



United Nations Development Programme
Country: Turkey
Project Document



Project Title

Sustainable Energy Financing Mechanism for Solar Photovoltaic Systems in Forest Villages in Turkey

UNDAF Outcome(s):

OUTCOME 3: Strengthened policy formulation and implementation capacity for the protection of the environment and cultural heritage in line with sustainable development principles, taking into consideration climate change, including disaster management, with a special focus on gender perspective

Expected CP Outcome(s):

(Those linked to the project and extracted from the CP)

Outcome 3: Strengthening policy formulation and implementation capacity for the protection of the environment, and cultural heritage in line with sustainable development principles and taking into consideration climate change and disaster management

Expected CPAP Output(s):

(Those that will result from the project)

Enhanced climate-resilient, pro-poor and gender-sensitive policies, institutions and programmes are mainstreamed, developed and implemented at the national and local levels for strengthened low carbon development (CP Output 3.1.)

Enhanced national capacity to develop market for and access to environmental funds to support strategic environmental protection areas, including (a) biodiversity and ecosystem services; (b) climate change adaptation and mitigation; (c) sustainable forest and land management; and (d) safe management of chemicals (CP Output 3.3.)

Strengthening capacities for National Climate Change Adaptation Strategy and Climate Change Action Plan development and implementation with gender differentiated impacts (CP Output 3.5.)

Implementing Entity / Responsible Partners:

Ministry of Forestry and Water Affairs, General Directorate of Forestry (GDF), Forest Village Relations Department (ORKOY)

Implementing Partner/ Executing Entity:

UNDP Turkey

Brief Description

This project will assist Turkey with the promotion and financing of on-grid village cooperative solar PV in forest villages. The public support and involvement in the initiative will be led by the General Directorate of Forestry, Department of Forest and Village Relations (aka ORKOY), working together with other key actors in the solar PV value chain, including private sector solar PV installers, Turkish utilities, and domestic and international banks as well as other institutions that provide financing. The project objective is to support the successful launching of a sustainable energy financing mechanism within the ORKOY credit mechanism to ensure that there is at least 30 MW of installed capacity of grid-connected, cooperative solar PV in forest villages) by the end of the project: 28.750 tons CO₂ avoided emissions from the power sector (compared to the project baseline) by the end of the project: 30MWp cumulative installed capacity of grid-connected PV systems: 47.520.000 kWh/year cumulative total electricity generation from installed grid-connected PV systems and 450 created job positions for forest villagers. The project is divided in 3 components focused on: Developing and expanding the policy and institutional framework to promote on-grid, residential solar PV (Component 1), Demonstrating the technical and economic viability as well as the business model of the ORKOY sustainable energy financing mechanism for solar PV systems through 4 pilot installations (Component 2), and Scaling up and replication at the national level (Component 3). The financing scheme will be divided on 4 phases. The first one will use grants only for financing of the pilot sites installation: second phase will use combination of GEF and ORKOY grants and ORKOY soft loan; third phase will introduce commercial loan together with GEF/ORKOY grants and ORKOY soft loan and the last phase will use deferred supplier payment tool in combination with ORKOY grant/soft loan and commercial line of credit.

Programme Period: 2011-2015

Award ID: 00089904

Project ID: 00095942

PIMS No.: 5323

Start Date: 01/03/2016

End Date: 01/03/2020

PAC Meeting Date: 19/02/2016

Management Arrangements: NIM

Total resources required \$ 56,280,000

Total allocated resources: \$ 56,280,000

- Regular:
- UNDP (TRAC) \$ 100,000

- Other:
- GEF \$ 3,780,000
- ORKOY \$ 45,000,000

In-kind Contributions
- UNDP \$ 100,000
- ORKOY \$ 2,675,000
- GUNDER \$ 125,000
- PI ENERJI \$ 1,500,000
- SOLARTURK ENERJI \$ 1,500,000
- ODUL ENERJI \$ 1,500,000

Agreed by Ministry of Foreign Affairs:

Kerem DİVANLIOĞLU

Elçi

Cok Taraflı Ekonomik İşler
Genel Müdür Yardımcısı

Date/Month/Year

Agreed by Ministry of Forestry and Water Affairs:

Ismail ÜZMEZ
Genel Müdür

Date/Month/Year

Agreed by United Nations Development Programme:



1/3/2016
Date/Month/Year

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LIST OF ACRONYMS

AFD	French Development Agency
CO ₂	Carbon dioxide
EBRD	European Bank for Reconstruction and Development
EPC	Engineering, Procurement and Construction
EPDK	Energy Market Regulation Authority
FiT	Feed in Tariff
GEF	Global Environment Facility
GDF	General Directorate of Forestry
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GUNDER	International Solar Energy Society – Turkish Section
MoD	Ministry of Development
ME	Marketing Expert
MEU	Ministry of Environment and Urbanization
MFA	Ministry of Foreign Affairs
MFWA	Ministry of Forestry and Water Affairs
MENR	Ministry of Energy and Natural Resources
M&E	Monitoring and Evaluation
NARP	The National Awareness Raising Programme
NGO	Non-governmental Organization
NIM	Nationally Implemented
ORKOY	Forest Village Relations Department
OR-KOOP	Central Union of Turkish Forest Cooperatives
PA	Project Associate
PFA	Project Finance and Procurement Officer
PIR	Project Implementation Review
PM	Project Manager
PPG	Project Preparation Grant
PSC	Project Steering Committee
PV	Photovoltaic
QPR	Quarterly Progress Report
RES	Renewable Energy Sources
RET	Renewable Energy Technology
STE	Solar PV Technical Expert
TEDAS	Turkish Electricity Distribution Company
TEIAS	Turkish Electricity Transmission Company
TKDK	Agriculture and Rural Development Support Institution
ToR	Terms of Reference
UNDP	United Nations Development Programme
UNDP-CO	United Nations Development Programme Country Office
UNFCCC	United Nations Framework Convention on Climate Change

1 SITUATION ANALYSIS

1.1 Context and global significance: Environmental, Policy and Institutional

1.1.1 Problem statement

1. An upper middle-income country with a population of some 77 million, Turkey boasts a rapidly growing economy with an average annual growth rate of 4,8%. Between 1990 and 2010, Turkey's overall emissions increased by 115% to a total of 402 MtCO₂e while per capita emissions rose from 3.39 to 5.51tCO₂e according to numbers provided by the Turkish Statistical Institute.
2. Turkey became a party to the United Nations Framework Convention on Climate Change (UNFCCC) in May 2004 and to the Kyoto Protocol in August 2009.
3. Turkey's rapidly expanding economy is heavily reliant on increasing energy imports, which is costly, unsustainable and leads to concerns over energy security. With a significant area of land, much of it of limited agricultural value, and high levels of annual solar irradiance, the country is particularly well suited to solar PV development. However, to date, Turkey's progress on domestic renewable energy has been limited. This has been due to an unappealing financial, legislative and institutional environment. Whilst in recent years there has been significant government rhetoric on encouraging renewables, supported by, for example, the introduction of financial incentives such as a Feed-in Tariff (FiT), the level of these efforts is still considered to be insufficient to kick-start the industry into achieving the great potential it promises. There still remain a number of barriers that have been reducing investor interest in the sector and further work is needed in these areas:
 - The approval process for installations is long, arduous and protracted (1 – 3 years depending on the type of the procedure).
 - The FiT tenure and pricing levels, relative to import electricity prices, are extremely poor compared to other countries that have successfully managed to establish a strong renewables foothold.
 - Community generation schemes are forced to connect to grid, sell power, pay distribution fees, and then re-import energy at higher costs, the difference being absorbed by utility companies, thus substantially reducing the net-benefit to the community.
 - Administrative processes are generally considered to be complex and highly bureaucratic.
 - To date there is a perceived lack of interest in more innovative, equitable incentives such as Net-Metering to encourage development in the sector.
4. The government target, of 3GW PV installed capacity by 2023, appears to be remarkably unambitious for a country of high average solar irradiance when compared to Germany, which has half the land area and 30% less irradiance, which has recently been installing 7.5GW per year, and has so far reached 38GW.
5. In compliance with its core mandate UNDP is helping countries achieve the simultaneous eradication of poverty and significant reduction of inequalities and exclusion through interventions which are innovative, integrated, scalable, and deliver multiple environment and development benefits. In collaboration with Turkey to find solutions, UNDP works closely with a number of government agencies, municipalities, private sector partners and NGOs, to integrate environmental and sustainable development principles into national and regional development policies and plans. UNDP

Turkey not only promotes mainstreaming environment, climate change and energy efficiency into sectoral policies, but also supports strengthening the institutional and policy capacities. UNDP Turkey works for progress in three core areas: inclusive and sustainable growth; inclusive and democratic governance; and climate change and environment. In addition to these core areas, UNDP Turkey is emphasizing the role of women, private sector, capacity development, and information and communication technologies in its policies and programmes.

6. UNDP helps to combat environmental degradation by promoting projects that address climate change adaptation and mitigation, renewable energy, energy efficiency, sustainable forest management, land degradation, water management, sustainable development, biodiversity and protected areas. UNDP facilitates the integration of sustainable development principles by promoting low carbon economy and considering climate change related risks and adaptation priorities into development planning at national, regional and local level in line with the Tenth National Development Plan of the Government.
7. From the perspective of the impoverished forest communities that account for 1 in 10 Turkish people in 21,549 villages, there is little evidence of legislative concessions that can help them break out of their vicious cycle; the poor are deemed high-risk and are thus penalised through lack of access to affordable financing to help them out of their predicament. Many renewables incentives, such as FiTs, primarily favour the wealthy that have money to invest in the first place. A scheme such as this project, combined with activities to improve legislative practices, would help kick-start the industry and give some of the neediest people in Turkey access to green energy – helping mitigate climate change whilst assisting in the plight of these poverty stricken forest villagers.
8. In Turkey, villages that have some forest landscape within their official boundaries and/or nearby a forest area are designated as forest villages. The population of forest villages is around 7,332,000, representing 9.6% of the entire country's people and 35% of the rural population. This population is distributed around the country across 21,549 villages. They account for the poorest section of Turkish society with an average gross annual income in 2004 of \$400 compared with a national average of \$5,780 (GDF, 2004). Their agricultural activities are relatively limited due to the harsh geological conditions. Forest villages are eligible for financial and technical support by the Forest Village Relations Department (aka ORKOY) within the General Directorate of Forestry (GDF) under the Ministry of Forestry and Water Affairs. ORKOY was founded in 1970 and has gone through several organizational changes. Until recently ORKOY was itself a General Directorate but following changes in the structure of the Ministry of Forestry and Water Affairs it has been placed under GDF as a department. ORKOY aims to contribute to the conservation of forests by supporting local communities. It has been operating a grant/loan program since 1974 targeting the forest villagers. ORKOY is running two grant/loan systems: 1 - social (non-profit projects, including grants, available only for individuals) and 2 – economic (typically 20 % grant, available for both individuals and cooperatives).
9. Forest villages in Turkey enjoy almost 100% grid-access, availability and intermittent energy supply, for the most part, are not an issue. Forests cover 27% of the surface area of Turkey and due to their limited land resources as well as lack of alternative sources of income; the communities living in forest areas in Turkey have traditionally been heavily dependent on utilizations from the forest areas and are among the poorest in Turkey .

1.1.2 Country Information

10. Turkey is located on two continents, Europe and Asia. The Asian side is called Anatolia and the European side is called Eastern Thrace. Area of Turkey is 814,578 square kilometres. 97 per cent of the area is located on the Asian side. Turkey is surrounded by four seas. Turkey enjoys an excellent geographic location for the development of solar power plants. The Mediterranean Sunbelt passes through the country, placing it in one of Europe's most advantageous positions; solar irradiation values are similar to Spain and Portugal's, which are the highest on the continent.

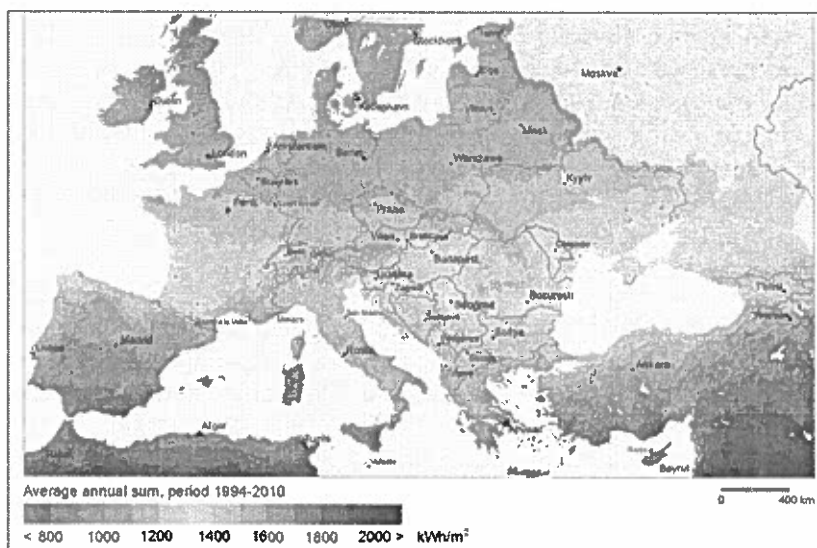


Figure 1 Global Horizontal Irradiation, Europe

11. Turkey's diverse regions have different climates due to the irregular topography. Most of the rainfall is received in the winter season when the temperature is usually below 5°C and there is scarce evaporation. Summer rainfall is very limited and is not enough to overcome the water deficit resulting from increased temperature and evaporation. The Aegean and Mediterranean coasts have cool, rainy winters and hot, moderately dry summers. Annual precipitation in these areas varies from 580 to 1,300 mm, depending on location. The Black Sea coast receives the greatest amount of rainfall. The eastern part of that receives 2,200 mm annually and is the only region of Turkey that receives rainfall throughout the year. In the Eastern region of Anatolia, the elevation of mountains exceeds 2500-3000 m. Northern Black Sea Mountains and Caucasian Mountain hold the rain clouds, and therefore the area is affected by the continental climate with a long and very cold winter. Minimum temperatures of -30°C to -38°C are observed in the mountainous areas in the east, and snow may lie on the ground 120 days of the year. Winters are bitterly cold with frequent, heavy snowfall. Villages in the region remain isolated for several days during winter storms.
12. Turkey is the world's 17th largest economy (IEA Turkey, 2009) and has been developing strongly over the past decade. Fast industrialization and increased urbanization has resulted in rapid increases in energy consumption of 4,6%pa since 1990, (cf EU average increase of 1.6%pa over the same period). Total electrical energy demand is predicted to reach 500TWh by 2023 (up from 245TWh in 2013). Almost all demand is currently imported, which is expensive, unsustainable and leads to concerns over energy security. Renewable energy is seen as a potentially effective solution to a more cost effective, sustainable and secure development of the country. Whilst the country is resource rich for renewables, with the possible exception of hydro, these resources have been heavily under exploited to date.

13. Turkey became a party to the United Nations Framework Convention on Climate Change (UNFCCC) in May 2004 and to the Kyoto Protocol in August 2009. Turkey is not included in the Annex B Countries List of the Protocol on the grounds that it does not have responsibility for emissions reductions over the initial period (2008-2012) of the Protocol. This means that Turkey has not been able to participate in the flexible mechanisms of the Kyoto Protocol, CDM, JI, or international emissions trading. Rather, Turkey can only participate in voluntary market mechanisms of the Kyoto Protocol. As part of its obligations under the UNFCCC, Turkey, on a regular basis, has the responsibility to submit national communications and greenhouse gas inventory pursuant to related COP decisions and articles 4 and 12 of the Covenant.
14. Greenhouse gas emissions in Turkey have been growing at a rapid rate of between 8-10% per year in recent years. Total greenhouse gas emissions from Turkey in 1990 have doubled from about 187 million tons of CO₂eq (when Land Use, Land Use Change and Forestry-LULUCF were not taken into account) to 401 million tons of CO₂ eq in 2009. While sinks absorbed about 44 million tons of CO₂ eq in 1990, this value increased to about 82 million tons of CO₂ eq in 2009. In addition, Turkey has a high population growth rate of 1.27% which is above the OECD average and which contributes to further growth in GHG emissions. GHG emissions per capita in Turkey increased from approximately 3.4 tonnes CO₂eq per capita in 1990 to 5.2 tonnes CO₂eq per capita in 2010. Taking into account its commitments under the UNFCCC and the Kyoto Protocol to reduce GHG emissions, the Turkish Government is committed towards implementing policies which reduce greenhouse gas emissions and enhance sinks and this includes promoting solar PV.

Forest villages in Turkey

15. In Turkey, villages that have some forest landscape within their official boundaries and/or nearby a forest area are designated as forest villages. The population of forest villages is around 7,157,826, representing 9.6% of the entire country's people and 35% of the rural population. This population is distributed around the country across 21,723 villages. They account for the poorest section of Turkish society with an average gross annual income in 2004 of \$400 compared with a national average of \$5,780 (GDF, 2004). Their agricultural activities are relatively limited due to the harsh geological conditions. Among these, cereals, fruit and vegetable production are the most common. The main income for forest villagers comes from forestry activities (e.g. employment in reforestation and afforestation activities) and timber production as well as harvesting, animal grazing, bee keeping and freshwater fish production. Although there have been attempts to build ecotourism activities in forest villages with several successful examples in some regions, it is still in its infancy in Turkey. Due to low-income levels, forest villagers have historically had a negative effect on local forests through activities such as opening up agricultural areas, heavy grazing pressure and illegal tree felling. The population of forest villages has been decreasing over past decades. Young people especially are migrating to cities and bigger towns mainly due to economic pressures, the dearth of educational and medical services combined with poor infrastructure. Consequently, forest village populations are ageing and are relatively older than the Turkish average. Forest cooperatives are one of the key organizational structures that villagers have developed to undertake specific tasks. Their main aim is to improve economic and living conditions. There are over 2,000 of them across the country, having 290,000 members. Most cooperatives are focused on timber harvesting and debarking activities with some also working on ecotourism, handicrafts, dairy and honey production. The cooperatives are organized into 27 regional unions that are united under one umbrella organization called the Central Union of Turkish Forestry cooperatives (OR-KOOP). The General Directorate of Forestry (GDF) works with forest cooperatives on timber production, forestry activities such as reforestation, afforestation, nursery works etc. GDF subsidises forest cooperatives by offering a third of all wood production at cost to the cooperatives' benefit. In 2004, the total GDF subsidy for forest cooperatives was estimated to be over \$80m.

1.1.3 Policy, Institutional & Legal Framework

Policies & Priorities

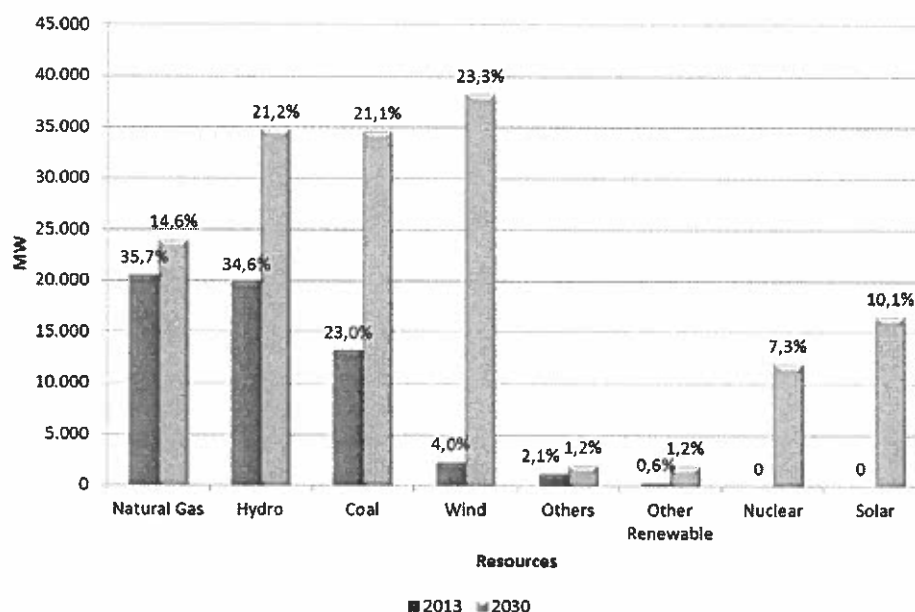
16. With the adoption of the Electricity Sector Strategy in 2009, Turkey has outlined renewable energy and energy efficiency programs that aim to provide 30% of the country's power supply by the centenary of the Turkish Republic in 2023. These goals are reiterated in Turkey's National Climate Change Action Plan of 2011. As well as focusing on renewable generation, technologies such as waste processing and electrical transmission efficiency are also cited as mechanisms to help reduce carbon emissions. The total amount of investments required to meet the energy demand in Turkey by 2023 is estimated to be around \$120bn, more than double the total amount invested over the last decade. In Turkey's the Tenth Development Plan (2014-2018), the main objectives of its energy policy are *"based on main targets of supplying continuous, qualified, secure, minimum cost energy to the end-user and resource diversification in energy supply. The main objective is to reach a competitive energy system that exploits domestic and renewable energy resources to the extent possible"*. Additionally, Turkey envisages specific targets for the energy sector including:

- Increasing installed power to 120,000MW
- Increasing the share of renewables to 30%
- Maximizing the use of hydropower
- Increasing wind power installed capacity to 20,000MW
- Installing power plants with 600MW of geothermal and 3,000MW of solar energy
- Extending the length of transmission lines to 60,717km
- Reaching a power distribution unit capacity of 158,460MVA
- Extending the use of smart grids
- Raising the natural gas storage capacity to 5 billion m3
- Establishing an energy stock exchange
- Commissioning nuclear power plants (two operational nuclear power plants, with a third under construction)
- Building a coal-fired power plant with a capacity of 18,500MW
- Utilizing natural resources in a sustainable manner
- Improving economic and social conditions of rural people

17. In achieving this desired additional ~50GW of capacity, there is much emphasis then on hydro, wind and coal while PV apparently has a very minor role to play, despite the excellent solar resource here. Up to now, cumulative installed PV power in Turkey is about 55MW. According to the projection made by GDEA (General Directorate of Energy Affairs) for 2030, as seen in figure-2, the share of the solar power is expected to exceed 10% of the total installed capacity.



Installed Capacity by Resources in 2013* and 2030



Source: TEIAS, GDEA

*:As of March 20, 2013

Figure 2 Installed capacity by resources in 2013 – 2030

18. Turkey has liberalized its energy sector. Now, 65% of electrical generation facilities are run by the private sector; the aim is increasing up to 100% in near future. All power distribution is now completely within private hands. In addition to having a large domestic market, Turkey is strategically well located amongst other major national energy consumers and suppliers and thus has the potential to serve as a regional energy hub. Turkey's increased leverage over the energy prices and its potential gateway status has been raised via the current and planned oil and gas pipelines, and promising findings of hydrocarbon reserves in the country, as well as the critical Turkish straits.
19. The use of renewable energy resources for generating electricity was first supported with law no 5346 "Utilization of Renewable Energy Sources For the Purpose of Generating Electrical Energy" in 2005. The Feed-in Tariff or Renewable Energy Resource (RER) Support Mechanism, is a policy mechanism designed to accelerate investment in renewable energy technologies. It achieves this by making use of medium-term agreements and pricing tied to costs of production for renewable energy generators. By offering medium-term contracts and guaranteed pricing, producers are sheltered from some of the inherent risks in renewable energy production, thus allowing for more diversity in energy technologies.

Table 1 National strategies, policies and plans relevant to the project

Title of Policy, Strategy, or Plan	Adoption Date	Description/Assessment of relevant strategy, policy or plan
Turkey's Fifth National Communication Under the UNFCCC	2013	Pursuant to decision 26/CP.7 of the United Nations Framework Convention on Climate Change (UNFCCC) at the 7 th Session of the Conference of Parties held at Marrakesh, Morocco in 2001, Turkey's name was deleted from Annex II of the UNFCCC, and the Parties were invited to recognize the special circumstances of Turkey. These circumstances place Turkey in a

		<p>situation different from that of other Parties included in Annex I to the UNFCCC. Subsequent to this decision Turkey became a Party to UNFCCC on 24 May 2004. Law No. 5836 regarding the participation of the Republic of Turkey in Kyoto Protocol was published in the Official Gazette #27144 (17 February 2009). After the relevant decision of the Council of Ministers was published in the Official Gazette, the “Instrument of Accession” declaring Turkey as a Party to Kyoto Protocol, was submitted to the United Nations Secretary General on 28 May 2009, and the Republic of Turkey became a Party to the Kyoto Protocol as of 26 August 2009.</p> <p>Turkey does not have emission reduction targets under the Kyoto Protocol. However the country has been conducting intensive emission reduction activities in areas such as energy efficiency, promotion of renewable energy, transportation, and waste management. In addition to this, Turkey has demonstrated an active commitment to the development of markets for voluntary emission reductions and for integration of emission reductions into compliance markets. Furthermore, Turkey has conducted activities to better understand national mitigation opportunities. The Communication has been prepared in accordance with the Guidelines for the Preparation of National FNC by Parties included in Annex I to the UNFCCC (FCCC/CP/1999/7) and is consistent with the reporting requirements stated in Article 7.2 of Kyoto Protocol.</p>
Turkey's the Tenth Development Plan (2014-2018)	2014	According to the Tenth Development Plan; to establish a competitive energy system that makes use of local and renewable energy sources as extensively as possible.
Energy Strategy 2012-2023	2012	Having a substantial potential for the renewable energy resources, Turkey ranks seventh in the world and first in Europe in terms of geothermal energy. Turkey also aims at further increasing its use of hydro, wind and solar energy resources. Turkey envisages producing 30% of its electricity need from the renewables by 2023. The target to commission 20GW of wind power, 3GW of solar power and 600MW of Geothermal.
Energy Production Action Plan Based on Domestic Resources (2014-2018)	2014	The action plan, prepared by the Ministry of Energy and Natural Resources, underscores the importance of solar energy production in forest villages. GDF, coordinator of the action, will collaborate with the Ministry of Energy and Natural Resources to undertake solar energy applications in forest villages.
Climate Change Action Plan 2011-2023	2011	Turkey's national vision within the scope of “climate change” is to become a country fully integrating climate change-related objectives into its development policies, disseminating energy efficiency, increasing the use of clean and renewable energy resources, actively participating in the efforts for tackling climate change within its “special circumstances”, and providing its citizens with a high quality of life and welfare with low-carbon intensity.
National Climate Change Strategy	2010	This strategy specifically addresses land use, agriculture and forestry strategies in its chapter on greenhouse gas (GHG)

		<p>emission control. The proposed project will support many of the short, medium, and long-term strategies identified for mitigating GHG emissions (e.g. improved agricultural techniques, adoption of proven technologies for carbon sequestration and/or absorption in soil (and monitoring) and methane gas capture, afforestation and rehabilitation of degraded lands with drought tolerant species and plant varieties).</p> <p>The share of renewable energy in total electricity generation shall be increased up to 30% by 2023. Electricity generation from solar energy will be supported.</p>
National Rural Development Plan (2009-2013)	2009	<p>Plan targets the conservation of agricultural areas, pastures and forests, including soil and water resources in areas that will be integrated into forest regimes. The Rural Development Plan underscores the relationship between rural poverty and natural resource degradation, recognizing a significant increase in recent years in erosion and degradation of land and water resources in the country, in many cases due to improper farming techniques and increasing climate variability (droughts, floods and landslides). To mitigate these processes, the Plan gives priority to strategies, measures and activities that address desertification and promote proper management of land and water land resources.</p> <p>The term of forest village is defined including relations to ORKOY.</p>
National Rural Development Strategy (2014-2020)	2014	<p>Strategy aims to generalize renewable energy sources in the rural area apart from promote proper management of natural resources.</p>

Table 2 Regulations

Law or Regulation Title	Adoption Date	Description/Assessment of Law/Regulation
Forestry Sector		
Forestry Law (6831)	1956	This Law sets forth the basic forestry legislation. The boundaries of protection forest are determined and declared to the surrounding villages. The conditions, principles, and periods of designation of such forests; and management, development, improvement and utilization principles, and decisions are decided by the Ministry of Forestry and Water Affairs. The costs of cutting, hauling, and stacking with tariff price and the necessities of the ones who are entitled to the right to building timber and the people among this group with poor status are determined by the board of village alderman with the participation of the forest chief considering the productivity of the forest and the requirements of the demanders.
Law on Supporting Forest Villages' Development (2924)	1983	This law sets forth the principles and process of supporting forest villages' development.
Regulation on Activities for Supporting Forest Villages' Development	2012	This regulation sets forth the details of supporting mechanism and management of ORKOY funds. Details such as credit requirements, eligible activities, eligibility criteria, co-finance thresholds, application process, interest rates, and repayment plan identified with this regulation.
Regulation on Forestation	2012	Regulation includes main procedures and principles for forestation, erosion control, pasture improvement, seed production, seedling tree nursery, and energy forestry.
Energy Sector		
Law on utilization of the renewable energy source for the purpose of generating electrical energy (Law 5346)	2005	The first renewable energy law to be enacted by the Turkish government. The purpose of this law is to expand the utilization of renewable energy sources for generating electric energy, to benefit from these resources in a secure, economic and qualified manner, to increase the diversification of energy resources, to reduce greenhouse gas emissions, to assess waste products, to protect the environment and to develop the related manufacturing industries for realizing these objectives.
Law on amendments on the law on utilization of the renewable energy source for the purpose of generating electrical energy (Law 6094)	2010	Renewable energy resources (RES) support mechanism is amended as follows: In the event that the mechanical and/or electro-mechanical equipment used in the production facilities of license holder entities based on the Renewable Energy Resources within the scope hereof and commissioned before 31/12/2015* are manufactured domestically; prices in Schedule-I (Feed in Tariff) will be added to the prices given in Schedule-II (Domestic product support), attached hereto, for a term of five years as from the commissioning of the production facility for electrical energy produced and given in such facilities and given to the distribution

		<p>system.</p> <p>Principles and procedures relating to domestic contribution for RES certified production facilities that will be commissioned after 31/12/2015* will be determined and announced by the Council of Ministers upon the Ministry's proposition.</p> <p>*This time is extended until 31.12.2020 with the official gazette published in December 5th 2013.</p>
Turkish Electricity Market Law (Law 6446)	March 2013	<p>This law is substituting the old regulation of 2001 (number 4628).</p> <p>This law envisages a waiver of license for those generation facilities based on renewable resources. This allows investors to initiate solar or wind energy projects, among others, in Turkey without needing a previous authorisation from the <i>Energy Market Regulatory Authority</i>. In order to benefit from this advantage, it is however required that the installed capacity should not exceed 1MW, which may be eventually further increased by 5MW by the respective authorities. The old legislation established on the contrary a more restrictive limit of 500Kw.</p>
Unlicensed Electric Power Production Market Regulation (Official Gazette Communiqué- Number 28783)	October 2013	<p>The purpose of this regulation in the electricity market; Electricity Market Law No. 6446, dated 14.03.2013 under Article 14, the point of consumption to the nearest production facilities to meet the needs of electricity consumers, facilities to meet the needs of electricity consumers supply of the country's economy to gain and ensuring the efficient use of electricity in order to reduce the amount of network losses occurring without any obligation to obtain a license to establish the company, natural or legal persons to produce electrical power to determine the procedures and principles to be applied.</p> <p>This regulation covers the principles and procedure for the scope of unlicensed production activity on the need for producing electrical energy from the electricity generated by natural and legal persons to do in the event of system implementation.</p> <p>The Regulation regulates the exemption from the requirement to obtain a licence and establish a company in order to generate electricity and lists the generation facilities that benefit from such exemption.</p>
Regulation on Electricity Facilities Project (Official Gazette Communiqué- Number 29221)	30 December 2014	<p>The Regulation abolishes the Regulation on Electricity Facilities Project published in the Official Gazette on December 16, 2009 and numbered 27434. The purpose of the Regulation is to determine the procedures and principles regarding (i) the incorporation and the project approval process of the electricity facilities to ensure compliance with modern technology; (ii) the connection of the facilities to the transmission and distribution networks; (iii) the safety and protection of life, property and</p>

		environment; and (iv) authorization for institutions/establishments or legal entities in charge of granting project approvals.
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20. Renewable incentives – guaranteed grid access - According to legislation, any subscriber may install a renewable energy based generation facility such as a solar system after approval of the responsible bodies, giving them the opportunity to generate their own electricity and reduce the costs of their imported electricity. Subscribers also have the right to sell surplus energy onto the grid. The primary legislative framework for unlicensed electricity generation is the Electricity Market Law (Law No 6446), which has been in force since March 2013. According to Article 14 of this law, all electricity subscribers have the right to generate their own electricity without having the requirement to obtain a license or establish a company, although a lengthy approval process is still required.
21. Renewable incentives – Medium-term Contracts - For plants subject to the Renewable Energy Resource (RER) Support Mechanism, prices are applied to license holders for 10 years. These prices are also valid for unlicensed RER in order to sell the surplus energy.
22. Renewable incentives – FiT Prices - The Main FiT is banded according to method of generation, and is fixed in USD for a period of 10 years – Table 3.

Table 3 Main FiT levels cited in law 5346 for Renewable Energies

Power Plant Type Based on Renewable Energy Resource	Prices to be Applied (USD cent/kWh)
a. Hydroelectric power plant	7,3
b. Power plant based on wind energy	7,3
c. Power plant based on geothermal energy	10,5
d. Power plant based on biomass (including landfill gas)	13,3
e. Power plant based on solar energy	13,3

23. There is an additional domestic FiT component available for the utilisation of domestically produced equipment which lasts for just 5 years, again banded by generation mechanism and, within this, further subdivided by the level of individual components that are locally sourced–Table 2

Table 4 Domestic FiT levels cited in law 5346 for Solar PV

Domestic Production	Domestic Contribution (USD cent/Kwh)
1. PV panel integration and structural mechanics production	0,8
2. PV Modules	1,3
3. Cells which form PV module	3,5
4. Inverter	0,6
5. Material which focuses solar light on PV module	0,5

24. The Main FiT component for PV of \$0.133/kWh (for 10 years) is thus theoretically capable of being raised to \$0.20/kWh (for the first 5 years) if all sub-components are of domestic origin. However, in practice, no producers have been able to get adequate licensing under the challenging certification process for their equipment to fully qualify for the domestic component, which demands that at least

55% of all production is of Turkish origin. Some producers have managed to get partial licensing for some elements of their equipment (2 producers of inverters, 2 candidate suppliers of end 2014) and the maximum practicable achievable level of the domestic component is currently \$0.007/kWh. The maximum total FiT support as it currently stands then is \$0.14/kWh fixed for the first 5 years plus \$0.133/kWh fixed for the subsequent five years.

Carbon market in Turkey

25. Turkey became a party to the United Nations Framework Convention on Climate Change (UNFCCC) in May 2004 and to the Kyoto Protocol in August 2009. Turkey is not included in the Annex B Countries List of the Protocol on the grounds that it does not have responsibility for emissions reductions over the initial period (2008-2012) of the Protocol. This means that Turkey has not been able to participate in the flexible mechanisms of the Kyoto Protocol, CDM, JI, or international emissions trading as of 2015. Rather, Turkey can only participate in voluntary market mechanisms of the Kyoto Protocol as of 2015. As part of its obligations under the UNFCCC, Turkey, on a regular basis, has the responsibility to submit national communications and greenhouse gas inventory pursuant to related COP decisions and articles 4 and 12 of the Covenant. Inventory is subject to regular review pursuant to the COP decision numbered 19/CP.8.2. Turkey, as a part of its responsibility has prepared its first and fifth communications regarding the issue. The fifth report covers the second, third, fourth and fifth communications.
26. A breakdown of GHG emissions sources in Turkey is as follows:
 - Public Electricity 37%, (162,8 metric tons CO₂e)
 - Industry 21%, (92,4 mtCO₂e)
 - Domestic Energy Usage 18%, (79,2 mtCO₂e)
 - Transportation 17%, (74,8mtCO₂e)
 - Agriculture, Forestry, Fishery 5%, (22mtCO₂e)
 - Others 2% (8.8mtCO₂e)
27. As a country that is eligible to obtain credit from the World Bank and receive technical support from UNDP, Turkey received grants worth \$22 million from the GEF to support five climate change projects since 2007 with the total budget of approximately \$68 million. During the same time period, the GEF provided Turkey with \$11 million of support for four projects related to biodiversity and forestry with total budget of \$38 million.
28. Turkey is also eligible to benefit from the short-term financing facility of \$30 billion that is committed by developed countries under the Copenhagen Accord and officially recognized under Cancun Agreements, with an aim to provide support to developing countries in their investments to combat climate change. This position, as agreed by Cancun Agreements (Resolution No.: 2/CP.17), also emphasize the special position of Turkey among other Annex I countries of the UNFCCC, Turkey is listed in the official list of countries eligible for development support declared by the OECD Development Assistance Committee, although Turkey is an OECD country.
29. Accordingly, Turkey can benefit from official development assistances provided to help developing countries to combat climate change. This highlights the exceptional position of Turkey amongst other Annex I countries of the UNFCCC, since many of the non-Annex I countries are not listed in the OECD Development Assistance Committee list due to their high GDP per capita values.

Legislative and Procedural Guidelines on Photovoltaic Systems in Turkey

30. The application procedure for photovoltaic power plants in Turkey is divided into two groups according to the size of the project. Sites with installed capacity under 1MW are covered by the Unlicensed procedure, sites over 1 MW are covered by tougher Licensed procedure. The detailed steps of both systems are described below.

Unlicensed Photovoltaic Systems

31. Even so called ‘unlicensed’ (ie <1MW) installations require a lengthy bureaucratic approval processes which is a significant bottleneck for the sector which can be up to 12 months. The secondary legislative framework for unlicensed electricity generation from renewable sources is the “Regulation on the Unlicensed Electricity Generation on the Electricity Market” and “Communication Concerning the Application of Regulation on the Unlicensed Electricity Generation on the Electricity Market” that came into force in October 2013. According to this, there are two methods of connection to the grid based upon the type of connection point:

- If the solar system connects to the grid via a transformer of the local distribution company, it is classified as a low voltage connection and has limitations such as: a maximum 30% of the capacity of each transformer is allowed for all renewables connected to it and additionally, each individual applicant is allowed a maximum 10% of the transformer’s capacity.
- Alternatively, if the solar system connects to the grid via a transformer that belongs to the solar system, it is classified as a medium voltage connection. Here the limit of the connection is raised to match the capacity of the transformer. The disadvantage of this method is the transformer cost, elevating investment costs by 2-3%.

32. The capacity of transformers supplying forest villages are typically between 50-100kVA. In these cases, the maximum capacity of a solar power plant for direct connection would be 15-30kW. Hence, in such situations where higher capacity installations are required, a transformer needs to be purchased for an indirect connection. The unlicensed solar PV system application process involves a number of bureaucratic steps:

1-Pre-application to the distribution company: Pre-application of unlicensed energy systems should be submitted to the regional electric distribution company. The following documents are required to be in the application file.

- The ownership certificate – land title or the rental contract of the land on which the solar power plant will be installed. In case of the land belonging to the government or forestry commission, a special permission certificate is required.
- Environmental Impact Report
- Agricultural status certificate of the land (N/A for roof-top projects)
- Single line diagram
- Layout sheet and application sketch
- Electrical consumption invoice which is in the name of the investor
- Application fee

After the application, the regional distribution company investigates the application file and can extend the process for 10 days in case of missing documents. If missing documents are not delivered

within this time, the application is rejected. If the application documents are correct, the regional distribution company seeks the opinion of the Turkish Electricity Transmission Company for the availability of the transformer which would be used as the grid connection. Additionally, the area of the new facility needs to be scanned for the existence of other facilities with the Renewable Energy Department. After a positive response from all these institutions, the regional distribution company sends a call letter. This process might take 3-4 months dependant on the availability of the distribution company.

2-Approval of the Project File: The project file of the solar power plant is presented to TEDAS for approval. Over the next 90 days following receipt of the call letter, the investor should submit the detailed project file to TEDAS. This file should be approved within 180 days maximum. In case of an extension the application would be rejected. Due to the workload intensity of TEDAS the total process might take around 4-5 months.

3-Installation of Solar Energy System: The installation is done after the approval of TEDAS. After the completion of the installation, a team of TEDAS and RDC (Regional Distribution Company) engineers makes an investigation in the field for provisional acceptance. After the PA the facility can start to produce energy and is covered by FiT. Due to workload intensity, the PA phase might take 1-2 months.

It is quite possible then that the entire process can take a year of administrative bureaucracy before approval is given. What is more, even after installation and suppliers have been paid, it is possible to have to wait another two months before the system is permitted to actually generate and earn the FiT to pay back any debt which would be accruing interest.

Legislative and Procedural Guidelines on Photovoltaic Systems in Turkey - Licensed Photovoltaic Systems

33. According to the new Turkish Electricity Market Law 6446, which entered into force in March 2013, and the Electricity Market License Regulation that came into force in November 2013, generating electricity in the Turkish market requires an electricity generation license to be obtained from the Energy Market Regulatory Authority (EPDK). With respect to solar schemes, a license is required if the capacity is greater than 1MW. Unlike applications for electricity generation from conventional sources, such as natural gas and coal, the RES Law mandates that license applications concerning solar generation facilities can only be made on a specific date, to be determined by EPDK. In addition, the current legislation introduces limits on established capacity and requirements in relation to the land.
34. *Power Limit:* EPDK has brought two limitations with respect to capacity of licensed solar plants. Under the Electricity Market License Regulation, the established capacity of a single solar power plant cannot exceed 50MW. Moreover, the aggregate established capacity of solar energy based generation facilities to be connected to the grid is limited through time. For example, EPDK announced the availability of 600MW as the first phase of licensed solar power plants up to end 2013. This limited capacity is distributed across 121 substation locations in 27 provinces in the country's south and eastern regions.
35. *Requirement in Relation to Land:* An attractive benefit of the licensed solar power generation process is the provision of land to investors at a special discount of 85%. To be able to manage the provision phase properly, a limit has been defined with respect to the land area of the plant. According to this limit, a maximum 20,000 m² of land can be utilized per MW. Applications that request the

establishment of a solar power plant on agricultural land will be automatically rejected. Compared to unlicensed application, licensed applications have an even more complicated process plus the requirement of pre-studies as shown below:

1-Solar Measurement: Investors have to provide a report which includes meteorological data for one year (at least six months of which must include on-site measurement data) for the proposed site. To be able to report, a measurement station needs to be placed on site. Based on the restrictions of MENR, the solar radiation that is received by a flat plate must be at least 1,620 kWh/m²/yr.

2-Pre-License Application to EPDK: The investors have to provide an application file which includes documents concerning company profile, financial provision and permissions that are required by EPDK.

3-Technical Evaluation by MENR: When the application file is complete and accepted for evaluation, the General Directorate of Renewable Energy will evaluate the project technically and send it to TEİAŞ or the relevant distribution company for grid connection feasibility. TEİAŞ and/or the relevant distribution company determine the grid connection and voltage level.

4-Competition Tender: In case the application capacity is more than the dedicated capacity for any substation, TEİAŞ must organize a competition tender. The applicants attend the tender and the winner of the competition is engaged with a pre-license.

5-Granted Pre-License: Upon obtaining both the General Directorate of Renewable Energy approval and TEİAŞ's affirmative grid connection approval, EPDK issues the pre-license for the applicant.

6-Permission from Related Authorities: Once the pre-license is granted investors must collect required permissions from related authorities. If any required permission cannot be collected, the pre-license is cancelled by EPDK.

7-Granted License: If all required permissions are collected, the investor is awarded with a license by EPDK.

1.1.4 Baseline information on the Turkish Energy Sector and Electricity System

36. Turkey is almost entirely dependent upon fossil fuels as a primary energy source, with renewables accounting for <10% – Figure 3.

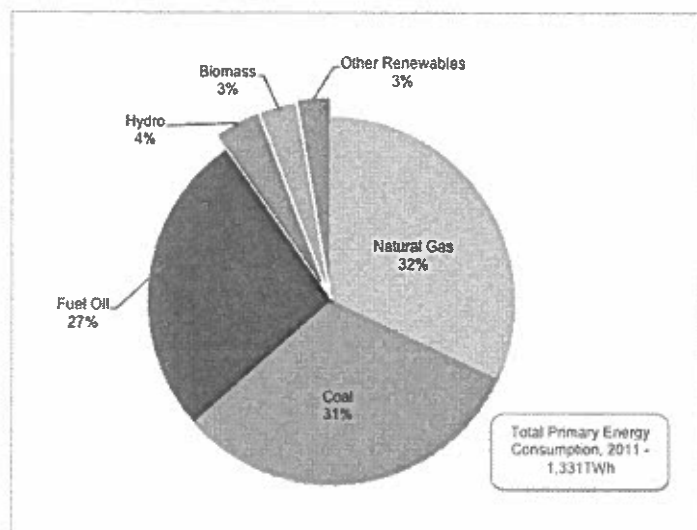


Figure 3 Turkey's primary energy sources, 2011 (Ref: www.teias.gov.tr)

37. With respect to electrical energy, Turkey's total domestic installed generation capacity reached 67GW in 2014, and this represents an increase of 11% on the previous year. It is projected that this capacity will have to rise in coming years to ~100GW to meet the increasing demand. Between 1971 and 2011, electrical consumption per capita in Turkey rose ten-fold from 268kWh/person/yr to 2,709kWh/p/yr, but this is still around a third of the per capita consumption witnessed for example in Germany. By 2002, 99.9% of Turkish people had access to the electrical grid. Currently 70% of domestic electrical generation is from fossil fuels. In terms of renewable energies, hydropower dominates and accounts for 25% of total production capacity – following Figure 4.

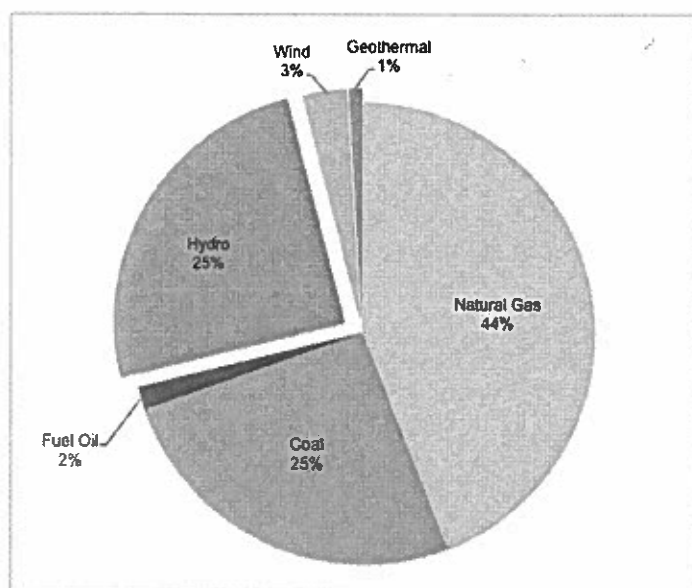


Figure 4 Installed domestic electrical generation capacity (2014) (Ref: www.teias.gov.tr)

1.1.5 Renewable Energy Uses & Potential in Turkey

38. There is much authoritative talk on the progress of renewable energy development in Turkey and this was ratified in 2005 by the enactment of the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy. Although, whilst the absolute levels of generation from renewable sources has risen over the past 40 years, their share of all generation has fallen significantly from around 35% in 1970 to less than 10% today – Figure 5.

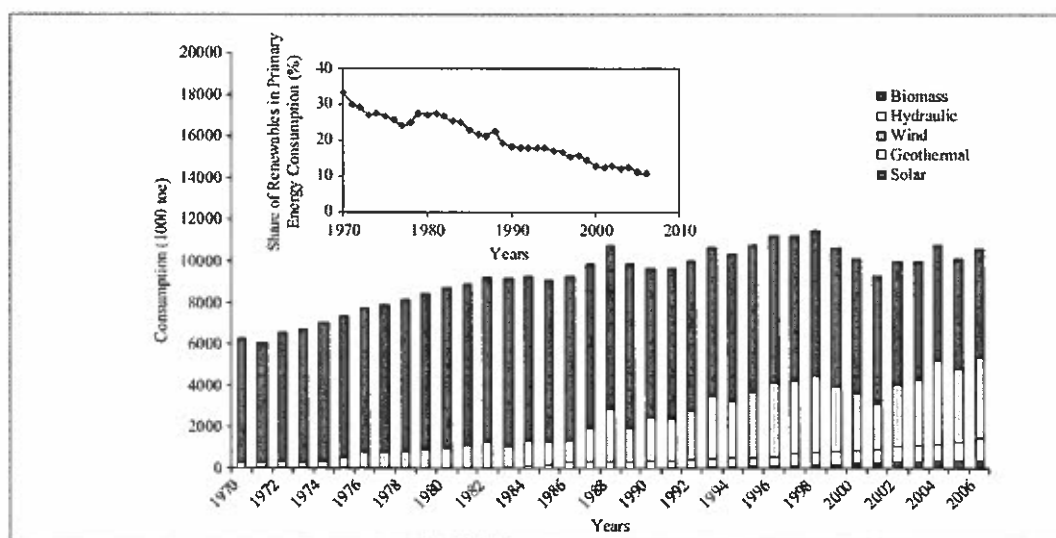


Figure 5 Consumption of energy by renewable resource, 1970-2006 (Ref: www.teias.gov.tr)

39. Despite being well suited for solar generation, the only notable use of the resource has been in the thermal sector, which yielded 1.5TWh in 2000, which is equivalent to ~ 0.15% of total energy consumption across the country. Historically, biomass has been the key renewable resource utilised in Turkey, but over the past 20 years this is being displaced by significant progress made in hydropower, which now accounts for 25% of all electrical production.
40. Although Turkey has a great potential for solar power, installed capacity is extremely low. Because of the high irradiance levels in Turkey and the marked reduction in equipment costs in recent years, the amortization term for solar investment is now theoretically down to 6-7 years if there is no interest to pay on any debt, however, in a more realistic scenario, given the low levels of FiT and high local interest rates demanded, particularly for poorer community schemes, payback of 10 years is a more realistic figure. Since the FiT itself is also only guaranteed for a period of 10 years and there is no legislation in place to cover export prices after this time, this leads to huge long-term financial uncertainty for solar investments in Turkey.
41. Renewables projects can be approved as either licensed or unlicensed (see paragraphs 25 - 27). Following modifications to the new electricity market law, published on 30 March 2013 (Law no: 6446) at official gazette, the capacity limit for individual unlicensed solar projects has been increased from 500kW to 1000kW. Following the announcement of these new regulations on 2nd October 2013, there has been an increase in demand for unlicensed solar power plant approvals in Turkey: As of 11th November 2014, submitted applications amounted to a combined capacity of 532,068kW. 132,768kW of these have been approved by TEDAS (Turkish Electricity Distribution Company). Of this, just 24,345kW has received a provisional acceptance certificate.

42. According to the 2010-2014 Strategy Paper of the Ministry of Energy and Natural Resources, Turkish renewables targets are defined as:
- Providing resource diversification with priority on use of domestic resources. Making available all domestic resources and maximum renewable energy resources by 2023.
 - Increase renewable energy share in energy supply. Make renewable share available at least 30% in electricity generation in 2023.
 - Reach an installed capacity of at least 3000MW in solar power by the end of 2023.
43. The total amount of approved solar power has so far reached 2,000MW according to TEIAS (Turkish Electricity Transportation Company) and they cite this as evidence that the 3,000MW target will be reached much earlier than the 2023 target. However, to put this 3GW target into context, it appears to be remarkably unambitious for such a large country of high average solar irradiance when compared for example to Germany, which has half the land area and 30% less irradiance/m², which has recently been installing 7.5GW per year, and has so far reached 38GW total solar capacity.

1.2 Threats posed by climate change

44. Climate change is one of the most difficult challenges facing the world today. Therefore, renewable energy resources will play an important role in the future. Optimal use of these resources minimizes environmental impacts. Renewables provide an excellent opportunity for mitigation of greenhouse gas. The potential of greenhouse gas mitigation depends on the use and availability of renewable energy sources and fuel replaced by it. Air pollution is a significant environmental concern in Turkey. Therefore, renewable energy sources are becoming attractive solution for clean and sustainable energy future of Turkey. The resource availability is very important for the nature of the energy supply.
45. Turkey lies in an area that is projected to be one of most vulnerable areas to climate change in the world. The rise in temperatures and the decline in precipitation will increase the aridity in Turkey. There will be a decrease in Turkey's water resources in the future. The per capita water amount will decrease to the level classified as "water scarcity" at national scale. If the present distribution of population does not change in the future, the per capita water amounts will be low in the basins in the western half of Turkey. The southern basins will also be affected as the precipitation, hence run-off, will be substantially, where the allocation of water into energy generation, irrigation, domestic and industry use will have to be reconsidered. Solutions to water depletion in some basins that involve the transfer of water from nearby basins will certainly cause tensions amongst the residents of the basin whose water is removed. This may result in an increase in "resource appropriation" in the future. Generally, Turkey is expected to be affected by the climate change phenomenon with drier periods, warmer summers and colder winters. These are not expected to affect the renewable energy situation in a negative way. On the contrary these can further trigger the demand for energy that is also related with renewable energy. Climate change is not expected to create a risk for the project.

1.3 Long-term solution and barriers to achieving the solution

46. Despite law 5346 ratifying the FiT for solar projects in mid 2005, supportive regulations for the installation phase weren't announced until end 2013. As a result, there have been few large-scale solar projects commissioned in Turkey to date. Recent amendments have led to an increase in applications; by November 2014, 24MW of a 532MW application pipeline had been approved. But there remain a number of barriers that can negatively impact and impede the progress of solar

development in Turkey, particularly for smaller, community based projects. These barriers can be broken down into three categories:

1.3.1 Financing and Market Barriers

47. The renewables market is not well developed in Turkey, consequently there is a lack of sophistication in the availability of financial products, particularly for smaller unlicensed projects. Due to lack of experience, project financing is limited for such schemes and so most debt is based upon the balance sheets of sponsors and, in this particular case, with forest villagers being some of the poorest members of Turkish society, their access to this is both severely limited and perceived as high risk; they are therefore unlikely to be considered for credit or, if they are, will be penalized with prohibitively high interest rates. Whilst licensed renewables projects are free to trade electrical generation on an open market, unlicensed (<1MW) grid connected installations are compelled to adopt the Turkish Feed-in Tariff (as defined in Law 5346, recently revised to cover legislation to 2020), which has shortcomings on a number fronts:

1) The price is not based upon generation of energy but purely on export. It is common for FiT regimes to be based upon the generation of energy with an export bonus, this allows the generator to benefit from use of the green energy whilst simultaneously receiving income to repay capital costs. In Turkey's case though, since revenue is entirely dependent upon export and there is generally a priority to repay debt as rapidly as possible (to minimise interest charges), this means that generators will not be able to receive any energetic benefit whatsoever from the installation until all debt has been settled.

2) The current pricing level (\$0.133/kWh plus small domestic bonus) is actually lower than the current retail electricity pricing level (\$0.16/kWh) and it is guaranteed to last for only five years. The FiT is thus less a financial incentive and more a restrictive cap on the amount for which unlicensed generators can sell energy than say an open green-energy market might offer. This may not be an issue for the majority of unlicensed schemes since they may be installed at a single site e.g. a factory with strong daytime demand profile, that is permitted to use the electricity directly to offset consumption (thereby pricing generation at the same level as imports) and use these savings to repay the debt. However, a community scheme, under current legislation, is not able to use generation in this way across multiple dwellings. The development of more sophisticated incentives such as Net-Metering (see below) would negate this issue.

3) The electricity price level is fixed, not index-linked, in any way. Since retail electricity import prices will inevitably inflate through time, the effective energetic value of the FiT deflates through time in relation to import costs.

4) Unlike typical 20-25 year periods commonly seen around the world, the domestic element of the FiT is guaranteed for just 5 years whilst the main component expires after 10 years. There is no legislation in place governing export prices after this event. Since investment payback periods can be up to 10 years for solar PV, this creates extreme long-term financial uncertainty for a PV project with an anticipated lifespan of 25 years and thus makes it more difficult to raise financing.

5) The domestic component of the FiT technically provides a bonus of up to \$0.067/kWh for domestically produced equipment. However, it appears that there are no domestic suppliers who have been adequately licensed to offer any more than \$0.007/kWh. This takes the total FiT level to just \$0.14 for the first 5 years and \$0.133 for the subsequent five.

48. Renewable energy projects that are connected to the grid are also subject to an export distribution fee (currently \$0.006/kWh) from the electricity utility companies, which further deflates the net benefit of

the FiT. There are no indications of inflation predictions for this component of cost, which raises further uncertainty of future income levels. Under current regulations, the above factors take payback of a commercially funded community scheme to nearly the end of the 10 year FiT window with no indication of income levels thereafter – Table 5

Table 5: Debt Payback for 100kWp Community PV System Using Net FiT Income

Table 6: Debt Payback for 100kW _p Community PV System Using Net FIT Income								
Year	Generation (kWh)	Main FiT (\$)	Local FiT (\$)	Distribution Charge (\$)	O&M (\$)	Net Income (\$)	7% Debt Repayment (\$)	Balance (\$)
							130,000	
1	158,400	21,067	1,109	-950	-1,300	19,926	-19,926	-
2	157,221	20,910	1,101	-972	-1,320	19,720	-19,720	-
3	156,050	20,755	1,092	-993	-1,339	19,514	-19,514	-
4	154,889	20,600	1,084	-1,016	-1,359	19,310	-19,310	-
5	153,736	20,447	1,076	-1,038	-1,380	19,105	-19,105	-
6	152,591	20,295		-1,061	-1,400	17,833	-17,833	-
7	151,455	20,144		-1,085	-1,421	17,637	-17,637	-
8	150,328	19,994		-1,109	-1,443	17,442	-17,442	-
9	149,209	19,845		-1,134	-1,464	17,246	-17,246	-
10	148,098	19,697		-1,159	-1,486	17,051	-14,701	2,350
Total	1,531,977	203,754	5,462	-10,518	-13,914	184,783	-182,433	2,350
Assumptions:								
Irradiance = 1,800kWh/m ² /yr			Distribution = \$0.006/kWh		System Cost = \$1,300/kW _p			
System Efficiency = 88%			Distribution inflation = 3%pa		System Size = 100kW _p			
Main FiT = \$0.133/kWh			O&M = \$1,300/kW _p /yr		Panel Degradation = 0.75%pa			
Local FiT = \$0.007/kWh			O&M inflation = 1.5%pa		Interest Rate = 7%pa			

49. Assuming a capital cost of \$1,300/kWp all financed from commercial debt at 7% interest, even with modest O&M costs, payback takes 9yrs and 10 months, with interest payments totalling \$52,433, which is equivalent to 28% of all net-income in the first ten years – Figure 6.

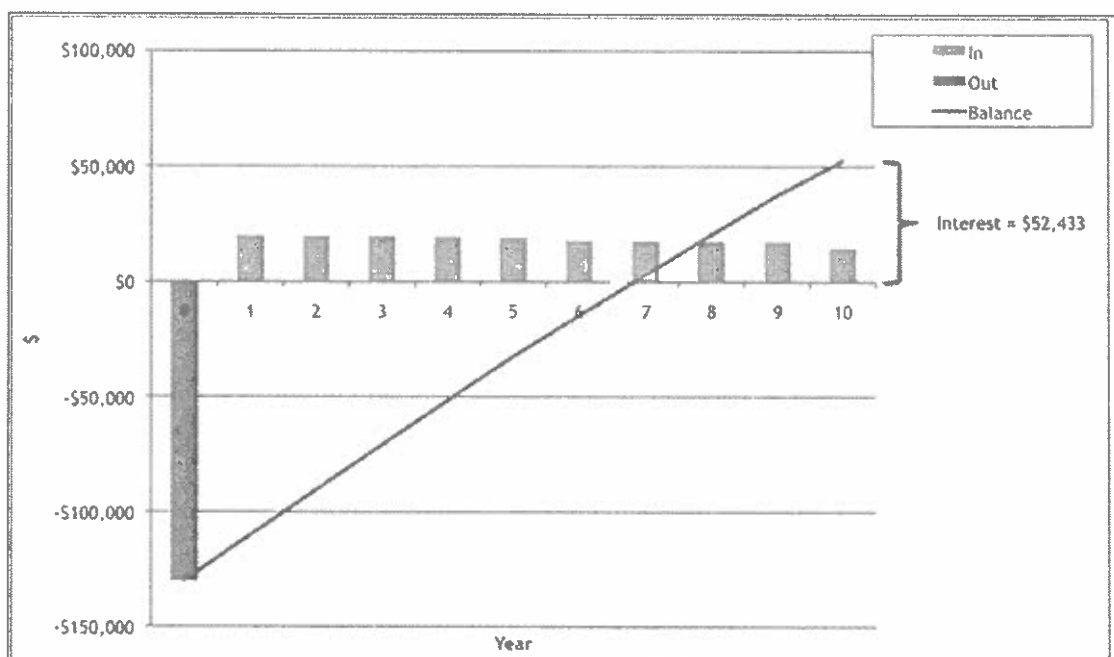


Figure 6 Bank Debt Balance of Payments for 100kWp Community PV System Using Net FiT Income from table 5

50. Net-metering is a well established protocol designed to encourage renewables deployment across many countries, most notably the US, where it was pioneered in 1980 and has been Federal law since 2005. By metering positively during periods of electrical export and negatively through periods of import it effectively prices exports at the same level as imports, thereby removing the expanding differential between the fixed price Feed-in Tariff (at \$0.133/kWh) and the inflating import price (currently \$0.16/kWh). This differential represents a significant loss to community projects, which is absorbed by the electrical utility and distribution companies. If employed in Turkey, it would radically affect the economics of the community project illustrated in table 4 and figure 6; improving effective income (by pricing it at the same level as imports), thereby reducing payback time to 6½ years and reducing total interest costs to \$37,514 – Figure 7.

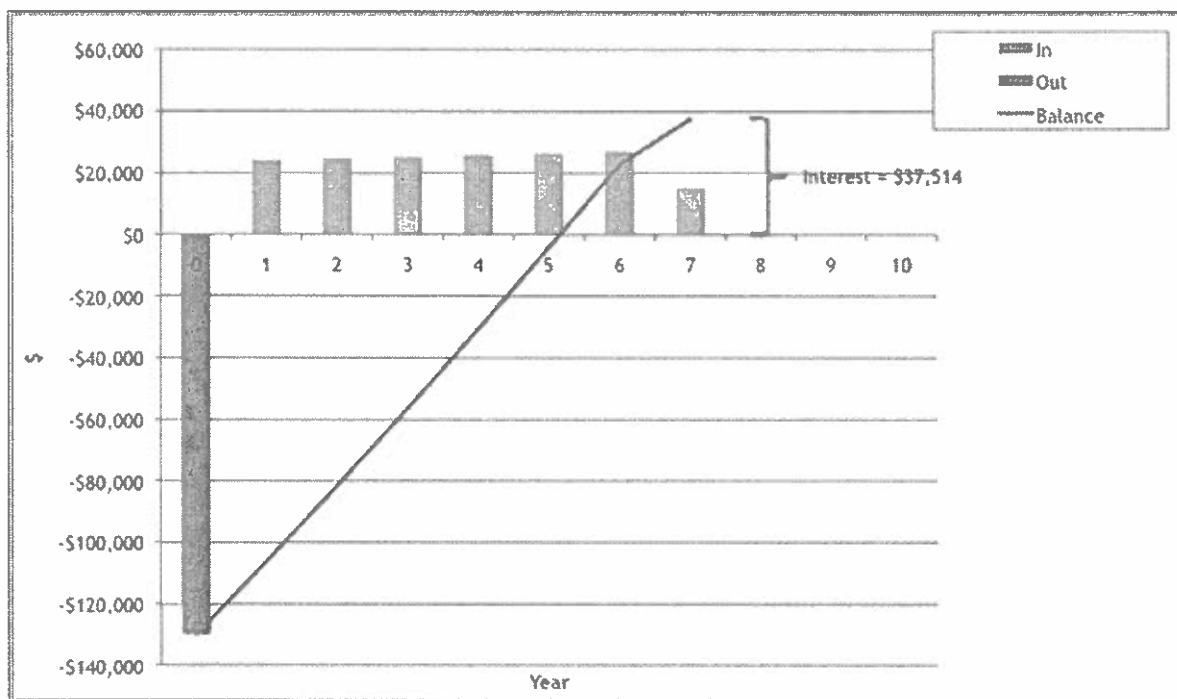


Figure 7 Bank Debt Balance of Payments for 100kWp Community PV System Under a Net-Metering Protocol

51. Single site schemes such as a factory, which are allowed to use all their generation directly (and avoid distribution charges), effectively benefit in the same manner as net-metering by directly offsetting imported consumption and this can explain the recent increase in unlicensed applications. To date though there is resistance from Turkish regulatory authorities to allow such a protocol for community schemes.

1.3.2 Legislative and Institutional Barriers

52. A large number of different permits and documents are required, making the process slow, laborious and risky. Communication between the various directorates and ministries is considered to be weak and poorly managed. Projects may be rejected for spurious reasons or minor infractions with little recourse to appeal for investors. Applications are being submitted to local distribution companies on a monthly basis. Due to the high volume of submissions, researchers have been unable to keep pace, extending the time frame by 3-4 months. The quantity of qualified technicians and engineers are not enough to be able to keep up with the volume of applications. It is estimated they are currently 5-6 months behind schedule. Before the new regulation published on 30th December 2014, projects up to 30kW were being examined by local TEDAS agencies. According to new decision of TEDAS (14th January 2015- Decision number:1154), this power limit is updated to 100kW and projects up to 100kW are now being examined by local TEDAS agencies. Although this new regulation seems to make legislative process fast, qualification of the technicians in local TEDAS agencies may lead to new problems. After approval of project, to be able to start installation, the required zoning permissions need to be sought and this process might take up to 1-2 months. After installation the plant needs to be checked by TEDAS HQ engineers for PAC. Due to the unavailability of these engineers and researchers, the PAC phase might take around 1-2 months.

1.3.3 Technical and Knowledge Barriers

53. The capacity of sub-station transformers is limited. And this limitation is a critical issue of the approval process. Even if every criteria is satisfied for an application, if the sub-station capacity is

already allocated to other renewables projects, the application will be rejected. However, in the vast majority of forest villages, there is currently no additional renewables activity and hence this is not felt to be a serious threat to the project. The renovation and improvement by TEIAS of sub-station transformers and transmission lines would allow more capacity to be integrated and commissioned in the near future. During the selection of land, the following conditions must be satisfied.

- The land is not used for agriculture (arid land)
 - Access to the distribution line.
 - Suitable distribution line (power capacity, voltage and power drop, short circuit current value)
54. There is limited availability of local companies producing components such as panels and inverters. There is a lack of local professional expertise. The limited number of qualified technical personnel currently limits the scope of the project.
55. A key issue regarding the establishment of solar PV systems in forest villages is the awareness of the scheme amongst both forest villagers and ORKOY staff. This will be an entirely new concept to these groups and the FiT system is not generally well known. Two potential networks are available for the dissemination of such information; ORKOY's local offices & staff, and the union of forest villages across the country. ORKOY's loan mechanism is driven by demand from local forest villagers. Hence driving pull demand from villagers will be a critical success factor. Traditionally the most effective mechanism for achieving this is via face to face dialogue between local ORKOY staff (belonging to one of 27 regional directorates of GDF) and the villagers themselves. To be administered effectively this will clearly require ORKOY staff to be well informed and motivated on the project details and merits. It was this method that was heralded as key to the success of their solar thermal program (see 9.3). Similarly, the demonstrable benefits of working PV systems in forest villages and the FiT will be key to attracting the attention, willingness and demand of forest cooperatives. Therefore, a systematic awareness-raising program is necessary to overcome this barrier. The Central Union of Forest Cooperatives (OR-KOOP) and its 28 branches are the key stakeholders to distribute such information among forest cooperatives across the country.

1.4 Stakeholder Analysis

1.4.1 Description of Key Stakeholders

56. The Department of Forest and Village Relations (ORKOY) under General Directorate of Forestry of Ministry of Forestry and Water Affairs is the main contributor of the project. With its long lasting existence and working relations with forest villagers, ORKOY is one of the most experienced public organizations in Turkey in terms of rural development. ORKOY has been the center for supplying the fundamental needs of forest villagers through its loan programs. The organization has been implementing GHG emission reduction related loans including house insulation and solar thermal heating for several years. ORKOY's success on these areas has triggered the organization's will to include solar electric generation.

Table 6 Stakeholders of the project

Project Stakeholder	Relationship With The Project
Ministry of Forestry and Water Affairs (MFWA)	Ministry of Forestry and Water Affairs (MFWA) is the organization that is responsible from management and protection of natural resources including forests and water resources in Turkey. MFWA has six general directorates operating in different subjects: State Hydraulic Works, Nature Conservation and National Parks, Forestry, Water Management, Combating Desertification and Erosion, State

	<p>Meteorological Service.</p> <p>General Directorate of Forestry (GDF) is the organization responsible from management, development and protection of forests in Turkey. Organization's mission is to protect forest resources against any threats and danger, to develop forest resources in a nature-friendly manner and to achieve sustainable forest management at a level that will provide far-reaching sustainable benefits for society in ecosystem integrity. Project beneficiary ORKOY is a department working under GDF.</p>
Forest and Village Relations Department (ORKOY)	<p>Working under General Directorate of Forestry (GDF) of Ministry of Forest and Water Affairs, ORKOY has a long history of working with people living in and around forests. ORKOY, GDF will be the Executing Partner of the GEF Project and will provide the soft loans necessary to make sure that the projects are successfully implemented. The ORKOY was founded in 1970 and has gone through several organizational changes. Up to recent years ORKOY was itself a General Directorate but following changes in the structure of Ministry of Forestry and Water Affairs it has been placed under GDF as a department. ORKOY aims to contribute to the conservation of forests through supporting the local communities. ORKOY has been operating a grant/loan program since 1974 targeting the forest villagers. Main duties of the organization are:</p> <ul style="list-style-type: none"> • To support socio-economical development of forest villagers; • To undertake inventories and researches as well as planning projects and implementation; • To develop and implement projects on decreasing the wood consumption and alternative energy resources; • To support the industry on wood and non-wood related product; • To direct all sorts of loans and support mechanisms to forest villagers; • To enable efficient use of products through supporting cooperatives on a project base; • To undertake village transfer related tasks according to law no 2924.
Ministry of Environment and Urbanization (MoEU)	<p>Ministry of Environment and Urbanization is the focal point of UNFCCC. The Climate Change Department under the General Directorate of Environmental Management is one of the key stakeholders to the project. MoEU has released the MRV legislation that is directly linked to the project. Moreover, MoEU is leading the Turkey part of World Bank supported Partnership for Market Readiness (thepmr.org) program that can have close links to the Project.</p>
Ministry of Energy and Natural Resources (MENR)	<p>The Ministry of Energy and Natural Resources is responsible for developing energy policy for Turkey and policies related to natural resource use. The Energy and Environmental Management Department under the General Directorate of Energy Affairs is one of</p>

	<p>the key stakeholders to the project. This department is responsible from monitoring and assessment of carbon emissions related to the energy sector as well as defining the climate change policies regarding the sector. Moreover, General Directorate of Renewable Energy is another key stakeholder to the project. They are the key organization to identify renewable energy policies of Turkey. Although their role is limited in terms of Solar Energy Project applications by individuals (they are responsible from assessment of application in terms of controlling the possible overlaps between different projects in the same region) they are key to sustainability of the project.</p>
Ministry of Development (MoD)	<p>The Ministry of Development (MoD) is natural member of the Project Board/Steering Committee, with a responsibility for defining, assessing, and monitoring programme outputs towards country-level outcomes to ensure that the project results have been linked to the national development plans. MoD will work closely with UNDP to ensure that the plan of the programme includes necessary aspects, including identification of projects required to achieve the expected outcomes. MoD will be represented on the Project Steering Committee and provide policy and strategy inputs in a macro approach related to solar PV technologies for promoting sustainable development as well.</p>
Turkish Electricity Distribution Company (TEDAS)	<p>TEDAS is the state economic enterprise responsible to undertake approval procedure of energy projects including photovoltaic according to the related legislations (i.e. Law#5346 "Law on Utilization of Renewable Energy Sources For the Purpose of Generating Electrical Energy"). TEDAS is the key stakeholder of the project. TEDAS identifies the energy project's structure, properties etc. All energy projects are currently approved by TEDAS before they are initiated. TEDAS has local offices but currently project approvals are handled in Ankara headquarters. TEDAS is currently working on easing the procedure for unlicensed PV projects less than 30 kW. The project will envisage methods for establishing PV in forest villagers specific to the project and TEDAS's role and cooperation with GDF is key to the success of the project.</p>
Turkish Electricity Transmission Company (TEIAS)	<p>TEIAS is the state economic enterprise responsible for transmission of electricity within the country. TEIAS is a key stakeholder to the project in terms of defining the quotas for electricity feed in. The regional distribution utilities approaches TEIAS and ask for suitability of energy projects in terms of quotas. TEIAS's contribution and approach to the project is therefore key to the project strategy.</p>
Energy Market Regulation Authority (EPDK)	<p>Energy Market Regulatory Authority has been founded in 2001. The main aim of the organization is to perform the regulatory and supervisory functions in the energy market. The objectives of the organization are; to ensure the development of financially sound and transparent energy markets operating in a competitive environment and the delivery of sufficient, good quality, low cost and environment-friendly energy to consumers and to ensure the autonomous regulation and supervision of these markets. EPDK has regulatory functions such as licensing to transcribe the entries and exits to the market; regulating the market to assure non-discriminatory third party access to the monopolistic infrastructures such as grids; ratemaking to inhibit</p>

	monopoly rents; and supervising and penalizing (if necessary) to make sure that the market participants are in compliance with the rules and regulations. Although EPDK is a higher policy making organization their role in the project can be key to overcome specific barriers in terms of defining the methodology, permissions and ensuring the replicability of the project results.
Turkish Utilities (Private sector)	Turkish utilities will purchase the electricity provided by the solar PV systems through power purchase agreements, either on the spot market or through longer-term agreements. Electricity will be purchased in accordance with the Turkish legislation on preferential feed-in-tariffs for renewable energy. Three of these utilities are key to the project in terms of projects pilot areas. Osmangazi EDAŞ is the local company for Afyon Project site. Fırat EDAŞ is the distribution company in Elazığ Region, Yeşilirmak EDAŞ is the distribution company for Çorum and finally Meram EDAŞ is the company for Konya region. The project will keep these organizations in the loop in terms of successful implementation of the project activities.
Forest Cooperatives and the OR-KOOP	Forest cooperatives are legal non-governmental bodies consist of forest villagers with a mandate of development of forest villagers. OR-KOOP (Central Union of Turkish Forest Cooperatives) is the organization that is representing the forest cooperatives in Turkey with its headquarter in Ankara. OR-KOOP is an organization that is founded by 27 regional forest cooperative unions with more than 2,000 cooperative members. The forest cooperatives are eligible to be supported by ORKOY. Forest cooperatives will be supported by GDF in terms of capacity building activities to maximize benefits of the sustainable energy-financing program. The role of forest cooperatives will be to utilize ORKOY soft loans with the goal of investing in small-scale solar PV systems.
Forest Village Legal Entity	Forest Village Legal Entities are the smallest governance body in Turkey. It is managed by the “Mukhtar”, Head of Village, who was elected for 5 years period during national elections. Forest village legal entities are eligible to be supported by ORKOY. The GEF project will support forest village legal entities in terms of capacity building activities. Two villages to be selected for demonstration component of the project will benefit from the sustainable energy finance program with GEF partial finance support and the Government co-finance. In return, the forest village legal entity will be responsible on running the system and serve as a training centre for the deployment of the program.
Agriculture and Rural Development Support Institution (TKDK)	TKDK is an institute working under Ministry of Food, Agriculture and Livelihood that is eligible for supporting rural development under IPARD program of Turkey. TKDK has a grant scheme made of IPARD and national funding that supports instalments of solar PV systems. The main aim of the program is to give credits to support rural development. Currently the program has initiated its 13 th call for proposals. Both individuals and organizations are eligible for crediting. Any solar PV instalment up to 1 mw that is to match the energy needs of facilities such as integrated animal husbandry systems can be supported within the program. Although, currently solar energy

	is the only renewable energy source that is eligible, in the near future other renewables will be added to the portfolio.
Domestic and International Banks (private sector)	<p>Initially, it is expected that domestic and international banks would have no role in the project as they cannot compete with zero interest soft loans from ORKOY. However, the ORKOY soft loan programme (initially US \$45 million) is not going to be large enough to cover the financing needs for solar PV for all forest villagers and over time technology and financing costs are expected to come down. Therefore, under component 3 of the project it will be important to bring in domestic and international banks to see how they might provide financing for further investment in solar PV systems for forest villagers.</p> <p>DenizBank, one of the private banks in Turkey has a financing scheme for solar PV projects for private sector. During the stakeholder consultation meetings of the PPG period a meeting was held with DenizBank team. The Bank has a good experience on solar PV projects and financing in Turkey that can contribute to the Project implementation. Moreover, DenizBank has been working with agricultural cooperatives that have similar structure with forest cooperatives.</p> <p>Moreover, several public banks in Turkey (mainly Ziraat Bankası and Halkbank) have a long history and great experience on supplying credits to farmers and villagers. Their contribution to the project in terms of establishing financial structures can be a positive asset.</p>
Solar PV installers/manufacturers (private sector)	<p>The role of the solar PV installers/manufacturers will be to install and maintain solar PV equipment for forest villagers who will have successfully obtained financing either from the ORKOY soft loans or later from domestic and international banks. The solar PV installers should benefit from the fact that this project will lead to greater interest and uptake in solar PV systems. In Turkey, the domestic solar PV installers and manufacturers have been increasing during the last years. They are mostly the members of the GUNDER (see below). Private sectors role on policy making is a key asset for the project.</p>
International Solar Energy Society – Turkish Section GUNDER	<p>International Solar Energy Society – Turkish Section (GUNDER) is the umbrella organization of solar PV companies in Turkey. The aim of the society is to promote all activities directed at the better utilization of solar energy. Since GUNDER is an umbrella organization serving not only governmental bodies but also private sector, GUNDER is a partner of the GEF project. Some of technical support activities will be implemented by GUNDER along with capacity development activities for sustainable energy finance program, through a project cooperation agreement with UNDP. They will be a co-financer of the project and contribute to the project activities.</p>
WWF Turkey (NGO)	<p>WWF-Turkey is committed to stopping the degradation of Turkey's natural environment and building a future in which humans live in harmony with nature. Addressing climate change is one of the main pillars of WWF-Turkey's strategy. For effective climate change mitigation, scaling up the share of renewable energy in power generation, as well as primary energy demand is a top priority for</p>

	<p>WWF-Turkey. Organization has recently conducted a research in collaboration with Bloomberg New Energy Finance and on energy policies of Turkey named "Turkey's Changing Power Markets". As of early January 2015, WWF-Turkey has submitted a proposal to UK Prosperity Fund, "Laying the Groundwork (Legislation, Business and Finance Models and End-User Awareness) in Order to Scale up Residential Solar Power in Turkey" that is relevant with the project. Main objectives of the project are (i) to provide legislative and policy recommendations to help establish a more effective and better functioning residential solar PV market in Turkey and (ii) to provide accurate information, which will prevail over the widespread misinformation about the technical and economical feasibility of the use of residential solar PV, for prospective end-users.</p>
<p>Ziraat Bankası (Agriculture Bank)</p>	<p>Ziraat Bankası is one of the oldest and most widespread public banks of Turkey. With its widespread local branches, it has been a key bank for the people living in the rural areas. The bank has a long history and experience of given credits to the farmers and villagers. The beneficiary of the project, ORKOY, also has a long working history with the Bank. Currently its loan programs run through the bank. During the project preparation period Ziraat Bankası has been consulted on various possible financing mechanism for the project period. The bank was positive on collaborating with the project and the Ministry on developing solar-forest village specific credit lines and other financing mechanism. The bank will be a key stakeholder to the project.</p>
<p>French Agency of Development (AFD - The Agence Française de Développement)</p>	<p>AFD is a public development finance institution that has been working to fight poverty and foster economic growth in developing countries and the French Overseas Provinces for seventy years. AFD has been actively working in Turkey since 2005 with its headquarters in Istanbul and Ankara office. A framework agreement on bilateral cooperation for environmental protection was signed in 1996 between Turkey and France on environmental protection and AFD has been directly contributing to this framework. This bilateral cooperation concerns the major issues of common interest for the sustainable development of economies and societies. With specific targets on climate change and environmental protection in Turkey, AFD works with public and private institutions through variety of financial tools. During the project preparation phase the officials of AFD were consulted several times and they expressed their interest to provide low interest loans for solar PV in forest villages in Turkey.</p>

2 STRATEGY

2.1 Project rationale and policy conformity

2.1.1 Project Rationale

57. This project will assist Turkey with the promotion and financing of on-grid, solar PV in forest villages in Turkey, with special focus on a cooperatives model. Innovative public-private business models will be developed and implemented to provide affordable residential solar PV to forest cooperatives. The public support and involvement in the initiative will be led by the Department of Forest Village Relations Department (ORKOY), working together with other key actors in the solar PV value chain, including private sector solar PV installers, Turkish utilities, and domestic and international banks as well as other institutions that provide financing.

2.1.2 Consistency of the Project with GEF Strategies and Strategic Programs

58. The project is consistent with Climate Change Objective 3 of the GEF 5 Operational Strategy which is to promote investment in renewable energy technologies as this project aims to promote at least 30MW of additional investment in solar PV technologies in Turkey. The project is consistent with Outcomes 3a – Appropriate policy, legal and regulatory frameworks adopted and enforced; Outcome 3b – Sustainable financing and delivery mechanisms established and operational and Outcome 3c – GHG emissions avoided. Following paragraphs describe in detail the content of project components.

2.2 Country ownership: country eligibility and motivation

2.2.1 Country Eligibility

59. A country is an eligible recipient of GEF grants if it is eligible to borrow from the World Bank (IBRD and/or IDA) or if it is an eligible recipient of UNDP technical assistance through its Indicative Planning Figure (IPF). Further, the country should meet the eligibility criteria established by the Conference of the Parties (COP) of the relevant convention. The following UNECE countries are eligible for funding: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Lithuania, Montenegro, Republic of Moldova, Romania, Russian Federation, Serbia, Tajikistan, the former Yugoslav Republic of Macedonia, **Turkey**, Turkmenistan, Ukraine and Uzbekistan.
60. As a country that is eligible to obtain credit from the World Bank and receive technical support from UNDP, Turkey received grants worth \$22 million from the GEF to support five climate change projects since 2007 with the total budget of approximately \$68 million. During the same time period, the GEF provided Turkey with \$11 million of support for four projects related to biodiversity and forestry with the total budget of \$38 million.
61. Turkey is also eligible to benefit from the short-term financing facility of \$30 billion that is committed by developed countries under Copenhagen Accord and officially recognized under Cancun Agreements, with an aim to provide support to developing countries in their investments to combat with climate change. This position, as agreed by Cancun Agreements (Resolution No.: 2/CP.17), also emphasize the special position of Turkey among other Annex I countries of the UNFCCC, Turkey is listed in the official list of countries eligible for development support that is declared by the OECD Development Assistance Committee, although Turkey is an OECD country.

62. Accordingly, Turkey can benefit from official development assistances that are provided to help developing countries to combat climate change. This position also highlights the special circumstance of Turkey among other Annex I countries of the UNFCCC. As many of the non-Annex I countries are not listed in the OECD Development Assistance Committee list for receiving development assistance due to their high GDP per capita values

2.2.2 Consistency with National Priorities & Programs

63. Turkey became a Party to the UNFCCC on 24 May 2004 and an official Party to the Kyoto Protocol on 26 August 2009. Greenhouse gas emissions in Turkey have been growing at a rapid rate of between 8-10% per year in recent years. Total greenhouse gas emissions from Turkey in 1990 have doubled from about 187 million tons of CO₂eq (when Land Use, Land Use Change and Forestry (LULUCF) were not taken into account, to 401 million tones of CO₂ eq in 2009. While sinks absorbed about 44 million tones of CO₂ eq of greenhouse gases emission in 1990, this value increased to about 82 million tones of CO₂eq in 2009. In addition, Turkey has a high population growth rate of 1.27% which is above the OECD average and which contributes to further growth in GHG emissions in Turkey. GHG emissions per capita in Turkey increased from approximately 3.4 tonnes CO₂eq per capita in 1990 to 5.2 tonnes CO₂eq per capita in 2010. Taking into account its commitments under the UNFCCC and the Kyoto Protocol to reduce GHG emissions, the Turkish Government is committed towards implementing policies which reduce greenhouse gas emissions and enhance sinks and this includes promoting solar PV .
64. The Turkish Law on “Utilization of RES for the Purpose of Generating Electrical Energy” was adopted in 2005 with the goal of promoting the development of renewable energy in Turkey. The law has been amended and improved in 2007, 2010, and 2012. The Law has introduced, preferential grid access for renewable energy projects, and a guaranteed feed-in tariffs which includes US \$0.133 per kWh for solar power. This increases to US \$0.189 per kWh when domestic equipment produced in Turkey is utilized. The current retail tariff to residential end-users is US \$0.12 per kWh. The law includes a provision for waived permitting for all solar PV systems, including residential systems, up to 1,000kW and this should help projects to be successfully realized. As a result of this new environment for renewable energy investments, there are vast numbers of applications on solar PV that are under 1,000 kW power. Although the Law brings the necessary environment for the investors, the “domestic equipment additional support” issue remains as an unsolved problem. The Ministry of Energy and Natural Resources is working on a better definition of the “domestic equipment” in order to have a clearer situation.

2.2.3 Consistency with Regional Priorities & Programs

65. A forest village is defined under Turkish Forest Law # 6832 as any village that contains a forest area within their administrative borders. Forest villages are eligible for financial and technical support by the Department of Forest and Village Relations (ORKOY) within the General Directorate of Forestry under the Ministry of Forestry and Water records. According to the 2013 census, there were 7,332,000 people living in 21,549 forest villages who constitute approximately 9.6% of the total population and 35% of the total rural population of the country. Forests cover 27% of the surface area of Turkey and due to their limited land resources as well as lack of alternative sources of income, the communities living in forested areas in Turkey have traditionally been heavily dependent on utilizations from the forest areas and are among the poorest in Turkey. Due to their high level of dependency on fossil fuels and their weak capacity to finance solar PV on their own, forest villages are an excellent choice for a GEF project which aims to overcome barriers to promote greater investment in renewable energy. Greenhouse gas mitigation potential from forest villages is high given the fact that currently forest villagers are not able to easily finance and implement renewable

energy electricity generation projects, despite feed-in tariffs that make investment in solar PV systems more attractive than in the past.

66. Forest villages have been identified in the 5th National Communications to the UNFCCC of Turkey as being particularly vulnerable to the impacts of climate change, as well as having high mitigation potential and low capacity to reduce GHG emissions without additional incentives and assistance.

2.3 Design principles and strategic considerations

2.3.1 Value-Added of GEF Involvement in the Project Demonstrated through Incremental Reasoning (What would happen if the GEF did not support the project)

The baseline

67. At the current time there has been no major emphasis of the ORKOY Social or Economic Credit programme on supporting renewable energy power generation projects (except the solar heating campaign) and the capacity of ORKOY staff to support such activities is insufficient. The scale of such investments are much higher than for home insulation and for solar water heating and higher levels of due diligence are required so it is highly unlikely that in a business as usual scenario, the ORKOY programme would be expanded to also support solar PV. The key issue for forest villagers is the affordability of the residential solar PV system. While the technology costs have fallen dramatically in recent years, forest villagers have limited capital of their own and very limited access to financing, and when financing is available it is often costly. In general the affordability of renewable energy is highly sensitive to financing costs due to renewable energy's upfront capital intensity. Without this project, it is initially estimated that a maximum of 3MW of solar PV might be deployed in forest villages over the next five years. Detailed analysis is provided in following table.

The GEF alternative

68. It is estimated that approximately 3,600,000 MWh of electricity is consumed each year by over 7 million inhabitants of forest villages in Turkey. Given that these villages are almost all grid connected an initial calculation could be made that the total greenhouse gas emissions in Turkey from electricity generation in all forest villages are approximately 2,178,000 tonnes per annum using the grid emission factor for Turkey of 0.605 tonnes of CO₂e/MWh. The initial assumption is that over 2.5% of all forest villages in Turkey should be able to benefit from ORKOY soft loans and installing 30MW of solar PV systems by the end of the project will result in approximately 28,750 tonnes of CO₂e being avoided per annum. Over a 20 year lifetime of the solar PV systems this works out to approximately 575,000 tonnes of CO₂e reduced (28,750 x 20 = 575,000) which represents approximately US \$6.57 of GEF money spent per tonne of CO₂ reduced which, if achieved, is a highly cost-effective number. Detailed analysis is provided in following table.

Table 7 Incremental Reasoning

Value-Added of GEF Involvement in the Project Demonstrated through Incremental Reasoning	
The baseline	GEF Alternative
Component 1. Policy & Institutional Framework for supporting Sustainable energy financing mechanism for solar power in forest villages	
No scheme for support of PV installations in forest villages is in place. Villagers interested in residential PV installation have to use the unlicensed procedure and apply to the regional electricity distribution company directly. However	The detailed evaluation of available business models will be carried out with special focus on cooperative model of PV installation. This system enters the cooperative as an eligible partner for financing and multiplies the social benefit of each

<p>no scheme, framework or any supporting mechanism is available, which limits the potential project to almost zero. It is expected that only a few residential installation would be developed without the support scheme in next four years (up to 100 installations with max installed capacity 30 kWp each). The benefit from such installations will go directly to the individual households and will not have a positive social effect to the community. The overall spread of the information about the PV technologies and related issues (technical conditions, permitting procedure, supply chain, operation of the installation) is very low among average villagers.</p> <p>Of these issues, the most significant is the lack of available funding among the forest villagers. The individual household is limited in getting funding from banks, most of the installations connected with the households belonging to entrepreneurs from various sectors who will have enough funding and experience to implement residential PV successfully.</p> <p>Furthermore no special support from the local distribution authority could be expected in case of the grid capacity or other technical problems in case of sole projects in distant regions.</p> <p>It is expected, that only off-grid systems in areas with very limited access to grid or with frequent black outs will expand rapidly due to the need of overcoming these substantial problems.</p> <p>Due to the limited number of installations no need or push on the regional distributing companies will arise to enable innovative approaches in residential PV operation (such as net metering).</p>	<p>installation. Larger projects can be developed (100 – 300 kWp) in this regime; the main limitation would be the technical capacity of the village transforms and the connection to the grid.</p> <p>ORKOY's Credit Programme will be revised and updated to correspond with needs of the cooperative type of installations.</p> <p>A strong framework will be established including a model of contract for installation, pre-negotiated conditions with the regional distribution offices, and the technical analysis of grid conditions.</p> <p>All of these steps and outputs will be intensively and widely disseminated across the regions among forest villagers, regional distribution offices, producers of PV equipment, and suppliers of PV installations. This will increase significantly not only demand on the side of forest villages, but also involvement of the PV value chain to promote their services.</p> <p>The key factor is the availability of funding for the forest villagers. As previously described, the four step approach is planned first as a 100% grant for the pilots, later the partial grant and soft loan combination, with introduction and increasing of the private funding in later phases of the project.</p> <p>As a strong partner, the ORKOY SEFM unit can negotiate with the regional distribution companies the strategy, how to apply the innovative ways of PV operation/accounting for the benefit of forest villages. This activity will enable the wider introduction of such schemes in the national level and will contribute significantly to the PV market development of the country.</p>
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Component 2. Solar PV demonstration Projects

<p>Currently no small-scale demonstration projects have been installed in the regions. The installations, which can be used for lessons learned, are usually large scale (over 1MWp with different permitting procedure) or some residential rooftop installation in urban areas. Therefore there is a lack of resources for education and knowledge building among the forest villages and the existing ones are of different type/scale which doesn't bring required effect in building the familiarity and credibility in the PV technology.</p>	<p>The four pilot sites will be selected for the development of 100kWp installations in a cooperative model. The selection will be made according to the multi-criteria scheme developed by this project. All steps of the construction will be monitored and documented. The video documentation will be prepared and broadcast; the manual how to develop the PV installations for forest village cooperatives will be prepared based on the existing experience. Together with a set of workshops and training (involved cooperatives, PV value chain, banks) these outputs will contribute to the high awareness level and building the familiarity and credibility of the cooperative PV model. The information about the successful pilot projects will be disseminated on regional and</p>
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	national level, all forest villages (21,549) will be reached through the local ORKOY offices.
Component 3. Replication and scaling up – Enhancement of the sustainable energy financing mechanism	
<p>No programme on awareness building focused on solar PV is operated by the ORKOY. The level of solar installations is limited due to the lack of information (permitting procedure, available technologies) and availability of funding for forest villagers.</p> <p>No quality standards focused on small scale domestic equipment are developed, which creates problems with the quality of installed projects not only in core equipment, which is usually in compliance with the international standards, but also with the related technologies (supporting frames and structures, data collection systems, monitoring systems etc.).</p> <p>There are missing conditions for the establishment to PV under ORKOY Credit Programme.</p>	<p>National Awareness building programme will be developed, which will enable effective distribution of information to all of the PV supply chain and other stakeholders. The success stories from the pilot sites will be adopted to demonstrate the technical viability and also the reasonability of the cooperative model.</p> <p>Special focus under this component will be put on the banks and other financing institutions to bring the commercial financing into 3rd and 4th step of the proposed financial model (combination of the soft loan with the commercial financing).</p> <p>The quality standards for the project installations will be developed. This approach will support the regional suppliers' involvement into the scheme and give the preference to quality companies. The awarding ceremony scheme will be developed for the best projects under the SEFM. It will increase the marketing value of the scheme and will help the suppliers also on the market outside the project borders.</p> <p>The installation of at least 30MWp is planned (as described in paragraph 59) by the end of the project which represents 28,750 tonnes of CO₂e being reduced per annum by the end of the project and also approx. 450 new working positions directly for the villagers on the operation of their installations (maintenance, security).</p> <p>The MRV system will be developed under the project to monitor the key indicators of the project. Based on the project development results the plan of activities for the voluntary carbon market will be prepared. It will provide the other options for the scaling up phase and will create the post-project phase more attractive to the other investors.</p>

2.4 Project objective, Components and outputs/activities

2.4.1 Objective, Components and Outputs

69. The objective of the project is to increase the use of grid-connected photovoltaic systems as a sustainable means of generating electricity in the forest villages in Turkey by at least 30 MW by the end of the project. The project will pursue this objective by establishing a Sustainable Energy Finance Mechanism under ORKOY. Component 1 of the project is focused on developing and expanding the policy and institutional framework to promote on-grid, residential solar PV ; Component 2 is focused on demonstrating the technical and economic viability as well as the business

model of the ORKOY sustainable energy financing mechanism for solar PV systems and Component 3 will focus on scaling up and replication at the national level. Activities under Components 1 and 2 will be concentrated in the initial stages of the project, as they will set the stage for the establishment of the PV financial scheme and installation of the pilot sites; under Component 3 during the latter stages of the project (scaling up phase with awareness campaign and capacity building).

70. Different variants of project funding scenarios and combination of the budget resources (GEF/ORKOY/private sector) have been investigated during the PPG phase. Based on the results of this investigation and modeling a 4 step approach in financing of the cooperative PV plants has been developed and is proposed to be used during the project. It calculates with initial fully grant funded pilot installations, high share of ORKOY grant and soft loans in the first and second year and gradual increase of a commercial line of credit in later phases. The detailed overview of the proposed scheme is presented in the following table:

Table 8 Four step scenario for the project financing

Year	No. Installations	Cumulative Capacity	Scenario	Funding	PV Cost/100kWp	Total Cost	Supplier Payment	GEF Grant Funding	ORKOY Grant Funding	ORKOY Soft Loan	Payment of FIT income to Supplier	Commercial Loan/Credit	Repayment ORKOY	Repayment Commercial Loan/Credit
1	4	0 I	100% GEF grants		\$130 000	\$650 000	\$650 000	\$650 000						
2	12	2 I	12.5% GEF grants, 25% ORKOY grants, 62.5% ORKOY soft loans (@1.3%)		\$126 750	\$1 521 000	\$1 521 000	\$190 125	\$380 250	\$950 625				
3	60	8 II	7.5% GEF grants, 25% ORKOY grants, 21.25% ORKOY soft loans (@1.3%) 46.25% Commercial Loan (@6%)		\$123 581	\$7 414 875	\$7 414 875	\$556 116	\$1 853 719	\$1 575 661		\$3 429 380	\$239 107	
4	224	30 III	Deferred Supplier Payment (50,25,25) 25% ORKOY grants, 20% ORKOY soft loans (@1.3%) 22% Commercial line of credit (@5%) 33% FIT income		\$120 492	\$26 990 145	\$13 495 073		\$6 747 536	\$5 398 029		\$1 349 507	\$236 638	\$1 195 536
5							\$6 747 536				\$4 463 334	\$2 284 202	\$234 173	\$1 183 188
6							\$6 747 536				\$4 417 234	\$2 330 303	\$231 715	\$1 170 867
7													\$864 753	\$4 706 299
8													\$2 907 954	\$2 263 944
9													\$3 669 951	
Total						\$36 576 020	\$36 576 020	\$1 396 241	\$8 981 505	\$7 924 315	\$8 880 568	\$9 393,391	\$8 384 291	\$10 519 833

71. It is demonstrated here that it is possible to use the funding of \$1.4m from GEF as grants and part of ORKOY's sustainable energy budget as grants and soft loans to act as an invaluable catalyst for the

project to enable at least 30MW of PV to be installed in forest villages within four years to the benefit of Turkey's poorest communities whilst avoiding 658kt of carbon emissions over the 25 year lifespan of the systems.

72. What is more, once this essential soft-funding has been used to establish and build a protocol between the key participants (ie village cooperatives, banks and PV suppliers), it would be possible to continue the program indefinitely with commercial banks without the need for any further financial subsidies. This would allow the project to expand significantly beyond the 30MW target. For example, if 25% of forest villages were ultimately to enrol, the total installed capacity could reach 539MW, generating 854GWh/yr, avoiding the emission of 517,000tCO₂/yr and providing an effective financial benefit to 1.75m villagers of \$100m each year.
73. The most significant area of inefficiency in the entire project is the compulsion for community schemes to sell generation to the grid, pay distribution fees and then reimport energy at a higher price. Effectively, across the entire scheme, this will represent a monetary loss to the villagers of some \$83m over 25 years, and this loss is effectively absorbed by the electrical distribution companies. The adoption of a community net-metering policy in Turkey would negate this issue and make a significant difference to the impoverished forest villagers and so every effort should be made to work for legislative improvements in this area, although there is likely to be significant resistance to this, not least from the distribution companies who stand to lose this \$83m revenue. What is more though, this kind of activity would help make Turkey a more attractive environment for renewables investments per se and so could help the country deliver on the enormous potential it offers for renewables, especially solar. If Turkey could deliver similar PV capacities as some European countries of similar irradiance levels (ie Italy, Spain and Greece), this would have a significant emissions avoidance impact. For example, if it were able to achieve a similar PV capacity per capita as Italy (~300W/person), this would be equivalent to 22.5GW (cf Germany's 38GW capacity), this would yield ~33.75TWh/yr., satisfy 17% of current national demand and avoid 20MtCO₂ each year.

Component 1. Policy & Institutional Framework for supporting Sustainable energy financing mechanism for solar power in forest villages

74. Component 1 of the project is focused on developing and expanding the policy and institutional framework to promote on-grid, residential solar PV. The first step will involve evaluating and selecting possible public-private business models to provide residential solar PV to forest villagers, with the primary focus on cooperative model. This evaluation will build upon the initial detailed work undertaken in this area during the project preparation grant (PPG) phase in evaluating various business models for financing solar PV in forest villages in Turkey. This will involve collaborating and consulting with all actors in the value chain, including private sector solar PV installers, utilities (transmission/distribution for on-grid connections), domestic banks (lending for solar PV), village end-users and their cooperatives. The incentives of the various market players include: (i) for solar PV installers, making additional revenues as the soft loans should lead to more business; (ii) for the utility, fulfilling a mandated obligation under Turkish law to purchase the electricity under the FiT, (iii) for domestic banks, being able to lend more easily in future and therefore disburse more loans with lower risk assessment thereby enabling the banks to make more money; and (iv) for village end users, benefitting from the economics of the FIT and contributing to the environment. A business model of developing a pipeline of bankable projects for commercial bank financing (without soft loans) will also be explored as technology costs come down and make investment in solar PV more attractive over time.

75. ORKOY, can tailor its financial assistance to the particular business model selected, lending directly or indirectly to the end-user (forest cooperative). The key determinant of ORKOY's terms (interest rate, loan tenor) will be to reduce the financing costs to a level that results in affordable electricity generation from solar PV for the forest villagers. ORKOY's lending will also be evaluated in the context of other financial instruments, including the possibility of rebates and grants. A model contract for the ORKOY soft loans under the financing mechanism will also be developed by legal specialists. Component one will support the expansion of ORKOY's social credit program through revised regulation and methodologies, a new Renewable Energy Financing Unit specialized not only in a phased performance based approach for credit loan disbursements, the development of technical specifications for the grid code for solar PV, but also the formulation of advanced and innovative approach in the running of PV installation (e.g. net metering system) to further establish and support the medium term development of solar PV in Turkey. The outputs and outcomes to be achieved under this component through the creation of an enabling environment within ORKOY for financing of sustainable energy projects in forest villages will be critical for the success of the demonstration projects under component 2 and to enable and ensure the scaling up and replication of the proposed approach and business model. A key outcome of component 1 will therefore be that the institutional, policy, and regulatory framework is in place to enable the Renewable Energy Financing Unit to operate in a sustainable manner, and to provide the soft loans for solar PV systems.

Output 1.1 – Evaluation and selection of public-private business models (ORKOY, solar PV installers, utilities, domestic banks) for provision of affordable, grid-connected residential solar PV to forest villagers, using an individual household and/or cooperative model.

76. This output will provide the clear definition of appropriate business model for the grid connected installations. As it follows from the investigation and meetings with the key stakeholders during the PPG phase, the primary concern will be aimed on the cooperative model of financing. This solution creates from the cooperatives stronger partners for the investors and utility providers. The cooperatives have a strong legal background and long term history within the ORKOY's funding system. The cooperative model also multiplies the social aspect of the project, bringing the benefit from the PV installation to the all community, not only for selected persons. It will create an employment opportunities directly in regions (maintenance, security) with special focus on gender balance (e.g. maintenance services). However, the individual household variant will be further explored by the project team as this solution could be eligible in some of forest villages' localities.

Activities

1.1.1. Evaluation of public-private business models

77. The findings from PPG phase will be evaluated in detail way, the justification for the selected method will be prepared.

1.1.2. Selection of the proper model for provision of grid connected solar PV in forest villages

78. Based on the findings from 1.1.1. the preferred model will be selected. The dissemination materials for verification meetings with stakeholders will be prepared, bilateral meetings with stakeholders will be organized.

Output 1.2 - Terms of Reference for ORKOY's Credit Programme are revised, agreed, published and disseminated

79. The 10th five year Development Plan for Turkey, adopted in 2013, determines the road map for Turkey's development policies until 2018 and aims to achieve a 5.5% increase in Turkish GNP and a 7.2% decrease in the unemployment rate. The 10th five year development plan includes the requirement to develop and enhance incentive tools in order to enable forest villages to enhance their development situation. As a result, the General Directorate of Forestry, Department of Forest and Village Relations (ORKOY), has been operating a financial (credit and grant) mechanism to improve the living conditions of villagers through various means. Currently, ORKOY which has an annual budget of US \$70 million focuses on support for economic development projects, including the social credit programme. In line with the "Regulation of Supporting Activities for Development of Forest Villagers No. 28322 of 2012", the ORKOY social credit mechanism currently provides support, mainly through interest-free soft loans, to individual homeowners for insulation of households and for solar water heaters. The interest-free soft loans can cover up to 100% of the hardware cost. The ORKOY social credit mechanism also has the mandate to lend to village cooperatives. However, while Regulation No. 28322 also calls for an increased use of renewable energy power generation in village communities, the ORKOY programme does not currently include any support with financing renewable energy power generation projects. Therefore amending of the Credit Programme with the possibility to support renewable energy sources utilization, namely PV installations, and its approval by ORKOY is a key stone of the project implementation. After the approval, the ToR needs to be disseminated among all forest villages and other stakeholders.

Activities

1.2.1. Revision and approval of ToR for ORKOY's Credit Programme

80. The existing ORKOY Credit Programme will be evaluated with respect to the proposed model for financing of PV projects for forest village cooperatives under SEFM. The need for amendments and updates will be inspected as the cooperative model of financing is different from the previous experience of ORKOY with funding of solar thermal rooftop installations. Appropriate updates will be suggested and the ToR will be prepared.

1.2.2. Publishing and dissemination of ToR for ORKOY's Credit Programme

81. Dissemination of the new scheme for financing of forest cooperatives PV sites among regional offices of ORKOY and other relevant stakeholders.

Output 1.3 Sustainable Energy Financing Unit established within ORKOY with dedicated full time staff

82. At the moment, ORKOY hasn't the dedicated full time staff to deal with the renewable energy projects. To ensure the successful project implementation, the Sustainable Energy Financing Unit has to be established to manage the project. The team will combine the key experiences related to the matter of this project, particularly the knowledge of the technology of the PV installations, project financing and local banking sector, marketing/communication, and the project management. Detailed requirements and draft of the ToR for the SEFM unit staff are specified in Annex 3.

Activities

1.3.1. Establishment of the team

83. The SEFM team will be appointed. It will be comprised of the project team funded by GEF and two full time ORKOY's loan officers – one with special focus on financing issues, the other one with focus on technical aspects of the installations. The team will be supported by contractual short term

experts – International Solar Technical Advisor, International Marketing Expert, International MRV expert, International Carbon Market Expert, Local Solar Technical Advisor and Local Marketing Expert. The detailed requirements on the team are presented as separate Annex.

1.3.2. Capacity building and trainings on regional level

84. Once the team is activated, it will focus on knowledge sharing and awareness raising about the project, planned steps and changes in ORKOY's Credit Programme among relevant staff in ORKOY's HQ and regional offices. It is crucial for the project success to spread detailed information at a regional level. 20 regional workshops will be organized and dissemination material will be prepared.

1.3.3. Organizing study tours on other PV projects for ORKOY staff

85. To extend the technical understanding of solar PV the study tour on successful PV installations in Turkey and abroad will be organized for 60 participants from ORKOY'S regional offices.

Output 1.4 – Model contract for ORKOY soft loan developed and utilized

86. Based on the results – from outputs 1.1. and 1.2., the model contract for utilizing the ORKOY soft loan will be defined. The condition of the contract will respect the common praxis used within the ORKOY Credit Programme with necessary amendments related to the chosen model (cooperative PV installation). Currently the ORKOY Credit Programme does not sanction additional involvement from other lenders, however, the large scale of the project to be implemented in such a short time scale may well necessitate the inclusion of additional funding assistance e.g. from a development/commercial bank. This option needs to be included in the contractual legislation and, if it is, repayment of this commercial debt should be paid prior to the zero interest ORKOY debt in order to optimise financial efficiency for the villages. Hence a provision for a repayment holiday for the ORKOY debt element needs inclusion. Repayment of debt will come from FiT income, which will be variable depending primarily upon meteorological conditions, hence debt repayments cannot be absolutely fixed. It has also been proposed that PV instalment costs are settled through deferred payments and, if this is achieved, debt will not be required in a single payment, but rather through a line of credit to cover the balance of payments, making it more financially efficient. To reduce the potential perceived risk from third party lenders and some administrative burden upon the village cooperatives, it would be prudent to establish a covenant such that all FiT receipts are paid directly to settle lenders' debt. From a project financing perspective, PV installations in a Feed-in Tariff environment are low-risk. However, third party lenders in Turkey may be reluctant to view PV financing as project finance but rather see it as debt financing. In which case the perceived credit worthiness of village cooperatives may be low, resulting in high interest charges. To address this, a loan guarantee provision from ORKOY could significantly reduce this sense of risk without burdening ORKOY with excessive real liability. With respect to the early schemes, it is proposed that a proportion of installation costs (~10%) are grant funded from the GEF allocation. The outstanding amount will be met by ORKOY soft loans at 1.3% interest for a period of up to 7 years.

Activities

1.4.1. Development of the model contract

87. Development of the model contract for utilizing the ORKOY soft loan. The condition of the contract will respect the common praxis used within the ORKOY Credit Programme with necessary amendments related to the chosen model (cooperative PV installation).

Output 1.5 – National Framework designed and operationalized to use Turkey’s Feed-In-Tariff scheme for the purpose of solar PV for forest villagers

88. The National Framework under ORKOY responsibility will be the main document for successful project implementation and further scaling up among the target groups. It will benefit from all previous project inputs (PPG phase – baseline and financial reports; evaluation and definition of business models; amended ORKOY credit programme and developed model contract) to create clear strategy and instruction to all stakeholders connected in this chain (ORKOY, forest villages and cooperatives, regional utility providers, associations /e. g. Gunder/, producers and project developers). The emphasis will be put on the maximum level of involvement of the local producers and suppliers, however, the current setting of the market doesn’t enable the project developers to use the full scale of the FiT component, which gives advantage to domestic production. It is envisaged, that the number of local suppliers and producers will increase significantly during the project implementation and scaling up phase.

Activities

1.5.1. Design of the National Framework under ORKOY

89. Development and design of the National Framework. It will cover also the identification of eligible villages (natural conditions, average consumption, cooperative presence), field trips, communication of the team with TEIAS/TEDAS local offices and PV equipment producers/suppliers.

Output 1.6 – Technical report on grid capacity and requirements for grid-connected PV installations

90. This output will focus on the technical issues related to the grid-connected installation in the rural areas. The main issues are connected with limited transformer capacities and overall condition of the grid network in target areas. The project team will closely cooperate with the local branches of utility providers and transmission authorities (TEIAS and TEDAS) to deal with this issue, to bring the sustainable solution, and to define technical information for the national grid code.

Activities

1.6.1. Development of the technical report

91. The report focused on the technical issues of the small scale grid-connected PV plants will be developed. This output will be prepared in connection with the output 1.4. (Model contract) to support/explain the technical aspects of this contract.

Output 1.7 – Methodology for innovative approach (e.g. net metering) is developed, published and disseminated

92. The current legislation for community schemes is restrictive and uncertain: Schemes are compelled to connect to grid, sell exports via FiT, pay distribution fees and then reimport for consumption at higher prices. Whilst export prices are fixed, import and distribution fees will be subject to uncertain levels of inflation. The FiT itself is priced relatively low and is of short duration, thereafter there is no certainty over export prices. Collectively this makes such schemes less attractive and less efficient than more innovative approaches. Efforts should thus be made, potentially in collaboration with other interested parties such as GÜNDER and NGOs (e.g. WWF), to improve legislation, particularly for community schemes. In the short-term this could be to improve the above conditions e.g. to index-link/raise FiT, improve domestic FiT certification, reduce/fix/eliminate distribution charges, extend

FiT period, provide guidance/guarantees for post-FiT export prices. For the longer-term, a more equitable arrangement would be to allow community schemes to employ virtual net-metering, administered by the utility/distribution company, whereby villagers are charged only for net consumption calculated by subtraction of generation from collective consumption. This will demand extensive negotiation and planning with all key stakeholders i.e. government, electricity companies, GÜNDER and village cooperatives. A task force will need to plan and coordinate this strategic approach.

Activities

1.7.1. Development of the methodology

93. Based on the investigation during PPG phase, results from the first steps of project implementation, feedback from the forest cooperatives and local electricity distribution companies the innovative methodology with special focus on net metering will be developed.

1.7.2. Approval from key stakeholders

94. As the net metering is a new approach in Turkey and it's prospective implementation will have significant influence on the local distribution companies, all steps within this output need to be discussed and approved by the local distribution companies and other relevant stakeholders.

1.7.3. Publishing and dissemination

95. To enable the communication on the innovative approach implementation the dissemination materials will be prepared.

1.7.4. Organising of study tour for the key stakeholders to get familiar with the foreign schemes using net metering or other innovative methods

96. The study tour for 25 participants on foreign grid systems using net metering will be organised. The detailed programme and focus will be developed by the SEFM unit during the project implementation (year 1) based on the specific needs arisen during the project implementation. The study tour is an important tool how to extend the knowledge and build familiarity with this approach among the key stakeholders.

Component 2. Solar PV demonstration Projects

97. Component 2 of the project is focused on demonstrating the technical and economic viability as well as the business model of the ORKOY sustainable energy financing mechanism for solar PV systems. It is envisaged that demonstration projects in four forest villages in different regions will be carried out. The maximum size of the installation is 100 kW. The demonstration projects should prove both variants of the connection to the grid – via existing transformers, which already supply the energy to the village (typically 100kW with legal reserved capacity for utilization of renewable energy up to 30%, which represents 30kW installation for such equipment) or via a newly installed transformer (without capacity limits, but with increased project costs). The selection of the four villages will be made on the basis of a combination of technical, environmental and financial criteria. Technical criteria will consider the solar irradiation potential of the selected sites, accessibility for the construction and transport, good conditions for grid connection, shading obstacles and orientation of the site with preferred southerly orientation. From an environmental point of view the preferred sites should hardly be utilized for any other purpose. The detailed evaluation of the potential sites and the

selection criteria developed under the project are presented in Annex 9. The designs of the demonstration projects will expressly be selected to test different PV technologies and specifications, as well as different business models and partners (suppliers, construction companies). Overall, these demonstration projects will aim to demonstrate the viability of the business model as a means for scaling up. The estimated GEF contribution for the four demonstration projects is US \$650,000, including US \$130,000 for business plans and feasibility studies. In addition, the private sector matching financing will be provided for the business plans and feasibility studies as well as for the roll-out and expansion of the programme beyond the four demonstrations.

Output 2.1 Business plans & feasibility studies prepared for a total of four demonstration projects in forest villages up to 400kW

98. The four pilot sites from different regions will be selected by the Sustainable Energy Finance Unit in cooperation with ORKOY. The maximum size of the installation is 100 kW. The demonstration projects should prove both variants of the connection to the grid – via existing transformers, which already supply the energy to the village (typically 100kW with legal reserved capacity for utilization of renewable energy on 30%, which represents 30kW installation for such equipment) or via a newly installed transformer (without capacity limits, but with increased project costs). After selection of the pilot sites the feasibility studies including business plans will be prepared by the project team. This activity will involve a detailed evaluation of the local condition of each site (technical, environmental and financial as described above). The communication with local offices of ORKOY, TEDAS and TEIAS will be crucial at this point for the successful implementation of the pilots. The optimally and technically feasible solution for each locality will result from such multi level communication, where especially TEDAS will have the main role in the definition and confirmation of the feasibility of the selected technical solution. For detailed design it is expected that the project team in cooperation with the involved cooperative representatives will manage a procurement process in line with UNDP and GEF rules and regulations. The priority will be given to the technical proposal with maximum level of domestic production. This approach will on the one hand guarantee the maximum financial benefit due to the advantageous FiT for domestic suppliers and on the other hand enable the expansion of the local PV market (in terms of further scaling up during next phases). Apart from the technical quality criteria, the delivery time will be evaluated as a key parameter as the timely finalization of the pilot sites is very important for further scaling up phase.

Activities

2.1.1. Selection of the 4 pilot sites

99. The selection of the four villages will be made on the basis of a combination of technical, environmental and financial criteria. Technical criteria will consider the solar irradiation potential of the selected sites, accessibility for the construction and transport, good conditions for the grid connection, shading obstacles and orientation of the site with preferred southern orientation. From an environmental point of view the preferred sites should hardly be utilized for any other purpose. Financial criteria will relate to the ability of the forest villagers to provide co-financing for the demonstration projects. Detailed criteria are presented as Annex 9. However, the amount of overall co-financing that can be expected to be provided by the villages can be calculated on the basis of \$1.6 million USD which represents the cost of administrative, maintenance, and technical staff for solar PV installations. As the money from ORKOY will be provided to forester villagers as soft loans (\$45 million) then it could also be considered as a co-financing contribution from the forest villagers to the project.

2.1.2. Development of business plans for the 4 pilot sites

100. The business plans with focus on financial aspects will be prepared for each pilot site.

2.1.3. Development of feasibility studies for the 4 pilot sites

101. The feasibility study with focus on technical aspects will be prepared for each pilot site.

2.1.4. Organizing of 4 workshops for stakeholders

102. Four workshops for stakeholders will be organized in the regions where the pilot sites will be located. These workshops will summarize and evaluate the preparatory phase of the pilot sites implementation. The important feedback will come from the competent permitting bodies about the course of the permitting procedure

Output 2.2 – Four demonstration projects successfully implemented in forest villages in 4 different regions.

103. The implementation phase of the pilot projects will be driven by the SEFM unit, namely through its technical specialist. The procurement procedures for supply and installation of 4 pilot PV systems will take into account after sales services, not only repair and maintenance services but also operation support, through detailed technical and administrative specifications of the procurement documents in accordance with applicable legislation in Turkey. After sales services for 4 pilot PV systems will be realized by the contractor in line with procurement documents. The SEFM unit will monitor and control the installation in close cooperation with the cooperative representatives. All emerged technical problems or other obstacles will be monitored and documented by the SEF unit. As a result of this output, 4 grid connected PV installations up to 100 kWp will be put into operation, each representing a different region, a different technical solution (connection via existing transformer, creating the new grid connection) and different suppliers. The maximum variability of the mentioned project conditions is important for the risk mitigation, further promotion and dissemination and scaling up of the project.

Activities

2.2.1. Review of project documentation

104. The project documentation (developed by the contracted suppliers) will be evaluated and approved by the SEF unit (under leadership of the International solar technical advisor).

2.2.2. Installation of 4 pilot projects

105. Four pilot PV installations up to 100 kWp will be implemented in the selected locations.

2.2.3. Construction monitoring and verification

106. During the entire construction phase the process will be monitored on regular basis (at least once a month) through a site visit carried out by the SEF members. The construction will be monitored and documented on compliance with the proposed documentation. This output will be coordinated with the works on Output 2.4. Video documentary.

2.2.4. Organization of trainings for 4 involved cooperatives

107. To increase sustainability of this step the training workshops for involved villagers and cooperative members will be organized. The workshop will be focused on both financial aspects and benefits to the community/cooperative members and technical aspects of the plant operation. The trainings will also focus on sharing benefits to be provided by electricity production to detail who and how to share revenue among members, in line with current cooperative/village entity related legislations.

Output 2.3 – Case Studies Prepared on each of the Demonstration Projects

108. The SEFM unit will prepare the case study for each of the demonstration project. These studies will highlight the specific conditions of each locality and selected technical solution. Such examples will be used further for the awareness, dissemination and training purposes in the Component 3 phase. Therefore it is very important to learn from the problems or obstacles emerged from the pilot stage. The set of four different case studies will enable easy communication and involvement of other forest village cooperatives, producers, suppliers, investors and the local utility providers as well during for the scaling up phase.

Activities

2.3.1. Preparation of case studies for the 4 pilot projects

109. Based on the experience from the implementation of the pilot projects the case study will be prepared for each pilot project. This material together with the video documentary will be the main tool for further awareness building among the stakeholders and cooperatives/forest villagers.

2.3.2. Preparation of the Guide for the cooperative type of investors based on pilot sites experience

110. Based on the experience from the implementation phase of the pilot projects the guide describing how to implement the PV project under SEFM for forest cooperatives will be prepared. It will describe all phases of the process (contact with ORKOY SEFM, establishing of cooperative, tendering of suppliers, contracting with suppliers and regional electricity providers, implementation and scheme for sharing of benefits among cooperative members.

2.3.3. Organizing of the 20 workshops for stakeholders

111. Twenty regional workshops for stakeholders will be organized to demonstrate the success stories of the pilot sites across the regions.

Output 2.4 – Short video documentary prepared on the demonstration projects

112. For further dissemination and awareness purposes, the video from all construction stages and of formal opening ceremony will be taken for all projects. The final document will be used for training and dissemination activities within Component 3. The works on this output will be managed by the marketing specialist of the SEFM unit. The key message of this information tool will be to show technical viability of the proposed approach and the availability of the Sustainable financing unit, its utilization in different regions and natural conditions for projects with various sizes and technical solutions.

Activities

2.4.1. Preparation of video documentary

113. The video documentary will be made during all the pre-operational, construction and operational phase. It will be comprised of the services of the external supplier (video studio, document preparation, output format production /including DVDs/ and the broadcasting in the national and regional media.

Component 3. Replication and scaling up – Enhancement of the sustainable energy financing mechanism

114. Component 3 of the project will focus on scaling up and replication at the national level. ORKOY's sustainable energy finance mechanism will be promoted at the national level through a national awareness campaign which will aim to raise significantly awareness among village communities of the benefits of the soft loans provided under the mechanism. This campaign will be coordinated with solar PV installers, commercial banks and utilities, as necessary depending on the business models selected, to provide a coherent and coordinated information to consumers. The reason why commercial banks are important is that the ORKOY soft loan programme on its own will not be large enough to cover the hundreds of millions of dollars of financing requirements that will be needed to replicate the business model to forest villagers all over Turkey. Over time, as technology costs of solar PV come down and as financing costs will fall it is expected that commercial bank lending will also be attractive for small scale solar PV. Commercial bank lending will also benefit from the track-record and data on performance of solar PV that will be generated by the project. With reduced levels of project risk following the barrier removal and capacity building activities of this project, the ability of banks to lend for solar PV systems will be increased. A solar PV training manual covering both technical and financial aspects of solar PV financing will also be prepared for banks, solar PV installers, forest villagers, and utilities and will be presented at 20 workshops around the country designed to build capacity to implement projects. The workshops will also present the ORKOY sustainable energy programme to all key stakeholders in the value chain such as commercial banks, PV installers, utilities, and forest villagers and the workshops will focus on practical steps how to develop, finance, and implement a solar PV project in a forest village in Turkey. The ORKOY programme will be presented throughout Turkey as a means of raising awareness and building knowledge about both the technical and economic aspects of the ORKOY programme. Workshops will also be targeted at commercial banks in Turkey, building their familiarity with residential solar PV in order to start to establish longer-term private sector lending. In addition, component 3 will design MRV systems and indicators which will be used to help track GHG emissions at the national level. The GEF support, which includes support for an international MRV expert, will be used to help expand the ORKOY Sustainable Energy Financing Mechanism to the national level which will include a support for strengthening and expanding the financial support mechanism of soft loans as it has been demonstrated under component 2 with the target by the end of the project of 30MW. The key outcome from component 3 is that the ORKOY sustainable energy financing mechanism has proper systems for quality assurance, testing, and MRV in place and that the programme has been expanded so that it brings benefit to at least 2.5% of all forest villagers in Turkey (approx. 175,000 individuals) by the end of the project.

Output 3.1 National Awareness Raising Programme for ORKOY Sustainable Energy Financing Mechanism addressing forest village end-users and cooperatives

115. The National Awareness Raising Programme (NARP) will be the main tool which will help to overcome one of the identified barriers – lack of awareness among the end users – forest villages and cooperatives. The key information channel is the regular communication of local offices of ORKOY with the village representatives. The NARP will put together all important information and will be based on the following components (basic description of legislation context with special focus on FiT mechanism and its utilization for the benefit of project investors/owners; financial background of the SEF, with the highlighted role of the SEF soft loan for an easy implementation on the cooperative level; technical issues; producers availability and the key information about information contact points). The local ORKOY offices will distribute the NARP to all villages through their common information channels (web page, official announcement, direct communication). The awareness and following interest of the end users is the key stone for the successful implementation of the project.

Activities

3.1.1. Development of the National Awareness Raising Programme for ORKOY SEFM

116. The NARP will be developed based on the experience, data and products from the previous outputs. The strategy for the next steps will be prepared including the outputs planned to carry out under this component.

Output 3.2 – Solar PV Training Manual for actors in solar PV value chain (ORKOY officials, installers, utilities) on how to develop, finance, and implement solar PV projects is prepared, published and disseminated widely

117. The Solar PV Training Manual will be prepared and published to provide comprehensive information about all phases of the development process. It will summarize the basic information about the natural conditions; the legal framework including the support of the utilization of renewable energy sources through the FiT; how to provide the loan from ORKOY SEF; the current status of available suppliers and finally the experience from successful pilot installations within this project. This material will be widely distributed to all levels of the PV chain (ORKOY and its local offices, utilities, PV installers). The International Solar Energy Society – Turkey Department (GÜNDER) will assist with the dissemination and involvement of PV producers and installers.

Activities

3.2.1. Development of training manual

118. The training manual will be developed to summarize all key information and feedbacks from the previous phases of the project for the PV value chain and wider group of interested stakeholders and other entities.

3.2.2. Publishing and dissemination of training manual

119. The manual will be published and widely disseminated. The cooperation of the International Solar Energy Society – Turkey Department (GÜNDER) will be favorable at this stage. This output is closely connected to output 3.3.

Output 3.3 – Twenty National workshops held to promote the solar PV training manual targeting solar PV value chain (ORKOY officials, installers, utilities)

120. Twenty workshops will be held under management of SEF unit at regional offices of ORKOY and other suitable places to promote the Solar PV training manual and disseminate information about the project. The information from the manual will be supported by video presentation from pilot sites created within output 2.4. To support the key message also other stakeholders will be involved in the presentation (GÜNDER, local TEDAS etc.)

Activities

3.3.1. Development, printing, and dissemination of training toolkits

121. Development, printing and dissemination of training toolkits for the National workshops will be carried out.

3.3.2. Organization of 20 National workshops

122. The twenty National workshops will be held to provide excellent and comprehensive information about the successful project implementation and opportunities related to the scaling up phase with the support of the involved key stakeholders.

Output 3.4 – MRV system and indicators designed and implemented to reliably track energy consumption

123. The monitoring, reporting and verification system will be developed and implemented to enable continuous monitoring of the key indicators of the project. This will be managed through the system of periodic reports (quarterly, annually), site visits and meetings of the project steering committee, which will be established as a project coordination and decision making body. The key indicators will consist of kWp installed; kWh produced; tons CO₂ spared; number of installations, number of directly influenced cooperative members and forest villagers.

Activities

3.4.1. Setting MRV framework for the SEFM under ORKOY

124. The proper monitoring, reporting and verification system will be developed under leadership of the International MRV expert to enable continuous monitoring of the key indicators of the project.

3.4.2. Selection and modeling of carbon accounting methodology

125. The MRV system will be implemented.

Output 3.5 – Quality standards and certification scheme designed and implemented for solar PV hardware and for skilled technicians

126. The quality standards and project certification scheme will be developed by SEF unit under the leadership of the PV technical expert to enable maximum involvement of domestic producers. The standards will incorporate the current technical level of the worldwide available PV equipment and the Turkish legal framework including the support of domestic producers to maximize the positive effect on the growth of the local PV market. The SEF unit will closely cooperate with GÜNDER and TEDAS to utilize their technical knowledge as well as their impact on the local market. To multiply the commercial effect of such a scheme, the quality certification will be developed which enable an easier selection process of suitable technology suppliers for the end users.

Activities

3.5.1. Evaluation of the quality standards used in the PV sector

127. The quality standards used in the PV sector (international and national) will be evaluated.

3.5.2. Development of the quality standards for SEFM under ORKOY

128. Based on the evaluation under previous activity the quality standards for the ORKOY's SEFM will be developed with special focus on support of quality domestic producers. The cooperation of the local producers and GÜNDER will be necessary at this level.

3.5.3. Development of the certification schemes

129. To increase credit of the successful installers and suppliers under ORKOY'S SEFM, the certification scheme will be developed. This scheme will improve the connections with the PV supply chain and the marketing value of their involvement in the project. The annual awarding ceremony for the best projects will be organized. The output will be managed in cooperation of the technical and marketing staff of the SEFM team. It comprises also marketing/graphics services for production of the certificates and related items.

Output 3.6 – Workshops with domestic and international banks to consult, build familiarity, and integrate their lending to solar PV with ORKOY

130. Workshops with all potential investors (local and international banks, international development organizations, international finance institutions IFIs) will be organized by SEF unit to integrate interested banks and other organizations into the scaling up phase to reach the expected level of 30MW installed on grid PV in forest villages. The workshops will be based on success stories with the pilot projects, continued scaling up and financial figures of already installed projects. 10 workshops will be organized during the 2nd year of the project.

Activities

3.6.1. Development, printing, and dissemination of training toolkits

131. Development of the training toolkits with focus on financial aspects and benefits of the scheme.

3.6.2. Organization of workshops

132. Organization of 10 workshops focused on the potential investors and including their regional staff. It is recommended to join some important event (International Renewable Energy fair held in Turkey etc.) for one of the events to maximize the impact of this activity.

3.6.3. Cooperation with involved banks and integration of their fund into SEFM

133. This activity will be the follow up phase of the workshops, focused on integration of the interested local and international banks and development organizations into the SEFM scheme. The details of such cooperation need to be clarified during project implementation and approved by ORKOY.

Output 3.7 – Project Website – Practical Guide to Investing in Solar PV in Turkey with a focus on forest villages

134. The project website will be created immediately after the start of the project. The marketing expert of the SEF unit will be responsible for its development. All related project information will be published here to enable a wide knowledge about the project. The project materials will be published on the webpage, consisting of the pilot site video documents, developed training manuals, quality standards and awarded certifications, etc.

Activities

3.7.1. Development of the project website

135. The website will inform about all steps carried out under the project. The project outputs (tools, materials, video spots) will be published through the site. The activity includes also related services (web hosting, graphics, programming).

Output 3.8 – Programme of Activities (PoA) for voluntary carbon market forest villages solar PV project

136. The Programme of Activities (PoA) for the development of the voluntary carbon market for the forest villages PV project will be developed. The options to be explored and evaluated to support development of the voluntary carbon market will include i.e. 1) capacity building to help create enabling legal and regulatory environment, 2) demonstration of the technical and financial viabilities of technologies, 3) partial risk guarantees and contingent financing.

3.8.1. Development of the PoA, including development and validation of Project Design Document (PDD)

137. The development of the PoA PDD will be led by the International carbon market expert and one the PDD is ready to be validated.

Output 3.9. 30 MW of Solar Projects successfully implemented

138. The majority of the Solar PV installations will be developed under this output (up to 30 MW). The implementation of the project will be managed according to the proposed financial steps (see details in section 2.4.1.) to continuously increase level of commercial funding to provide sustainability of the proposed scheme.
139. The PV project implementations will benefit from the knowledge built and all tools and outputs developed during the project implementation under Components 1 and 2. A four step approach in financing of the cooperative PV plants has been developed and is proposed to be used during the project. It calculates with initial fully grant funded pilot installations, high share of ORKOY grant and soft loans in the first and second year and gradual increase of a commercial line of credit in later phases

2.4.2 Global, National and Local Benefits

140. The project will create provide measurable global benefits through the installation of 30MWp of grid-connected Solar PV systems in the forest villages in Turkey. This installed capacity is expected to produce approximately 47,520 MWh of electricity annually; replacing an equal amount of fossil fuel based electricity production, and directly reduce CO₂ emissions by approximately 28,750 metric tons per year. For the lifetime of the system (20 years), there will be a total reduction of 575,000 metric tons CO₂. In addition to these direct benefits, the project will facilitate additional installed capacity of grid-connected PV systems during scaling up phase after the project (300MWp). Using the GEF bottom-up approach for indirect emissions reductions and a replication factor of 2.5, it is estimated that total emissions reductions would be 1,437,480 metric tons of CO₂. Alternatively, using the GEF top-down approach for indirect emissions reductions, with estimation that further 3000 project installations with average capacity of 100 kWp will be installed in 10 years post project period (it represents 13,9% of involved villages with total installed capacity of 300MWp) and a GEF causality factor of 80% (where the “GEF contribution is dominant, but some of this reduction can be attributed to changes in the baseline”), the total emissions reductions would be 4,599,936 metric tons of CO₂. A more detailed description of GHG emissions calculations is provided in Annex 6.
141. Development of the renewable energy sector in forest villages will have also national benefits for Turkey. Due to its focus on regions distributed across all the country including less developed rural

areas of the country, the project will help to diversify energy production, improve energy security in such regions. Moreover the project will produce more employment in local small and medium enterprises (SME) through labour required for marketing, installing and maintaining the systems. On national level the project will contribute to the growth of the capacity of local producers of the equipment (modules, inverters, supporting structures). Finally, solar PV systems and other RETs that replace fossil fuel power generation at large power plants will reduce air and noise pollution and thereby benefit human health and well-being.

2.5 Key indicators, risks and assumptions

2.5.1 Key Indicators

142. Key indicators of the project's success include:

- Direct reduction of GHG emissions by 575,000 tons of CO₂eq by end of project
- Estimated indirect reduction of GHG emissions of at least 1,437,480 tons of CO₂ on the basis of a replication factor of 2.5 and a 20-year projected life for equipment
- Sustainable Energy Finance mechanism under ORKOY established and fully operational by the end of the project
- 300 forest villages involved in the project
- Construction of 30 MWp of grid-connected PV systems completed by end of the project, generating 47,520 MWh of electricity per year

143. Detailed indicators are provided in the Project Results Framework in Section 3.

2.5.2 Risks

144. Table below shows summary of risks and mitigation actions, further details on these risks, together with related mitigation measures, are presented in the "Offline Risk Log" in Annex 1.

Table 9 Risk and mitigation actions summary.

Risk	Mitigations
ORKOY loan mechanism is not sustainable and the willingness of forest villagers is low.	<ul style="list-style-type: none"> - ORKOY will be carrying on its finance program according to the laws - Government's action plan for 2014-2018 on Energy Development Program Depending on Domestic Sources states to undertake solar energy implementations in a shorter term and in an intense way. - Pilot demos and awareness raising program built on ORKOY's previous experience will increase the attractiveness of the solar PV applications.
The climate change phenomenon is affecting the project activities and success.	<ul style="list-style-type: none"> - Climate change's effects are not expected to affect the renewable energy situation in a negative way in Turkey. Rather it can further trigger the demand for energy that is also related with renewable energy.
Technical and capacity risks for ORKOY central and regional staff that are key to implementation and generalizing	<ul style="list-style-type: none"> - Project will implement series of training and capacity building activities targeting ORKOY staff. The pilot demonstrations will be increasing the capacities of ORKOY staff that are working in 4 different regional directorates of General Directorate of Forestry. Furthermore, several training programs will be executed by the project on project design for solar PV, monitoring, maintenance, evaluation, regulations regarding electricity generation etc.

Risk	Mitigations
the solar PV in forest villages.	
Environmental and social risks of solar PV instalments and electric generation.	<ul style="list-style-type: none"> - The average project sizes will be less than 100kW with relatively minimum effect on habitats. - The criteria for ORKOY support for solar PV will include no harm to nature. - UNDP's Social and Environmental Screening Procedures (SESP) will be implemented during the project execution.
Increased dependence on natural gas will lead to less demand for renewable energy.	<ul style="list-style-type: none"> - The Government of Turkey wants to achieve security of energy supply and wants to reduce its dependence on imported oil and gas. New laws to promote and support renewable energy and a stated national target of 30% renewable by 2023.
Co-financing does not materialize	<ul style="list-style-type: none"> - As the main beneficiary of the project, the ORKOY will contribute to the project with an amount of 45m USD through its loan mechanisms. GEF will contribute \$1.4 million and forest villagers might be expected to contribute around \$1.6 million USD of in-kind contribution for technical staff, administrative staff, and maintenance staff for solar PV systems. ORKOY funding for its Credit Programme for the next three years is already approved. The release of funding depends on the demand by forest villages and this risk is already addressed above.
Lack of financial support in the solar PV market for small-scale projects by banks.	<ul style="list-style-type: none"> - Currently DenizBank is providing solar PV credits for companies and they expressed their willingness to support cooperatives, too. Moreover, Ziraat Bank, a public bank in Turkey is also open to support cooperative with low interest credits and also with other specific options. Banks' willingness in this area can even grow further. Project is planning a series of activities targeting that.
Application process is complex and long.	<ul style="list-style-type: none"> - During the project preparation phase this issues has been discussed among various stakeholders and it is agreed to ease the process for forest villagers through a protocol between TEDAS and GDF. - Moreover, TEDAS is working on several new approaches to ease the application process for small-scale solar PV applications.

2.5.3 Derisking

145. This project has been developed to be consistent with the Derisking Renewable Energy Investment methodology, as published by UNDP in March 2013 (see http://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/derisking-renewable-energy-investment). While policymakers can use a range of different instruments to address renewable energy investment risks and their underlying barriers, certain types of instruments have achieved greater prominence than others and are often referred as 'cornerstone instruments'. A cornerstone instrument targets key investment risks and is the foundation upon which all complementary policy and financial derisking instruments are built. Usually, cornerstone instruments are supplemented by a number of policy and financial derisking instruments to address residual investment risks. Policy derisking instruments seek to remove the underlying barriers that are the root causes of risks. These instruments include, for example, support for renewable energy policy design, institutional capacity building, resource assessments, grid connection and management, and skills development for local operations and maintenance (O&M). Financial derisking instruments do not seek to directly address the underlying

barriers but, instead, transfer the risks that investors face to public actors, such as development banks. These instruments can include, for example, loan guarantees, political risk insurance (PRI) and public equity co-investments.

146. This project is based on Feed in Tariff as a cornerstone instrument. FiT, as defined in the law no. 5346 “Utilization of RES for the Purpose of Generating Electrical Energy”, provides market access to the grid and a guaranteed price over a period of 10 years. The Public derisking instruments considered in the project represents the long-term energy targets of the Government of Turkey; planned streamlining of the permitting procedure for the forest villagers (based on the planned agreement between ORKOY and TEDAS) and improved O&M skills of the chain members provided through the awareness and capacity building activities of this project. As the financial derisking instrument the diversification of the project funding among other interested investors (such as AFD, Ziraat Bankasi) is considered, together with the soft loan system, which enable easy-implementation environment for the forest villagers and their cooperatives. Detailed financial plan including various scenarios is provided as Annex 8.

2.5.4 Assumptions

147. The assumptions are outlined in the Project Results Framework in Section 3.

2.6 Financial modality

2.6.1 Justify the type of financing support provided with the GEF resources

148. The GEF funds will be used for developing and implementing of the SEFM under ORKOY’s Credit Programme, amending legal and policy frameworks; for carrying out capacity building and awareness activities necessary to enable the adoption and replication of grid-connected cooperative PV systems and the strengthening of a Solar PV market in the regions; and for installing and operating demonstration PV systems. The proposed project is requesting grant money for both technical assistance and investment; approximately 37% of GEF funds will go directly towards investment in several pilot solar PV systems. The great majority of the funds for the implementation of the PV systems of totally 30 MWp installed power will come from governmental (ORKOY) co-financing. The transfer of GEF funds through the financial mechanism will be conditional on the verified installation and active operation of the forest cooperatives PV systems, so that GEF funding can directly be attributed to reductions in GHG emissions. As such, GEF funds will support activities that are incremental to the existing baseline.

2.7 Cost-effectiveness

149. The proposed project activities to promote the installation of solar PV systems in the forest villages represent the most cost-effective opportunity for ORKOY to significantly increase renewable energy production in forest villages.
150. The initial assumption is that over 2.5% of all forest villages in Turkey should be able to benefit from the ORKOY soft loans and planning to install or have installed 30MW of solar PV systems by the end of the project resulting in approximately 28,750 tonnes of CO₂e being reduced per annum by the end of the project or shortly thereafter. Over a 20 year lifetime of the solar PV systems this works out to approximately 575,000 tonnes of CO₂e reduced (28,750 x 20 = 575,000) which represents approximately US \$6.57 of GEF money spent per tonne of CO₂ reduced which, if achieved, is a highly cost-effective number.
151. In addition to these direct benefits, the project is expected to “jumpstart” the market for grid-connected PV systems in the regions. The demand for turnkey developers of the PV projects and

operation, maintenance and servicing companies will grow in line with the number of project installations.

Table 9 Project GHG emission reduction impacts

Particulars	Direct: Project (20-year equipment life)	Direct: Post-Project	Indirect – Bottom Up: Post-project with replication (GEF Replication Factor of 3)	Indirect – Top Down: (GEF Causality Factor of 80%)
Installed PV (MW)	30	100	75	30 – 300
Total CO ₂ emissions reduced (tons)	574,992	1,914,723	1,437,480	4,599,936
CO ₂ emissions reduced (tons) per GEF \$ (GEF Budget of \$3,780,000)	\$6.57	\$1.97	\$2.63	\$0.82

2.8 Coordination with Other GEF Agencies, Organizations and Stakeholders

152. There are several projects in the renewable energy and forestry sectors. One of those projects are funded by the GEF while others are by EC, JICA, IFAD, and EBRD. The related projects with cooperation porability on dissemination strategy are presented in Table 8 below.

Table 10 Related projects and coordination activities

Integrated Approach to Management of Forests in Turkey, with Demonstration in High Conservation Value Forests in the Mediterranean Region of Turkey (aka IFM Project)	This GEF funded full-scale project aims to ensure multiple benefits of forests focusing on climate change mitigation, biodiversity, and sustainable forest management benefits at landscape level. Capacity building activities and a database on MRV and NAMA for forestry sector will help ORKOY to establish MRV and in future if and when Turkey becomes eligible, then also a NAMA for a sustainable energy financing program for solar PV in forest villages in Turkey. This will assist component 1 of this project. The IFM project, working closely with ORKOY finance unit, will direct ORKOY's fund to 1,100 families for solar water heating system (net benefit up to 13,038 tCO ₂ /y), will augment ORKOY's involvement to the project implementation phase. Same representatives of the UNDP and the Ministry of Forestry and Water Affairs on Project Steering Committees of both projects will ensure coordination between the two projects.
Murat River Watershed Rehabilitation Project	The project, funded by IFAD, is being implemented throughout Murat River Basin in Elazığ, Muş and Bingöl provinces with 25 micro-basins. The project goal is to stop natural resources degradation and contribute to the poverty reduction in the region. Forest villages are one of the key target groups of the project and ORKOY has a key implementation role in the project. One of the project pilot provinces is Elazığ that is also the demonstration site of the solar PV project. As ORKOY has a key role in the project, establishing the coherence between two projects will be ensured in order to maximize the efficiency.
Çoruh River Watershed	Çoruh River Basin, funded by JICA, is located in the north east of Turkey and covers a region of greater than 2 million hectares. Project

Rehabilitation Project	<p>aims to</p> <ul style="list-style-type: none"> * Provide integrated watershed rehabilitation including vegetation, soil and water resources * Better living conditions for the rural population * Soil conservation * Rehabilitation of degraded forests. * Prevention of natural disasters (avalanche, flood and overflow control) <p>The project is lead by Ministry of Forestry and Water Affairs in partnership with Ministry of Food, Agriculture and Livelihood. Some of the project activities will contribute to the solar power panels in order to reduce the use of fossil fuels. As ORKOY plays a key role in this project lessons learnt from this project can contribute to the solar PV project.</p>
European Climate Foundation/ GÜNDER Development of advocacy, lobbying and campaigning constituencies on solar power to develop alternative supply narrative	<p>Project objective is to develop political will to scale up electricity production from solar power through lobbying, advocacy, campaigning and constituency building to develop alternative supply debate that would eat in coal. Key project activities are:</p> <ul style="list-style-type: none"> - Fact sheets and briefings on costs, subsidies, domestic production, development and employment angles of solar economy, - Briefings on financing to solar in comparison to fossil fuels, - White papers in collaboration with sector representatives on legal barriers on solar.
Horizon2020/GÜNDER PV financing	<p>GÜNDER, one of the members of the implementing consortium, lead the project. The goal of the project is to help stakeholders with the implementation of PV projects based on the new business models while using various equity financing schemes. In addition, cost of debt financing shall be reduced through educating commercial banks and insurance companies on the business models and their risks. Project implementer GÜNDER is one of the key stakeholders of the Solar PV project. The project has a direct links with the Solar PV project in terms of investigating finance of solar PV.</p>
Air Pollution and Climate Secretariat / European Climate Foundation Renewable Energy Pillar of WWF-Turkey's Work	<p>Program's objective is to scale up the use of renewable energy in Turkey in order to meet the twin goals of ensuring energy security and climate change mitigation. Primary Activities:</p> <ul style="list-style-type: none"> - Research & analysis: (i) on the future outlook of Turkey's power markets and energy mix, (ii) on employment potential of renewables. - Awareness raising and communication activities. - Coalition building among environmental NGOs and between renewables energy industry and NGOs. - Lobby work for scaling up renewables in power generation (especially solar and wind)
EBRD TURSEFF	<p>Turkey Private Sector Sustainable Energy Finance Facility - Credit lines will be provided by EBRD to eligible commercial banks for on-lending to private sector borrowers for energy efficiency ("EE") and small-scale renewable energy ("RE") investments. The influence on</p>

	the small-scale RE produces would be multiplied in cooperation with this project.
EBRD TUREEF	TuREEFF (Turkish Residential Energy Efficiency Financing Facility) is a programme developed by the EBRD (European Bank of Reconstruction and Development) and supported by CTF (Clean Technology Fund) and the EU (European Union) that aims to provide finance to residential consumers who wish to invest in Energy Efficiency projects in their homes.

2.9 Sustainability

153. As the ORKOY soft loan program will continue beyond the lifetime of the project, it is expected that the results of this project will be sustainable. In the near to medium term, the widespread adoption of solar PV systems in forest villages in Turkey will depend on the availability of financial incentives and mechanisms to reduce system costs, in particular the costs of capital equipment. In recognition of this, significant efforts were carried out during the PPG phase to secure long-term financing partners and funds for PV installations in forest villages. This program is expected to become operational in 2016 and to continue beyond the end of the proposed GEF project in 2019 with an open-ended timeframe, thanks to the legislation about ORKOY funds. Additionally, the existing legislation enables ORKOY to extend funding levels for this program based on the level of demand in the forest villages. Beside government support, The Agence Française de Développement (French Agency for Development – AFD, a public development finance institution working to fight poverty and foster economic growth in developing countries) and Ziraat Bankası expressed their interest in the programme and can bring additional funds for successful continuation of the programme after the project period.
154. The market-based approach taken by the project also will contribute to financial, and institutional, sustainability within ORKOY. By promoting the development of a market value chain (suppliers, service companies, technicians, financiers), the project is designed to help establish self-sustaining mechanisms for adoption and operation of solar PV systems in rural regions.
155. With the project focus on the cooperative model of the PV ownership, the internal relations among villagers will be strengthened. This principle will bring more employment (maintenance, security), financial benefits and higher social status for the members and thus the sustainability of the project is going to be ensured.

2.10 Replicability

156. The potential to replicate installed capacity of solar PV systems throughout the forest villages is high because over time capital costs for solar PV systems should continue to come down, bureaucratic licensing procedures should become easier, and readiness of the local market should increase. In terms of available sites / capacity, there is significant potential for additional grid-connected PV systems among 21,549 villages and 7.3 million inhabitants. The PV market in the country will grow in the future years mainly because of the development of the large-scale projects invested by the multinational corporations, but partly also in the small-scaled household or village installations.



3 PROJECT RESULTS FRAMEWORK

<p>This project will contribute to achieving the following Country Programme Outcome as defined in the 2011 – 2015 CPD for Turkey</p> <p>Outcome 3: Strengthening policy formulation and implementation capacity for the protection of the environment, and cultural heritage in line with sustainable development principles and taking into consideration climate change and disaster management</p> <p>Country Programme Outcome Indicators: Reductions in the level greenhouse gas emissions.</p> <p>Primary applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): 1. Mainstreaming environment and energy, and 4. Expanding access to environmental and energy services for the poor.</p> <p>Applicable GEF Strategic Objective and Program: Climate change objective3: To promote investment in renewable energy technologies</p> <p>Applicable GEF Expected Outcomes: 3a Appropriate policy, legal and regulatory frameworks adopted and enforced; 3b Sustainable financing mechanisms established and operational; 3c GHG emissions avoided.</p> <p>Applicable GEF Outcome Indicators: 3a Extent to which EE policies and regulations are adopted and enforced; 3b Volume of investment mobilized; 3c Avoided GHG emissions from on-grid PV electricity generation (tons CO₂/MWh); and \$/t CO₂.</p>					
Strategy	Indicator	Baseline	Targets	Source of Verification	Assumptions
<p>Project Objective: To support the successful launching of a sustainable energy financing mechanism within the ORKOY credit mechanism to ensure that there is at least 30 MW of installed capacity of grid-connected, residential solar PV in forest villages in Turkey (approximately 2.5% or 175,000 people living in forest villages will have their electricity needs met by solar PV) by the end of the project</p>	<ul style="list-style-type: none"> Amount of reduced CO₂ emissions from the power sector (compared to the project baseline) by end of project, tons CO_{2eq} 	<ul style="list-style-type: none"> 0 	<ul style="list-style-type: none"> 28,750 	<ul style="list-style-type: none"> Project's annual reports, GHG monitoring and verification reports 	<ul style="list-style-type: none"> Continued commitment of project partners, including Government agencies and investors / developers
	<ul style="list-style-type: none"> Cumulative installed capacity of grid-connected PV systems (kWp) 	<ul style="list-style-type: none"> 0 	<ul style="list-style-type: none"> 30,000 	<ul style="list-style-type: none"> Project final evaluation report 	
	<ul style="list-style-type: none"> Cumulative total electricity generation from installed grid-connected PV systems (kWh/year) 	<ul style="list-style-type: none"> 0 	<ul style="list-style-type: none"> 47,520,000 	<ul style="list-style-type: none"> Post project market monitoring and evaluations 	
	<ul style="list-style-type: none"> Cumulative number of created job positions for forest villagers related to solar pv 	<ul style="list-style-type: none"> 0 	<ul style="list-style-type: none"> 450 	<ul style="list-style-type: none"> Annual reports from forest cooperatives 	<ul style="list-style-type: none"> 1,5 work positions per project (maintenance, security)
	<ul style="list-style-type: none"> Number of people living in forest villages who will have their electricity needs met by solar PV 	<ul style="list-style-type: none"> 0 	<ul style="list-style-type: none"> 175,000 		

Component 1.

Policy & Institutional Framework for supporting Sustainable energy financing mechanism for solar power in forest villages

<p>Outcome 1.1 Enhanced enabling policy and environment, within which ORKOY's sustainable energy financing mechanism continues to operate beyond the lifetime of the project</p>	<ul style="list-style-type: none"> SEFM unit appointed, introduced and confirmed by ORKOY National Framework published and approved Technical report developed and published 	<ul style="list-style-type: none"> None None None 	<ul style="list-style-type: none"> 5 months after project start 6 months after project start 7 months after project start 	<p>Published Projects annual reports.</p>	<p>Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Unchanged legislative framework.</p>
<p>Output 1.1 – Evaluation and selection of public-private business models (ORKOY, solar PV installers, utilities, domestic banks) for provision of affordable, grid-connected residential solar PV to forest villagers, using an individual household and/or cooperative model.</p>	<ul style="list-style-type: none"> Completed and published Evaluation report by Year 1 (building on the initial detailed analysis of various business models prepared and developed during the PPG stage) 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> ER by end of Year 1 	<p>Published ER</p>	<p>Unchanged commitment of relevant stakeholders (ORKOY, utilities, installers, banks)</p>
<p>Output 1.2 - Terms of Reference for ORKOY's Credit Programme are revised, agreed, published and disseminated</p>	<ul style="list-style-type: none"> Completed and published TOR by Year 1 No. of dissemination events for stakeholders 	<ul style="list-style-type: none"> 0 0 	<ul style="list-style-type: none"> 3 months from project start At least 5 	<p>Published TOR Lists of participants, official publications, media reports</p>	<p>Unchanged commitment of relevant stakeholders (ORKOY, utilities, installers, banks)</p>
<p>Output 1.3 Sustainable energy Financing unit established within</p>	<ul style="list-style-type: none"> No. of full time staff appointed SEFM unit appointed, introduced and confirmed by 	<ul style="list-style-type: none"> 0 No SEFM 	<ul style="list-style-type: none"> At least 2 5 months 	<p>Project's annual reports ORKOY's official</p>	<p>Unchanged commitment of ORKOY</p>

ORKOY with dedicated full time staff	ORKOY	unit	after project start	announcement	
Output 1.4 – Model contract for ORKOY soft loan developed and utilized	<ul style="list-style-type: none"> Model contract published and approved by ORKOY 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 6 months after project start 	Model contract published	Unchanged commitment of ORKOY
Output 1.5 – National Framework designed and operationalized to use Turkey's feed-In-Tariff scheme for the purpose of residential solar PV for forest villagers.	<ul style="list-style-type: none"> National Framework published and approved 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 6 months after project start 	Published framework	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government).
Output 1.6 – Technical report on grid capacity and requirements to enable feed-in of grid-connected PV and to define technical information for the national grid code.	<ul style="list-style-type: none"> Technical report developed and published 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 7 months after project start 	Published report	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Unchanged legislative framework.
Output 1.7 – Methodology for innovative approach (e.g. net metering) is developed, published and disseminated	<ul style="list-style-type: none"> Methodology developed by end Year 2 Number of dissemination events 	<ul style="list-style-type: none"> 0 0 	<ul style="list-style-type: none"> End of Year 2 At least 10 	Published methodology Lists of participants, official publications, media reports, press releases	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Unchanged legislative framework.
Component 2.					
Solar PV demonstration Projects					
Outcome 2.1 Sustainable Energy Financing Mechanism of ORKOY	<ul style="list-style-type: none"> No. of projects implemented No. of regions involved 	<ul style="list-style-type: none"> 0 0 	<ul style="list-style-type: none"> 4 At least 3 	Project documents Approvals from competent bodies	Unchanged commitment of ORKOY and interest of forest villages

successfully finances four solar PV demonstration projects (each up to 100 kW in total) in forest villages, using either individual household and/or cooperative models	<ul style="list-style-type: none"> • Total installed capacity of the projects (kWp) 	• 0	• 400	Press releases	Unchanged commitment of ORKOY and interest of forest villages
Output 2.1 Business plans & feasibility studies prepared for a total of four demonstration projects in forest villages up to 400kW	<ul style="list-style-type: none"> • No. of project reports prepared and approved 	• 0	• 4	Published documents	Unchanged commitment of ORKOY and interest of forest villages
Output 2.2 – Four demonstration projects successfully implemented in forest villages in 4 different regions.	<ul style="list-style-type: none"> • No. of projects implemented 	• 0	• 4	Project documents	Unchanged commitment of ORKOY and interest of forest villages
	<ul style="list-style-type: none"> • No. of regions involved 	• 0	• 4	Approvals from competent bodies	Unchanged commitment of ORKOY and interest of forest villages
	<ul style="list-style-type: none"> • Total installed capacity of the projects (kWp) 	• 0	• 400	Press releases	Unchanged commitment of ORKOY and interest of forest villages
Output 2.3 – Case Studies Prepared on each of the Demonstration Projects	<ul style="list-style-type: none"> • No. of case studies prepared 	• 0	• 4	Published case studies	Unchanged commitment of ORKOY and interest of forest villages. Successful implementation of demonstration projects.
Output 2.4 – Short video documentary prepared on the demonstration projects	<ul style="list-style-type: none"> • No. of video spots published 	• 0	• 1	Published video spots	Unchanged commitment of ORKOY and interest of forest villages. Successful implementation of demonstration projects

Component 3. Replication and scaling up – Enhancement of the sustainable energy financing mechanism						
Outcome 3.1: Sustainable Energy Financing Mechanism of ORKOY successfully provides soft loans to contribute to the deployment of at least 30MW of solar PV during project lifetime	<ul style="list-style-type: none"> Amount of reduced CO₂ emissions from the power sector (compared to the project baseline) by EOP, tons CO_{2eq} Cumulative installed capacity of grid-connected PV systems (kWp) Cumulative total electricity generation from installed grid-connected PV systems (kWh/year) 	<ul style="list-style-type: none"> 0 0 0 	<ul style="list-style-type: none"> 28,750 30,000 47,520,000 	Project's annual reports, GHG monitoring and verification reports	Unchanged of commitment of ORKOY and relevant stakeholders (utilities, government). Successful implementation of demonstration projects Interest of other financial subjects in the program.	
	<ul style="list-style-type: none"> NARP is developed 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 12 months after project start 	Published document NARP		Unchanged of commitment of ORKOY and relevant stakeholders (utilities, government).
	<ul style="list-style-type: none"> Training manual developed 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 15 months after project start 	Manual published		
Outcome 3.2: Sustainable Energy Financing Mechanism of ORKOY has in place systems for M&E, quality standards, and certification systems and training	<ul style="list-style-type: none"> MRV system developed Quality standards developed Certification scheme implemented 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> End Year 1 	Projects annual reports.	Unchanged of commitment of ORKOY and relevant stakeholders (utilities, government). Successful implementation of demonstration projects	

programmes						
Output 3.3 – Twenty National workshops held to promote the solar PV training manual targeting solar PV value chain (ORKOY officials, installers, utilities)	<ul style="list-style-type: none">No. of dissemination eventsNo. of involved persons/entities	<ul style="list-style-type: none">NoneNone	<ul style="list-style-type: none">20400	Lists of attendance Press releases	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Successful implementation of demonstration projects	
Output 3.4 – MRV system and indicators designed and implemented to reliable track energy consumption	<ul style="list-style-type: none">MRV system developed	<ul style="list-style-type: none">None	<ul style="list-style-type: none">End Year 1	Projects annual reports.	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Successful implementation of demonstration projects	
Output 3.5 – Quality standards and certification scheme designed and implemented for solar PV hardware and for skilled technicians	<ul style="list-style-type: none">Quality standards developedCertification scheme implemented	<ul style="list-style-type: none">NoneNone	<ul style="list-style-type: none">End Year 1End Year 1	Projects annual reports.	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Successful implementation of demonstration projects	
Output 3.6 – Workshops with domestic and international banks to consult, build familiarity and integrate their lending to solar PV with ORKOY	<ul style="list-style-type: none">No. of events organizedNo. of involved institutions	<ul style="list-style-type: none">00	<ul style="list-style-type: none">At least 10At least 50	Projects annual reports. Lists of attendance Press releases	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Successful implementation of demonstration projects	
Output 3.7 – Project Website – Practical Guide to Investing in Solar PV in Turkey	<ul style="list-style-type: none">Web site developed and updated	<ul style="list-style-type: none">0	<ul style="list-style-type: none">Within 6 months of the start of the project	Web site	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government).	

						Successful implementation of demonstration projects
Output 3.8. – Programme of Activities (PoA) for voluntary carbon market for forest villages solar PV project	<ul style="list-style-type: none">The programme developed	<ul style="list-style-type: none">None	<ul style="list-style-type: none">End year 2	Projects annual reports.	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Successful implementation of the projects	
Output 3.9.: 30 MW of solar projects successfully implemented	<ul style="list-style-type: none">Amount of reduced CO₂ emissions from the power sector (compared to the project baseline) by EOP, tons CO_{2eq}Cumulative installed capacity of grid-connected PV systems (kWp)Cumulative total electricity generation from installed grid-connected PV systems (kWh/year)	<ul style="list-style-type: none">000	<ul style="list-style-type: none">28,75030,00047,520,000	GHG monitoring and verification reports Implemented MRV system	Unchanged commitment of ORKOY and relevant stakeholders (utilities, government). Successful implementation of demonstration projects Interest of other financial subjects in the program.	

4 TOTAL BUDGET AND WORK PLAN

Award ID:	00089904	Project ID (s):	00095942
Award Title:	PIMS 5323 SEF Mechanism for SPV in forest villages		
Business Unit:	TUR10		
Project Title:	Sustainable Energy Finance Mechanism for solar photovoltaic systems in forest villages in Turkey		
PIMS no.	5323		
Implementing Partner (Executing Agency)	Ministry of Forestry and Water Affairs, General Directorate of Forestry (GDF), Forest Village Relations Department (ORKOY)		

GEF Outcome / Atlas Activity	Responsible Party / Implementing Agent	Fund ID	Donor Name	Atlas Budget Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	Budget Note
Component 1: Policy and Institutional Framework for supporting Sustainable energy financing mechanism for solar power in forest villages	GDF/UNDP	62000	GEF	71200	International Consultants	40.000	9.000	5.000	5.000	59.000	1
				71300	Local Consultants	90.400	7.500	5.400	3.600	106.900	2
				71400	Contractual Services - Individ	27.300	27.300	27.300	27.300	109.200	3
				71600	Travel	86.500	1.500	3.000	-	91.000	4
				72100	Contractual services - Companies	28.000	-	8.000	8.000	44.000	5
				72200	Equipment & Furniture	25.000	-	-	-	25.000	6
				74200	Audio Visual&Print Costs	20.000	-	-	-	20.000	7
				75700	Training Workshops and Conference	200.000	100.000	-	-	300.000	8
Total Component 1						517.200	145.300	48.700	43.900	755.100	
Component 2: Solar PV demonstration Projects	GDF/UNDP	62000	GEF	71200	International Consultants	32.000	61.000	-	-	93.000	9
				71300	Local Consultants	60.400	87.300	-	-	147.700	10
				71400	Contractual Services - Individ	13.000	17.109	12.000	12.000	54.109	11
				71600	Travel	27.700	38.500	-	-	66.200	12
				72100	Contractual services - Companies	-	77.000	-	-	77.000	13
				72100	Contractual services - Companies	650.000	-	-	-	650.000	14
				74200	Audio Visual&Print Costs	-	55.000	-	-	55.000	15
				Total Component 2						723.100	181.609

				Training Workshops and Conference	8,000	90,000	-	-	98,000	16
				Total Component 2	791,100	425,909	12,000	12,000	1,241,009	
				International Consultants	42,750	64,500	48,750	50,750	206,750	17
				Local Consultants	11,100	58,500	41,600	16,200	127,400	18
				Contractual Services - Individ	24,000	24,000	24,000	24,000	96,000	19
				Travel	15,000	41,500	45,000	38,000	139,500	20
				Contractual services - Companies	5,000	83,000	55,000	-	143,000	21
				Contractual services - Companies	-	190,125	556,116	-	746,241	22
				Audio Visual & Print Prod Costs	15,000	-	10,000	10,000	35,000	23
				Training Workshops and Conference	-	40,000	50,000	50,000	140,000	24
				Total Component 3	112,850	501,625	830,466	188,950	1,633,891	
				Contractual Services - Individ	23,500	23,500	23,500	23,500	94,000	25
				Travel	3,335	2,985	2,885	3,335	12,540	26
				Equipment and Furniture	2,500	-	-	-	2,500	27
				Professional Services	-	2,500	-	2,500	5,000	28
				Miscellaneous	750	750	750	750	3,000	29
				Direct Project Costs	5,362	4,852	4,852	4,852	19,918	30
				Training Workshops and Conference	3,335	3,335	3,335	3,037	13,042	31
				Contractual Services - Individ	15,000	35,000	25,000	25,000	100,000	
				Total Project Management	53,782	72,922	60,322	62,974	250,000	
				PROJECT TOTAL	1,474,932	1,145,756	951,488	807,824	3,880,000	

Budget notes:

Budget Notes (prices in USD)	
1	International solar technical advisor (ISTA) covering work under outputs 1.1., 1.3, 1.5, 1.6. and 1.7. – 3,000*18weeks=54,000; International marketing expert (IME) covering work under outputs 1.2. and 1.7 – 2,500*2weeks=5,000
2	Local solar technical expert (LST) covering work under outputs 1.1., 1.2., 1.3., 1.5., 1.6. and 1.7. – 2,500*37weeks=92,500; Local marketing expert (LME) covering works under outputs 1.2., 1.7. – 1,800*8=14,400
3	Project manager (PM) and Project associate (PA) technical input to Outcome 1.
4	Travel of local and international consultants for implementation of Outcome 1. Unit costs 1000/international, 300/local travel.
5	Subcontractors for publishing and dissemination activities under outputs 1.1.(5,000), 1.2.(8,000), 1.3. (15,000) and 1.7. (16,000).
6	IT equipment and office furniture for SEFM team under output 1.3.
7	Printed materials for dissemination under outputs 1.1. and 1.3.
8	Costs for organization of the workshop (20*4000 = 80,000) and study tour for stakeholders and ORKOY staff (60 participants*2000 = 120,000) under output 1.3 and international study tour under output 1.7. (25 participants * 4000 = 100,000).
9	International solar technical advisor (ISTA) covering work under outputs 2.1, 2.2., and 2.3.– 3,000*21weeks=63,000; International marketing expert (IME) covering work under output 2.1., 2.3., and 2.4. – 2,500*12weeks=30,000
10	Local solar technical expert (LST) covering work under outputs 2.1., 2.2. and 2.3. – 2,500*49weeks=122,500; Local marketing expert (LME) covering works under output 2.1., 2.3., and 2.4. – 1,800*14=25,200
11	Project manager (PM) and Project associate (PA) technical input to Outcome 2.
12	Travel of local and international consultants for implementation of Outcome 2. Unit costs 1000/international, 300/local travel.
13	Subcontractors for publishing and dissemination under 2.2. (5,000) and 2.3. (30,000) and video service (8000/site – 32,000) and broadcasting services (10,000) under output 2.4.
14	The estimated GEF contribution for procurement and installation of 4 pilot PV plants under Output 2 is US \$650,000, including US \$130,000 for business plans and feasibility studies and \$520,000 for investment grants for 4 pilot demonstration projects. These are full subsidies for 4 demo projects up to a maximum of 100% as explained in the project document.
15	Printing and publication of knowledge products, posters, leaflets and workshop materials (55,000) for pilot implementations under output 2.4.
16	Costs for organising of workshops under outputs 2.1. (4*2000= 8,000) and 2.3. (20*4000=80,000) and trainings for 4 cooperatives under output 2.2. (4*2500 = 10,000).
17	International solar technical advisor (ISTA) covering work under outputs 3.2. and 3.5. – 3,000*4weeks=12,000; International marketing expert (IME) covering work under outputs 3.1., 3.2., 3.3., 3.5., 3.6. and 3.7. – 2,500*40weeks=100,000; International MRV expert covering work under output 3.4. – 3,000*11 weeks= 33,000; International carbon market expert covering work under output 3.8. – 3,000*4weeks=12,000. External consultants for Technical and periodical reports (2,750*5=13,750); Mid-term external evaluation(18,000) and Final external evaluation (18,000).
18	Local solar technical expert (LST) covering work under outputs 3.2, 3.5., and 3.9. – 2,500*12weeks=30,000; Local marketing expert (LME) covering works under outputs 3.1., 3.2., 3.3., 3.5., 3.6., 3.7. – 1,800*43weeks=77,400; Local carbon market expert covering work under output 3.8. – 2,500*8weeks=20,000
19	Project manager (PM) and Project associate (PA) technical input to Outcome 3.
20	Travel of local and international consultants for implementation of Outcome 3. Unit costs 1000/international, 300/local travel.
21	Subcontractors for dissemination and publishing under output 3.1 (20,000), 3.2 (13,000), 3.3 (55,000), 3.5 (10,000), 3.6 (40,000) ; web hosting, graphics and programming under output 3.7. (5,000)
22	The estimated GEF contribution for the procurement and installation of PV plants as part of ORKOY's sustainable energy soft funding for enabling at least 30 MW of PV plants under Output 3 is US \$746,241. These are partial subsidies as explained in the project document.
23	Communication and audio equipment for national awareness raising programme under output 3.1.

	Budget Notes (prices in USD)
24	Costs for organization of workshops under outputs 3.3. (100,000) and 3.6. (40,000).
25	Cost of Project Manager, Project Associate, and Project Finance and Admin Officer (Annex 3 and Project Organization Structure provides details). Sub-total: \$ 94,000
26	Management-related travel to/from project sites for the project management unit to enable hands-on management. Sub-total: \$ 12,540
27	Cost of IT equipment. Sub-total: \$ 2,500
28	Cost of a professional company for audits. Sub Total: \$5,000
29	Stationery for office. Sub total: \$ 3,000
30	Direct Project Costs: Estimated UNDP Direct Project Cost recovery charges as indicated in the Agreement in Section IV Part I of the Project Document. The project is to be managed on the 100% Country Office Cost Recovery basis, upon request of the government, the implementing partner. The estimated cost (Total USD 19,918) includes: (i) recruitment and payroll management of project staff; (ii) purchase of goods and equipment as requested; and (iii) hiring of consultants. In accordance with GEF Council requirements, the costs of these services will be part of the executing entity's Project Management Cost allocation identified in the project budget. DPC costs would be charged at the end of each year based on the UNDP Universal Pricelist (UPL) or the actual corresponding service cost. The amounts here are estimations based on the services preliminarily indicated, however as part of annual project operational planning the DPC to be requested during the calendar year would be defined and the amount included in the yearly project management budgets and would be charged based on actual services provided at the end of that year. Sub Total: \$ 19,918.
31	Cost of participation of the project management to project workshops. Sub-total \$ 13,042

Summary of Funds (USD):

	Year 1	Year 2	Year 3	Year 4	Total
Global Environment Facility	1,459,932	1,110,756	926,488	282,824	3,780,000
ORKOY	668,750	668,750	23,168,750	23,168,750	47,675,000
GUNDER	31,250	31,250	31,250	31,250	125,000
PI ENERJI	0	0	750,000	750,000	1,500,000
SOLAR TURK ENERJI	0	0	750,000	750,000	1,500,000
ODUL ENERJI	0	0	750,000	750,000	1,500,000
United Nation Development Programme (UNDP)	50,000	50,000	50,000	50,000	200,000
Total	2,209,932	1,860,756	26,426,488	25,782,824	56,280,000

Note: Total funds including in-kind. ORKOY's funds for years 3 and 4 responds to the amount defined in ORKOY's co-finance letter as a sustainable energy budget including support for solar PV installations. This means that not the full volume of this amount has to be used for the PV financing. In the financial plan USD 16,9 million is requested for the combination of grant funding and soft loan. The rest of the available ORKOY's budget will be used as a guarantee of sustainability of the scheme if the commercial loan contribution fails or for the further expansion of the SEFM scheme in case of excess demand from forest villages.



5 MANAGEMENT ARRANGEMENTS

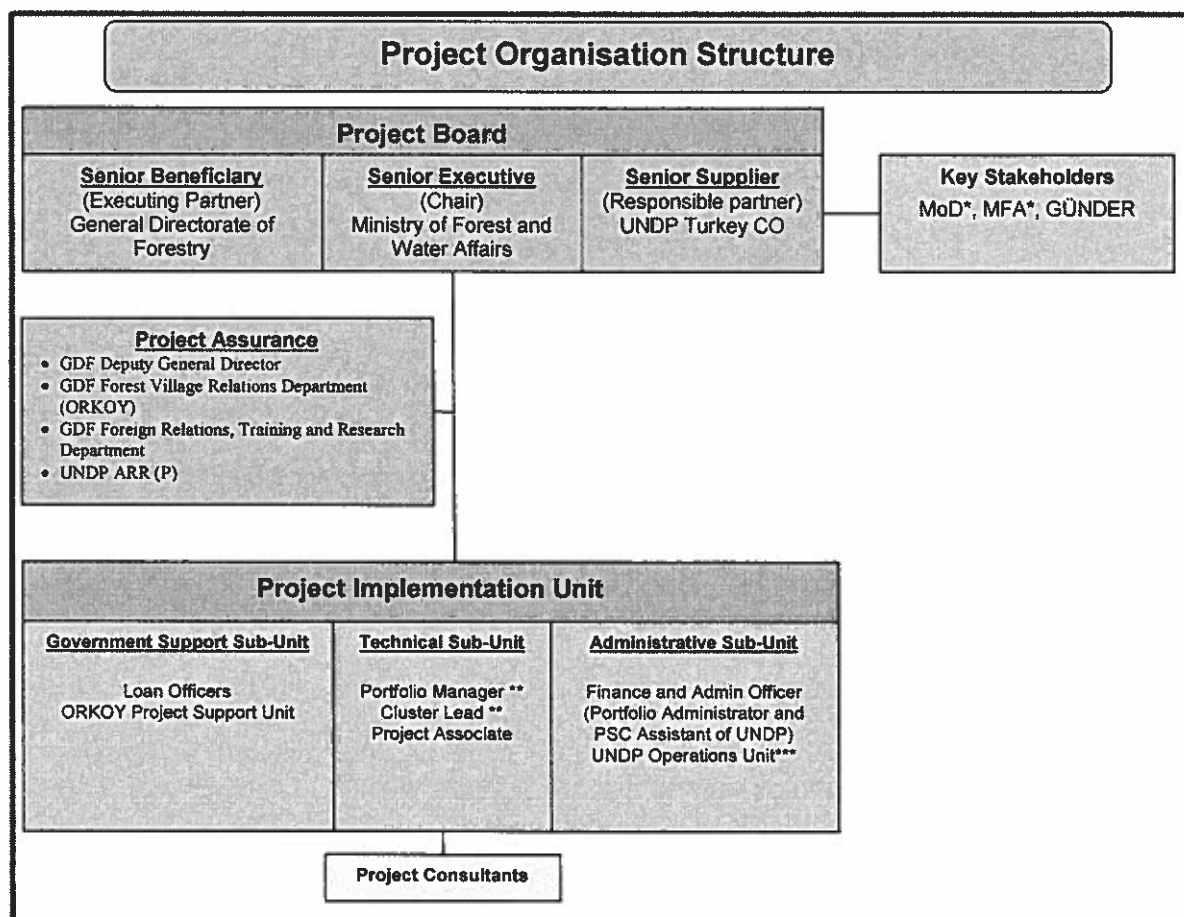
5.1 Institutional Arrangements

157. UNDP is the Implementing Partner for this project. The project fully complies with the comparative advantages matrix approved by the GEF Council. UNDP Turkey has been successfully managing a portfolio of technical assistance and capacity building initiatives in the areas of biodiversity conservation, prevention of land degradation, sustainable forest management, and climate change mitigation. UNDP Turkey has extensive experience and expertise in policy advice, project management in a highly challenging technical assistance environment in the country, as well as an extensive network of national partners. Moreover, UNDP Turkey is leading the only GEF supported project with the executing agency (GDF), namely “Integrated Approach to Management of Forests in Turkey, with Demonstration in High Conservation Value Forests in the Mediterranean Region of Turkey”. The existing knowledge and experience of this project will be directed to the Project.

5.2 Project Implementation Arrangements

158. The project will be executed by the Forest Village Relations department (ORKOY) under the overall responsibility of the General Directorate of Forestry (GDF) of Ministry of Forestry and Water Affairs over a four-year time period. The project will be nationally implemented (NIM). Direct day-to-day oversight of the project will be the responsibility of ORKOY.
159. The UNDP will support and monitor the project’s implementation and achievement of the project outputs, and ensure the proper use of UNDP/GEF funds. The UNDP Country Office (CO) will be responsible for: (i) providing financial and audit services to the project; (ii) recruitment and contracting of project staff; (iii) overseeing financial expenditures against project budgets; (iv) appointment of independent financial auditors and evaluators; and (v) ensuring that all activities, including procurement and financial services, are carried out in strict compliance with UNDP/GEF procedures. The project organization structure (summarized in the figure below) will consist of a Project Board, Project Assurance and a Project Implementation Unit (PIU). Roles and responsibilities are described below.

5.3 Project Organisation Structure



*MoD (Ministry of Development) and MFA (Ministry of Foreign Affairs) are natural members of the Project Board with a role to link the project results to the national development policy and oversight for international agreements.

** Please refer to Annex 3 for further information.

*** Please refer to Annex 11 – Letter of Agreement between UNDP and Government of Turkey.

160. **Project Board:** The Project Board, or Project Steering Committee, will be responsible for making management decisions for the project, in particular when guidance is required by the Project Manager. It will play a critical role in project monitoring and evaluations by assuring the quality of these processes and associated products, and by using evaluations for improving performance, accountability and learning. The Project Board will ensure that required resources are committed. It will also arbitrate on any conflicts within the project and negotiate solutions to any problems with external bodies. In addition, it will approve any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the Project Board can also consider and approve the quarterly plans and also approve any essential deviations from the original plans. In order to ensure UNDP's ultimate accountability for project results, Project Board decisions will be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. Members of the Project Board will consist of key national governmental and non-governmental agencies, UNDP, and appropriate local level representatives. The Project Board will be balanced in terms of gender. Representatives of other stakeholder groups may also be included in the Project Board as considered appropriate and necessary. The Project Board will meet at least twice per annum.

161. The Project Board will contain three distinct roles:

- Senior Executive (Chairman of Project Board) – Ministry of Forest and Water Affairs: The Senior Executive is ultimately responsible for the project, supported by the Senior Beneficiary and Senior Supplier. This role requires representing the interests of Ministry of Forest and Water Affairs who will ultimately benefit from the project. The Senior Executive's primary function within the Board will be to ensure that the project is focused throughout its life cycle on achieving its objectives and delivering outputs that will contribute to higher level outcomes. The Senior Executive has to ensure that the project gives value for money, ensuring a cost-conscious approach to the project, balancing the demands of beneficiary and supplier.
- Senior Beneficiary (Executing Partner) – General Directorate of Forestry: The Senior Beneficiary is responsible for validating the needs and for monitoring that the solution will meet those needs within the constraints of the project. The role represents the interests of all those who will benefit from the project, or those for whom the deliverables resulting from activities will achieve specific output targets. The Senior Beneficiary role monitors progress against targets and quality criteria. The General Directorate of Forestry will appoint a senior official to this role.
- Senior Supplier (Implementing Partner) – UNDP: The Senior Supplier represents the interests of the parties which provide funding and/or technical expertise to the project (designing, developing, facilitating, procuring, implementing). The Senior Supplier's primary function within the Board will be to provide guidance regarding the technical feasibility of the project. This role will rest with UNDP-Turkey represented by the Resident Representative.

162. Project Assurance: The project assurance supports the Project Board by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. Project Assurance has to be independent of the Project Manager; therefore, the Project Board cannot delegate any of its assurance responsibilities to the Project Manager. The Project Assurance role will rest with combination of several positions. A Deputy General Director from GDF will lead the Project Assurance. Moreover, two representatives from GDF's Forest Village Relations Department and Foreign Relations, Training and Research Department will be appointed. Finally, UNDP Turkey Assistant Resident Representative for Programme (ARR-P) will be a member of Project Assurance team.

163. Project Implementation Unit (PIU): The PIU will assist the GDF in performing its role as implementing partner. PIU will be comprised of three sub-units according to implementing function of the project.

- First sub-unit, namely Governmental Sub-unit, will be established by ORKOY for governmental support function. Governmental support sub-unit comprising positions including: two loan officers appointed by ORKOY, and ORKOY's senior officials for technical and administrative management.
- Second sub-unit, namely Technical Sub-unit, will be established by UNDP, through new recruitments and/or assignment of existing staff in line with UNDP CO structure and project management needs, for daily implementation of the project. Project Management function will be carried on by Cluster Lead with support from Project Associate and the relevant UNDP Portfolio Manager. Technical sub-unit will be composed of : a Portfolio Manager, a Cluster Lead, and a Project Associate.
- Third sub-unit, namely Administrative Sub-unit, will be established by UNDP, through new recruitments and/or assignment of existing staff in line with UNDP CO structure and project

management needs, for undertaking administrative management function of the project and ensuring compliance with UNDP/GEF administrative regulations. Administrative sub-unit will be comprised of: a Portfolio Administrator (Finance and Admin function), a Project Support Center Assistant, and UNDP Operations Unit. While the Portfolio Administrator will act as Finance and Admin Officer, the Project Support Center Assistant will fulfill administrative functions specific to the project for effective and timely implementation according to UNDP/GEF rules and regulations and Project Document, and the UNDP Operations Unit will provide support in relations to, including but not limited, procurement, resource management, human resources (HR), Results-Based Management (RBM) and Information and Communication Technologies (ICT) functions (advise/guidance/input on administrative functions for ensuring the compliance with applicable UNDP rules and regulations).

Three sub-units will work in harmony and compliment each other for smooth implementation in line with UNDP/GEF rules and regulations.

164. According to the UNDP's structure, the Project Management (PM) function (roles and responsibilities) will be performed by the Forestry Cluster Lead, with support of UNDP Portfolio Manager, based in Ankara. The Forestry Cluster Lead will be responsible for daily implementation and technical inputs for project activities, while the UNDP Portfolio Manager will ensure advocating for and scaling up the project strategy at national and international level. Under the direct supervision of the Cluster Lead, the Project Associate function will be performed by a nationally recruited staff or Forestry Cluster Associate of the UNDP who will be responsible to provide inputs on both substance and administrative related activities according to the Terms of Reference (see Annex 3). Other technical expertise will be engaged as needed. Portfolio Administrator responsible for GEF projects being implemented by the CO will perform the project finance and administrator function, with support from the Project Support Center Assistant and UNDP Operations Unit. As such in an cost efficient manner, the project will benefit from the existing capacities of UNDP for implementing other related GEF projects (in particular in the forestry sector), both in terms of programmatic synergies and technical knowledge as well as in relation to administrative and operations capacities. In addition, synergies in respect to forestry interventions supported by GEF will be ensured.
165. The PM has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The PM's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The PM will be responsible for overall project coordination and implementation, consolidation of work plans and project papers, preparation of quarterly progress reports, reporting to the project supervisory bodies, and supervising the work of the project experts and other project staff. The PM will also closely coordinate project activities with relevant Government institutions and hold regular consultations with other project stakeholders and partners.
166. The PM will be supported by Solar PV Technical expert taking the lead in the implementation of the specific technical assistance components of the project, as well by national financial and marketing experts. These services, either of individual consultants or under sub-contacts with consulting companies, will be procured in accordance with applicable UNDP/GEF guidelines. Contacts with experts and institutions in other countries that have already gained more experience in implementing solar PV projects are also to be established. Relevant terms of references regarding the key positions are given in the Annex 3.

167. The PIU, following UNDP procedures on implementation of NIM projects, will identify national experts and consultants, and international experts as appropriate to undertake technical work. The national and international companies may also be involved in project implementation. These consultants and companies will be hired under standard prevailing UNDP procedures on implementation of NIM projects. The UNDP Country Office will provide specific support services for project realization through the Administrative and Finance Units as required.
168. Audit Clause: Audit will be conducted according to UNDP Financial Regulations and Rules and applicable audit Policies. Use of intellectual property rights: In order to accord proper acknowledgement to GEF for providing funding, a GEF logo should appear on all relevant GEF project publications, including among others, project hardware and vehicles purchased with GEF funds. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgment to GEF.

6 MONITORING FRAMEWORK AND EVALUATION

169. The project team and the UNDP Country Office (UNDP-CO), supported by the UNDP/GEF Regional Coordination Unit will be responsible for project monitoring and evaluation conducted in accordance with established UNDP and GEF procedures. The Project Results Framework in Section 3 provides performance and impact indicators for project implementation, along with their corresponding means of verification. The GEF Climate Change Mitigation Tracking Tool will also be used to monitor progress. The following sections outline the principle components of the M&E plan and indicative cost estimates related to M&E activities. The project's M&E plan will be presented to all stakeholders at the Project's Inception Workshop and finalized following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities. The M&E plan and budget is provided in Table M&E below.
170. *Carbon monitoring:* Given the project's focus on avoiding emission, particular emphasis will be placed on monitoring these reductions. Output 3.4 will measure, report and verify carbon benefits of the project.
171. **Project start:** A Project Inception Workshop will be held within the first two months of project start. Workshop participants will include all those with assigned roles in the project organization structure, UNDP country office and, where appropriate/ feasible, regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to build ownership in the project targets and to agree on the first year's annual work plan. The Inception Workshop will address a number of key issues, including:
- Assist all partners to fully understand and take ownership of the project.
 - Detail roles, support services and complementary responsibilities of UNDP CO and RCU staff vis-à-vis the project team.
 - Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms.
 - The Terms of Reference for project staff will be discussed again as needed.
 - Based on the project results framework and the GEF Tracking Tool mentioned above, finalize the first annual work plan.
 - Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
 - Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
 - Discuss financial reporting procedures and obligations, and arrangements for annual audits.
 - Plan and schedule Project Board meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the Inception Workshop.
172. **Quarterly:**
- Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform.
 - Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS.
 - Based on the information recorded in ATLAS, Project Progress Reports (PPR) can be generated in the Executive Snapshot.

- Other ATLAS logs can be used to monitor issues, lessons learned, etc. The use of these functions will be a key indicator in the UNDP Executive Balanced Scorecard.
173. **Annually:** Annual Project Review/ Project Implementation Reports (APR/PIR): This key report will be prepared to monitor progress made since project start and in particular for the previous reporting period. The APR/PIR combines both UNDP and GEF reporting requirements. The APR/PIR includes, but is not limited to, reporting on the following:
- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
 - Project outputs delivered per project outcome (annual)
 - Lesson learned/good practice.
 - AWP and other expenditure reports
 - Risk and adaptive management
 - ATLAS QPR
 - Portfolio level indicators (i.e. GEF focal area tracking tools.)
174. **Periodic Monitoring through site visits:** UNDP CO and the UNDP RCU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.
175. **Mid-term of project cycle:** The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation. The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will: focus on the effectiveness, efficiency and timeliness of project implementation; highlight issues requiring decisions and actions, and; present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the UNDP Evaluation Office Evaluation Resource Center (ERC). The relevant GEF tracking tools will also be completed during the mid-term evaluation cycle.
176. **End of Project:** An independent Final Evaluation will take place three months prior to the final Project Board meeting and will be undertaken in accordance with UNDP and GEF guidance. The Final Evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The Final Evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC). The relevant GEF tracking tools will also be completed during the final evaluation. During the last three months of project implementation, the project team

will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may be needed to ensure sustainability and replicability of the project's results.

177. **Learning and knowledge sharing:** Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Finally, there will be a two-way flow of information between this project and other projects of a similar focus.
178. **Communications and visibility requirements:** Full compliance is required with UNDP's Branding Guidelines. These can be accessed at <http://intra.undp.org/coa/branding.shtml>, and specific guidelines on UNDP logo use can be accessed at: <http://intra.undp.org/branding/useOfLogo.html>. Amongst other things, these guidelines describe when and how the UNDP logo needs to be used, as well as how the logos of donors to UNDP projects needs to be used. For the avoidance of any doubt, when logo use is required, the UNDP logo needs to be used alongside the GEF logo. The GEF logo can be accessed at: http://www.thegef.org/gef/GEF_logo. The UNDP logo can be accessed at <http://intra.undp.org/coa/branding.shtml>. Full compliance is also required with the GEF's Communication and Visibility Guidelines (the "GEF Guidelines"). The GEF Guidelines can be accessed at: http://www.thegef.org/gef/sites/thegef.org/files/documents/C.40.08_Branding_the_GEF%20final_0.pdf. Amongst other things, the GEF Guidelines describe when and how the GEF logo needs to be used in project publications, vehicles, supplies and other project equipment. The GEF Guidelines also describe other GEF promotional requirements regarding press releases, press conferences, press visits, visits by Government officials, productions and other promotional items. Where other agencies and project partners have provided support through co-financing, their branding policies and requirements should be similarly applied.

Table 112 M&E: Project Monitoring and Evaluation Plan and Budget

Type of M&E activity	Responsible Parties	Budget (US\$)	Time frame
Inception Workshop (IW)	Project Manager Ministry of Forestry and Water Affairs, General Directorate of Forestry, UNDP, UNDP-GEF	30,000 (based on experience of UNDP CO)	Within first two months of project start up
Inception Report	Project Manager Project Board, UNDP CO	None	Immediately following IW
Measurement of Means of Verification for Project Results	Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team	To be finalized in Inception Phase and Workshop. Cost to be covered by targeted	Start, mid and end of project

Type of M&E activity	Responsible Parties	Budget (US\$)	Time frame
	members	survey funds.	
Annual Measurement of Means of Verification for Project Progress and Performance	Oversight by Project GEF Technical Advisor, Project Manager and M&E local expert	TBD as part of the Annual Work Plan's preparation. Cost to be covered by field survey budget.	Annually prior to APR/PIR and to the definition of annual work plans
APR/PIR	Project Team Project Board UNDP-RTA UNDP-GEF	None	Annually
QPR	Project Team (including M&E local expert)	None	Quarterly
Project Board meetings	Project Manager	None	Following IW and annually thereafter.
Technical and periodic status reports	Project team Hired consultants as needed 13, 750	13,750	TBD by Project team and UNDP-CO
Mid-term External Evaluation	Project team Project Board UNDP-GEF RCU External Consultants (evaluation team) – 18,000	20,000	At the mid-point of project implementation.
Final External Evaluation	Project team, Project Board, UNDP-GEF RCU External Consultants (evaluation team) – 18,000	20,000	At the end of project implementation
Terminal Report	Project team Project Board External Consultant	None	At least one month before the end of the project

Type of M&E activity	Responsible Parties	Budget (US\$)	Time frame
Audit	UNDP-CO Project team (included in PMC costs)	5,000 in project life-time	Yearly
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	UNDP-CO, UNDP-GEF RCU Government representatives	None	Yearly average one visit per year
TOTAL (indicative) COST (Excluding project and UNDP staff time costs)		88,750	

7 LEGAL CONTEXT

179. This document shall be the instrument referred to as such in Article-I of the SBAA between the Government of Turkey and UNDP signed on 21 October 1965 Consistent with the attached Supplemental Provisions to the Project Document, attached hereto. Consistent with the above Supplemental Provisions, the responsibility for the safety and security of the executing agency and its personnel and property, and of UNDP's property in the executing agency's custody, rests with the executing agency. The executing agency 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 executing agency's security, health and safety and the full implementation of the security plan.
180. 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 this agreement. The executing agency agrees to undertake all reasonable efforts to ensure that none of the 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 list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm>. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document
181. Audit Clause: The Audit will be conducted in accordance with UNDP Financial Regulations and Rules and applicable audit policies on UNDP projects.



8 ANNEXES

8.1 Annex 1: Risk Analysis



OFFLINE RISK LOG

Project Title: Sustainable Energy Financing Mechanism for Solar PV in Forest Villages in Turkey					Award ID: 00095942		Date: 08/07/2015	
#	Description	Date Identified	Type	Impact & Probability 1 (low); 5 (high)	Countermeasures / Management Response	Owner	Submitted Last Updated by	Status
	ORKOY loan mechanism in PV is not sustainable	During PIF. Updated during project formulation	Organizational and regulatory	I: 4 P: 1	ORKOY has been running its support mechanisms since 1974 with its obligations coming from the Law 2924. With GoT having a rural development focus, support mechanisms for economic development in rural areas are likely to continue in the future including the finance mechanism of ORKOY. Moreover, the GoT has published a new action plan for 2014-2018 on Energy Development Program Depending on Domestic Sources. In the action plan, it clearly states to undertake solar energy implementations in a shorter term and in an intense way. In case of support for solar PV, the historic experience of ORKOY indicates that upon successful demonstrations followed by awareness rising and communication activities, the necessary environment is likely to occur to achieve success on solar PV in forest villages. The project will have 4 pilot demonstrations in the first year that will be followed by capacity building activities towards ORKOY central and local staff as well as advertising activities towards forest villagers and cooperatives to create the willingness and motivation coming from forest villages. This will ensure the motivation of ORKOY decision-making during and after the project period. This fact has been highlighted several times by the ORKOY decision makers during the PPG period.	Project Steering Committee and ORKOY	N/A	N/A

#	Description	Date Identified	Type	Impact & Probability 1 (low); 5 (high)	Countermeasures / Management Response	Owner	Submitted & Updated by	Last Update	Status
					<p>Defaults rates can approach zero if appropriate legal structures are put in place eg US solar loan products from Mosaic reports default rates of 0% for their commercial scale projects and 0.2% for residential.</p> <p>Loans should be considered as project finance rather than debt finance. In this way, a legal framework can be established under which FiT income is paid directly to creditors until loans are settled, such that the villages themselves do not have direct access to funds and are therefore unable to actively default. The debt repayment risk then falls upon the performance of the equipment and this risk can be negated by an appropriate warranty with the supplier/installer.</p>				
	The climate change phenomenon is affecting the project activities and success.	During PIF	Natural	I: 2 P: 3	Turkey is expected to be affected by the climate change phenomenon with drier periods, warmer summers and colder winters. These are not expected to affect the renewable energy situation in a negative way. On the contrary these can further trigger the demand for energy that is also related with renewable energy. The climate change is not expected to create a risk for the project.	Project Steering Committee and later ORKOY		N/A	N/A
	Technical and capacity risks for ORKOY central and regional staff that are key to	During PIF	Organizational	I: 4 P: 1	The ORKOY finance system works through the demand coming from the forest villagers. The historic examples have showed that local staff of ORKOY is key to achieve success through informing and motivating the villagers. The key issue here is to increase the technical capacities in order to increase the motivation and ownership of ORKOY staff. Moreover, once the scheme for solar PV is in place, the technical capacities of ORKOY staff will be necessary to assess the applications and	Project Steering Committee		N/A	N/A

#	Description	Date Identified	Type	Impact & Probability 1 (low); 5 (high)	Countermeasures / Management Response	Owner	Submitted, Updated by	Last Update	Status
	implementation and generalizing the solar PV in forest villages.				<p>monitor the progress.</p> <p>ORKOY will allocate 2 full time staff as a loan officers (LO). First LO will be focused on the financial aspects of the scheme, the second LO will deal also with some technical aspects of the solar PV. The team will be supported by contracted international and local part time experts. The project will have systematic capacity building activities towards the central and local staff of ORKOY. The pilot demonstrations will be increasing the capacities of ORKOY staff that are working in 4 different regional directorates of General Directorate of Forestry. Moreover, these demonstrations and existing experience of these 4 regional directorates will be used to disseminate the know-how obtained to others. Furthermore, several other training programs will be executed by the project on project design for solar PV, monitoring, maintenance, evaluation, regulations regarding electricity generation etc. These activities are expected to decrease the probability of this risk.</p>				
	Environmental and social risks of solar PV instalments and electric generation.	During PIF	Operational and strategic	I: 3 P: 2	<p>The large-scale solar PV systems can cause land degradation and/or habitat loss due to the size of instalments. However, the solar PV instalments that are foreseen under this project are small-scale that are under 100 kwp.</p> <p>During the project preparation phase, the project development team has come up with draft site selection criteria that will be the base of ORKOY's conditions for solar PV. These criteria include no harm to habitats and biodiversity. Moreover, the project is planning to establish the solar PV panels within or nearby the village boundaries that are not valuable in terms of key habitats. Moreover, during the project preparation phase, several meetings and workshops were carried out to find out the best methodology</p>	Project Steering Committee and ORKOY		N/A	N/A

#	Description	Date Identified	Type	Impact & Probability 1 (low); 5 (high)	Countermeasures / Management Response	Owner	Submitted, Updated by	Last Update	Status
					<p>for solar PV installation. All of the options were also assessed by the experts in terms of social risks too. The project preparation team has come up with the most suitable approaches that are having the least social conflict possibilities.</p> <p>Furthermore, the project will be implemented in accordance with UNDP's Social and Environmental Screening Procedures (SESP). The objectives of the SESP are to: (a) Integrate the SES Overarching Principles (human rights, gender equality and environmental sustainability); (b) Identify potential social and environmental risks and their significance; (c) Determine the Project's risk category (Low, Moderate, High); and (d) Determine the level of social and environmental assessment and management required to address potential risks and impacts.</p>				
	Increased dependence on natural gas will lead to less demand for renewable energy.	During PIF	Political	I: 4 P: 2	<p>The Government of Turkey wants to achieve security of energy supply and wants to reduce its dependence on imported oil and gas. New laws to promote and support renewable energy and a stated national target of 30% renewable by 2023 mean this risk is low. Awareness campaigns, trainings and study tours are planned to expand the knowledge about the solar PV appliances among forest villagers, governmental officers and installers and to guarantee expanding demand for renewable energy within the target group.</p>	Project Steering Committee		N/A	N/A
	Co-financing does not materialize	During PIF			<p>As the main beneficiary of the project, the ORKOY will contribute to the project with an amount of 47 675 000 through its loan mechanisms. ORKOY funding for its Credit Programme is already approved. The release of funding depends on the demand by forest villages and this risk is already addressed above.</p> <p>Another key co-financer is the private sector and Gunder association.</p>	Project Steering Committee		N/A	N/A

#	Description	Date Identified	Type	Impact & Probability 1 (low); 5 (high)	Countermeasures / Management Response	Owner	Submitted, Updated by	Last Update	Status
	Lack of financial support in the solar PV market for small-scale projects by banks.	During project formulation	Financial	I: 3 P: 2	<p>In Turkey, mainly due to lack of experience among financing institutes, project financing is currently limited for small scale solar PV schemes and so most debt is based upon the balance sheets of sponsors and, in this particular case, with forest villagers being some of the poorest members of Turkish society, their access to this is both severely limited and perceived as high risk and is therefore penalized with high interest rates.</p> <p>During the project development phase, several meetings have been undertaken with banks and international financing organizations to develop methods to overcome this barrier. Project will focus on developing alternative financing mechanisms on top of ORKOY's financing scheme.</p> <p>The workshops, media releases and study tours are planned during implementation phase to increase the involvement of the potential partners from banking sector.</p>			N/A	N/A
	Application process is complex and long.	During project formulation	Regulatory	I: 4 P: 1	<p>Although the application for unlicensed projects are easier, still the current application process has so many steps and is quite time consuming. For an average forest villager this is a barrier and unless a faster and easier way is defined and implemented, it creates a risk in terms of less applications.</p> <p>During the project preparation phase this issues has been discussed among various stakeholders and it is agreed to ease the process for forest villagers. TEDAŞ is currently working on developing a faster system for roof instalments with smaller scales projects. TEDAŞ indicated that their new application procedure will be operational soon and a similar system can be developed for forest villages under a protocol between TEDAŞ</p>	Project Steering Committee and TEDAŞ		N/A	N/A

#	Description	Date Identified	Type	Impact & Probability 1 (low); 5 (high)	Countermeasures / Management Response	Owner	Submitted, Updated by	Last Update	Status
					and General Directorate of Forestry. This will minimize the risk of forest villager's avoidance of solar PV applications.				

8.2 Annex 2: Signed Co-Financing Letters

Signed Letters of Co-Financing (separate documents)

8.3 Annex 3: Terms of Reference for SEFM Unit and Consultants

The key project staff responsible on Sustainable Energy Financing Mechanism Unit (SEFM Unit) consists of the Project Manager, the Project Associate, ORKOY's Loan Officers, and project consultants. Two ORKOY Loan Officers will be assigned by ORKOY to SEFM Unit. The first officer will be focused on the financial issues of the scheme; the second officer will be focused on the technical aspects of the PV installations. ORKOY's Loan Officers will be located at ORKOY's office while the PM and the Project Associate will be located at UNDP CO in Ankara with UNDP support staff.

Terms of Reference for key project staff responsible on SEFM are detailed below:

1) Project Manager Function (PM)

The Project Manager function (roles and responsibilities) will be performed by Forestry Cluster Lead of UNDP, with support of UNDP Portfolio Manager. PM function is the key responsibility in ensuring the success of the project, guided closely by the part time national and international technical experts.

Background

The UNDP CO's Forestry Cluster Lead (FCL) will be assigned as the Project Manager (PM). He 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. The Forestry Cluster Lead will be tasked with the day-to-day management of project activities, as well as with financial and administrative reporting. The Forestry Cluster Lead's prime responsibility is to ensure that the project produces the planned outputs and achieves the planned indicators and indicator targets by undertaking necessary activities specified in the project document to the required standard of quality and within the specified constraints of time and cost. This will require linking the indicators to the work plan to ensure Results-Based Management. The FCL will be responsible for meeting government obligations under the project and will perform a liaison role with the Government, UNDP and other UN Agencies, NGOs and other project partners.

The FCL will report to the UNDP Turkey CO's Portfolio Manager for all of the project's substantive and administrative issues. The Portfolio Manager will provide guidance to the Forestry Cluster Lead on substantial issues of the project including but not limited to policy making and scaling up strategy at national and international level.

Duties and Responsibilities

- Supervise and coordinate the project to ensure its results are in accordance with the Project Document and the rules and procedures established in the UNDP Programming Manual
- Assume primary responsibility for daily project management - both organizational and substantive matters – budgeting, planning and general monitoring of the project
- Ensure adequate information flow, discussions and feedback among the various stakeholders of the project
- Ensure adherence to the project's work plan, prepare revisions of the work plan, if required
- Assume overall responsibility for the proper handling of logistics related to project workshops and events
- Maintain regular contact with UNDP Country Office and the GDF on project implementation issues of their respective competence
- Monitor the expenditures, commitments and balance of funds under the project budget lines, and draft project budget revisions

- Assume overall responsibility for meeting financial delivery targets set out in the agreed annual work plans, reporting on project funds and related record keeping
- Liaise with project partners to ensure their co-financing contributions are provided within the agreed terms
- Assume overall responsibility for reporting on project progress vis-à-vis indicators in the logframe
- Undertake any other actions related to the project as requested by UNDP or the GDF
- Assuring technical co-ordination among consultants to be hired

Qualifications

- Proven management expertise – must be able to fluidly handle the political, technical, and people management challenges that will face the SEFM on a daily basis. This is first and foremost the most important qualification.
- A university degree in Engineering, Management or Environmental Sciences or related fields;
- At least 8 years of experience in project/programme management;
- At least 5 years of international project/programme management experience;
- Working experience with ministries, national institutions and energy sector in Turkey;
- Ability to effectively coordinate a large, multi-stakeholder project;
- Ability to administer budgets, train and work effectively with counterpart staff at all levels and with all groups involved in the project;
- Strong drafting, presentation and reporting skills;
- Strong computer skills, in particular mastery of all applications of the MS Office package and internet search;
- Strong knowledge of forest villages issues in Turkey, including the political, institutional and socio-economic contexts;
- Full proficiency in English and Turkish.

2) Project Associate (PA)

Background

According to project management needs, Project Associate (PA) will be a nationally recruited selected based on an open competitive process or UNDP CO's Forestry Cluster Associate will be assigned as the Project Associate (PA). He will report to FCL and assist the FCL in the coordination of the UNDP-GEF project. The PA will oversee support activities in project implementation including procurement, recruitment and operations logistics. The PA will assess support requirements against project objectives and operating environment.

Duties and Responsibilities

- Assist the PM in managing the project staff
- Coordinate the project experts and ensure that their results are delivered on time
- Prepare GEF quarterly project progress reports, as well as any other reports requested by the Executing Agency and UNDP
- Act as PM in case of his/her absence
- Overall, provide all necessary support to the PM in implementation of the project
- Provide general administrative support to ensure the smooth running of the PMU
- During the visits of foreign experts, manage their visa support, transportation, hotel accommodation etc

- Monitor the use of non-expendable equipment (record keeping, drawing up regular inventories)
- Arrange duty travel
- Perform any other administrative duties as requested by the PM
- Provide technical assistance and co-ordination for capacity building activities on carbon-focused forestry activities and sustainable forest management
- Assisting PM for technical co-ordination among consultants to be hired

Qualifications

- 3 years of experience in the area of the assistance to the project management at medium and small scale
- Familiarity with UNDP administrative procedures and requirements;
- Good organizational capacity;
- Knowledge in administrative procedures of the Government
- Good computer skills in common word processing (MS Word), spreadsheet (MS Excel), and accounting software.
- Appropriate English and Turkish language skills, both spoken and written.

International consultants

3) International Solar PV Technical Advisor (ISTA) (48 person weeks with at least 10 missions to Turkey – OR international solar CTA already based in Turkey)

Background

The Solar PV Technical Advisor (ISTA), will be an internationally recruited selected based on an open competitive process. He/She will report to Project Manager (PM) and assist in the coordination of the UNDP-GEF project in terms of technical matters. The ISTA will work approximately 25% of their time (1 week per month) to support this project and will travel to visit the project team and spend a week with them at least once per three months. The International Solar TA will be responsible for leveraging additional investment in solar PV in forest villages and Turkey and will have as a main role to provide strategic direction to the project with the goal of securing as much investment as possible. S/he will be responsible for communication with related technical organizations (TEDAS, TEIAS), will manage the information about technical portfolio of project installations and will support the awareness and capacity building activities.

Duties and Responsibilities

- Assist the PM in managing the technical aspects of the project
- Daily communication with related state technical organisations (TEDAS, TEIAS) and their local branches on projects implementation in the regions
- Responsibility for the development of the quality standards and project certification scheme
- Assist the PM and Marketing specialist with the awareness and capacity building activities (National awareness raising programme, workshops)
- Prepare the technical parts of the dissemination materials
- Lead in preparation of the case studies from the pilot projects
- Lead the works on the methodology for innovative approach (e.g. net metering) implementation and its pilot implementation into the market

- Lead the technical part of workshops

Qualifications

- A university degree in technical sciences.
- Full proficiency in English.
- Excellent knowledge of the local energy market.
- Knowledge of PV system installations and operation.
- Good knowledge of office software, such as word processors, spreadsheets, databases.
- At least 6 years of proven experience in the relevant field.

4) International Marketing Expert (ME) (48 person weeks with at least 10 missions to Turkey – OR international ME already based in Turkey)

Background

The Marketing Expert (IME), will be a internationally recruited national selected based on an open competitive process. He/She will report to Project Manager (PM) and assist in the coordination of the UNDP-GEF project in terms of marketing and awareness matters. S/he will be responsible for communication with the stakeholders, will manage the relations with the media and use other information channels to strengthen the level of information about the project.

Duties and Responsibilities

- Assist the PM in managing the awareness aspects of the project
- Regular communication with the stakeholders
- Preparation of the press releases
- Responsibility for the video outputs from the pilot sites
- Lead in organization of the awareness activities

Qualifications

- A university degree in social sciences or related field.
- Full proficiency in English.
- Proven experience in marketing of the projects (public or industrial).
- Knowledge of PV system installations and operation.
- Good knowledge of office software.
- At least 5 years of proven experience in the relevant field.

5) International MRV Expert (11 person weeks including 3 missions to Turkey)

Background

The International MRV expert (IMRV), will be an internationally recruited national selected based on an open competitive process. He/She will report to Project Manager (PM) and assist in the coordination of the UNDP-GEF project in terms of MRV system introduction. S/he will be responsible for development of the system and communication with the implementing agency (UNDP) about the related matters.

Duties and Responsibilities

- Assist the PM in managing the MRV of the project

- Regular communication with the implementing agency
- Preparation of the regular reports

Qualifications

- A university degree in technical sciences.
- Full proficiency in English.
- Proven experience in MRV systems of similar projects (RE implementation).
- Knowledge of PV system installations and operation.
- Good knowledge of office software.
- At least 5 years of proven experience in the relevant field.

6) International Carbon Market expert (4 person weeks including 2 missions to Turkey)

Background

The International Carbon Market expert (ICME), will be an internationally recruited national selected based on an open competitive process. He/She will report to Project Manager (PM) and assist in the coordination of the UNDP-GEF project in terms of writing the PDD (Project Design Document) and organizing and preparing for the validation and ensuring that the validation is successfully completed.. S/he will be responsible for the development of the PDD for the plan of activities for the voluntary carbon market under output 3.9.

Duties and Responsibilities

- Writing the PDD (Project Design Document)
- Organizing the Validation and making adjustments to PDD, as required
- Assist the PM in managing the PoA for voluntary carbon market (output 3.9.)
- Regular communication with the related stakeholders

Qualifications

- A university degree in technical sciences or related field.
- Full proficiency in English.
- Proven experience in voluntary carbon market projects.
- Minimum 5 years of experience in carbon finance
- Practical experience with designing JI/CDM projects, determination and monitoring missions
- Knowledge of PV system installations and operation.
- Good knowledge of office software.

Local Consultants

7) Local solar technical expert (102 person weeks)

Background

The Local Solar PV Technical Advisor (ISTA), will be a locally recruited national selected based on an open competitive process. He/She will support the International Solar Technical in the coordination of the UNDP-GEF project in terms of technical matters. S/he will be responsible for communication with

related technical organizations (TEDAS, TEIAS), will manage the information about technical portfolio of project installations and will support the awareness and capacity building activities.

Duties and Responsibilities

- Assist the ISTA in managing the technical aspects of the project
- Daily communication with related state technical organisations (TEDAS, TEIAS) and their local branches on projects implementation in the regions
- Responsibility for the development of the quality standards and project certification scheme
- Assist the PM and Marketing specialist with the awareness and capacity building activities (National awareness raising programme, workshops)
- Prepare the technical parts of the dissemination materials
- Assist in preparation of the case studies from the pilot projects
- Assist the works on the methodology for innovative approach (e.g. net metering) implementation and its pilot implementation into the market
- Assist the technical part of workshops

Qualifications

- A university degree in technical sciences.
- Full proficiency in English.
- Excellent knowledge of the local energy market.
- Knowledge of PV system installations and operation.
- Good knowledge of office software, such as word processors, spreadsheets, databases.
- At least 3 years of proven experience in the relevant field.

8) Local Marketing expert (60 person weeks)

Background

The Local Marketing Expert (LME), will be a locally recruited national selected based on an open competitive process. He/She will report to International Marketing Expert (IME) and assist in the coordination of the UNDP-GEF project in terms of marketing and awareness matters. S/he will be responsible for communication with the stakeholders, will manage the relations with the media and use other information channels to strengthen the level of information about the project.

Duties and Responsibilities

- Assist the LME in managing the awareness aspects of the project
- Regular communication with the stakeholders
- Preparation of the press releases
- Responsibility for the video outputs from the pilot sites
- Lead in organization of the awareness activities

Qualifications

- A university degree in social sciences or related field.
- Full proficiency in English.
- Proven experience in marketing of the projects (public or industrial).
- Good knowledge of office software.
- At least 3 years of proven experience in the relevant field.

9) ORKOY Loan Advisors

Background

The ORKOY Loan Advisors (LA) will be assigned from the current ORKOY staff. They will be responsible for the running of the SEFM mechanism under ORKOY structures, coordination of the SEFM activities with the ORKOY Credit Programme. They will help to PM and the responsible experts with day-to-day realization of the project outputs. Their prior responsibility will be the communication with the forest cooperatives and running on the funding scheme.

One of the LA will be focused on the financial aspects of the SEFM scheme, the other one will be focused on technical aspects. Both LA can benefit from the previous experience of ORKOY Credit Programme focused on installations of solar heating in forest villages.

Duties and Responsibilities

- Supervise and coordinate the grant/loan processes within the ORKOY
- Assist to PM and the experts with delivering of the project outputs and coordinate issues related to ORKOY structure.
- Ensure/coordinate the communication with the regional offices of ORKOY and the cooperatives.

Qualifications

- Proven financial and technical expertise – ability to deal with all financial, technical and communication challenges on daily basis.

- A university degree in Engineering, Management or Economical Sciences or related fields;
- At least 5 years of experience in project financing;
- At least 3 years experience with the ORKOY Credit Programme;
- The active participation in the ORKOY support programme for solar heating in forest villages would be an advantage;
- Strong knowledge of Forest villages issues in Turkey, including the political, institutional and socio-economic contexts;
- Strong computer skills, in particular mastery of all applications of the MS Office package and internet search;
- Excellent writing and communication skills in Turkish, knowledge of English would be an advantage.

8.4 Annex 4: GEF Climate Change Mitigation Tracking Tool

See separate document

8.5 Annex 5: Project Implementation Schedule

Outputs	Year 1				Year 2				Year 3				Year 4				Lead Responsibility for Implementation
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1. Policy & Institutional Framework for supporting Sustainable energy financing mechanism for solar power in forest villages																	
1.1 Evaluation and selection of public-private business models (ORKOY, solar PV installers, utilities, domestic banks) for provision of affordable, grid-connected residential solar PV to forest villagers, using an individual household and/or cooperative model.																	PM + ISTA
1.2 Terms of Reference for ORKOY's Social Credit Programme are revised, agreed, published and disseminated																	PM + ISTA
1.3 Sustainable energy Financing unit established within ORKOY with dedicated full time staff																	PM + PA
1.4 Model contract for ORKOY soft loan developed and utilized																	PM + PA
1.5 National Framework designed and operationalized to use Turkey's feed-In-Tariff scheme for the purpose of residential solar PV for forest villagers.																	PM + ISTA
1.6 Technical report on grid capacity and requirements to																	ISTA

	Year 1	Year 2	Year 3	Year 4	Lead Responsibility for
enable feed-in of grid-connected PV and to define technical information for the national grid code.					
1.7 Methodology for innovative approach (e.g. net metering) is developed, published and disseminated					ISTA
2. Solar PV demonstration Projects					
2.1 Business plans & feasibility studies prepared for a total of four demonstration projects in forest villages up to 400kW					PM + ISTA
2.2 Four demonstration projects successfully implemented in forest villages in 4 different regions.					ISTA
2.3 Case Studies Prepared on each of the Demonstration Projects					ISTA + IME
2.4 Short video documentary prepared on the demonstration projects					IME
3. Replication and scaling up – Enhancement of the sustainable energy financing mechanism					
3.1 National Awareness Raising Programme for ORKOY Sustainable Energy Financing Mechanism addressing forest village end-users and cooperatives					ISTA

	Year 1			Year 2			Year 3			Year 4			Lead Responsibility for
3.2 Solar PV Training Manual for actors in solar PV value chain (ORKOY officials, installers, utilities) on how to develop, finance, and implement solar PV projects is prepared, published and disseminated widely													ISTA + IME
3.3 Twenty National workshops held to promote the solar PV training manual targeting solar PV value chain (ORKOY officials, installers, utilities)													ISTA + IME
3.4 MRV system and indicators designed and implemented to reliable track energy consumption													PM + IMRV
3.5 Quality standards and certification scheme designed and implemented for solar PV hardware and for skilled technicians													ISTA
3.6 Workshops with domestic and international banks to consult, build familiarity and integrate their lending to solar PV with ORKOY													PM + ISTA + IME
3.7 Project Website - Practical Guide to Investing in Solar PV in Turkey													IME
3.8 Programme of Activities (PoA) for voluntary carbon													ICM

	Year 1	Year 2	Year 3	Year 4	Lead Responsibility for
market for forest villages solar PV project					
3.9. 30 MW of solar projects successfully implemented					PM

Note: Project Manager (PM); Project Associate (PA); International Solar PV Technical Advisor (ISTA); International Marketing Expert (IME); International MRV Expert (IMRV); International Carbon Market Expert (ICM)

8.6 Annex 6: Analysis of Greenhouse Gas Emission Reductions

GEF requires every climate change project to provide an estimate of the avoided or reduced amount of greenhouse gas (GHG) emissions. The calculation is based on MANUAL FOR CALCULATING GHG BENEFITS OF GEF PROJECTS: ENERGY EFFICIENCY AND RENEWABLE ENERGY PROJECTS.

Direct link to document:

https://www.thegef.org/gef/sites/thegef.org/files/documents/C.33.Inf_18%20Climate%20Manual.pdf

1. Quantification of Direct Benefits: Comparing the emissions of the current energy supply with that of PV

1.1 Project Parameters

The Yearly Energy Production of a PV system is $FLH \times kWp$.

The Installed Capacity (kWp) of the PV in the project is estimated at 30 000 kWp.

The Theoretical Annual Full Load Hours (FLH) for PV system in Turkey is about 1 800 (kWh). However, conservative assumptions are considered in the project, an average of 1 584 full load hours could be expected under reasonably favourable local conditions with minimum shade (this is the average efficiency assumption we used for the project).

Therefore the yearly energy production of the project PV systems is:

$$30\,000\text{ kWp} \times 1\,584 = 47\,520\text{ MWh}$$

1.2 Calculation of the Annual Amount of CO₂ avoided

If the amount of electrical energy produced by the PV were to be produced by the existing electricity distribution system, the CO₂ emissions generated would be calculated using the formula below:

$$\text{Average Carbon Dioxide Emissions: } tCO_2\text{MWh} \times FLH \times KWp / 1000 = \text{Amount } tCO_2/\text{yr}$$

For the proposed PV systems, the grid emission factor for electricity based on the data from EBRD 0,605 tCO₂ / MWh is used. (<http://www.ebrd.com/downloads/about/sustainability/cef.pdf>).

The following results are realized:

$$\text{Annual CO}_2 \text{ Emission Reduction} = (0.605 \times 1\,584 \times 30\,000) / 1000 = 28\,750\text{ tCO}_2/\text{yr}$$

1.3 Direct Project Emission Reductions

The GEF guidelines for calculating the lifetime CO₂ emission savings of technology / measures implemented during the project period (as direct action of the GEF project) are as follows:

$$CO_2 \text{ direct} = e * l * c$$

Where

e = annual energy savings in the last year of the project period [in t / MWh]

l = average useful lifetime of equipment in years

c = CO₂ intensity of the marginal technology [in t CO₂/ t fuel or MWh]

Using this calculation, and assuming an expected lifetime of 20 years for the PV systems, the total direct CO₂ Emission reduction will be $47\,520 \times 20 \times 0.605 = 574\,992 \text{ tCO}_2$

1.4 Direct Post-project Emission Reductions

It is expected that the SEFM unit established during the project will continue in operation under ORKOY for at least another 10 years after the project. Every year a total output of 10 MWp will be installed with this support. Therefore the total installed capacity (post-project) after ten years will be 100 MWp.

The GEF guidelines for calculating GHG emissions saved by the Post-project are as follows:

$$CO_2 \text{ DPP} = CO_2 \text{ direct} * tf$$

Where

CO₂ DPP = emission reductions stemming from the post-project operation of the revolving fund

CO₂ direct = direct emission reductions occurring during the project lifetime that were supported by the fund

tf = turnover factor of the fund

Using this calculation, and assuming an expected turnover factor 3.33 (100 MWp /30 MWp), the total Direct Post-project Emission Reduction will be $574\,992 \times 3.33 = 1\,914\,723 \text{ tCO}_2$.

2. Quantification of Indirect benefits: Estimate medium to long-term replication of PV systems installed by project

Indirect benefits in terms of emissions reductions can be estimated using both a top down and a bottom up approach.

2.1 Bottom-Up Approach

The GEF guidelines for calculating GHG emissions saved with investments after the project period, using the bottom-up approach, are as follows:

$$\text{CO}_2 \text{ indirect BU} = \text{CO}_2 \text{ direct} * \text{RF}$$

Where

- $\text{CO}_2 \text{ direct}$ = estimate for direct & direct post-project emission reductions
- RF = replication factor, i.e., how often the project's investments are repeated during the 10 years after project implementation

Using the bottom up approach, and assuming a replication factor of 2.5 (according to MANUAL FOR CALCULATING GHG BENEFITS OF GEF PROJECTS: ENERGY EFFICIENCY AND RENEWABLE ENERGY PROJECTS, paragraph 43 a) and c), http://www.thegef.org/gef/sites/thegef.org/files/documents/C.33.Inf_18%20Climate%20Manual.pdf), the additional total indirect CO_2 emissions reduced (with investments after the project period) as a result of the project can be estimated at: $574\,992 \times 2.5 = 1\,437\,480 \text{ tCO}_2$

2.2 Top-Down Approach

The GEF guidelines for calculating maximum achievable indirect GHG emissions as assessed by the top-down methodology are as follows:

$$\text{CO}_2 \text{ indirect TD} = \text{P10} * \text{CF}$$

Where

- P10 = Technical and economic potential GHG savings with the respective application within 10 years after the project
- CF = GEF causality factor

The population of forest villages is around 7,332,000, representing 9.6% of the entire country's people and 35% of the rural population. This population is distributed around the country across 21,549 villages. It is anticipated, that further 3000 project installations with average capacity of 100 kWp will be installed in 10 years post project period, using established SEFM. It represents 13,9 % of forest villages and total 300MWp of total installed capacity.

By the 10th year after the end of the project, the indirect GHG savings will be $300 \text{ MWp} \times 1.584 \text{ MWh} \times 0,605 \text{ tCO}_2/\text{MWh} = 287\,496 \text{ tCO}_2$ per year. The GEF causality factor selected is 80% based on GEF definition: "The GEF contribution is dominant, but some of this reduction can be attributed to changes in the baseline." (according to MANUAL FOR CALCULATING GHG BENEFITS OF GEF PROJECTS: ENERGY EFFICIENCY AND RENEWABLE ENERGY PROJECTS, paragraph 47 b), http://www.thegef.org/gef/sites/thegef.org/files/documents/C.33.Inf_18%20Climate%20Manual.pdf)

Thus, the total indirect emissions reductions equal the annual amount in year 10 x the average useful lifetime of the equipment (in years) x the GEF causality factor: $287\,496 \times 20 \times 0.80 = 4\,599\,936 \text{ tCO}_2$.

3. Summary of Emission Reductions & Cost Effectiveness

The summary table below presents the CO₂ Emission Reduction that may result from the project, and the cost effectiveness of the emissions reduction impacts of the project. The calculation is made based on the following assumptions:

The Theoretical Annual Full Load Hours (FLH) for PV system in Turkey is about 1 800 (kWh). However, conservative assumptions are considered in the project, an average of 1 584 full load hours could be expected under reasonably favourable local conditions with minimum shade (this is the average efficiency assumption we used for the project).

For the proposed PV systems, the grid emission factor for electricity based on the data from EBRD 0,605 tCO₂ / MWh is used.

The population of forest villages is around 7,332,000, representing 9.6% of the entire country's people and 35% of the rural population. This population is distributed around the country across 21,549 villages. It is anticipated, that further 3000 project installations with average capacity of 100 kWp will be installed in 10 years post project period, using established SEFM. It represents 13,9 % of forest villages and total 300MWp of total installed capacity.

By the 10th year after the end of the project, the indirect GHG savings will be 300 MWp x 1.584 MWh x 0,605 tCO₂/MWh = 287 496 tCO₂ per year. The GEF causality factor selected is 80% based on GEF definition: "The GEF contribution is dominant, but some of this reduction can be attributed to changes in the baseline."

Project GHG emission reduction impacts

Time-frame	Direct: Project (20-year equipment life)	Direct: Post- Project	Indirect – Bottom Up: Post- project with replication (GEF Replication Factor of 2.5)	Indirect – Top Down: Causality Factor of 80%
Installed PV (MW)	30	100	75	30 – 300
Total CO ₂ emissions reduced (tons)	574 992	1 914 723	1 437 480	4 599 936
CO ₂ emissions reduced (tons) per GEF \$ (GEF Budget of \$3 780 000)	\$6.57	\$1.97	\$2.63	\$0.82

8.7 Annex 7: Pricing for Solar PV Systems in Turkey

In this annex, prices for solar PV systems for different sizes are given. Turkish section of International Solar Energy Society, the GUNDER, has contributed to gather this information. One of GUNDER members, the Alfa Solar Co. has prepared the costs for the following projects as an example according to the January 2015 market conditions. The same organization was visited during the stakeholder consultation phase in order to collect information on the position of private sector on Solar PV in Turkey.

Table 1 – The costs of solar PV installations according to different size of established power. The figures are collected as of January 2015.

Established power	Annual Energy Production (kWh/year)	Number of Panels	Number of Inverters	Total Price (USD) (excluding 18% VAT)
30 kWp	48,900	120	2	48,122
100 kWp	163,000	400	5	143,194
1,000 kWp	1,630,000	4,000	50	1,260,200

The prices of solar instalments given above include the items below:

- Polycrystalline ASE 250P panels with 15,14% efficiency
- Galvanize and aluminum carrying systems
- String inverter with 15 or 20 kW Freneus
- CCTV monitoring system
- DC solar cables and AC cables
- DC and AC electric panels
- Project design
- Installation
- Meter
- Fencing
- Prefab warden hut
- TEDAŞ project approval costs
- Transportation

The original quotations are given below in Turkish.

Proposal for 1,000 kwp for an instalment in Konya province.

Firma adı		Tarih	
Yetkili Kişi	Bahtiyar Kurt	19.1.2015	
Adres	MERMER / KONYA / TÜRKİYE	Teklif No	ASE15GEST-3011
Telefon			
E-Posta	Kurt.bahtiyar@gmail.com		
Konu	1000 Kwp Sistem Teklifi		
Hazırlayan	Aydın H.S.		

SN	ÖRÖN	AÇIKLAMA	ADET	BR.	TUTAR
1.	Polycrystalline 10P ASE-250P	Fotovoltaik Güneş Paneli P: 250 wp V: 30 Volt I: 8,33 Amper EN: 997 mm DCY: 1652 mm VERİM % 15,14	4.000	Adet	1.100.000 €
2.	Taşıyıcı Sistem	Yapı: Galvaniz ve Alüminyum Yükseklik: 500 mm Açı: 33°	1.000	Kwp	
3.	Inverter-Evriç	Sizing Inverter 20 kW Fronius	50	Adet	
4.	Uzaktan İzleme	İzleme ve Veri Kayıt (UP-Web)	1	Tk.	
5.	DC Kablo	DC Solar Kablo 4mm² x 1	7.000	Mt.	
6.	AC Kablo	AC Kablo 1 K 240 mm²	4.000	Mt.	
7.	DC Elektrik Panosu	DC Sigortalama, IP65 KUTU	20	Adet	
8.	AC Elektrik Panosu	AC Pano (Keski, Anailetör v.b.)	1	Adet	
9.	Projelendirme	Anahtar Teslim Tüm Projeler	1	Tk.	
10.	Montaj-Uygulama	Tüm Süreçler - Devreye Alma	1	Tk.	
11.	Seyah	Çift Yönlü	1	Ad.	
*	Prefabrik Bina	Prefabrik Bekçi Kabini	0	Tk.	
*	Güvenlik Ekipmanı	Telçik , CCTV Kamera, DvR	1	Tk.	
Toplam					1.100.000,00 €

Proposal for 100 kwp for an instalment in Konya province.

Firm adı		Tarih	
Yetkili Kişi	Bahtiyar Kurt	19.1.2015	
Adres	MERKEZ / KONYA / TÜRKİYE	Teklif No	ASE15GEST-2010
Telefon			
E-Posta	Kurt.bahtiyar@gmail.com		
Konu	100 Kwp Sistem Teklifi		
Hazırlayan	Aydin H.S.		

SN	ÜRÜN	AÇIKLAMA	ADET	BR.	TUTAR	
1.	Monocrystalline İp ASE-250P	Fotovoltaik Güneş Paneli P: 250 wp V: 30 Volt I: 8,33 Amper EN: 997 mm BOY: 1652 mm VERİM % 15,14	400	Adet	125.000 ₺	
2.	Taşıyıcı Sistem	Yapı: Galvaniz ve Alüminyum Yükseklik: 500 mm Açı: 33°	100	Kwp		
3.	Inverter-Eviziçli	String Inverter 20 kW Fazlısuz	5	Adet		
4.	Uzaktan İzleme	İzleme ve Veri Kayıt (IP-Web)	1	Tk.		
5.	DC Kablo	DC Solar Kablo 4mm² x 1	700	Mt.		
6.	AC Kablo	AC Kablo 1 X 240 mm²	400	Mt.		
7.	DC Elektrik Panosu	DC Sigortakama, IP65 KUTU	2	Adet		
8.	AC Elektrik Panosu	AC Pano (Kesici, Analizör v.b.)	2	Adet		
9.	Projelendirme	Anahtar Teslim Tüm Projeler	1	Tk.		
10.	Montaj-Uygulama	Tüm Süreçler - Devreye Alma	1	Tk.		
11.	Sayaç	Çift Yönlü	1	Ad.		
*	Prefabrik Bina	Prefabrik Bekçi Kabini	0	Tk.		
*	Güvenlik Ekipmanı	Teletip , CCTV Kamera, D/VB	1	Tk.		
Toplam						125.000,00 ₺

Proposal for 30 kwp for an instalment in Konya province.

Fiyat Teklifi

Firma adı					Tarih
Yetkili Kişi		Bahtıyar Kurt			19.1.2015
Adres		MERMER / KONYA / TÜRKİYE			Teklif No
Telefon					ASE15GEST-3009
E-Posta		Kurt.bahtıyar@gmail.com			
Konu		30 Kw Sistem Teklifi			
Hazırlayan		Aydın H.S.			
SN	ORDN	AÇIKLAMA	ADET	BR.	TUTAR
1.	Polycristaline İp ASE-250P	Fotovoltaik Güneş Panelli P: 250 wp V: 30 Volt I: 8,33 Amper EN: 997 mm BOY: 1652 mm VERİM % 15,14	120	Adet	42.000 €
2.	Taşıyıcı Sistem	Yapı: Galvaniz ve Alüminyum Yükseklik: 500 mm Açı: 33°	30	Kwp	
3.	(Inverter-Evrikl)	String Inverter 15 kW Freoqus	2	Adet	
4.	Uzaktan İzleme	İzleme ve Veri Kayıt (IP-Web)	1	Tk.	
5.	DC Kablo	DC Solar Kablo 4mm² x 1	210	Mt.	
6.	AC Kablo	AC Kablo 1 X 240 mm²	160	Mt.	
7.	DC Elektrik Panosu	DC Sigortalama, IP65 KUTU	1	Adet	
8.	AC Elektrik Panosu	AC Pano (Kesici, Anaizastör v.b.)	1	Adet	
9.	Projelendirme	Anahtar Teslim Tüm Projeler	1	Tk.	
10.	Montaj-Uygulama	Tüm Süreçler - Devreye Alma	1	Tk.	
11.	Sayac	Çift Yönlü	1	Ad.	
*	Prefabrik Bina	Prefabrik Bekçi Kabini	0	Tk.	
*	Güvenlik Ekipmanı	Telet , CCTV Kamera, DVR	1	Tk.	
Toplam					

8.8 Annex 8: Summary of the Financial Report

The objective of this report is to outline sustainable financing options that can help kick-start development of community-scale, grid-connected solar PV installations amongst Turkey's poorest populace, its 7m forest villagers. The project itself aims to enable installation of at least 30MW of capacity within a 4-year time span, catalysed by grants and low-cost loans from ORKÖY (The Department of Forest and Village Relations) together with grant funding from GEF (The Global Environment Facility).

Turkey's rapidly expanding economy is heavily reliant on increasing energy imports, which is costly, unsustainable and leads to concerns over energy security. With high levels of annual solar irradiance, the country is particularly well suited to solar PV development. However, to date, Turkey's ambition and progress on domestic renewable energy has been limited and it stands out as the southerly European country with the lowest solar PV capacity per head, by a wide margin. This has been due to an unappealing financial, legislative and institutional environment.

Whilst there has been significant government rhetoric on encouraging renewables, support is still considered to be insufficient to kick-start the industry into achieving the great potential it promises. The Feed-in Tariff, for example, is one of the poorest in Europe and its short-term nature creates much long-term financial uncertainty for renewable schemes.

What's more, with respect to community generation projects of this nature, current legislation compels schemes to sell generation to the grid, pay distribution fees and then reimport consumption at significantly higher prices, severely affecting the overall financial efficiency to the detriment of impoverished forest villagers. For this reason, the report strongly advocates for legislative change, allowing community schemes to adopt a virtual net-metering policy that would negate these inefficiencies.

ORKÖY's current policy framework precludes the involvement of third party financiers. However, in the absence of this, the project would require utilizing 75% of their entire sustainable energy budget, which may not be available if demand for other schemes is high. Furthermore, financing the project entirely from subsidies does not help establish a sustainable mechanism that can ultimately run independently of benefaction for the longer term.

In order then to more confidently fulfill the project and create a sustainable mechanism for further deployment beyond subsidies, a number of options are proposed that additionally involve contribution from PV suppliers and banks (eg The French Development Agency has expressed an interest in participating in the scheme).

It is recommended that the project commences using the \$1.4m GEF funding as grants towards installation costs, weighted towards the earlier schemes (when PV prices are higher), with ORKÖY grants and soft-loans financing the remainder, whilst in parallel efforts are made to make legislative changes and encourage ORKÖY to adapt its policy to embrace cooperation from other lenders.

It is demonstrated, for example, that if PV suppliers accept deferred payments over three years, GEF funds were used as small grants towards installation costs, ORKÖY were to give 25% grants and lend 20% of costs at 1.3% interest under their Economic Credit Scheme and the outstanding debt were funded by a line of credit with a bank at 5% interest (supported by debt guarantees from ORKÖY) that the entire 30MW could be deployed whilst keeping ORKÖY's exposure to 35% of their entire sustainable energy budget. What is more, if the more expensive bank debt were settled prior to the soft loans from ORKÖY,

then the overall effective interest on all debt would fall to 2.6%pa, allowing all debt to be settled within 4.8 years, providing villagers with over 20 years' of low-cost green energy.

A potential pathway to achieving the aims, acknowledging ORKÖY's current resistance to third party involvement, is to initiate the project with purely soft financing and aim to gradually engage other parties through time, ultimately building a long-term sustainable platform for the project that can work beyond the 30MW/4 year window, for example:

Year	No. Installations	Cumulative Capacity	Scenario	Funding	PV Cost/100kWp	Total Cost	Supplier Payment	GEF Grant Funding	ORKÖY Grant Funding	ORKÖY Soft Loan	Payment of FIT income to Supplier	Commercial Loan/Credit	Repayment ORKÖY	Repayment Commercial Loan/Credit
1	4	0.1	I	100% GEF grants	\$130 000	\$650 000	\$650 000	\$650 000						
2	12	2.1	I	12.5% GEF grants, 25% ORKÖY grants, 62.5% ORKÖY soft loans (@1.3%)	\$126 750	\$1 521 000	\$1 521 000	\$190 125	\$380 250	\$950 625				
3	60	8.1	II	7.5% GEF grants, 25% ORKÖY grants, 21.25% ORKÖY soft loans (@1.3%) 46.25% Commercial Loan (@6%)	\$123 581	\$7 414 875	\$7 414 875	\$556 116	\$1 853 719	\$1 575 661		\$3 429 380	\$239 107	
4	224	30	III	Deferred Supplier Payment (50,25,25) 25% ORKÖY grants, 20% ORKÖY soft loans (@1.3%) 22% Commercial line of credit (@5%) 33% FiT income	\$120 492	\$26 990 145	\$13 495 073		\$6 747 536	\$5 398 029		\$1 349 507	\$236 638	\$1 195 536
5							\$6 747 536				\$4 463 334	\$2 284 202	\$234 173	\$1 183 188
6							\$6 747 536				\$4 417 234	\$2 330 303	\$231 715	\$1 170 867
7													\$864 753	\$4 706 299
8													\$2 907 954	\$2 263 944
9													\$3 669 951	
Total						\$36 576 020	\$36 576 020	\$1 396 241	\$8 981 505	\$7 924 315	\$8 880 568	\$9 393 391	\$8 384 291	\$10 519 833

Under this approach, by the end of the project's four-year implementation period, the financial subsidies will have enabled the creation of a valuable protocol between village cooperatives, PV suppliers and banks that could continue to be used thereafter without the need for further financial subsidy. This would allow the installed capacity to expand significantly beyond the 30MW target. For example, if 25% of forest villages were ultimately to enrol, the total installed capacity could reach 539MW, generating 854GWh/yr., avoiding the emission of 517,000tCO₂/yr. and providing an effective financial benefit to 1.75m villagers of \$100m each year.

If there is success in persuading government to accept a virtual net-metering policy for community schemes such as these, it would add a further \$280,000 income over the 25 year lifespan to an individual 100kW_p village installation, equivalent to \$83m across the entire 30MW project, which would make a significant difference to these people's lives.

Furthermore, if this project is successful in effecting legislative changes to make the overall renewables environment in Turkey more attractive to investors per se it could have significant ramifications. For example, if the country were able to achieve a similar PV capacity per capita as Italy, this would be equivalent to 22.5GW, yielding ~33.75TWh/yr., satisfying ~17% of current national electrical demand and avoiding 20MtCO₂ each year.

Many renewables incentives, such as FiTs, primarily favour the wealthy who have money to invest in the first place. A scheme such as this project, combined with studies to improve legislative practices, would help kick-start the industry and give some of the most needy people in Turkey access to green energy – helping mitigate climate change whilst assisting in the plight of these poverty stricken forest villagers.

Financial Scenarios Summary

Lifetime Variables	Scenario I Pure Soft Funding	Scenario II +Commercial Banking Support	Scenario III +Deferred Supplier Payments	Scenario IV +Net-Metering
Total Income	\$177.0m	\$177.0m	\$177.0m	\$260.0m
Debt Repayments	\$27.0m	\$29.0m	\$27.2m	\$26.8m
(of which) Interest Costs	\$1.0m	\$2.9m	\$1.2m	\$0.7m
Net Income	\$150.0m	\$148.0m	\$149.8m	\$233.2m
Maximum Exposure of ORKÖY	\$33.3m	\$17.5m	\$15.7m	\$15.7m
Av Payback Period (yrs)	4.7	5.0	4.8	3.3
GEF Funding	\$1.4m			
Avoided CO ₂	658,054t			

From the perspective of the villages, the net income from Scenarios I and III are almost the same, yet, in Scenario III the exposure of ORKÖY is less than half that in Scenario I. Scenario III is thus significantly less susceptible to uncertainties over ORKÖY's budget allocation for this PV scheme. What is more, it establishes a protocol for lending to forest villages that can work beyond the 30MW/4 year window of this project without the need for further subsidies .

However, by far the most significant impact upon the viability of these projects comes from net-metering (Scenario IV); income is greater, so debt is repaid more quickly, so interest costs are lower, resulting in an increased net benefit to forest villagers of \$83m over the other scenarios.

Beyond Subsidies

After the project's intended deployment period of four years, a valuable protocol will have been established between village cooperatives, PV suppliers and, hopefully, lending banks that could continue to be employed.

By this time PV installation costs are likely to have fallen by at least ~10%, taking the installed cost of 100kW_p to under \$117,000. In this case, even if there has been little progress on improvement of FiT conditions or net-metering, such an installation could repay all debt in 7 years assuming all capital was borrowed at 6% interest, providing forest villages with 18 years' of low-cost green energy without the need for any subsidy.

This would allow the capacity of the project to expand significantly beyond the 30MW target. For example, if 25% of forest villages were ultimately to enroll, the total installed capacity could reach 539MW, generating 854GWh/yr., avoiding the emission of 517,000tCO₂/yr. and providing an effective financial benefit to 1.75m villagers of \$100m each year.

Furthermore, if this project is successful in effecting legislative changes to make the renewables environment more attractive to investors per se it could have significant environmental ramifications. For example, if Turkey were able to achieve a similar PV capacity per capita as Italy (~300W/person), this would be equivalent to 22.5GW (to put this into context, Germany, with a similar population to Turkey, currently has 38GW installed PV). This would yield ~33.75TWh/yr. (ie satisfying ~17% of current national demand) and avoid 20MtCO₂ each year.

Conclusions

It is demonstrated here that it is possible to use the funding of \$1.4m from GEF as grants and part of ORKÖY's sustainable energy budget as grants and soft loans to act as an invaluable catalyst for the project to enable at least 30MW of PV to be installed in forest villages within four years to the benefit of Turkey's poorest communities whilst avoiding 658kt of carbon emissions over the 25 year lifespan of the systems.

However, in the absence of involvement of an additional external funding partner, this would consume a sizeable proportion (75%) of their entire sustainable energy budget, and this may not be available to the project if there is high demand from other schemes such as solar water heating and home insulation.

If, however, it is possible for inclusion of a third party bank prepared to offer loan guarantees, and additionally arrangements are established with suppliers to defer a proportion of payments, the project can be completed using around 1/3 of the ORKÖY budget whilst also keeping debt costs to manageable levels at an overall net interest charge of just 2.6%pa.

What is more, once this essential soft-funding has been used to establish and build a protocol between the key participants (ie village cooperatives, banks and PV suppliers), it would be possible to continue the program indefinitely with commercial banks without the need for any further financial subsidies. This would allow the project to expand significantly beyond the 30MW target. For example, if 25% of forest villages were ultimately to enroll, the total installed capacity could reach 539MW, generating 854GWh/yr, avoiding the emission of 517,000tCO₂/yr and providing an effective financial benefit to 1.75m villagers of \$100m each year.

The most significant area of inefficiency in the entire project is the compulsion for community schemes to sell generation to the grid, pay distribution fees and then reimport energy at a higher price. Effectively, across the entire scheme, this will represent a monetary loss to the villagers of some \$83m over 25 years, and this loss is effectively absorbed by the electrical distribution companies.

The adoption of a community net-metering policy in Turkey would negate this issue and make a significant difference to the impoverished forest villagers and so every effort should be made to study for legislative improvement in this area, although there is likely to be significant resistance to this, not least

from the distribution companies who stand to lose this \$83m revenue. What is more though, this kind of activity would help make Turkey a more attractive environment for renewables investments per se and so could help the country deliver on the enormous potential it offers for renewables, especially solar. If Turkey could deliver similar PV capacities as some European countries of similar irradiance levels (i.e. Italy, Spain and Greece), this would have a significant emissions avoidance impact. For example, if it were able to achieve a similar PV capacity per capita as Italy (~300W/person), this would be equivalent to 22.5GW (cf Germany's 38GW capacity), this would yield ~33.75TWh/yr., satisfy 17% of current national demand and avoid 20MtCO₂ each year.

Given reluctance to engage with third parties for additional funding at this stage, it is recommended that the approach is tackled in phases, initially adopting Scenario I (purely using soft-funding) and through time attempt to persuade ORKÖY and address financial/legislative barriers, to migrate to the 'higher' more efficient scenarios as circumstances permit, hopefully ultimately gaining acceptance of a net-metering policy to allow the villagers to receive optimal benefit.

Many renewables incentives, such as FiTs, primarily favour the wealthy who have money to invest in the first place. A scheme such as this project, combined with activities to improve legislative practices, would help kick-start the industry and give some of the most needy people in Turkey access to green energy – helping mitigate climate change whilst assisting in the plight of these poverty stricken forest villagers.

8.9 Annex 9: Pilot Sites of the Project

As described in the project rationale, increasing the awareness among forest villagers and increasing the technical capacities of ORKOY staff and decision makers in central and regional levels are key challenges in order to remove the barriers regarding the solar PV installments in forest villages of Turkey. The existing loan mechanism of ORKOY is based on demand coming from the villagers. Thus, the project is planning to undertake a series of awareness and capacity building activities targeting forest villagers and ORKOY staff. A key activity of the project is the establishment of solar PV s in forest villages in different parts of Turkey as a demonstration. These pilot implementations will establish a know how on project design, implementation and other issues and will be used as capacity building instrument for the regional and central technical ORKOY staff. The project is aiming to install 4 different solar PV systems in different parts of Turkey. This Annex summarizes the selection criteria as well as the candidate sites for implementations.

During the project preparation period, several meetings have been held between UNDP, consultants and ORKOY officials aiming to identify the pilot sites approach. The experts have first of all come up with an agreed list of criteria for site selection that is summarized in the table below. These criteria will be taken as a base for future implementations by ORKOY upon further development regarding the experience gained during the pilot implementations

Table 1 - Site selection criteria for pilot sites

General
Accessibility: The site should be accessible within a 1one day round trip from Ankara so that it is visible to any stakeholder.
Technical
Construction easiness: The site should be accessible from the main roads for construction and transport of equipment.
Connectivity: In the selected site, the grid connection conditions should be good enough to avoid possible problems regarding energy transfer.
Solar radiation: The site should have no shading obstacles (forest cover, buildings, hill effect etc.) and preferably face south.
Environmental
Production landscapes: The site shouldn't be used for any other purpose (farming, pastureland, forestry).
Biodiversity conservation: The site shouldn't be in any kind of protected area and/ or the construction shouldn't harm any pristine habitats of natural value.
Social

Social easiness: The social structure of the selected site should be open to such projects in order to avoid possible conflicts and increase the ownership of the action.

The General Directorate of Forestry (GDF) works through its local branches distributed in 27 regions in Turkey and in each of these offices there is an ORKOY branch. During the project preparation period, GDF has worked to decide which of these regional directorates to be selected for pilot sites of the project. The existing capacities of the local branches and geographical representativeness were the key issues regarding this selection. After a detailed assessment, GDF has decided to select Afyon, Corum, Elazig and Konya regional directorates to be pilot areas. Afterwards, a questioner was sent to all of these four branches to fill in to identify the candidate villages. After the assessment of local branches a matrix was build to list candidate sites with their typical features like the province and sub province the villages belong; number of active households; transformer capacities (obtained from local utility companies); existence of suitable site for solar PV installation and existence of forest cooperatives. The table is given at the end of the annex.

During the first six months of the project, the project team will visit those candidate sites and come up with the exact list of pilot sites. ORKOY will support and speed up the process with its local offices.

The specific radiation values and possible electricity production values with respect to three different solar PV capacities are given in the table below for each pilot region.

Table 2 - Radiation levels and expected electricity production in the candidate provinces

Province	Average radiation (kwh/m2-year)	Average specific production (kWh/kWp)	Annual energy production of 30 kWp (kWh)	Annual energy production of 50 kWp (kWh)	Annual energy production of 100 kWp (kWh)
Afyon	1,550-1,600	1,500-1,550	45,000-46,500	75,000-77,500	150,000-155,000
Corum	1,450-1,500	1,400-1,450	42,000-43,500	70,000-72,500	140,000-145,000
Elazig	1,600-1,650	1,550-1,600	46,500-48,000	77,500-80,000	155,000-160,000
Konya	1,650-1,700	1,500-1,650	45,000-49,500	75,000-82,500	150,000-165,000

Figure 1 – Pilot regions for solar PV installations

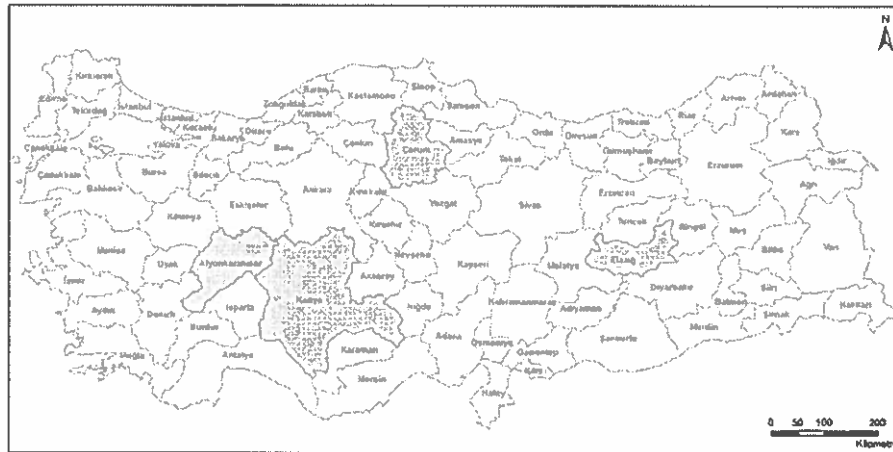


Table 3 – Pre selected sites

No	Province	Sub-province	Village	Village Info							
				Is there a coop?	Name of the Coop	Active household no.	Easy to access?	Suitable place for installment	All day sunlight?	No. of transformers	Total transformer capacity (kW)
1	Çorum	Laçın	Narlı	No		200	Yes	Yes	Yes	2	250-100
2	Çorum	Center	Şeyhhamza	No		45	Yes	Yes	Yes	1	50
3	Çorum	Center	Taşpınar	No		25	Yes	Yes	Yes	1	50
4	Çorum	Osmancık	Başpınar	Yes	Koop. S.S. Tarım Kalkınma	125	Yes	Yes	Yes	2	100-100
5	Çorum	Osmancık	Tekmen	No		50	Yes	Yes	Yes	1	50
6	Çorum	Osmancık	Gecek	No		75	Yes	Yes	Yes	1	100
7	Çorum	Sungurlu	Büyükbolatlı	No		40	Yes	Yes	Yes	1	50
8	Çorum	Alaca	Küçükdonu	No		60	Yes	Yes	Yes	1	50
9	Çorum	Mecitözü	Figani	No		100	Yes	Yes	Yes	2	100-50
10	Çorum	Ortaköy	Salbaş	No		35	Yes	Yes	Yes	1	50
11	Çorum	Dodurga	Çiftlik	No		120	Yes	Yes	Yes	2	160-100
12	Afyon	Center	Kızıldağ	No		260	Yes	Yes	Yes	2	50-50
13	Afyon	Sinanpaşa	Çayhisar	Yes	Çayhisar Tarım Kalkınma	60	Yes	Yes	Yes	1	100

14	Afyon	Şuhut	Altıhisar	No			Yes	Yes	Yes	5	100-160-160-250-250
15	Afyon	Şuhut	Çobankaya	No			Yes	Yes	Yes	1	250
16	Afyon	Emirdağ	Aşağıkurudere	No			Yes	Yes	Yes	1	50
17	Afyon	Bolvadin	Dipevler	No			Yes	Yes	Yes	2	100-160
18	Afyon	Çobanlar	Kale	Yes	Kale Tarım Kırsal Kalkınma	150	Yes	Yes	Yes	2	100-100
19	Afyon	Hocalar	Kozluca	No			Yes	Yes	Yes	1	50
20	Afyon	Sandıklı	Nasuhoğlu	No			Yes	Yes	Yes	1	100
21	Afyon	Sandıklı	Çamoğlu	No			Yes	Yes	Yes	2	50-100
22	Elazığ	Center	Bağlarca	No		70	Yes	Yes	Yes	2	100-100
23	Elazığ	Center	Ortaçalı	Yes	Ortaçalı Kırsal Kalkınma	30	Yes	Yes	Yes	4	160-100-100-100
24	Elazığ	Center	Küllük	No		23	Yes	Yes	Yes	2	50-100
25	Elazığ	Center	Yukarıbağ	No		85	Yes	Yes	Yes	1	50
26	Elazığ	Center	Günaçtı	No		30	Yes	Yes	Yes	3	100-50-50
27	Elazığ	Center	Sakabaşı	No		140	Yes	Yes	Yes	5	50-50-250-250-160
28	Elazığ	Center	Öksüzuşağı	No		80	Yes	Yes	Yes	6	50-100-100-50-100-160
29	Elazığ	Center	Koparuşağı	No		30	Yes	Yes	Yes	1	100
30	Elazığ	Center	Yalındamlar	No		85	Yes	Yes	Yes	3	100-100-50
31	Elazığ	Baskil	Sarıgül	No		35	Yes	Yes	Yes	1	100
32	Elazığ	Sivrice	Kavak	Yes	Günbaşı Kavak köy Kösebayır Kırsal Kalkınma	7	Yes	Yes	Yes	1	100
33	Elazığ	Sivrice	Güneyköy	Yes	Güney Cevizdere Kırsal Kalkınma	40	Yes	Yes	Yes	1	50
34	Konya	Selçuklu	Küçük muhsine	Yes	TKK	80	Yes	Yes	Yes	2	100
35	Konya	Beyşehir	Doğancık	No		50	Yes	Yes	Yes	1	100
36	Konya	Beyşehir	Üçpınar	No		150	Yes	Yes	Yes	3	450
37	Konya	Seydişehir	Yenice	No		60	Yes	Yes	Yes	1	63

38	Konya	Akşehir	Çimendere	No		47	Yes	Yes	Yes	2	50-50
39	Karaman	Center	Narlıdere	No		80	??	Yes	Yes	2	100-100
40	Karaman	Center	Dereköy	No		120	Yes	Yes	Yes	3	??
41	Karaman	Center	Kızılkaya	Yes	TKK	80	??	Yes	Yes	1	250
42	Aksaray	Center	Yenipınar	Yes	YKK	260	Yes	Yes	Yes	2	100-50

8.10 Annex 10: UNDP Social and Environmental Screening Report

Please refer to separate file

8.11 Annex 11: Direct Project Costs: Letter of Agreement between UNDP and the Government of Turkey

STANDARD LETTER OF AGREEMENT BETWEEN UNDP AND THE GENERAL DIRECTORATE OF FORESTRY, MINISTRY OF FOREST AND WATER AFFAIRS, OF THE REPUBLIC OF TURKEY FOR PROVISION OF SUPPORT SERVICES

Dear Mr. KAYA,

1. Reference is made to consultations between officials of the General Directorate of Forestry, Ministry of Forest and Water Affairs, of the Republic of Turkey (hereinafter referred to as "General Directorate") and officials of UNDP Turkey hereinafter referred to as UNDP with respect to the provision of support services by the UNDP Turkey country office for nationally managed project "Sustainable Energy Financing Mechanism for Solar Photovoltaic Systems in Forest Villages in Turkey " (**Hereinafter referred to as Project**). UNDP and the General Directorate hereby agree that the UNDP country office may provide such support services at the request of the General Directorate through its institution designated in the relevant project document, as described below.

2. The UNDP country office may provide support services for assistance with reporting requirements and direct payment. In providing such support services, the UNDP country office shall ensure that the capacity of the General Directorate -designated institution is strengthened to enable it to carry out such activities directly. The costs incurred by the UNDP country office in providing such support services shall be recovered from the administrative budget of the office.

3. The UNDP country office may provide, at the request of the designated institution, the following support services for the activities of the project:

- a) Identification and recruitment of project and programme personnel;
- b) Identification and facilitation of training activities;
- c) Procurement of goods and services.

4. The procurement of goods and services and the recruitment of project and programme personnel by the UNDP country office shall be in accordance with the UNDP regulations, rules, policies and procedures. Support services described in paragraph 3 above shall be detailed in an annex to the project document, in the form provided in the Attachment hereto. If the requirements for support services by the country office change during the life of a project, the annex to the project document is revised with the mutual agreement of the UNDP resident representative and the designated institution.

5. The relevant provisions of the "Revised Standard Agreement" between UNDP and the Government of Turkey signed on 21 October 1965, including the provisions on liability and privileges and immunities, shall apply to the provision of such support services. The Government shall retain overall responsibility for the nationally managed project through the Ministry as its designated institution. The responsibility of the UNDP country office for the provision of the support services described herein shall be limited to the provision of such support services detailed in the annex to project document.

6. Any claim or dispute arising under or in connection with the provision of support services by the UNDP country office in accordance with this letter shall be handled pursuant to the relevant provisions of the "Revised Standard Agreement" signed on 21 October 1965.


7. The manner and method of cost-recovery by the UNDP country office in providing the support services described in paragraph 3 above shall be specified in the annex to project document.

8. The UNDP country office shall submit progress reports on the support services provided and shall report on the costs reimbursed in providing such services, as may be required.

9. Any modification of the present arrangements shall be effected by mutual written agreement of the parties hereto.

10. If you are in agreement with the provisions set forth above, please sign and return to this office two signed copies of this letter. Upon your signature, this letter shall constitute an agreement between the Ministry and UNDP on the terms and conditions for the provision of support services by the UNDP country office for nationally managed projects.

Yours sincerely,



For UNDP
Mr. Kamal Malhotra
UNDP Resident Representative

23 March 2016

For the General Directorate of Forestry, Ministry
of Forestry and Water Affairs of the Republic of
Turkey

Mr. Musa KAYA

Head of Department of the General Directorate
of Forestry, Ministry of Forest and Water Affairs
of the Republic of Turkey

Attachment

DESCRIPTION OF UNDP COUNTRY OFFICE SUPPORT SERVICES

1. Reference is made to consultations between the General Directorate of Forestry, Ministry of Forest and Water Affairs, the institution designated by the Government of Turkey and officials of UNDP with respect to the provision of support services by the UNDP country office for the nationally managed GEF funded project "Sustainable Energy Financing Mechanism for Solar Photovoltaic Systems in Forest Villages in Turkey"

2. In accordance with the provisions of the letter of agreement signed on .../.../2015 and the project document, the UNDP country office shall provide support services for the project "Sustainable Energy Financing Mechanism for Solar Photovoltaic Systems in Forest Villages in Turkey", as described below.

3. Support services to be provided:

Support Services	Total Cost to UNDP	Method of Reimbursement of UNDP
1. Procurement Support	\$8,171.00	DPC & Billing
2. Finance and Resource Management Oversight	\$7,405.00	DPC & Billing
3. HR and Administrative Support	\$4,341.00	DPC & Billing
Total:	\$19,918.00	

4. Description of functions and responsibilities:

UNDP country office support services to national execution:

1. Recruitment of Project personnel:

- Assist in conducting search for suitable candidates (advertisement, website, roster)
- Assist in preparing TORs
- Involve in interviewing candidates
- Assist in issuing contracts
- Authorizing salary/consultancy fee/missions
- Assess performance

2. Sub – contracting/Procurement

- Assist in identifying suitable subcontractors (advertisement, website, posters)
- Assist in preparing TORs

- Assist in evaluating TORs
 - Assist in evaluation bids
 - Assist in issuing contracts (when necessary)
 - Assess sub – contractors work
 - Ensure inputs as per contracts TOR's
 - Ensure payments are made accordingly
 - Ensure milestones are met
 - Critical review of sub – contractors performance
3. Financial Management and Accountability
- Making direct payments and ensuring flow of funds for project activities
 - Training of staff of implementing agency on financial disbursement and reporting
 - Financial monitoring and record keeping
 - Financial reporting
4. Training/Workshops
- Making appropriate arrangements for the logistical and technical support of the training and workshop activities
5. Equipment
- Review specifications
 - Identify suppliers of goods and services
 - Approve specifications
 - Assist in evaluating contracts
 - Assist in awarding contracts (when necessary)
 - Undertake Customs clearance
 - Authorize payments.