, Ashgabat/Ahal

Average temperature (°C)			Set point (° Heating 20.5	C
Ashgabat / Ahal area			Temp. differen	
Jan	2.7	31	17.76	
Feb	4.5	28	16.03	
March	10.4	31	10.1	
Apr	17.2	30	3.26	
May	23.3	31		
June	30.0	30		
July	32.0	31		
August	30.0	31		
Sept	25.5	30		
Oct	18.5	31	2	
Nov	11.0	30	9.5	
Dec	4.1	31	16.36	
			K*days	
		Total [K.day]	2801	q

[48] It is assumed here that each apartment has an individual system for heating and DHW (domestic hot water) production. Alternatively, there can be heat pump per floor and/or for heating and DHW separately (see *Box 25 in Annex F of the Project Document* for heat pump info)

[49] In the base case, a gas boiler usually provides heat for a small group of apartment buildings (as a micro district heating system)

space is also heated by 'free heat' gains from the occupant's bodies, lights and appliances as well as passive solar gains (solar radiation penetrating through the windows). Heating (and cooling) is needed to add to (or compensate) for the 'free heat' and energy flows through the building's envelope and keep the temperature in the building at acceptable values. Energy flows in and out through the building fabric (its walls, roof, floor and windows) as well through ventilation (moving the air through the building and eventually inside and outside).

Cutting the building envelope heat losses (in winter, or gains in summer) is using materials that give the wall, roof, floor or window a lower heat flow. This can be expressed by their *U-value (heat transmittance*). The U value is the heat flow per surface area] divided by the temperature difference (outside minus inside temperature) into the units Watt per (Kelvin x square metre, W/(K.m^2). The lower the U-value, the better the insulation performance. In walls, roofs and floors **conduction** is the main mechanism of heat flow and this can be reduced by incorporating one or more of a range of insulating materials. The heat flow is determined by the characteristics of the building and insulation material (thermal conductivity, in [W/(m.K] and the thickness (in metres, [m]). The lower the conductivity and the higher the thickness, the better the insulation. The U-value of a wall or roof is determined by the characteristics of its composite elements (such as brick or concrete, plaster, mineral insulating wool or polystyrene foam, etc.). Windows were traditionally single-glazing with a high U-value of about 4.8). A double-glazed window (argon-filled) has a value of between 2.0 and 1.5, while triple-glazing can have 1.3-0.8 (depending on coating, thickness, and airtightness).

Box 28 Base date used in energy efficiency and renewable energy calculations

Natural gas	36.6	MJ/m3
- heating value	47.1	MJ/kg
- carbon content	55	kgCO2/GJ
Grid factor	0.63	tCO2/MWh
Efficiency power generation from gas	31.4%	
T&D losses	10%	
Lifetime EE and RE	20	yrs
Solar energy - Ashgabat		
Direct normal irradiation	1511	kWh/m2/yr
Global tilted radiation	1918.5	kWh/m2/yr
	4.05	sunhrs/day
Solar PV panel output	1479	kWh/kWp
Watts per area	0.221	kWp/m2
Cost of PV	1250	USD/kWp

Source: power sector data from solar data from project papers produced by the UNDP/GEF GURB project (Integrated Green Urban Development). Heating values from www.engineeringtoolbox.com. Prices of solar PV and SWH based on *Implementing nearly Zero-Energy Buildings* (nZEB) series (BIEE) www.globalsolaratlas.info/map?s=38.02438,58.708989&m=site&c=37.99508,58.539619,11: solar data

Buildings also lose heat by **ventilation**, i.e., the passage of air through them. This normally means the controllable air movement through openable windows, extractor fans, or, in the case of larger buildings, a mechanical ventilation system. Some form of ventilation in a building is essential to remove moisture from kitchens, toilets and bathrooms, and to provide fresh air for occupants and to keep them cool in summer. The key factor in determining the ventilation heat loss in a building is the *ventilation rate*, which can be specified as the number of complete air changes that take place per hour (ACH). A typical rate is 0.5 ACH, meaning that it will take two hours for the air to be completely replaced by new, incoming air. If the volume of a house is V m3, and the air change rate is n ACH, then the total amount of air passing through it per hour will be n × V [m3]. The total ventilation heat loss Qv follows
Qv = 0.33 × n × V × ΔT [in Watts] with the heat capacity of air is 0.33 [Wh/(K.m^3].

Heat loss can also be reduced by recovering some of the heat from ventilation air before it is released. Many large buildings use mechanical ventilation driven by electric fans. One way of reducing ventilation heat loss is to use mechanical ventilation with heat recovery (MVHR), which involves allowing warm outgoing air to preheat cold incoming air. This can be done by passing both air streams through a heat exchanger. They must be installed in buildings that are airtight to start with, otherwise, any attempt to pump air around the system may just increase the flow of air through unwanted air infiltration paths. Energy-recovery ventilation significantly reduces the energy use the coldest winter months and hottest summer months) owing to the large outdoor-indoor temperature differences.

TEESB project will promote the use of insulated pipes and ducts. Compared to the use of boilers and chiller option, the use of heat pumps (providing for heating, cooling and hot water) allows for larger energy efficiency. Thus, it is assumed that the baseline of gas boiler (for space and hot water heating) and chiller (for cooling) is replaced by an advanced ground source

heat pump system in the case of the office building and individual air source heat pump system in case of the apartment building[50].

Currently, the apartment occupants are charged per square meter of floor space, irrespective of their energy-for-heating use. Temperature valves need to be installed on room heat radiators (to finetune heat supply to actual demand). In the case of (partly) central systems, apartments or office departments need meters to be installed to be able to measure the heat supplied for each apartment or office department, By using an automated heat control (AHC) system it is possible to use 'compensated' control whereby the circulating water temperature (heated in the central boiler system that serves a group of buildings) is modulated according to the weather, reducing heat output when the weather is mild and increasing it when it is cold[51]. EMIS (energy management information systems) are the broad and rapidly evolving family of tools that monitor, analyse, and control building energy use and system performance. The data generated from EMIS tools enable building owners to operate their buildings more efficiently and with improved occupant comfort by providing visibility into and analysis of the energy consumed by lighting, space conditioning and ventilation, and other end uses. A building automation system (BAS) can be used to control building heating, ventilation, and cooling systems (and in some cases, building lighting and security systems. The BAS controls indoor temperature, humidity, ventilation, and lighting conditions. EMIS tools such as energy information systems (EIS), fault detection and diagnostics systems (FDD), and automated system optimization tools (ASO) supplement the BAS to facilitate analysis and management of building performance, including energy, comfort conditions, and ventilation. An EIS can Track, weather-normalized energy data on an interval basis (and more advanced versions are integrated with the BAS). An ASO continuously analyses and modifies BAS control settings to optimize heating, ventilation and cooling energy usage while maintaining occupant comfort. A FDD identifies abnormalities in the heating, ventilation and cooling systems or equipment performance and in some instances can isolate the root cause of anomalies. In the Project is proposed that EMIS is installed in two (new) pilot office buildings.

All the measures mentioned above (better energy performance of the building envelope, triple-glazing windows, heat recovery in ventilation) will reduce the energy loss, of the building or contribute to using energy more efficiently, and will reduce the associated greenhouse gas emissions. Energy consumption in Turkmenistan's buildings is based on natural gas, whether direct use or in the form of natural gas used for power generation. The remaining energy consumption (after the implementation of NZEB technologies) must be compensated for by using renewable energy. It is assumed that a PV system can supply (the larger part of) the electricity demand of the heat pump. Thus, the emissions by the remaining gas and electricity are compensated for to a large extent, which leads to having a 'nearly zero emission building',

Box 26 provides the energy-relevant characteristics and an estimate of the energy consumption for heating, ventilation and cooling) of the reference residential building and one with NZEB options and Box 27 presents the reference office building and the case with NZEB options. The boxes show the calculated energy savings that can be obtained for heating (resulting in savings of direct natural gas use) as well as cooling and ventilation (resulting in electricity savings). Since most of all electricity is generated from natural gas, saving power results in savings in natural gas). It should be noted that in cases where the PV can produce more electricity than the energy needed for heating, cooling or ventilation, in which case it is assumed that the access power can be delivered to the grid (and thus the corresponding CO_2 emission reduction can still be accounted as compensation for energy consumption, albeit outside the building). The estimates in this Annex do not include the energy consumption of electric appliances used by households and in offices, such as refrigerators and freezers, washing

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[23] Ground-source heat pumps are more efficiency than air heat pumps but investment cost is also relatively higher, For an apartment building a range of onions are possible from central to individual

24 Energy storage systems and the associated energy conversion equipment are not considered here, as they make NZEBs more complex and require additional investment. In cases were peak demand exceeds the capacity of the heat pump system (e.g. very cold days and/or without sufficient sunshine), the heat is assumed to be provided by the gas boiler systems in the vicinity of the pilot buildings (micro district heating). Electricity will always be guaranteed as all buildings are grid-connected.

[51] Air temperature may be sensed either (a) within the room(s) supplied or (b) in the room extract ductwork. Similarly, in cooling with central chillers, the supply of chilled water to the battery, is based on an air temperature measurement from a sensor located (a) within the supplied room space, or (b) in the air extract ductwork. In the EERB project, it was found that the installation of AHC systems yielded heat energy savings of about 18% in heating and 3% in cooling.

machines and dryers, lighting products, computers, printers, etc. The introduction of energy-efficient appliances with minimum performance standards and labelling has been the subject of separate GEF-supported projects in many countries.

Also, in urban areas water can be used more efficiently. One way is by using more water-efficient appliances and devices (toilets, showerheads, efficient dishwashers and washing machines). Another way is to recycle wastewater. There are two kinds of wastewater in domestic buildings: greywater and blackwater. Blackwater comes from toilets, contains harmful pathogens, and cannot be reused unless treated in a dedicated sewage facility. Greywater (typically 50-80% of wastewater in a building) is generated from domestic activities such as laundry, dishwashing, and bathing. It can be recycled and reused for watering the garden or flushing toilets after some form of treatment such as filtering and disinfectant to remove bacteria and other biological material. Reusing greywater can save up to 30-50% of water use in a residential building. In the case of the pilot buildings, the grey water system is assumed to be applied in the office building where building management can more easily absorb the system in comparison with individually owned apartments. However, if the results of the pilot are positive the options could be extended to future NZE apartment buildings.

Box 29 Calculation of energy flows (heating, cooling, ventilation) in a pilot residential apartment building (reference case and with NZEB options)

Height floor (m)	2.95	Total height	17.7	(4 floors + attic +_basement)		
Area; one floor)	1350	Wall area	3,717	Total floor	8100	m^2
Length (m)	90.0	Entrance	280	Apart.space	5308	m^2 (stairway space is 92 m^2)
Width (m)	15	No. apartments	30	Volume	23895	m^3
Energy transmittance values						
	Area (m2)	*Current values* *U-value W/(m2.K)*	*Contribution W/K*	*NZEB values* *U-value in NZEB*	*Contribution W/K*	
Wall	3,052	0.44	1635.5	0.2	743.4	U*area (wall w/o window)
Roof	1,350	0.33	445.5	0.15	202.5	U*area (roof)
Basement	1,350	0.6	810.0	0.4	540.0	U*area (basement)
Window	385	1.7	654.0	0.86	330.8	U*area (window)
- % of wall	10%					% of wall area
Vestibule	280	2	560	1.0	280	vestibule
Envelope	6,417	*0.64*	4105.0	*0.33*	2096.7	a (=sum of above)
Energy losses/gains						
Degree.hours [K.hr]			2801		2801	q (see footnote)
Energy flow- convection [MWh/yr]			276.0		141.0	$d=c*(a+b)*24/1.10^6$
Energy flow - ventilation			188.4		188.4	e=n*f*c*V*24/1.106
ACH (n)	0.35			0.35		n: air exchange per hr
air heat flow	0.34					f: 1204*1002/3600
Heat recovery ventilation			0	60%	75.4	e2=(1-60%)*e
Energy flow (MWh/yr)		Total	464.4		216.3	
Heating and cooling needs						
Heating	Heat		375.4		174.9	i, see footnote
	Free heet		48.4		48.4	j, see footnote
	Hot water need		114		114	k, see footnote
					0	
Heating need	18%	w/o AHC	**500.1**	with AHC	**240.7**	m=(i-j)*(1+18%)+k
Cooling	Heat gain		89.0		41.5	c, see footnote
	Free heat		18.4		18.4	o, see footnote
Cooling need	3%	w/o AHC	**110.6**	with AHC	**59.9**	p=(n+o)*(1+3%)
Total			***610.8***		***300.6***	MWh/yr
Energy consumption						
Gas consumption			556		0	MWh_{th}
Efficiency burning, boiler		90%	2000	90%	0	GJ
Share heat pump				100%	241	MWh
			73217		0	m3
			110.0		0.0	tCO_2
Electricity consumption						
IPLV, chiller; COP heat pump		3.8	29.1	3.5	85.9	MWhe
			20.2		59.5	tCO_2
Emissions heating, cooling, ventilation			130.2		59.5	tCO_2/yr

Renewable energy (solar)			**Summary savings and substitution**		
Solar PV	298.36	m^2	EE savings	70.7	tCO_2/yr
Size	66	kW		357.0	MWh gas/yr
Electr production	97.6	MWh/yr	Substit. PV	54.1	tCO_2/yr
Net electr production	78.1	MWh/yr		273.32	MWh gas/yr
Emissions avoided	54.1	tCO_2/yr	**Total**	124.8	tCO_2/yr
				630.32	MWh gas/yr
			Net emissions	5.4	tCO_2/yr

Box 30 Calculation of energy flows (heating, cooling, ventilation) in a pilot office (public) building (reference case and with NZEB options)

Height floor	2.95	m	No. of floors	6	(5 floors plus basement)
Area; one storey	1440	m^2			
Average length	37.9	m	area (m^2)	8640	
Volume	25488	m^3	Office area	6544	(excl. 92 m^2 stairway area)

Energy transmittance values						
		Current values		*NZEB values*		
	Area (m2)	*U-value W/(m2.K)*	*Contribution W/K*	*U-value in NZEB*	*Contribution W/K*	
Wall	1466.3	0.44	645.2	0.2	293.3	U*area (wall w/o window)
Roof	1440	0.33	475.2	0.15	216.0	U*area (roof)
Basement	1440	0.6	864.0	0.4	576.0	U*area (basement)
Window	789.6	1.7	1342.3	0.86	679.0	U*area (window)
- % of wall	35%					% of wall area
Vestibule	280	2	560	1.0	280	vestibule
Envelope	5415.9	*0.72*	3886.6	*0.38*	2044.3	a (=sum of above)
Energy losses/gains						
Degree.hours [K.hr]			2801		2801	q (see footnote)
Energy flow- convection [MWh/yr]			261.3		137.4	d=c*(a+b)*24/1.10^6
Energy flow - ventilation			287.1		287.1	e=n*f*c*V*24/1.106
ACH (n)	0.5			0.5		n: air exchange per hr
air heat flow	0.34					f: 1204*1002/3600
Heat recovery ventilation				60%	114.9	e2=(1-60%)*e
Energy flow (MWh/yr)		Total	548.5		252.3	
Heating and cooling needs						
Heating	Heat		443.3		203.9	i, see footnote
	Free heet		82.4		82.4	j, see footnote
	Hot water need		60		60	k, see footnote
					0	
Heating need	26%	w/o EMIS	**514.7**	w EMIS	**181.4**	m=(i-j)*(1+26%)+k
Cooling	Cooling		105.1		48.4	c, see footnote
	Free heat		47.4		47.4	o, see footnote
Cooling need	12%	w/o EMIS	**170.9**	w EMIS	**95.8**	p=(n+o)*(1+12%)
Total			***685.5***		***277.2***	MWh/yr

Energy consumption					
Gas consumppption		572		0	MWh_{th}
Efficiency boiler	0.9	2059	90%	0	GJ
Share heat pump			100%	181	MWh_{th}
		75346		0	m^3
		113.2		0.0	tCO_2
Electricity					
IPLV, chiller; COP heat pump	3.8	45.0	4.5	61.6	MWh_e
		31.2		42.7	tCO_2/yr
Emissions heating, cooling, ventilation		144.4		42.7	tCO_2/yr

Renewable energy			**Savings and substitution**		
Solar PV	207.95	m^2	Savings	101.7	tCO_2/yr
Size	46	kW		513.6	MWh gas/yr
Electr production	68.0	MWh/yr	Subst PV	37.7	tCO_2/yr
Net electr production	54.4	MWh/yr		190.50	MWh gas/yr
Emissions avoided	37.7	tCO_2/yr	**TOTALS**	139.4	tCO_2/yr
				704.09	MWh gas/yr
			Net emissions	5.0	tCO_2/yr

Box 31 Estimated investment cost of the TEESB pilot buildings (residential apartments; public)

		Residential (30 apt.)	Office building	Residential building	Office building
	Incremental cost (USD/unit)	*Incremental cost*		*Full cost*	
Increase U-value, wall	0.6 per m^2/cm	11,151	4,399	34,683	16,662
Increase U-value, roof	0.6 per m^2/cm	9,356	9,936	13,946	16,363
Increase U-value, basement	0.60 per m^2/cm	4,050	4,320	15,296	16,363
Increase U-value, windiw	16 per m^2	6,155	12,633	33,084	67,903
Incremental cost heat pump	See footnote price differenc	89,835	82,314	114,510	127,828
Heat recovery ventilation	15 per m^3/h	106,631	162,486	106,631	162,486
BAS (with AHC), meters		20,000		20,000	
EMIS(with AHC), meters			35,000		35,000
Solar PV	1250 per W_p syst.	82,500	57,500	82,500	57,500
Grey water recycling			35,000		35,000
Vestibule	1700 USD	1700	1700	1700	1700
Contingency and other cost		6,622	6,712	7,651	8,196
Subtotal		**338,000**	**412,000**	**430,000**	**545,000**
GEF INV **TOTAL** (one 5-floor building + one office)			**750,000**		
Co-financing (baseline heating with boiler/chiller; current building codes)				92,000	133,001
Co-financing (construction only)				12,908,000	12,826,999
Co-financing INV (for all construction, incl. baseline energy efficiency and supply)				**13,000,000**	**12,960,000**

Notes for Box 24, Box 25, and Box 26:

- Data on U-values and incremental costs based on NZEB reports Romania and Poland (BPIE, 2012) and www.globalpanel.com, assuming g thickness increase of insulation materials of 5 cm (wall, 11.5 cm (roof), 5 cm (basement) and changing from double to triple glazing. The total full cost of insulation is USD 10.33 per m^2 to which 10% installation cost is added. Source: (https://glavsnab.net/bazaltovaya-vata-rockwool-venti-batts-1000kh600kh100-mm-4-shtuki-v-upakovke.html?specification). Full cost of window id USD 86 per m^2 based on https://1-ok.com.ua/tceny/steklopakety-tceny#!/tproduct/492634085-1663184494269)
- HRV cost based on values mentioned in above-mentioned NZEB reports with m^3/h value = volume building*85%
- Cost of automated heating and cooling control, meters, USD 20,000. Cost of additional EMIS features (energy information system, EIS, and fault detection, diagnostics, FDD, USD 15,000). Based on *Proving the Business Case for Building Analytics,* Lawrence Berkeley National Laboratory (2020)
- free heat (human body heat, heat generated by electric appliances) estimated assuming 6.66 kWh per apartment per day calculated over heating days per year (giving j) and cooling days (giving c); see Box 22
- Hot water needs provided with boiler system, consumption assumed at 120 litres per apartment per day (heating difference 40 K), c_{water}= 4.186 KJ/(kg.K). Office hot water needs: 5 litre per person, 654 employees (office space of 10 m^2 per employee).
- For solar PV energy generation and cost data of solar PV systems (per kW), see Box 24
- Grey water recycling and re-use cost is average of prices mentioned in a) *Feasibility and impact of greywater recycling in four types of buildings in Sharjah, United Arab Emirates* (Tayara, et.al., 2020), in IOP Conf. Series: Earth and Environmental Science 725 (2021) 012009; b) *Greywater Reuse System Design and Economic Analysis for Residential Buildings in Taiwan* (Yuan, et.al.; 2016), in: Water 2016, 8, 546; doi:10.3390/w8110546; c) *Feasibility of Recycling Grey-water in Multi-Storey Buildings in Melbourne* (Imteaz & Shanableh; 2012; www.wsforum.org); d) *Feasibility study grey water use* (Jiang et.al., Proceeding 11th Conference on Science and Technology)
- Chiller baseline cost based on data provided in Annex of the UNDP/GEF project document "Super-efficient technologies and thermal comfort in buildings, India" (2021). The cost of a boiler is assumed to be USD 155 and 120 per kW respectively. Including 10% installation cost, this gives USD 27143 for the apartment building and USD 250,0337 for the office building,
- The cost of GSHP (for the central office building system) is based on USD 1200/kW plus 10% installation cost. Data based on comparison of various sources, including a) http://2050-calculator-tool-wiki.decc.gov.uk/, b) www.kensacontracting.com/market-sectors, c) *Implementing Nearly-Zero Buildings (nZEB)*, Romania and Poland reports, BPIE (2012), d) https://www.epa.gov/rhc/rhc-multi-unit-housing. The cost of air heat pump systems for an apartment is based on USD 3,470 plus 10% installation cost. Source: https://limitenergy.ru/sila-am-18-i-evi-invertornyj-teplovoj-nasos/. The incremental cost of the heat pump system is its investment cost minus the cost of the alternative gas boiler-chiller solution.
- To determine co-financing INV, building construction cost are assumed to be USD 1500 per m^2 of total floor space. Assumption based by comparing sources, incl. https://economictimes.indiatimes.com/industry/services/property-/-cstruction/construction-cost-in-mumbai-highest-across-india-chennai-hyderabad-lowest-report/articleshow/81424837.cms; https://proest.com/construction/cost-estimates/apartment-complexes/; https://www.levelset.com/blog/cost-to-build-an-apartment-complex/; and https://www.checkatrade.com/blog/cost-guides/how-much-cost-build-flats/

Differences with the project concept (PIF)

At the PIF stage, the emission reductions have been calculated using the GEF-EE-Tool-v1.0, and by assuming that the greenhouse gas emission reduction would come from:
- Direct emission reduction due to two pilot residential buildings
- Direct ER, due to building codes getting into force
- Indirect ER, due to replication in 130 apartment buildings after project closure
- Energy savings are assumed to be 395.1 MWh/yr.

The PPG phase has provided more nuance to the calculation methods, and the basis for the determination of energy savings and substitution potential in reference apartment and office buildings. While both the PIF approach and the calculation presented in Annexes G and H lead to more or less the same level of emission reduction, the calculation methods have some differences:

1) The PIF does not indicate how the reported savings of 395.1 MWH are derived at. The figure seems to correspond to the energy savings measured in the EERB project in three 9-floor renovated residential apartment blocks (393 MWh per year; as mentioned in the summary document on *Key Achievements* of the project) although the document gives lower savings in *new* 9-floor apartment blocks (228 MWh per year). It may not be correct to use energy savings from the EERB period as a basis for comparison. The project resulted in the 2020 EERB building codes, and thus the corresponding energy values should be taken as the new baseline and not those based on the pre-EERB building codes. For the TEESB Project, the GEF alternative is adhering to newer NZEB norms, while the 2020 EERB building code should now be considered as the baseline. In other words, the savings are calculated by comparing energy consumption at the current building codes (SNT, as explained in the previous Annex G) with future NZEB energy performance. In addition, the GHG emission of the remaining building energy consumption (for heating, cooling and ventilation) efficiency in the building's fabric will then be nearing zero by compensating for the remaining energy consumption with (on-site) renewable energy.

2) The GEF-EE-Tool-v1.0 assumes all energy savings are electricity savings. This is not correct as most savings come from reduced direct natural gas consumption (in a boiler) for heating in addition to reduced power consumption (mainly from reduced energy-for-cooling needs). Since all power is generated from natural gas, in practice the result is, however, the same, namely a reduction in natural gas demand.

Summary of the project targets – direct benefits

Error! Reference source not found. shows the project's target contributions to GEF-7 Core Indicators as updated at CEO ER formulation (PPG) stage, and compares them to those expected at the PIF phase. The **direct emission** reduction is based on several assumptions:

- Construction of one residential apartment building and one office building as GEF-supported pilots. Apartment buildings and office buildings may vary widely (from 3 to 30 floors) and floor space area. The case of a building with 30 residential apartments on 4 floors with a combined floor space of 5,308 m^2 and total floor space of 8,100 m^2 (incl, basement and attic) and an office building (with an office floor space of 6,544 m^2 on 5 floors; total floor space 8,640 m^2) has been taken as the basis for energy savings and GHG emission reduction calculations resulting from adding NZEB options to the reference building (i.e., assuming to be built in accordance with current codes and without solar energy added). The emission reduction of the two pilot buildings is 5,284 tCO_2 over the building's energy intervention's lifetime (of 20 years) with avoided natural gas consumption (avoided direct use and use for avoided power generation) of 26,688 MWh over the project's lifetime). The details of the calculation, methodology and assumptions are provided in Annex G.
- New NZEB-oriented building codes will only be drafted towards the end of the project and, some will be officially approved by the project's end. Even if still in draft form, it is assumed that some new buildings will be built by the end of the project in accordance with a proposed NZEB investment strategy and following the NZEB codes. It is estimated that (apart from the two pilots) a total of 210,600 m^2 of residential and 51,840 m^2 of office floor space will be constructed or with investments approved according to NZE practices [52]. These are substantial figures but not unrealistic to assume,

[52] The calculations take the two pilot buildings as a basis for the calculation, resulting in the GHG emission avoidance in

given the fact that the Government often wants to showcase new urban developments as 'high-technology' (see description of Arkadag and new Ashgabat City megaprojects in the main text of the Project Document), including constructing new buildings will be built according to NZEB norms and with digital technology features (by the two co-financing partners, Ministry of Energy and Ministry of Construction and Architecture, as well as other government entities). Therefore, as was also assumed in the PIF, the contribution of this NZE floor space built or approved by the end of the project is counted as contributing to the direct emission reduction (81,627 tCO_2 in total, with corresponding natural gas avoidance of 412,258 MWh)

Box 32 Direct and indirect lifetime GHG emission reduction, energy (natural gas) reduction;

	Total floor space (m^2)	Number buildings	Cumulative tCO_2	Cum. energy reduction	EE savings MWh gas	RE subst MWh gas	GEF INV (USD)
Pilot bldngs. Residential	8,100	1	2,496	12,606	7,140	5,466	338,000
Office	8,640	1	2,788	14,082	10,272	3,810	412,000
Measuring							15,000
Subtotal	*16,740*	*2*	*5,284*	*26,688*	*17,412*	*9,276*	*765,000*
Bldng codes Residential	210,600	26	64,898	327,767	185,641	142,126	
	51,840	6	16,729	84,491	61,632	22,859	
Subtotal	*262,440*	*32*	*81,627*	*412,258*	*247,273*	*164,985*	
Direct emission and energy reduction (over lifetime = 20 yrs)		**tCO2**	**86,911**	**438,947** 1,580,208	MWh (gas) GJ		**765,000**
		Electricity savings		16,805	MWh_e		
		Nat. gas savings (direct)		380,128	MWH_{th}		

	Pilots	Direct-	Indirect-NZEB bldng codes	
	2025-26	**2028**	**2029-2038**	**Annual**
Floor area (m2) with NZEB				
- residential	8,100	210,600	2,106,000	210,600
- office	8,640	51,840	345,600	34,560
Cumulative GHG ER (tCO2)				
- residential	2,496	64,898	648,979	64,898
- office	2,788	16,729	111,528	11,153
TOTAL	*5,284*	*81,627*	*760,507*	*76,051*
Direct - Cumulative GHG ER (tCO2)		**86,911**	**760,507**	**Indirect**
Energy savings (MWh of gas)		**438,947**	**3,840,945**	
(in GJ)		1,580,208	13,827,402	
- EE savings (GJ)		952,866	8,162,241	
- RE substitution (GJ)		627,342	5,665,162	
- Electricity (in MWHe)		16,805	141,115	
- Nat. gas (savings direct use)		380,128	3,347,041	

Indirect emission reduction is based on assumptions regarding the construction of new buildings complying with the NZEB-like energy building codes (with corresponding construction investments approved only after TEESB's end). Since there are

reduced natural gas demand (for heating, cooling and ventilation) in 56 residential and 16 office buildings. In practice, a range of apartment buildings may be constructed with different floor space values and volume-floor space ratios. For the calculation, it is assumed that the GHG reduction of a total floor space of 190084 is the same, whether it corresponds to 28 5-floor buildings with 6 apartments per floor or 15 seven-floor buildings (with 8 apartments per floor, assuming these have the same floor space per apartment). This may not be exactly true. Buildings will have different shapes and heights with different surface area/volume ratio, leading to slightly different energy flows, but the deviations are minor and would make the calculation to complicated or impossible as no statistics on future building (broken down per apartment height and floor size) are available.

no national construction plans with quantitative targets, the building plans of the new Arkadag and Ashgabat New City (see the description in **Error! Reference source not found.** and **Error! Reference source not found.**) are taken as providing some guidance on the number of buildings constructed in the coming decade. The calculation assumes that 2,106,00, m^2 of residential floor space will be built according to the stricter post-project energy-relevant building norms (and with additional solar technology to achieve the 'nearly-zero' effect) and 345,600 m^2 of office space.

The two pilots/demos together with the anticipated investment plan construction will lead to **86,911 tCO_{2e} direct lifetime GHG ER** over the period 2025-2037; avoiding the use of 1,580 terajoules (TJ) of natural gas (directly used for heating or indirectly through avoided power consumption for cooling). The indirect lifetime emission reduction is estimated at **760.5 kilotons of CO_2** and avoided natural gas use of 13,827 terajoules.

The projects will benefit directly[53] the occupants of the 810 apartments (in on average 27 buildings and office workers in 7 office buildings (pilots as well as estimated NZEB buildings built according to drafted NZEB codes), giving a total of 7,820 beneficiaries. To these, can be added a total of 620 participants in the TEESB's workshop, seminar and training events, giving a total of 8,440 **direct** beneficiaries (of which 3,671 women; 47%).

[53] That is, related to the direct emission reduction of the Project

ANNEX I. PROJECT STAFF, CONSULTANCIES AND SUBCONTRACTS

A) Key project staff

Project Manager (PM) - *Full-time (60 months)*

*The Project M*anager (PM), together with the Lead Advisor will be responsible for the overall management of the project, including the mobilization of all project inputs, supervision over project staff, consultants and sub-contractors.

Duties and Responsibilities

Manage and supervise the project to ensure achievement of results:

- Oversee the day-to-day project implementation and ensure achievement of targets as outlined in the project document, inception report and subsequent work plans;
- Lead and supervise project team, builds team coherence and establishes clear roles and responsibilities among team members; Conducts internal capacity-building training for project staff to facilitate appropriate management and timely delivery of project outputs;
- Execute activities by managing personnel, goods and services, training and low-value grants, including drafting terms of reference and work specifications, and overseeing all contractors' work.
- Take overall responsibility for the project and performs oversight roles for project compliance against the relevant government and UNDP regulations for project management;
- Develop the project standard operating procedures in line with the government and UNDP's regulations; seeks the Project Board's approval; and takes responsibility for updating and revising it as necessary;
- Consult with the project board through the National Project Director for any issues that require their attention, including issues related to deviation from the approved work plans and its tolerance (e.g., deviation from the approved target, and/or budget).

Ensure effective planning, budgeting and monitoring:

- Performs project management duties on UNDP's ERM (Quantum) in line with the NIM manual and as outlined in the delegation of authority for Project Manager. Prepare revisions to the multi-year work plan, as needed, as well as annual and quarterly plans if required.
- Prepare the inception report no later than one month after the inception workshop.
- Monitor and track progress against the GEF Core indicators; Ensure that these and other indicators (e.g. gender) included in the project results framework are monitored annually in advance of the GEF PIR submission deadline so that progress can be reported in the GEF PIR.
- Ensures effective monitoring of project performance. Watch for plan deviations and ensure that changes are controlled and problems addressed when needed within Project Board-agreed tolerances to achieve results. Assess major and minor amendments to the project within the parameters set by UNDP-GEF;
- Prepare the GEF PIR and perform regular results-oriented progress reporting to the project board as agreed with the board, including measures to address challenges and opportunities. Provide support for the completion of assessments required by UNDP, spot checks and audits.
- Manage and monitor the project risks – including social and environmental risks - initially identified and submit new risks to the Project Board for consideration and decision on possible actions if required; update the status of these risks by maintaining the project risks log;
- Monitor implementation plans including the gender action plan, stakeholder engagement plan, and any environmental and social management plans;
- Manage requests for the provision of UNDP financial resources through funding advances, direct payments or reimbursement;
- Mobilize goods and services and other project inputs, including preparing ToRs for expert consultants, meetings, and workshops; Ensure that the quality of project inputs meet the expected standards and are sufficient to produce project outputs and targets;
- Monitor financial resources and accounting to ensure the accuracy and reliability of financial reports.
- Prepare and submit financial reports to UNDP on a quarterly basis.
- Support the Mid-term review and Terminal Evaluation process.

Create and nurture strategic partnerships and support the implementation of resource mobilization

- Establish and maintain good working relationships with the relevant public and development partners who are the principal counterparts for the project;
- Initiate and maintain partnerships with development partners, government institutions, private sector, civil society and other stakeholders to contribute to the achievement of project results;
- Build project reputation for quality design, reliable delivery as well as integrity and accountability;
- Identify and work with key partners/stakeholders to ensure synergies with other projects/initiatives and to avoid duplication of activities among actors;
- Identify opportunities for mobilizing resources for the project, and prepares substantive briefs on possible areas of cooperation.

The following are *Component-specific tasks* that will be performed by the Project Manager:

- In Outcomes 1, 2 and 3, he/she provides a technical review of studies (design, advice and comments) in the various components and provides technical backstopping to all activities in the three Components of the Project for technical matters related to energy efficiency and renewable energy in buildings and construction sector.
- Outcome 4: Identifies best practices and lessons learnt from the project and from other initiatives that can be helpful to the project in achieving its goals and objectives; Leads in generating knowledge products such as best practices and lessons learned for knowledge sharing; Contributes to knowledge networks and communities of practice; Capture lessons learned during project implementation.

Project financial-administrative assistant – *Part time 50% (60 months)*

Duties and Responsibilities

Under the guidance and supervision of the Project Manager, the Project Assistant will carry out the following:

Administrative

- Assist the Project Manager in day-to-day management and oversight of project activities;
- Assist in the preparation of reports; Review project documents, especially cost plans/budgets, for completeness and compliance with relevant rules and procedures prior to submission for final approval and signature; Distribute project documents to relevant parties upon approval
- Ensure all project documentation (progress reports, consulting and other technical reports, minutes of meetings, etc.) are properly maintained in hard and electronic copies in an efficient and readily accessible filing system, for when required by PB (PSC), UNDP, project consultants and other PMU staff;
- Provide PMU-related administrative and logistical assistance. Follow-up on administrative actions and resolve issues related to project implementation (e.g. recruitment and appointment of personnel, travel arrangements, training/study tours, authorization of payments, disbursement of funds, procurement of equipment and services, security compliance, etc.
- Updated database of the relevant public and development partners private sector, civil society and other stakeholders who are counterparts for the project;

Financial

- Keep records of project funds and expenditures, and ensure all project-related financial documentation are well maintained and readily available when required by the Project Manager;
- Review project expenditures and ensure that project funds are used in compliance with the Project Document and government financial rules and procedures;
- Validate and certify FACE forms before submission to UNDP;
- Provide necessary financial information as and when required for project management decisions;
- Provide necessary financial information during project audit(s);
- Review annual budgets and (quarterly) project expenditure reports, and notify the Project Manager if there are any discrepancies or issues;
- Consolidate financial progress reports submitted by the responsible parties for implementation of project activities;
- Liaise and follow up with the responsible parties for implementation of project activities in matters related to project funds and financial progress reports.

Pilot project and monitoring coordinator *- - Full time (60 months)*

Description of responsibilities:

The incumbent will be responsible for the implementation of Outcome 1, including assistance to mobilize all component resources, and supervision of consultants and sub-contractors. Under the direction of the PM, the Demo Project Coordinator will liaise with the national and local governments, UNDP, and all stakeholders involved in Outcome 1 of the project. She/he will be specifically responsible for:

(a) Overall management of Component 1, in particular by providing technical guidance on the planning of the pilot and demonstration projects (Output 1.1), audits and performance monitoring (Output 1.2) and investment replication plan (Output1.3)
(b) Oversee and guide the design of surveys/ assessments commissioned for monitoring and evaluating project results;
(d) Coordination of various assessments and background studies (status and experiences in EU and neighbouring countries, compendium of NZE technologies and measures, stiock of existing and planned new buildings, energy savings potential and impacts of introducing upgraded building codes (towards NZEB);
(e) Support the PMU in project-related meetings, as required;
(f) Ensure project's M&E meets the requirements of the Government, the UNDP Country Office, and UNDP-GEF; develop project-specific M&E tools as necessary; Oversee and ensure the implementation of the project's M&E plan,
(g) Ensuring management of component funds consistent with UNDP requirements, and budget planning and control.
(h) Assisting the PM in the submission of progress reports and key-issues reports to the PB (PSC)
(i) Undertaking other activities as assigned by the PM.

Lead (technical) Advisor - *(part-time, 25 working days a year)*

Description of responsibilities:

Under the overall supervision of the Project Manager, the non-resident Lead (technical) Adviser will:

- Provide guidance and assistance to the PM and project staff to ensure that the project activities conform to the approved project document;
- Assist the PM during the initiation of the project, in the preparation of an "inception report" which will review the project Logical Framework Matrix and planned project activities, the Annual Work Plan and Budget, ToRs for key project staff, and an M&E plan;
- Assist the PMU in the development of relevant ToRs and recruitment/mobilization of qualified national and international experts and organizations as needed to provide specific consultancy and engineering services;
- Support formulation of Terms of References for studies and assessments carried out as part of Component 2 and Output 3.1
- Support the PM in reporting to the PB on the progress of project implementation and achievement of project results in accordance with the project's logical framework matrix, including guidance to the PMU on the tracking and measurement of project success indicators, e.g., energy savings and substitution, GHG emission reduction
- Review reports of national and international consultants, project budget revisions, and administrative arrangements as required by UNDP/GEF procedures;
- Assist the M&E expert in the development of a concrete Monitoring and Evaluation Plan at the outset of the project (as part of the inception report);
- Support the PM in preparing project progress reports, and in the preparation and implementation of Mid-Term Review and Terminal Independent Evaluation Missions (TOR's, identification and recruitment of appropriate candidates, organization of missions, joint field missions and discussion with evaluators, etc.)
- Assist in preparation of the project scale-up and roll-out plan, including preparation of project results/impacts communication articles

Social safeguards and gender – *(part-time, 5 years at 25% of full-time)*

Duties and Responsibilities

Gender

- Monitor progress in the implementation of the project Gender Action Plan ensuring that targets are fully met and the reporting requirements are fulfilled;
- Oversee/develop/coordinate the implementation of all gender-related work;
- Review the Gender Action Plan annually, and update and revise corresponding management plans as necessary;
- Ensure reporting, monitoring and evaluation fully address the gender issues of the project;

Social safeguards

- Monitor progress in the development/implementation of the project ESMP (or ESMF, as needed) ensuring that UNDPs SES policy is fully met and the reporting requirements are fulfilled;
- Oversee/develop/coordinate the implementation of all safeguard-related plans;
- Ensure social and environmental grievances are managed effectively and transparently;
- Review the NZEB SESPs annually, and update and revise the corresponding risk log; mitigation/management plans as necessary;
- Ensure full disclosure with concerned stakeholders;
- Ensure environmental and social risks are identified, avoided, mitigated and managed throughout project implementation;
- Ensure reporting, monitoring and evaluation fully address the safeguard issues of the project

B) Consultants and contracts

The table below gives an overview of short-term staff and subcontracts hired with GEF funding.

Consultants	Inter-national	National	Main tasks
	(person/weeks)		
EE in construction	6	12	• Advice on content in ToRs and bidding documentation in pilot NZEB (incorporation of NZE features in design; advice on energy performance measurements) • Provide inputs into NZEB investment plan formulation • Suggestions for upgraded benchmarks for categories of buildings per climatic zone and formulation of building energy passports • Participate in selected training and workshop events
Solar energy in buildings	6	10	• Advice on content in ToRs and bidding documentation in pilot NZEB (incorporation of NZE features in design; advice on energy performance measurements) • Provide inputs into NZEB investment plan formulation • Suggestions for upgraded benchmarks for categories of buildings per climatic zone and formulation of building energy passports • Participate in selected training and workshop events
Water reuse/recycling	5	8	• Advice on content in ToRs and bidding documentation in pilot NZEB (incorporation of NZE features in design; advice on energy performance measurements) • Provide inputs into NZEB investment plan formulation • Participate in selected training and workshop events
NZE codes and MVE	6	8	• Overview of on NZEB initiatives and plans in EU and neighbouring countries

Consultants	Inter-national	National	Main tasks
	(person/weeks)		
			• Suggestions for upgraded benchmarks for categories of buildings per climatic zone and formulation of building energy passports. • Recommended package of updated or expanded energy code • Advice and support study tour organization • Participate in selected training and workshop events
EE economics and planning	8	9	• Provide inputs into NZEB investment plan formulation, in particular, financial-economic analysis • Advice on lifecycle cost, energy and carbon assessments methodologies; Inputs into the costs-benefits and impacts of NZEB technologies in Turkmenistan • Participate in selected training and workshop events
Training and knowledge		8	• Capacity needs assessment and advice on training packages • Participate in selected training and workshop events
Review and evaluation	12	10	• External (independent) consultants for mid-term review and terminal evaluation
	43	**65**	
National consultants		USD 30,000 USD 20,000	• iSocio-environmental assessment (determination of possible livelihood impacts in pilot buildings; development of code of conduct for contracted parties, building on GEF and UNDP requirements. contractors and third-party contractors to sign a declaration of understanding and their willingness to be held accountable based on the requirements • Social-environmental screening of NEZB investment strategy

Contracting - company	Value (USD)	Description
Integration NZE options and measures in building design	70,000	• Feasibility studies of the proposed NZEB interventions (building envelope, heat recovery, sustainable water management, solar PV and solar thermal) in the pre-selected pilot buildings, including comprehensive technical and economic evaluations for the recommended NZEB options. • Detailed engineering designs with technical specifications (incorporated in overall building construction design)
Measurements of energy performance	40,000	• Monitoring and evaluation of building performance (consumption of heat, gas, water and power) to estimate the building energy savings. Energy performance measurement in reference buildings (formed by new buildings constructed in the same city development project but without the NZEB features of the pilot buildings).
White paper on the real cost of fossil fuel subsidies to the public budget	20,000	• Assessment of the costs of current policies to the national budget and economy (including impact on GDP growth) with a list of alternatives to repurpose direct cash subsidies to residents and other means of reducing the impact of phased-out fuel subsidies. The White Paper will detail the results of similar policy steps across the globe and present conclusions and a step-by-step guide, including draft regulations to effectuate a transition to a zero-subsidy regime for fossil fuels and for more cost-effective electricity tariffs
Assessment of the potential of NZE technologies and measures in Turkmenistan	20,000	• Overview of energy savings and renewable technologies in buildings applied in Europe or elsewhere • Potential for energy savings in existing buildings undergoing capital renovation (i.e. significant remodelling and refurbishment) and higher-energy performance
White paper on the costs-benefits and impacts of	15,000	• Sector assessment with building characteristics, energy consumption and projections for the coming three decades in scenarios, assuming different levels of

Contracting - company	Value (USD)	Description
NZEB technologies in Turkmenistan		penetration of new buildings (according to 2020 SNT building codes and new NZEB standards). Recommendations for policy actions to bring older buildings at least towards the level of current codes or even set towards a net-zero pathway.
Road map for upgrading codes and institutional improvements	25,000	• Proposals for setting up appropriate unit/structure and for the upgrading of the bylaws, monitoring and regulations along with the enforcement routines. • Developed action plan (with budget allocation and milestones; governance setup) for upgrading current building codes
Report on applying lifecycle cost assessment and methodologies in public budget and procurement	20,000	• Overview of accessible life-cycle-costing methodologies and case studies, documenting new experiences and lessons learned into targeted messages • Paper on embodied emissions (construction materials)
Capacity building needs assessment	10,000	• Assessment of technical and institutional capacity strengthening needs (officials, auditors, MRBV staff, architects, engineers, planners) regarding energy in buildings and recommendations for training (packages)
Capacity strengthening and awareness-raising of central and local government officials and construction companies	35,000	• Organization and delivery of training sessions for officers of the Ministry of Construction and Architecture, Ahal district, and Ashgabat city administration will be trained in the data collection, preparation of feasibility study assessments, and execution of the monitoring and verification work. • Organization and delivery of training over employees from at least 20 private-sector companies
Knowledge enhancement of architects, engineers and advanced students on NZEB	25,000	• Training of architects, engineers and students in the fields of architecture and engineering trained on NZEB, in particular, integration of renewable energy and passive solar design
Measurement of progress indicators	9,963	• Survey on capacity building and knowledge results (see Indicator in results framework)

ANNEX J. GENDER ANALYSIS AND ACTION PLAN

A.4 Gender mainstreaming analysis

National policies on women's rights and gender equality

The human development index (HDI) value for Turkmenistan was 0.745 in 2021, ranking it 91st out of 191 countries in the 'high human development' category. The 2021 female HDI value for Turkmenistan is 0.726 in contrast with 0.760 for males, resulting in a GDI value of 0.956.

Turkmenistan is a signatory to ten core human rights treaties (and their protocols) and has ratified all eight of the International Labour Organization's Fundamental Conventions. Progress has been made in national legislative reforms and the adoption of some international human rights instruments; for example, amendments made in the Family Code (2007) provided an important legal basis for ensuring observance of the principles of equality, safeguarding human rights of women and girls, and promoting violence-free relations in family settings.

The ratification of the UN Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) by Turkmenistan has largely influenced the country's legal framework, primarily the content of the basic law with the highest legal power - the Constitution of Turkmenistan. In 2016, the Parliament of Turkmenistan adopted a new Law "On a new edition of the Constitution". According to the CEDAW recommendations, the new edition of the Constitution was formulated in such a way as to create conditions for the implementation of an active gender-oriented national policy based on the principles of equal rights and opportunities for women and men.

On January 2015 the Government adopted a National Action Plan for Gender Equality (NAPGE) as a major policy document articulating state priorities for the achievement of gender equality. NAPGE prioritized 14 areas requiring specific state attention and measures to be implemented from 2015 to 2020, stipulating the achievement of 'gender equality through coordination of the activities of state power and administration, local executive and representative bodies, public associations aimed at preventing discrimination based on sex and creating conditions for a more complete realization of the personal potential of women and men in all spheres of life'.

The second NAPGE (2021-2025) has been developed with the support of UNFPA, the United Nations Population Fund. It builds on the Concluding Observations of the UN Committee on the Elimination of Discrimination Against Women (CEDAW), other international human rights obligations relating to gender equality, the first NAPGE (2016-2020), and relevant SDG goals and targets linked to gender equality committed to by the Government. The seven strategic areas of the second NAPGE include a) further enhancement of the legislation, b) ensuring gender-responsive healthcare, c) fostering equal access to education, d) prevention and response to gender-based violence, e) economic empowerment of women and girls; f) advancing women's participation on all levels, including the political and social dimensions. The new Plan takes into account the socio-economic impact of the global pandemic on women and girls and outlines the measures to ensure that no one is left behind, including young girls and women with disabilities.

The implementation of NAPGE is closely aligned with the strategic development goals of the country, defined in key National Programmes[54] that focus on the enhancement of living standards as the primary goal of social development, implemented through a mix of economic and social policies, i.e., (1) increasing the middle class through new, more attractive private sector jobs, expanded employee training and re-training, and higher incomes; and (2) fostering a decline in the number of

[54] For example, the National Program for socio-economic development of Turkmenistan for 2011-2030; Program for the Revival of a New Era of a Powerful State: the National Program for the Socio-Economic Development of Turkmenistan in 2022-2052, Program of the President of Turkmenistan on socio-economic development for 2019-2024.

disadvantaged and vulnerable people, through increased and better targeted social assistance and higher-quality social service.

The Law on State Guarantees for Equal Rights and Opportunities of Women and Men, adopted with new amendments in August 2015, provides for advances in the area of violence against women. Article 22, stipulating 'state responsibilities for prevention and protection the rights of women and men from violence in family settings, in all cases of violence- physical, psychological, or any form of harm to the person,' represents an official legal recognition of the existence of a phenomenon of violence against women and forms a basis for state measures to end impunity and prevent/respond/protect the cases of violence. In addition, other laws of Turkmenistan such as the Laws of Turkmenistan "On State Guarantees of the Rights of the Child", "On Protecting the Health of Citizens", "On Education", and "On Combating Human Trafficking" contain norms on non-admission of discrimination on the basis of sex. Support for small and medium-scale entrepreneurship is one of the priority areas supported by the government for promoting the diversification of the economy. The Law 'On state support For Small and Medium Entrepreneurship (SME)' stipulates a mechanism of state support to SMEs, creation of conducive financial, investment, and technical conditions for stimulating entrepreneurship, creation of job opportunities, increase in competitive capacity of locally produced goods and services, and strategic use of SMEs in the socio-economic development of the country. The Law proclaims equal access of all citizens to the measures of support to SMEs.

Turkmenistan established institutional mechanisms necessary to ensure gender mainstreaming and mandated to promote gender equality into general policies. The implementation of the country's international obligations in achieving gender equality is coordinated by the Interdepartmental Commission for Ensuring the Implementation of Turkmenistan's International Obligations in the Field of Human Rights and International Humanitarian Law. The functions and rights of the Secretariat of the Commission were granted to the Institute of State, Law and Democracy of Turkmenistan which is subordinated to the Cabinet of Ministers of Turkmenistan. It also coordinates the implementation of national action plans on gender equality, human rights, rights of children. In November 2016, an important mechanism was created in Turkmenistan – the Authorized Representative for Human Rights (Ombudsman). The Ombudsman complements the existing state framework for ensuring equal rights and freedoms by undertaking consideration of citizens' complaints and is authorized to request information from the responsible bodies and institutions, explanations regarding the complaint, and instruct the responsible bodies to conduct expert research. All this contributes to the observance of the rights and freedoms of a citizen and a person, as well as the restoration of violated rights and freedoms. The Ombudsman annually submits a report on his/her activities and on the situation in the field of human rights in the country to the President of Turkmenistan, makes this report to the Mejlis of Turkmenistan. The Women's Union as the non-governmental organization operates since 1994 with the aim of expanding the participation of women in the social, industrial, and cultural life of Turkmenistan and providing women with social and professional support. It can be named the most influential women's organization which has approximately one million members. It is built on a territorial basis and its branches operate in *velayats*, cities and *etraps*, enterprises, and higher educational institutions.

Observations of the CEDAW Committee on conditions and policies in Turkmenistan

The CEDAW Committee noted its serious concern regarding gender-based violence[55] on, among others, a) "The lack of a comprehensive strategy to combat all forms of gender-based violence and the exclusion of women from participation in related processes; b) The lack of understanding, in particular among policymakers and religious and local leaders, of the criminal nature and the various forms of gender-based violence against women and their negative impact on women and society; c) The systemic impunity for perpetrators, as reflected by the low number of prosecutions, the low number of convictions and the lenient sentences imposed on them and by the State party's failure to provide reparation to victims".

The Committee[56] "regrets the extremely low levels of the participation of women in political and public life in the State party, in particular in decision-making positions, including within the parliament, academia, the public sector, the diplomatic

[55] Committee on the Elimination of Discrimination against Women (CEDAW), *Concluding observations on the fifth periodic report of Turkmenistan* (July 2018)

[56] Ibid.

service and provincial, district and municipal councils. It is also concerned about reports that women are prohibited from taking higher-level positions and running in presidential elections". CEDAW also expresses concerns about "a) Cumbersome legal and administrative requirements for the registration and operation of civil society organizations, including women's organizations, in the State party, as well as restrictions on their activities; b) The absence of independent women's human rights organizations, as reflected by the lack of alternative reports received by the Committee from national civil society organizations on the implementation of the Convention in the State party; and c) The limited cooperation of the State party with civil society organizations".

Support for small and medium-scale entrepreneurship is one of the priority areas supported by the government for promoting the diversification of the economy. The Law 'On state support For Small and Medium Entrepreneurship (SME)' stipulates a mechanism of state support to SMEs, creation of conducive financial, investment, and technical conditions for stimulating entrepreneurship, creation of job opportunities, increase in competitive capacity of locally produced goods and services, and strategic use of SMEs in the socio-economic development of the country. The Law proclaims equal access of all citizens to the measures of support to SMEs. Further analysis is needed, however, to assess the real access of different groups of women/men from urban and rural settings to the opportunities provided by the Law and subsequent policy actions.

The CEDAW Committee has raised concern on a) recent education reforms that have increased literacy rates and secondary school completion rates, but have not translated into equal professional and economic opportunities for women and men; (b) The persistent horizontal and vertical occupational segregation, the low participation of women in the formal labour market and the high concentration of women in low-paid and unskilled jobs, in particular in the agricultural sector; (c) The list of professions considered dangerous and unsuitable for women and the consistent position of the State that such distinctions are not discriminatory under the current legislation; (d) The persistent gender pay gap and the denial of its gravity by the State party; (e) The insufficient measures taken to promote the concept of shared family responsibilities and to address the difficulties that women face in reconciling work and family responsibilities.

Other issues

The National Educational Policy of Turkmenistan is aimed at ensuring gender equality and creating educational opportunities for women. In general, there is a gender balance in the education system but disbalance is present in the higher education. According to the Voluntary National Review (VNR) of Turkmenistan submitted in 2019, the share of the female students in technical training facilities equals to 57% in secondary vocational schools and 38.5% in higher vocational schools.

In Turkmenistan, vocational training shows that the share of female students in all technical training facilities seems to be less than a third. Gender discrimination does not start at the point of entry into the labour market but is to a large extent pre-determined through unequal division of labour within the home and choices made in education and training systems.

The lack of high-quality sex-disaggregated data represents a challenge for evidence-based policymaking concerning gender. A database for gender statistics (GenStat) has been introduced in Turkmenistan to assess gender development in the country representing 1,537 indicators in the areas of population, health care, physical education and sports, education and science, social welfare, work and employment, and households[57]. However, GenStat statistics are not available to the public, while its accessibility and availability 'are necessary for an accurate assessment of the situation of women, to determine whether they suffer from discrimination, as well as for informed and targeted policymaking and for systematic monitoring and evaluation of progress achieved toward the realization of women's substantive equality'.

The ongoing process of localizing Sustainable Development Goals (SDGs, see **Error! Reference source not found.**) to the context and development priorities in Turkmenistan is another important entry point for ensuring that globally defined gender goals and targets are well localized and aligned with urgent gender priorities related to ensuring substantive equality in the areas of, women's political, social, economic rights, equal access economic opportunities and health, education and

[57] CEDAW, *Combined Third and Fourth Periodic Reports*

social services, the rights to live in a culturally and socially harmonious environment and be free from any form of violence. As of 2019, integration of SDG 5 "Gender Equality" was reached by 67%[58] in Turkmenistan.

Gender and employment

Although female labour force participation in Turkmenistan is above the average of lower-middle-income countries, it is still lower than men's labour force participation (47% versus 56% in 2020 for ages 15+), respectively, according to the International Labour Organization (ILO). Women's participation in technical and managerial jobs in the energy sector is particularly relevant for advancing women's employment and their income-earning opportunities. While there are no statistics on construction sector employment available, ILO estimates of employment in the broad industry sector[59] indicate that, as of 2020, 36% of the Turkmenistan female labour force was employed in the industry sector, while 42% of the male labour force was employed in the same sector.

Rapidly expanding towns and cities have created employment for many youths and women. Yet, in the construction sector, more women than men find it difficult to access employment. While in other industries, many women have been employed in semi-skilled or skilled jobs, in the construction industry, women are often employed as unskilled labourers. The job of an unskilled worker is more strenuous in the construction industry than in other manufacturing industries.

Human development is a process of enlarging the choices for all people not just for one part of society such a process becomes unjust and discriminatory if most women are excluded from its benefits. Existing sexual stratification in the construction labour market will not go away unless women gain more formal training in such areas as engineering and mechanization. Often, when men and women enter construction work at the same time, over half of the women will remain as casual workers while only a relatively small fraction of the men remain in that category. It could be alleged therefore that men have more staff development opportunities than women or that men can be more easily promoted to higher positions compared to women. The rigid gender division of labour confines women to a narrower range of income-earning or employment opportunities in the construction industry.

Gender issues addressed in TEESB

The Project will work with the Ministry of Environmental Protection and the Ministry of Construction and Architecture to ensure that big numbers of women are imparted with skills useful to the nascent sector of energy-efficient rehabilitation of the buildings sector. Increased participation of women in the sector will support meaningful employment opportunities for women reducing the extent and intensity of unemployment and poverty. The project will also provide opportunities for women to participate in the design of nearly zero-energy use buildings as well as in the production, supply, delivery, and administration of installation of energy efficiency and renewable energy technologies. Women will also gain access to the capacity building and training, required to understand avenues of participation in the procurement of NZE goods and services. The project will ensure that the gender balance is maintained in all project activities (e.g. seminars, workshops, and training). Moreover, gender considerations will be included in the consultations regarding needs and preferences on types of training.

A.5 Gender action plan (GAP)

Further examination of the project's theory of change and its proposed activities reveals various areas in which gender dimensions need to be taken into account in order to maximize effectiveness and ensure gender inclusivity.

a) **Data collection and analysis**,

[58] *Voluntary National Review of Turkmenistan: Empowering people and ensuring inclusiveness and equality*

[59] Share of industry in overall employment was 40% in 2020, ILOSTAT database

Contribute to addressing the lack of gender-disaggregated data by carrying out studies on employment in the energy efficiency and buildings subsector (and address some of the underlying reasons for the gender gap in employment in that subsector). Gender disaggregated data highlighting the participation of women in decision-making at the national, city and community level institutions and committees will also be useful in influencing future initiatives. The project will also gather gender-disaggregated data for evaluation purposes and use gender-sensitive indicators) to facilitate planning, implementation, and monitoring; particularly around beneficiaries (building occupants and office workers as well as participants in events and project activities).

b) **Engagement of women in program development**.

Encourage national partners to ensure women's participation and their equal and active participation in all project-related events. Implementation strategies to deliver these targets will be designed and delivered by the project team in conjunction with key project partners. This will be done through the clear setting of targets in project agreements and regular monitoring of progress. This concerns consultation processes, workshops and informative events, at the level of at least 30-35% of total participants, with a special focus on young women professionals in the field of engineering, including university students and academics.

In addition to the collection of data, the project will also ensure gender relevance and gender inclusivity in its activities by engaging women in the development and implementation of activities – including those targeting professionals (such as the active role of women in NZEB planning and formulation of regulations), as well as those targeting non-government stakeholders. This engagement will encourage the inclusion of women as national experts (where possible), recipients of training, and as members of advisory groups.

c) **Code of conduct**

The project will implement Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) mitigation measures, including a Code of Conduct for workers, a channel in the Grievance Redress Mechanism (GRM) report SEA/SH cases, and training and awareness sessions for project workers and affected stakeholders. Standard Codes of Conduct will be adhered to and signed by all project workers which addresses measures on prevention of). Regular monitoring of workplaces and training on SEA/SH delivered by PMC/Contractors to their workers during the project implementation. Civil works contractors for the pilot buildings) when selected, will prepare their contractor's labour-management procedures, including the grievance redress for their workers. SEA/SH risk is assessed as moderate, and proposed measures will help to mitigate the risk (as indicated in the social and environmental safeguards Annex K).

c) **Informational outreach**.

Make an effort to reach both men and women equally with its informational outreach, including both training for professionals and promotional activity among the general public. Women will be depicted equally in program materials, with special attention to ensuring equal portrayal (where stereotypes might more strongly assume male roles). There is a need for women as active participants in key capacity-building workshops and training. In addition to their participation, it is also essential to integrate gender-inclusive training materials and content, project documents, IEC materials and documentation of both written text as well as the development of audio and visual content with inclusive languages and appropriate illustrations highlighting balanced gender perspectives. There is also a need for the availability of relevant information, communication and accessing knowledge for women and men on energy-efficient and sustainable consumption practices. However, the promotion of energy-efficient and sustainable consumption can be achieved through focused and gender-sensitive awareness campaigning.

d) **Gender and social expert**

Although there is sufficient technical expertise available for the project, consideration of the user perspective concerning men, women and children, particularly women in various age groups along with their needs and the impact it will have on these stakeholders, is essential. Their specific needs can shape the outcome to be more gender-inclusive as well as effective.

A gender expert, as part of the project, will also supplement the need to incorporate these considerations into the project design.

Gender-specific indicators				
	Indicator		**Target**	**Source, verification, and assumptions**
Component 1	*Piloting NZEB in residential and public buildings* - Y/N gender review of pilot NZEB proposal performed - % Proposals received that are gender-responsive and include credible gender action & management plans - % Proposals accepted that are responsive with credible plans - Design team composition (of proposed pilots) - Number of women participating in construction and installation of NZEB technology (per type of job) - Status of mainstreaming gender in the NZEB investment plan		 - Gender review performed - All NZEB pilot proposals are gender-responsive with credible social action & gender elements in their ESMP - 100% of accepted proposals are responsive to plans - 35% of the team consists of women - 25% of the workforce are women - 100% mainstream gender	*As in component 1 (see Annex D - Monitoring Plan)*
Component 2	*NZEB policy, regulation and institutional mechanism* - M/F representation on committees, boards, etc. - % of presentations, discussions, reports etc. that include a discussion of gender aspects - Y/N gender mainstreamed in NZEB national action plan and in underlying assessment report (e.g. MVE institutional)		 - 35-40% F/M balance - 100% of topics, discussions and reports acknowledge gender aspects - yes	*As in component 2*
Component 3	*Knowledge sharing and capacity building* - Y/N Gender-differentiated analysis - Y/N Gender-inclusive training and curricula - Number of women receiving training and number of women giving training) - M/F event attendance - M/F presentations, speaking roles Y/N gender mainstreamed in lessons learned, final; report, insight brief and other project materials		 - yes - yes - TBD - at least 35% of female attendance yes - - yes	*As in component 3*
M&E	- Y/N gender issues risks evaluated and accounted for - M/F attendance at events		- yes - at least 35% of female attendance	*As in component 4*

ANNEX K. STAKEHOLDER ENGAGEMENT PLAN

A.1 Stakeholder engagement plan

Introduction

This Stakeholder Engagement Plan (SEP) defines how TEESB will identify and engage key stakeholders, and integrate their inputs into project implementation and risk management. Implementation of this plan will provide stakeholders with meaningful access to dialogue and decision-making in the development and implementation of the project. By providing channels for all stakeholders, including the disadvantaged and vulnerable, effective stakeholder engagement helps to ensure understanding, acceptance, and ownership of the project, thereby strengthening its benefits and sustainability.

Stakeholder engagement is an end in itself, ensuring that no one is left behind and that disadvantaged and vulnerable project stakeholders have a voice in project development and implementation. It is also a means for improving project design, identifying and managing risks, and ensuring transparency, accountability and integrity. In this light, one important purpose of this plan is to provide feedback and monitoring mechanisms to ensure the project is achieving its intended results and identifies potential unintended consequences. The development and implementation of the SEP are part of the UNDP Social and Environmental Safeguards (SES) requirements. Hence, the presented SEP will be reviewed and updated during the social and environmental assessment processes (see also Annex K)

Purpose and objective

The enhancement of the viability and social acceptability of NZE technologies and measures in buildings depends on the level of flow of information between building occupants and administrators, private sector (construction companies and technology suppliers), institutions and government officials and decision-makers. This flow will guarantee that the decisions made are well-informed and constitute the best use of resources to serve the best interest of the country and beneficiaries. The flow will also guarantee that investors, developers and social groups are actively engaged in the development of regulations governing the energy sector before they become legally binding and are allowed to utilize their technical expertise in the formulation of national plans and laws aiming to increase bioenergy development and application. Hence, this SEP is developed to ensure tripartite engagement of public entities, private sector actors, and representatives of beneficiaries in all stages of pilot development and overall project implementation.

Project preparation

As part of the project development (PPG) phase, and in addition to the desk review and data collection exercise, the PPG team of National and International Consultants identified key stakeholders and engaged with them in a series of in-person and online meetings, during the PPG international consultant mission to Turkmenistan, and thereafter by the PPG gender and social safeguards consultant (see list of stakeholders met on the next page). The purpose of these meetings was to share information about TEESB, to seek first-hand information on baseline conditions and needs, and to scope out potential project activities and partnerships. The discussions also aimed to identify the gaps that the TEESB initiative seeks to fill, especially in the presence of several projects targeting energy access and renewable energy development financed by development partners besides UNDP and the GEF.

The consultations served to accomplish the following:

- Validate the findings of the SESP.
- Identify additional risks to be considered in the SESP.
- Clarify the potential roles of stakeholders.
- Identify capacity needs.
- Validate the recommended mitigation measures.

In addition, UNDP CO staff had several follow-up meetings with the three ministries involved (MEP (MAEP), MOE, MCA)

Meeting date	**Meetings with PPG team** (incl. international consultant)
16 January 2023	Meeting with UINDP Internal meeting PPG consultants
17 Jan	Ministry of Energy Ministry of Construction and Architecture
18 Jan	Institute of Seismic Construction Ministry of Agriculture and Environmental Protection (Separated into the Ministry of Agriculture and the Ministry of Environmental Protection as of July 14, 2023) Turkmengas Ministry of Finance and Economy
19 Jan	Institute of Construction and Architecture Internal meeting PPG consultants
20 Jan	Meeting with the project manager of the EERB Project Wrap-up meeting at UNDP
07 June 2023	Validation workshop (attended by above-mentioned stakeholders

Project inception and implementation

The project will effectively engage the stakeholders involved in the project to get their support and guide the project implementation to achieve higher results.

- Project outreach, including the project website, media (print/audio-visuals), workshops, training, etc.
- The PMU and the Project Board will ensure that the Gender Action Plan recommended by the project is pursued and implemented. The various groups especially women will be engaged during the consultation meetings prioritized to avail of the programme, and be included in the different capacity-building programs. The project will also ensure through the Project Board and Advisory group (see Section 7 on "project governance") will be closely coordinated with the activities of NGOs, government bodies and development partners.
- Meetings, monitoring visits, surveys, and written communications will be used to receive feedback to continue the ongoing dialogue as well as during implementation.
- The project will follow a participatory approach in decision-making by engaging all the relevant stakeholders. Government agencies, NGOs, and private sector actors will be actively involved during the project implementation.

A detailed list of stakeholders and their involvement in particular project outcomes and outputs are given in Box 11. The key indicator for the engagement of each group of stakeholders is their practical involvement in implementation and dissemination.

Category	**Stakeholder or group**
Government and public sector	• Ministry of Energy • Ministry of Construction and Architecture • Ministry of Environmental Protection • Ministry of Finance and Economy • Municipalities (e.g., Arkadag, Ashgabat)
Institutes and state companies	• Turkmengaz • Turkmenenergo • State Institute of Architecture and Construction • Scientific Research Institute of Seismic Construction • State Energy Institute of Turkmenistan
Development partners	• Asian Development Bank • European Bank for Reconstruction and Development

Category	Stakeholder or group
Private sector	• Large international construction companies and developers and design firms • Material suppliers (insulation, windows, construction materials) and technology providers (heating, cooling and ventilation; appliances and equipment; solar thermal and solar PV) • Professional groups (architects, engineers)
Direct beneficiaries	• Occupants of residential apartment buildings; office workers in public buildings and building administrators • Local community groups • Recipients of the project's training and awareness-raising

TEESB has not yet selected the specific localities for its planned pilot NZEB (Outputs 2.1). These localities will be are likely to be located in the Arkadag (second phase) and the new Ashgabat City megaproject. The specific pilot buildings will then be selected from a list provided by the two ministries (Energy; Construction and Architecture) at the inception of the project. At that point, the project will identify and connect with all local stakeholders, including both partners and beneficiaries.

Engagement methods and communication mediums

The following list presents the main engagement mediums to be utilized by the project team during implementation to ensure continuous engagement and active participation of stakeholders.

1) *In-person meetings*:
   - Consultation workshops: These workshops will have a pre-structured agenda which will be designed to present a specific result/report and discuss with stakeholders the best way forward. These workshops will also be an opportunity to gain consensus from stakeholders on a specific action plan prior to proceeding with implementation. Therefore, stakeholder consultation meetings and workshops are included in the project design as part of the main activities to be carried out by the consultants in charge of each output.
   - Interviews and focus groups: These will be conducted with different groups of indirect beneficiaries, with special attention to NGOs and representatives from the NZEB locations, to overcome their generally low participation capacity and ensure that their input is integrated with the different stages of the project implementation. The Project Manager and Gender and Social officer will be responsible for ensuring that these interviews and focus groups have been conducted by the responsible consultants, as appropriate.
2) *Written communication:*
   - Emails: Email communication is widely used in Turkmenistan to provide direct access to individuals and representatives of organizations. Emails will be used as the main tool for organizing meetings, i.e., sending invitations to participants, sending the meeting minutes after the meeting, etc.
   - Letters: Being the formal method for communication and conveying messages between public parties, letters will be requested by the project team and provided by the relevant authority, as appropriate.
   - Survey forms: Several activities under the project implementation strategy constitute undertaking a needs assessment or other types of analyses, with some requiring a survey to collect information. The responsibility for the surveys is that of the consultant undertaking the analysis. However, the SES Officer will be responsible for supporting the project consultants with the sampling process and surveying procedure to ensure that the results are as representative and inclusive as possible.
   - Project brochures and manuals to present the results of specific studies and outcomes of certain activities.
3) *Online meetings and phone calls:* Virtual communication is sometimes preferred since it is quicker and easier compared with email and letters, and is a viable alternative to in-person meetings. Online applications and telecommunication tools will be used throughout project implantation to facilitate the work and ensure the project team have easy access to stakeholders, and vice versa.

Although the mode of communication may vary according to task and participants, all consultations and engagement activities will be undertaken with the goal of ensuring full participation of relevant stakeholders, whereby all participants will be provided sufficient notice to prepare well and provide input for the project. Moreover, TEESB will also use all possible opportunities, i.e. workshops, meetings, training and awareness events, to promote diversity and gender balance. Balanced

representation of relevant stakeholders will be ensured by reaching out to both men and women and different groups through appropriate communication mean and encouraging their participation, noting the most socially and culturally acceptable language and method of communication for each group of stakeholders.

Public disclosure of information

Project-affected, marginalized, and disadvantaged stakeholders at the pilot location will be identified during site selection and assessment, including persons with disabilities and other disadvantaged groups as per the list of stakeholder groups provided above. For each group, the following assessments will be conducted as part of the stakeholder engagement activities, taking into account their involvement in each project component:

- Identify limitations for understanding project information and participating in the consultation process (e.g. language differences, lack of transportation, accessibility of venues, disability, etc.)
- Develop measures to support and accommodate engagement, e.g. provide information in accessible formats, choose convenient locations for consultations, ensure venues are accessible, provide transportation to meetings, change the time of meetings to accommodate needs, provide facilitation and explain complex issues and terminology, provide support workers for assisting participants with disabilities, provide simultaneous interpretation (including sign language).
- On the national level, methods to receive feedback and to ensure ongoing communications with stakeholders (outside of a formal consultation meeting) will be developed as part of the project's knowledge management and dissemination plans (to be developed as part of the implementation of Component 4).

Diversity, inclusion and gender-balance

The inclusion of women and other relevant groups will be made possible through enhancing opportunities, improving access to resources, making their voices heard and ensuring respect for their rights. The process of identification of these groups and their representatives and engaging them through the various project activities is achieved using two approaches:

1) Conducting context-specific gender analysis using gender and mini-grid analysis framework and developing participatory action plans at the community level at locations where pilot projects and productive use will be supported. The analysis will be sensitive in scheduling community-level meetings selecting appropriate time and location, giving deliberate attention to the participation of diverse groups to listen to their voice and applying appropriate language that fit the audience level. It will also explore the existing status of the different groups their roles, responsibilities, opportunities, and deprivations and seek participatory solutions in their engagement as consumers and actors at various levels of the mini-grid value chain.
2) At every stage of the project implementation the project team will make a specific effort to make sure opportunities are created and accessed by women and other vulnerable groups while implementing institutional-level capacity-building training, policy-level discussions, access to education and financial opportunities

Responsibilities

The PMU is primarily responsible for carrying out the specified stakeholder engagement activities. The stakeholders will be engaged while carrying out various assessments and studies, training, and workshop events.

Monitoring and reporting

The project stakeholders would be engaged at various levels to carry out the monitoring activities. Then the PMU will liaise with relevant Government agencies and other partners and collect data and monitor the activities regularly. The PMU will report back the results to the stakeholders at the earliest through letters or conduct meetings both individually as well as through the engagement of all relevant agencies.

Resources, responsibilities and timelines

The size of the project does not allow for extensive stakeholder engagement measures or dedicated staff for this purpose. Stakeholder engagement will therefore form part of the broader interactions with project stakeholders. The frequency of communication will be guided by the specific level of stakeholder interest. Specific opportunities for engagement will coincide with anticipated outputs and the development phases for deliverables and milestones towards outputs. More

deliberate consultation and engagement activities will be implemented for the two pilot projects and as part of the project monitoring and reporting activities. At the national level, project-affected, marginalized and disadvantaged stakeholders have been identified, including persons with disabilities and other disadvantaged groups as per the list of stakeholder groups provided above in this document. This list will also be completed at the local level for the pilot sites.

While the project financially supports the Social safeguard and gender officer (in the PMU), there is no budget specified for SEP activities but has been included in the budgets of related outputs, notably the design and implementation of the training and knowledge plan, national dialogue (bioenergy task force), stakeholder consultation for pilot projects and extensive data collection for the monitoring, review and evaluation of impacts.

A.2 Grievance mechanism

Project-level Grievance Redress Mechanism

During the design and implementation of any project, a person or group of people may perceive or experience potential harm, directly or indirectly due to the project activities. The grievances that may arise can be related to social issues such as eligibility criteria and entitlements, disruption of services, temporary or permanent loss of livelihoods and other social and cultural issues. Grievances may also be related to environmental issues such as excessive dust generation, damages to infrastructure due to construction-related vibrations or transportation of raw material, noise, traffic congestion, damage to green areas, etc.

Should such a situation arise, there must be a mechanism through which affected parties can resolve such issues in a cordial manner with the project personnel in an efficient, unbiased, transparent, timely and cost-effective manner. To achieve this objective, a Grievance Redress Mechanism will be agreed upon during the Inception Phase. The design of the Grievance Redress Mechanisms (GRM) will be discussed at the project inception workshop and operationalized prior to the initiation of activities.

The Grievance Redress Mechanism will be designed to:

a. be a legitimate process that allows for trust to be built between stakeholder groups and assures stakeholders that their concerns will be assessed in a fair and transparent manner;
b. allow simple and streamlined access to the Grievance Redress Mechanism for all stakeholders and provide adequate assistance for those that may have faced barriers in the past to be able to raise their concerns;
c. provide clear and known procedures for each stage of the Grievance Redress Mechanism process, and provides clarity on the types of outcomes available to individuals and groups;
d. ensure equitable treatment to all concerned and aggrieved individuals and groups through a consistent, formal approach that is fair, informed and respectful to a concern, complaints and/or grievances;
e. to provide a transparent approach, by keeping any aggrieved individual/group informed of the progress of their complaint, the information that was used when assessing their complaint and information about the mechanisms that will be used to address it; and
f. enable continuous learning and improvements to the Grievance Redress Mechanism. Through continued assessment, the learnings may reduce potential complaints and grievances.

The GRM will be gender- and age-inclusive and responsive and address potential access barriers to women, the elderly, the disabled, youth and other potentially marginalized groups as appropriate to the Project. The GRM will not impede access to judicial or administrative remedies as may be relevant or applicable and will be readily accessible to all stakeholders at no cost and without retribution.

Information about the Grievance Redress Mechanism and how to make a complaint and/or grievance will be communicated and validated during the stakeholder engagement process and placed at prominent places for the information of the key stakeholders. Information on the GRM will be regularly communicated during other related project communication activities.

All complaints and/or grievances regarding social and environmental issues can be received either orally (to the field staff), by phone, in a complaints box, via WhatsApp or in writing to the UNDP. This may be done anonymously or declaratively. A key part of the grievance redress mechanism is the requirement for the PMU to maintain a register of complaints and/or grievances received, the timeliness of responses provided and the conclusion/adjudication of the grievance. It will also be important that the record speaks to any repetitiveness of any specific grievances which should trigger more serious steps and consideration. The following information will be recorded:

a) time, date and nature of the enquiry, concern, complaints and/or grievances;
b) type of communication (e.g., telephone, WhatsApp, written communication or letter, personal /oral contact);
c) name, contact address and contact number (where relevant);
d) response and review undertaken as a result of the enquiry, concern, complaints and/or grievances;
e) actions taken with the name/role/accountability of the person taking action as well as the formal response given to the complaint/complainant; and
f) Any repetition and escalation of the same or related complaint and any additional measures taken (where relevant).

Communications related to the GRM are expected to be clear, easily understood and free of stereotypical language/images and biases. Guidance within the GAP will outline steps and considerations to ensure gender sensitivity and inclusive approaches.

UNDP SRM and SECU

In addition to the project-level and national grievance redress mechanisms, complainants have the option to access UNDP's Accountability Mechanism, with both compliance and grievance functions.

The Social and Environmental Compliance Unit investigates allegations that UNDP's Standards, screening procedures or other UNDP social and environmental commitments are not being implemented adequately, and that harm may result to people or the environment. The Social and Environmental Compliance Unit is housed in the Office of Audit and Investigations and managed by a Lead Compliance Officer. A compliance review is available to any community or individual with concerns about the impacts of a UNDP programme or project. The Social and Environmental Compliance Unit is mandated to independently and impartially investigate valid requests from locally impacted people, and to report its findings and recommendations publicly.

The Stakeholder Response Mechanism offers locally affected people an opportunity to work with other stakeholders to resolve concerns, complaints and/or grievances about the social and environmental impacts of a UNDP project. Stakeholder Response Mechanism is intended to supplement the proactive stakeholder engagement that is required of UNDP and its Implementing Partners throughout the project cycle. Communities and individuals may request a Stakeholder Response Mechanism process when they have used standard channels for project management and quality assurance and are not satisfied with the response (in this case the project-level grievance redress mechanism). When a valid Stakeholder Response Mechanism request is submitted, UNDP focal points at country, regional and headquarters levels will work with concerned stakeholders and Implementing Partners to address and resolve the concerns. Visit www.undp.org/secu-srm for more details.

All stakeholder and project-related engagement and communications are expected to be gender sensitive and inclusive, free of bias and discrimination as much as possible. They should also be accessible to persons without regular access to data, internet and online telephony or other technology. Low bandwidth solutions and low-resolution content should be an option where possible.

A.3 Communication and knowledge management plan

The Project will also emphasize strong communication with a broader range of stakeholders. Key elements of the project's communication strategy are outlined in the table below:

Key element	Relevant group	Means	Timeframe
1. Project governance meetings; PSC meetings and its Working Group meetings	All stakeholders that are members of the PSC or its Working Groups or are invited to attend	Meetings	Periodically, depending on PSC and Advisory Committee frequency of meetings
2. Seminars/workshops and training events, including the Inception workshop, and final project workshop	National and sub-national government officials Private sector; NGOs and CSOs	Workshop, meeting, seminar, training On-the-job training Budget:	Typically, workshops will be held to start up an activity and/or at the end to present results. The timeline of each activity is given in Annex C of the UNDP ProDoc
3. Project documents, thematic reports and publications; Technical and other reports	Government departments and decision-makers at the national and local level; Development partners Research institutes and academia; individual experts; NGOs	Direct dissemination (e.g., email or hard copy/ USB-drive) Access via website to reports and documents and database and info systems	Technical reports will typically be published at the end of an assignment (see Annex C of the ProDoc).
4. Project knowledge capturing and info dissemination	Government officials Private sector Development partners; Research institutes NGOs	Online access; Printed materials Media Study tour	Thematic reports and knowledge products are published at the end of one or more outputs to provide a summary of findings, results, and lessons learnt
5. Communications on significant project-related works that could be disruptive to individuals, communities, recreation and or livelihoods.	All stakeholders but particularly government departments and decision-makers at the national and sub-national level; subcontractors working on behalf of the project and or project partners	Online access Printed materials as well as radio/TV Social Media (including Facebook/Instagram, as far as accessible in Turkmenistan)	Periodically and at least 30 days before any significant physical works are to be undertaken. During works, if any significant changes are to occur (e.g., stoppages, intensification and or extension of the activity.

The budget for workshops, training and information dissemination (printed materials, etc.), including the study tour, is about USD 183,000 (not including consultancy or contracted services which are in separate budget lines).

All communications are expected to be gender-sensitive, non-discriminatory and free of bias. Gender-sensitive communications imply that imagery, writing and presentations will be non-stereotypical, free of patriarchy and misogyny and also empowering particularly for vulnerable and marginalized groups. Communications content will also consider visibility for key project partners including the Government of Turkmenistan, UNDP and the GEF, consistent also with the GEF's Communication and Visibility guidance.

ANNEX L. SOCIAL AND ENVIRONMENTAL SAFEGUARDS PLANNING (SESP)

Project Information

Project Information	
1. Project Title	Developing National Capacity of Turkmenistan through Improving Regulatory Environment towards Energy Efficient and Sustainable Building Sector (TEESB)
2. Project Number (i.e. Quantum project ID, PIMS+)	Quantum Project ID: 01002480 PIMS ID: 6692
3. Location (Global/Region/Country)	RBEC/Turkmenistan
4. Project stage (Design or Implementation)	Design
5. Date	May 2023

Part A. Integrating Programming Principles to Strengthen Social and Environmental Sustainability

QUESTION 1: How Does the Project Integrate the Programming Principles in Order to Strengthen Social and Environmental Sustainability?

Briefly describe in the space below how the project mainstreams the human rights-based approach

The project fully supports UNDP's commitment to a human-rights-based approach and supports the universal respect for, and observance of, human rights and fundamental freedoms for all, but particularly in the case of this project, for all urban citizens in new urban development schemes. The project does this broadly by supporting the effective and sustainable use of energy in the housing sector, including the development and adoption of energy-efficient (and nearly-zero) building codes and standards with long-term impact as well as by promotion of clean solar energy use. In addition, the project will ensure and support the human rights principles of participation, inclusion and non-discrimination. More specifically, the project will carry out the following activities that support UNDP's human rights-based approach:

- Throughout all project activities, the principles of participation and inclusion will be applied. In practical terms, this means, that all stakeholders will be consulted in planning the details of project activities for the project work plans. Stakeholder groups will be fully represented in the project steering committee, which will have oversight of the project, and provide strategic guidance on project implementation.
- In all aspects of the project, the project will ensure that residents in the project pilot site have meaningful means of raising any concerns, to UNDP or to respective resource management authorities, including government institutions, that are involved in the project. During the project inception phase, the project will specifically communicate to all stakeholders and participating communities the specific mechanism and means for raising concerns or grievances to UNDP or to government representatives when activities may adversely affect them.
- The project supports the equality aspect of human rights particularly through supporting the implementation of UNDP's gender mainstreaming policy, as further described in the following question of this SES.

By promoting energy efficiency in the construction sector, this project will lead to local social and economic growth and additional employment opportunities (notably in and around the Ashgabat). The intended socioeconomic outcomes of the project – including a cleaner environment, reduced energy and utility costs – apply equally to all urban citizens (more than 2.6 million people) of Turkmenistan in the longer term, equally and without discrimination with respect to income, gender, or other factors.

Briefly describe in the space below how the project is likely to improve gender equality and women's empowerment

Rapidly expanding towns and cities have created employment for a lot of youth, including women. Yet, in the construction sector, more women than men find it difficult to access employment. Women continue to be discriminated in relation to jobs and pay, promotion and security benefits, capacity building and skills development and are subject to poor occupational health and safety standards. While in other industries, many women have been employed in semi-skilled or skilled jobs, in the construction industry, women are often employed as unskilled labourers. The job of an unskilled worker is more strenuous in the construction industry than in other manufacturing industries. However, difficult work is often assigned to women, not because of their physical capacities as compared to men but on the ground of socially assigned roles. Women also show less eagerness to break the traditional ethics that suppress forms of employment that are "alternative" to the traditional roles.

The project will be developed fully in line with and supportive of both the GEF's and UNDP's gender mainstreaming policies. A full gender analysis will be conducted during the PPG phase and based on this a project Gender Action Plan will be drafted. Appropriate information gathering and planning will be carried out during the project development involving key stakeholders and including women as much as possible in the local consultations and through the validation workshop. The Project will work with the Ministry of Environmental Protection and the Ministry of Construction and Architecture to ensure that a large number of women are imparted with skills useful to the nascent sector of energy-efficient rehabilitation of the buildings sector. Increased participation of women in the sector will support meaningful employment opportunities for women reducing the extent and intensity of unemployment and poverty.

The project will also provide opportunities for women to participate in the design of nearly zero-energy use buildings as well as in the production, supply, delivery, and administration of installation of nearly-zero energy building (NZEB) technologies. Women will also gain access to capacity building and training, required to understand avenues of participation in the procurement of NZE goods and services. The project will ensure that the gender balance is maintained in all project activities (e.g., seminars, workshops. Enforcement agency staff will be expanded by more women hires and will get health and safety (H&S) monitoring training in order to spot H&S violations at work sites in terms of lack of appropriate protective conditions and gear. The project will also gather gender-disaggregated data for evaluation, capacity needs assessment and planning purposes and use gender-sensitive indicators (particularly around beneficiaries) to facilitate planning, implementation, and monitoring as well as on ways to reduce energy consumption. This will be done through the clear setting of targets in project agreements, payment by results and regular monitoring of progress.

Briefly describe in the space below how the project mainstreams sustainability and resilience

The core focus of this project is environmental sustainability as it relates to reducing the scale of CO_2 emissions from the building sector. The project seeks to mainstream best building design and construction practices at the level of the national government, municipal administrations, and private construction businesses. It also has major activities focusing on raising awareness and creating behavioural change among buildings users. The TEESB project will:

- Enhances sustainability of construction design of certain building types. This reduces the vulnerability of the residents to extreme climate events that are anticipated to become more frequent in any of the climate change scenarios
- Supports strengthening of the building design capacity development at the national and local levels for critical buildings energy delivery and energy management (for energy monitoring, building code enforcement, etc.)

Briefly describe in the space below how the project strengthens accountability to stakeholders

The project design:

- Supports meaningful participation and inclusion of all stakeholders, in particular marginalized individuals and groups, such as women, in the buildings design and maintenance process, which are high value-added activities with salaries that are close to or higher than median salaries producing a more equitable distribution of benefits among women and creating an enabling environment for women's entry and participation in the sector (consistent with participation and inclusion human rights principle)
- Supports meaningful means for disenfranchised segments of the population to raise concerns and/or grievances about unfair labour practices and poor workplace conditions, including a redress process when activities may adversely impact them (consistent with accountability and rule of law human rights principle).
- The project-affected people (staff of the design, construction and buildings maintenance subcontractors, and eventually the beneficiary occupants) will be informed of UNDP's accountability mechanism via seminars, targeted information campaigns and dedicated annexes to their employment contracts. The project will use a transparent, fair, and free-to-access Grievance Redress Mechanism (GRM). Furthermore, stakeholders will have access to the UNDP Stakeholder Response Mechanism and the Social and Environmental Compliance Unit (SECU). UNDP's Information Disclosure Policy, which is guided by openness, with the underlying presumption that any information concerning UNDP programmes and operations is available to the public, will apply to the project. Grievance Redress Mechanism (GRM) will be developed at the funding proposal stage and operationalized during the first year of implementation to mitigate/resolve any complaint
- An Environmental and Social Management Plan (ESMP) will be prepared during the project implementation, as a requirement, prior to the start of any civil works, giving details for administering and monitoring the potential environmental and social impacts and their mitigation measures. TEESB will not finance any activities with pilot/demos (output 1.1) that are categorized as Substantial or High environmental and social risk.

Part B. Identifying and Managing Social and Environmental Risks

QUESTION 2: What are the Potential Social and Environmental Risks? *Note: Complete SESP Attachment 1 before responding to Question 2.*	**QUESTION 3: What is the level of significance of the potential social and environmental risks?** *Note: Respond to Questions 4 and 5 below before proceeding to Question 6.*			**QUESTION 6: Describe the assessment and management measures for each risk rated Moderate, Substantial or High.**
Risk Description (broken down by event, cause, impact)	***Impact and Likelihood (1-5)***	***Significance (Low, Moderate Substantial, High)***	***Comments (optional)***	***Description of assessment and management measures for risks rated as Moderate, Substantial or High***
Risk 1: Construction related to applying energy-saving infrastructure, technologies and equipment may have negative environmental, social and health impacts, if not designed, and constructed properly S 1.3, 1.7 S 2.2, 2.3, 2.4 S 3.1, 3.2, 3.5, 3.7, 3.8 S 7.1, 7.2, 7.5, 7.6 S 8.1, 8.2, 8.3, 8.6	I=3 L=3	**Moderate**	This risk arises especially in activities related to the selection, tendering and application of energy-saving materials, infrastructure, technologies and equipment in the two pilot NZE buildings (Output 1.1) The project's pilot activity on outfitting buildings with energy-saving and measurement equipment will be relatively small in scale,	Following the requirements of the national Law on Environmental Expertise (2014), process of Environmental Impact Assessment will be applied to buildings construction, including the design and application of the energy-saving technologies and solutions. To ensure that the national EIA process adheres to the UNDP SES requirements all construction projects subject to domestic EIA will be screened for the applicable UNDP SES standards, prior to the initiation of each EIA process. Process of the combined national EIA and UNDP ESIA will be described in the ESMF. Environmental and social impact assessment will include recommendations for the mitigation of local environmental and social risks. Besides the other issues, the pilot buildings' ESIAs will include

			however, introducing these technologies will be carried out as part of the construction of new buildings. Construction of new NZEB buildings is included as one of the outputs of the project. Therefore, full-scale environmental and social impact assessment will be required. Examples of potential environmental and health related risks, especially for surrounding communities are: dust and noise generation, vehicle and machines emissions, generation of construction waste including oil, grease, hydrocarbons, old electrical appliances, lead-based paints, etc. Health of future tenants may be affected by the quality of indoor environment (from applying toxic materials, containing for volatile organic compounds (VOC) and formaldehyde| or by improper ventilation.	adequate resource efficiency and waste management plan, hazardous materials management and disposal etc. During the building design process (implementation stage), the characteristics of each building will be assessed to identify the possible hazardous materials, as need be. For the construction phase, the ESIA will address good housekeeping, (ii) emissions (including dust, noise, etc.) control, and (iii) proper waste management including hazardous, solid, and construction waste management. It should be noted that air ventilation is an integral part of the NZE design (see Annex F). Concerning new buildings only, asbestos is not be used, since its use of is forbidden in Turkmenistan (since 2001 as per Building Code on roofs and rooftops – SNT 2.03.10-01). In any case, the technical design will scrutinize the: impact on health from applying toxic materials, containing volatile organic compounds (VOC) and formaldehyde. During the implementation, the construction companies will be selected through an international tendering process, which will require preparation of the EIA study. r Detailed requirements will be specified in the tenders following international standards and best practices (the most stringent one will be applied). The responsible parties shall confirm that: • Construction projects comply with applicable national construction norms/building codes and standards as well as international best practices. The same applies to electric systems (installation of photovoltaic systems, solar heating systems, and the installation of LED lighting systems inside and outside of buildings). • Works will be implemented and maintained by the legally registered contractor(s) having relevant permits for the relevant works. Proof of experience and track record will be required from the contractor(s) prior to the award of the retrofit work. • Contractor(s) will be required to conduct orientation and training for workers on EE building retrofits, particularly multi-apartment buildings and public buildings. The contractors will be required to implement the Code of Conduct (CoC).
Risk 2: Occupational health and safety arrangements during the construction works and that the employment opportunities provided by the project may	I = 4 L = 2	**Moderate**	This risk is primarily applicable to Output 1.1, where construction work is expected but also to all other project activities.	Responsible party agreements/letter of agreements will include requirement to oblige contractors to comply with the national and international labour and working conditions standards, including the occupational health and safety. Procedures will be put in place after project inception. ESMF will include an Occupational Health Management

fail to comply with national and international labour standards Standard 7			This risk is not fundamentally different from the risks associated with any other ongoing construction works, including the management of materials, waste and handling heavy machinery, but in any case, will be properly monitored and managed during the project implementation stage. .	Protocol f in compliance with the national legislation, complemented by the provisions of the Labour Management Procedure to comply with the SES and International Labour Standards Such requirements should include, but not necessarily be limited to the following: • Provisions for a full occupational safety plan and training in advance of any construction, plus inspections in accordance with and possibly beyond existing national occupational health and safety regulations • Provisions to inform construction workers about what wastes are hazardous and therefore should be handled separately from other waste streams. • Procedures to avoid the working conditions not meeting the national labour laws and international commitments, and in denial of freedom of association and collective bargaining, use of child labour, forced labour, to discrimination against women considering that construction activities are dominated by men labour.[60]
Risk 3: Increases of greenhouse gas emissions or other drivers of climate change due to 'rebound effects' s in newly built complexes.	I = 3 L =2	**Moderate**	This risk is applicable mainly to Output 3.2 on capacity development and awareness creation. Due to the higher energy efficiency of the residential buildings, residents' energy bills on heating and cooling may drop and use the freed resources to heat at higher and cool at lower temperatures or on purchasing additional energy consumers, such as larger refrigerators or more powerful indoor lighting devices	Such "rebound effects" (putting appliances at higher cooling or heating levels or using oversized consumer appliances) will be addressed by the Project Team during training sessions with residents and via information campaigns in the media and on-site information boards. Reference to awareness raising and capacity development of the residents too shall be clearly included in the project document, in Output 3.2.
Risk 4: The design of building construction might not consider access to the buildings by people with disabilities Principle: P1-P5	I=3 L=3	**Moderate**	There could be a risk that buildings are constructed in a way that makes or keeps them inaccessible to persons with disabilities.	There is a probability that the design of the four pilot buildings (Output 1.1) might omit the design on the accessibility by persons with disabilities and that the project might exacerbate the problem. The Project team will only have the mandate to improve the energy efficiency qualities of the

[60] Including, inter alia., requirements for employment and working conditions, implementing adequate occupational health and safety measures (including emergency preparedness and response measures), promoting equal opportunities for work

				building's design and will have to leverage over broader buildings design features. During project development and the building design process, the buildings will be screened concerning accessibility by persons with disabilities to ensure that the project does not accentuate this issue in any way.
Risk 5: Project activity to promote increased participation of women in the construction sector exposes women to increased risks of employment related discrimination and workplace harassment Principle: 8-9-10-12	I=3 L=2	**Low**	Participation of women in the construction sector is a nascent but growing trend in Turkmenistan. What is the cause of concern is the difficulty in the equitable distribution of high-value activities to women workers/employees.	In its promotion of increased participation of women in the supported construction and maintenance-related project activities, the project will not encourage informal hires, but rather specifically aim at bringing women out from the grey sector into the fully contracted environment with prior know-your-rights training delivered to interested candidates. This will apply both to the pilot buildings and the new urban developments (new Ashgabat city; Arkadag) as a whole, and to related goods/materials and equipment/services supply chains. This risk might apply to all project activities. Gender Analysis (see Annex I in UNDP ProDoc) assesses and presents the status of the women working in the public building/construction sector and their capacity to participate in decision-making or other processes. The gender action plan outlines management measures for this and lists any other gender risks as well as opportunities to involve women in/through the project. Standard Codes of Conduct will be adhered to that address measures on prevention of Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH).
Risk 6: Project activities involving local/field interventions and close engagement with local communities may inadvertently contribute to the spread of COVID-19, while project activities may make it difficult to travel or to implement activities (training, workshops) Principles and Project-Level Standards: All	I=2 L=2	**Low**	Activities at the local level are based on participatory approaches, and most of the time will include meetings and local consultations. There will be several training workshops and awareness events and round table meetings which will be organized mindful of government regulations and healthcare standards and related safeguards.	The risk can be mitigated through adequate safeguards such as: (i) clear procedures in place in case of COVID-19 reinstatement of restrictions, approved during project inception (ii) use of protective equipment, maintaining social distancing and using remote methods of engagement whenever possible (iii) if adequate safeguards cannot be put in place, activities that entail close local communities' engagement will be put on hold if necessary. In general, the work programme/budget will be revised as needed. Wherever possible, online meeting platforms will be used instead of closed-quarters meetings and training in case of COVID-related urgencies.
Risk 7: Activities funded by project (co-)financing partners may not be carried out in consistency with UNDP SES. Principles and Project-Level Standards: All	I = 3 L = 3	**Moderate**	The risk refers to Output 1.3 (NZEB investment strategy) A distinction will be made at the project development stage between direct co-finance and parallel finance in line with UNDP guidance.	For activities funded by co-financing partners that are directly coordinated with the project's activities (i.e., the pilots of output 1.1), any gaps with respect to UNDP SES will be discussed and reviewed regularly, including during the multi-stakeholder coordination platform meetings and Project Board meetings. The Stakeholder Plan identifies the stakeholders and proposes engagement during all phases (preparation and implementation; see **Annex J**)

				As a general rule, an agreement will be aimed to be signed with co-financiers (and potentially parallel financiers), outlining that in case of discrepancy/ different policies of the relevant institutions/ financiers, the most stringent Environmental and Social guidelines/ safeguards will be applied.
Risk 8: Inequitable or discriminatory distribution of rights to reside in energy-efficient dwellings to people excluding those living in poverty or other marginalized i.e. excluded individuals or groups.	I=2 L=2	**Low**	Some socially disadvantaged groups might not get a chance to be relocated from their current (energy-inefficient) dwellings to the ones built according to the new building codes.	In assigning families and individuals to newly built and more energy-efficient buildings the Government is being guided both by the current sq. footage availability per household member and an institutional link (i.e., by whether rehoused individuals are employed by the agency/ministry sponsoring the construction of a particular block of flats). Poorer families have an equal chance to be relocated subject to them having a work affiliation (via the employment of a family member), particularly if they hail from more crowded households. Although the Project does not partake in the selection of residents for rehousing, it will aim to collect socioeconomic data on all residents rehoused to benchmark their standing against available national and international benchmarks and discuss the findings with the project partners to ensure non-discriminatory/equitable rehousing practices. Also, the project GRM will be available for stakeholders involved in collaborative activities implemented by the project and co-financing partners
Risk 9: Investment plan (2027-2036) for NZEB construction fail to sufficiently address issues of sustainable construction, safe construction materials, adaptation to climate change and indoor environmental quality, potentially hindering the positive effects of the project in terms of GHG emissions reduction, energy saving, waste reduction and health and safety of residents.	I=3 L=3	**Moderate**	This potential risk arises during the design of the Investment plan (Output 1.3) and development of the National NZEB plan (Output 2.3).	All mentioned outputs will be screened for the potential risks mentioned under the Risk 9 and where needed, targeted assessments or appropriately scoped SESA will be conducted to minimize the risks and suggest sustainable building criteria (aligned both with the national legal requirements and UNDP SES) to be incorporated in the relevant outputs.

	QUESTION 4: What is the overall project risk categorization? *Note: Project categorization is determined by the highest level of significance of identified risks across all potential risk areas (as rated in Question 3).*		
	Low Risk	☐	
	Moderate Risk	☒	Given that no high risk or substantial risk elements were identified during the final screening the project as a whole can be assessed as a moderate risk project.
	Substantial Risk	☐	
	High Risk	☐	

	QUESTION 5: Based on the identified risks and risk categorization, what requirements of the SES are triggered? (check all that apply)				
	Question only required for Moderate, Substantial and High Risk projects.				
	Is assessment required? (check if "yes")	X			***Status? (completed, planned)***
	if yes, indicate overall type and status		X	Targeted assessment(s)	Gender analysis and GAP (see Annex I). Stakeholder Engagement Plan (SEP; Anne K). At inception, planned assessment of labour, Occupational Health; Construction and Safety assessments
			X	ESIA (Environmental and Social Impact Assessment)	-Planned: The need for an ESIA will be determined based on further screening after project inception, to be carried out for demonstrative sites (two pilot buildings) The project may conduct a series of targeted (impact) assessments as indicated in Section B or a tailored ESIA to focus on the various risks. The determination of the need for ESIA will be done after screening is conducted in the project sites and deemed as a necessary requirement to comply with UNDP SES.
			☐	SESA (Strategic Environmental and Social Assessment)	Depending on the screening, an appropriately-scoped SESA may be needed Investment plan (Output 1.3) and development of the National NZEB plan (Output 2.3).
	Are management plans required? (check if "yes)	☒			
	If yes, indicate overall type		☐	Targeted management plans (e.g. Indigenous Peoples Plan, Resettlement Action Plan, others)	Planned during implementation: Gender Action Plan
			X	ESMP (Environmental and Social Management Plan)	Planned during implementation: ESMP(s), including waste disposal/management plan and other protocols (see risk descriptions)
			☐	ESMF (Environmental and Social Management Framework)	
	Based on identified risks, which Principles/Project-level Standards triggered?		**Comments (not required)**		
	Overarching Principle: Leave No One Behind	---			

	Human Rights	☒	
	Gender Equality and Women's Empowerment	☒	
	Accountability	☒	
	1. Biodiversity Conservation and Sustainable Natural Resource Management	☐	
	2. Climate Change and Disaster Risks	☒	
	3. Community Health, Safety and Security	☒	
	4. Cultural Heritage	☐	
	5. Displacement and Resettlement	☒	
	6. Indigenous Peoples	☐	
	7. Labour and Working Conditions	☒	
	8. Pollution Prevention and Resource Efficiency	☒	

Final Sign Off

Final Screening at the design-stage is not complete until the following signatures are included.

Signature	***Date***	***Description***
QA Assessor		UNDP staff member responsible for the project, typically a UNDP Programme Officer. Final signature confirms they have "checked" to ensure that the SESP is adequately conducted.
QA Approver		UNDP senior manager, typically the UNDP Deputy Country Director (DCD), Country Director (CD), Deputy Resident Representative (DRR), or Resident Representative (RR). The QA Approver cannot also be the QA Assessor. Final signature confirms they have "cleared" the SESP prior to submittal to the PAC.
PAC Chair		UNDP chair of the PAC. In some cases PAC Chair may also be the QA Approver. Final signature confirms that the SESP was considered as part of the project appraisal and considered in recommendations of the PAC.

SESP Attachment 1. Social and Environmental Risk Screening Checklist

Checklist Potential Social and Environmental Risks		
INSTRUCTIONS: The risk screening checklist will assist in answering Questions 2-6 of the Screening Template. Answers to the checklist questions help to (1) identify potential risks, (2) determine the overall risk categorization of the project, and (3) determine required level of assessment and management measures. Refer to the SES toolkit for further guidance on addressing screening questions.		
Overarching Principle: Leave No One Behind		**Answer (Yes/No)**
Human Rights		
P.1	Have local communities or individuals raised human rights concerns regarding the project (e.g. during the stakeholder engagement process, grievance processes, public statements)?	No
P.2	Is there a risk that duty-bearers (e.g. government agencies) do not have the capacity to meet their obligations in the project?	No
P.3	Is there a risk that rights-holders (e.g. project-affected persons) do not have the capacity to claim their rights?	No
Would the project potentially involve or lead to:		---
P.4	adverse impacts on enjoyment of the human rights (civil, political, economic, social or cultural) of the affected population and particularly of marginalized groups?	No
P.5	inequitable or discriminatory impacts on affected populations, particularly people living in poverty or marginalized or excluded individuals or groups, including persons with disabilities? [61]	Yes
P.6	restrictions in availability, quality of and/or access to resources or basic services, in particular to marginalized individuals or groups, including persons with disabilities?	No
P.7	exacerbation of conflicts among and/or the risk of violence to project-affected communities and individuals?	No
Gender Equality and Women's Empowerment		
P.8	Have women's groups/leaders raised gender equality concerns regarding the project (e.g. during the stakeholder engagement process, grievance processes, public statements)?	No
Would the project potentially involve or lead to:		---
P.9	adverse impacts on gender equality and/or the situation of women and girls?	*Yes*
P.10	reproducing discriminations against women based on gender, especially regarding participation in design and implementation or access to opportunities and benefits?	*Yes*
P.11	limitations on women's ability to use, develop and protect natural resources, taking into account different roles and positions of women and men in accessing environmental goods and services? *For example, activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their livelihoods and well being*	*No*
P.12	exacerbation of risks of gender-based violence? *For example, through the influx of workers to a community, changes in community and household power dynamics, increased exposure to unsafe public places and/or transport, etc*.	*Yes*
Sustainability and Resilience: Screening questions regarding risks associated with sustainability and resilience are encompassed by the Standard-specific questions below		
Accountability		
Would the project potentially involve or lead to:		---
P.13	exclusion of any potentially affected stakeholders, in particular marginalized groups and excluded individuals (including persons with disabilities), from fully participating in decisions that may affect them?	Yes
P.14	grievances or objections from potentially affected stakeholders?	Yes

[61] Prohibited grounds of discrimination include race, ethnicity, sex, age, language, disability, sexual orientation, gender identity, religion, political or other opinion, national or social or geographical origin, property, birth or other status including as an indigenous person or as a member of a minority. References to "women and men" or similar is understood to include women and men, boys and girls, and other groups discriminated against based on their gender identities, such as transgender and transsexual people.

P.15	risks of retaliation or reprisals against stakeholders who express concerns or grievances, or who seek to participate in or to obtain information on the project?	No
Project-Level Standards		
Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management		
Would the project potentially involve or lead to:		---
1.1	adverse impacts to habitats (e.g. modified, natural, and critical habitats) and/or ecosystems and ecosystem services? *For example, through habitat loss, conversion or degradation, fragmentation, hydrological changes*	*Yes*
1.2	activities within or adjacent to critical habitats and/or environmentally sensitive areas, including (but not limited to) legally protected areas (e.g. nature reserve, national park), areas proposed for protection, or recognized as such by authoritative sources and/or indigenous peoples or local communities?	*No*
1.3	changes to the use of lands and resources that may have adverse impacts on habitats, ecosystems, and/or livelihoods? (Note: if restrictions and/or limitations of access to lands would apply, refer to Standard 5)	*No*
1.4	risks to endangered species (e.g. reduction, encroachment on habitat)?	*No*
1.5	exacerbation of illegal wildlife trade?	*No*
1.6	introduction of invasive alien species?	*No*
1.7	adverse impacts on soils?	*Yes*
1.8	harvesting of natural forests, plantation development, or reforestation?	*No*
1. 9	significant agricultural production?	*No*
1. 10	animal husbandry or harvesting of fish populations or other aquatic species?	*No*
1.11	significant extraction, diversion or containment of surface or ground water? *For example, construction of dams, reservoirs, river basin developments, groundwater extraction*	*No*
1.12	handling or utilization of genetically modified organisms/living modified organisms?[62]	*No*
1.13	utilization of genetic resources? (e.g. collection and/or harvesting, commercial development)[63]	*No*
1.14	adverse transboundary or global environmental concerns?	*No*
Standard 2: Climate Change and Disaster Risks		
Would the potentially involve or lead to:		---
2.1	areas subject to hazards such as earthquakes, floods, landslides, severe winds, storm surges, tsunami or volcanic eruptions?	*No*
2.2	outputs and outcomes sensitive or vulnerable to potential impacts of climate change? *For example, through increased precipitation, drought, temperature, salinity, extreme events*	*No*
2.3	direct or indirect increases in vulnerability to climate change impacts or disasters now or in the future (also known as maladaptive practices)? *For example, changes to land use planning may encourage further development of floodplains, potentially increasing the population's vulnerability to climate change, specifically flooding*	*No*
2.4	increases of greenhouse gas emissions, black carbon emissions or other drivers of climate change?	*Yes*
Standard 3: Community Health, Safety and Security		
Would the potentially involve or lead to:		---
3.1	construction and/or infrastructure development (e.g. roads, buildings, dams)? (Note: the GEF does not finance projects that would involve the construction or rehabilitation of large or complex dams)	*Yes*
3.2	air pollution, noise, vibration, traffic, injuries, physical hazards, poor surface water quality due to runoff, erosion, sanitation?	*Yes*
3.3	harm or losses due to failure of structural elements of the project (e.g. collapse of buildings or infrastructure)?	*No*

[62] See the Convention on Biological Diversity and its Cartagena Protocol on Biosafety.

[63] See the Convention on Biological Diversity and its Nagoya Protocol on access and benefit sharing from use of genetic resources.

3.4	risks of water-borne or other vector-borne diseases (e.g. temporary breeding habitats), communicable and noncommunicable diseases, nutritional disorders, mental health?	*Yes*
3.5	transport, storage, and use and/or disposal of hazardous or dangerous materials (e.g. explosives, fuel and other chemicals during construction and operation)?	*Yes*
3.6	adverse impacts on ecosystems and ecosystem services relevant to communities' health (e.g. food, surface water purification, natural buffers from flooding)?	*No*
3.7	influx of project workers to project areas?	*Yes*
3.8	engagement of security personnel to protect facilities and property, or to support project activities?	*Yes*
Standard 4: Cultural Heritage		
Would the project potentially involve or lead to:		---
4.1	activities adjacent to or within a Cultural Heritage site?	*No*
4.2	significant excavations, demolitions, movement of earth, flooding or other environmental changes?	*No*
4.3	adverse impacts to sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g. knowledge, innovations, practices)? (Note: projects intended to protect and conserve Cultural Heritage may also have inadvertent adverse impacts)	*No*
4.4	alterations to landscapes and natural features with cultural significance?	*No*
4.5	utilization of tangible and/or intangible forms (e.g. practices, traditional knowledge) of Cultural Heritage for commercial or other purposes?	*No*
Standard 5: Displacement and Resettlement		
Would the project potentially involve or lead to:		---
5.1	temporary or permanent and full or partial physical displacement (including people without legally recognizable claims to land)?	*No*
5.2	economic displacement (e.g. loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	*No*
5.3	risk of forced evictions?[64]	*No*
5.4	impacts on or changes to land tenure arrangements and/or community based property rights/customary rights to land, territories and/or resources?	*No*
Standard 6: Indigenous Peoples		
Would the project potentially involve or lead to:		---
6.1	areas where indigenous peoples are present (including project area of influence)?	*No*
6.2	activities located on lands and territories claimed by indigenous peoples?	*No*
6.3	impacts (positive or negative) to the human rights, lands, natural resources, territories, and traditional livelihoods of indigenous peoples (regardless of whether indigenous peoples possess the legal titles to such areas, whether the project is located within or outside of the lands and territories inhabited by the affected peoples, or whether the indigenous peoples are recognized as indigenous peoples by the country in question)? *If the answer to screening question 6.3 is "yes", then the potential risk impacts are considered significant and the project would be categorized as either Substantial Risk or High Risk. TThe risk is in the context of this specific project considered Moderate at this stage, applying a precautionary approach, given the range of refurbishment interventions (windows, doors, solar panels etc) is not expected to cause relocation of ethnic minorities living around the targeted public buildings. This would be an indirect risk, which is however identified as part of this due diligence process. If the range of planned interventions change, this would be re-assessed and appropriate management measures put in place either at the funding proposal or at the implementation stage.*	*No*

[64] Forced eviction is defined here as the permanent or temporary removal against their will of individuals, families or communities from the homes and/or land which they occupy, without the provision of, and access to, appropriate forms of legal or other protection. Forced evictions constitute gross violations of a range of internationally recognized human rights.

6.4	the absence of culturally appropriate consultations carried out with the objective of achieving FPIC on matters that may affect the rights and interests, lands, resources, territories and traditional livelihoods of the indigenous peoples concerned?	*No*
6.5	the utilization and/or commercial development of natural resources on lands and territories claimed by indigenous peoples?	*No*
6.6	forced eviction or the whole or partial physical or economic displacement of indigenous peoples, including through access restrictions to lands, territories, and resources? *Consider, and where appropriate ensure, consistency with the answers under Standard 5 above.*	*No*
6.7	adverse impacts on the development priorities of indigenous peoples as defined by them?	*No*
6.8	risks to the physical and cultural survival of indigenous peoples?	*No*
6.9	impacts on the Cultural Heritage of indigenous peoples, including through the commercialization or use of their traditional knowledge and practices? *Consider, and where appropriate ensure, consistency with the answers under Standard 4 above.*	*No*
Standard 7: Labour and Working Conditions		
Would the project potentially involve or lead to: (note: applies to project and contractor workers)		---
7.1	working conditions that do not meet national labour laws and international commitments?	*Yes*
7.2	working conditions that may deny freedom of association and collective bargaining?	*Yes*
7.3	use of child labour?	*No*
7.4	use of forced labour?	*No*
7.5	discriminatory working conditions and/or lack of equal opportunity?	*Yes*
7.6	occupational health and safety risks due to physical, chemical, biological and psychosocial hazards (including violence and harassment) throughout the project life-cycle?	*Yes*
Standard 8: Pollution Prevention and Resource Efficiency		
Would the project potentially involve or lead to:		---
8.1	the release of pollutants to the environment due to routine or non-routine circumstances with the potential for adverse local, regional, and/or transboundary impacts?	*Yes*
8.2	the generation of waste (both hazardous and non-hazardous)?	*Yes*
8.3	the manufacture, trade, release, and/or use of hazardous materials and/or chemicals?	*Yes*
8.4	the use of chemicals or materials subject to international bans or phase-outs? *For example, DDT, PCBs and other chemicals listed in international conventions such as the Montreal Protocol, Minamata Convention, Basel Convention, Rotterdam Convention, Stockholm Convention*	*No*
8.5	the application of pesticides that may have a negative effect on the environment or human health?	*No*
8.6	significant consumption of raw materials, energy, and/or water?	*No*

ANNEX M. GEF TAXONOMY

Level 1	Level 2	Level 3	Level 4
☒**Influencing models**			
	☒**Transform policy and regulatory environments**		
	☒**Strengthen institutional capacity and decision-making**		
	☒**Convene multi-stakeholder alliances**		
	☒**Demonstrate innovative approaches**		
	☒**Deploy innovative financial instruments**		
☒**Stakeholders**			
	☐**Indigenous Peoples**		
	☒**Private Sector**		
		☒Capital providers	
		☒Financial intermediaries and market facilitators	
		☒Large corporations	
		☒SMEs	
		☒Individuals/Entrepreneurs	
		☐Non-Grant Pilot	
		☐Project Reflow	
	☒**Beneficiaries**		
	☒**Local Communities**		
	☒**Civil Society**		
		☒Community Based Organization	
		☐Non-Governmental Organization	
		☐Academia	
		☐Trade Unions and Workers Unions	
	☒**Type of Engagement**		
		☒Information Dissemination	
		☒Partnership	
		☒Consultation	
		☒Participation	
	☒**Communications**		
		☒Awareness Raising	
		☒Education	
		☒Public Campaigns	
		☒Behavior Change	
☒**Capacity, Knowledge and Research**			
	☒**Enabling Activities**		
	☒**Capacity Development**		
	☒**Knowledge Generation and Exchange**		
	☐**Targeted Research**		
	☒**Learning**		
		☒Theory of Change	
		☒Adaptive Management	
		☒Indicators to Measure Change	
	☒**Innovation**		
	☒**Knowledge and Learning**		

Level 1	Level 2	Level 3	Level 4
		☒Knowledge Management	
		☒Innovation	
		☒Capacity Development	
		☒Learning	
	☒**Stakeholder Engagement Plan**		
☒**Gender Equality**			
	☒**Gender Mainstreaming**		
		☒Beneficiaries	
		☒Women groups	
		☒Sex-disaggregated indicators	
		☒Gender-sensitive indicators	
	☒**Gender results areas**		
		☐Access and control over natural resources	
		☒Participation and leadership	
		☒Access to benefits and services	
		☒Capacity development	
		☒Awareness raising	
		☒Knowledge generation	
☒**Focal Areas/Theme**			
	☒**Climate Change**		
		☒**Climate Change Mitigation**	
			☐Agriculture, Forestry, and other Land Use
			☒Energy Efficiency
			☐Sustainable Urban Systems and Transport
			☒Technology Transfer
			☒Renewable Energy
			☒Financing
			☒Enabling Activities
		☒**United Nations Framework on Climate Change**	☒Nationally Determined Contribution
	☒ **Rio Markers**		
		☒Paris Agreement	
		☒Sustainable Development Goals	
		☐Climate Change Mitigation 0	
		☐Climate Change Mitigation 1	
		☒Climate Change Mitigation 2	
		☐Climate Change Adaptation 0	
		☐Climate Change Adaptation 1	
		☐Climate Change Adaptation 2	

ANNEX N. PROJECT CAPACITY ASSESSMENT

The PCAT will be available in a separate electronic file

https://pims.undp.org/attachment-revision/index?attachmentId=1767246#comments

ANNEX O. UNDP QUALITY ASSURANCE REPORT

See separate electronic files

https://pims.undp.org/attachment-revision/index?attachmentId=1767660#comments

ANNEX P. AGREEMENTS (CO-FINANCING LETTERS)

The co-financing letters can be seen from the following link:
https://pims.undp.org/attachment-revision/index?attachmentId=1767691#comments

ANNEX R. PROCUREMENT PLAN

	GEF+UNDP Year1	Other years	budget	Budget note (in AWPB)
Expected general and non-consulting services				
Meeting space and associated catering services and organisational support, workshops/seminarstraining sessions, etc,				
- Outcome 1	0	14,000	14,000	8
- Outcome 2	0	21,000	21,000	17
- Outcome 3	5,500	68,500	74,000	26
- M&E (incl. inception workshop)	3,500	3,500	7,000	31
Equipment and supplies				
- Equipment, goods and furniture for office	3,750	8,750	12,500	6,14,23
- Goods for measurements or academia facilities	0	35,000	35,000	6,23
- Information techn and AV equipment	3,308	18,308	21,615	7,16,25
- Office supplies; printing and AV materials	1,823	18,909	20,732	7,16,25,34
Travel costs				
- Local travel and DSA, consultancy	3,099	22,975	26,074	4,13,21,29,33
- DSA/travel for participation in regional events	0	15,000	15,000	21
Expected consultancy contracts				
Project manager	38,000	152,000	190,000	3,11,20,32 and *
Dep. Manager (technical and pilots)	22,400	89,600	112,000	3,11,20,32 and *
Social safeguards and gender	7,000	28,000	35,000	3,11,20,32 and *
Lead (technical) advisor	7,200	28,800	36,000	3,11,20,32 and *
Fin-admin staff	18,000	72,000	90,000	3,11,20,32 and *
International consultants				1,9,18,27, Annex I
- EE in construction	4,200	18,300	22,500	
- solar energy in buildings	4,200	18,300	22,500	
- water use and recycling	4,100	14,650	18,750	
- NZE codes and MVE		22,500	22,500	
- EE economics and planning		30,000	30,000	
- evaluation and review (M&E)		45,000	45,000	
National consultants				2,10,19,28, Annex I
- EE in construction	9,517	3,483	13,000	
- solar energy in buildings	9,517	3,483	13,000	
- water use and recycling	9,517	-1,717	7,800	
- NZE codes and MVE		10,400	10,400	
- EE economics and planning		9,100	9,100	
- training and knowledge		3,900	3,900	
- M&E		13,000	13,000	
- social and environmental assessments & safeguards	15,000	25,000	40,000	
Expected company contracts and hired services				5,13,22,30, Annex I
- pilot buildings and EE conbstruction	50,000	700,000	750,000	
- integration NZE options		80,000	80,000	
- measurements of energy performance		40,000	40,000	
- investment prospects NZEB		15,000	15,000	
- white paper fossil fuel subsidies		20,000	20,000	
- assessment NZE technologies in Turkmeni context		20,000	20,000	
- white paper NZE technologies and C&B		15,000	15,000	
- action plan on NZEB codes and institutionalization		25,000	25,000	
- lifecycle cost assessment and budgeting		20,000	20,000	
- capacity needs assessment and course development		10,000	10,000	
- NZEB awareness and capacity govr't and companies		35,000	35,000	
- measurement progress indicators (survey on cap.dev. Results)		9,963	9,963	
- knowledge enhancement architects and engineers		25,000	25,000	
- professional services for audit	3,000	12,000	15,000	35
Other	1,000	4,000	5,000	36
Subtotal GEF budget	**223,630**	**1,842,703**	**2,066,333**	
DPC (non GEF funding)	10,000	40,000	50,000	36
TOTAL	**233,630**	**1,882,703**	**2,116,333**	