

# Europe and Central Asia Energy Efficiency Financing Option Papers for Turkey

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The team was led by Jas Singh (Senior Energy Specialist and Task Team Leader) and included Dilip Limaye (Lead Consultant), Joseph Melitauri (Senior Operations Officer), Rhedon Begolli (Energy Specialist), Yasemin Örucü (Energy Specialist), Aditya Lukas (Junior Professional Officer), Selma Zahirovic (Consultant) and Dardan Velija (Consultant). The final report was written by Jas Singh and Dilip Limaye. The team would like to acknowledge contributions and valuable feedback provided by Feng Liu, Jonathan Sinton, Pedzi Makumbe, Ivan Jaques and Ranjit Lamech.

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A Roundtable discussion was also held on April 7, 2016 at MENR to discuss and debate some of the report’s findings and recommendations.

## EXECUTIVE SUMMARY

### Why Energy Efficiency is Important for Turkey

Turkey imports a large percentage of its energy needs. In 2014 imports were 75 percent of energy needs, accounting for US\$55 billion or about 7 percent of its GDP. Also, continued growth in electricity demand is projected to deplete the power reserve margins within the next five years. As a result, energy efficiency (EE) is critical for Turkey to sustain its economic growth while meeting its global commitments for climate change mitigation and environmental sustainability in line with Turkey's accession to the European Union (EU). Turkey's energy intensity, in terms of energy use per unit of GDP, is 38 percent higher than that of the Organization for Economic Cooperation and Development (OECD) countries, and about 80 percent higher than some EU countries, showing substantial potential for EE improvement. Further, Turkey's energy use per capita is about 36 percent of OECD countries, so its energy intensity is likely to increase further as incomes rise.

### EE Potential in Public Buildings

The public sector in Turkey (which includes central government and municipal buildings and facilities, and street lighting) is a large user of energy. The recent World Bank/GEF-sponsored Market Assessment Report for Public Buildings, which conducted a survey of all regional governments, indicates that there are about 175,286 public buildings in Turkey of which 5 to 10 percent are central government buildings. This study reviewed the results of a number of energy audits and estimated the average potential energy savings at 32 percent. The total estimated annual energy savings are 1,130 to 5,122 GWh resulting in energy cost savings of US\$121-537 million. The required investment to achieve these savings is an estimated US\$0.85 to 5.4 billion.

### Global Experience with Financing EE in Public Buildings

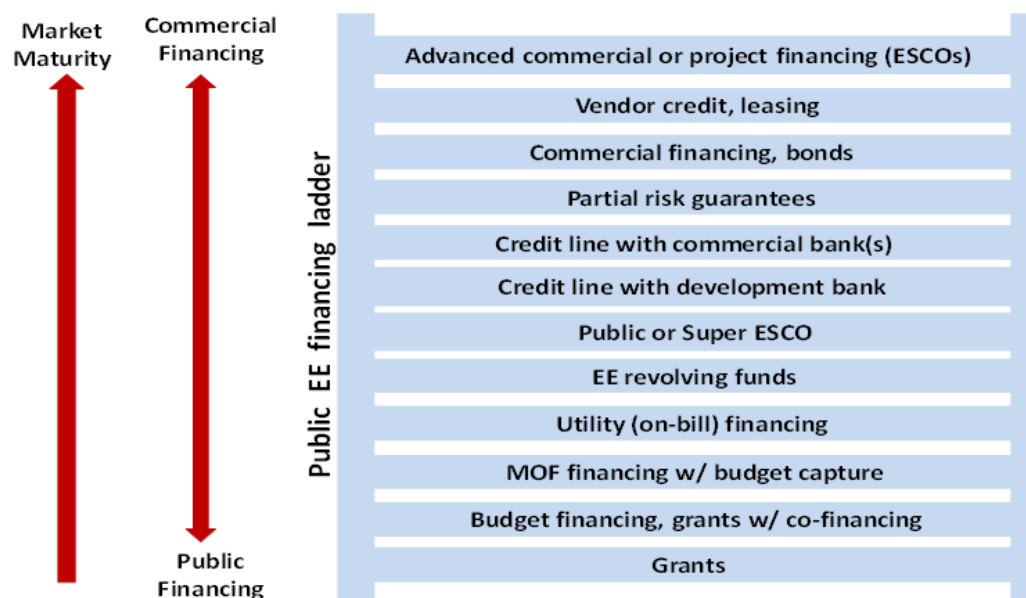
Barriers. Despite the economic viability of EE, numerous barriers often prevent it from happening on its own. These can include:

- (i) *policy and regulatory barriers*, such as budgetary and borrowing limitations, restrictive budgeting procedures, public procurement rules, low energy tariffs, and lack of building and construction codes and enforcement;
- (ii) *underdeveloped market conditions*, including limited demand for EE goods and services, high project development costs, limited experience and capabilities of EE service providers, and limited access to commercial financing;
- (iii) *institutional constraints*, such as limited incentives of public agencies to invest in EE, limited awareness of and knowledge about EE opportunities, lack of credible data, low service levels, lack of implementation capacity, etc.; and
- (iv) *lack of commercial financing*, including unattractive financing terms, overcollateralization, high transaction costs, and informational and behavioral biases among financiers.

Financing models. There are a number of financing models that countries have used to support public EE programs. These range from budget financing or grants to advanced project or energy service company (ESCO) financing, as shown in the "financing ladder" in Figure ES1. Selecting the most suitable option depends on a number of factors, including the current legislative and regulatory conditions, market maturity, state of the local EE service industry, and technical and financial capacity of public agencies to undertake EE. Once the

option is selected, it must then be carefully designed to suit the local market characteristics. Consideration should also be given for mechanisms capable of serving multiple market segments (e.g., central government agencies, creditworthy municipalities with implementation capacity, creditworthy municipalities without implementation capacity, and non-creditworthy municipalities). Over time, as local markets evolve, the goal should be to move up the ladder to more commercial financing mechanisms.

**Figure ES1. Options for Financing Public EE in Turkey**



## Options for Financing Public EE in Turkey

While Turkey has a strong legislative framework, it has a more limited implementation experience and an underdeveloped EE service/ESCO market. Therefore financing mechanisms in the middle rungs of the ladder were deemed most appropriate. (However, utility on-bill financing was not deemed viable because the local distribution utilities do not have the regulatory authority, capacity or interest in offering such services at present.) Based on the analysis conducted, three appropriate models were identified for Turkey. These include:

1. *Budget financing with capital recovery.* Under this option, the Ministry of Finance (MOF), or another parent budgeting agency, provides budgetary resources necessary for an EE investment and then recovers the investment by reducing future budgetary outlays (thus capturing the energy cost savings). This is also known as the 'budget capture method'. This can work for central and municipal entities and, since there is almost no risk of nonpayment, municipalities without credit histories.
2. *Energy efficiency revolving fund (EERF).* An independent financing institution, called an EE revolving fund or EERF, is created using public funds to provide financing to public sector EE projects. Since both the borrower and lender are publicly-owned, such funds may often offer lower-cost financing with longer tenors (repayment periods) and less-stringent security requirements than typical commercial loans. As loans are repaid from energy cost savings, they can be redeployed to new projects, thereby revolving over time.
3. *Public ESCO.* Established by the government, a public (or super) ESCO functions as an ESCO for the public sector market, entering into energy performance contracts and

outsourcing actual project implementation to small, private ESCOs and other EE service providers. A primary function of the public ESCO is to facilitate access to project financing by developing relationships with local or international financial institutions (IFIs). The public ESCO may also provide credit or risk guarantees for ESCO projects, or act as a leasing or financing company to provide ESCOs and/or customers with EE equipment on lease or on benefit-sharing terms.

ESAs. Energy service agreements (ESAs) are more recent product that some EERFs have now begun offering in addition to traditional loans. They can be very useful for public agencies that lack capacity to borrow funds and implement EE projects. (See Box ES1.)

**Box ES1. Energy Service Agreements**

Under an ESA, the financier (an EERF, in this case) offers a full package of services to identify, finance, procure, implement, and monitor EE projects for clients. The client is only asked to pay what it is currently paying for energy, its *baseline energy costs*, from which the financier makes the new (lower) energy payments and recovers its investment cost and associated fees until the contract period ends.

The figure on the right illustrates the basic idea of a client's cash flows under the ESA, with payments equal to their baseline energy bill. This allows them to maintain a constant cash flow while retaining their energy cost savings for the duration of the ESA. In some cases, the contract duration is fixed; in other cases, the contract is terminated after an agreed level of payment has been made, which encourages the client to save more energy.

For public clients, ESAs are generally not viewed as debt, but rather long-term service contracts, thereby allowing financing of central government entities that are typically not allowed to borrow, and municipalities that may have already reached their debt limits or otherwise have borrowing restrictions. This provides a dual advantage to the client of being relatively simple to implement with very little risk. It also helps ensure that the public client is able to retain the energy cost savings for the duration of the ESA.

## Recommendations

Regardless of the option selected, the Government of Turkey will need to identify the potential sources of financing, implement the needed legislative and regulatory changes, build implementation capacity, and leverage private sector participation. Because each of the proposed models have advantages and limitations, the Government will need to consult with the relevant stakeholders, before selecting the most appropriate model. The next steps include developing the detailed design and implementation plans for the selected option.

Based on the analysis and the current state of the Turkey market, *the World Bank recommends creating a dedicated Turkey EERF (TEERF) for the public sector* and focusing its initial efforts on financing EE renovation of central government buildings. For administrative ease, it is proposed that the TEERF be established as a government-owned account and initially managed by an existing entity, such as the Development Bank of Turkey (TKB). Such a scheme would allow implementation to be initiated sooner while still enabling Turkey to develop a dedicated entity for a more sustainable program. If the Government decides to establish the TEERF as a new entity, or to create TESCO at a future date, then the account and related receivables could be sold or transferred to this new entity. Should the



TEERF perform well, operations could later be extended to address the needs of municipalities and include municipal buildings, street lighting, water pumping, and other EE investments. This would fill a critical gap in public sector EE financing in Turkey and help address perhaps some of the most pressing public sector needs.

Establishment of the TEERF can help the government meet its national EE targets of reduced energy imports and public energy costs, improved comfort levels, refurbished public building stock, creation of an ESCO industry and new jobs, and reduced GHG emissions. The TEERF will be sustainable, since no recurring Government budget will be needed, and operate on a revolving basis for more than 20 years. Other advantages include:

- The TEERF will represent the interests of all the relevant stakeholders (including various Ministries and private sector stakeholders).
- Fund management by TKB can be more independent and thus avoid political influence.
- The TEERF can allow pooling of government and donor funds to avoid parallel initiatives.
- The TKB can select a highly qualified management team.
- Fund management staff would be long-term and compensated at market-based levels.
- The Fund may not have to comply with government procurement rules and bureaucratic procedures.
- It can operate with more flexibility and faster decision-making than a government agency.

Capitalization of the TEERF. The Fund could be capitalized with equity of US\$10 million – from the Green Climate Fund (GCF), Global Environment Facility (GEF), government contributions, and other donors – with an additional US\$90 million in concessional debt financing from GCF loans. Additional public debt of US\$300 million could be obtained from IFIs such as the World Bank, KfW, and AfD. Assuming adequate deal flow and operations, it would likely require a recapitalization of about US\$115 million in Year 7.

Results. It is projected that the TEERF would make investments in EE projects of about US\$30 million in Year 1, increasing to US\$90 million in Year 6. It will continue to make investments of US\$90 million in Years 7 through 15. The TEERF would likely breakeven in terms of covering its administrative and overhead costs and fees from its revenues from Year 3 onwards. Over a 15-year period, other impacts could include:

- Cumulative project investments by Year 15 – US\$1.2 billion.
- Annual government budget savings by Year 15 – about US\$170 million.
- Lifetime energy savings – 24,030 GWh.
- Lifetime GHG reductions – 30.6 million tons of CO<sub>2</sub>e.
- Increase in green employment – 15,800 to 20,000 jobs.

Next steps. The most critical next step is for the Government to make a decision regarding the most suitable option and institutional set-up for the proposed financing program. Subsequent steps include adopting the necessary legislative framework to establish the Fund, mobilizing the required financing, developing the governance structure and operating procedures, preparing the investment and staffing plan, and identifying a pipeline of potential projects.

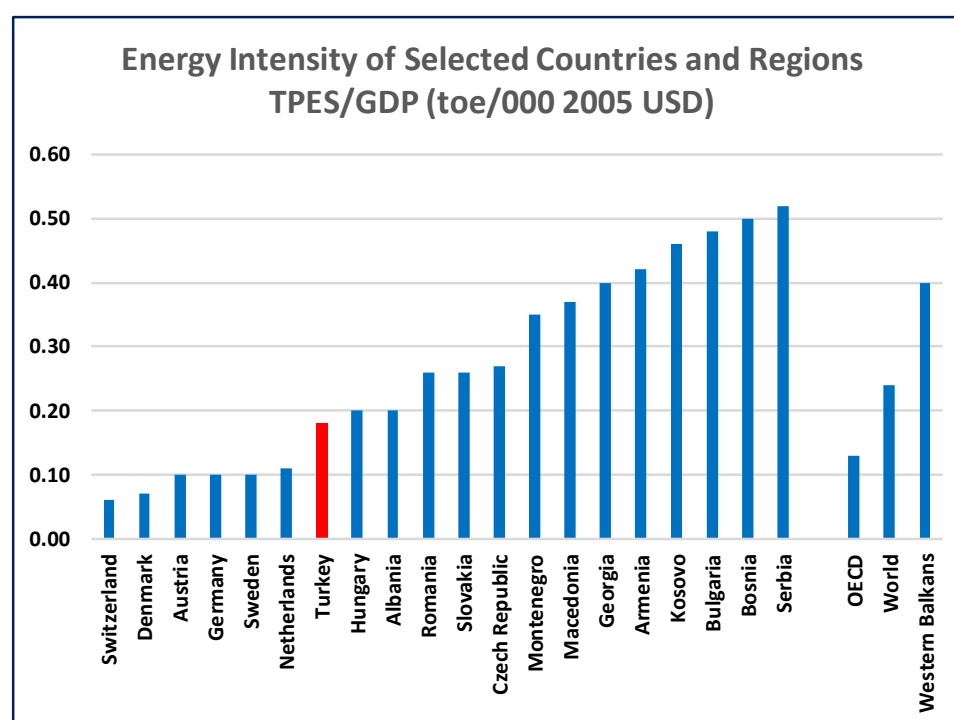
## SECTION 1 - INTRODUCTION

### Importance of Energy Efficiency in Turkey

Energy efficiency (EE) is critical for Turkey to sustain its economic growth while meeting its global commitments for climate change mitigation and environmental sustainability in line with Turkey's accession to the European Union (EU). In 2014, Turkey imported 75 percent of its energy<sup>1</sup>, which accounted for US\$55 billion or about 7 percent of its GDP. At current trends, continued growth in electricity demand will deplete the power reserve margins within the next five years.

Figure 1.1 shows a comparison of the energy intensity<sup>2</sup> of Turkey relative to many other countries in the Western Balkans and the EU. At 0.18 tpe/000 US\$ GDP, the energy intensity of Turkey compares favorably with many of its neighboring countries in Eastern Europe and the Balkans, but it is higher than that of OECD countries (0.13) and EU countries such as Denmark, Austria, Germany, and Sweden (0.07 to 0.10)<sup>3</sup>, and has been steadily rising – by 6.5 percent from 2005 to 2011 – while EU countries have declined by 8.4 percent over the same period. As energy use per capita in Turkey rises (1.52 tpe per capita compared with 4.2 in OECD countries), its energy intensity is expected to continue to grow (see Figure 1.2).

**Figure 1.1 – Energy Intensity of Turkey and Other Countries**



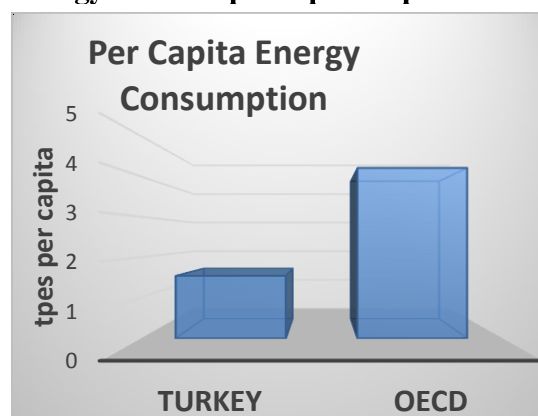
Source: IEA 2015

<sup>1</sup> European Environment Agency (See <http://www.eea.europa.eu/resource-efficiency>).

<sup>2</sup> Energy intensity is expressed as tons of primary energy supply divided by gross domestic product (GDP) in thousand US dollars (2005).

<sup>3</sup> International Energy Agency, Energy Statistics website ([www.iea.org/statistics](http://www.iea.org/statistics)).

Figure 1.2 – Energy Consumption per Capita – Turkey vs. OECD



Source: IEA 2015

The relatively high energy intensity (80 percent higher than some of the EU countries and about 40 percent higher than the average of all OECD countries) and the potential increase with economic growth points out the need for improving EE in Turkey.

Recent World Bank and other assessments have identified substantial potential for EE gains across all sectors (World Bank 2011a and 2011b). In the industrial sector, estimates indicate savings of 25 percent, with some industries consuming 2 to 3 times their peers in OECD countries. The building sector could save about 30 percent. Such substantial inefficiencies adversely affect the country's competitiveness. Further, total greenhouse gas (GHG) emissions in Turkey have increased by more than 130 percent from 1990 to 2012, presenting a major environmental challenge.<sup>4</sup> The government recognizes this and places EE as a key component of its energy security strategy and Turkey's National Climate Change Strategy and Action Plan.

### Turkish Government Initiatives

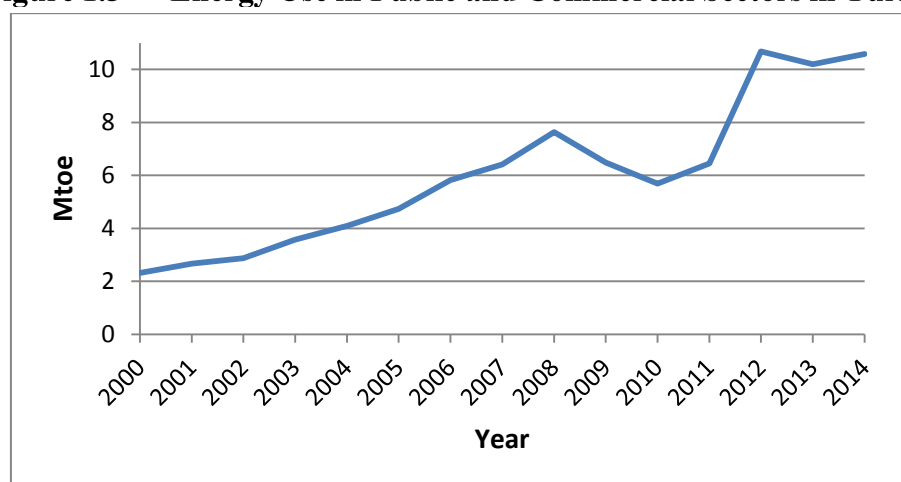
Recognizing the importance of EE, both to enhance its energy security and support sustainable economic growth, Turkey has adopted a broad policy framework and is supporting legislation to encourage EE throughout the economy. The National Energy Efficiency Strategy (Government of Turkey 2012) calls for a 10 percent reduction in energy intensity across all sectors, including buildings. Further, Turkey's 10<sup>th</sup> Development Plan (Government of Turkey 2013) specifically calls for a 10 percent reduction in energy use in government buildings by 2018 (based on 2012 consumption levels). A number of pilot efforts are underway, including energy audits of about 166 central government buildings conducted by the General Directorate for Renewable Energy (GDRE). A recent program is being finalized to finance projects in select line ministries under a KfW loan. Despite these promising developments, energy use in the public and commercial sector continues to rise with more than a four-fold increase between 2000 and 2014 (see Figure 1.3).

Major EE potential has been identified in the building, street lighting, and water pumping sectors. Additional studies are underway by the government and donors to better assess the public building stock, savings potential, and investment needs. The Ministry of Energy and Natural Resources (MENR) Market Assessment Study for Public Buildings has estimated that a total of 175,286 public buildings are in operation across the country (Econoler 2016). If only 5 to 10 percent of these are under central government management, this would imply

<sup>4</sup> TurkStat Bulletin, April 7, 2014 (<http://www.tuik.gov.tr/PreHaberBultenleri.do?id=16174>).

that between 8,750 and 17,500 buildings are in need of audits and renovation, requiring a very large amount of investment—far beyond the financing pledged to date. Implementation at such a large scale would also require a more robust institutional set-up and parallel financing structures to meet demand and enable the Government to achieve its ambitious targets.

**Figure 1.3 — Energy Use in Public and Commercial Sectors in Turkey**



Source: Eurostat<sup>5</sup>

While such a program poses a major challenge, other schemes, most notably the ISMEP program in Istanbul, which is renovating thousands of public buildings to ensure seismic safety, demonstrate that this can be done at scale (World Bank 2011c). The public sector, which is the largest single energy user, can also lead by example while helping to catalyze markets for EE goods and services. Common ownership and public financing allows for potential bundling of smaller projects, thus lowering purchasing and implementation costs and implementing at a larger scale. A scaled-up public sector program can also create jobs, fostering a sustainable local energy service company (ESCO) industry—as shown in other countries such as Canada, Germany, Japan, the Republic of Korea, and the United States (World Bank 2014b). Therefore, a national-scale program to renovate all central government buildings in Turkey could be developed with the Government and IFI partners to realize such benefits.

## World Bank Experience with Public Sector EE

Since 2007, the World Bank Group has provided about US\$10 billion in financing for EE globally. Within the Europe and Central Asia region, the World Bank has financed about US\$500 million in public buildings alone in 15 countries. Such projects have generally led to a 25 to 40 percent energy savings with simple payback periods of less than 8 to 10 years, substantial co-benefits (e.g., improved indoor comfort, better air quality and health), and increased public awareness. Repayments have been extremely good, with a demonstrated willingness for public building administrators to co-finance such investments.

Despite attractive payback periods and energy savings potential, EE financing in the public sector is plagued by a number of market barriers. In the Turkish context, some of the identified challenges include:

<sup>5</sup> [ec.europa.eu/eurostat](http://ec.europa.eu/eurostat)

- *Perverse incentives*, as public administrators have little incentive to lower costs as it could lead to a corresponding budget reduction.
- *Public procurement* which typically favors lowest upfront cost to the least overall life cycle cost, and often lacks agreed methods for selecting and contracting ESCOs.
- *Lack of budgets or financing* since central government buildings often lack sufficient budgetary resources for costly capital upgrades and are generally not legally allowed to borrow.
- *Limited technical and implementation capacity* across central government agencies to review audits/designs and finance, implement, and monitor EE projects.
- *High transaction costs* for individual public EE projects which may be small in size.

Perhaps the most critical gaps are the lack of suitable and sustainable financing mechanisms, along with supporting institutional structures, for public building programs to be implemented at scale. The creation of a national-level program, with access to financing, technical assistance (TA), specialized ESCO procurement schemes with standardized audit/contracts, specialized ESCO windows, etc. would unlock the EE potential of this sector.

## **Project Objectives**

The primary objective of this project is to identify options that can address the barriers to financing and help scale-up EE implementation in central government buildings in Turkey. Specifically, the project is designed to:

- Review existing information on energy consumption in public buildings (central government and municipal buildings and facilities) and assess energy savings opportunities in this sector.
- Document the existing legislative and regulatory framework for facilitating EE projects in public buildings.
- Identify the major barriers to EE financing in the public sector.
- Review international experience with financing options for public sector EE implementation.
- Identify attractive options for EE implementation in public buildings in Turkey.
- Conduct a comparative assessment of the advantages and limitations of the options
- Define the steps for selection and implementation.

## **Summary of Approach**

The project consisted of the following activities:

1. Inception Mission and review of current situation;
2. Development of a long list of financing options based on international experience with public sector EE financing;
3. Assessment of the options in the context of Turkey;
4. Selection of a short list of three options;
5. Assessment of the selected options; and
6. Preparation of this report.

A draft of this report was presented and discussed at an EE Roundtable in Ankara on April 7, 2016 in order to define the steps for moving forward with the detailed design and implementation of the preferred financing option. A summary of the results of this Roundtable is provided in Annex D.

## **Outline of This Report**

Section 2 provides a summary of the country context, including the legislative and regulatory framework, energy consumption characteristics of public buildings, and potential for energy savings and investments needed.

Section 3 summarizes the barriers to financing EE in the public sector in Turkey, including legal and regulatory barriers, lack of access to commercial financing, institutional barriers, and limited implementation capacity.

Section 4 provides information on international experience with financing public sector EE projects. It includes a review of a number of financing mechanisms: budget financing, EERFs, dedicated EE credit lines, risk sharing programs, public or super ESCOs, and commercial financing with ESCOs and performance contracting. It also presents a comparative assessment of the key characteristics of these financing options.

Section 5 identifies the three options considered appropriate for implementation in Turkey – budget financing, Turkey EE revolving fund (TEERF), and Turkey super ESCO (TESCO) – and provides detailed information on each. It also presents information on the potential role of international financial institutions in providing complementary financial and TA.

Section 6 summarizes the advantages and limitations of the three financing options and provides guidance on moving forward with the recommended option: the TEERF. A road map for implementing the TEERF is included.

## **SECTION 2 - COUNTRY CONTEXT**

### **Legislative and Regulatory Framework**

#### **Major Laws and Regulations Related to Energy Efficiency**

The most important legislation is the Energy Efficiency Law (Law No. 5627) enacted in May 2007.<sup>6</sup> This Law, managed by MENR, has been complemented by dozens of regulations and communiqués.

The second important legislation is the Law related to the Preparation and Implementation of Technical Legislation of Products (Law No. 4703), enacted in June 2001. This Law, managed by the Ministry of Science, Industry and Technology (MoSIT), relates to EE since it governs household appliance labeling. In 2010, the Regulation on Eco Design of Energy Related Products was adopted according to the notification 2009/125/EC and 11 other notifications released later. In 2011, the Regulation on Indication by Labeling and Standard Product Information of the consumption of energy and other resources by energy-related products was adopted according to 2010/30/EU and four later notifications related to products. In addition, the Regulation on Increasing Efficiency in Energy Resources and Energy Issues defines most of mandatory issues regarding public buildings.

In 2008, the Regulation on Energy Performance of Buildings, under the Ministry of Environment and Urbanization (MoEU), was adopted, which required all new buildings to have energy certificates which specify the energy performance level of the building.

The Energy Efficiency Strategy Paper was approved by High Planning Council in 2012. This paper calls for energy intensity reduction of at least 10 percent for each subsector within 10 years, based on 2011 consumption levels.

The Energy Efficiency Development Program is included in Section 1.14 of the 10<sup>th</sup> Development Plan (2014-2018), which was approved in 2013. This includes performance indicators such as reduction of primary energy intensity from 0.265 toe/1000\$ in 2011 to 0.246 in 2018 and 10 percent reduction in energy usage of government buildings by 2018 compared to 2012.<sup>7</sup>

Figure 2-1 shows the major legislation related to EE.

#### **Major Agencies with EE Responsibilities**

##### **The Ministry of Energy and Natural Resources (MENR)**

MENR's legal mandate is "to help define targets and policies related to energy and natural resources in a way that serves and guarantees the defense of the country, security, welfare, and strengthening of our national economy; and to ensure that energy and natural resources are researched, developed, generated, and consumed in a way that is compatible with said targets and policies."<sup>8</sup> The General Directorate of Energy Affairs (EIGM) is the main policy

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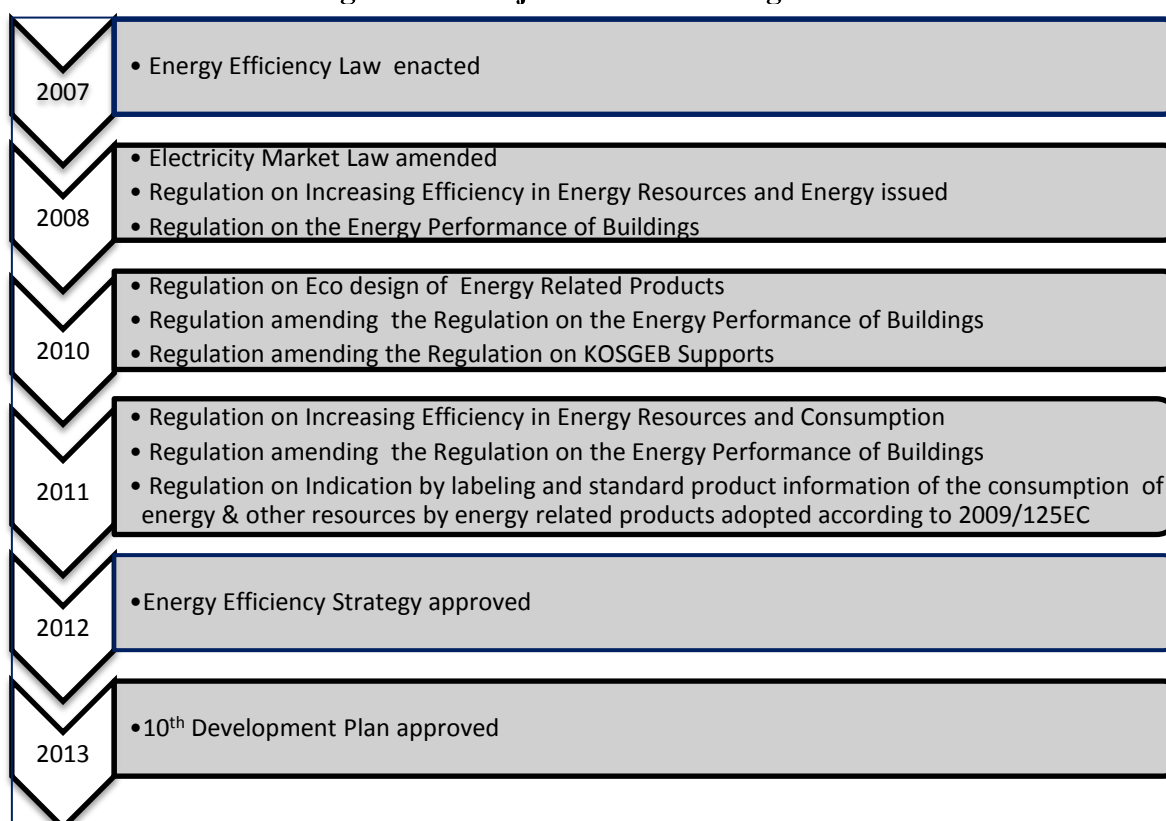
<sup>6</sup> The references to all the relevant legislation are listed in Section 7 under "Government of Turkey: Laws, Decrees and Decisions.

<sup>7</sup> The government's energy intensity figures are different than IEA figures in Chapter 1, because IEA converts international dollars of GDP using purchasing power parity rates based on the 2005 international comparison program, or ICP, round. This method makes it possible to compare the output of economies and the welfare of their inhabitants in real terms.

<sup>8</sup> MENR website ([www.enerji.gov.tr](http://www.enerji.gov.tr))

body within the MENR and is responsible for coordinating energy policy measures, including natural gas, EE, and renewable energy (RE), which is the responsibility of GDRE (see below), and electricity sector reform programs.

**Figure 2-1: Major EE Related Legislation**



Source: World Bank 2014c

### General Directorate of Renewable Energy (GDRE)

The General Directorate of Electrical Power Resources Survey and Development Administration (EIE) was the main responsible body regarding EE and RE.<sup>9</sup> Under the administration of the MENR, EIE was responsible for promoting rational energy use and increasing the demand for EE through concerted, integrated collaboration with related institutions. EIE carried out EE studies in end-user sectors, conducted energy audits in energy-intensive industries, and organized and conducted training, public awareness campaigns, and studies on policy and legislation. In November 2011, the government released a statutory decree that closed EIE, and EIE was absorbed within MENR to GDRE.

### MoSIT - Climate Change and Energy Efficiency Branch

The EE Law also assigns responsibilities related to the industrial sector and manufacturing to MoSIT. Under this Ministry, the Environment, Climate Change and Energy Efficiency Branch under the General Directorate of Industry (GDI), is responsible for the impacts of industrial policy on the environment, EE and climate change. The DG of Productivity under this Ministry has some responsibilities regarding 10th Development Plan.

### MoEU - Energy Efficiency Department

<sup>9</sup> EIE started to work on energy efficiency and renewable energy in 1981.



The EE Law and Regulation on Energy Performances in Buildings also assigns certain responsibilities to the Ministry of Public Works and Settlement, now the Ministry of Environment and Urbanization (MoEU). The Energy Efficiency Department (EED), under the General Directorate of Professional Services has been delegated responsibility for implementing the building EE policies.

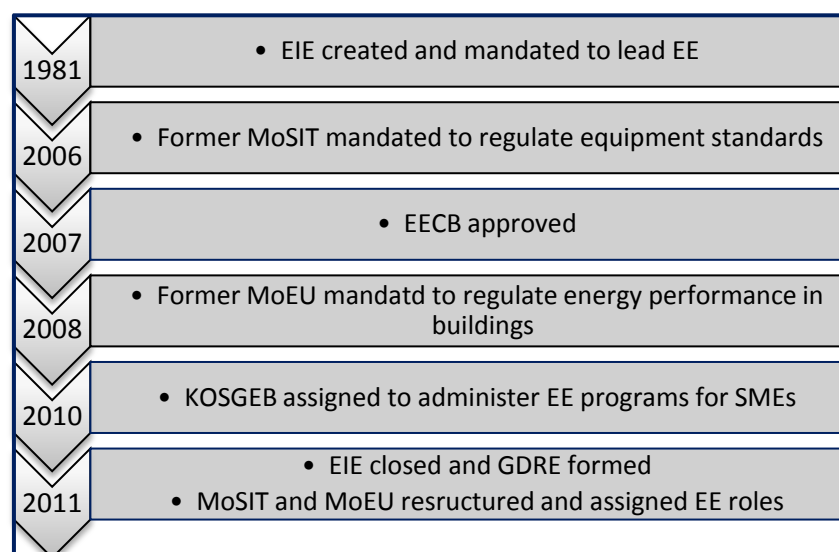
### **Energy Efficiency Coordination Board**

The EE Law also mandated the establishment of a central body – the Energy Efficiency Coordination Board (EECB) – comprising high-level representatives from all ministries related to EE along with some industrial associations. The EECB’s main functions are to: (i) prepare national EE strategies, plans and programs, assess their effectiveness and revise/implement as necessary; (ii) steer EE studies and approve authorization of certificates for EE service; (iii) approve EE projects eligible for government incentive schemes and monitor results; (iv) establish ad hoc commissions as needed; (v) set meeting agenda and participants for advisory committee meetings; and (vi) establish and publish fees for certificates each year. The EE Law indicates that the EECB should meet four times in a year, although no meetings have been held since December 2014.

### **Summary Timeline of Major Institutional Changes**

A summary of the timeline for some of the important institutional changes related to EE is presented in Figure 2-2 below.<sup>10</sup>

**Figure 2-2: Timeline of Major Institutional Changes**



*Source: World Bank 2014c*

## **Energy Consumption in Central Government Buildings in Turkey**

### **MENR Market Assessment Study**

There has been no prior comprehensive data collection on public buildings stock and assessments of EE potential. As indicated in Section 1, estimates from a recently commissioned Market Assessment Report for Public Buildings, completed under the World

<sup>10</sup> It should be noted that EIE was established in 1935 and started to work on EE in 1981

Bank/GEF—supported Small and Medium Enterprises Energy Efficiency Project, indicate that there are about 175,286 public buildings in Turkey (Econoler 2016). This information is based on a survey of all regional governments to identify the number and characteristics of all public buildings. It is estimated that about 5 to 10 percent of these are central government buildings.<sup>11</sup>

The information developed in the MENR study includes:

- Structural information, including location (region), type of building, operational characteristics (e.g., hospital, school, etc.), and built area (m<sup>2</sup>);
- Energy-related information, including type of fuels used, total energy consumption, and cost by type of fuel;
- Information about usage of the building (e.g., 24 hours in hospitals, eight hours in office buildings, etc.).

### **Existing Data**

The types of public buildings identified in the MENR market assessment are:

- school
- university
- dormitory
- teachers' lodge
- hospital
- governmental building
- place for worship
- other.

The assessment has segmented these buildings by size (50 to 1000 m<sup>2</sup>, 1000 to 5000 m<sup>2</sup>, and over 5,000 m<sup>2</sup>) and climate zone (very hot and humid, warm marine, cool dry, cold dry, and very cold). The results of the data collection have estimated the total number of public buildings at 175,286 (see Table 2.1). However, the data does not indicate how many of these are central government buildings.

The assessment has also developed preliminary estimates of energy consumption per square meter for the different building types in each climate zone. These were developed using international benchmarks and are shown in Table 2.2.

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<sup>11</sup> Preliminary estimates provided by GDRE. These estimates may be revised in the ongoing Econoler study

**Table 2.1 – Public Buildings in Turkey — Survey Results  
(Total Number of Buildings by Type and by Climate Zone)**

	i. Very Hot and Humid	ii. Warm Marine	iii. Cool Dry	iv. Cold Dry	v. Very Cold	Total
1. School	6,296	19,245	12,700	6,289	2,069	46,599
2. University	216	1,386	1,525	193	95	3,415
3. Dormitory	175	866	597	444	115	2,197
4. Teachers' Lodge	70	257	237	110	22	696
5. Hospital	240	1,398	959	231	283	3,111
6. Government Building	4,975	18,598	10,496	3,490	1,605	39,164
7. Place for Worship	6,629	25,997	15,762	5,653	2,162	56,203
8. Others	3,341	8,393	8,666	2,467	1,034	23,901
Total	21,942	76,140	50,942	18,887	7,385	175,286

Source: Econoler 2016

**Table 2.2 – Estimated Average Energy Consumption by Building Type (kWh/m<sup>2</sup>)<sup>12</sup>**

Climate Zone	School	University	Dormitory	Teachers Lodge	Hospital	Government Building	Places of Worship	Other
Very Hot and Humid	38	136	330	175	247	103	23	152
Warm Marine	75	153	179	175	261	168	23	144
Cool Dry	59	152	221	175	283	160	23	218
Cold Dry	88	176	213	199	218	197	23	177
Very Cold	95	188	191	211	178	245	23	146
Average	71	161	227	187	237	175	23	167

Source: Econoler 2016

Note: Low consumption for schools is likely due to underheating/undercooling rather than high efficiency but more analysis is needed.

## Potential for Improving Energy Efficiency in Buildings

The MENR Market Assessment Study reviewed the results of a number of energy audits. These audits estimated the average potential savings were estimated at 32 percent. The EE measures identified in these audits are summarized in Annex A. The Study also reviewed available information from prior research, including studies by the World Bank (World Bank 2011a), UNDP (UNDP 2011) and the Energy Charter Secretariat (ECT 2008). Based on these, the study estimated the EE potential shown in Table 2.3.

<sup>12</sup> GDRE has commented that the estimates of university, dormitory and hospital consumption in cold climates appear to be low and need to be reexamined.

**Table 2.3 — Energy Efficiency Potential in Turkey’s Buildings Sector**

	Electricity (percent)	Fuel (percent)	Potential Savings (ktoe)
Residential	29	46	5,655
Public and Commercial	29	20	1,505
Buildings Sector	30		7,160

Source: Econoler 2016

For public buildings, the Study estimated the total potential EE in public buildings and the anticipated energy savings and estimated investment requirements at paybacks of 7 and 10 years (see Tables 2.4 and 2.5).

**Table 2.4 – Estimated Energy Savings in Public Buildings**

Potential	Energy Savings in Percentage	Annual Energy Savings (GWh)	Annual Savings (MTRY)	Annual Savings (MUSD)
Theoretical Technical Total Potential Energy Savings	30 to 40 percent	7,532 – 10,043	2,417 – 3,222	806 – 1,074
Economically Feasible Total Potential Energy Savings	50 percent of the theoretical technical	3,766 – 5,022	1,208 – 1,611	403 – 537
Total Potential Energy Savings Feasible for EPC Market	15 percent of the theoretical technical	1,130 – 1,506	363 – 483	121 – 161

Source: Econoler 2016

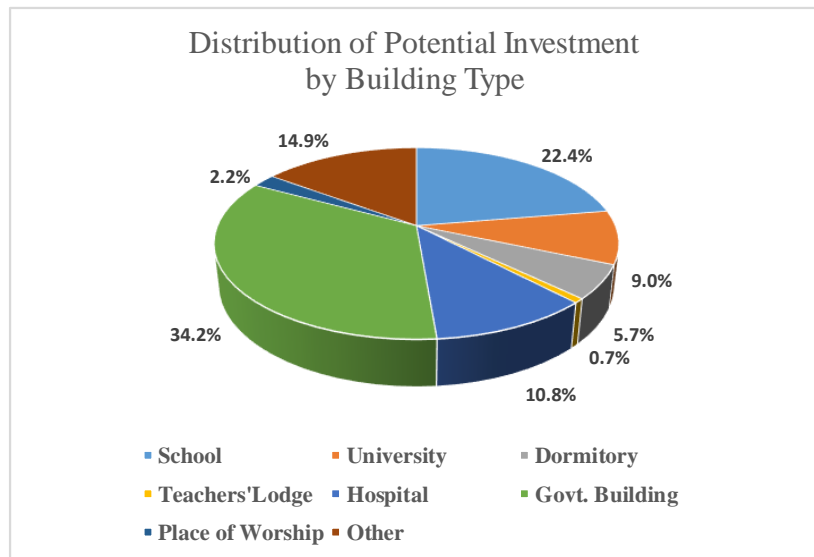
**Table 2.5 – Estimated Investment Needs for EE in Public Buildings**

	Payback (Years)	Investment (MTRY)	Investment (MUSD)
Total Theoretical Energy Savings Potential	20	48,334 – 64,445	16,111 – 21,482
Economically Feasible Total Potential Energy Savings	10	12,083 – 16,111	4,028 – 5,370
Total Potential Energy Savings Feasible for EPC Market	7	2,538 – 3,383	846 – 1,128

Source: Econoler 2016

The results indicate investment potential of US\$0.9 to 5.4 billion for EE measures with paybacks of 7 to 10 years. The distribution of the investment potential by building type is illustrated in Figure 2.3.

Figure 2.3 – Investment by Building Type



Source: Econoler 2016

## SECTION 3 - BARRIERS TO FINANCING PUBLIC SECTOR EE

### Introduction

Energy efficiency investment programs in public institutions are notoriously difficult to implement. They are impeded by the same barriers that have slowed down EE improvements in other sectors of the economy, such as lack of information on EE potential and benefits, lack of trained personnel, lack of incentives, high transaction costs, and scarcity of financing. In addition, several barriers specific to the public sector further hold back sustained improvements in EE in this sector. Among them are public accounting, budgeting and procurement rules, financing constraints, and very limited staff capacity and motivation for identifying and implementing EE measures. Figure 3.1 lists the barriers to EE in the public sector based on international experience.

**Figure 3.1: Barriers to EE in the Public Sector**

Policy / Regulatory	Equipment/ Service Provider	End User	Financiers
<ul style="list-style-type: none"> <li>• Low energy pricing and collections</li> <li>• Public procurement and budgeting policies</li> <li>• Limitations on public financing and borrowing capacity</li> <li>• Ad hoc planning</li> <li>• Import duties on EE equipment</li> <li>• Under-developed or weak EE institutional framework</li> <li>• Lack of appliance standards and building EE codes, lack of testing, poor enforcement</li> <li>• Limited and poor data</li> </ul>	<ul style="list-style-type: none"> <li>• High project development costs</li> <li>• Perceived risk of late/ non-payment of public sector</li> <li>• Limited demand for EE goods/services</li> <li>• Diffuse/diverse markets</li> <li>• New contractual mechanisms (e.g., ESCOs)</li> <li>• Limited technical, business, risk management skills</li> <li>• Limited access to financing/ equity</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of awareness</li> <li>• High upfront and project development costs</li> <li>• Ability/willingness to pay incremental cost</li> <li>• Low EE benefits relative to other costs and priorities</li> <li>• Perceived risks of new technologies/systems</li> <li>• Low levels of comfort</li> <li>• Mixed/lack of incentives</li> <li>• Behavioral biases</li> <li>• Lack of credible data</li> <li>• No discretionary budgets for special projects/ upgrades and limited ability to borrow</li> <li>• Cannot collateralize public assets</li> </ul>	<ul style="list-style-type: none"> <li>• New technologies and contractual mechanisms</li> <li>• Small sizes/widely dispersed projects leads to high transaction costs</li> <li>• High perceived risks, including public credit risks</li> <li>• Other higher return, lower risk projects</li> <li>• Over-collateralization, restrictions on public assets as collaterals</li> <li>• Behavioral biases</li> </ul>

Source: World Bank 2015.

### Barriers to Financing Public Sector EE in Turkey

The barriers to financing public sector EE projects in Turkey have been summarized below in the following categories:

- Policy and regulatory barriers.
- Barriers related to equipment and service providers.
- Barriers related to end users.
- Lack of access to commercial financing.

In addition, the public sector has very limited capacity to identify, develop, and implement EE projects.

## Policy and Regulatory Barriers

- **Budgetary and borrowing limitations.** Both central government agencies and municipalities have limited availability of budget funds for investment in EE improvements. The existing legal framework in Turkey does not allow central government agencies to undertake loans.<sup>13</sup> The borrowing capacity of municipalities is limited, and few municipalities are creditworthy or have borrowing capability.
- **Restrictive budgetary procedures.** Existing budgetary rules do not allow central government agencies and municipalities (public agencies) to benefit from energy savings they achieve, since each year's budget allocation is based on the previous year's expenditures. Therefore, the reduction of budgetary spending for energy costs can lead to a decrease in allocation in the next budget cycle. Operating cost reductions are also typically unable to cover capital expenditures.
- **Public procurement rules.** Public procurement regulations and procedures require tenders to be evaluated purely on the basis of lowest cost, and the value of the energy-savings from EE is not adequately taken into account.
- **Building codes.** There is a lack of building code enforcement and the new energy performance in buildings directive has not yet been implemented.

## Barriers related to Equipment and Service Providers

- **Limited demand and high development cost.** There is limited demand for EE services in the public sector, and equipment and service providers need to devote substantial time and effort to develop EE projects, which leads to high project development costs.
- **Limited experience and capabilities.** Turkey has limited experience with mechanisms such as energy saving performance contracting (ESPC). Also there are a limited number of ESCOs or EVDs<sup>14</sup> in the market and none of them have experience working with the public sector. Most of the existing energy service providers have limited technical, business development, financing and risk management skills and capabilities.
- **Lack of commercial financing.** Equipment suppliers and energy service providers have limited access to commercial financing and cannot invest much of their own equity in EE projects. Also, innovative financing mechanisms such as leasing or vendor financing for EE equipment in the public sector are less common in Turkey.

## Barriers related to End-Users

- **No internal budgets.** There are generally no discretionary budgets for special projects or efficiency upgrades, although there is a proposal to allocate about 10 percent of line ministry budgets for EE. Even with this allocation, ministries may only be able to renovate a few buildings each year. Also, public sector decision-makers do not have any incentives to undertake EE projects, because they do not benefit from the resulting cost savings and are not mandated to do so.
- **Limited knowledge of EE options.** Public sector facility and energy managers (both in central government agencies and in municipalities) have limited

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<sup>13</sup> However, Treasury can undertake loans for these agencies.

<sup>14</sup> EVD refers to energy efficiency consulting companies licensed by MENR.

knowledge and awareness of EE technologies and implementation options. There is very limited data on the number, characteristics and energy use of public buildings and no central public buildings registry or consolidated data on energy performance.

- ***Low existing comfort levels and poor structural conditions.*** The conditions of older buildings, underheating and/or undercooling, structural deficiencies, lack of compliance with seismic codes, etc. limits the cost-effectiveness of EE improvements.

### **Lack of Access to Commercial Financing**

- ***Lack of interest and unattractive financing terms.*** Commercial banks have limited or no interest in lending to the public sector, and restrictions on lending to central government agencies. Most banks consider loans to municipalities riskier than loans to private sector organizations such as small and medium-sized enterprises (SMEs). The commercial financing terms (interest rate, loan tenor, collateral requirements, etc.) are not attractive from the perspectives of the public agency decision-makers.
- ***Collateral requirements.*** Commercial banks require substantial assets to be pledged as collateral. They are unwilling or unable to offer debt financing to public agencies, because it is very difficult or impossible to collateralize public assets for debt financing.
- ***High transaction costs.*** The small size of EE projects leads to relatively high transaction costs, which makes financing such projects unattractive. This is especially true for public sector projects which typically take much longer to implement.

### **Implementation Capacity**

- ***Public agency decision-makers.*** Both central government agencies and municipalities have limited capacity to identify EE opportunities, prepare “bankable” project proposals, carry out procurement for goods and services, and develop and implement EE projects.
- ***Public agency implementers.*** MENR and other relevant line ministries have limited experience and staff capacity to provide sufficient TA to public agencies to design and implement EE projects. Public agencies that are interested in EE have no single agency that can assist or guide them through the financing and implementation process.
- ***Inadequate delivery infrastructure.*** Turkey has a very limited energy services delivery infrastructure.. The fragmented nature of the private sector, the small number of ESCOs in the market, and their lack of experience with public sector clients limit the use of performance-based contracting options in the public sector.



## SECTION 4 - INTERNATIONAL EXPERIENCE IN FINANCING PUBLIC SECTOR ENERGY EFFICIENCY PROJECTS

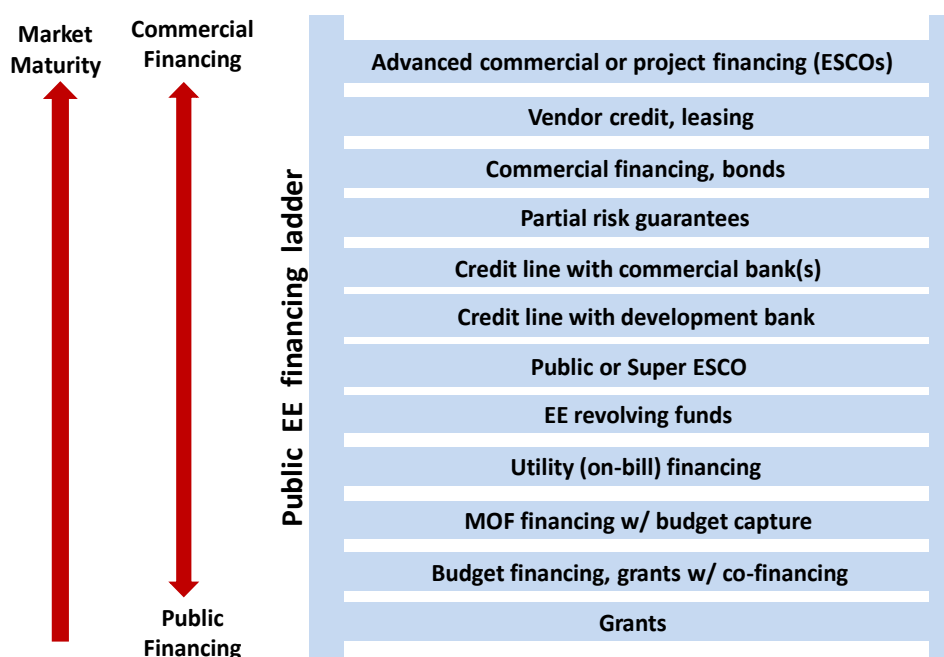
### Introduction

Beyond purely grant financing, various countries have implemented a range of more sustainable financing and implementation mechanisms, either to enhance the financial leverage of public funds or to better transition to commercial funding for public sector EE projects. These include:

- Budget financing with capital recovery (financing by the MOF or a parent budgeting agency using donor funds, with repayments in the form of reduced future budgetary outlays)
- Utility on-bill financing
- Establishment of an EE revolving fund
- Establishment of a public or super ESCO
- Establishment of an EE credit line through existing financial institutions, such as a development bank or commercial banks
- Creation of a risk-sharing facility, such as a partial credit guarantee program, to cover commercial loans
- Commercial financing, bonds
- Vendor credit and leasing
- Leveraging commercial financing using energy service companies (ESCOs) under the energy saving performance contracting (ESPC) approach.

Figure 4.1 illustrates these options in the form of a “financing ladder” for public sector projects, moving from public (bottom) to commercial (top) financing. A brief description of each of these options follows.

**Figure 4.1. Illustrative Financing Ladder for Municipal EE Projects**



Source: Adapted by authors from World Bank 2013

## **Budget Financing with Capital Recovery**

Under this approach, financing is provided by a government agency, such as the MOF, using a combination of government budget allocations and IFI or donor funds. This funding covers the investment costs of the EE projects in both central and municipal buildings and facilities. The funding recipient “repays” the funds using the savings generated by the investment project in the form of reduced budgetary outlays for energy bills of the public entity in future years (“budget financing”). The size of the reduced outlay is usually based on the amount of energy cost savings. The flow of funds to pay for EE improvements follows the same flow as the normal appropriations from the MOF. The repayment to MOF could be complete or partial; the partial approach encourages municipal utilities and public agencies to participate in the program because they retain a share of the savings achieved.

## **Utility On-Bill Financing**

Utility on-bill financing is a mechanism under which a utility provides financing for the implementation of EE projects. The funds are provided as a loan to the customer (which could be a public sector entity) for equipment purchase and installation, and loan repayments are recovered by the utility through the energy bill (ECO-Asia 2009). Individual customers whose facilities have installed EE measures (the direct beneficiaries of the energy savings and related cost reductions) bear the associated costs.

The utility on-bill financing approach is designed to overcome the first cost barrier (lack of availability of internal funds) for investment in energy efficiency. Under this approach, the utility provides or arranges for the financing needed for the project investment. The customer signs a Loan Agreement (LA) with the utility and the utility collects the loan repayments from the customer through the customer’s utility bill by adding a line item on the bill. In most cases, the loan repayments are arranged such that the amount of the repayment is smaller than the customer’s cost reduction from the energy savings created by the energy-efficient equipment. This allows the customer to be “cash flow positive” throughout the life of the EE project.

## **Energy Efficiency Revolving Fund (EERF)**

An EERF is a viable option for scaling-up EE financing in the public sector. Under a typical EERF, created using public funds and IFI loans, financing is provided to public agencies to cover the initial investment costs of EE projects. Some of the resulting savings are then used to repay the EERF until the original investment is recovered, plus interest and service charges. The repayments can then be used to finance additional projects, thereby allowing the capital to revolve and creating a sustainable financing mechanism (World Bank 2014b).

Since both the borrower and lender are publicly owned, such funds may often offer lower-cost financing with longer tenors (repayment periods) and less-stringent security requirements than typical commercial loans. Because EE projects have positive financial rates of return, capturing these cost savings and reusing them for new investments creates a more efficient use of public funds than typical budget- or grant-funded approaches. This can help demonstrate the commercial viability of EE investments and provide credit histories for public agencies, paving the way for future commercial financing.

## **Public or Super ESCO**

Several countries have taken a more active role in promoting EE projects using the performance contracting approach, creating either public or “super” ESCOs that are wholly

or partly owned by the state. Often this was done to promote ESCOs generally. Examples include China (pilot EMCs created by the World Bank in Beijing, Shandong, and Liaoning), Poland (MPEC), Croatia (HEP ESCO), and Ukraine (UkrESCO). Such public ESCOs were typically formed when the local ESCO markets were nascent and some public effort was deemed necessary to catalyze them. The advantage of a public ESCO is often no competitive process is required for project development since a public agency is simply contracting with another public entity.

The super ESCO is a special type of public ESCO. Established by the government, it functions as an ESCO for the public sector market (hospitals, schools, municipal utilities, government buildings, and other public facilities) while also supporting the capacity development and project development activities of existing private sector ESCOs. The government (possibly with help from IFIs) capitalizes the super ESCO with sufficient funds to undertake public sector ESPC projects and to leverage commercial financing.

A primary function of the super ESCO is to facilitate access to project financing by developing relationships with local or international financial institutions. The super ESCO may also provide credit or risk guarantees for ESCO projects, or act as a leasing or financing company to provide ESCOs and/or customers with EE equipment on lease or on benefit-sharing terms (Limaye and Limaye 2011).

### **Public Sector Energy Efficiency Credit Line**

A public sector EE credit line is a financing mechanism that makes funds available to local banks and financial institutions (FIs) to provide debt financing of EE projects in utilities and public buildings and facilities. The major purpose of such a credit line is to increase the funding available from these lenders for debt financing of municipal EE project investments. These can be managed by a development bank, municipal bank, commercial bank(s), or other FIs.

Dedicated EE credit lines may be established by governments, multilateral or bilateral financial institutions, or governments in cooperation with international donor agencies. The funds provided by the donors or governments to lenders are often leveraged by additional funds provided by the participating banks and/or financial institutions to increase the total amounts available for debt financing.

### **Risk-Sharing Facility**

A major barrier to commercial financing of public EE projects is commercial lenders' perception that EE projects are inherently riskier than their traditional investments. A risk-sharing facility is designed to address this by providing partial coverage of the risk involved in extending loans for EE projects. The facility – essentially a bilateral loss-sharing agreement – includes a subordinated recovery guarantee and might also have a “first loss reserve” to be used to absorb up to a specified amount of losses before the risk sharing occurs.

A partial risk-guarantee facility, provided by a government, donor agency, or other public agency, can assist municipal utilities and public agencies by: (a) providing them access to finance, (b) reducing the cost of capital, and (c) expanding the loan tenor or grace periods to match project cash flows (Mostert 2010). Such a facility would also build commercial lenders' capacity to finance EE projects on a commercially-sustainable basis.

## **Commercial Financing, Bonds**

Under this option, municipalities take commercial bank loans (if they are creditworthy and have borrowing capacity) or issue bonds to finance EE investments. This option can mobilize commercial financing which can deliver scale and be sustainable. The elements of competition can help lower financing costs, address overcollateralization/short tenor issues, and allow public agencies to undertake its own procurement/ implementation.

This option can work if there are well-developed municipal credit and rating systems, financial institutions who are willing and able to lend to public sector for EE projects, and large municipalities with strong technical capacity willing and able to bundle many EE projects together.

## **Vendor Credit and Leasing**

A lease is a contractual arrangement in which a leasing company (lessor) gives a customer (lessee) the right to use its equipment for a specified length of time (lease term) and specified payment (usually monthly). Depending on the lease structure, at the end of the lease term the customer can purchase, return, or continue to lease the equipment. Many types of organizations, including proprietorships, partnerships, corporations, government agencies, religious and non-profit organizations, use leasing throughout the world. Suppliers of energy efficient equipment can provide such equipment under a leasing arrangement, usually with lease payments based on estimated energy savings

Equipment leases are broadly classified into two types: operating lease and finance or capital lease (Lee 2003). In an operating lease, the lessor (or owner) transfers only the right to use the property to the lessee. At the end of the lease period, the lessee returns the property to the lessor. Since the lessee does not assume the risk of ownership, the lease expense is treated as an operating expense in the income statement and the lease does not affect the balance sheet.

## **Leveraging Commercial Financing with Private ESCOs**

At the top of the “financing ladder” for public sector projects described earlier is the development of private sector energy service providers, such as ESCOs that specialize in EE project development and implementation. Private ESCOs can help overcome important barriers to scaling-up implementation of public sector EE projects. They can (a) offer a range of services spanning the energy services value chain and (b) provide the technical skills and resources needed to identify and implement EE opportunities, perform services using performance based contracts (thereby reducing the risks to the municipal utilities and public agencies), facilitate access to financing from commercial lenders, and enable energy users to pay for services out of the cost savings achieved.

*Performance contracting* refers to EE implementation services offered by private ESCOs under ESPCs. These have the following key attributes (SRC Global 2005):

- ESCOs offer a complete range of implementation services, including design, engineering, construction, commissioning, and maintenance of EE measures, and monitoring and verification of the resulting energy and cost savings.
- ESCOs provide or arrange financing (often 100 percent) and undertake “shared savings” or “guaranteed savings” contracts, such that the payments to the ESCO are less than the cost savings resulting from the project implementation.
- Under the performance contract, ESCOs offer specific performance guarantees for the entire project (as opposed to individual equipment guarantees offered by equipment manufacturers or suppliers) and generally guarantee a level of energy cost savings.

- Payments to the ESCO are contingent upon demonstrated satisfaction of the performance guarantees.
- Most of the technical, financial, and maintenance risk is assumed by the ESCO, thereby substantially reducing the risks to the energy user.

### **Comparison of the Financing Options**

Table 4.1 provides a comparative assessment of the key characteristics of the finance and delivery models discussed above.

**Table 4.1 - Summary of Characteristics of Financing Options for Public Sector Energy Efficiency Projects**

Financing Option	Conditions	Pros	Cons	Issues to be addressed in Turkey	Examples
1. Budget financing with capital recovery	<ul style="list-style-type: none"> <li>• Credit barrier is too high, underdeveloped banking sector, collateralization is difficult</li> <li>• Financing should target new and under-developed markets, programs must be efficiently administered, initial subproject results should be intensely disseminated, need viable co-financing</li> <li>• Availability of funding for EE projects</li> </ul>	<ul style="list-style-type: none"> <li>• Easy to implement</li> <li>• Can directly finance municipal entities and central government agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainability may be questionable, even if repayment is obtained through budget financing</li> </ul>	<ul style="list-style-type: none"> <li>• Who will manage and administer the funds?</li> <li>• Is there sufficient implementation capacity?</li> </ul>	<ul style="list-style-type: none"> <li>• Hungary</li> <li>• Lithuania</li> <li>• Armenia</li> <li>• Belarus</li> <li>• FYR Macedonia</li> <li>• Montenegro</li> <li>• Serbia</li> </ul>
2. Utility on-bill financing	<ul style="list-style-type: none"> <li>• Requires regulations for utility participation</li> <li>• Strong financial position and financial management of utilities</li> <li>• Payment discipline among public clients, adequate energy pricing and billing practices</li> </ul>	<ul style="list-style-type: none"> <li>• Streamlined repayments, lower repayment risk if risk of utility disconnection,</li> <li>• Builds off of utility relationships and services</li> <li>• Can be done on a sustainable and scalable basis</li> </ul>	<ul style="list-style-type: none"> <li>• Requires changes in utility regulations and billing systems</li> <li>• Creates potential for monopolistic behaviors</li> <li>• Financing may compete with local banks,</li> <li>• Limited experience with heat utilities</li> </ul>	<ul style="list-style-type: none"> <li>• Are utilities in Turkey interested and willing?</li> <li>• Do they have capacity and billing systems for on-bill financing?</li> <li>• What regulatory changes may be needed?</li> </ul>	<ul style="list-style-type: none"> <li>• Brazil</li> <li>• China</li> <li>• India</li> <li>• Mexico</li> <li>• Sri Lanka</li> <li>• Tunisia</li> <li>• U.S.</li> <li>• Vietnam</li> </ul>
3. Energy efficiency revolving fund	<ul style="list-style-type: none"> <li>• Insufficient liquidity in banking sector, major aversion to risk among lenders</li> <li>• Use of grant funds as subordinated debt can help mobilize commercial co-financing</li> <li>• TA to disseminate information on EE subproject performance/financial data critical to sustainability</li> <li>• Need for professional, well-incentivized Fund Management Team</li> </ul>	<ul style="list-style-type: none"> <li>• Can be structured to address financing needs and evolving capacity of all public buildings (central and municipal)</li> <li>• ESA option can be very useful for municipalities with poor credit and lack of capacity</li> </ul>	<ul style="list-style-type: none"> <li>• May require new legislation</li> <li>• May be difficult to cover administrative costs of the fund from its revenues</li> </ul>	<ul style="list-style-type: none"> <li>• Needs a strong and capable fund manager or management team</li> <li>• Needs supporting legislative framework for establishment</li> </ul>	<ul style="list-style-type: none"> <li>• Bulgaria</li> <li>• Romania</li> <li>• Armenia</li> </ul>

*Options for Financing Energy Efficiency in Public Buildings in Turkey*

<p>4. Dedicated credit line with development bank</p>	<ul style="list-style-type: none"> <li>• Underdeveloped public/ municipal credit market</li> <li>• High commercial bank lending rates and low tenors</li> <li>• Existence of credible development bank willing to lend for EE and assume repayment risks</li> <li>• Municipalities must have ability and willingness to borrow</li> <li>• Public agencies able to retain energy cost savings</li> </ul>	<ul style="list-style-type: none"> <li>• Builds commercial lending market by demonstrating public agencies can repay</li> <li>• Allows public agencies to undertake own procurement and implementation</li> <li>• Allows for lower interest rates</li> <li>• Funds can revolve making it more sustainable</li> </ul>	<ul style="list-style-type: none"> <li>• Relies on strong banking partner with incentive and ability to proactively develop pipeline and offer good financial products</li> <li>• Serves only creditworthy municipalities</li> <li>• Some development banks do not conduct proper risk assessments and appraisals</li> </ul>	<ul style="list-style-type: none"> <li>• Is there a suitable development bank?</li> <li>• How many public agencies can borrow and are creditworthy</li> </ul>	<ul style="list-style-type: none"> <li>• Brazil</li> <li>• India (municipal infrastructure fund)</li> <li>• Mexico</li> </ul>
<p>5. Dedicated EE credit line with commercial financial institution(s)</p>	<ul style="list-style-type: none"> <li>• Well-developed banking sector, willingness of banks to accept risks and EE as line of business</li> <li>• Sufficient market activity to develop project pipeline</li> <li>• Need for parallel TA to develop strong demand, create sustained quality pipeline</li> </ul>	<ul style="list-style-type: none"> <li>• Leveraging of private funds</li> <li>• Utilization of existing banking infrastructure for financing public sector</li> </ul>	<ul style="list-style-type: none"> <li>• Needs municipalities or ESCOs that have borrowing capacity (credit and collateral)</li> <li>• Banks/FIs need to be willing to lend to public sector</li> </ul>	<ul style="list-style-type: none"> <li>• Will the participating financial institutions provide loans to municipal utilities &amp; public agencies?</li> <li>• How many public agencies are creditworthy and have borrowing capacity?</li> </ul>	<ul style="list-style-type: none"> <li>• KfW credit line in Serbia</li> <li>• Hungary</li> <li>• China</li> <li>• Ukraine</li> <li>• Uzbekistan</li> </ul>
<p>6. Risk-sharing program (such as partial credit guarantee)</p>	<ul style="list-style-type: none"> <li>• Well-developed banking sector, banks are liquid and willing to accept some risks but have a perception of high risk with respect to EE projects</li> <li>• Sufficient market activity to develop project pipeline</li> </ul>	<ul style="list-style-type: none"> <li>• Has worked well in some Central and Eastern European countries</li> <li>• May scale up commercial financing</li> </ul>	<ul style="list-style-type: none"> <li>• Needs a relatively mature banking sector and eligible borrowers</li> <li>• Poor experience of WB and USAID in some countries with respect to public agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Is the banking sector mature enough?</li> <li>• How many municipalities are creditworthy?</li> </ul>	<ul style="list-style-type: none"> <li>• USAID DCA in FYR Macedonia, Bulgaria and other countries</li> <li>• Bulgaria, CEEF (Central/Eastern Europe), China, Croatia, Hungary, Poland</li> </ul>
<p>7. Public ESCO or super ESCO</p>	<ul style="list-style-type: none"> <li>• Immature private sector ESCO industry, but interest/demand to develop ESCO industry</li> <li>• Contracting between public ESCO and public sector entities may be easier than with private sector service providers</li> </ul>	<ul style="list-style-type: none"> <li>• Can address financing issues and build ESCO capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Need to create a new organization</li> <li>• Need to provide funding</li> <li>• Needs to operate efficiently and avoid acting as monopoly</li> </ul>	<ul style="list-style-type: none"> <li>• Where will such a public ESCO be located?</li> <li>• Will donors be interested in funding such an entity?</li> </ul>	<ul style="list-style-type: none"> <li>• Ukraine Public ESCO (EBRD)</li> <li>• Croatia HEP ESCO (WB/GEF), Armenia, Uruguay, EESL (India)</li> </ul>

*Options for Financing Energy Efficiency in Public Buildings in Turkey*

<p>8. Commercial financing, bonds</p>	<ul style="list-style-type: none"> <li>• Requires well-developed public sector credit and rating systems</li> <li>• Financiers willing and able to lend to public sector for EE projects</li> <li>• Large municipalities with strong technical capacity willing to bundle many EE projects together</li> </ul>	<ul style="list-style-type: none"> <li>• Mobilizes commercial financing which can deliver scale and be sustainable,</li> <li>• Elements of competition can help lower financing costs,</li> <li>• Can help address overcollateralization/short tenor issues</li> </ul>	<ul style="list-style-type: none"> <li>• Only makes sense for very large bundles of projects</li> <li>• Only highly creditworthy agencies can use these schemes</li> <li>• Relatively high transactions costs</li> </ul>	<ul style="list-style-type: none"> <li>• Are financiers willing and able to lend to public sector?</li> <li>• How many public agencies are creditworthy and have borrowing capacity?</li> </ul>	<ul style="list-style-type: none"> <li>• Bulgaria</li> <li>• Denmark</li> <li>• India</li> <li>• U.S.</li> </ul>
<p>9. Vendor credit, leasing</p>	<ul style="list-style-type: none"> <li>• Large, credible local and/or international vendors able and willing to finance public EE projects</li> <li>• Local bank financing available for vendor leasing</li> <li>• Creditworthy public agencies able to sign long-term vendor contracts</li> <li>• Public agencies able to retain energy cost savings, pay based on consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Mobilizes commercial financing which can deliver scale and be sustainable</li> <li>• Can help address overcollateralization/short tenor issues</li> <li>• Financing and procurement in one contract</li> <li>• Lease may not count against public debt</li> </ul>	<ul style="list-style-type: none"> <li>• Relies on local banks and leasing companies</li> <li>• Serves only very creditworthy public agencies,</li> <li>• Vendors must assume substantial debt and offer long-term financing</li> <li>• Only some building equipment suited for leasing (lighting, SWH, boilers)</li> </ul>	<ul style="list-style-type: none"> <li>• How many public agencies are creditworthy and have borrowing capacity?</li> </ul>	<ul style="list-style-type: none"> <li>• China</li> <li>• EU</li> <li>• U.S.</li> </ul>
<p>10. Leveraging commercial financing using private ESCOs/performance contracts</p>	<ul style="list-style-type: none"> <li>• Supportive policies and enabling environment</li> <li>• Introduction of simpler business models first</li> <li>• Appropriate financing schemes</li> <li>• Early market development through public sector projects</li> <li>• Development of public-private partnership (PPP) models to kick-start market</li> </ul>	<ul style="list-style-type: none"> <li>• Mobilizes commercial financing which can deliver scale and be sustainable,</li> <li>• Helps address overcollateralization/short tenor issues</li> <li>• ESPC may not count against public debt, public agency shifts technical risks to third party</li> </ul>	<ul style="list-style-type: none"> <li>• Needs local banks and ESCOs to provide reasonable cost financing and assume credit risk</li> <li>• Serves only very creditworthy public agencies,</li> <li>• ESCO industry is difficult to develop</li> <li>• Public procurement issues difficult to address</li> </ul>	<ul style="list-style-type: none"> <li>• Are there any private ESCOs in the market?</li> <li>• Are private ESCOs and/or municipalities creditworthy for commercial project financing?</li> </ul>	<ul style="list-style-type: none"> <li>• WB China ESCO program</li> <li>• Czech Republic</li> <li>• Germany</li> <li>• Hungary</li> <li>• India</li> <li>• Japan</li> <li>• South Korea</li> <li>• U.S.</li> <li>• Canada</li> </ul>

*Source: Adapted by authors from World Bank 2013*



## **SECTION 5 - ASSESSMENT OF FINANCING AND IMPLEMENTATION OPTIONS FOR PUBLIC SECTOR ENERGY EFFICIENCY IN TURKEY**

### **Characteristics of Financing Options in the Turkey Context**

This section reviews the potential applicability of the public sector financing options identified in Section 4 to the public sector in Turkey. For assessing the suitability and benefits of the financing options, three distinct types of public sector entities are considered:

- I. Central government entities;
- II. Creditworthy municipalities, or municipal entities with their own budgets; and
- III. Municipal entities without their own budgets and/or with little or no capacity to implement projects.

The financing options may have different applicability, advantages and limitations for each type. Of the 10 options summarized in Section 4 (based on international experience), four were not considered further:

- Utility on-bill financing – because it does not appear that the utilities in Turkey have the regulatory authority, capacity and interest in offering such services.
- Credit line with development bank – because these credit lines have very limited or no applicability to central government agencies.
- Commercial financing and bonds – because of the limited capacity to issue bonds and lack of a market for such bonds.
- Vendor credit and leasing – because of the immaturity of the existing market for leasing.

The key characteristics of the other six options in the Turkey context are summarized in Table 5.1.

### **Narrowing the Financing Options: Rationale and Results**

As shown in Table 5.1 six EE financing options can be applicable to Turkey, but they are not equally viable in terms of serving the needs of central government agencies and municipalities. A review of Table 5.1 indicates that three of the options do not appear to be suitable for the needs of public sector entities (central government and municipal) in the short-to-medium term (approximately the next five years).

- While dedicated public sector EE credit lines may be attractive and useful for financing projects using commercial lending, they are limited to serving only a few creditworthy municipal entities that have sufficient borrowing capacity. These financing options will therefore not be able to serve the needs of central government agencies and many other municipalities that are not creditworthy and/or do not have sufficient borrowing capacity.
- Similarly, risk sharing or guarantee programs would be limited to creditworthy municipal entities and would not meet the needs of central government agencies or other municipalities.
- While commercial financing can be leveraged using performance contracting and private ESCOs, such financing options are likely to be limited only to creditworthy municipalities or ESCOs with strong balance sheets and borrowing capacity. Few ESCOs currently exist in Turkey — the private ESCO market today is nascent and will take many years' focused efforts to mature.

Table 5.1 – Key Characteristics of the Public Sector Energy Efficiency Financing Options in Turkey Context

Characteristics	Budget Financing with Capital Recovery	EE Revolving Fund	Dedicated Public Sector Credit Line	Risk Sharing Program	Public or Super ESCO	Private ESCOs & Performance Contracting
<b>Type of Financing</b>	Loans and TA; may include some grants	Loans, TA, ESAs	Loans, TA	Guarantees, TA	Loans	Loans
<b>Public Entities Served*</b>	I, and II	I, II and III	II only	II only	I, II and III	I and II
<b>Management and Governance</b>	PIU within MOF	Board of directors Fund management team	IFI, participating financial institutions	IFI, participating financial institutions	Board of directors	IFI, participating financial institutions
<b>Project Development</b>	By PIU	Fund management team	Participating financial institutions	Participating financial institutions	Management team of public or super ESCO	Private ESCOs
<b>Project Implementation</b>	By Type II municipalities and Type I central entities PIU may implement for Type III & some Type I	Type I central entities Type II municipalities; Fund Mgmt. Team via ESA for Type III and some Type I	Type II municipalities	Type II municipalities	Management team of public or super ESCO	Private ESCOs
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Easy to implement</li> <li>• Analogous to some existing models</li> <li>• Can address all three types</li> </ul>	<ul style="list-style-type: none"> <li>• Addresses needs of all three types</li> <li>• Multiple windows (including ESA) to address financing needs and evolving capacity of central agencies and municipalities</li> </ul>	<ul style="list-style-type: none"> <li>• Can leverage commercial financing</li> <li>• Existing credit lines provide experience</li> </ul>	<ul style="list-style-type: none"> <li>• Can leverages commercial financing</li> <li>• Existing guarantee programs provide some relevant experience</li> </ul>	<ul style="list-style-type: none"> <li>• Can address needs of all three types</li> <li>• Multiple windows to address financing needs and evolving capacity of municipalities and central agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Can address needs of all three types</li> <li>• Can leverage commercial financing</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li>• Requires capable PIU</li> <li>• Sustainability not assured</li> <li>• Needs of some Type III municipalities may not be easily met</li> </ul>	<ul style="list-style-type: none"> <li>• Needs new legislation for implementation</li> <li>• Need a strong and capable Fund Management Team</li> </ul>	<ul style="list-style-type: none"> <li>• Cannot address needs of Type III municipalities</li> <li>• Only serves municipalities or ESCOs that have borrowing capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Cannot address needs of Type III municipalities</li> <li>• Only serves municipalities or ESCOs that have borrowing capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Need the creation of new organizations</li> <li>• Needs capable management team</li> </ul>	<ul style="list-style-type: none"> <li>• Need a mature ESCO industry</li> <li>• ESCOs need to have borrowing capacity</li> </ul>
<b>Can be Implemented under Current Regulations?</b>	Yes	No	Yes	Yes	Yes, but requires creation of a new company	No

Source: Authors

\* Types of public entities: I – Central government agencies; II — Creditworthy Municipalities or Municipal Entities with their own budgets; III — Municipal entities without their own budgets, having poor credit, and/or little or no capacity to implement projects.

The three remaining options are discussed in detail below.

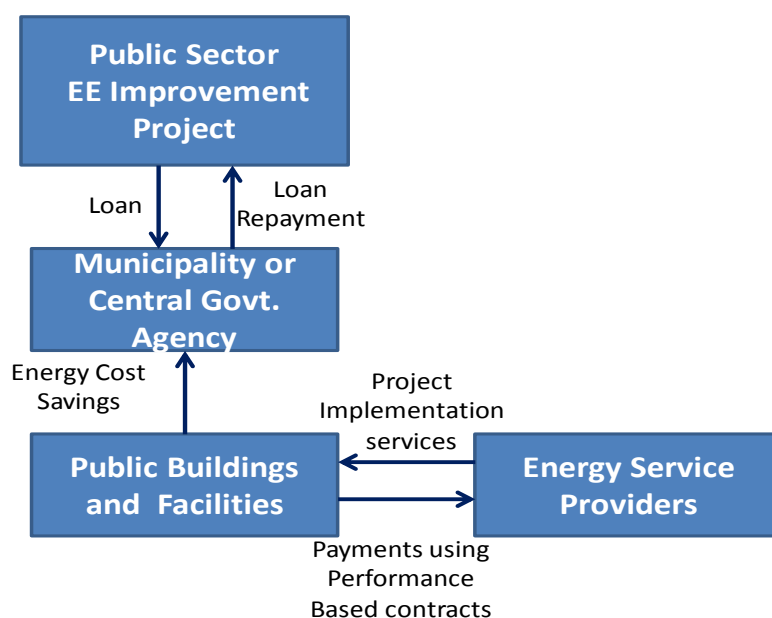
## Budget Financing with Capital Recovery

### Overview

This option involves actions by the MOF, with funding provided by budgets or donor agencies to establish a Public Sector EE Financing Facility to finance EE project investments in municipalities and central government agencies that are funded from the national budget. The funds provided are used by these entities to make capital investments in EE projects that will result in energy cost savings.

The recipient public entity is then required to “repay” the investment over a specified period of time from the cost savings generated by the investment project. This will be accomplished by the MOF in the form of reduced budgets for energy bills of the budget agencies in future years (hence the term “budget financing”). The size of the reduced outlay is usually structured to be lower than the energy cost savings. Figure 5.1 shows a typical structure of such a project.

**Figure 5.1 – Budget Financing - Public Sector EE Improvement Project**

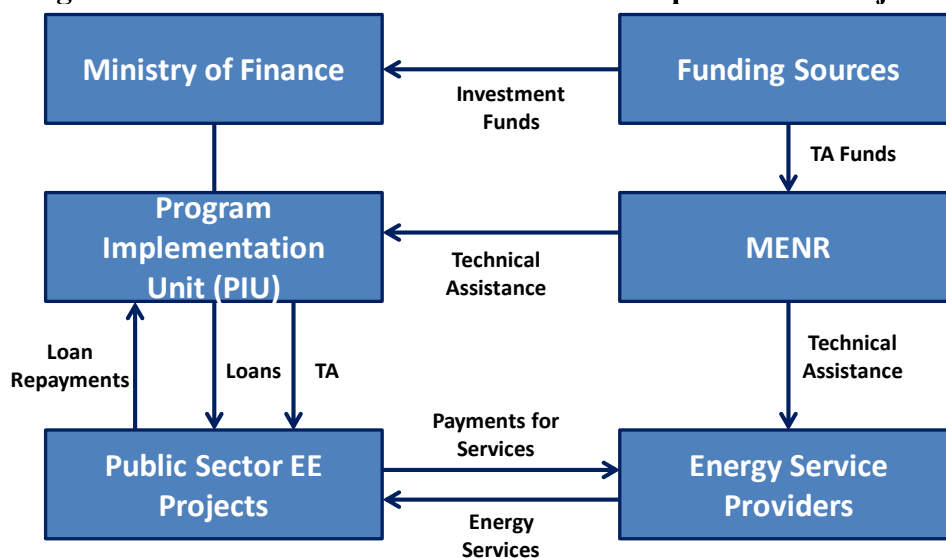


### Funds flow

The flow of funds to pay for EE improvements follows the same flow as the normal appropriations from the MOF. The repayment to the MOF could be complete or partial and may allow public agencies to retain a share of the savings achieved. It would be desirable for the MOF to allow the public entities to keep a portion of the savings as an incentive for their active participation and support in identifying and implementing the EE projects. This could require some changes in public budgeting procedures. The development of such procedures could be supported by TA.

Figure 5.2 illustrates the funds flow.

Figure 5.2 – Funds Flow – Public Sector EE Improvement Project



### Implementation

The program would be implemented by a Program Implementation Unit (PIU) within the MOF or another suitable agency. The PIU could carry out tasks such as project identification, review of applications, and monitoring and reporting as well as assisting public entities with project preparation activities. These include review of feasibility studies, preparation of detailed design and bidding documents, and supervision of construction activities.

This option requires the establishment of a ministry PIU and training and capacity building of the PIU staff to undertake the activities envisioned. Some TA could be provided by MENR, but MOF would have to assume responsibilities for budget allocation and repayments.

The funds would be lent by MOF to public agencies by entering into Loan Agreements (LAs). The funds will be provided to central government agencies and municipalities that have capabilities to manage implementation of EE projects and demonstrated willingness to commit to repay the loans from energy savings.

MOF would provide loans for projects undertaken by these borrowers that will be treated as debt, with fixed repayment obligations to be made within their budget provisions in future years. The PIU would negotiate LAs with the borrowers that will define the terms of the loans, determined by MOF or in negotiations between MOF and donors.

### Technical Assistance

Certain additional services may be provided to the borrowers by the PIU as TA. Such services may include: conducting a preliminary screening to identify and define the general scope of the EE projects; providing standard bidding documents for services related to project implementation; and providing measurement and verification (M&V) protocols. The borrowers will be responsible for engaging energy service providers (as needed), implementing the project, properly maintaining the systems, and repaying the loan in accordance with the terms of the Loan Agreement. The repayment installments will be designed to allow borrowers to repay the investment costs and, if applicable, service fee from the accrued energy cost savings.

TA may be provided by MENR with respect to energy audits, project implementation

support, and M&V protocols, etc.

## **Energy Efficiency Revolving Fund**

The basic structure of an EERF was described in Section 4. Key design elements that need to be considered to implement such a fund in Turkey are discussed below.

### **Legal Framework**

The establishment of an EERF is likely to require legislative action. The options for establishing an EERF include creating the fund under an existing ministry, energy agency, or development bank; creating a new legal entity (independent corporation or new statutory agency); not-for-profit entity; or establishing a public-private partnership (PPP). The preferred option is generally the creation of a new independent corporation or a new statutory agency. However, the Turkey Energy Efficiency Revolving Fund (TEERF) focusing on financing public sector EE projects could be established either under an existing entity, such as TKB,<sup>15</sup> or as a new, independent organization that would serve as the Fund administrator. Consequently, if the Government of Turkey decides to establish an EERF, the relevant legislation should specify its legal organization and ownership.

### **Fund Management and Governance**

The key elements of management and governance of the TEERF include the following:

- Oversight arrangements
- Fund manager selection
- Monitoring and evaluation
- Reporting

#### ***Oversight Arrangements***

Although oversight arrangements vary, they typically include all relevant ministries that have some authority over EE, such as those responsible for finance, construction, economy/energy, environment, or urban/regional development. Options for oversight arrangements are listed below:

- For the Bulgarian Energy Efficiency Fund, or BEEF, oversight is by a management board (MB) appointed by the national government,
- The Renewable Resources and Energy Efficiency Fund (R2E2 Fund) in Armenia is governed by a government-appointed board of trustees and comprises representatives from the government, private sector, NGOs and academia;
- The Romanian Energy Efficiency Fund (FREE) is governed by a government-appointed board of administration consisting of seven members, five from the private sector; and
- Salix Finance in the U.K. has a three-person board, of whose members two are from the private sector.

If Turkey establishes the TEERF, it is strongly recommended to have representation from both the public and private sectors.

The main functions of the oversight body will be setting the investment strategy and policy of the fund, hiring the fund management team, establishing the overall criteria for selecting

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<sup>15</sup> Turkiye Kalkinma Bankasi (Development Bank of Turkey)

projects, approving the annual business plans and budgets formulated by the management team, preparing and submitting an annual financial report to the government, and assuring that the fund is operating in compliance with national EE strategy and plans.

### ***Fund Manager Selection***

Reviews of international experience with EE funds (World Bank 2014a) have identified a number of options for the choice of a fund manager, including an existing government agency or development bank, a utility, or a special directorate related to municipal services or building management. Alternatively, a new organization may be created to manage the fund — an independent agency, a new statutory authority, a public corporation, or a PPP. Any of these types of organizations could also hire a fund manager or fund management team under a contract.

In Bulgaria, an independent fund management team was appointed (World Bank 2010). This team was competitively selected and included a consortium of three firms.<sup>16</sup> In the case of the Armenia R2E2 Fund (World Bank 2012), the government appointed an Executive Director and supporting financial and technical staff to manage the fund.

Whatever form the fund manager takes, the fund management team must have expertise in a number of areas, including knowledge and understanding of EE technologies and options; skills in market assessment and pipeline development; capabilities in credit analysis, financial analysis, and project appraisal; and understanding of EE and energy services markets.

### **Debt Financing Window**

For creditworthy municipalities that can borrow and are able to identify, design, and implement projects, the TEERF can offer debt financing. One of the advantages of an EERF is that – unlike commercial financing, which may require an equity contribution from the borrower – the Fund may provide up to 100 percent debt financing. Also, the fund may not require the type of collateral typically requested by commercial borrowers because the public agencies may not be legally able to pledge public assets.

The tenor (repayment period) of the loan will be based on (i) the type of project and (ii) the anticipated cash flows resulting from the energy cost savings; usually the repayment period will be structured in such a way that the loan repayments are less than the energy cost savings. It is anticipated that TEERF will offer tenors can be longer than typical commercial bank loans.

### **Energy Services Window**

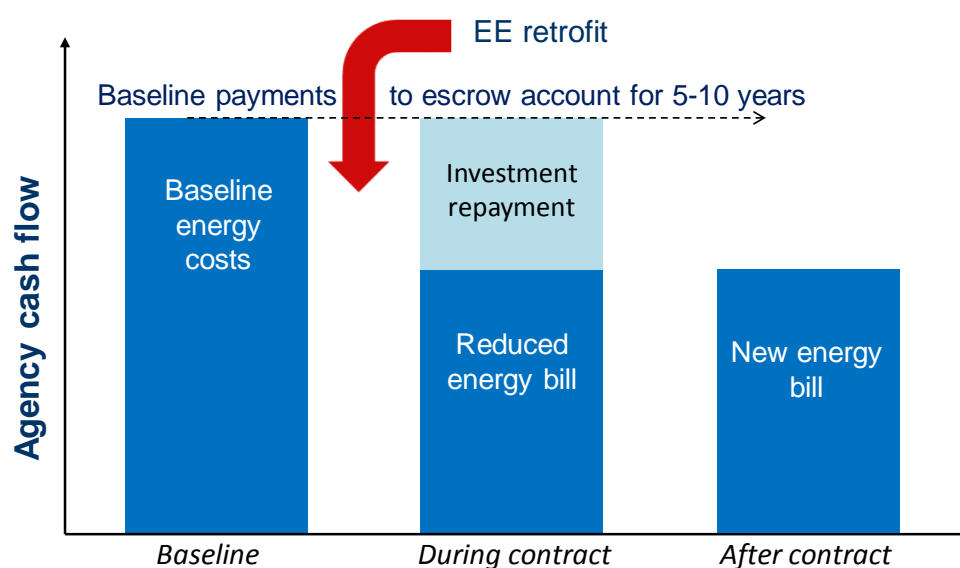
This is an innovative feature of EERFs that can be very effective for central government agencies and for municipalities that lack the capacity to borrow funds or to effectively implement EE projects. An ESA can offer a full package of services to identify, finance, implement, and monitor EE projects. The public agency is usually required to pay some or all of its baseline energy bill into an EERF-established escrow account to cover the investment cost and associated fees during the contract period. Figure 5.4 illustrates the basic concept of a public agency's cash flows under the ESA, with payments equal to its baseline energy bill during the contract period.

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<sup>16</sup> The Consortium includes an energy efficiency consultancy (Econoler International), a Foundation (Center for Energy Efficiency EnEffect), and a non-banking financial institution (Elana Holding PLC).

For example, let us assume that the monthly energy bill for the public agency prior to the EE project implementation is US\$10,000. The ESA will specify this as the baseline amount, and the public agency will agree to pay this amount each month into an escrow account for the duration of the ESA, which is assumed to be five years. The EERF will then make the EE project investment (assumed in this example to be US\$150,000). This investment will reduce the energy costs by 30 percent, to US\$7,000 per month. During the five-year ESA period, the agency will pay into the escrow account (i) its monthly energy bill of US\$7,000 and (ii) the remaining US\$3,000 per month, thus allowing the fund to recover its investment (plus interest and fees). Following the five-year period, the agency will be able to retain its energy cost savings and its overall energy bill will fall to the assumed US\$7,000.

**Figure 5.4 - The Energy Services Agreement Model**



Source: World Bank 2013

In some cases, the contract duration is fixed; in other cases, the contract can be terminated after an agreed number of payments have been made to the EERF—thereby offering a greater incentive for the agency to save more energy. Either way, one of the main advantages of Energy Services Window model is that the ESA payments generally do not count as public debt, allowing public entities that are not allowed to borrow, or municipalities that do not have sufficient debt capacity, to implement EE measures. In this way, the model also helps public agencies to use their limited budget/debt space for higher-priority investments while still being able to implement EE. In addition, the repayments to the EERF and energy payments can be bundled together, providing some added leverage to the Fund to cut off the energy supply should the public agency default on its ESA repayment obligations.

### Technical Assistance

An important feature for the success of the TEERF is the TA provided. The types of TA that the TEERF may provide could include the following:

- Program marketing to and capacity building of the target public agencies to address the information and knowledge gaps related to EE, build demand for financing, and improve the sustainability of energy savings.
- Developing procedures that help public agencies engage ESCOs/EVDs under public-private partnerships such as performance-based contracts; preparing

performance-based bidding documents for procurement of various elements of project implementation services; and refining these bidding documents based on the implementation experience.

- Identifying ways to bundle procurements by multiple public entities implementing similar projects, thus reducing transaction costs and equipment costs through bulk purchases. Under some financing arrangements, the TEERF can conduct the preliminary audit, procure the ESP, and monitor the project on behalf of the clients.
- Identification, assessment, and recommendation of changes, if needed, in rules for public accounting, budgeting, and procurement to facilitate the financing of EE projects and procurement of EE services.
- Carrying out capacity building for ESCOs and other market actors to enhance their ability (i) to conduct energy audits and (ii) to screen, design, evaluate, appraise, finance, implement, and measure EE investments in the public sector.
- Developing or adapting appropriate methodologies for M&V and providing M&V training to public agency staffs and EVDs/ESCOs.
- Developing the terms and conditions of the ESAs with public agencies for the ESA option, including establishment of the baseline conditions and identification of the baseline changes that would require an adjustment of the fixed annual payments.

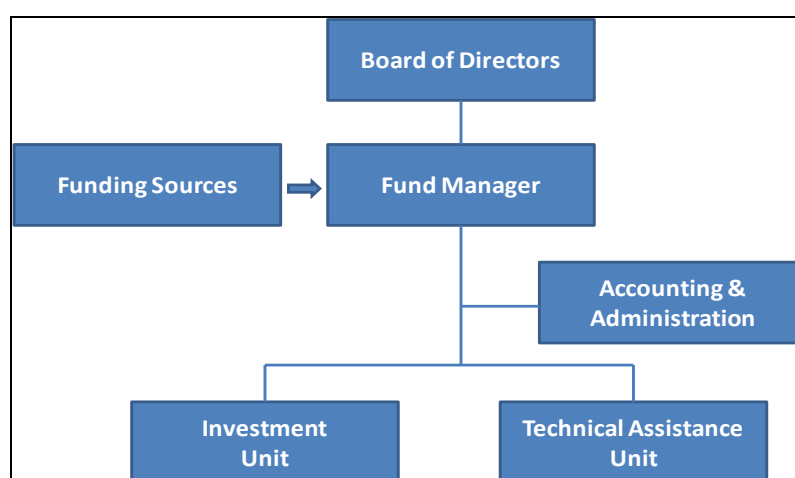
### **Procurement of Implementation Services**

Under the ESA option, the EERF can engage private ESCOs to provide some implementation services using simple performance-based contracts. This approach can help transfer some of the project implementation risk to the private sector. It can also help build the capacity of the ESPs and facilitate the development of an energy services market (World Bank 2010b).

### **Organization Structure**

The organizational structure of the TEERF could be developed as illustrated in Figure 5.5.

**Figure 5.5 - Organization Structure - Energy Efficiency Fund**



### **Investment Models**

In Turkey, the TEERF should be structured to offer two main financing mechanisms: debt



financing and ESAs. The step by step implementation process for the two basic fund models is shown in Table 5.2.

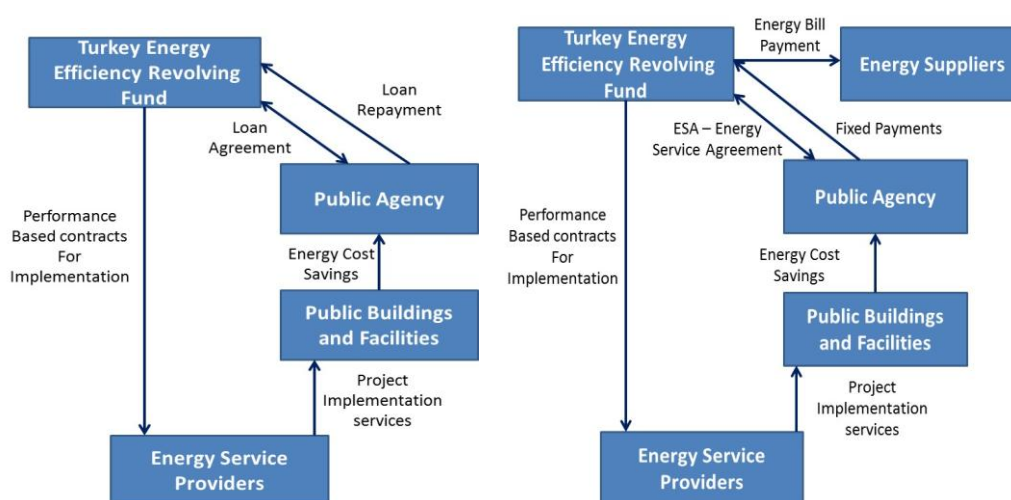
**Table 5.2 — Implementation Steps for Fund Investment Models**

	<b>Model 1: Loans</b>	<b>Model 2: Energy Services Agreements</b>
Step 1	Fund manager prepares and announces the availability of loan funds for EE projects in municipalities and other public entities and invites Expressions of Interest (EOIs) from municipalities and public facilities to borrow funds for projects.	Fund manager prepares and announces the availability of ESAs for public sector EE projects and invites EOIs from municipalities and public facilities to participate in such agreements.
Step 2	Fund Manager receives applications from municipalities and public entities.	
Step 3	Fund Manager conducts preliminary screening of EOIs and selects promising candidates.	
Step 4	Fund Manager conducts preliminary assessment of energy savings opportunities including a walk-through audit.	
Step 5	If walk-through audit shows promising opportunities for energy savings, a project design is prepared by the borrower; the PIU may provide assistance in the preparation of the project design. The borrower needs to obtain approval from MOF for the loan. A Loan Agreement is then negotiated between the Fund and the borrower. The LA specifies the responsibilities of the Fund and the borrower, the EE measures to be implemented, the total project costs and the amount to be loaned by the Fund, assignment of collateral, the length of the agreement, the terms of the loan repayment, the selection of the M&V methodology and M&V agent, etc. The Loan Agreement also specifies the responsibilities of the borrower for conducting the project implementation activities, the services that are to be provided by the Fund to assist the borrower with implementation, and the terms for payment for such services, if any.	If walk-through audit shows promising opportunities for energy savings, an ESA is negotiated between the Fund and the facility. The ESA specifies that the facility will pay the Fund a fixed amount equal to between 95 and 100 percent of the baseline energy costs for a fixed period of time as determined and agreed to after a detailed assessment is conducted of the facility's baseline energy use and costs and operating characteristics. The ESA also specifies the adjustments to be made to the fixed payments in case of any changes to the facility characteristics, operating conditions, or other baseline parameters.  An ESA would most likely not be considered as a liability on the balance sheet and therefore may not be part of the entity's debt ceiling.
Step 6	A detailed audit is commissioned to identify the investment cost, energy savings, and implementation requirements.	A detailed audit is conducted by the Fund to identify the baseline conditions.
Step 7	The Fund prepares performance-based bidding documents for project implementation services and provides these to the borrower.	The Fund prepares and issues performance-based bidding documents for project implementation services.
Step 8	The borrower approves the bidding documents and the procurement of the service providers is conducted either by the borrower or by the Fund as specified in the LA. The contracts for the project implementation services are partly performance-based as specified in the bidding documents.	The Fund conducts the procurement of the service providers. The contracts for the project implementation services are partly performance-based as specified in the bidding documents.
Step 9	The energy service providers implement and commission the project under the supervision of the borrower or the Fund staff.	The energy service providers implement and commission the project under the supervision of the Fund staff.
Step 10	Upon completion of the implementation and commissioning, the M&V agent conducts the measurement and verification of project results. Payments are made to the service providers by the borrower or the Fund based on the performance criteria.	Upon completion of the implementation and commissioning, the Fund conducts the M&V (using its own staff or an M&V agent). Payments are made to the service providers by the Fund based on the performance criteria.

Step 11	The borrower repays the loan over the term of the agreement from the savings achieved.	The Fund receives the fixed payments from the facility as specified in the ESA (adjusted, if appropriate) for the specified time period. The Fund pays the facility's energy bills and retains the remaining amount to cover its investment and service costs.
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The investment models for the debt financing option and the ESA option are shown in Figures 5.6 and 5.7.

**Figure 5.6 – Investment Model – Debt**      **Figure 5.7 – Investment Model - ESA**



Source: Authors

### How the TEERF Can Address the Barriers to EE Implementation

Table 5.3 shows how the TEERF can address the barriers to EE implementation, identified in Section 3.

### Super ESCO

There has been much discussion about the benefits of the ESCO model using performance contracting to help implement EE projects (Singh et al. 2010). Unfortunately, implementing the ESCO model in developing countries has been challenging for many countries (Limaye et al 2016).

### Limitations on Growth of ESCOs in Developing Countries

The growth and development of the ESCO industry has often been constrained by a number of barriers, many of which are also present in Turkey:

- There are few ESCOs. Most ESCOs have a small capital base and have difficulties accessing project funding from commercial FIs because they can only provide limited equity financing.
- Due to the immaturity of the EE market, the costs of project development are relatively high, and most small ESCOs are likely to find it difficult to finance project development costs.
- The ESCO model is relatively new, and ESCOs have not yet developed good credibility with public sector energy users.

**Table 5.3 – How the TEERF Can Address EE Implementation Barriers**

Barrier	How Addressed
Inability of central government agencies to incur debt	Offer ESAs to serve the EE needs
Limited number of creditworthy municipalities and borrowing capacity	Finance projects directly with creditworthy municipalities with borrowing capacity and engage in ESAs with others
Restrictive budgeting and procurement regulations and procedures	Since the fund will most likely be considered a public entity, it can enter into loan agreements or ESAs with public agencies without facing the restrictive regulations/procedures
Low energy tariffs	Provide longer tenor on loans and longer terms for the ESAs to allow public agencies to repay the loans from cost savings
Relatively high interest rates charged by commercial banks	Provide lower interest rates than commercial banks and engage in ESAs
Small project sizes, leading to high project development and transaction costs)	Standardize agreements and procedures; aggregate similar projects across public agencies
Lack of development of energy service providers and performance-based contracting	Engage energy service providers in project implementation and develop their capacity for performance-based contracting
Low existing comfort levels	Work only with agencies that meet minimum comfort level standards; provide longer tenor loans and longer term ESAs to assure desired comfort levels and yet allow the public agencies to repay the loans or pay the ESA payments

Source: Adapted from World Bank 2014a

- The concept of project financing for ESCO projects is not commonly accepted by FIs. A major reason for this is that FIs require collateral and are generally unwilling to accept the savings stream generated by the project as appropriate collateral.
- The FI's have limited knowledge and understanding of EE projects and the ESPC concept.
- FIs also perceive EE projects as inherently riskier than other investments, and generally require a large proportion of equity funding from the ESCO for a project.

Also, large-scale implementation of EE projects in the public sector in Turkey is constrained by a number of barriers:

- Facility managers in public buildings generally do not have a good understanding of the opportunities, costs and benefits of EE options.
- There is very limited technical capacity in public agencies for conducting energy audits, designing and engineering projects, and/or contracting with and managing ESCOs or other energy service providers to implement projects
- There is little or no incentive to staffs of public facilities to save energy as the resulting cost savings may simply lead to reduced operational budgets in future years (which may actually represent a disincentive to save energy).
- Public sector contracting and procurement rules are often rather restrictive; for example, they require the selection of the low bidder which may make it difficult to adopt the performance contracting approach.
- Responsibilities for capital and operating budgets in public agencies are often

dispersed, making it difficult to deploy funds from capital budget to reduce operating costs.

- Commercial banks in Turkey are likely to be unwilling to provide project financing for ESCO projects with public agencies.

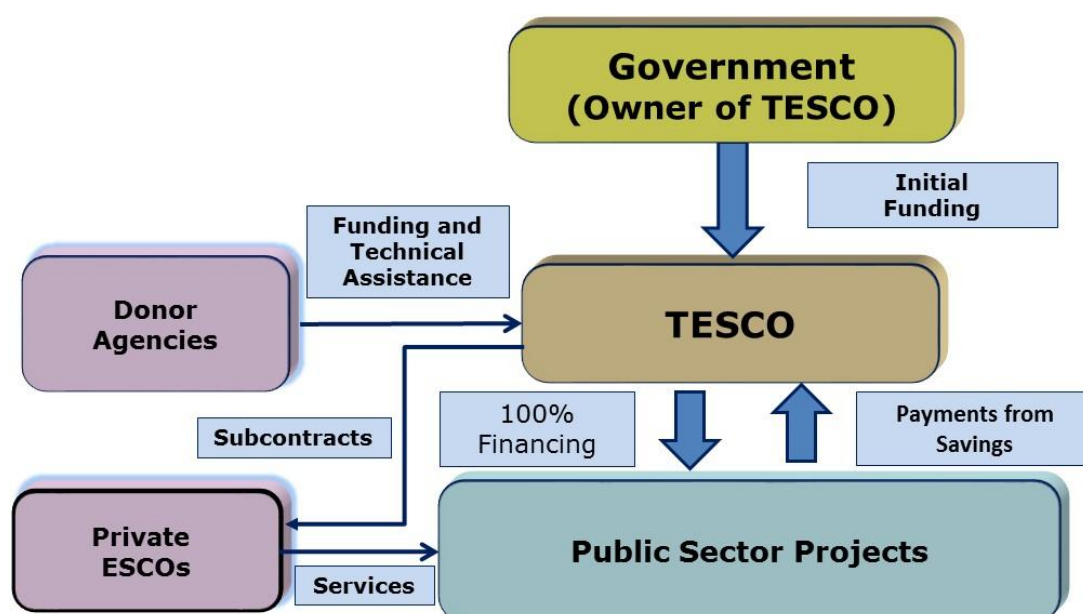
### Turkey Super ESCO

The concept of a Super ESCO has evolved as one of the mechanisms for overcoming some of the limitations and barriers hindering the large-scale implementation of EE projects. The Super ESCO is a special case of a public ESCO. It is established by the Government<sup>17</sup> and functions as an ESCO for the public sector market, including hospitals, schools, municipalities, government buildings, and other public facilities. It also supports capacity development and project development activities of existing private sector ESCOs including helping create new ESCOs (Limaye and Limaye 2011).

In Turkey, the Government, with the assistance of the World Bank and/or other donors, can capitalize the Turkey Super ESCO (“TESCO”) with sufficient funds to undertake public sector ESPC projects and to leverage commercial financing. A primary function of TESCO will then be to facilitate access to project financing by developing relationships with local or international financial institutions. TESCO may also provide credit or risk guarantees for ESCO projects, or act as a leasing or financing company to provide ESCOs and/or customers energy-efficient equipment on lease or on benefit-sharing terms.<sup>18</sup>

The World Bank study of the international experience in public procurement of EE services (Singh et al 2010) identified the Super ESCO as a potentially viable model for developing countries. TESCO may be uniquely positioned to overcome a number of the barriers faced by smaller ESCO companies. With its size and credibility as a public institution, TESCO can have the capability to support the growth of a nation’s private domestic ESCO business and can have the capacity to provide financing for EE projects. Figure 5.8 illustrates the structure of a Super ESCO.

Figure 5.8 - Typical Structure of a Super ESCO



<sup>17</sup> A Super ESCO may also be established by a private sector organization, an NGO or as a PPP.

<sup>18</sup> The discussion in this section is extracted from Limaye and Limaye 2011.

*Source: Limaye 2013b*

A Super ESCO can have a unique ability to target the largely untapped EE market in the public sector. The EE potential in the public sector is generally substantial, but the implementation of energy savings programs is complicated by numerous factors, including a lack of commercial orientation of public agencies, limited incentives to lower energy costs, complex and strict budgeting and procurement procedures, and limited access to budgetary or commercial project financing. Many public agencies face budget constraints and often focus on the upfront cost as a matter of necessity.

TESCO will also be assigned a major responsibility to help build the capacity of the local private sector ESCOs, and create a competitive private market for ESCO services. An appropriate role for TESCO will be to engage private ESCOs as subcontractors for parts of the implementation (such as installation, commissioning and performance monitoring), thereby helping to build their capacity. TESCO may also be in a position to arrange financing for small private ESCOs to help them implement projects and build their capacity and credentials.

The payments from the municipalities and other public clients for the services provided by TESCO may need to be secured through a payment security mechanism such as an escrow account. For central government agencies, TESCO may sign a framework agreement with the MOF (or the Ministry responsible for payment of the energy bills) to secure payments from the energy savings generated by the EE projects. (Information on a number of Super ESCOs is provided in Annex C.)

### **How TESCO Can Address EE Financing Barriers**

The key contributions that TESCO can make to the scaling up of EE project implementation are summarized in Table 5.4.

**Table 5.4 - How TESCO can Address Barriers to Implementation in the Public Sector**

<b>BARRIERS TO EE PROJECT IMPLEMENTATION IN THE PUBLIC SECTOR</b>	<b>HOW TESCO CAN ADDRESS THESE BARRIERS</b>
Low awareness and interest on the part of public agencies in energy efficiency (EE) projects	TESCO can conduct "marketing campaign" to increase awareness and interest
Zero budgeting policy of many governments provides little incentive for saving energy costs	TESCO can develop incentive mechanisms for public agencies
Budgeting Issues for public agencies - Capital Expenditure vs. Operating Expenditure	Agency can avoid issue by having project financed by a TESCO
Lack of procurement regulations that would allow ESCOs and Performance Contracting	Contracting with a TESCO can overcome this problem
Limited capacity in public agencies for performance contracting using ESCOs	TESCO can develop standard contracts customized for public agencies
Lack of interest on the part of local financial institutions to fund public sector projects	Financing can be provided by TESCO
Local financial institutions generally unwilling to provide "project financing" for EE projects	TESCO can provide "project financing" for public agency EE projects
Private ESCOs unwilling to invest in public sector projects	TESCO can invest in public agency EE projects
Public agencies not used to contracting with private sector for energy services	Public agencies may find it easier to contract with a TESCO

*Source: Adapted by authors from Limaye and Limaye, 2011*

## The Potential Role of IFIs and Donors

For all three shortlisted financing options, IFIs and donors can play a major role in their establishment and operation in three ways: (a) financial assistance, (b) capacity building, and (c) other technical assistance.

### Financial Assistance

Financial assistance may be provided in the form of loans, grants and guarantees. The loans would have the structures and characteristics of typical IFI loans, with sovereign guarantees. IFIs may also provide or arrange for grant funds (from the Global Environment Facility, or GEF, for example). Another financing option would be risk-sharing facilities (such as partial credit or risk guarantees) to the TEERF or to TESCO.

### Capacity Building

One of the most important ways in which IFIs can assist is through TA for capacity building. TA may be provided to:

- *PIU* – the TA would address training of PIU staff to build their capacity to manage the financing and implementation of the EE projects. The TA would include training related to EE technologies and relevant implementation strategies; basic concepts and tools for performance-based contracts; guidelines and procedures for measurement and verification of energy savings; and monitoring and reporting of the overall program results to the financing sources. In addition, in the case of the Budget Financing and TEERF, the capacity building TA may also include funding for the initial set-up, administration and operation of the PIU, and for purchase of equipment for auditing, data collection, and measurement and verification.
- *Central government agencies* – to help facility managers and engineers identify the opportunities for EE implementation in their buildings, conduct energy audits, and develop EE Action Plans.
- *Municipalities* – to help mayors, city councils, utility executives, facility managers, and facility engineers understand the need for and the importance of EE implementation, and to obtain information on the technical options for EE in municipal utilities and public buildings and facilities; also to conduct energy audits and develop EE Action Plans.
- *Banks and financial institutions* – to provide information on the characteristics of EE projects, implementation business models, financial and technical appraisal, M&V, and business opportunities in financing EE projects.
- *Energy service providers* – to build their capacity to develop projects; conduct energy audits; screen, design, evaluate, appraise/finance, implement, measure and verify EE investments in the public sector; and understand the perspectives of banks and financial institutions, M&V protocols, and preparation of “bankable” project proposals.
- *M&V agencies* – to create the M&V infrastructure and provide Turkey-specific protocols and supporting tools for conducting M&V of EE projects.

### Other Technical Assistance

The government, together with IFI and donor partners, may also provide other types of TA to facilitate the scaling-up of financing of EE projects. This may include the following:

### ***Building Energy Databases***

The development of a national inventory of public buildings and establishment of a database containing information by building type on floor area, annual energy use, and fuel type is needed to inform a national program. An analysis can then be conducted to develop benchmarks such as energy use per square meter and identify the high and low energy users. The database can also be used to estimate EE potential and investment needs.

### ***Public Sector EE Programs and Projects***

The development and documentation of information on existing and planned public sector EE programs, their costs, results and energy savings achieved is also needed and, once developed, should be widely disseminated.

### ***Incentives and Recognition***

Voluntary and mandatory measures can also be used to identify and publicize the high and low energy performers (“fame and shame”). TA could also be provided to help establish EE targets and reporting requirements. These TA activities should be designed to achieve long-term, sustainable cultural changes in the public sector.

### ***Appliance Labeling and Standards***

There is a need to transform the market towards more efficient energy-using appliances and equipment. TA can be designed to:

- Ensure that building materials and appliances are properly tested and certified.
- Develop procedures to assure enforcement of the standards and labeling requirements.
- Accelerate the implementation of building energy certificates.
- Redesign the ESCO certification scheme.

### ***Templates and Standard Contracts***

Other important areas of TA include:

- Developing and publishing case studies of EE project and documenting the lessons learned
- Providing templates for conducting energy audits.
- Preparing standard contract terms and conditions for ESPCs.
- Preparing an M&V User’s Guide.



## SECTION 6 - MOVING FORWARD

## Advantages and Limitations of the Three Options

A summary of the advantages and limitations of Budget Financing, TEERF, and TESCO is provided in table 6.1.

Table 6.1 – Comparison of Public Sector Financing Options

Characteristics	Budget Financing	TEERF	TESCO
<b>Types of financing</b>	Loans and TA; may include some grants	Loans, TA, ESAs	Loans, TA, ESAs
<b>Governance and management</b>	PIU	Board of Directors	Board of Directors
		Fund management team	TESCO management team
<b>Project development</b>	PIU	Fund management team	TESCO management team
<b>Project implementation</b>	Public agencies	Public agencies (for debt financing)	TESCO management team
		Fund management team (for ESAs)	
<b>Sustainability</b>	Based on GOT decisions	Yes, due to revolving investment capital and fees to cover operating costs	Yes, due to commercial operations and leverage of private financing
<b>Repayment risk</b>	None	Assumed by TEERF	Assumed by TESCO
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Easy to implement</li> <li>• Analogous to some existing models</li> <li>• Can serve all public agencies</li> <li>• Does not require any investment from the public agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Can address needs of all public agencies</li> <li>• Multiple windows to address financing needs and evolving capacity of public agencies</li> <li>• ESA model useful for smaller and weaker public agencies</li> <li>• Helps introduce ESPCs and build local ESCO industry</li> </ul>	<ul style="list-style-type: none"> <li>• Can address needs of all public agencies</li> <li>• Multiple windows to address financing needs and evolving capacity of public agencies</li> <li>• Can provide ESAs and introduce ESPCs</li> <li>• Can help build capacity of private sector ESCOs</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li>• Requires active participation of MOF</li> <li>• May need changes in budgeting procedures</li> <li>• Requires capable PIU</li> <li>• Sustainability is not assured</li> </ul>	<ul style="list-style-type: none"> <li>• Need legislation for implementation</li> <li>• Need strong, capable Fund management team</li> <li>• May need payment security mechanism to assure payments for services</li> </ul>	<ul style="list-style-type: none"> <li>• Need legislation to create a new state-owned enterprise</li> <li>• Need strong, capable TESCO management team</li> <li>• Need to develop payment security mechanism to assure payments for services</li> </ul>
<b>Are legislative changes needed?</b>	Yes	No, requires new legislation; may require creation of a new entity.	No, requires new legislation and creation of a new state enterprise

Source: Authors

## Moving Forward on the Public Sector EE Financing Agenda

Pursuing any one of the three potential options will require deliberate efforts by the Government of Turkey to:

- Identify the sources of the needed investment capital.
- Secure the commitments from IFIs as appropriate.
- Implement the needed legislative and regulatory initiatives.
- Design the delivery system.
- Build implementation capacity.
- Leverage private sector participation.

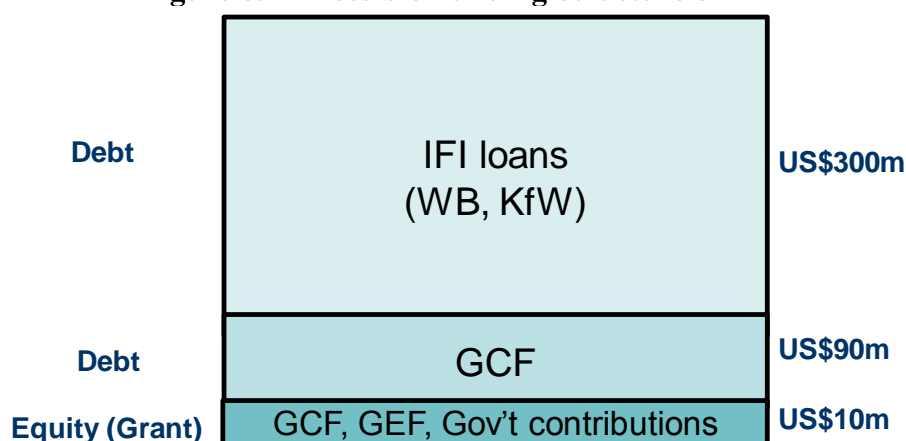
The Government should select one of the options for implementation only after review and consultation with all relevant stakeholders — including government officials, mayors and city councils, private sector representatives, banks and financial institutions, consumer groups, and the IFI community. The next step would then be the detailed design and implementation planning for the selected option.

In view of the analysis and state of the Turkey market, the World Bank recommends creating a dedicated TEERF for the public sector, and focusing its initial efforts on financing EE renovation of central government buildings. For administrative ease, it is proposed that the TEERF be established as a government-owned account and initially managed by an existing entity, such as TKB. If the Government decides to establish the TEERF as a new entity, or to create TESCO at a future date, then the account and related receivables could be sold or transferred to this new entity. Such a scheme would allow implementation to be initiated sooner while still enabling Turkey to develop a dedicated entity for a more sustainable program. Should the TEERF perform well, operations could later be extended to address the needs of municipalities and include municipal buildings, street lighting, water pumping, and other EE investments. This would fill a critical gap in public sector EE financing in Turkey and help address perhaps some of the most pressing public sector needs.

## Possible Funding Structure

A preliminary concept for the proposed funding structure of the TEERF is summarized below (see Figure 6.1):

Figure 6.1 – Possible Funding Structure of TEERF



- The TEERF could be capitalized with equity of US\$10 million. The equity sources could be the Green Climate Fund (GCF), GEF, Government contributions, and possibly other donors.
- The TEERF could also be eligible for concessional debt financing of US\$90m through GCF loans.
- Additional public debt of US\$300 million could be obtained from IFIs such as the World Bank, KfW, AfD.
- The TEERF can be staffed with a small permanent Fund staff with use of consultants.
- The fee structure to cover admin and overhead costs (prelim audit, procurement, financial structuring, oversight, etc.) will be established. It is expected that the initial annual costs would be about US\$1.5 million for staff, overhead costs, consultants, TA and other variable costs.

## **Results**

The TEERF would make investments in EE projects of US\$30 million in year 1 increasing to US\$90 million per year from Years 6 to 15. The typical simple paybacks would be in the range of about 7 years and the TEERF would be likely to achieve breakeven in terms of covering its administrative and overhead costs and fees from its revenues from Year 3 onwards. TEERF could invest US\$390 million by Year 6 and it is assumed that it will need recapitalization of about US\$115 million by the end of Year 7.

Estimated results based on a preliminary financial model would be:

- Cumulative project investments by Year 15 – US\$ 1.2 billion
- Net equity after Year 15 (equity plus debt account) – \$26.5 million
- Annual energy savings – 1,602 GWh
- Annual government budget savings of about US\$170 million (by Year 8)
- Lifetime energy savings – 24,030 GWh
- Lifetime GHG reductions – 30.6 million tons of CO<sub>2</sub>e
- An increase in 15,800 to 20,000 green jobs

## **Roadmap for Establishing the TEERF**

The major steps in establishing the TEERF are shown in Figure 6.1.

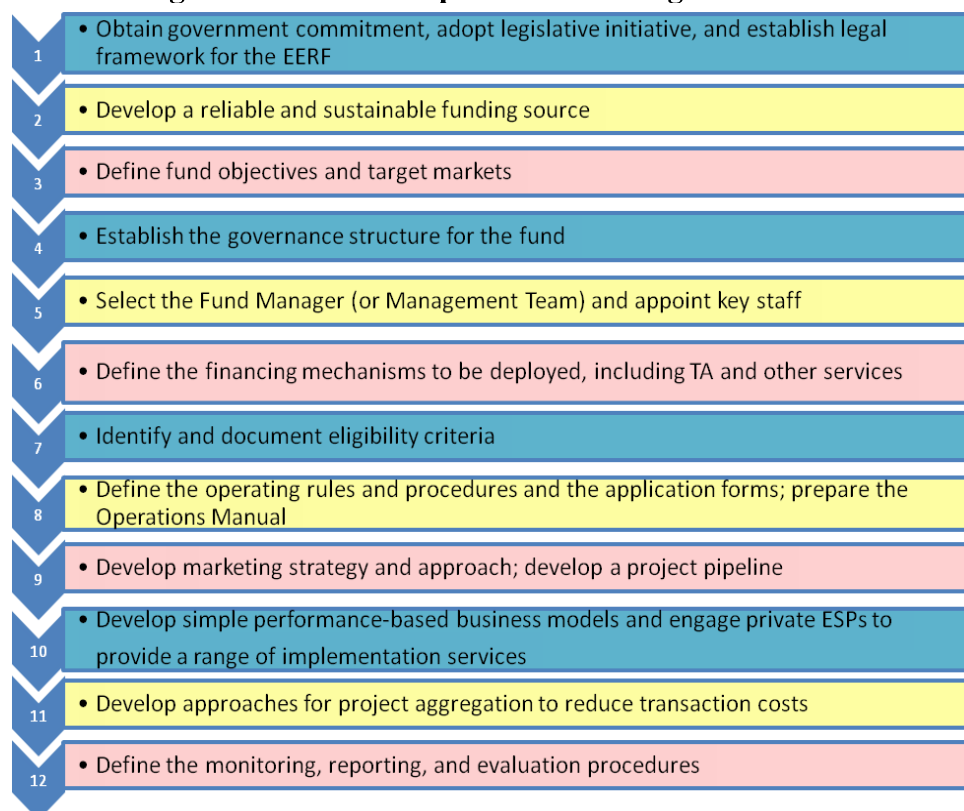
## **Advantages of the TEERF**

It is recommended that the TEERF be initially established as a government-owned account initially managed by TKB to serve the needs of central government agencies. TEERF will be governed by a Government-appointed Board of Directors or Board of Trustees comprising of public and private sector members. It will offer the following advantages:

- The TEERF will represent the interests of all the relevant stakeholders (including various Ministries and private sector stakeholders)
- Fund management (by TKB or new, independent entity) can be independent and thus avoid political influence
- The TEERF can allow pooling of government/donor funds to avoid parallel initiatives
- The Board can select a highly qualified management team

- Fund management staff could be long-term and compensated at market-based rates
- The TEERF may not have to comply with government procurement rules and bureaucratic procedures
- It can operate with more flexibility and faster decision-making than a government agency

**Figure 6.1 – Road Map for Establishing the TEERF**



Source: Adapted by authors from World Bank 2014b

## Concluding Remarks

As indicated above, the TEERF can initially be established under the management of TKB to serve the needs of central government buildings. If the program and ESA mechanism are successful, it could later be extended to municipal buildings and facilities. Should the Government decide in future years to establish a new entity to serve as the TEERF, or establish TESCO, the portfolio of TKB could be sold to this new entity. This would allow the program to begin right away without creating any new entity, while still preserving the Government's flexibility to establish a dedicated institution at a later date.

The creation of such a program would help the government meet its national EE targets and directly contribute to its targets for public buildings (under the 10<sup>th</sup> Development Plan). The TEERF will also provide significant co-benefits, including reduced energy imports and public energy costs, improved comfort levels, refurbished public building stock, creation of an ESCO industry and new jobs, and reduced GHG emissions

It will be sustainable, since no recurring Government budget will be needed, and operate on a revolving basis for more than 20 years. It can provide the basis for extension or replication to other municipal sectors (e.g., street lighting, water pumping, etc.). By implementing

TEERF, Turkey can also become a regional leader on EE implementation and foster what could become the largest ESCO industry in the region.

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## **ANNEX A - ENERGY EFFICIENCY MEASURES**

Measures included in energy audits and associated average paybacks:

<b>Energy Efficiency Measures</b>	<b>Payback Period (Years)</b>
Building Envelope Insulation	7.74
Boiler Replacement	0.80
Burner Optimization	0.05
Economizer	1.37
Installation Insulation	0.62
Thermostatic Valve	2.51
Solar Thermal	7.85
Ballast Replacement	3.99
Modernization of Lighting Equipment	3.39
Motion Sensor	1.54
Electrical Motors	2.15
Solar PV	7.54
Electricity Tariff Analysis	0.00
Compensation	0.47
Stand—by	0.02
Modernization of Pumps	0.46
Fresh Air Usage in Compressors	1.88
Modernization of Cooling Systems	13.15

*Source: Reported in Econoler 2016 based on results of 166 public buildings audits conducted by GDRE.*

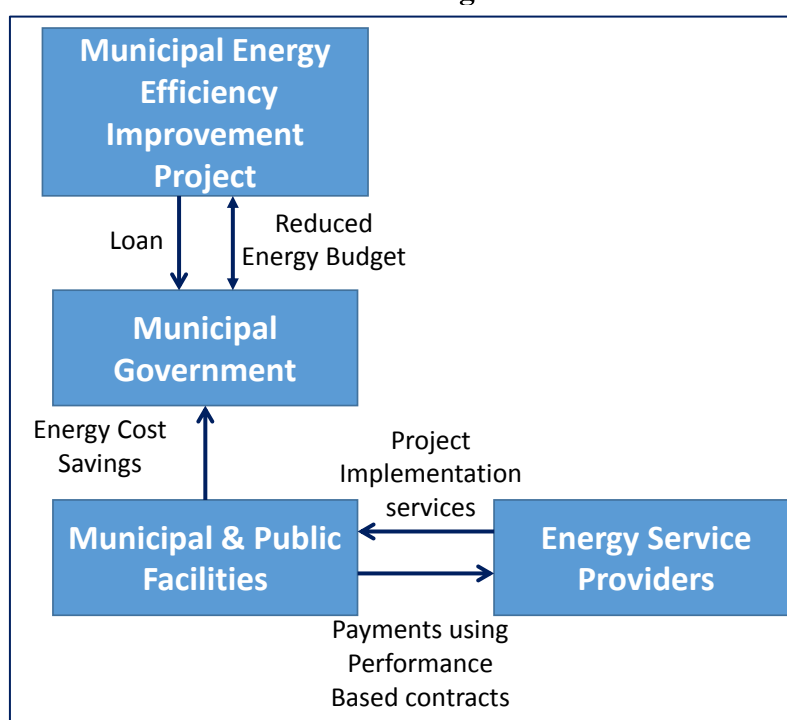


## ANNEX B – ADDITIONAL INFORMATION ON SELECTED FINANCING MECHANISMS

### Budget Financing with Capital Recovery

Figure B.1 shows a typical structure of a public EE improvement project using budget financing. An illustrative example of this approach is a project financed by the World Bank in the former Yugoslav Republic of Macedonia (see Box B.1).

**Figure B.1 - Structure of a Municipal EE Improvement Project Using Budget Financing**



Source: Authors.

#### Box B.1 - Example of Budget Financing with Capital Recovery: Macedonia

The World Bank provided a loan of US\$25 million (later expanded to US\$75 million) to Macedonia to fund the Municipal Services Improvement Project (approved in 2009), which sought to improve the transparency, financial sustainability and delivery of municipal services in the participating municipalities through a focus on revenue-generating public services and investment projects with cost-saving potential. The loan funds were managed by the MOF and were on-lent to participating eligible municipalities through sub-loan and grant agreements on the same terms as the World Bank loan. The loan repayments were in the form of reduced budget outlays to the municipalities for energy.

Eligible borrowers were creditworthy municipalities that had received MOF approval to borrow, with publicized budgets and audit reports. The loan program was supplemented by technical assistance funds for capacity building and institutional reform, and also by a performance-based investment grant fund that provided incentives and rewards to municipalities for implementing reform initiatives to improve service delivery performance.

Source: World Bank 2009 and 2012b.

## **Utility On-Bill Financing**

A summary of this mechanism was provided in Section 5. Some of the advantages of this mechanism, based on experience in 20 U.S. states, are (ACEEE 2011):

- It provides consumers access to financing using the utility's relationship with its customers.
- It generally provides the customer the advantage of paying for the EE investment from the savings in the utility bills resulting from that investment.
- Such a program may be able to extend financing to otherwise underserved markets, such as consumers renting their facilities and residents of multi-family dwelling units.
- There is also the possibility of providing financing to consumers whose weak credit limits their ability to obtain conventional financing.
- The costs and risks related to the collection of loan repayments from consumers are reduced because very few consumers are delinquent on their utility bill payments.

### **Key Characteristics**

- The financing structure is generally on favorable loan terms. The interest rate is based on the utility's cost of capital and is therefore usually below the commercial market rate. Some utility financing programs charge a zero interest rate.
- The length of the loan is determined based on the type of EE equipment being financed and is designed in such a way that the consumer's monthly loan repayment is less than the bill savings generated by the equipment. For example, financing of CFLs may be for a 9 to 18-month period which is commonly the payback period for such efficient lamps.
- The equipment is generally owned by the consumer and the utility has a lien on the equipment under the loan agreement.
- The utility's financing and administrative costs can be rolled into the equipment price and paid by the consumer as a part of the loan repayment.
- The risk of default is low as most consumers usually are diligent about paying their utility bills. In some cases, the utility may threaten to cut off the electricity service for non-payment of the equipment loan, providing a major incentive to the consumer to not be in default.
- Some utilities have found it difficult and cumbersome to modify their billing systems to add loan repayments for EE equipment to the electricity bills.

### **Illustrative Examples**

Recent examples of utility financing of EE projects through the billing mechanism include the Bangalore Efficient Lighting Program (BELP) launched by the Bangalore Electricity Supply Company (BESCOM) in India and the PROSOL program in Tunisia for installation of solar water heaters.

In the BELP program, the electric utility competitively selected manufacturers of energy-efficient Compact Fluorescent Lamps (CFL) based on price, quality and warranties offered. Residential customers of BESCOM were able to obtain the CFLs from the manufacturers' retail outlets. The customer signed an agreement with BESCOM to pay for the CFLs over a

9-month period through their electric bills (IIEC 2006).

The Tunisian program (called Programme Solaire or PROSOL) was a joint effort involving the Tunisian Ministry of Industry, Energy, and Small and Medium Enterprises, and the National Agency for Energy Conservation (ANME). The solar water heating manufacturers and suppliers worked with commercial banks to arrange financing for customers interested in purchasing solar water heating systems. The customers agreed to repay the loan through their electricity bill. The electric utility collected the customer payments and repaid the banks. A summary is provided in Box B.2.

**Box B.2 – Tunisia PROSOL Program**

The PROSOL project was initiated in 2005 by the Tunisian Ministry for Industry, Energy and Small and Medium Enterprises and the National Agency for Energy Conservation (ANME), with the support of the UNEP-MEDREP Finance Initiative. The objective of PROSOL was to revitalize the declining Tunisian solar water heater market. The innovative component of PROSOL was in its ability to actively involve the finance sector, and turn it into a key player for the promotion of clean energy and sustainable development. By identifying new lending opportunities, banks were able to build dedicated loan portfolios, thus helping to shift from a cash-based to a credit-based market.

The main features of the PROSOL financing scheme were:

- Loan mechanism for domestic customers to purchase solar water heaters
- Cost subsidy provided by the Tunisian government, up to 100 dinars (57 Euros) per m<sup>2</sup>
- Discounted interest rates on the loans, progressively phased out.
- A series of accompanying measures including an awareness raising campaign, a capacity building program and carbon finance.
- Key partners included:
  - Société Tunisienne de Banque (STB)
  - Two commercial banks (UBCI and Amen bank)
  - The State electricity utility STEG (Société Tunisienne d'Electricité et du Gaz)
  - Manufacturers, importers and installers of solar water heaters
  - Local consultants

Launched in April 2005, the PROSOL project achieved immediate success. In less than one year (April-December 2005), sales reached the record figure of 7,400 solar water heating systems, for a total surface installed of 23,000 m<sup>2</sup>. By the end of 2006, an additional 11,000 units were sold, corresponding to approximately 34,000 m<sup>2</sup>.

The main advantages of utility on-bill financing are:

- Allows the customer to purchase EE equipment and pay for it from savings generated by the equipment
- Facilitates the customer's repayment of the equipment purchase by collecting the payments through the electricity bill
- Reduces the transaction cost of recovering the loan repayments from customers
- Reduces the risk of default
- Improves the relationship between the utility and the customer.

There are also some limitations and challenges related to the utility consumer financing approach:

- Many utilities are unwilling to enter into such arrangements to finance equipment purchase through the electricity bill.
- The utility billing system may not be structured to handle the collection of loan repayments and the cost of modifying the system may be high.

- The regulatory system may not allow the utility to collect payments for equipment loans.
- While default risks are low in such programs, there are issues with respect to what actions the utility can take in case the customer does not pay the finance charge or only pays a part of the utility bill. While some utilities have included provisions to cut of service for non-payment of the EE finance component, consumer advocates have questioned the legal basis to do so.
- Some of the other challenges include accurately estimating the utility financing and administration costs, assuring that the monthly payment is less than the bill savings, addressing the payments when the ownership of the property changes, addressing energy savings that are non-electric, etc.

## **Energy Efficiency Revolving Fund**

EERFs have been successfully deployed in Bulgaria, Romania and (more recently) in Armenia. The typical structure of an EERF was presented in Section 5. Box B.3 provides an illustration of the Armenian R2E2 fund.

### **Box B.3 - Armenia Renewable Resources and Energy Efficiency Fund (R2E2 Fund)**

The Fund was established in 2005 and capitalized with an US\$8 million IDA credit and US\$0.7 million GEF grant. The Fund is overseen by a Board of Directors, which includes government, private sector and academia and operates on a fully commercial basis.

The Fund currently implements a World Bank/GEF project that provides EE services in public sector facilities—such as municipal street lighting, schools, hospitals, and administration buildings (average size about US\$100,000). It has already financed 63 ESAs worth US\$9.9 million between 2012 and 2016 and provided TA for project preparation and capacity building.

The Fund provides loans to municipalities and public entities with revenue streams independent of the state budget, and energy service agreements (ESAs) to schools and other public facilities, which are not legally independent:

- Loans will be provided under an ESA, whereby the Fund will also provide additional services against a service fee (conduct a preliminary screening; carry out the procurement of design and works; oversee construction and commissioning; pay the contractors for services provided; and monitor the sub-projects). The loans will be treated as municipal debt, with fixed repayment obligations to be made within their budget provisions in future years. The amount of the repayments will be designed to allow fund clients to repay the investment costs and service fee from the accrued energy cost savings.
- Energy Service Agreements: The Fund will first determine the average baseline energy use, identify the general scope of a sub-project, develop bidding documents, conduct the procurement, finance the project, oversee construction and commissioning, and monitor the sub-project. The ESA will obligate the facility to pay the baseline energy costs (with adjustments for energy prices, usage, etc.) over the life of the agreement. In such cases, there is no loan or debt incurred by the client entity. With these payments, the Fund will pay the energy bills on the facility's behalf and retain the balance to cover its investment cost and service fee of up to 10 years. The agreement will also be designed so that the duration can be adjusted if the Fund recovers its full investment earlier or later.

To support the build-up of an ESCO industry in Armenia, the Fund uses simplified ESCO contracts to shift some performance risks to private construction firms/contractors.

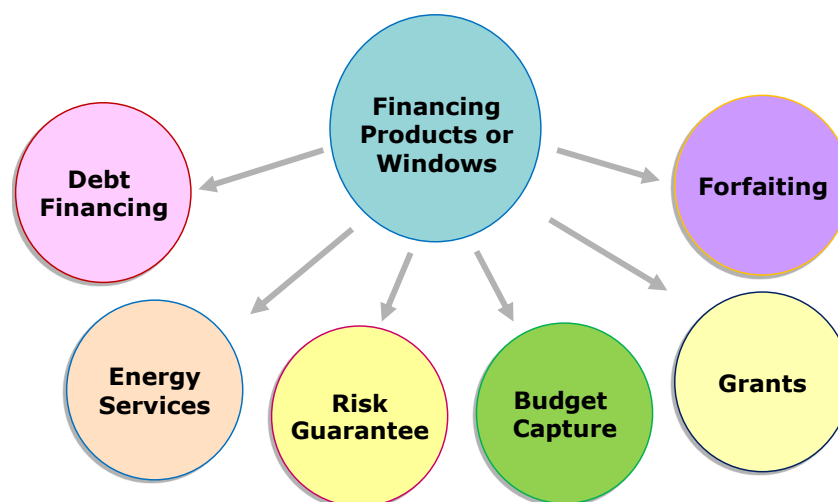
*Source: World Bank 2012a, World Bank progress reports.*

## **Financing Windows or Products**

An EERF would need to be designed to serve the needs of all municipalities and central government agencies. Some of these agencies may not be creditworthy, or have no

borrowing history; others may not have available borrowing capacity; and others may not have the internal capacity to identify, design, and manage the implementation of EE projects. To address some of these issues, an EERF may offer several financing products and “windows,” as shown in Figure B.2:

**Figure B.2 – Financing Windows of an Energy Efficiency Revolving Fund**



The Debt Financing Window and ESAs were discussed in detail in Section 5. The other windows are summarized below.

### **Risk Guarantee Window**

An EERF may offer a risk-sharing mechanism by providing credit or risk guarantees to commercial banks and other financial institutions (FIs) in order to leverage commercial financing for public sector EE projects. Risk-sharing programs are designed primarily to address the common perception of lenders that EE projects are inherently riskier than traditional investments (a major financing barrier), or to allow them to lend to marginally creditworthy clients with very attractive EE investment opportunities. They provide commercial banks/FIs with a partial coverage of the risk involved in extending loans for EE projects. The risk-sharing facility generally includes a subordinated recovery guarantee<sup>19</sup> and may also have a “first-loss reserve”<sup>20</sup> that may be used to absorb up to a specified amount of losses before the risk sharing occurs.

For example, the Bulgaria EE Fund provides three types of guarantees: (i) a credit guarantee covering up to 80 percent of the credit value to secure loans for EE projects, with individual guarantee commitments not to exceed Lev 800,000 (about \$500,000); (ii) an uncollateralized guarantee to a portfolio of receivables of energy service companies (ESCOs) for their energy

<sup>19</sup> In a *subordinated recovery guarantee*, the guarantor ranks behind other lenders in the recovery of the guarantee funds it pays out in case the borrower defaults on the loan. This allows lenders to offer better loan terms, such as lower interest rates or longer tenors. A subordination provision may be useful, for example, when interest rates are high due to higher perceived risk, or if a new technology with limited operational experience is being deployed.

<sup>20</sup> In the event of a loan default, a *first-loss reserve* pays for all losses incurred until the maximum first-loss reserve amount is exhausted. The lender incurs losses only if the total loan loss exceeds the first-loss amount. By covering all or a large share of first losses and sizing the definition of first losses to be a reasonable proportion of the loan portfolio (usually higher than the estimated default or loss rate), a first-loss reserve can provide meaningful risk coverage to the lender, but with a low level of total guarantee liability relative to the total size of the portfolio.

performance contracts (EPCs), covering the first 5 percent of the delayed payments of the portfolio covered; and (iii) a residential portfolio guarantee covering the first 5 percent of defaults within the portfolio of projects.<sup>21</sup>

### ***Budget Capture***

The budget capture option may be used by an EERF when the public agency receives dedicated funds from the MOF or another government agency to pay its energy bills. In such cases, after the EERF invests in EE projects implemented by the public agency, the government (i) reduces its budgetary outlays to that public agency by an amount equivalent to the amount of energy cost savings (thereby “capturing” the savings) and (ii) redirects these funds to the EERF. This would require that the government agrees to provide the same amount to the public agency for energy bill payments in subsequent years.

### ***Grants Window***

If an independent, sustainable financing source is available, EERF may also offer a grant window. For example, if a government (through special taxes, levies, or surcharges, for example) or a donor agency commits to funding EERF for a given number of years, a portion of the funding may be used for grants to public agencies to improve the economic attractiveness of the EE project from the public agency perspective.

However, if the EERF is established to operate on a fully commercial basis, it is unlikely that it will provide grant financing—except when such grant financing is available from another source and can be combined with the loan financing provided by the revolving fund. If such funds are made available, it should be made clear that these are limited; failing to do so may create false expectations for more grants, which may undermine the fund’s long-term sustainability.

### **Forfeiting**

A possible service that an EERF can provide or arrange is forfeiting, the sale of receivables from an EE project. Forfeiting is useful in situations where an energy service provider (ESP) is providing its own equity for project financing. It is a form of transfer of future receivables from one party (the seller to an ESP) to another (the buyer to a financial institution).<sup>22</sup> An example of forfeiting is the Bulgarian ESCO Fund (BEF) established under the Law for Special Investment Companies by the Bulgarian company Enemona. This fund received a loan of €7 million from the European Bank for Reconstruction and Development (EBRD) to buy receivables under the energy saving contracts signed by Enemona. The fund allows Enemona to use its capital for further development of projects in both the industrial and public sectors including kindergartens, schools, hospitals, and other municipal buildings.

### **Dedicated EE Credit Lines**

Dedicated EE credit lines for public sector projects address many of the issues related to insufficient lending by banks and financial institutions. By establishing a credit line and providing funding, governments or donor agencies can help overcome some of the barriers to commercial financing. Most EE credit lines also have a TA component to build lender

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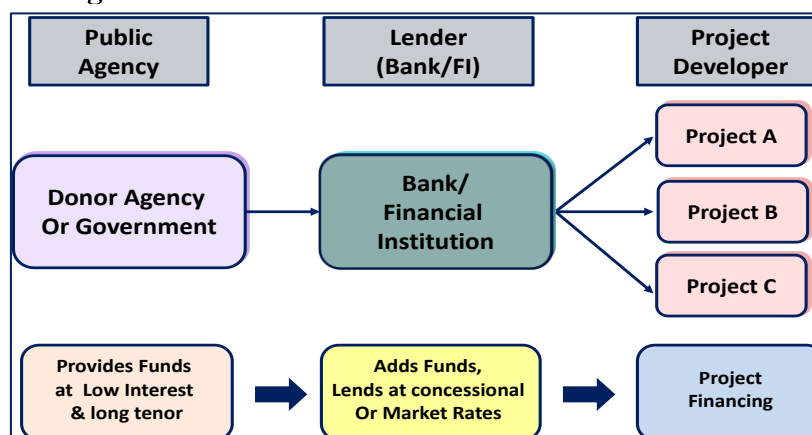
<sup>21</sup> The residential portfolio guarantee was not used. The available funds were committed to the ESCO portfolio guarantees.

<sup>22</sup> The original creditor (the ESP) cedes his claims to future revenues from the project and the new creditor (the FI) gains the right to claim these future receivables from the debtor (the client). The ESP receives a discounted one-time payment from the FI that then allows it to invest in new energy savings performance contract (ESPC) projects.

capacity relative to EE project financing. However, issues related to creditworthiness and adequate collateral limit their use in municipalities.

The typical structure of an EE credit line is shown in Figure B.3. Box B.4 provides an illustration of a municipal EE credit line in Serbia.

**Figure B.3 – Illustrative Structure of EE Credit Line**



Source: Limaye 2013a

#### Box B.4 — Example of Municipal Credit Line in Serbia

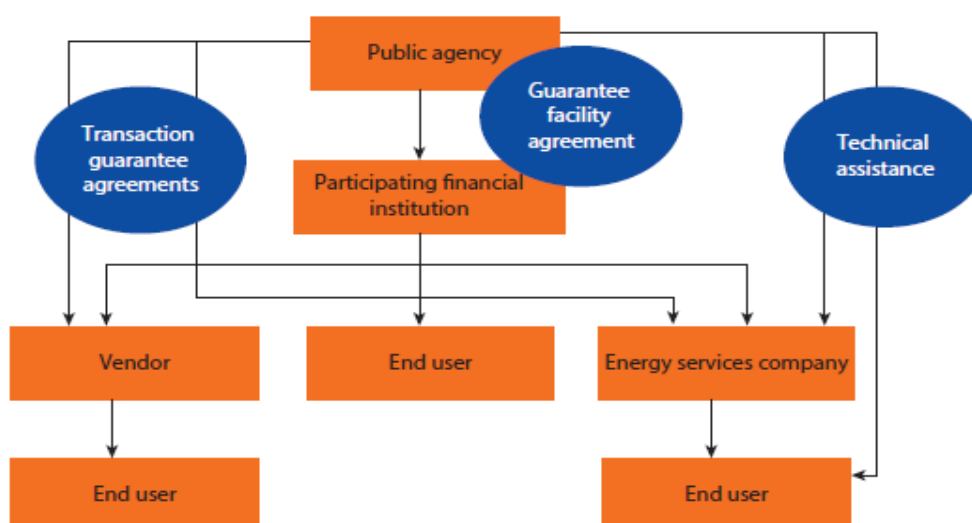
The German development bank, KfW, has launched a dedicated credit line for municipal environmental infrastructure and EE investments in Serbia. A total of €100 million will be made available and disbursed to eligible municipalities and public sector utility companies via Serbian on-lending banks, following the standard procedures for municipal borrowing. This is a continuation of the current KfW project on "Municipal Infrastructure via the Financial Sector". To provide more incentives for Serbian municipalities to invest in EE and environmental projects, KfW and the European Commission signed an agreement at the end of 2011. A grant scheme will be implemented to award grants of 15 to 20 percent of the loan amount financed from the KfW credit line after their successful completion.

Source: [http://www.meglip.org/wp/?page\\_id=4](http://www.meglip.org/wp/?page_id=4).

### Risk-Sharing Facility

A typical structure of a risk-sharing facility is shown in Figure B.4. Box B.5 provides the example of the IFC/GEF risk sharing program for Commercializing Energy Efficiency Finance in Central and Eastern Europe.

Figure B.4 - Typical Structure of Risk-Sharing Facility



Source: Mostert 2010

#### Box B.5 - Risk Sharing Facility Example – Commercializing EE Finance (CEEF)

The Commercializing Energy Efficiency Finance (CEEF) Program was launched in April 2003 as a joint program of the IFC and the GEF. The countries included in CEEF were the Czech Republic, Hungary, Estonia, Latvia, Lithuania, and the Slovak Republic. CEEF was designed to work in partnership with local lenders by providing partial guarantees to share in the credit risk of EE loan transactions that the partner lenders would fund with their own resources. The transactions eligible for the program included capital investments aimed at improving EE in buildings, industrial processes, and other energy end-use applications.

Risk sharing was achieved through a partial guarantee structure under which the IFC guaranteed 50 percent of the project risk on an equal basis with the participating lenders.

Technical assistance was an important component of the program to (a) help prepare projects for investment and (b) build capacity in the EE and lender industries in each country.

CEEF resulted in substantial increased investments by commercial lenders for EE projects. Although few of these projects were for municipalities, CEEF did lead to a major lending program for financing EE in schools in Hungary.

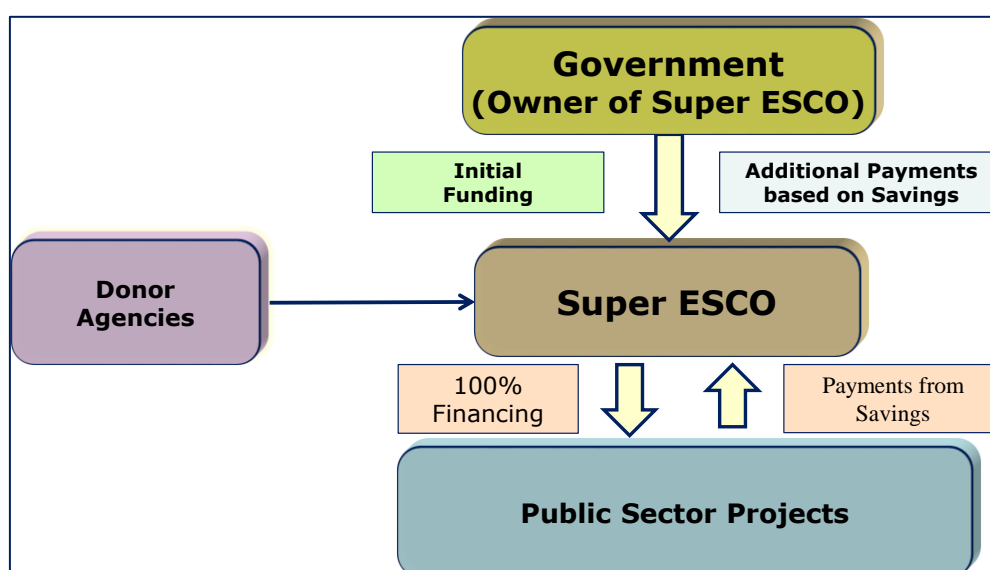
Source: IFC 2004

## Super ESCO

A Super ESCO can be uniquely positioned to overcome a number of the barriers faced by smaller ESCO companies. With its size and credibility as a public institution, a super ESCO has the capacity both to support the growth of a nation's private domestic ESCO business and to finance EE projects, since it typically subcontracts all project implementation to local ESCOs. Figure B.5 illustrates the structure of a Super ESCO.



Figure B.5 - Typical Structure of a Super ESCO



Source: Limaye 2013b

Examples of Super ESCOs include the New York Power Authority (NYPA) in the United States, Fedesco in Belgium, Fakai Super ESCO in China, and Energy Efficiency Services

#### Box B.5 - Energy Efficiency Services Limited: India's Super ESCO

The government of India established Energy Efficiency Services Limited (EESL) as a super ESCO to carry out public sector undertakings under the Ministry of Power. EESL functions as the implementation arm of the National Mission for Enhanced Energy Efficiency (NMEEE). The purpose of setting up a separate corporate entity was to develop an EE market that was virtually nonexistent in the country. It has the mandate to implement EE projects in the public sector and facilitate and promote the development and growth of the private ESCO industry through partnerships and subcontract arrangements. The initial capital of EESL is about US\$50 million.

Some of the major functions of EESL are EE planning and implementation in the residential sector, commercial buildings, industrial sites, municipal street lighting and water pumping, and agricultural pumping. EESL also does capacity building of utilities and state designated agencies (SDAs) responsible for EE implementation under India's Energy Conservation Act.

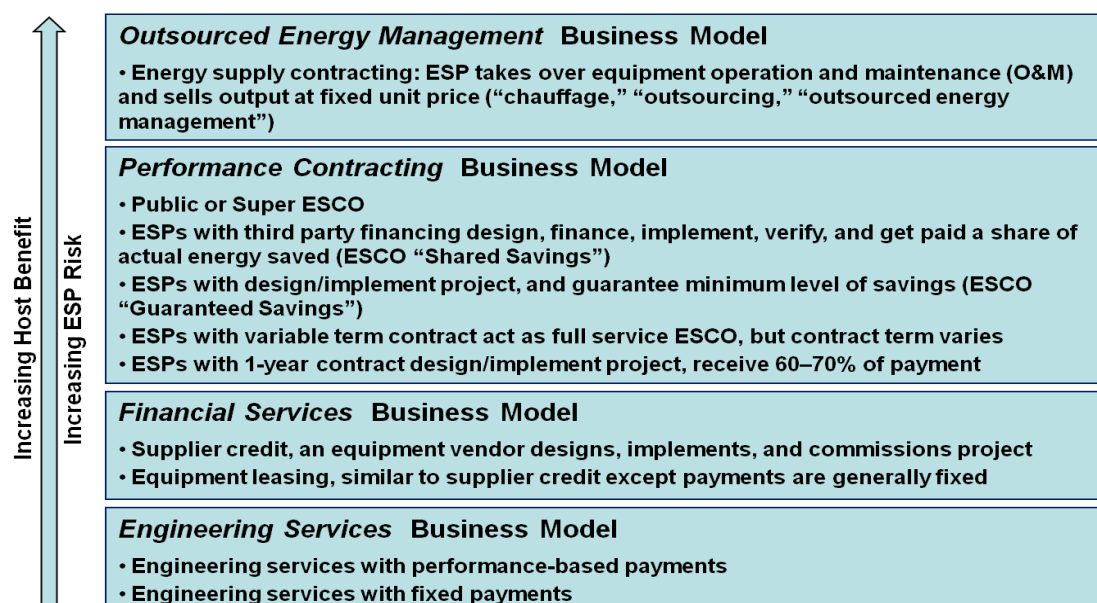
EESL has successfully collaborated with state and local government agencies to implement a wide range of projects including LED lighting in homes, efficient agricultural pumps, efficient street lighting, and efficient chillers in commercial buildings. EESL has engaged in a number of partnerships with private sector organizations to implement these projects.

Source: EESL 2015

Limited (EESL) in India (see Box B.6).

## Commercial Financing with ESCOs

The business models typically utilized by ESPs are illustrated in Figure B.6.

**Figure B.6 - Summary of Business Models for Energy Service Companies (ESCOs)**

Source: World Bank 2014c

Before an energy service market for the public sector can be developed, the government must first undertake a set of legislative, regulatory, and policy initiatives targeted at:

- Creating a large and stable demand for energy services projects in the public sector;
- Removing barriers to public procurement of EE services and establishing clear regulations, rules and procedures for public agencies to work with private ESCOs; and
- Facilitating adequate and affordable financing of private ESCO projects.

Table B.1 provides more detail on these initiatives.

**Table B.1 — Government Actions to Foster Private ESCOs**

<b>Create Demand for EE Services</b>	<b>Remove Barriers to Public Procurement of EE Services</b>	<b>Facilitate Financing of ESP Projects</b>
<ul style="list-style-type: none"> <li>• Increase PA knowledge and awareness of ESPs</li> <li>• Increase PA capacity to identify ESP opportunities</li> <li>• Require EE targets and action plans</li> <li>• Develop standard, templates, benchmarks, and M&amp;V schemes</li> <li>• Organize workshops with PAs and ESPs</li> <li>• Aggregate similar projects across PAs</li> <li>• Accredite or certify ESCOs</li> </ul>	<ul style="list-style-type: none"> <li>• Allow PAs to sign multiple-year contracts</li> <li>• Allow retention of energy cost savings to pay ESPCs</li> <li>• Change procurement rules to select most value, not least cost</li> <li>• Exclude ESP payments from PA debt</li> <li>• Require consumption-based billing for district heating</li> <li>• Allow PAs to engage in PPPs and EE equipment leasing</li> <li>• Encourage PAs to use simple ESCO business models</li> </ul>	<ul style="list-style-type: none"> <li>• Establish EE revolving fund with loan facility</li> <li>• Establish EE revolving fund with ESAs</li> <li>• Provide budgetary grants</li> <li>• Provide risk-sharing facility</li> <li>• Facilitate forfeiting of ESPCs</li> <li>• Establish public or super ESCO</li> </ul>

*Note:* ESA = energy service agreements; ESPC = energy savings performance contract; M&V = measurement and verification; PA = public agency; PPP = public-private partnership.

*Source:* World Bank 2014b

## **ANNEX C - EXAMPLES OF SUPER ESCOS**

While the concept of the Super ESCO is still in its infancy, several countries have already adopted the idea of a Super ESCO and have created a Super ESCO to help encourage their domestic energy services market. Other nations are now considering the establishment of Super ESCOs. Some examples are provided below.

### ***Belgium - FEDESCO***

In 2005, the Belgian federal government created FEDESCO, a public but independent energy services company to encourage the development of a domestic energy services industry (FEDESCO 2010). The primary mission of FEDESCO is to study, facilitate and coordinate energy savings projects in public buildings through the use of third party financing (JRC, 2010). Phase 1 of FEDESCO's objectives focuses on 1800 buildings occupied by ministries, federal public services (administrations) and other governmental organizations with a floor area of over 8 million m<sup>2</sup> and an annual energy bill of over €100 million. These buildings are owned and managed by the Federal Building Agency. In subsequent phases, other public buildings (from regional governments, provinces, municipalities, public companies, etc.) and even private buildings will be included.

FEDESCO provides both professional energy services and innovative financial services (pre-financing, third party financing, and energy savings performance contracting) to private ESCO companies in Belgium. This Super ESCO also seeks to facilitate an annual investment program of up to €7.5 million to encourage private sector investment in energy efficiency. FEDESCO was created in the framework of the 2nd Belgian Federal plan for sustainable development (2004-2008) and the National Climate Plan (2002-2010). FEDESCO has been successful in achieving a 10 percent reduction in both total energy consumption and GHG emissions in federal public buildings in Belgium.

### ***Croatia - HEP ESCO***

In 2003, the World Bank and the Global Environment Facility (GEF) helped create an ESCO subsidiary within the national power utility, Hravatska Elektroprivreda (HEP). This national HEP ESCO was capitalized by a World Bank loan (World Bank, 2003), HEP equity, local banks, and other sources, to offer EE services to public and private clients. GEF funds were also mobilized to provide additional credit enhancement for HEP ESCO projects and provide some technical assistance to the ESCO and local banks. Since the Croatian market was small and no private ESCOs were operating in the market, the government did not foresee inherent risks related to crowding out the private sector. The HEP ESCO used the "open book" model to keep its pricing fair and transparent. Government entities can directly contract with government companies and their subsidiaries, so public agencies are not required to conduct any competitive procurement to contract with HEP ESCO.

The HEP ESCO received a US\$7 million GEF grant and a US\$5 million World Bank loan, and equity investment from the parent utility. The ESCO also negotiated financing arrangements with local commercial bank debt facilities. By the end of 2008, about 186 million Kuna (US\$35.4 million) in energy savings contracts have been signed. HEP ESCO has received a credit line from KfW to increase its financing capacity.

***Province of Hebei, China - The Fakai Scientific Services Corporation***

Recognizing that implementation of EE projects needed to be substantially increased in Hebei to meet the goals established by the Chinese national government, the Hebei DSM Center established the Fakai Scientific Electricity Services Limited Corporation as a wholly-owned subsidiary to encourage, promote and implement EE and DSM projects (Hebei DRC, 2009). This company has been established as a Super ESCO. It is developing and implementing projects using the ESPC model, as well as assist other ESCOs operations in Hebei to grow their businesses and undertake more ESPC projects (USAID, 2010).

Fakai was capitalized by the Hebei Development and Reform Commission (DRC) and will strive to work with local, national and international financial institutions as well as donor agencies (such as the Asian Development bank) to mobilize resources in an effort to achieve the EPP goal of 600 MW. Fakai is also exploring the establishment of a PPP to scale up its Super ESCO activities.

***India - Energy Efficiency Services Limited***

The Bureau of Energy Efficiency (BEE), created by the Energy Conservation Act, 2001, has undertaken a number of initiatives to encourage and promote ESCOs and to create a market for ESCO services. BEE working with other agencies of the Government of India, established a national organization called Energy Efficiency Services Limited (EESL). EESL was capitalized by four existing national public sector undertakings (PSUs) namely National Thermal Power Corporation, Power Grid Corporation, Power Finance Corporation, and Rural Electrification Corporation (Business Standard, 2009). The initial capital of EESL was about US\$50 million.

The company functions as the implementation arm of the National Mission for Enhanced Energy Efficiency (NMEEE). The purpose of setting up a separate corporate entity was to develop an EE market that was virtually nonexistent in India. Some of the major functions of EESL include EE planning and implementation in buildings and industrial sites, implementing the “Bachat Lamp Yojana” (a scheme for promotion of CFL lamps nationally using the Program of Activities concept for CDM), and demand-side management in the municipal and agricultural sectors. EESL is also assisting the growth and development of the existing ESCOs by engaging them in project implementation.

## **ANNEX D – TURKEY EE ROUNDTABLE SUMMARY**

### **Turkey Energy Mission**

#### **Options for Financing Energy Efficiency in Public Buildings in Turkey**

*Summary of roundtable on April 7, 2016, 10:00am—12:00pm*

As part of the World Bank’s continuing policy dialogue on energy efficiency (EE) with the Government of Turkey, and building on the findings of the recently completed *Institutional Review of Energy Efficiency in Turkey*, the Bank prepared a presentation on *Options for Financing Energy Efficiency in Public Buildings in Turkey*. The purpose of this work was to assess financing and institutional options for a national program for EE in central government buildings in order to help the Government meet its 10 percent energy savings target as defined in the 10<sup>th</sup> Development Plan. A roundtable meeting was co-hosted by the Bank and the Ministry of Energy and Natural Resources (MENR) on May 7, 2016 at MENR’s premises to present and discuss the findings of the draft analysis. Participants included 27 representatives from MENR, the Ministry of Environment and Urbanization (MoEU), Ministry of Development, Development Bank of Turkey (TKB), Islamic Development Bank (IDB), European Bank for Reconstruction and Development (EBRD) and its Turkish Residential Energy Efficiency Financing Facility (TuREEFF), KfW Development Bank, and GIZ.

The Bank team presented its draft findings, including preliminary data on energy consumption in the public sector (which is currently being completed by an ongoing market assessment under the SME EE Project), opportunities for and barriers to financing public building EE retrofits in Turkey, identification and assessment of alternate financing options based on experience in the region and elsewhere, and recommendations for a sustainable setup. Three public sector EE financing schemes for Turkey were discussed in detail: (i) budget financing with capital recovery (i.e., ‘budget capture’), (ii) a Turkey Energy Efficiency Revolving Fund (TEERF); and (iii) a Turkey Super Energy Service Company (TESCO). Based on an evaluation of the limitations and advantages of the three options in the context of Turkey, the study concluded that the TEERF may be the most suitable option to finance EE in the public sector—either by a new or existing institution (e.g., TKB).

While there was general consensus that a revolving fund would appear to be a desirable option for the Government, some key issues and questions were raised by the Bank team in the development of a TEERF or a similar structure:

- Several donors highlighted that EE is an important area of intervention and confirmed their willingness to support the establishment of a public sector EE financing scheme. While it was noted that budget financing may be easiest model to implement, as this may require minimal changes to existing regulations, all three identified options appeared to be applicable. KfW has recently received approval for an initial loan to pilot such efforts, from which important experience can be gained. The donors agreed that the Government should make a timely decision so work to further develop such a program could proceed.
- Several participants sought clarification on how financing of central government entities would work given their borrowing restrictions. The Bank clarified that it

was proposed to provide financing to this market using energy service agreements (ESAs). Under such agreements, a public entity would agree to pay its *baseline energy costs* for a period of 5-10 years to the TEERF. The TEERF would undertake and manage the EE renovation and use these baseline energy payments to pay for the new (lower) energy bills and retain the balance to cover its investment repayment and administrative fees. Once it had recovered the agreed amount, the ESA would be closed. Under such a scheme, the investment would generally not be considered a loan but as a long-term service agreement. The ESA structure would also allow the central government agency to retain its baseline energy budget for the duration of the agreement, effectively allowing it to preserve its energy cost savings, until the TEERF is fully repaid.

- Several Government agencies present noted that options that required the creation of a new entity may take time for a decision to be made and carried out. The Bank team suggested that the TEERF could be initially established as a Government account – rather than a new institution – with agreement that an existing entity, such as TKB, would be assigned to operate it for a period of time. If a decision is made to create the TEERF or even TESCO at a future date, the Government account and TKB portfolio could then be sold or transferred to the new entity, allowing it to resume further investments. In this way, the program could start earlier with a transition to a more sustainable set-up once a Government decision had been made. Several participants indicated such an approach may minimize the need for legislative changes in the near-term.
- Given the large number of public buildings, a question was raised who would carry out energy audits of buildings, handle the large number of applications, and assume supervision responsibility. Some participants asked if TKB would be willing and able to manage such a facility. TKB confirmed that, with its current administration of an EE and renewable energy credit line under the Bank’s ongoing Private Sector Renewable Energy and Energy Efficiency Project, it had developed substantial internal capacities to assess and manage EE investments. TKB indicated that it would be willing to leverage its experience to manage an EE financing scheme for public buildings if requested by the Government. However, their legal framework and mandate would need to be modified to allow them to assume such a role, along with technical assistance (TA) on ESA development, implementation and management in public buildings.
- It was pointed out that the TEERF may rely on private energy service companies (ESCOs) for implementation. While the establishment of the TEERF would help to build capacity of private sector ESCOs by engaging them as subcontractors, there may be a lack of capable ESCOs in the initial phase of the TEERF. The Bank noted that local energy efficiency consulting companies (or EVDs) would welcome such a program and several were well-qualified to undertake such work. Similar programs have worked in other countries, successfully relying on existing engineering firms, construction firms and equipment suppliers—who may become ESCOs in the future. The Bank team also noted that the initial operation of the TEERF would use Bank procurement procedures which would allow the TEERF to test alternative procurement schemes for ESCOs to inform the Government of any necessary adjustments to Turkey’s public procurement rules and procedures, rather than waiting for them to be changed upfront and then modified each time new experiences are gained.
- Some participants noted that some public buildings may also require structural

improvements not directly related to EE, both to repair existing weaknesses and enable them to comply with seismic codes, which could not be recovered by energy cost savings. The Bank indicated that this was an issue. Under similar programs elsewhere, the Bank noted that it typically provided some modest share of investment (~10 percent) for non-EE measures provided the full investment amount could still be recovered through the energy cost savings. If this was insufficient for some buildings, then either they would have to be excluded from the program, or some budgetary or grant funds would have to be provide to cover these costs.

- Several participants highlighted the need for a combined effort that includes all government entities and for significant technical assistance (TA) that would be required to support such a national program. The Bank team fully agreed that, to be successful, the TEERF must be supported by the various government agencies and other stakeholders and would require concerted donor support and coordination. The Bank noted that such a scheme would better allow the donors to collaborate to strengthen the capacity of one entity rather than working with different project implementation units in various ministries. Several participants noted such TA should also include support for post-renovation building operations and maintenance (O&M). The Bank fully agreed with this suggestion.