

FINANCIAL SUPPORT MECHANISMS FOR DISTRIBUTED SOLAR TECHNOLOGIES AND ENERGY EFFICIENCY DEPLOYMENT IN MEDITERRANEAN COUNTRIES

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Table of Contents

Introduction.....	6
1. General aspects of support mechanisms design	8
2. Funding and support mechanism typology	12
2.1. Quota based support mechanisms	12
2.1.1. Best practices.....	12
2.1.2. Advantages and disadvantages.....	13
2.2. Tender systems	14
2.2.1. Best practices.....	14
2.2.2. Advantages and disadvantages.....	15
2.3. Net Metering.....	15
2.3.1. International best practices.....	15
2.3.2. <i>Advantages and disadvantages</i>	16
2.4. Feed-in tariffs.....	16
2.4.1. <i>Advantages and disadvantages</i>	17
2.4.2. <i>Best practices</i>	17
2.5. Tax and investment incentives	19
2.5.1. <i>Best practices</i>	19
2.5.2. <i>A taxonomy of tax incentives</i>	19
2.5.3. <i>Advantages and disadvantages.</i>	20
2.6. Soft loan mechanisms	20
2.6.1. <i>Advantages and drawbacks</i>	20
2.7. Public Private Partnership.....	21
2.8. Effectiveness and efficiency of support mechanisms.....	21
3. Financial schemes to support Renewable Energy and Energy Efficiency	23
3.1. Support Mechanisms	23
3.1.1. <i>Credit lines</i>	23
3.1.2. <i>Guarantees</i>	26
3.1.3. <i>Project Loan Facilities</i>	27
3.1.4. <i>Soft Loan Programmes</i>	28
3.1.5. <i>Private equity funds</i>	29
3.1.6. <i>Venture Capital Funds</i>	29
3.1.7. <i>Project Development Grants</i>	29
3.1.8. <i>End-User Loan Softening Programmes</i>	30

3.1.9.	<i>Tradable certificate systems</i>	31
3.2.	Special features of public-backed loans for energy efficiency and small scale investments in renewable energy	33
3.2.1.	<i>Collateral value</i>	34
3.2.2.	<i>Positive credit features</i>	34
3.2.3.	<i>Security interest</i>	34
3.2.4.	<i>Portfolio approach</i>	34
3.2.5.	<i>Extra collateral from the borrower</i>	35
3.2.6.	<i>Pooled procurement</i>	36
3.2.7.	<i>SMEs programs</i>	36
3.2.8.	<i>Housing programs</i>	36
3.2.9.	<i>Renewable energy development finance</i>	36
3.2.10.	<i>Energy Efficient Mortgage</i>	36
3.2.11.	<i>On-bill financing</i>	37
3.2.12.	<i>Green bonds</i>	37
3.2.13.	<i>ESCO</i>	38
3.2.14.	<i>Multi/project finance facility for ESCO</i>	38
3.3.	Mechanisms to reduce uncertainty	38
4.	Small scale energy efficiency context in target countries.....	40
4.1.	Outlook on energy efficiency and small-scale renewable energy sector in Egypt.....	40
4.1.1.	<i>Energy consumption patterns and urban development</i>	40
4.1.2.	<i>Main public stakeholders dealing with energy efficiency and small-scale renewable energy</i>	41
4.1.3.	<i>Private sector</i>	41
4.1.4.	<i>Policy, regulatory and financial frameworks</i>	41
4.1.4.1.	<i>Policy framework</i>	41
4.1.4.2.	<i>Regulatory framework</i>	42
4.1.4.3.	<i>Financial framework</i>	42
4.1.5.	<i>National targets and identified projects pipeline</i>	42
4.1.6.	<i>Barriers to energy efficiency and small scale renewable energy projects and mitigation measures</i>	42
4.2.	Outlook on energy efficiency and small-scale renewable energy sector in Lebanon..	44
4.2.1.	<i>Energy consumption patterns and urban development</i>	44
4.2.2.	<i>Main stakeholders dealing with energy efficiency and small scale renewable energy</i>	45

4.2.2.1.	Private sector.....	45
4.2.3.	<i>Policy, regulatory and financial frameworks.....</i>	45
4.2.3.1.	Regulatory framework.....	45
4.2.3.2.	Financial framework.....	45
4.2.4.	<i>National targets and identified projects pipeline.....</i>	46
4.2.5.	<i>Barriers to energy efficiency and small-scale renewable energy projects and mitigation measures</i>	48
4.3.	Outlook on energy efficiency and small-scale renewable energy sector in Tunisia	49
4.3.1.	<i>Energy consumption patterns and urban development.....</i>	49
4.3.2.	<i>Main public stakeholders dealing with energy efficiency and small-scale renewable energy</i>	49
4.3.3.	Private sector	50
4.3.4.	<i>Policy, regulatory and financial frameworks.....</i>	50
4.3.5.	<i>National targets and identified projects pipeline.....</i>	51
4.3.6.	<i>Barriers to energy efficiency and small-scale renewable energy projects and mitigation measures</i>	52
4.4.	Support mechanisms in target countries.....	53
4.4.1.	<i>Feed-in or net metering.....</i>	53
4.4.2.	<i>Tax incentives</i>	54
4.4.3.	<i>Investment subsidies.....</i>	54
4.4.4.	<i>Soft Loans - Measures to ease the access to credit.....</i>	55
4.4.5.	<i>Innovative financing mechanisms in target countries.....</i>	56
5.	Access to credit in Lebanon, Tunisia and Egypt.....	60
5.1.	An overview on banking sector in target countries.....	60
5.2.	Lebanon.....	63
5.3.	Egypt	66
5.3.1.	<i>Domestic credit to private sector</i>	67
5.4.	Tunisia	68
5.4.1.	<i>Access to finance</i>	70
6.	Final remarks.....	71
7.	Case studies from European Partner Countries.....	72
7.1.	Case Study 1 - The Andalusian Energy Agency – An integrated approach to energy savings.....	72
7.2.	Case study 2: Italy - White Certificates scheme for energy saving and energy efficiency.....	78

List of Tables

Table 1: Support mechanisms taxonomy	12
Table 2: Performance of different support mechanisms.....	22
Table 3: Identified EE and small-scale RE projects in Tunisia	51
Table 4: Direct financial incentives for REEE in Tunisia	54
Table 5: Time series of indicators of access to credit in Lebanon	65
Table 6: Access to credit indicators in Lebanon - Comparison with the regional average and the OECD countries	66
Table 7: Access to credit indicators in Egypt - Comparison with the regional average and the OECD countries	67
Table 8: Access to credit indicators in Tunisia - Comparison with the regional average and the OECD countries	70

List of Figures

Figure 1: Total final energy consumption in Egypt (2000-2030)	40
Figure 2: Total final energy consumption in Lebanon (2000-2030)	44
Figure 3: Total final energy consumption in Tunisia (2000-2030)	49
Figure 4: Main Banking Sector Characteristics in MPCs	60
Figure 5: Percentage of Adults with an Account in a Formal Financial Institution	61
Figure 6: Number of Bank Branches per 100,000 Adults (2011)	62
Figure 7: Private-Sector-Credit-to-GDP and Loan to-Deposit Ratios	63
Figure 8: How Lebanon and comparator economies rank on the ease of getting credit	65
Figure 9: How Tunisia and comparator economies rank on the ease of getting credit.....	69

Introduction

This document focuses on the financial support mechanisms to stimulate the diffusion of solar technologies in the Mediterranean countries.

Setting the right support framework to renewable energy technology's diffusion is crucial and requires mechanisms with qualifying and adequate criteria in order to avoid the adverse selection of investors i.e. unprofitable companies unable to ensure the success of the initiatives. In this context, it should be mentioned that in the MENA region the private investments face a number of barriers. Among these are the insufficient cash-flow generated by the project as it is registered a general lack of profitability of renewable energy projects at current market conditions; high investment risk; and the difficult access to finance.

Usually the renewable energy investments are less profitable than the traditional ones as the cost of electricity produced from renewable energy is higher than that the cost from fossil sources which are highly subsidized. However, it should be underlined that some renewable energy technologies are still in an early commercial development stage and that their competitiveness is expected to increase as the price of generated fossil-fuelled energy increases too.

In the MENA countries, the cost of heat and electricity generated by renewable energy sources is still generally higher than generation by fossil sources, even with the presence of counterbalancing subsidies. In this context, the renewable energy investments do not find a conducive environment and the deployment of renewable energy technologies cannot take off without support mechanisms.

Moreover, one of the key characteristics of Renewable Energy and Energy Efficiency (REEE) projects is capital intensity. In general REEE projects require substantial upfront investments and benefit from low, usually predictable and stable operating costs.

Therefore, in order to be competitive, projects require a change in financing patterns – from financing operating costs to financing upfront investments and from short term financing to long term financing.

Therefore, also mature applications characterized by costs of final energy comparable with fossil fuel generation (Solar Water Heating, Photovoltaic, Wind, etc.) can require support to be attractive to investors/customers, as the initial investment can only be repaid over some years while marginal production costs are very low.

The high risk associated to investments in renewable energy initiatives should be also considered, in particular for electricity generation projects. Usually, the investors have only one client, the local utility or the government, which purchases all the electricity and guarantees the profitability of the project in the context of a specific long-term contract. Political and regulatory risks have thus to be taken into consideration. Investors dislike political uncertainty, especially in the case of long-term investments as in the case of renewable energy initiatives. The current political situation in the southern shore of the Mediterranean may be a concern for many investors.

Technological risk associated to new technology (the risk of overestimating the resource availability and the efficiency, or of underestimating the operational costs) can also affect the viability of the projects.

Besides, the problem of access to finance may curb the interest of potential investors. Traditionally, banks are quite reluctant to fund project with high risk as depicted above. When they do so, usually they charge a premium on the loans. In addition, traditional companies have a better access to credit than newly established renewable energy companies.

According to OECD Environment Directorate¹, there are three ways to stimulate renewable energy investments

- Reducing cost of the investment through fiscal incentives or direct subsidies providing incentives for the private sector to produce energy through renewable energy
- Increasing the cash-flow
- Reducing the risk associated with the project through soft loan, guarantees and contract guarantees.

The tools and instruments to support renewable energy can be grouped as follows:

- Financial mechanisms for increasing the liquidity in the market.
- Active financial tools and mechanisms for a limited period.
- Regulatory mechanisms.
- Market-based mechanisms taking into account the externality costs from fossil fuel based generation.

The next paragraphs will describe the scenarios of incentives available and their effectiveness and efficiency, the possible best practices and some conclusions about the lessons learnt and the possible intervention by policy makers. After a general overview on support mechanism typologies, the paper will focus on finance mechanisms for distributed solar technologies and energy efficiency support. An overview of support mechanisms in target countries (Egypt, Lebanon and Tunisia) and on the barriers to be removed in target countries will be provided, with a special focus on access to credit issues.

¹ Inderst, G., Kaminker, Ch., Stewart, F. (2012), “*Defining and Measuring Green Investments: Implications for Institutional Investors*” *Asset Allocations*”, OECD Working Papers on Finance, Insurance and Private Pensions, No.24, OECD Publishing. See also: Heymi Bahar, Jagoda Engeland and Ronald Steenblik ‘*Domestic incentive measures for renewable energy with possible trade implications*’, OECD Trade and Environment Paper n° 2013/1, 19th March 2013, and ‘*Expanding access to clean energy for green growth and development*’. An OECD report to the G20, with contributions by the World Bank and UNDP’. October 2013 ; Kaminker, Ch., Stewart, F. (2012), “*The Role of Institutional Investors in Financing Clean Energy*”, *OECD Working Papers on Finance, Insurance and Private Pensions*, No.23, OECD Publishing and Cochran, I. et al. (2014), “*Public Financial Institutions and the Low-carbon Transition: Five Case Studies on Low-Carbon Infrastructure and Project Investment*”, OECD Environment Working Papers, No. 72, OECD Publishing.

1. General aspects of support mechanisms design

As mentioned above, support schemes for renewable energy and energy efficiency are required in order to overcome market failures in the energy sector.

The support mechanisms have two objectives:

1. The mobilization of investment in REEE technology
2. The creation and the deployment of a sustainable market for those technologies.

These two objectives should be taken into account while designing the system of incentives in order to avoid that short-term incentives create market distortion that could hamper the sustainable growth of the market.

Usually the public funds address the financing where the private sector is unable or unwilling to provide investment on commercial basis. In this connection, it is particularly relevant while designing a support mechanism, the leverage, i.e. the quantity of private funds, mobilized by a support mechanism. It is well known, as a “thumb rule”, that mechanism such as credit line could show a leverage of 3 or 4 to 1 (i.e. for each unit of public funds, the mechanism mobilizes an equivalent of 3 or 4 of private funds). However, the leverage depends considerably on the context as well as on the design of the mechanism. Some financial support scheme such as credit guarantee scheme on other hand show a leverage effect far higher, to the tune of 12 to 15 to 1, i.e. for each unit invested there is mobilization of 12 to 15 units from private sector.

As mentioned above, the creation of a sustainable market is the other objective, in order to support the market players in reducing costs and the deployment of renewable energy. In the early development stages of a new market the State may decide to support it in order to achieve certain objectives of public policies. In this phase it is crucial to design the correct support mechanisms and make sure that they are implemented in combination with technical assistance programs as well as capacity building activities in order to create an enabling and sustainable environment for the diffusion of the new technology.

Frequently public actors decide to support renewable energy by reducing the costs of RE projects using incentives such as direct subsidies, grants and premiums reducing the installation and investment costs or the operational costs of the private sector. Another mechanism frequently utilised is the fiscal support.

These mechanisms should be carefully developed as they may lead to market distortions. For instance, in a country with few suppliers, the increase in financial capacity of investors related to the incentives mentioned above, may lead to an increase of the price of the equipment or supply because the suppliers exploit the increased purchase power of the investors. In this case, the profitability increase is owned by suppliers while investors and government increase their expenditures. In such a situation, the benefit of schemes moves up along the supply chain but

does not go to the actors which were meant to be the target of the incentives.

Another possible strategy consists of developing incentives that make the production of renewable energy more profitable for the whole duration of the project. There are two options: setting higher prices for the electricity produced or setting a certain share of electricity production from RE sources at an unspecified market price. Usually these incentives have a limited duration and are used to support the development of RE projects, until the technology is mature enough to operate without incentives.

Additionally, governments may target the reduction of the risk associated with renewable energy projects, mostly, loans, guarantees, or contract guarantees.

Researchers have pointed out in recent years², that the design of support schemes is more important than the selection of a support schemes. There is no fit-all solution but, depending on the context, specific solutions should be identified for each country. In addition, the development of the support mechanism should also be technologically sensitive.

From a financial point of view, it is very important to ensure to the investors the guarantee of the investment security. In this connection, according to some researchers (De Jaeger and Rathman, 2008³), with an adequate investment security the costs of an investment in renewable energy could be reduced by 10 to 30%.

To this end, the United Nations Development Programme (UNDP) recently issued *Derisking Renewable Energy Investment*⁴, a report to assist policymakers to promote renewable energy investment in developing countries. The report introduces an innovative framework, with an accompanying financial tool, to quantitatively compare different public instruments and their cost-effectiveness.

Moreover, the design of financial support scheme is important but it is not sufficient to ensure the success of initiatives aiming at implementing renewable energy projects. Typically the success scheme combine two aspects: financial support and technical assistance in order to assist the market actors in developing the investment initiatives in an adequate way and stimulate the capacity of various institutional and private actors involved.

A scheme may fail because is poorly designed but also because, although it is designed in an adequate way from a financial point of view, it is not able to address the non-financial aspects of an investment initiative. A successful scheme aims at tackling the problems concerning the

² See for instance: 'Energy efficiency financing - models and strategies', Capital E for the Energy Foundation 2011; *Policy Instruments Design to Reduce Financing Costs in Renewable Energy Technology Projects*, IEA - RETD – Renewable Energy Technology Deployment, David de Jager and Max Rathmann, October 2008; *Greening the Financial Sector How to Mainstream Environmental Finance in Developing Countries*, Springler, Kohn Doris, 2012; *Framework Conditions and International Best Practices for Renewable Energy Support Mechanisms*, OCSE, 2009; *Study on innovative financing mechanisms for renewable energy projects in North Africa*, UNITED NATIONS ECONOMIC COMMISSION FOR AFRICA 2012.

³ David de Jager and Max Rathmann, (October 2008) *Policy instrument design to reduce financing costs in renewable energy technology projects*, IEA - RETD – Renewable Energy Technology Deployment.)

⁴ Waissbein, O., Glemarec, Y., Bayraktar, H., & Schmidt, T.S., (2013). *Derisking Renewable Energy Investment. A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries* - New York, NY: United Nations Development Programme.

demand and the supply sides of a developing market or market niche. A particular attention should be devoted to small actors, which usually lack of capital and technical skills to prepare adequate investment proposals.

In order to design the most appropriate support scheme, the policy maker should take into account the technological maturity of the industrial segment to be promoted, the features of the market segment and the country conditions that may affect significantly the effectiveness of the scheme

For each different level of technological maturity, a different financial scheme may be more appropriate. For instance, in a pre-commercialization phase or context i.e. during the early stages of development of a technology market the financing gap could be addressed by utilizing technology incubators, venture capitals, private equity funds, grants etc. Those tools are ideal to compensate and support the insufficient private capital, typical of a nascent market. Once the technology is mature and proven, the support may shift towards the diffusion.

The market segments are another important aspect to be considered. In addition, the scale of the projects is equally important.

Barriers and gaps associated with large-scale projects include lack of project sponsor equity, lack of long-term local currency financing options, foreign exchange risks for foreign currency loans, lack of appropriate instruments to manage commercial and political risks, and high transaction costs and timing uncertainties all along the project development cycle.

Barriers and gaps associated with medium and small scale RE and EE projects include many of the issues cited above for large-scale projects, as well as some others that are specific to these smaller transactions.

An additional gap is the lack of early-stage capital needed to help innovators develop their business models, raise market awareness, and take the risks associated with new product/service offerings. This issue is sharpened by the lack of appropriate financial intermediaries to channel the right sort of financing and technical support to these young innovators.

Once businesses begin to develop, growth capital is needed to adapt technologies to local market conditions, test new business models and build up local service infrastructure. Even companies that manage to raise financing for their operations often deal with customers that require co-financing to purchase the clean technology.

Suggested public finance interventions to address the financial needs of clean-energy businesses range from business development grants to early-stage risk capital instruments such as seed capital financing, publicly-backed private equity funds to provide growth capital and project equity contributions, and credit support instruments to help local banks providing end-user financing for these small scale but still capital intensive projects and technologies.

It is necessary to note that an appropriate combination of support mechanisms is capable to bring to bankability nearly each project or to make cost-effective investment in renewable energy or energy saving equipment even when this is not really economically viable. This may not be relevant in the case of programs or projects promoted by governments or international institutions when they are characterized by a double or possibly triple bottom line (local development, scientific and technological research, reduction of localized pollution, etc.).

In general, however, it is necessary to frame the support programs in a horizon of economic profitability, in order to ensure the self-sustainability of the markets after the phase-out from subsidies.

In this respect, according to the report of European Investment Bank 'Financing of Urban Energy Efficiency and Small Scale Renewable Energy Investments in the Southern and Eastern Mediterranean Region'⁵, many of the energy efficiency and small scale renewable energy investments would be economically profitable by 2020. In particular:

- Solar water heating for residential use and efficient lighting investments (residential, tertiary and street lighting) appear financially justified in most of the countries of the area.
- Thermal insulation of buildings would be financially justified in new buildings only and mainly in countries with low (or no) energy subsidies. Thermal insulation of existing buildings is generally not economically justified in the countries of the area at this stage.
- The high-energy subsidies (on oil/gas) influence the viability of the investment such as installation of PV modules or substitution of refrigerators. In particular, while the above-mentioned investments are economically justified they are not financially viable. Investing in roof-top PV would be likely financially justified in the very short term, because of the significant reduction of the cost of PV modules.
- The adoption of energy efficiency standards in new buildings is considered economically justified while the same does not apply to the replacement of appliances or rehabilitation of old buildings.
- Efficient washing machines or air-conditioners should become economically justified towards the end of the decade for most residential users but would be profitable for energy intensive users (e.g. hotels, hospitals, commercial centres, etc.) even sooner.
- In addition, the development of the market for more efficient appliances (supported via energy performance labelling and other measures) should reduce the difference between more and less efficient appliances in terms of purchase and thus facilitate the adoption of more efficient appliances.

⁵ European Investment Bank, *Financing of Urban Energy Efficiency and Small Scale Renewable Energy Investments in the Southern and Eastern Mediterranean Region*, 2013.

2. Funding and support mechanism typology

Support mechanisms for REEE deployment can be classified into **price-based** and **quantity-based** support and, additionally, they can be grouped into **capacity** and **production focussed** incentives. The following table shows the concerning taxonomy:

Table 1: Support mechanisms taxonomy

Mechanisms	Price based	Quantity based
<i>Investment focussed</i>	Investment subsidies	Tender mechanisms
	Tax incentives	
	Soft loans	
<i>Generation focussed</i>	Feed-in tariffs	Tender mechanisms
	Net metering	Quotas

In the following sections, a number of support mechanisms will be described, with a particular focus on international best practices. Subsequently, in the last section of the present chapter, most relevant mechanisms will be analysed and compared in terms of effectiveness and efficiency.

2.1. Quota based support mechanisms

Through this type of mechanism, the legislator obliges a market actor (consumers, producers or suppliers) to provide a defined share of electricity from RE sources. The selection or choice of the market actor depends on the national market design. In addition, the obliged party can supply the electricity directly or buy it from green producers. In many countries, the obliged party may also reach the required share by trading green certificate (the so-called Tradable Green Certificate schemes i.e. TGC or, in USA, the Renewable Portfolio Standards). RPS schemes may also function without the certificate trading and be combined with tender mechanisms or Feed-in tariffs.

In case of certificate trading, RE products have two sources of income. The first one consists of selling the product on the market at a given market price. The second consists of selling the green certificate on the national green certificate market.

2.1.1. Best practices

The quota based support mechanism have been utilised in a number of EU countries (such as UK, Italy, Norway, Belgium) as well as in more than 30 US states and Japan. The number of mechanisms in place has allowed the legislators all over the world to take into account the lessons learnt while designing a Green Tradable Certificate Scheme.

In particular, the volatility of certificate price should be avoided. This would be possible only if the market size is big enough to guarantee that the trading volume leads to a general reduction of costs of certificate trading. In addition, the penalty associated to the compliance with quota obligations should be high enough to enforce the above-mentioned compliance (i.e. higher than the marginal generation cost for renewable electricity).

In case of new or less mature technologies ad-hoc support scheme are also recommended as

quota mechanisms are generally technology neutral. In Italy, for instance, in order to promote the diffusion of solar PV a dedicated feed-in mechanism has been developed combined with the certificate banding mechanisms in order to support the development of the market at its early stages (these mechanisms have been utilised also in UK). The scheme foresees a different number of certificates to be associated to each unit of electricity generated, depending on the source of RE. For instance, the solar PV receives 2 certificates for each unit of electricity generated, while wind producers receive only one certificate per unit of energy produced.

Practitioners recommend combining the quotas with other incentives such as tender mechanisms of feed-in tariffs. In UK a FIT system was introduced in 2010, in order to stimulate the deployment of small scale electricity generation. This mechanism works in parallel with the Renewable Obligations system i.e. the support mechanisms dedicated to the deployment of large scale renewable electricity generation systems.

In US many states utilise the quotas support mechanisms at local level while grants or other incentives are made available at a federal level by the central Government.

2.1.2. *Advantages and disadvantages*

The quota mechanism is cost efficient but, since it is technology neutral and does not take into account the differences in generation costs for different renewable energy technologies, the producers have a set of incentives, under this support scheme, to deploy only the cheapest technology available. However, the researches⁶ consider the quota obligations the most effective way to reach the national target as well as a mechanism that is highly flexible: the producer can buy certificates to reach the quota obligations or generate green energy through any technology considered adequate. Finally, the quota does not carry additional costs on public budget such as in the case of tax incentives or development schemes.

Among the disadvantages, it should be mentioned the potential high volatility of prices of electricity and certificates and the subsequent higher risk associated to the investments. In addition, as already mentioned, the neutrality of the quota schemes with regard to technology may lead to a focus on mature technologies and a significant reduction of investments on innovative technologies with high initial investment costs. In other words, the innovation under quota regime is penalised if the certificate trading system is non-technology specific.

Another relevant outcome of researchers⁷ is that, especially in Europe, the Green Certificate Trading System favours the big players while the small and medium sized enterprises may find it difficult to enter the market. Finally, for the same reason, the quota system may not be the right choice in a small country.

⁶ See for instance OSCE, *Framework Conditions and International Best Practices for Renewable Energy Support Mechanisms*, 2009. Beck, F.; Martinot, E. (2004): *Renewable Energy Policies and Barriers*, *Encyclopedia of Energy* (2004), pp. 365 383. Available online at: http://www.martinot.info/Beck_Martinot_AP.pdf
Butler, L.; Neuhoﬀ, K. (2004): *Comparison of feed-in tariff, quota and auction mechanisms to support wind power development*, *Cambridge Working Papers in Economics CWPE 0503*, CMI Working Paper 70, 21 December 2004. Available online at: <http://www.econ.cam.ac.uk/electricity/publications/wp/ep70.pdf>

⁷ See for instance: European Commission, *'Financing Energy Efficiency: Forging the Link between Financing and Project Implementation'*, (Report prepared by the Joint Research Centre of the European Commission. Authors: Silvia Rezessy and Paolo Bertoldi), 2010.

2.2. Tender systems

The tender system is a support mechanism that foresees the issuance of a bid or tender for a renewable energy project of a specific size. Either the financial support may result in an equity participation in the investment capital or in allowing the bidder to fix the power generation cost per unit of electricity. The latter is usually the preferred type of intervention under the tender systems. The bidders oblige themselves to provide renewable electricity at a pre-defined price for a defined number of years.

2.2.1. Best practices⁸

The UK was the first country to introduce the tender systems for non-fossil energies in 1991. Among the most relevant features of such schemes, it should be underlined the development of specific design options as well as the need to issue technologically specific tenders and the need to implement penalties for non-compliance in order to ensure the commitment of the bidder in the realization of the power project.

According to the practitioners, the tender system is particularly efficient if combined with Power Purchase Agreement i.e. the government agrees to purchase the electricity from a company at a price higher than that registered in the market for a limited period of time (usually 20-25 years.). Especially with reference to solar technologies, the combination of the tender system with other schemes could be able to promote large renewable energy projects.

The design of the procedures concerning the conditions is the most critical part of the mechanisms. In other sectors, such as telecommunication, for instance, the utilization of Vickrey auction⁹ mechanism has led to significant positive results in connection to the tender. However this is not sufficient to ensure the effectiveness of the mechanisms. In particular, the governments should be able to:

- Issue regularly the calls for tender in order to avoid discontinuity and therefore affecting negatively the development of the industry by discouraging potential investors;
- Set up a system of penalties in order to discourage delays and bids that are too low to run without affecting the profitability of plants (once again, in this regard, reference is made to Vickrey auction principles to avoid such a drawback.).

In April 2014 European Commission has adopted new rules on public support for projects in the field of environmental protection and energy. The guidelines¹⁰ will support Member States in reaching their 2020 climate targets, while addressing the market distortions that may result from

⁸ For a deepening on best practices different types of tender in the electricity market the reader can refer to: IRENA - *Renewable Energy Auctions in Developing Countries* – October 2013, available for download from www.irena.org/Publications.

⁹ A Vickrey auction is a type of sealed-bid auction. The key feature is that highest bidder wins but the price paid is the second-highest bid. For a deepening on different types of tender in the electricity market the reader can refer to: Thomas Greve and Michael G. Pollitt - *Designing electricity transmission auctions: an introduction to the relevant literature* - Cambridge Working Paper in Economics 1245 - University of Cambridge, October 2012

¹⁰ EUROPEAN COMMISSION - COMMUNICATION FROM THE COMMISSION - *Guidelines on State aid for environmental protection and energy 2014-2020* - (2014/C 200/01) - Official Journal of the European Union - 28/06/2014

subsidies granted to renewable energy sources. To increase cost effectiveness and limit distortions, the new guidelines foresee the gradual introduction of competitive bidding processes for allocating public support.

According to the guidelines, in a transitional phase covering the years 2015 and 2016, aid for at least 5 % of the planned new electricity capacity from renewable energy sources should be granted in a competitive bidding process on the basis of clear, transparent and non-discriminatory criteria. From 1 January 2017, aid for electricity from renewable energy sources will be granted only through competitive bidding process, with a limited number of exceptions.

2.2.2. Advantages and disadvantages

The tenders are in theory cost effective (the lowest bid wins the contract) and allow the Government to control over the amount of RE produced under the scheme. In addition, the competitive tenders favourite the competition and the competitiveness of the offers.

However, practically, countries such as France and UK have abandoned the tender schemes as they proved to be not particularly effective in a non-fully developed market environment. In fact, in several cases, the bids are too low to make the power plant profitable and frequently the projects are abandoned by developers. In this connection, the utilization of Vickrey auction mechanism could be a possible solution, provided the national legislation allows the adoption of such a mechanism.

Some other critics add that the tender system often promote the acquisition of foreign technology and not the development of local renewable energy technology.

2.3. Net Metering

The net metering mechanism refers to the meter measuring electricity consumption and such a mechanism is mostly applied in the promotion of decentralised solar electricity. Net metering is a service to an electric consumer under which electric energy generated by that electric consumer from an eligible on-site generating facility and delivered to the local distribution facilities may be used to offset electric energy provided by the electric utility to the electric consumer during the applicable billing period. If the consumer has produced more electricity than the electricity consumed before, the local grid or distribution operator has to purchase the net production at the end of a fixed period at a fixed price (as in Tunisia for Medium Voltage consumers) or simply retires the surplus of electricity produced, without any fee (as in Lebanon and in Tunisia for Low Voltage consumers).

2.3.1. International best practices

Net metering has been applied to a number of US states, Australia, Italy, Spain, Japan, Mexico, Thailand, Denmark, Lebanon and Tunisia among the others. Examples of successful net metering schemes are those developed in California and New Jersey. Some 23,000 solar systems were installed under these schemes by 2008. It is worth mentioning that net metering has been primarily developed to support the decentralisation of solar generated electricity but it could be utilised also for other renewable energy technologies.

2.3.2. *Advantages and disadvantages*¹¹

Theoretically, there are numerous advantages in net metering schemes. In particular, the solar PV is usually produced during the daytime and therefore there is availability of energy during the demand peak time. The combination of the scheme with flexible tariffs according to the time of the day during which the energy is consumed by the consumers can generate a significant income for consumers. It is very easily manageable, transparent and, when purchasing price of net production are appropriately fixed and revised, non-particularly costly for the Governments.

Among the disadvantages, the researchers mention that the investments usually target small scale initiatives and small solar PV systems, especially when there is a limit in the installed capacity (for instance, in US the producers of renewable energy cannot sell more electricity to the grid than the quantity they consume).

2.4. *Feed-in tariffs.*

This type of tariffs sets a fixed price for the purchase of a unit of electricity. The price is usually higher than the market price and the duration of the tariff often is around 15/20 years. In addition, usually the grid acquires the electricity regardless of the total demand.

When designing a Feed-in Tariff, it is crucial to define the eligible technology and plants. In this connection, mapping the potential of a country or a region is the first step.

The feed-in tariff schemes are calculated on the cost for each renewable energy technology and are technology specific. In this context, a clear tariff calculation methodology should be devised, including investment costs, grid connection costs, and operation and maintenance costs. The IRR of a good feed-in scheme is to the tune of 5/10%. The differentiation of the tariffs according to the technology is the key of success of such schemes. The profits for producers can be lower but the investment security is guaranteed.

Germany has also experimented a system to avoid excessive profits i.e. the schemes foresee a reduction of tariff payment on annual basis based on the expected learning curve of each technology.

In many European countries, a premium feed-in tariff (Feed-in Premium, FiP) has been introduced. Through this mechanism, a producer sells electricity on the conventional market and receives a premium for it.

These schemes are based on tariffs for avoided costs and not for actual costs. Good practices foresee a differentiation of tariffs on the basis of technology and plant size.

Feed-in tariffs have been the main financial tool for solar PV in OECD countries, especially in

¹¹ A number of relevant studies has been developed in order to highlight the different implications of net metering scheme. A comparative study that can be useful as a starting point for an in depth research, is the following: Jason B. Keyes, Joseph F. Wiedman - *A Generalized Approach to Assessing the Rate Impacts of Net Energy Metering* - Solar America Board for Codes and Standards Report - Interstate Renewable Energy Council - January 2012

Europe. According to Bloomberg New Energy Finance until 2011 87% of global solar PV has been deployed in FIT markets¹². The first Feed-in tariffs were implemented in US (1978), Portugal (1988) and Germany (1991).

2.4.1. Advantages and disadvantages

The feed-in tariffs are easy to manage, transparent and convey a strong political signal.

The success of the feed-in tariffs depends on the investment security, usually ensured by providing a fixed price over a long period of time. However, the main advantages rely on the technology specific approach. The mechanism allows the governments to promote all the RE technologies according to their stage of development.

The free-market thinkers have heavily criticized the feed-in tariff as for them fixing a tariff or a price is associated to a state market or monopolistic economy. In addition, the obligation to buy the electricity regardless of the electricity demand patterns may lead to a disequilibrium in the grid and in the grid operation costs.

The appropriate price level, in addition, is the most difficult task for government. A too low price is unprofitable for investors while a too high price may lead to the selection of unprofitable companies. In this context also the correct assessment of the costs of projects is crucial since the payments should be kept in line with the actual costs. A way to avoid this, it is useful to differentiate the tariffs according to the generation costs.

Moreover, in FiTs design it is particularly important to tribute the required attention to the mechanisms of ruling the prices of the feed-in tariffs, due to the volatility of the fossil energy prices. In particular, a ceiling to avoid excessive profits and a bottom to avoid the remuneration to fall below the threshold of minimum amount of revenue should be set up.

With this regard, recent EC guidelines¹³ also foresee for bigger plants the gradual replacement of feed-in tariffs by feed-in premiums, which expose renewable energy sources to market signals, while small installations will benefit from a special regime and can still be supported with feed-in tariffs or equivalent forms of support.

2.4.2. Best practices

As mentioned above the differentiation of tariffs based on generation costs is widely recognised as the best practice. As already stated, the price determination as well as the correct assessment of the costs are both fundamental thus requiring specific technical expertise.

In order to improve the effectiveness of FiTs, a mechanism which has proven to be very effective is the utilization of 'degressive' tariffs. This mechanism encourages innovation and avoids

¹² Bloomberg New Energy Finance Report, 2011

¹³ EUROPEAN COMMISSION, above n.10

excessive profits. In this connection the contracts have a clause that introduces an automatic reduction of the tariff on annual basis, anticipating the technological learning curve. In Germany for instance, the degression rate for solar PV reaches 11% due to the estimated high potential for technological innovation.

In France, for instance, the degression was applied in 2010 in order to correct a market distortion concerning the guaranteed FIT for solar PV, which was 7 to 14 times higher than the market price for electricity. The new schemes for solar PV are designed to lead to the convergence of prices between solar PV and conventional electricity.

Because of the progressive adjustment of the premium according to the learning curve of the market, the feed-in tariff on German ground-mounted PV projects was down at 9.38 euro cents per kWh in 2014, compared to its rate of 35 euro cents per kWh in 2008. The tariff for rooftop projects of less than 10kW has been cut from 46.75 euro cents in 2008, to 13.55 euro cents per kWh in 2014, although in rooftop owners are allowed to use, through a net-metering scheme, a part of this electricity in their buildings for self-consumption which is priced in average at over 27 euro cents per kWh.

In 5 OECD countries a scheme containing a premium has been recently implemented. Premiums supplement revenues from the sale of electricity for the FITs. Premiums may be fixed (Spain, Czech Republic, Slovak Republic) or variable (Denmark and Netherlands.)

Finally, for the poorer strata of population, some adjustment could be introduced in order to avoid that price sensitive segments of population are negatively affected by price increases. According to Mendonça, Jacobs and Sovacol (2009), there are two options:

- Capacity caps: limit to the total capacity of the plants in order to limit the costs for the final users. Critics argue that this is against the free market but often it is the only way to control the deployment rate and the volume of RE under FiTs regime. For example during 2013 in Italy the feed-in tariff budget for newly connected systems ran out in the middle of the year, determining a dramatic fall of the investments on PV in the second half of the year.
- Cost sharing, the additional cost covered by a national fund for renewable energy or other types of cost-sharing.

A number of studies has been developed addressing the issue of FiTs design in developing countries. A relevant example is “Global Energy Transfer Feed in Tariff for Developing Countries” (GET FiT) concept, developed by Deutsche Bank in 2010¹⁴ to improve the risk profile and commercial viability of renewable energy investments from a private sector investor’s

¹⁴ Deutsche Bank Climate Change Advisors: *Global Energy Transfer Feed in Tariff for Developing Countries* – April 2014. See also *GET Fit Plus – De-risking Clean Energy Business Models in a Developing Country Context* – April 2011. Both documents are available at <http://www.dbcca.com>

perspective. The GET FiT Pilot in Uganda¹⁵, initiated jointly by KfW and Deutsche Bank and officially launched in 2013, is supporting 103 MW of renewable energy (projects engaged until the end of 2013).

2.5. Tax and investment incentives

Investment incentives (capital grants, tax incentives, tax credits and soft loans) are usually set up during the early development phases of the RE market and utilised in combination with quota, feed-in tariffs and tender schemes. They are capacity based and investment based i.e. the fund are made available on the basis of the size of the power plant.

2.5.1. Best practices

The forms of financial incentives are various. In Japan, for instance, from 1994 to 2000, the government spent approximately 725 M US\$ through the Sunshine Program for the installation of 58,000 roof-top PV solar plant for a total of 220 MW. The subsidy consisted in the payment of a grant for each kW peak installed.

In 1991, Germany started a similar program i.e. 1000 solar roof providing a grant up to 60% of total equipment costs. In 1999, the 100,000 solar roof programme was launched. It consisted in a soft loan provided by KfW bank group, at an interest rate below the market rates.

Beside of the investment incentives, the producers of renewable energy are often exempted from some taxes. This is justified by the fact that usually conventional sources of energy do not internalise the negative external costs.

Many countries allow an accelerated depreciation for RE projects in order to allow the producer to benefit from tax benefits. Other countries, notably in US, prefer to provide investment tax credits and production tax credits in order to stimulate the diffusion of RE technologies.

2.5.2. A taxonomy of tax incentives

Tax incentives can be indirect and direct. The indirect tax incentives aim at reducing the costs and therefore increase the economic advantage of adopting a renewable energy technology.

Usually they take form in VAT reduction or reduced/zero customs duties on import. Thus a well-known mechanisms and, for instance, has existed for a number of years in Tunisia.

The direct tax incentives, on the other hand, by reducing the fiscal burden on revenues, affect directly the profit of the corporations. A possible taxonomy is as follows:

2.5.2.1. Tax credit for investment

With this mechanism a part of the investment is tax deductible and it is foreseen the possibility of a state reimbursement to the taxpayer. It can be applied to the tax base or the tax due.

2.5.2.2. Tax credits for the production

Beside the tax credit for investments, a tax credit scheme on sale of renewable energy, VAT paid,

¹⁵ <http://www.getfit-uganda.org/>

energy assessment etc. can be applied. Instead of applying the scheme to the investment, the credit is applied on the electricity produced.

2.5.2.3. Tax reduction

The tax reduction can be applied to the final tax. In case of exceeding tax, no reimbursement is foreseen.

2.5.3. Advantages and disadvantages.

The main disadvantages of tax and investment incentives consists on setting clear framework for the benefits of potential investors. As mentioned above, they are often utilised in the early stage of the market development besides the quota, feed-in tariffs and tenders systems. They are very easy to manage and the impact on public finances is easily predictable as well.

The researchers point out, as a drawback, that the investment incentives focus on investment and not on the performance of the power plant. In some case it may happen that the investor realises the power plant but is not able to manage it properly and subsequently the plant either does not operate at all or operates in a sub-optimal way. By taking into consideration this, in India¹⁶, for instance, the legislator shifted from investment incentives to production incentives.

Similarly it should be underlined that tax incentives favourite large producer and big investment (due to the economies of scale) while the small producers are often in the condition of not utilizing tax incentives properly. In addition they may impact significantly over public finances.

2.6. Soft loan mechanisms

Along with the schemes described in the previous paragraphs, usually the government support the investors with ad-hoc credit lines. Typically, such schemes are characterised by long maturity duration and concessional rates and are managed by the bank system.

2.6.1. Advantages and drawbacks

Transforming upfront costs in marginal costs, thus overcoming the main demand-side barrier, the soft loan of ad-hoc credit lines for the renewable energy investments are to be considered for neutralising the investment assuring the loan repayment through the gains on electricity and gas bill. In addition, they allow the government to mobilise the banking system and are to be considered, among the others, also an excellent tool of promotional activities.

On the other hand, these mechanisms exclude the un-bankable people, unless a strong guarantee like repayment on electricity bill managed by Public Utility is set and, since most of the schemes are meant to support SMEs, high transaction costs and high default risk are the norm as well as long lead time to process the proposals.

In addition, in case of imported equipment, the exchange risk should be added to the other risks

¹⁶ *Twelfth Five Year Plan (2012–2017): Faster, More Inclusive and Sustainable Growth*, Planning Commission Government of India, <http://planningcommission.gov.in/plans/planrel/12thplan/welcome.html>

and some researchers¹⁷ have pointed out the opportunity of using debt sourced from abroad. Indexing renewable energy tariffs to foreign currency eliminates the currency hedging costs that are responsible for the largest share of the difference between developed world and rapidly emerging country debt costs.

2.7. Public Private Partnership

The topic of Public Private Partnership have been already extensively addressed in the framework of MED DESIRE project in the deliverable 4.2.3 *“Guidelines to improve Public-Private Partnerships in innovative solar energy and energy efficiency”*. Below we present some considerations about one of the most functional shapes that PPP can assume for the implementation of projects for the production of energy from renewable sources, the Project Financing

Project finance usually entails large investments, combining the various sources of private and public funds and focus on the financial viability of the initiatives. Respect to other funding options, the project finance projects repay the initial investments through the cash-flow generated by the project over the years.

In order to achieve this, it is essential to identify the right mix of equity and debt to maximise the return on equity on one side and ensure the debt repayment on the other side, as well as to mitigate the risk associated to the initiative by creating an ad-hoc company (or Special Purpose Vehicle).

The development of project financing is particularly sophisticated and requires specific skills and expertise. Usually only big banks or consultancy companies are the actors able to cover all the aspects ranging from the financial analysis to the legal aspects and therefore ensure the viability of the initiatives.

The financial system cannot ask for reimbursement if the cash-flow generated by the project is less than expected. Therefore, the performance of the project (highway tolls, electricity tariffs etc) is crucial in order to ensure a reasonable remuneration of the capital and the repayment of the debt.

Project finance is usually utilised in large energy efficiency projects in the form of Public Private Partnership. For instance, in Egypt the PPP mechanism has been utilised for the wind plant in Suez Gulf of the capacity of 250 MW or in Morocco for the realization of a wind plant project in Koudia Bida with the capacity of 50 MW or the first CPS project¹⁸ of the Moroccan solar plan with the capacity of 125 MW.

2.8. Effectiveness and efficiency of support mechanisms

A number of studies have been developed in order to evaluate the performance of the various

¹⁷ David Nelson, Gireesh Shrimali - *Finance Mechanisms for Lowering the Cost of Renewable Energy in Rapidly Developing Countries* - CPI Series, Climate Policy Initiative, January 2014

¹⁸ Angela Falconer Gianleo Frisari - *San Giorgio Group Case Study: Ouarzazate I CSP* - CPI Report - Climate Policy Initiative, August 2012

support mechanisms. In particular EU and IEA (2008) have evaluated the performance of the above mentioned scheme. In addition, a large EU funded research called Assessment and optimization of renewable support schemes in European electricity market (OPTRES) measured the effectiveness and the efficiency of the support schemes.

Effectiveness is the capacity of the scheme to promote the growth of renewable energy share in the overall energy mix. Efficiency refers to the cost efficiency of the scheme i.e. the ratio between the support received and the cost of generation of renewable electricity.

To date, technology specific support mechanisms (feed-in tariffs) have proven to be the most effective schemes, especially in the case of solar PV, biogas and wind energy. Also the EU underlined in 2009 that it is more important to focus on the production incentives instead of investment incentives. Tax incentives and investment incentives should be provided as an additional support but they should not be the main option of the policies concerning renewable energy support mechanisms.

A similar pattern has been identified while measuring the efficiency of the mechanisms. The feed-in tariffs are more efficient than other schemes, especially when the tariff is guaranteed over a long period. In this case, the investment security is guaranteed.

The following table provides a summary of effectiveness, efficiency, and investment security of support mechanisms for renewable energy

Table 2: Performance of different support mechanisms

	Effectiveness	Efficiency	Investment security
Feed-in tariff	High (due to fixed tariff payment over a long period of time)	High Due to cost-based tariff calculation and frequent adjustment of tariffs	High Due to the fixed tariff payment over a long period of time
Net metering	Medium due to the focus on small scale applications	High Due to the focus on auto-consumption (power)	Medium Due to the volatility of purchase price for excess electricity
Tender scheme	Low Due to the high rate of unfinished projects	High Due to the acceptance of lowest bidders	High Due to the fixed remuneration based on tender process
Quota	Low Due to the technology neutral design	Low Due to the lack of technology differentiation	Low Due to the volatility of electricity market price and certificate price

3. Financial schemes to support Renewable Energy and Energy Efficiency

There is a number of effective support schemes implemented all over the world. While trying to develop and expand a support scheme the references are conspicuous. However, it is never a matter of replication of existing schemes but lesson learned should be adapted by taking into consideration the peculiarities of the context in which the scheme is supposed to operate.

In the following section the main schemes to support the development and diffusion of renewable energy are described. In particular, the following scheme will be analyzed:

- *Credit lines*
- *Guarantees*
- *Project loan facilities*
- *Soft Loan Programmes*
- *Private equity funds*
- *Venture Capital Funds*
- *Project Development Grants*
- *End-User Loan Softening Programmes*
- *Tradable certificate systems*
- *Grants for technical assistance*

3.1. Support Mechanisms

3.1.1. Credit lines

Credit lines address the lack of liquidity of investors in order to meet the medium-long term debt requirements. Usually they are provided at concessional rates, have long maturity and, especially in the case of international funds, are combined with technical assistance to support the development of the project proposals. They are effective both with large and small sized RE investments and typically fund a portion of them. The investment coverage percentage depend on many factors. Most important it is also the repayment period maturity

Two examples of credit lines are the *Thailand Energy Efficiency Revolving Fund* (see Box 1) and the *CORFO credit line* programme (see Box 2).

Thailand Energy Efficiency Revolving Fund

The TEERF has been established in 2003 by the Government of Thailand and managed by the Ministry of Energy, Department of Alternative Energy Development and Efficiency (DEDE). The objective consisted in mobilizing commercial investments to improve EE lending market opportunities. EERF provide low-interest loans to banks, which then finance EE projects through concessional loans. The loans are channeled through 11 banks (on a full-recourse basis and a zero interest rate) and the eligible borrowers are buildings, factories, ESCOs and project developers. The eligible projects are all the initiatives concerning energy conservation and saving projects. The terms of the loans are the following: max. 7 years duration, max. 4% interest rate. The loan can cover up to 100% of the project costs but the loan size is max THB 50 million (approx. 1.4 M US\$) per project. The projects financed until February 2012 are 294. The Fund is also used to pay for technical assistance programmes, such as energy audits and project feasibility studies.

Box 1: Thailand Energy Efficiency Revolving Fund¹⁹

¹⁹ For further information on this case study: Frankfurt School - UNEP Collaborating Centre for Climate & Sustainable Energy Finance (2012), *Case Study: The Thai Energy Efficiency Revolving Fund*, <http://www.fs-unep-centre.org/>.

Combining Finance Supply and Demand Strategies – The CORFO Experience

The Chilean Economic Development Agency (CORFO) has since 2005 been offering credit lines to commercial banks for on-lending to RE projects. In 2010, the initiative was renamed The Invest Chile Programme, an Energy Ministry (represented by National Energy Commission (CNE) before 2010) - Chilean Economic Development Agency (CORFO) cooperation plan to support renewable energy projects and finance renewable energy generation nationwide. The programme includes two sub-programmes.

The first initiative was a programme to provide non-conventional renewable energy (NCRE) projects connected to the grid with pre-investment stage financial incentives. In the period 2005-2009 the programme subsidised 50% of the total cost, with a USD 60,000 cap, of pre-feasibility studies and 50% of the total cost of pre-investment studies with a maximum cap of USD 160,000. A total of 217 wind, biomass, biogas, geothermal and small-scale hydroelectric projects have benefited from such support. In the period 2008-2010, CNE and Ministry of Energy transferred USD 2 million to CORFO to continue the programme. After 2010 the applications were received directly without contest.

The second incentive was provided in 2008 when the development bank Kreditanstalt für Wiederaufbau (KfW) extended a €85 million loan to finance NCRE projects with credit facilities and low interest rates. This allowed 19 projects to be funded, mainly mini-hydro energy projects.

Since 2012 the Renewables Energy Center (CER) which is part of CORFO, has developed two new contests to subsidize pre-investment studies of NCRE projects. The subsidy is up to 40% of the total study costs with a cap of CLF 1,000.

To date 31 projects (5 biogas, 1 biomass, 13 wind, 4 PV and 7 mini-hydro), and 78 studies have been benefited for a total amount CLP 542 million

Source: International Energy Agency website – May 2014

Url: <http://www.iea.org/policiesandmeasures/pams/chile/name,24763,en.php>

Box 2: The Chilean Economic Development Agency (CORFO)

A particular form of credit lines, is the one that allows financial intermediaries to offer ‘mezzanine’ or junior debt to projects. The debt in this case is also called ‘subordinated’ and the ‘Subordination’ refers to the order of priority for repayment. The debt is structured so that the repayment foresees a senior and a junior debt. The senior debt is the first to get repaid, in a later

stage the repayment of the junior debt. Usually the scheme utilizes the mitigation of the risk of the lender as well as filling out the equity/debt financial gap. The percentage of mezzanine fund over the total funds does not exceed 15%. In Italy, for instance, Veneto Sviluppo, a regional financial institution, support the local SMEs (including RE projects) through a credit line with a mezzanine facility implemented in combination with a guarantee fund. However, it should be underlined that the mezzanine schemes are relatively sophisticated and entails some long gestation period before becoming operational. The most critical aspects are those related to the contractual and legal aspects of them.

India Renewable Energy Development Agency (IREDA)

IREDA is a Government-owned company incorporated in 1987 that provides debt financing to RE and EE projects. IREDA has built up its own staff capability to originate clean energy project investments - projects as small as USD200,000 and as large as USD25 million. Funded projects have included wind, hydro, bio-mass cogeneration, industrial waste heat recovery power plants, industrial process efficiency. It has received international credit lines from the World Bank, ADB and KfW, amongst others, as well as grant support from the GEF. About one third of its capital is now raised domestically, both through bank borrowing and the issuance of tax free bonds. In India, State governments are now authorised to establish energy conservation funds; IREDA, as a national entity, has potential to replicate its capability by supporting development of such State funds.

For energy efficiency, for instance, the Government of India offers 80% depreciation in the first year on the specified energy efficiency equipment and concessional excise and customs duty on notified energy conservation equipment to promote energy efficiency. Some state government also provide financial assistance for conducting energy audits and tax holidays for power generation projects under IPP mode.

Source: UNEP-DTIE SEFI, Public finance mechanisms to mobilize investment in climate change mitigation, 2008

Box 3: India Renewable Energy Development Agency (IREDA)

3.1.2. Guarantees

The use of guarantees is appropriate when the investment promoters have adequate medium to long-term liquidity, yet are unwilling to provide financing to clean energy projects because of high-perceived credit risk. The role of a guarantee is therefore to mobilize domestic lending for such projects by sharing in the credit risk of project loans where the investment promoters deal with their own resources.

Typically, guarantees are partial, since they cover a portion of the outstanding loan principal with 50-80 percent being common. Guarantees can be effective in addressing credit risks of large-scale

grid connected RE and medium and small scale EE and RE projects, including the energy access markets. Guarantees can achieve low to high leverage depending on how they are structured, and depending on their target market segment.

Mobilising investment through the chain of financing - IFC Partial Credit Guarantees

IFC has been operating EE finance programmes using partial credit guarantees (PCGs) in 7 countries. These programmes employ the following chain of financial intermediation:

(1) The GEF provides grant funding to IFC. These funds are used (i) as reserves backing a portion of IFC guarantee liabilities, and (ii) for technical assistance and programme operating costs.

(2) IFC provides guarantees to local FIs

(3) Local FIs use the risk sharing support from IFC to provide financing to various EE market segments, including residential, commercial, industrial, municipal, energy supply and distribution. Multiple financial products have been used.

(4) Over time, the guarantees from IFC can be phased out as familiarity with these sectors improves and risk perceptions decrease. When effectively structured, one dollar in GEF funds can directly leverage USD12–15 of commercial investment into EE projects and indirectly catalyze long term growth of financial commitments to the sector.

Source: UNEP-DTIE SEFI, Public finance mechanisms to mobilise investment in climate change mitigation, 2008

Box 4: IFC Partial Credit Guarantees

3.1.3. Project Loan Facilities

While credit lines which operate within the conventional lending practices, loan facilities are created by governments or international institutions or Donor Agencies as special vehicles to provide debt financing directly to projects, typically on a project finance basis.

It is important to assess whether the financing gap can be better and more quickly filled by credit lines and/or guarantee instruments before targeting the creation of loan facilities.

Loan facilities are warranted in situations where there are large numbers of economic projects that are unable to make it to financial closure because local investors lack the capacity or liquidity to provide the needed financing. The leverage potential of loan facilities is medium. The

availability of project finance capital can greatly improve access to other forms of financing for clean energy projects.

Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL)

The BEERECL is an EBRD facility helping seven Bulgarian banks on-lend to private sector industrial energy efficiency and renewable energy projects. Besides the credit line, development assistance is also provided for project development services including energy auditing, financial analysis, risk assessment, formulation of loan applications and deal structuring.

The facility is partly supported by the nuclear power plant Kozloduy International Decommissioning Support Fund (KIDSF). An innovative component is that the project sponsors (borrowers) receive an incentive grant from the KIDSF upon successful project commissioning, 15% of the loan for efficiency projects and 20% for renewables.

Investments under the framework have led to savings of one terawatt hours per year and carbon emission reductions of 710,000 tons per annum.

The scheme lasted 10 years and was closed in February 2014.

Source: EBRD website

Box 5: Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL)

3.1.4. Soft Loan Programmes

Soft loans can be used to bridge the financing gap during the pre-commercialization stages and during actual project preparation. Project development, which spans from pre-feasibility to financial structuring, is a lengthy process that requires sufficient capital reserves; however like early-stage technology innovation it does not immediately generate positive cash flows in order for the project developer to service debt. The development risks are thus high and loans from the Commercial Financial Institutions (CFIs) are difficult to access.

Managed by quasi-public entities, soft loan programmes provide debt capital at concessional interest rates. Generally they do not require collateral although matching funds are often needed to ensure strong commitment from the developers. Soft loan programmes allow deferred repayment until such time that the ventures reach the operation and revenue-generating stages. In most cases, debt is forgiven if the ventures do not materialize.

Soft loan programmes give confidence to technology innovators and project developers by sharing some of their costs and in doing so, they can leverage commercial financing by demonstrating to the CFIs the viability of technologies and projects.

The State of Massachusetts' Sustainable Energy Economic Development (SEED) Initiative is a soft loan facility which can be accessed by companies during the pre-commercialization stages of their innovation activities. The Green Municipal Investment Fund (GMIF) which is run by the Federation

of Canadian Municipalities and the Connecticut Clean Energy Fund Pre-Development Program are examples of soft loan facilities designed to help move clean energy projects through the development pipeline by supporting preparation activities.

3.1.5. *Private equity funds*

Equity funds invest in projects and companies such as equipment manufacturers, project developers and ESCOs, project specific special purpose companies, independent power producers, and energy utilities. Typically these funds are set up to invest equity in private transactions (i.e., in companies not listed on public stock exchanges) and termed private equity.

Companies usually seek equity to start up or grow their businesses, activities that can seldom be bank financed. For projects, equity is generally needed to increase the level of investment to a level that meets lender debt-to-equity requirements. More equity means a lower risk of loan default. Compared to project loan facilities, equity funds assume significantly higher risks by assuming an ownership stake and taking a subordinated position in profit distribution (only after creditors and preferred shareholders).

Equity funds may specialize in one technology sector or pursue a full range of climate mitigation investments opportunities. The funds can be structured to provide a range of financial products, from venture capital for new technology developments, to early stage equity for project development activities, to late stage equity for projects that are already fully permitted and ready for construction.

3.1.6. *Venture Capital Funds*

Venture capital, whether public or private, is especially suited to supporting the development of technology, taking it from the end of the R/D phase up to the demonstration phase. Incentives for private investors, however, have created market failures leading to several financing gaps.

Public venture capital funds are usually effective in an early stage of development of a targeted market. In addition, the venture capital fund privileges high-risk (and high return) investments. Companies that generate returns in a long period may not attract their interest and nonetheless remaining profitable.

The *China Environment Fund* and the *UK Carbon Trust Venture Capital Fund* are two examples of publicly backed funds in this area of activity.

3.1.7. *Project Development Grants*

Support schemes are needed to assist project preparation particularly with small players who lack project development capital. An interesting area of intervention, in this connection, could be the cost-sharing of some time consuming activity such as permitting, power purchase negotiations, grid interconnection and transmission contracting.

Contingent grants can be targeted at various preparatory activities and then repaid partially or at one time when the project has reached the operation and revenue-generating stages.

They can also be combined with loan instruments to shift the focus from early stage “prospecting” to later stage project engineering and development. The contingent grant (all or part) becomes a loan and must be repaid if the project succeeds, as determined by close of construction financing

or other milestone, thus allowing the donor to replenish its funds and support further projects. If the project fails to proceed to implementation and financial closing, then the funding becomes a grant and does not have to be repaid. In some cases for example the project proceeds to implementation, the grant becomes a loan and must be repaid if project fails but the grant component is kept by the recipient.

Contingent grants are, however, criticized for creating disincentives for success since there is no penalty in event of failure. The Corfo Project Preparation Matching Funds, the Canadian Green Municipal Funds, Connecticut Clean Energy Fund Pre-Development Programme, and the Massachusetts Pre-Development Financing Initiative provide examples on the use of grants and contingent grants for project development activities.

3.1.8. End-User Loan Softening Programmes

These programmes usually target consumer loans and microfinance. Most typically the incentive comes in the form of an interest subsidy or can also be provided as a partial guarantee or a combination of the two. Either way, the benefit of the support is expected to be passed to the customers in the form of lower interest rates, lower front end deposits and extended loan repayment periods.

Germany has used low interest loans to promote renewables domestically. The Indian Ministry of New and Renewable Energy has used this Public Finance Mechanisms to Mobilise Investment in Climate Change Mitigation approach and to help Indian banks to lend for solar water heaters. UNEP has used this approach for a number of programmes, including Tunisia for solar water heating and India for solar PV. KfW has used this approach in Germany to promote a range of renewable energy technologies.

Berkeley Sustainable Energy Financing District

The City of Berkeley, California has established in 2008 a Sustainable Energy Financing District, issuing bonds and using the proceeds to provide loans to property owners for the installation of solar PV systems and EE improvements. The program has been developed in response to “Measure G” ballot initiative passed in 2007 which sets GHG emissions reduction targets for the City. Loans to property owners are on 20 year terms, allowing loan payments to be matched with the energy savings. The City bears the credit risk of the loans, but, in an important innovation, will collect loan payments on the property tax bill. This tax assessment belongs to the property rather than the individual end-user, who effectively sells it with the property if they move on. The City negotiated a private placement of the bonds with a green investment fund. In addition, a loss reserve fund has been raised to help cover the City’s credit risk exposure. The program design is applicable to funding EE measures as well.

This mechanism has been followed closely by many interested governments in the USA and, given its integration with property tax collections, has great replication potential. Concluded in 2010, the pilot program served as a model for Property Assessed Clean Energy (PACE) programs across the country. In particular:

- The CaliforniaFIRST program, available now to Berkeley property owners.
- The HERO program, which is expected to start offering financing in Berkeley in Spring of 2015.

Box 6: Berkeley Sustainable Energy Financing District²⁰

3.1.9. Tradable certificate systems

In the context of a tradable certificate scheme, the investors obtain certificates that represent the energy saved through the system. The certificates can then be sold in the market, typically dominated by a number of main stakeholders (energy suppliers) to cover a share of their renewable energy, energy efficiency or emission reduction obligations with certificates.

For instance, with reference to solar thermal systems, in Australia it is mainly a system for green/renewable energy and the obligations lie on the electricity utilities; in Italy the White Certificate scheme aims at developing energy efficiency measures and the obligations lie with the large electricity and gas suppliers. The certificates are expressed in energy units (MWh in Australia

²⁰ Source: <http://www.ci.berkeley.ca.us/berkeleyfirst/> . Further information on California FIRST program available at: <https://californiafirst.org/>; further information on HERO program available at: <https://www.heroprogram.com/>

and toe in Italy.) The price varies on the basis of demand and supply and as a consequence, the income is not known in advance. Due to this, many critics argue that these schemes do not create the market stability required.

In both schemes, the quantity of certificates is fixed upfront and based on known system parameters. Therefore, a metering system is not required for such schemes. IN Australia, for instance, the solar thermal systems receive advance certificates equivalent to 10 years of operation. As the number of certificate is known, the financial benefits of the certificates can be easily calculated.

Financial Clean Energy Infrastructure with a Combination of Bonds and Ratepayer Repayment: The Hawaii approach

A unique combination of bond financing and repayment via electric utility surcharges is poised to accelerate Hawaii's deployment of renewable projects, especially solar photovoltaic systems. One of the biggest challenges for Hawaii residents, as elsewhere in the country, who want to install solar water heaters or rooftop photovoltaic systems is the upfront cost. Hawaii's innovative financing model addresses this challenge by combining a bond-financed loan program for solar with an on-bill repayment program in a first of its kind in the nation. In May 2013 Hawaii's legislature passed Senate Bill 1087 allowing the state to create and issue a "green infrastructure bond." Under this law, the Department of Business, Economic Development, and Tourism (DBEDT) would issue revenue bonds at very competitive rates and then pass these savings on to the consumers in the form of lower borrowing costs. The bonds would be backed by an existing public benefits fee that consumers pay on their electricity bills. Proceeds from the sales of green infrastructure bonds to private investors such as pension funds would go into a special fund controlled by a new green infrastructure authority that would make loans to consumers. Consumers would repay the loans from the energy savings on their electricity bills. Hawaii plans to initially capitalize the loan fund with \$100 million in bonds. Hawaii's innovative financing structure will make solar and energy efficiency improvements affordable for residents and business owners who cannot afford the upfront costs of these improvements. The program will go into effect in 2014 and early indications reveal that the green infrastructure bonds will be well-received in the capital markets, enabling the state to borrow at interest rates below those that are paid on other revenue bonds.

Source: Robert Sanders and others, "Reduce Risk, Increase Clean Energy" (Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies, 2013).

Box 7: The Hawaii approach

Grants for Technical Assistance

Technical assistance programs remove barriers other than financial barriers. They address the development of commercial capacities, project development and preparation, need for aggregation of projects to assemble attractive financing volume, education of energy users to get them to buy EE/RE and ESCO services, preparation and structuring of transactions on sound project finance principles. By building the capacities of market actors, technical assistance programs ensure systematic project development to generate a pipeline of investment ready and creditworthy projects. Technical assistance programs thus have the potential to generate high leverage of commercial financing in the medium to long term.

Key components of technical assistance programs to support Financial Institutions (FIs) in clean energy finance business include:

- 1) Market research and marketing support
- 2) Transaction structuring support and development of new financial products
- 3) Staff training and business planning
- 4) Establishment of technical standards and engineering due diligence
- 5) Market aggregation programs and pooling of projects in order to create a critical mass in terms of financing opportunities.

3.2. Special features of public-backed loans for energy efficiency and small scale investments in renewable energy

The effectiveness of public spending in generating private investments is the key criterion to be taken into consideration as well as the magnitude of the additionality measured. The option of direct public funding should be always compared with the leveraging of private investments financed by the public sector (as it is done in the PPP projects.).

Incentives should be strong enough to stimulate the increase of renewable energy investments and they should be manageable.

The most common energy efficiency and small scale renewable energy finance product is a loan directly to the energy end/user. If the end/user is the borrower there will be two contracts, one between the borrower and the lender and one between the end/user and the contractor or ESCO. In this case, the technical risks will be separated from the credit risk. The loan repayment is independent from the technical performance of the system installed.

A second alternative is a package including the turnkey project and the financing of the same, offered by the ESCO. In this case, the loan is borne by the ESCO, not the end/user. In this case, the required due diligence is more complex, i.e. it includes the credit risk of end/user, the project economics, the engineering and technical performance, financial and equity contribution and ESCO management and performance track record.

In the next paragraphs some of the key features of credit analysis for small scale REEE project loans will be presented.

3.2.1. *Collateral value*

The small scale energy efficiency and renewable energy (EERE) equipment often has a low collateral value. In many case it represents some 60% of project costs and the peculiarities of its functions (lighting system, industrial process equipment etc) make the disinstallation or removal quite uneconomic or simply difficult. Due to this, the financial institutions (FIs) prefer to evaluate the credit worthiness of the borrower instead of the value of the equipment as a collateral.

3.2.2. *Positive credit features*

EERE equipment is *essential use* equipment i.e. no commercial or household premises may function without the lighting system or control system or air conditioners. In addition EERE save money and the savings improve the end/user ability to pay back the loan. Due to this, the energy costs saving should be incorporated into the lender's analysis of cash/flow and the debt to service cover service.

In addition there are also other techniques to ensure that the borrower repays the loans. For instance, the preferred rights and special escrow account i.e. a preferred rawing right agreement is included into the contract and usually the borrower agrees that the lender is paid automatically through a withdraw from the borrower bank account. Lenders may establish a special escrow account where borrower may deposit cash according to the terms of the contract and from where the lender would have the first call on fund for debt service.

3.2.3. *Security interest*

Since equipment may have low collateral value the lender may prefer a security interest. Through this mechanisms, if the borrower defaults, the lender may deny access to the utilization of equipment even though it is not in his possess. For instance, if the premises become vacant and a new owner shows up, the equipment subject to security interest cannot be utilized unless the new owner decides to assume the remaining payment obligations.

3.2.4. *Portfolio approach*

When many small loans can be pooled together, a credit analysis utilizing a credit portfolio approach with statistical techniques is possible. The principle is that a single default in the project portfolio would not affect the lender to fail to recover the loan. This scheme has been utilized for financing energy access equipment (PV household systems and bio/gas house systems)

Financing Municipal Clean Energy Projects with Low-Interest Bonds:

The Morris Model

Morris County, NJ is the birthplace of an innovative financing mechanism for renewable energy projects that combines power purchase agreements (PPAs) with government-issued bonds. Popularly known as the Morris Model, the mechanism got its start in 2010 when the Morris County Improvement Agency (MCIA) issued bonds for a 3.2 MW solar energy project that put solar panels on 19 schools and county buildings. Since then, the Morris Model—with its combination of PPA and bond financing—has attracted attention as a promising approach to deploy solar projects in public buildings that can satisfy municipal and state renewable energy goals. Under this model, the MCIA issues pooled bonds to finance the development costs of renewable energy improvements on public buildings throughout the county. MCIA issues a request for proposal seeking a private developer to own, operate, and maintain solar panels on public buildings. MCIA then enters into a lease-purchase agreement with the winning bidder which transfers ownership of the solar installations to the developer and also requires the developer to make payments to the county that are in turn used to pay principal and interest on the bonds. MCIA also enters into a PPA with the developer to buy the electricity from the system at a lower rate than it would pay a utility. The bonds are backed by both project revenues—arising from the PPA—and a county guarantee which decreases the interest rate and significantly lowers the cost of capital for projects. In addition to the low-cost bond financing, the developer also benefits from state incentives available through the sale of solar renewable energy certificates (SRECs) as well as federal income tax incentives which are not available to MCIA as a public entity, offsetting significant portions of the project costs. Morris County has benefitted from electricity prices approximately 35 to 60 percent less than that from a local utility. The Morris Model has been successfully adopted by several other counties in New Jersey.

Source: NREL, “Financing Solar PV at Government Sites with PPAs and Public Debt,” (Golden, CO: National Renewable Energy Laboratory, 2011).

Box 8: The Morris Model

3.2.5. Extra collateral from the borrower

Many lender requires the borrower to provide collateral guarantees to the tune of a multiple (sometimes 150%) of the upfront loan. A market in which a substantial portion of guarantees are covered through guarantee programmes made available by the institutions is likely to expand rapidly.

3.2.6. Pooled procurement

Methods to aggregate many small projects (each of them, too small to attract the interest of financial institutions) are probably the most crucial approach to small scale initiatives lending and therefore to scale up the market. The pooled procurement programmes organize groups of end-users to buy REEE products and services. The associations (households, industry, commercial organizations etc.) can therefore mobilize significant investments and stimulate the market growth. For instance, in Berkeley and Berlin, two leading programmes are an example of such an approach.

3.2.7. SMEs programs

The various tools described in this paper (guarantees, concessional loans, ESCOs etc.) can be utilized also for SMEs. In many countries there are dedicated credit lines or other financial tools such as guarantee schemes for SMEs energy efficiency (Italy, India etc). In some case, the financial facilities are addressed not only to the individual enterprise but to a group of cluster of them. For instance, in Italy, through the so called 'network contract', a group of companies may access to credit in order to improve the energy efficiency of their productions and obtaining, as a group, interest rates lower than those applied to the individual companies. Same for certain guarantee funds that in case of interventions aiming at improving the energy efficiency, covers a share of collateral higher than that of a 'normal' project. In the same way, many commercial banks adopted ad-hoc financial scheme with concessional interest rates for investments in the field of energy efficiency or emission reduction.

3.2.8. Housing programs

The principles of financing of housing are typically similar to those concerning the funding of a pool of small initiatives; therefore, there are many examples of loans provided to homeowner associations or multi-family residential buildings. Typically these loans are secured through first or second mortgages or pledged by the community of homeowners. This facilitates the marketing efforts of financial institutions and ESCOs.

Apart from loans, the financial institutions also activate equity or quasi-equity schemes and a number of new financial schemes has developed over the recent years.

3.2.9. Renewable energy development finance

This concept is referred to the rural off-grid areas where the problem of providing energy services to the community is crucial either for households but also for commercial activities and micro-enterprises. In order to justify economically an intervention of private sector in such areas two main conditions apply: the size of the market should be sufficiently big; and there should be the capacity to deliver the equipment finance to the end-users. In this connection, a particularly useful tool is represented by micro-finance. The case of Peru micro-finance schemes annexed represents an interesting example on how micro-finance can support the deployment of renewable energy in rural areas

3.2.10. Energy Efficient Mortgage

An energy mortgage is a mortgage that credits a home's energy efficiency in the home loan. For an

energy efficient home, for example, it could mean giving the home buyer the ability to buy a higher quality home because of the lower monthly costs of heating and cooling the home. For homes in which the energy efficiency can be improved, this concept allows the money saved in monthly utility bills to finance energy improvements. There are two types of energy mortgages:

- Energy Improvement Mortgage (EIM) - finances the energy upgrades of an existing home in the mortgage loan using monthly energy savings
- Energy Efficient Mortgage (EEM) - uses the energy savings from a new energy efficient home to increase the home buying power of consumers and capitalizes the energy savings in the appraisal

Essentially, an EEM is a reduced rate mortgage that credits the energy efficiency of the building in the mortgage itself. To get an EEM a borrower typically has to have energy rating conducted before financing is approved. This verifies to the lender that the building is energy efficient. In the United States EEMs are typically used to purchase a new home that is already energy efficient, such as Energy Star qualified one.

An EIM is used to purchase existing homes that will have an energy efficiency improvement made. EIMs allow borrowers to include the cost of energy efficiency improvement in the mortgage without increasing the down payment. EIMs allow borrowers to use the money saved in utility bills to finance energy improvements. In the US both EEMs and EIMs require a home energy rating (building certification) to provide the lender with the estimated monthly energy savings and the value of the energy efficiency measures.

3.2.11. On-bill financing

Integrating loan payments with energy bills and allowing utilities to cut off energy supply to defaulting customers has the potential to both lower collection costs and enhance credit quality of the financing scheme, thereby lowering financing costs. Payment via utility bill reduces risk of credit default and lowers collection risk.

Energy regulators may disapprove and distrust the addition of loan repayments into utility bills, preferring to keep the utility/customer contractual relationship implicit in utility billing simple and straightforward, and resisting, in particular, provisions allowing customer disconnection due to loan repayment default.

3.2.12. Green bonds

As already mentioned in Box n.6, REEE bonds have been developed in USA as Property Assessed Clean Energy (PACE). The instrument enables residential and commercial property owners to borrow money from municipal administrations in order to improve the energy efficiency of their properties. The funds are provided by the issuance of bonds where payments are met by the borrowers by utilizing the savings obtained through the efficiency gains.

A different option is represented by the bonds issued by the energy suppliers in order to finance the commercial and private proprietors that undertake energy efficiency investments.

The energy efficiency bonds are self-financing and are considered a win-win tool. However, if the bond market is not adequately developed, the role of bonds backed by international financial

agencies (such as green bonds of BEI and World Bank) or international donors is still fundamental. In fact, in order to be efficient in terms of mobilization of private capitals the bonds need to be secured. In European countries and US, the bonds are backed by the property object of the investments, with seniority over the mortgage payments. In other countries this could be difficult or impossible.

3.2.13. ESCO

An energy service company is a company that develops, engineers and install clean energy projects in a number of sectors. The combination of financing and turnkey project make ESCOs particularly powerful. They operate with a number of models but usually they can act as a bridge between the financial institutions and the end/users, by providing both financing and equipment. The structure of their projects has a variety of models but the one that makes the financing secure foresees some fixed payment obligation from the end/user in order to repay the capital investment.

As already stated, in the case of the ESCO the due diligence carried out by financial institutions includes also managerial and technical aspects, the number of contracts active, the risks associated to them etc.

The theme of ESCO has been extensively analyzed in MED DESIRE project in the study “*Guidelines to improve Public-Private Partnerships in innovative solar energy and energy efficiency*”, to which reference should be made to explore the topic.²¹

3.2.14. Multi/project finance facility for ESCO

Typically, a financial institution dealing with an ESCO explores the possibility to activate a multi/project loan facility through which the lender agrees to provide a determined amount of loans provided certain conditions and terms are respected. In this connection, a Standard end/user agreement will be defined along with a number of technical and economic parameters. The approval of the single loan will still be required but the whole process will be significantly eased. In particular, the due diligence has to demonstrate that the project meet the pre/defined standard criteria.

Many energy efficiency and small scale renewable energy programs focused on developing ESCOs or including ESCOs as a delivery mechanisms. However, the market potential for their creation should be carefully examined.

3.3. Mechanisms to reduce uncertainty

Public Financial Institutions may leverage private finance by targeting existing risks and constraints on investment. In general, low-carbon investors currently experience a wide range of risks and constraints. A broad categorization of these risks is summarized in Table 3 below.

²¹ Walter Cariani, Linda Cifoletta, Anna Sàloma, *Guidelines to improve Public-Private Partnerships in innovative solar energy and energy efficiency*, 2014, MED DESIRE project deliverable 4.2.3.

Table 3:- Basic risk categorization

Category	Factors	Mitigation Instruments
Strategic	Technological change, shifting consumer preferences, or other events that negatively impact the performance of market players	Adequate PPAs Legal obligations Capacity building & TA
Operational	Interruption of service due to system errors or defects	Insurances
Financial	Financial loss due to interest rate movements, currency fluctuations, oil price volatility, input cost changes, counterparty credit issues and decommissioning costs	Financing equity Senior loan equity Mezzanine
Political	Changes in the political or regulatory landscape that may harm performance of technologies, especially with regard to the policy framework that delivers a carbon price or revenue support mechanism	Feed-in tariffs Obligations
Legal	No respect of property right, land tenure, weak law enforcement	Strengthening the legal system, guarantee scheme
Technical	Weak equipment quality, lack of turnkey and O&M suppliers	Insurance, improve supplier infrastructure
External	Financial loss due to adverse weather events, resource shortage	Weather derivatives, insurances

Source: **GIZ, Smart climate finance: Designing public finance strategies to boost private investment in developing countries, Eschborn, April 2011**

As already pointed out in previous chapters, in developing countries, low-carbon investment conditions are characterized in general by higher levels of risk aversion among financial institutions; higher borrowing costs; lack of access to loans with tenor longer than 5-6 years, less experience with project finance structures and high requirements for equity co-finance (typically 40% and above); lack of angel and venture capital (business finance) for start-up SMEs, higher foreign exchange risks when sourcing international funds; greater market risk due to less stable macroeconomic conditions; limited equipment operations and maintenance expertise; and a greater need for technology transfer support.

With reference to risk mitigation for early stage market development, three types of mechanisms are largely utilized. First, the institutions may cover the initial risk of the project and take the project at a stage in which it is attractive for potential investors. Second, guarantee schemes may be offered, either on prices or on loans (guaranteed by a public institution.) Third, an insurance may be provided to the investors in order to protect them from a range of events able to harm or crowd out their investments. All the above mentioned mechanisms make the projects more profitable and viable but it is worth mentioning that all them are usually considered temporary, since it is assumed that once the global and national conditions become more conducive for renewable energy and energy efficiency investments and once REEE would become cost competitive with fossil fuels, the above mentioned schemes would not be required any longer. With reference to the costs, either the fossil fuels increase because of misalignment between demand and offer or become object of heavier pigouvian taxes or the renewable energy costs lower because of technology diffusion or economies of scale. But none of these two option is predictable in medium term. Due to this, unless the renewable energy industry becomes

competitive, it would be a continuous drainage of resources and such schemes are not sustainable in fiscal terms.

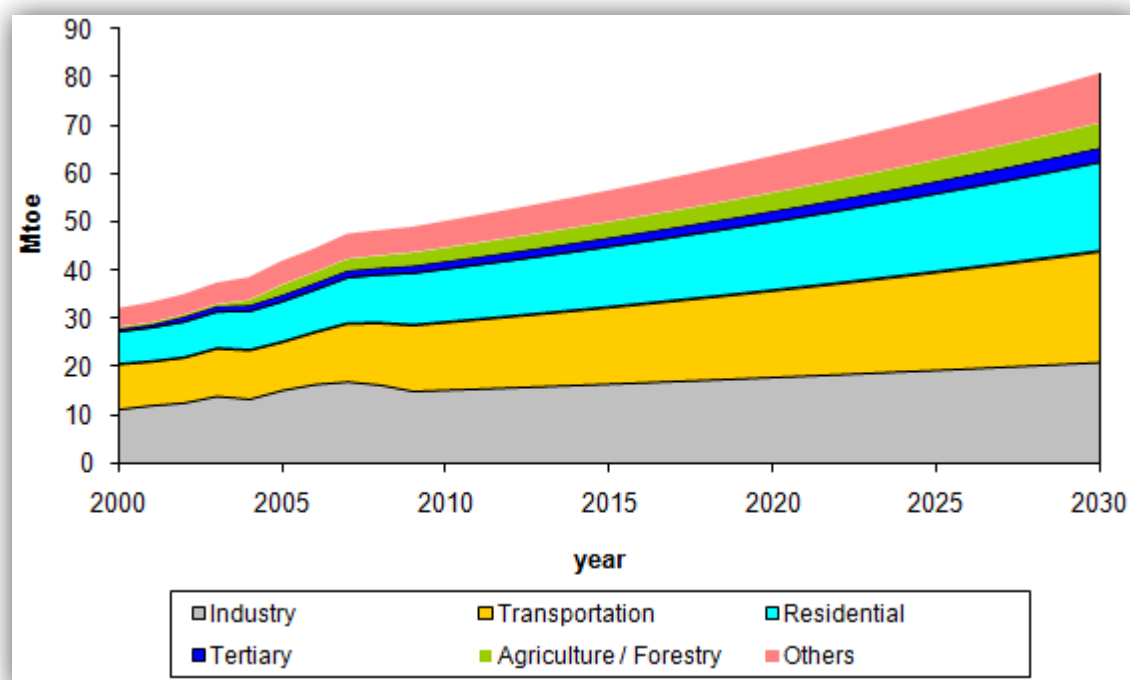
4. Small scale energy efficiency context in target countries

In the following paragraphs, an outlook of the small scale energy efficiency context in the target countries will be provided. In particular, information about the general framework of the country, the main stakeholder dealing with energy efficiency, the main barriers to the implementation of small scale investment in energy efficiency and possible mitigation measures.

4.1. Outlook on energy efficiency and small-scale renewable energy sector in Egypt

4.1.1. Energy consumption patterns and urban development

Figure 1: Total final energy consumption in Egypt (2000-2030)



Source: European Investment Bank 'Financing of Urban Energy Efficiency and Small Scale Renewable Energy Investments in the Southern and Eastern Mediterranean Region'

Egypt is an oil and gas producing country and the economic system energy demand depends considerably from fossil fuel sources (around 94% of the total). According to United Nations, out of 85 Million people, some 43% live in urban areas – a percentage significantly lower than other

countries in the area. The total residential building stock is equal to 20 million dwelling but, according to the Plan Bleu of United Nations (2010), by 2030 some additional 7 million dwelling are expected.

4.1.2. *Main public stakeholders dealing with energy efficiency and small-scale renewable energy*

The policies and regulations concerning the small scale energy sector are assigned to a number of departments and institutions:

- The Energy Supreme Council (ESC), established in 1979, is the highest policy-making authority in the energy sector. Its objectives are to develop energy strategies in management of energy resources, energy consumption and production patterns, as well as providing guidance to energy reform activities.
- The Energy Efficiency Unit in the ESC was established in May 2009. Its main goal is to coordinate all the activities concerning the implementation of policies concerning energy efficiency. In this connection, the EEU provides technical assistance, develops market initiatives etc. etc. Representatives of the ministries involved in production and consumption of energy are part of the Unit.
- The Energy Efficiency Council (EEC), created in 2000, is a consortium of public and private operators aiming at creating the context for energy efficiency initiatives in Egypt.
- The New and Renewable Energy Authority (NREA) was established in 1986 to support and develop renewable energy technologies / projects (including small-scale RE such as SWH and roof-top PV) in Egypt together with implementation of related energy conservation programs.

4.1.3. *Private sector*

In last years, international organization (namely UNDP and GEF facility) implemented activities for the creation of the conditions for a self-sustaining market for ESCOs. However, in spite of the efforts, the active ESCOs are relatively small. According to the analysts, this is mainly due to the fact that the Government favourites large scale investments and subsequently the small scale investment in energy efficiency are crowded out

4.1.4. *Policy, regulatory and financial frameworks*

4.1.4.1. *Policy framework*

The National Energy Efficiency Strategy (NEES) was developed in 2000 as part of the Egyptian Environmental Policy Program (EEPP) jointly implemented by the Egyptian Environmental Affairs Agency (EEAA), the Organisation for Energy Planning (OEP), and the Tourism Development Authority (TDA). A number of policy instruments were established – however, as there is no dedicated institution in charge of setting up objectives and targets the initiative has not been able yet to develop a comprehensive policy.

4.1.4.2. Regulatory framework

A law regulating the energy efficiency is still missing. However, a number of standards and labelling systems for household appliances have been developed over the years. Unfortunately, the compliance with the above-mentioned standards is still voluntary. . In September 2014 Ministry of Electricity and Renewable Energy (MoERE) announced a Feed-in Tariff (FiT) for both wind energy projects PV applications. The FiT is expected to open the door to disseminate both wind and PV technologies in different sectors, such as residential and commercial. Project's scale varies from small-scale to large-scale.

4.1.4.3. Financial framework

A dedicated fund for small-scale renewable energy and energy efficiency investments does not exist yet. Most of funds go to technical assistance programmes.

For small and medium PV project eligible for FiT, in late 2014 Ministry of Finance has committed itself in facilitating soft loans with interest rates of 4% for projects up to 200kW, and 8% for projects between 200kW and 500kW.²²

4.1.5. *National targets and identified projects pipeline*

The Egyptian energy strategy is targeting 8.3% reduction in the energy consumption by 2022 through energy efficiency applications collectively at both the supply and demand side. This would correspond to 20% of 2007 energy consumption by 2022.

In July 2012 the Egyptian Solar Plan was approved. The Plan set the target of 3500 MW to be reached by 2027 – 2800 MW for CSP and 700 MW for PV. Some 70% of the investments are supposed to be implemented by private sector. Government, however, is implementing a number of projects in RE with the support of international organizations and European countries. Summarising, in Egypt the support mechanisms utilised are the following: competitive bidding, the Feed-in Tariffs and capital subsidies and grants. In September 2014, a target of 2,300 MW solar PV for the period 2015 – 2017 was set by the Ministry of Electricity and Renewable Energy (MoERE), including 300 MW of projects below 500kW, and 2,000 MW for projects between 500kW and 50MW.

4.1.6. *Barriers to energy efficiency and small scale renewable energy projects and mitigation measures*

Energy efficiency measures have not been a priority over last years. The core business of energy policy concerns the electricity tariffs and the energy subsidies. In this connection, it should be underlined that historically, being Egypt a producer of oil and gas, the low prices of fossil fuel sources influence considerably all the initiatives concerning the energy efficiency or the utilization of renewable energy sources. However, as the subsidies for oil and natural gas reached some 18% of the total expenditures of Government in 2010, some reforms aiming at reducing the burden of oil and gas subsidies have been launched.

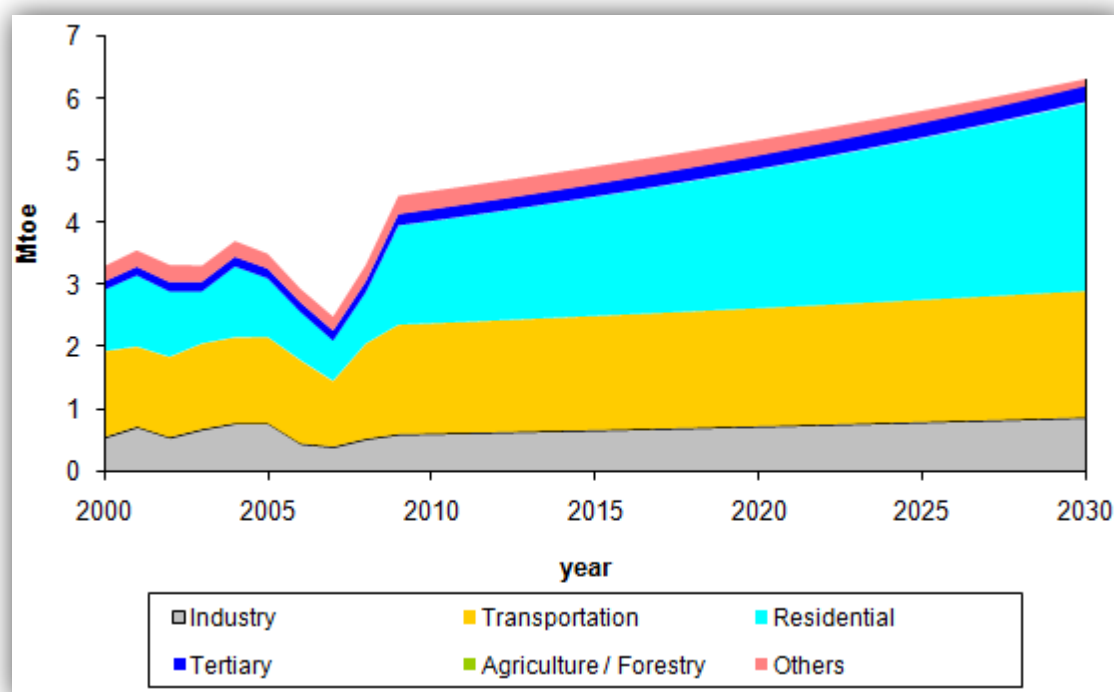
²² Source NREA, December 2014

In residential and agriculture sectors for instance, several mitigation measures have been introduced. Since 2004, an increment of 5% in electricity prices has been established. In addition the debate about the need to phasing out the subsidies for private and industrial consumption took place. A more targeted approach to subsidies can reduce the costs and reduce the impact on low-income groups.

4.2. Outlook on energy efficiency and small-scale renewable energy sector in Lebanon

4.2.1. Energy consumption patterns and urban development

Figure 2: Total final energy consumption in Lebanon (2000-2030)



Source: European Investment Bank 'Financing of Urban Energy Efficiency and Small Scale Renewable Energy Investments in the Southern and Eastern Mediterranean Region'

Lebanon is not a producer of oil and gas and heavily depends on energy import. It imports some 95% of energy and most of the import is dominated by fossil fuel. The main consumers are the transport and residential sectors. The power coverage is around 99% of the total and the subsidies of government to the energy sector reach 4% of the budget (Ministry of Environment data, 2011.). Lebanon has a total population of 4.3 million (2010) with 87% of them living in urban areas (Bleu Plan 2010). The total building stock is equal to 1 million but by 2030 an additional 1.4 million dwellings are expected.

Electricity is supplied by Electricité Du Liban (EDL), a state owned Lebanese power utility, and some other small concessions, with a stagnating generation capacity of 1,500 MW. This generation capacity lacks behind the total demand that can reach the peak values of around 2,500

MW²³. The gap between the demand and supply is being handled through frequent load shedding covered by private generators.

4.2.2. Main stakeholders dealing with energy efficiency and small scale renewable energy

The Ministry of Energy and Water (MEW) is the responsible ministry for energy matters in Lebanon. The Lebanese Centre for Energy Conservation (LCEC), currently affiliated with the MEW, was established in cooperation with the UNDP to foster EE and small-scale RE activities in Lebanon.

The LCEC is responsible to support and perform energy audits in various energy consuming sectors (mainly public buildings, service and industrial sectors), develop markets for energy efficient appliances (solar water heaters, compact fluorescent lamps, street lighting, etc.) and develop financial and legislative frameworks for energy efficiency and small scale renewable energy investments.

4.2.2.1. Private sector

The LCEC, through the programme “Cross sectoral energy efficiency and removal of barriers to ESCO operation”, tried to create a self-sustaining market for ESCOs. As an outcome, 2 ESCOs and 6 energy audit companies were created ²⁴

4.2.3. Policy, regulatory and financial frameworks

4.2.3.1. Regulatory framework

The Lebanese Government has officially adopted the National Energy Efficiency Action Plan (NEEAP) for the years 2011-2015 as developed by the Lebanese Center for Energy Conservation (LCEC) in collaboration with the League of Arab States and the regional center for renewable energy and energy efficiency (RCREEE).

The NEEAP 2011-2015 is the first comprehensive strategy in energy efficiency and renewable energy to be ever adopted by a Lebanese or Arab Government. It is based on the Arab Energy Efficiency Guideline developed by the League of Arab States and disseminated among its member states.

4.2.3.2. Financial framework

The Central Bank of Lebanon (CBL or BDL) has developed with the support of the LCEC, an energy efficiency and renewable energy fund called the National Energy Efficiency and Renewable Energy Action (NEEREA). It is a national programme aimed at stimulating EE & RE investments through

²³ European Investment Bank, *Financing of Urban Energy Efficiency and Small Scale Renewable Energy Investments in the Southern and Eastern Mediterranean Region*, 2013.

²⁴ LCEC(2010). *Results of nine energy audit studies: findings, analysis and recommendations*. Beirut, Lebanon.

various measures which lower the cost of funding or bank's risk perception vis-à-vis this type of projects (see details in previous sections).

In addition, and although not technically a component of NEEREA, loans to 'subsidised' sectors can benefit from an interest rate reduction of 4,50 %²⁵ granted by the Ministry of Finance via CBL. Moreover, CBL has permitted commercial banks to use a part of reserve funds at zero percent interest rate for environment beneficial purposes. An example of this scheme was the zero interest rate for solar water heaters.

The policy paper for electricity sector includes a budget of USD 25 million by the Government of Lebanon for investments in demand side energy efficiency. The investments are distributed as USD 15 million for short term activities and USD 10 million for long term activities.

The EIB in cooperation with the Agence Française du Développement (AFD) is setting-up a facility (i.e. credit line and technical assistance) which will provide long-term funding and technical assistance necessary for the Lebanese EE & RE market. This facility will complement other existing facilities managed by CBL and supporting energy efficiency, renewable energy and environmental protection. The credit line will allow Lebanese commercial banks to provide long-term funding to individual projects in the eligible sectors with the possibility of fixing interest rates that are currently not available in the Lebanese market. The technical assistance will support the project implementation unit of the credit line, financial intermediaries and final beneficiaries in selecting, structuring and monitoring eligible projects in the EE & RE sectors.

4.2.4. *National targets and identified projects pipeline*

In 2008, the recommendations of the national workshop on integrated planning in the electricity sector included the development of new and renewable energy sources as important components of the electricity sector. Such development could be accomplished by setting a cost-effective and technically-achievable proportion of renewable energies within the government's policies for a sustainable utilization of resources.

At the 2009 Copenhagen Climate Summit, Lebanon voluntarily pledged to increase the renewable energy shares to 12% by 2020. This voluntary commitment was anchored within the "Policy Paper for the Electricity Sector" prepared by the Ministry of Energy and Water (MEW) and officially adopted by the Council of Ministers in June 2010: it includes ten strategic initiatives for the improvement of infrastructure, supply and demand systems and the definition of legal framework. Two key initiatives target respectively the Renewable Energy and the Demand Side Management / Energy Efficiency. The renewable energy initiative includes, among others, the increase of 40 MW in hydropower, the realization of 60-100 MW of wind farms and the installation of 15-25 MW of installed capacity in biomass energy. The energy efficiency initiative aimed to save a minimum of 5% of the total demand by 2015 through the adoption of the energy conservation law, the implementation of a national financing mechanism (the National Energy Efficiency and Renewable

²⁵ European Investment Bank, *Financing of Urban Energy Efficiency and Small Scale Renewable Energy Investments in the Southern and Eastern Mediterranean Region*, 2013.

Energy Action – NEEREA), and the launch of the National Plan for Energy Conservation (later on named National Energy Efficiency Action Plan – NEEAP) in addition to concrete and directly-implementable actions and projects such as the diffusion of compact fluorescent lamps (CFLs), solar water heaters and efficient public lighting.

Developed by the Lebanese Center for Energy Conservation (LCEC), adopted in August 2010 by MEW and approved in November 2011 by the Lebanese Government, the National Energy Efficiency Action Plan (NEEAP) for Lebanon 2011-2015 summarized all national objectives, programmes and policies in 14 independent but correlated initiatives in the energy efficiency and renewable energy sectors. The Lebanese NEEAP was prepared in conformance with the Arab EE guideline (based on the EU directive 2006/32/EC on energy end-use efficiency and energy service) and Lebanon was the first Arab country to officially adopt such plan. The LCEC is currently updating the NEEAP while preparing the Renewable Energy Strategy for Lebanon that will include several scenarios in achieving the set target of 12% RE by 2020 and that will also be in accordance with the Arab RE guideline under preparation.

The initiatives of the NEEAP are the following:

- Initiative 1: Towards Banning the Import of Incandescent Lamps to Lebanon
- Initiative 2: Adoption of the Energy Conservation Law and Institutionalization of the Lebanese Center for Energy Conservation (LCEC) as the National Agency for Lebanon
- Initiative 3: Promotion of Decentralization Power Generation by PV and Wind Applications in the Residential and Commercial Sectors
- Initiative 4: Solar Water Heaters for Buildings and Institutions
- Initiative 5: Design and implementation of a national strategy for efficient and economic public street Lighting in Lebanon
- Initiative 6: Electricity Generation from Wind Power
- Initiative 7: Electricity Generation from Solar Energy
- Initiative 8: Hydro Power for Electricity Generation
- Initiative 9: Geothermal, Waste to Energy, and Other Technologies
- Initiative 10: Building Code for Lebanon
- Initiative 11: Financing Mechanisms and Incentive
- Initiative 12: Awareness and Capacity Building
- Initiative 13: Paving the Way for Energy Audit and ESCO Business
- Initiative 14: Promotion of Energy Efficient Equipment

Adding to the above, as of July 31st, 2008, the Lebanese Standards Institutions (LIBNOR), adopted voluntary energy efficiency standards for 5 household appliances: Solar Water Heaters, Compact Fluorescent Lamps, Refrigerators, AC split units, Electric/Gas water heaters. The standards for Solar Water Heaters and Compact Fluorescent Lamps were officially adopted as mandatory by the Council of Ministers in September 2010. In synchronization with the standardization process, the Industrial Research Institution (IRI) proceeded with the installation of a testing facility for solar collectors as part of a project financed by the Hellenic Aid, jointly managed by the United Nations

Development Programme (UNDP) and the Greek Center for Renewable Energy Sources (CRES) and implemented by the LCEC, and a testing facility for Compact Fluorescent Lamps.

4.2.5. Barriers to energy efficiency and small-scale renewable energy projects and mitigation measures

Very few barriers to energy efficiency and small-scale renewable energy projects specific to Lebanon have been identified. In spite of this, low electricity tariffs, combined with the diffusion of informal electrical generation charged depending on the capacity rather than on actual consumption do not encourage serious demand side management programmes.

Thus, electricity sector price reform is an essential part of any strategy which intends to provide an enabling environment for EE and small-scale RE investments in Lebanon. The policy paper for the electricity sector aims to gradually restructure and increase the electricity tariff to decrease the annual subsidies and eliminate the financial deficit in the electricity sector.

Several other measures have been adopted in Lebanon to implement and promote energy efficiency and small scale renewable energy investments in the various end-use sectors. These included standards and labelling programs where the LCEC proposed label prototypes for refrigerators, air conditioners and CFLs based on the Tunisian labelling system. The standards governing the three categories of appliances were accepted by the Lebanese Norm Institute (LIBNOR) and were implemented on a voluntary basis in November 2007. The standards for CFLs and solar water heaters were adopted by the Council of Ministers as mandatory in September 2010.

The UNDP/GEF project (2002-2007), “Capacity building for the adoption and application of thermal standards for buildings”, developed thermal standards in order to improve the poor thermal performance of buildings in Lebanon. These standards have, however, not been fully incorporated and have remained voluntary.

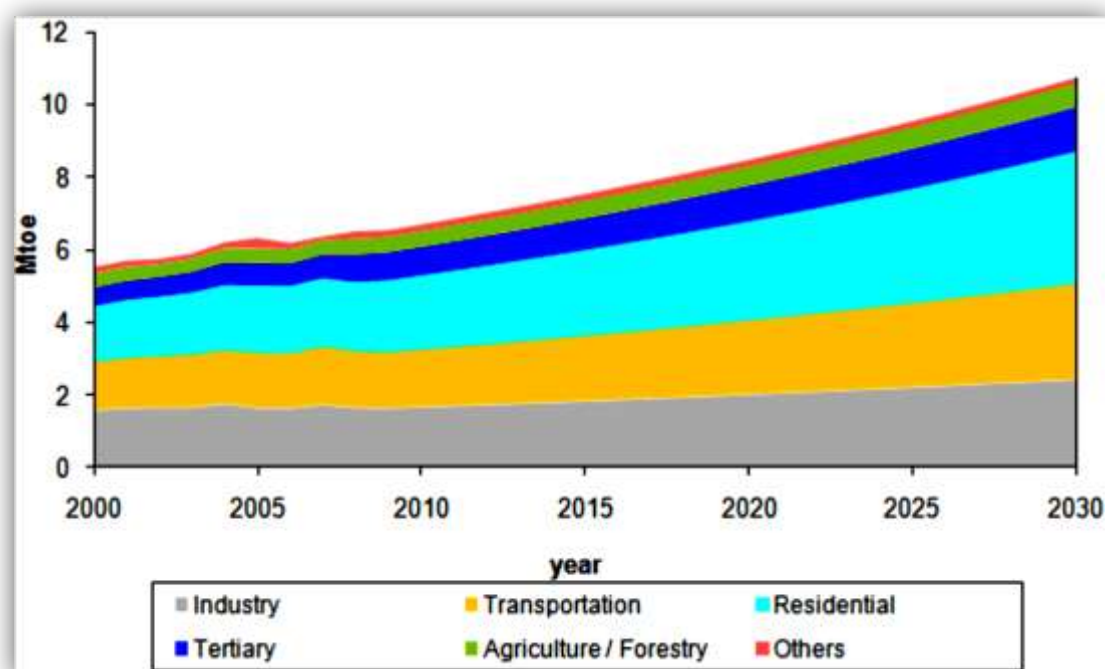
Moreover, the LCEC has launched an energy audit support program resulting in more than 120 energy audits with the majority of them taking place after 2005. About 20%²⁶ of the performed audits have led to new investments in energy efficiency and small scale renewable energy initiatives.

²⁶ *Ibid.*

4.3. Outlook on energy efficiency and small-scale renewable energy sector in Tunisia

4.3.1. Energy consumption patterns and urban development

Figure 3: Total final energy consumption in Tunisia (2000-2030)



Source: European Investment Bank 'Financing of Urban Energy Efficiency and Small Scale Renewable Energy Investments in the Southern and Eastern Mediterranean Region'

Tunisia has been an exporter of oil and gas during the 80's but over the time it has become an importer. The residential sector is the largest energy consuming sector (some 31% of the total energy consumption.)

The total population is 10.4 million and around 67% live in urban areas (UN, 2010.) according to the estimates, some additional 0.6 million dwelling are expected by 2030.

4.3.2. Main public stakeholders dealing with energy efficiency and small-scale renewable energy

The institutional framework for the renewable energy and energy efficiency is well articulated. An Agency for Energy Conservation (AME) was created in 1985. In 2004, the National Agency for Energy Management (ANME) was created as a financially autonomous legal entity (law 2004-72). The line ministry is the Ministry of Industry and Technology (MIT).

ANME plays a key role in both energy efficiency and renewable energy. It implements the action plans, manages the national energy fund and provides technical assistance. Additionally, ANME

manages the programme of mandatory audits, proposes financial incentives to EE and small-scale RE, and promotes educational and training programmes.

4.3.3. Private sector

While the ESCO model is not fully applied in Tunisia, there are many companies that have developed competences in energy audits of feasibility studies for EE and small-scale RE. The creation of ESCOs was the objective of a programme funded by World Bank (2004-2009.)

Ten ESCOs were licensed with the National Energy Management Agency (Agence Nationale pour la Maitrise de l'Energie – ANME.) Four were fully operational during the project, and with the support of credit guarantees, 30 contracts were signed with industrial companies. At the time the project closed, 37 percent of all energy efficiency projects in the industrial sector were using the Partial Guarantee Facility.

4.3.4. Policy, regulatory and financial frameworks

4.3.4.1. Policy framework

The policy measures for both energy efficiency and renewable energy have been conceived against a long-term strategy document extending up to 2020 and 2030. Within this strategy, the Tunisian government has set different action plans.

Action Plan Period Objective

- Triennial 2005-2008 Achieve energy savings of 700 ktoe in 2007 (8% of annual national consumption)
- Quadrennial 2008-2011 Reduce energy demand by 20% by 2011
- Presidential 2009-2014 Improve energy intensity indicator
- Tunisian Solar Plan (TSP) 2010-2016 - 40 projects with the objective to reduce primary energy demand by 24% by 2016 (latest revision in 2012)
- Action Plan 2014-2020 for Energy Conservation (issued by ANME) in order to consolidate the achievements and launch new initiatives in the periods 2014-2017 and 2017-2020

4.3.4.2. Regulatory framework

The energy efficiency and small-scale renewable energy sector in Tunisia is regulated by a series of laws and decrees. The law 2004-72 (August 2004) and its later modification, law 2009-7 (February 2009) has established energy efficiency as a national priority. These laws define priorities and reinforce the position of ANME by placing special emphasis on mandatory periodical audits, labelling and standards, building codes and the promotion of ESCOs.

A new law on renewable energies is in an advanced state of preparation and should overcome some current regulation limits and uncertainties. While expected since the beginning of 2013, the issue of the new law is experiencing severe delay.

4.3.4.3. Financial framework

Since 1994 there are incentives available for EE and small scale RE even though the structure and the scope of the above mentioned incentives have been modified over the years. The financial

incentives include grants for energy audits, consultancy, grants for the substitution of natural gas in a number of sectors.

4.3.5. National targets and identified projects pipeline

The Government of Tunisia has initiated a policy to improve energy efficiency and reduce energy intensity of the Tunisian economy by 3% per year in order to ensure significant energy savings by 2016. Currently, the Tunisian Solar Plan aims to achieve 24% reduction in the primary energy demand by 2016.

As a part of Tunisian Solar Plan, a number of energy efficiency projects were identified. They included intervention in solar thermal and water heating, efficient building envelope, OV systems and household electric appliances.

Table 3: Identified EE and small-scale RE projects in Tunisia

Project Description	Targeted Sector	Technology	Objectives	Period	Sponsors	Investment Costs [MEUR]	Energy Savings [Ktoe/year]	CO ₂ Avoided [KtCO ₂ /year]
Investment Projects								
Thermal insulation	Residential	RES_ENV	Install 11 million sqm of roof thermal insulation	2011-2016	ANME	110.0	50.0	117.5
PROSOL	Residential	RES_SWH	Develop SWH market to reach a total installation of 1 million sqm by 2014	2010-2014	ANME	80.0	20.3	53.0
PROSOL	Industry	Solar Thermal Heating	Promote collective solar thermal systems through the installation of 60,000sqm solar	2010-2014	ANME	25.0	N/A	11.0
PROSOL	Residential	RES_SWH	Promote the use of SWH in residential communities through the installation of 10,000sqm solar collectors for 200 buildings	2010-2014	ANME	4.3	0.7	1.8
Solar heating for indoor municipal	Tertiary	Solar Thermal Heating	Install 5700sqm of solar collectors for heating swimming pools	2010-2014	ANME	2.4	2.5	6.8
Solar refrigeration in food industry	Industry	Efficient Heating and Cooling	Develop concepts for producing cold energy through solar thermal (10 pilot projects)	2009-2014	ANME	9.0	0.2	N/A
Low consumption light bulbs	Residential	RES_LTG	Distribute 5 million energy efficient lamps	2009-2011	ANME	8.0	70.0	164.4
Energy efficient refrigerators	Residential	RES_REF	Replace 400,000 old refrigerators (over 10 years) by energy efficient refrigerators (Class 1)	2009-2016	ANME	85	24	56.4
Energy efficient buildings	Tertiary	TER_ENV	Construct 15,000sqm of energy efficient buildings (public areas)	2010-2016	ANME	0.30	0.00	0.01
PV public lighting	Tertiary	PV Systems	Achieve 500KW of PV installations for public	2010-2015	ANME	5.5	0.2	N/A
PV - service stations	Tertiary	PV Systems	Equip 200 service stations with PV systems	2010-2014	ANME	2.5	0.2	N/A
Decentralized PV systems	Residential	PV Systems	Provide 6000 PV systems for 600 residential buildings and public houses (total installed power = 15MW)	2010-2011	ANME; STEG	75.0	5.6	13.2
Solar pumping for irrigation	Agriculture / Forestry	Solar Pumping	Provide 200 PV solar pumping systems for irrigation	2009-2011	ANME	5.0	0.4	0.9
Monitoring systems for vehicles	Transportation	ICTs	Promote ICTs in the monitoring of fleet vehicles	2009-2014	ANME	8.0	4.0	11.6

Source: European Investment Bank 'Financing of Urban Energy Efficiency and Small Scale Renewable Energy Investments in the Southern and Eastern Mediterranean Region'

In order to fully deploy all the assessed energy efficiency and small-scale renewable energy investments, subsidies are needed to ensure sufficient profitability for all projects. These subsidies were estimated to a total of EUR 2.1 billion, in net present value, and for all the assessed projects to be implemented in Tunisia by 2020.

4.3.6. *Barriers to energy efficiency and small-scale renewable energy projects and mitigation measures*

Tunisia is well advanced in the national strategy for energy efficiency - especially if compared to North African countries – and it also appears to have the right means to implement successfully the above mentioned strategy. In fact, it has developed a legal framework along with a set of financial and fiscal incentives to stimulate the deployment of renewable energy systems. It has established the National Fund for Energy Management (Fonds National de Maitrise de l'Énergie) that provides grants for the development of energy efficiency and renewable energy projects.

The Tunisian government has taken several measures to address barriers to energy efficiency and small-scale renewable energy sector. It has supported the establishment of energy performance standards for buildings and household appliances (e.g. refrigerators and air-conditioners). Moreover, the government is now mandating large energy consumers in the transportation, tertiary and residential sectors (more than 500 toe/year) and industrial companies (more than 800 toe/year) to conduct periodic energy audits (every 5 years). Financial support for this purpose is provided through the FNME. For the period 2007-2011, the government's objective was to realise 200 energy audits and 300 performance contracts in order to achieve energy savings of 943 ktoe. The PROSOL programme was developed to promote solar water heaters. It led to a major recovery of the national solar water heaters market and attracted new industrial operators and networks' installers.

Furthermore, the government aims to set up an energy information system, including the definition of relevant energy and GHG emissions indicators. Capacity building initiatives in the public and private sector have been also conducted to raise awareness on the benefits of EE and small-scale RE.

The main barrier to the implementation of energy efficiency and small-scale renewable energy investments identified for Tunisia is the high energy subsidies. In April 2013 energy subsidies accounted for 4.7% of Tunisian GDP, electricity sector absorbing 51% of the whole amount²⁷. In order to lighten the financial burden, in October 2013 Tunisian Government adopted a decision for the progressive reduction of energy subsidies, with immediate effect on the tariffs applied to cement factories²⁸.

The phase-out strategy foresaw a generalized reduction of 10% of the subsidy in January 2014, and the total cancellation of the subsidy over a period ranging from three to six years depending on the branch of the productive activity served²⁹. Two electricity price increases of 10% each occurred at a distance of only 4 months in January and May 2014, confirming the actual commitment in phasing out.

²⁷ World Bank, *Vers une meilleure équité: les subventions énergétiques, le ciblage et la protection sociale en Tunisie* (Policy Note, November 2013) http://issuu.com/world.bank.publications/docs/vers_une_meilleure_quit_.

²⁸ Tunis Afrique Presse (TAP), *Tunisie: Conseil des ministres - Indemnisation des blessés et des familles des martyrs de l'armée et de la sûreté nationale* (AllAfrica, 30/10/2013) <<http://fr.allafrica.com/stories/201310310606.html>>, accessed on 06/07/2014.

²⁹ Investir en Tunisie, *Tunisie: la stratégie de Mehdi Jomâa pour la levée de la subvention énergétique* (Investir en Tunisie, 08/01/2014) <http://www.investir-en-tunisie.net/index.php?option=com_content&view=article&id=24106>, accessed on 07/07/2014.

Tunisian Ministry for Industry, Energy and Mines estimated that cancellation of subsidies should determine a net increase of electricity prices of 77% compared to 2013 tariffs³⁰, while World Bank estimated more prudently the effect in a 30% average net increase related to 2013 reference prices³¹.

The rise of energy price should constitute a relevant enabling factor for the deployment of REEE in Tunisia. Even without any provisional quantitative assessment, companies and citizens are clearly aware of operating in an environment characterized by a rapid increase of electricity costs. This is determining a progressive increase of the number of subjects who are actively looking for mitigation measures to energy costs increase and are keen to consider seriously, among others, an investment in REEE systems in the short term.

While for EE sector the framework is comprehensive and quite attractive, for RE market these actors has to cope with a substantial regulatory uncertainty due to conflicting interests of ANME and STEG. While the former is actively committed in pushing for the development of Renewable Energy market, the latter has a more relevant specific weight within the Ministry of Industry and feels renewable energy production as a breaking element for the *de facto* monopoly on the production of electricity. Moreover, for larger size projects, the lack of familiarity of STEG as a grid operator with a massive injection of energy from non-programmable source is a relevant factor that complicates and delays the issuing of authorizations, although 2009-7 law authorizes independent power production from renewable energy sources for all establishment operating in industrial, agricultural and tertiary sectors covering its own consumption. It also grants the right to transport green electricity via the STEG grid from the production site to the consumption point(s) and the right of sale of a limited amount of surplus to STEG.

4.4. Support mechanisms in target countries

In the target countries the experiences concerning the support mechanisms could be classified into 4 broad categories:

- Feed-in tariffs or net metering
- Direct and indirect tax incentives
- Investment grants
- Measures to ease the access to credit

4.4.1. Feed-in or net metering

In Tunisia, the law on energy management (L.2009-7) enables the companies producing renewable energy for self consumption in a net metering scheme to sell the exceeding part (up to a maximum of 30% of the total produced) to local public electricity company. The purchase price

³⁰ Rached Cherif, *Tunisie: Quel avenir énergétique pour la Tunisie ? La levée des subventions* (Le Courrier de l'Atlas, 22/11/2013) <http://www.lecourrierdelatlas.com/605922112013Quel-avenir-energetique-pour-la-Tunisie-1/2-Lancement-de-la-levée-des-subventions.html>, accessed on 07/07/2014.

³¹ World Bank, above n.27

is equal to the price set for to medium voltage 4 posts by the National Electricity and Gas Company, STEG (Société Nationale d'Electricité et de Gaz)

In Egypt, with the support of German Co-operation to development programme, a scheme of feed-in tariff has been developed. The rates will be revised every two to four years and it is foreseen a decrease equal to 2% per year of the same.

In Lebanon a PV net-metering scheme has been operating since 2011. The implementation of the feed-in policy in Lebanon is under consideration.

Finally, the law 462/2002 is the main electricity-related law. It restricts private generation and gives the EDL the monopoly of power generation.

4.4.2. *Tax incentives*

As already mentioned, in Tunisia, the VAT exemption and customs duty on imported equipment is a scheme implemented since many years.

A customs duty levy on imported energy equipment is also operational in Egypt.

At present, no tax incentives are available in Lebanon.

4.4.3. *Investment subsidies*

In Egypt, through the pilot programme EGYSOL funded by the Italian Ministry of Environment, a 25% subsidy were provided for collective solar thermal installations. The initial endowment of the fund was 0,5 M US\$.

In Lebanon, solar technologies can benefit of an upfront cost subsidy ranging between 5 and 15 % of investment costs (for projects financed through subsidized and non-subsidized loans respectively). The subsidy is channeled by Lebanese national bank (BDL) and is funded by a 12.2 MEUR grant from EU.

In Tunisia a number of direct financial incentives are available. The following table summarises them:

Table 4 – Direct financial incentives for REEE in Tunisia

Measures	
Solar and wind lighting and pumping in agricultural farms	40% capped at 20,000 TD
Electricity generation from biogas	40% capped at 100,000 TD
Electricity production by households from solar photovoltaic LC grid-connected	30% capped at 2300 TD/kWp capped at 15,000 DT/home
Individual solar water heater (SWH)	200 TD for solar water heaters of 1 to 3 m ³ surface sensor 400 DT for solar water heaters to 3 to 7 m ³ surface sensor
Tertiary solar water heater	Installation C2: less than 15 m ² sensors Subsidy of 30% of the SWH price capped at 150 DT per m ²
	Installation C2: more than 15 m ² sensors and less than 30

	<p>m2</p> <ul style="list-style-type: none"> - Subsidy of 30% of the CEs price capped at 150 TDD per m2 - 10% premium financed by the Italian co-operation (50 DT/m2) <p>Installation C3: more than 30 m2</p> <ul style="list-style-type: none"> - Subsidy of 30% of SHW price - 25% premium financed by Italian Ministry for the Environment, Land and Sea - Interest rate increase by 2% and 6 DT/m2 per year for 5 years maintenance - Capped at 300 DT/m2
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Source: ANME, MEDREC

4.4.4. *Soft Loans - Measures to ease the access to credit*

The measures to ease the access to credit is as follows:

- Bonus on interest rate
- Guarantee funds
- Ad-hoc credit lines

With reference to the bonus on interest rate, in Egypt the government has established an incentive in the form of interest rate reduction on loans to hoteliers to install collective SWH. The acting bank is the National Bank of Egypt while the resources are made available by Tourism Development Fund (50% of the total). There is no guarantee fund to support the access to credit or credit line.

In Tunisia with reference to the bonus on interest rates, a subsidy on loan's interest equal to 2% for collective SWH is available. In addition, it is operational a EU grant concerning a subsidy of 3% on interest rate for energy efficiency investments.

With reference to the guarantee funds, a fund for energy services companies is also available for energy management in industrial sector. The guarantee is up to 75% of loans for a max. amount of 4 MTD.

Dedicated credit lines are also available. In particular, an AFD credit line of 40 M US\$ managed by three private banks is made available for funding private investment projects in energy efficiency, moreover a World Bank facility of US\$ 55 M channelled through three private banks is operational to fund large private energy efficiency projects, mainly for cogeneration.

In Lebanon the National Energy Efficiency and Renewable Energy Action (NEEREA) is a national financing mechanism initiated by the Central Bank of Lebanon (BDL) in collaboration with the Ministry of Energy and Water, the Ministry of Finance, UNDP, the European Union (EU), and the LCEC. The NEEREA initiative was officially launched with the issuance of Circulars No. 236, 313,

318 and 346 by the Central Bank of Lebanon (BDL).

Through NEEREA private sector entities (individuals, SME's, or corporate bodies; residential, commercial, non-profit or industrial) can benefit from long term loans at around 0.6% interest rate to finance any type of EE and/or RE projects. The ceiling of the green loans is 20,000,000 USD. New projects can benefit from a repayment period up to 10 years, beginning after the end of the grace period ranging from 6 months to 4 years; however re-modeling existing projects can benefit from a repayment period of 10 years, including the grace period ranging only from 6 months to 2 years.

The current ceiling or coverage of NEEREA in 2014 is around 400 Million USD subsidized by the Lebanese Government through the Central Bank of Lebanon (BDL). In particular, commercial banks are provided by BDL with low interest liquidity up to 150% of the loan amount sanctioned under NEEREA loans.

The importance of NEEREA is in its sustainability, meaning that the envelope will be renewed yearly as long as NEEREA continues to be a success story. Accordingly, it is expected for NEEREA to continue for at least the coming 5 years. LCEC estimates that NEEREA loans per year will exceed 250 Million USD in 2014, and even more in 2015. On another front, the European Investment Bank (EIB) and the Agence Française de Développement (Afd) have approved a 90 Million Euros credit line to be added to the NEEREA mechanism for the following 3 years.

The results till February 2014 are the following: a total of 97 loan applications are presented to the commercial banks with a total of 126 million USD chosen which include different sectors with the residential and commercial respectively having the highest percentage (86%), industrial and NGOs the lowest (14%). The overall granted loan provided was \$ 126,333,891.43 USD.

Among the achievements of NEEREA mechanism, until the first half of 2014, we can notice:

- 52 Approved Photovoltaic projects of a total installed capacity 434.76 kWp count for an amount of 2,975,601.73 USD, contributed to an annual Energy, Cost and CO2 savings of: 1436 MWh, 456,812.2 USD, 1001.01 Tons; respectively.
- 15 LED lighting projects were financed by 1,520,616.95 USD; contributed to an annual Energy, Cost and CO2 savings of: 8,914 MWh, 1,021,534 USD, 5,554.75 Tons, respectively.
- Green building loans took the biggest part of the financing mechanism with a total budget of 92,278,550.17 USD distributed over 10 project.³²

4.4.5. Innovative financing mechanisms in target countries

In Egypt the funding mechanism EGY SOL was developed with the support of the Italian Co-operation and the MEDREP of the Italian Ministry of Environment, and had the goal to support the development of SWH market in the tertiary sector. The main features:

- 25% subsidy for collective installation of solar thermal systems and a decreasing subsidy of maintenance cost for 4 years.

³² Source LCEC, July 2014.

- Training of operators in order to ensure the quality of the service

It was a pilot programme with a little budget (500,000 US\$) to be scaled up by the Government with the resources of the Ministry of Tourism, with a particular focus on tourism sector. The programme is based on a combination of loans and direct financial incentives:

- A flexible credit system to facilitate access to SWH, with the support of National Bank of Egypt
- Financial support to design studies
- Financial support to operation costs and maintenance

In Lebanon, among its efforts in assisting the contracting and consulting companies regarding the preparation of technical proposals related to Energy Efficiency and Renewable Energy projects under the NEEREA financing mechanism, the LCEC has developed public templates reports dedicated for energy efficiency and/or renewable energy projects and to be used by potential beneficiaries in preparing their loan proposals. Furthermore, in order to facilitate the process and help design and contracting companies, LCEC published guidelines reports per type of technology for contractors regarding the design, installation, and evaluation of NEEREA-eligible technologies.

There are three template reports:

- The **GREEN** template dedicated for EE/RE solutions in existing facilities;
- The **YELLOW** template dedicated for EE/RE solutions in new facilities (non-certified);
- The **RED** template dedicated for certified approach for new facilities (LEED or equivalent).

And three LCEC Guidelines:

- Technical Proposals for Decentralized Solar Photovoltaic Systems (PV) Applications;
- Technical Proposals for Collective Solar Water Heating Systems (SWH) Applications;
- Technical Proposals for Light Emitting Diode Systems (LED) Applications.

Moreover, consumers that install PV roofs can offset the cost of power drawn from the utility (EDL) through Net Metering. The installation of a meter that records the bidirectional energy flow allows the excess power to be transmitted to the grid. The exported energy from the system is subtracted from the imported energy and only the net output is calculated and billed by the utility (EDL), while in case of production exceeding consumption, the surplus is credited to the next billing period, but not monetized.

The UNDP/UNEP/GEF Global Solar Water Heating Market Transformation and Strengthening Initiative has been providing the Lebanese Ministry of Energy and Water (MEW) with the technical assistance to accelerate the market development of solar water heating in Lebanon with an objective to facilitate the installation of 190,000 m² of new installed collector area over the duration of the project (2009-2014), an annual sale of 50,000 m² reached by the end of the project and with expected continuing growth to reach the set target of 1,050,000 m² of total installed SWH capacity by 2020.

UNDP-CEDRO project, funded by the Lebanon Recovery Fund by means of a donation from Spain, has been established with an aim to complement "the national power sector reform strategy" and to support the greening of Lebanon's recovery" reconstruction" and reform activities. Its objective is to install approximately 120 energy efficiency and renewable energy applications in public facilities throughout the country, ensure technology transfer, encourage the private sector to invest in various renewable energy sources, and ultimately create an enabling environment to adopt a national sustainable energy policy. CEDRO has been active since 2007.

UNDP project Small Decentralized Renewable Energy Power Generation (GEF Grant), launched in early 2014, aims to combine technical assistance for creating an enabling policy environment and sustainable renewable energy services with support for developing and expanding the use of the financing mechanisms for the promotion of small, decentralized RE applications.

Tunisia plans to reach 10% of energy from RE sources by 2016. Until today, about 250 MW out of the announced target, 485 MW, have been installed. However, Tunisia has registered a significant progress in comparison to other economies of the area.

In particular, the set of support mechanisms available in Tunisia are the following: net metering, capital subsidies and grants, investment tax credit, reduction in sales tax or VAT, customs duty, taxes. The Country does not have FITs mechanisms but the number of other incentives is particularly significant.

In addition, Tunisia, the system of incentives involves also international programmes such as the Tunisian Solar Plan (a PPP programme, planned from 2011 to 2016) and the Mediterranean Solar Plan set up by the Union for Mediterranean (see the case study in the following section.)

Tunisia has developed a number of financing mechanisms for renewable energy. Among the others:

PROSOL mechanisms for the development of solar water heaters in the residential and tertiary sectors: In Tunisia the above mentioned mechanism has proved to be the best solution for the removal of the financial and technical barriers against the development of SWH market. With reference to the residential sector, the programme was launched in 2005 and had the objective to achieve 1 M m² by 2015, by creating the conditions for the development of ESCs in the Country. The main features were the following: a public subsidy of 200 TD for 1 to 3 m² sensor SWH and 400 TD for 3 to 7 m² sensors SWH to lower the price of SWH acquisition; granting the consumer a loan repayable over 5 years through the STEG bill. In addition, a number of measures were developed to support the main scheme i.e. tax incentives on SWH import and manufacturing, training of operators and quality control of services and equipment. The results are as follows: about 100,000 m² per year (during the maturity years of the initiatives) and about 570,000 tons of CO₂ equivalent saved over the period 2007-2011. In addition, the programme has had an industrial effect estimated in 50 suppliers and 6 local manufacturers, lower price of SWH due to the competition and the economies of scale, job creation related to the installation of equipment.

With reference to the tertiary sector, the mechanism foresees the provision of 30% subsidy of SWH price capped at 150 TD per m² of sensors on every SWH purchase, a premium on installation

according to the size

PROSOL-Elec mechanism for the development of grid-connected PV installations: The mechanism is structured as follows:

- A grant from National Fund for Energy Conservation (FNME) up to 30% of the investment cost of photovoltaic system. The grants started from 3000 TND per kWp in 2010 and were progressively reduced according to the decrease of prices, still retaining a cap of 15,000 TND grant for each the photovoltaic system
- An additional premium of 10% of investment cost has been paid by the Italian Ministry of Environment through the Renewable Energy Centre MEDiterranean (MEDREC) for the first 1000 solar roofs, in order to boost the deployment of the market in its early stage.
- A soft loan payable on the STEG bill, issued by net metering principle and at a rate established by Minister of Energy.

5. Access to credit in Lebanon, Tunisia and Egypt

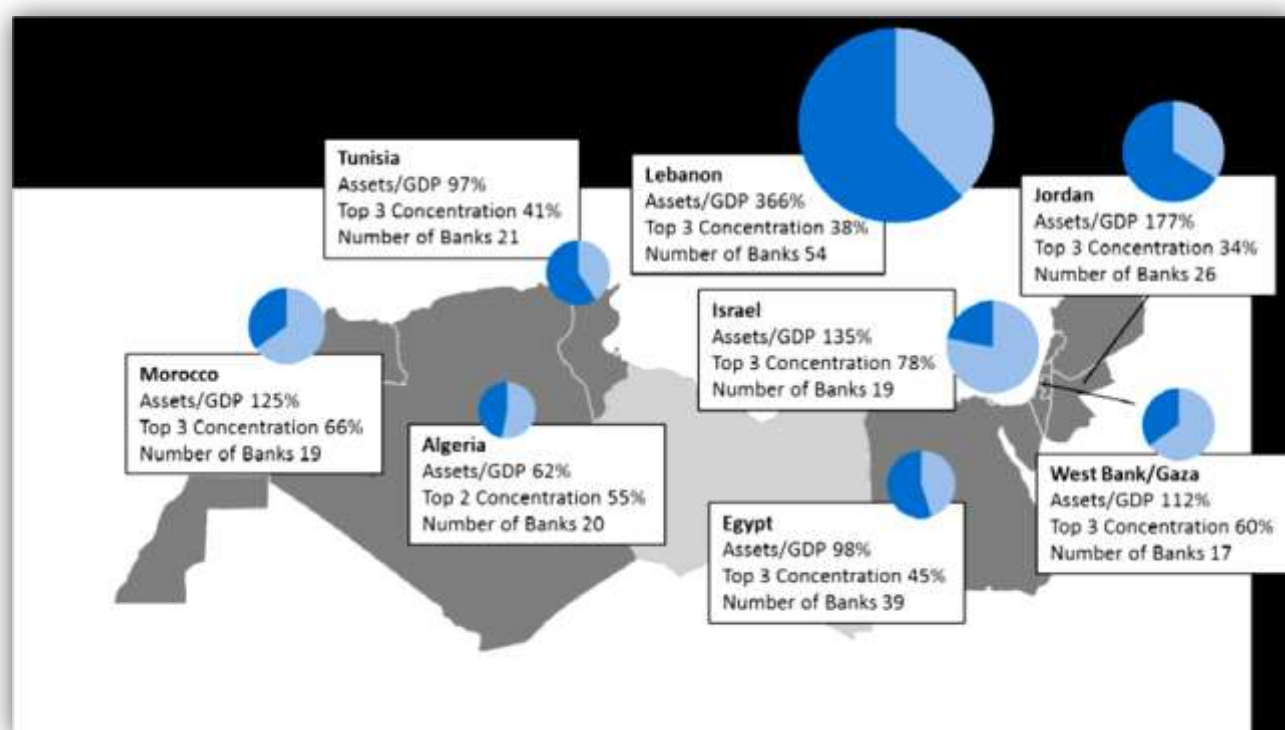
5.1. An overview on banking sector in target countries

According to the banking reports (see, for instance, EIB report on Mediterranean Banking System. Reference is made at the end of this paper) the debt market in Mediterranean countries is not particularly vibrant. The private sector is dependent on the banking sector for financing also because the banking sector in the above mentioned countries is particularly large. For instance, on average, the banks' assets amount to some 130% of GDP – more or less the same level as in Europe.

Lebanon, traditionally endowed with a strong and developed banking system shows a relevant concentration of assets (its assets amount to some 300% of national GDP.), confirming its role of financial centre of the Region. Tunisia, on the other hand, shows a concentration of assets around 38% of GDP.

The main banking sector characteristics are depicted in the following graph

Figure 4: Main Banking Sector Characteristics in MPCs

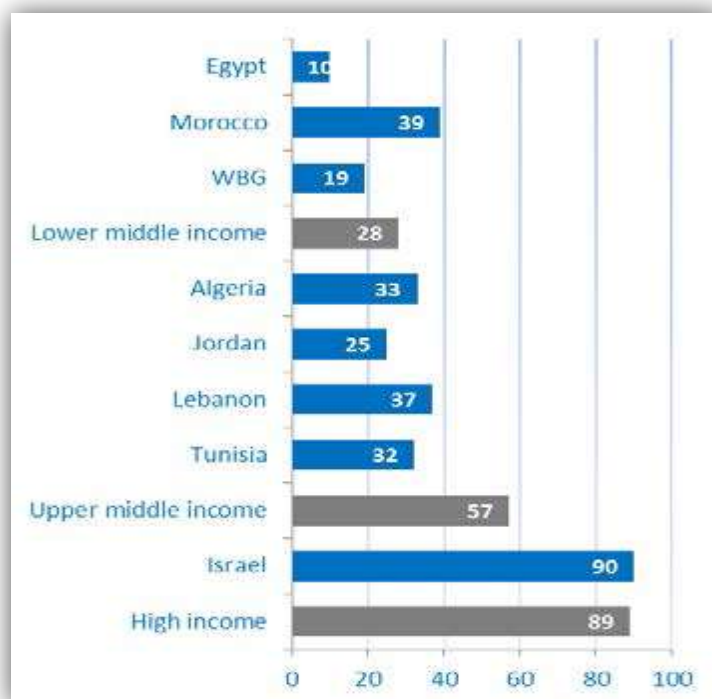


Source: National Central Banks, IMF, ECON elaborated by EIB, Banking in the Mediterranean

Note: Latest available data. The size of the circle indicates the size of the banking sector in terms of GDP. Light blue colour in circles indicates Top 3 asset concentration. Algeria: Top 2 asset concentration.

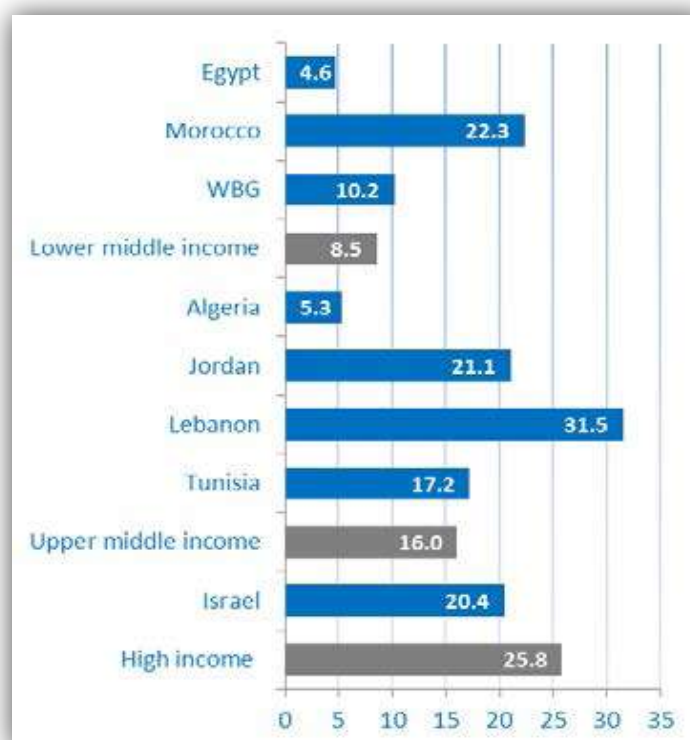
While the asset-to-GDO ratios are high, financial inclusion is still improvable. Countries such as Egypt, for instance, show a percentage of adult with an account in formal financial institutions near 10% and a subsequent low number of bank branches all over the country i.e. some 4,6 per 100,000 inhabitants. In comparison to the data concerning other countries of the Area (not to mention the high income countries) or the average of lower (28%) or upper middle income (57%), the difference is considerable. Lebanon and Tunisia account respectively for 37% and 32%, respectively, of adult with an accounts in formal financial institutions and 31,5 and 21,1 bank branches per 100,000 inhabitants respectively.

Figure 5: Percentage of Adults with an Account in a Formal Financial Institution



Source: World Bank Global Index Database

Figure 6: Number of Bank Branches per 100,000 Adults (2011)



Source: World Bank WDI

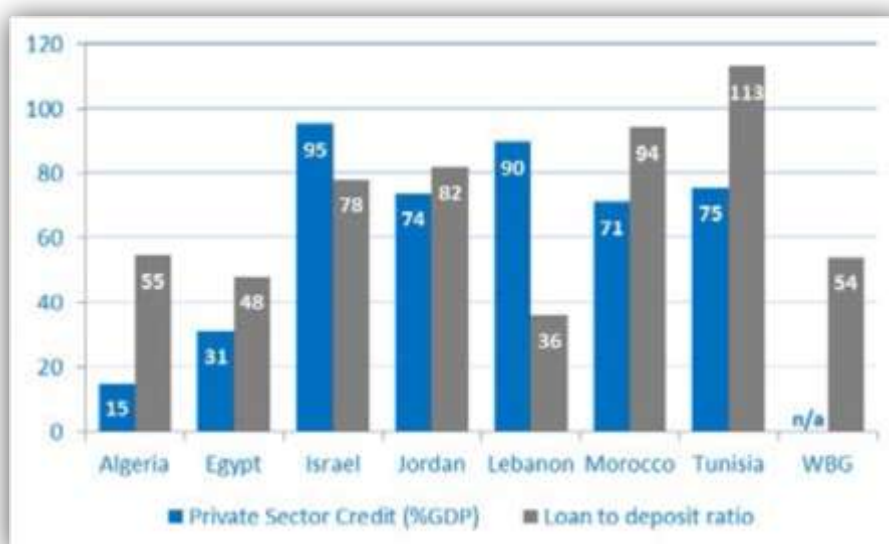
Note: Egypt 2010 data

The data concerning the private sector credit to GDP and Loan to Deposit ratios underlines the weak level of banking intermediation in the above mentioned Area.

In Egypt the private sector credit as a percentage of GDP amounts to some 31% and the loan to deposit ratio to 48%; in Lebanon 90% and 36 respectively; and in Tunisia 75% and 118.

On average, the loan to deposit ratio is high while the private sector credit to GDP is low i.e. the area is affected by liquidity problems in banking system.

Figure 7: Private-Sector-Credit-to-GDP and Loan to-Deposit Ratios



Source: World Bank, National Central Banks

SMEs are particularly affected by this state of affairs also because due to the high transactions costs associated to SMEs lending, banks often prefer to buy government debt. In addition, the demanding collateral requirements hamper the access to credit of SMEs.

In the framework of a severe international financial and economic crisis, the Arab Spring impacted heavily on the economies of the countries of the Area, with a significant impact on the banking systems too. In Tunisia and Egypt the effects of the Arab Spring was magnified by the closure of some banks for a period of time; in Lebanon the risk exposure increased with the Syrian crisis, due to the large financial exposure of the Lebanese banking system toward Syria business environment. By and large, Non-Performing Assets are increasing and some restructuring will probably be required.

The Central Authorities have immediately reacted to the difficulty of the situation. For instance, in Lebanon the Central Bank urged the banks to take appropriate measures to mitigate the risk exposure with Syria and to perform regular stress tests. In Tunisia the Central Bank increased the liquidity injection. In addition the authorities increased provisioning measures as well as changed the classification of doubtful loans.

However, with reference to the above mentioned data, the countries of the Area face an important challenge in terms of improving the access to finance.

5.2. Lebanon

The Lebanese banking system consists of 54 commercial banks. The banking system is one of the most important driver of economic growth and stability of the country. Their assets amount to some 366% of GDP and many of them have branches in the countries of the area. However, the regional crisis has recently stopped the expansion of the Lebanese banking system in the region. In addition the high exposure to Syria is a potential source of problems and economic instability.

The competition of the sector is high as well as the penetration of banking service, close to the level of high income countries. However, it should be underlined that the banking system is well rooted in the main cities and in the coastal area while the rural area still face some difficulty in accessing the credit market.

The main funding source are deposits, which amount to 87% of banks total liabilities and almost 20% of them are hold by non-resident Lebanese. In addition, the system is characterised by a short term maturity structure: about 70% of deposits have a maturity less than 30 days. Therefore the funding practices of banks expose them to a significant maturity mismatch in their balance sheets.

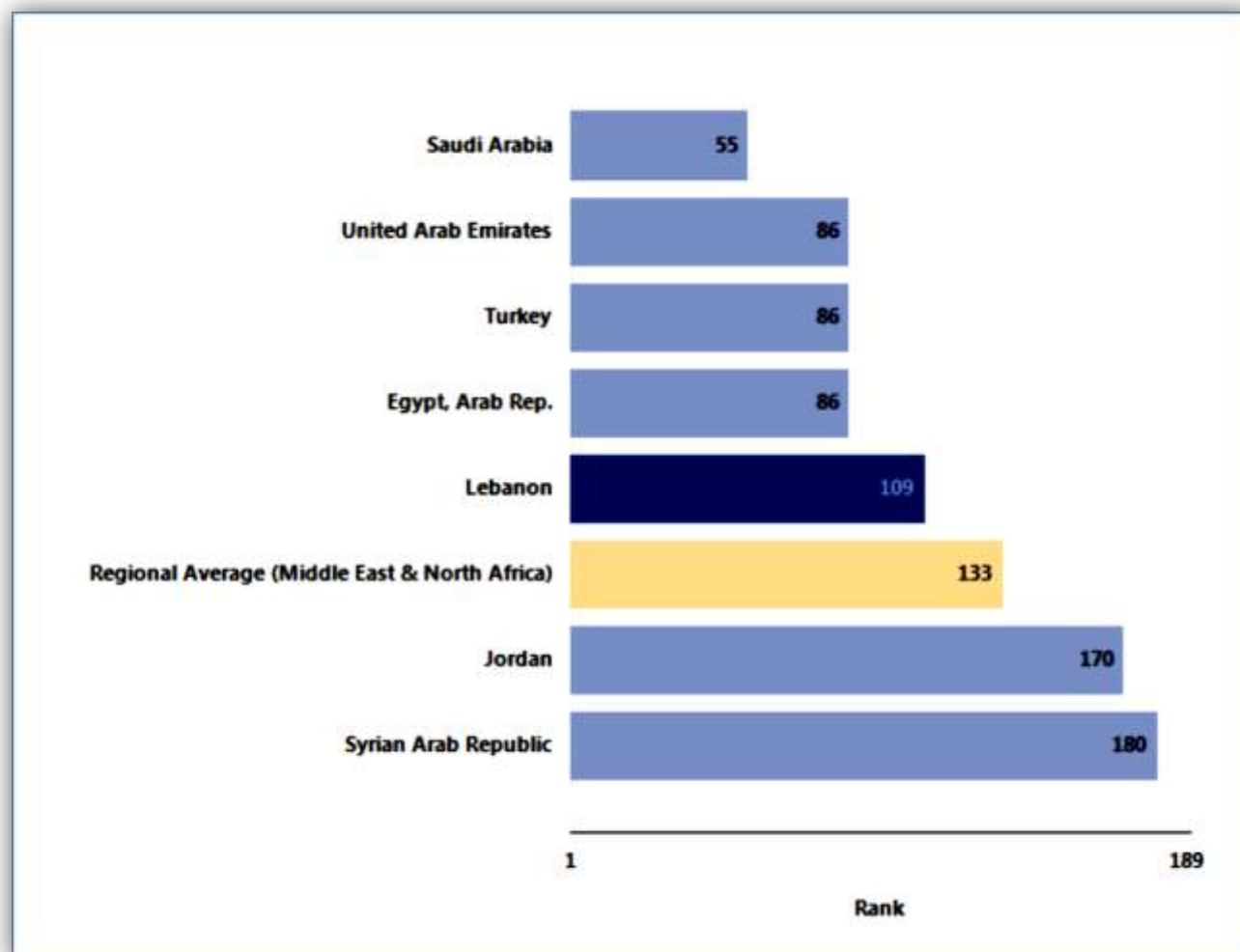
Lending to private sector is low while the exposure of bank to the government debt is high. The lending practices are very conservative and lending activities are addressed mainly to well-known customers.

The banking system is adequately capitalised and NPL have declines to a mere of 3,5% from gross loans in 2012. However, the slowing economy led to a decline in profitability, with returns on average equity dropping from 17.8% in 2010 to 12.5% in 2012. The real vulnerability factor affecting the banking system at present is the political risk

As far as the access to credit of private sector companies is concerned, reference is made to the methodology developed by IFC while preparing the series 'Doing Business'. In particular, the two variables examined in order to define a framework that can facilitate the access to credit are the existence of credit information system and collateral and bankrupt laws.

In the case of Lebanon, the country receives a score of 5 (out of 6) on depth of credit information and a score of 3 (out of 10) on the strength of legal right index. In this context, Lebanon stands at 109 in the ranking concerning the easiness of getting credit (out of 189 economies examined). The comparison with other economies and regional average ranking provides information about the performance of the country in terms of support to lending and borrowing:

Figure 8: How Lebanon and comparator economies rank on the ease of getting credit



However, it should be underlined that the situation has improved considerably over the years. In the following table, the time series are shown:

Table 5: Time series of indicators of access to credit in Lebanon

Indicators	2009	2010	2011	2012	2013	2014
Indicator rank	105	109
Strength of legal right index (0-10)	3	3	3	3	3	3
Depth of credit information index (0-6)	5	5	5	5	5	5
Public registry coverage (% of adults)	6.8	8.3	8.7	16.6	18.6	19.2
Private bureau coverage (% of adults)	0.0	0.0	0.0	0.0	0.0	0.0

Source: Doing Business, Lebanon, IFC

The table helps to understand where the improvements have been registered as well as identifies the areas where the potential for intervention is bigger.

The comparison with the regional average and the OECD countries average is shown in the following table:

Table 6: Access to credit indicators in Lebanon - Comparison with the regional average and the OECD countries

Summary of scoring for the access to credit indicators in Lebanon	LEBANON	MIDDLE EAST AND NORTH AFRICA AVERAGE	OECD HIGH INCOME AVERAGE
<i>Strength of legal rights index (0-10)</i>	3	3	7
<i>Depth of credit information index (0-6)</i>	5	4	5
<i>Public registry coverage (% of adults)</i>	19.2	11.9	42.9
<i>Private bureau coverage (% of adults)</i>	0.0	28.4	73.9

Source: Doing Business, Lebanon, IFC

The bank loan represents a modest source of real financing to SMEs. Only a limited number of companies have access to this financing mean against mortgages and guarantees required by the Lebanese financial institutions. Bank loans are always conceived for short run. In extreme cases, bank loans take the form of medium term credit particularly when they are renewed. The renewal of short-term loan (overdraft) represents also a common practice within the Lebanese commercial banks.

5.3. Egypt

The banking system consists of 39 Banks (end of financial year 2011/2012), 5 of which are state owned banks, 27 private banks and 7 private and joint venture banks.

The 5 State Owned Banks accounted to 40% of deposits.

The structure of financial sector has significantly changed after the revolution. In particular the excess of liquidity has been now absorbed by the public debt. The Central Bank has intervened a number of times in order to ensure a sufficient supply of liquidity to the inter-bank market. In addition, there is an increasing gap in terms of foreign exchange and this may turn to squeeze the lending activities in favour of private sector. However, despite the macroeconomic poor performance, the banking system has not been destabilised even in front of the increase of the sovereign risk.

The demand of private sector has declined since the beginning of 2011 as the economy slowed down and as a consequence of the increased demand of the public sector has increased. The confidence in banking sector remains good even though the ratio loan to deposit fell below 50%. This gives an indication of the constraints faced by the banking sector and the reduced opportunities to expand their lending activities to private sector.

Egypt stands at rank 86th out of 189 economies, according to IFC (year 2014). In 2013, the rank was 82 i.e. there has been an improvement of the general conditions associated to the lending and borrowing, while the overall ranking of the Country, as reported by Doing Business 2014, is in the position 128 (while the previous year, the rank was standing at 127, with a change in the rank equal to -1).

The comparison with the regional average and the OECD countries average is shown in the following table:

Table 7: Access to credit indicators in Egypt - Comparison with the regional average and the OECD countries

Summary of scoring for the access to credit indicators in Egypt	EGYPT	MIDDLE EAST AND NORTH AFRICA AVERAGE	OECD HIGH INCOME AVERAGE
<i>Strength of legal rights index (0-10)</i>	3	3	7
<i>Depth of credit information index (0-6)</i>	6	4	5
<i>Public registry coverage (% of adults)</i>	5.3	11.9	42.9
<i>Private bureau coverage (% of adults)</i>	19.6	28.4	73.9

Source: Doing Business, IFC

5.3.1. Domestic credit to private sector

Credit to the private sector was around 40-42% of GDP in the first half of 2010. This level is below the average of OECD countries (110%) but it is in line with the performance of many countries at the same stage of development. However, the deposits available are some 100% of GDP but are not transformed into loans to the productive sectors. The loan-to-deposit-ratio in 2010, for instance, was about 52%. At the same time, the percentage of credit lent to the private sector is declining over the years. While before the financial crisis (mid-2008) the loans to private business were around 50%, afterwards the ratio declined to some 40-42% (year 2010). During the same period, loans to public sector increased significantly.

According to World Bank observers, the increase in lending to the government tends to reflect banks difficulty in identifying profitable projects and their cautious investment policies. The lending practice is conservative, the regulations are quite inconsistent and this impacts heavily on private sector apart from diverting the banking system capacities to fund the public deficit. Another reason is that, historically, the government funds the budget deficit via domestic borrowing. Currently, some 80% of the government debt is held of domestic banks and this situation crowds out the private sector.

Second, as regards to the distribution of private sector loans, a closer look reveals that the private sector is not only generally underserved, but that it also suffers from an extremely skewed loan distribution. According to Central Bank figures (excluding loans below EGP 30,000, USD 5 360), 0.2% of lending clients in Egypt represent half of total loan value for commercial banks. Even after including loans below the reporting threshold at the Central Bank, average loan size probably exceeds EGP 150,000, which translates into a de facto dichotomy between the corporate sector with large loans and SMEs suffering from credit rationing. Large corporate loans represent up to 70% of total loans for banks, which limits diversification and raises risks. Similarly, banks tend to lend more to traditional sectors, where relations, collateral and repayment patterns are well-established, which slows down the shifting of resources to new economic sectors and the emergence of dynamic enterprises.

The main problems identified with regard to loan appraisals, and credit policies more generally have to do with staffing and training issues as well as internal procedures and screening rules.

Relationship-based lending and poor internal standards, as well as lacking credit risk evaluation skills and shortcomings in remuneration or incentives policies lead to the previously outlined loan concentration and credit rationing for small business and households.

In sum, the Egyptian banking systems appears to exhibit an almost systematic bias against financing the private sector and more particularly new and small businesses. This arises in no small part from the fact that the budget deficit tends to be financed through domestic banks, which crowds out lending to the private sector. The resulting credit rationing for most entrepreneurs and potential borrowers indicates a BCDS Score no higher than 3.

Improving access to finance for MSMEs is one of the key reform challenges in the financial sector. Loans to SMEs account for only 6 per cent of total banking loans. Poorly developed credit bureaus and weak contract enforcement are among the key obstacles to the further development of MSME finance. Constraints to lending to MSMEs appear more related to the institutional capacity and risk appetite of the private banking sector, as well as low bankability and low financial literacy of MSMEs, rather than liquidity. In addition, banks are highly selective in their lending practices, and mid-sized and smaller companies find it difficult to get funding from the banking sector, whereas the financing needs of larger corporates are generally adequately met.

5.4. Tunisia

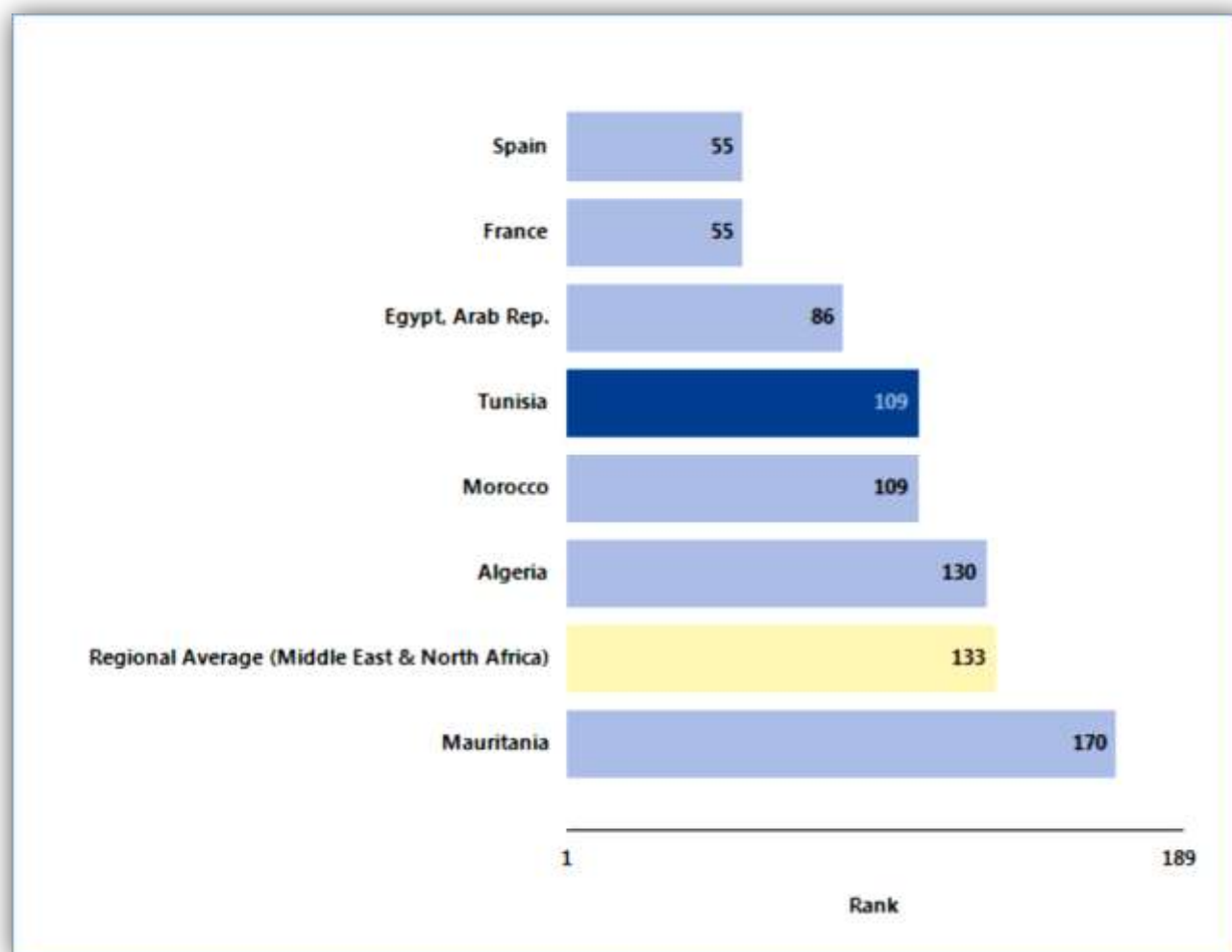
The Tunisian banking system is one of the smallest in the Area. The banking system experienced some problem before the Arab Spring and the political transformation and its subsequent economic difficulties have accentuated its vulnerability. One of the main chronic problems is the bank exposure to the tourism sector (an exposure initiated years before the inception of Arab Spring), currently in a structural profitability decline. The banking system accounts some 21 commercial banks. Three of them are state owned banks and control approx. 38% of totals assets. The biggest banks source are deposits which grew until 2011 and declined since then but still leaving a sufficient intermediation capacity to the system. The main factor hampering the lending services is the regulation on lending rates. The cap imposed by the Central Bank prevents the banks to price higher risk profiles. Therefore some high risk counterparts such as SMEs have difficulties in accessing finance. Lending is therefore restricted to big corporate clients.

After the revolution banks appear undercapitalised and liquidity situation has deteriorated (some 8% returns on equity and returns on asset at 0.7%). The NPL remain stable thanks to the measures adopted by the central authorities. In particular the Central Bank introduced a moratorium on reclassification requirements for loans with late repayment. This prevented the banks from placing these loans on the category on non-performing loans even if the repayment fell behind by more than 3 months. This caused, among the others, an NPL ratio artificially low and diminished the ability of banks to utilise non-reclassified loans as collateral to obtain Central Bank liquidity injections.

In the case of Tunisia, the Country receives a score of 5 (out of 6) on depth of credit information and a score of 3 (out of 10) on the strength of legal right index. In this context, Tunisia stands at 109 in the ranking concerning the easiness of getting credit (out of 189 economies examined). The

comparison with other economies and regional average ranking provides information about the performance of the country in terms of support to lending and borrowing:

Figure 9: How Tunisia and comparator economies rank on the ease of getting credit



The comparison with the regional average and the OECD countries average is shown in the following table:

Table 8: Access to credit indicators in Tunisia - Comparison with the regional average and the OECD countries

<i>Summary of scoring for the access to credit indicators in Tunisia</i>	TUNISIA	MIDDLE EAST AND NORTH AFRICA AVERAGE	OECD HIGH INCOME AVERAGE
<i>Strength of legal rights index (0-10)</i>	3	3	7
<i>Depth of credit information index (0-6)</i>	5	4	5
<i>Public registry coverage (% of adults)</i>	28.8	11.9	42.9
<i>Private bureau coverage (% of adults)</i>	0.0	28.4	73.9

Source: Doing Business, IFC

5.4.1. Access to finance

The financial sector in Tunisia has a number of structural deficiencies, particularly in MSME lending, private equity, and local market development. The banking sector, especially the state-owned banks, has been plagued in recent years by high NPLs and balance sheet weakness, due to directed lending to connected business under the previous regime and overexposure to a few sectors. This has crowded out lending to other sectors, especially to SMEs, which suffer from a lack of access to finance. The Tunisian stock exchange has low market capitalization and is dominated by financial institutions. Tunisia's sovereign rating was recently downgraded by S&P from BBB- to BB, with a stable outlook and is on negative watch by Moody's at Baa3.

The economy's access to credit by the banking system continues to be constrained due to structural impediments in the sector. Three of the four largest banks, which together hold around a third of banking assets, are state-owned. Although banking penetration is in line with peers with 13 branches per 100,000 inhabitants, a significant fraction of the low income population does not have bank accounts. Most lending and funding is in local currency.

However, lending decisions are made on the basis of the presence of collateral as well as on trust, which makes access to credit difficult for entrepreneurs lacking such collateral or relationships. Credit to the private sector grew by around 14 per cent y-o-y at end-2011, down from 19 per cent at end-2010.

Solvency and liquidity are becoming important issues for the system. Banks have a loan to deposit ratio of around 135 per cent, well above the countries of operation of EBRD, which range around 80-90 per cent. This partly stems from low deposits, which remain at less than 55 per cent of GDP. NPLs are also on the rise, expected to reach around 16 per cent in 2011 from 13.2 per cent in 2010. This is partly due to bad quality of loans disbursed by the state-owned banks under the previous regime, overexposure to cyclically vulnerable sectors (tourism accounts for 20 per cent of all bad loans), and weak balance sheets.

Access to financing remains a significant challenge for MSMEs, with bank lending to the sector at around 15 per cent of total lending. In the corporate sector, access to bank loans is heavily dependent on the presentation of personal guarantees or collateral, even when the cash flow analysis is satisfactory. SMEs therefore typically rely on self-financing or informal financing, as they are unable to fulfil these requirements.

The current institutional framework also hampers access to credit. The existing credit registry suffers from information gaps in the updating and clarity of information as well as with regards to the accounting of small loans. A unified collateral registry does not exist, and contract

enforcement remains costly and lengthy. On the borrower side, most entrepreneurs do not have a good understanding of financial products offered by banks and other lending organizations.

6. Final remarks

A one-size-fits-all investment incentive does not exist. It depends on the government objectives and its capacity, from the budget constraints, from the state of development of diffusion of renewable energy technologies as well as from the business environment.

However, some measures are more appropriate than others, especially for the private sector. In particular, researchers and practitioners agree ³³ that in the MENA region the cash-flow incentives (i.e. incentives offering high tariffs for the whole duration of the project) have proven to be particularly attractive for investors.

The cash-flow incentives should be developed along with a strong system of guarantees by the governments. In addition, a mechanism of soft loans, loan guarantees or tariff formulated in foreign currency may concur to create an appropriate regulatory and incentive mechanism.

The schemes should be tailored in order to support the local economic system, by encouraging local R&D, the local labor and local manufacturing.

The schemes should be monitored regularly and modified if any major constraint is detected. In addition, the role of technical assistance is crucial to the private players for the development of projects as well as the building of capacity of all the actors involved both public and private.

Moreover, less mature and high cost technologies (such as Solar CSP) should benefit of low risk incentives such as capital cost incentives, FITs or tenders. In addition, some specific schemes to support the R&D should be designed.

Once the technology is mature and can be deployed on a larger scale, the systems of subsidies should be phased out and leave the new technology to compete with other technologies at the same level. In other words, the incentives schemes should be limited to a fixed span of time with the only exception of the delivery of a public service to people who cannot afford the full price of electricity and gas.

³³ See, for instance Pedrosa-Garcia, J.A. 'Access to Finance by Small and Medium Enterprises in the Arab Region: Policy Considerations', Economic and Social Commission for Western Asia, 2013; Frewer G., Bets F., Stolting S. 'Banking in the Mediterranean. Financing Needs and Opportunities in Turbulent Times', July 2013; Kathy Hurley, Michael Louis, David Solan (2010), 'Energy efficiency financing mechanisms', The Energy Policy Institute, May 2010; UNEP (2011), 'Evaluating Clean Energy Public Finance Mechanisms'; UNEP (2009) 'Private Financing of Renewable Energy - A Guide for Policymakers'; IRENA (2012), 'Financial Mechanisms and Investment Frameworks for Renewables in Developing Countries'; Natalia Kulichenko Jens Wirth (2011), 'Regulatory and Financial Incentives for Scaling Up Concentrating Solar Power in Developing Countries', Discussion Paper n. 24.

7. Case studies from European Partner Countries

7.1. Case Study 1 - The Andalusian Energy Agency – An integrated approach to energy savings

The strategy of the AEA has been articulated according to two thematic areas: subsidies and energy planning.

Energy subsidies:

- **CITIZENS:**

The Regional Ministry of Economy, Innovation, Science and Employment of the Andalusian Government promotes energy saving and the use of renewable energy in Andalusian homes, through the Andalusian Energy Agency. Since 2009 more than 54 million euros have been assigned in subsidies under the Programme for the Sustainable Energy Development of Andalusia, "Andalucía A+".

The "Andalucía A+" subsidy programme is co-financed by own funds of the Andalusian Regional Government and by ERDF European Regional Development Fund.

As of today, the Andalusian Energy Agency supported more than 36,000 initiatives in the field of energy saving and efficiency. Through their website www.agenciaandaluzadelaenergia.es they provide the necessary information and tools to accede our subsidies, which could be used for:

- Energy saving at home
- Using energy efficient vehicles
- Energy saving or using renewable energy in neighborhoods communities
- Using renewable energy at home

The deadline for applications is open until 30th December 2014.

- **ENTERPRISES:**

The "Andalucía A+" subsidy programme is co-financed by own funds of the Andalusian Regional Government and by ERDF European Regional Development Fund.

The commitment of the Regional Ministry of Economy, Innovation, Science and Employment of the Andalusian Government to promote energy saving and the use of renewable energy in enterprises located in Andalusia has led the Andalusian Energy

Agency, since 2009, to dedicate more than 63 million euros in subsidies, through the “Andalucía A+” Programme, supporting more than 4,500 projects.

Subsidies can be requested for the following:

- To conduct audits to identify opportunities for energy improvement and invest in the best options for energy efficiency and the use of renewable energy.
- Industrial activity centres, where the realisation of energy audits for the optimisation of the processes is subsidised, as well as the realisation of the investments, among other actions.
- Energy improvement of existing buildings, with actions such as conducting quality energy audits or investments in efficient technologies of lighting, air conditioning, etc.
- Energy improvement in transport, through the renewal of fleets with the incorporation of energy efficient vehicles, using technology that allows fleet management or through mobility measures of the workers themselves.
- Projects of treatment, production and logistics of biomass.

The “Andalucía A+” subsidy programme also promotes investments by energy service companies, using the model of energy service contracts for carrying out projects of energy saving and use of renewable energy, both in the public and private fields, with investment subsidies for energy improvement.

Likewise, the Andalusian Regional Government grants ordinary loans, participative loans and issues guarantees, in market conditions and on a refundable basis, through the Fund for the stimulation of renewable energy and energy efficiency.

The deadline for applications is open until 30th December 2014.

- **PUBLIC ENTITIES**

The “Andalucía A+” subsidy programme is co-financed by own funds of the Andalusian Regional Government and by ERDF European Regional Development Fund.

The Andalusian Energy Agency subsidises projects that are carried out in Andalusia by public entities, in the following areas:

- Central Government.
- Local Government.
- Consortia mostly made up of the above-mentioned administrations and the public entities dependent on them.

The website www.agenciaandaluzadelaenergia.es contains detailed information on the subsidies through which the Andalusian Energy Agency collaborates with the

administrations listed to invest in the best options for energy saving and the use of renewable energy, either directly or through energy service companies.

Subsidies can be requested for the following:

- Energy audits: realising energy optimisation plans to detect possible actions to be undertaken in public buildings or lighting systems.
- Investment in facilities: implementing energy improvement actions in facilities.
- Transport and mobility: improving urban mobility, optimising the public vehicle fleet, replacing vehicles with other more efficient ones, among other measures.
- Dissemination actions: carrying out awareness campaigns to disseminate energy saving and efficiency among Andalusian citizens.

The Andalusian Energy Agency is the managing entity of the Energy Management Network of the Andalusian Regional Government -REDEJA, having the necessary infrastructures, measures and services for the energy management of the consumption centres of the Andalusian Regional Government and Agencies, foreseen under Law 9/2007, of the Andalusian Regional Government.

ENERGY PLANNING:

Energy planning reflects the strategy lines which mark the path to achieve the energy supply of the region in terms of safety, quality and environmental respect.

Andalusia counts on the **Andalusian Sustainable Energy Plan - Plan Andaluz de Sostenibilidad Energética 2007-2013 (PASENER)**. The plan seeks to approach a new energy model that responds to energy supply needs in the context of a sustainable development for our region. It includes aspects that will be key in this process: mainstreaming of energy policy, demand management and distribution of energy, priority use of renewable sources and innovation. The plan penetrates into the path of the **Andalusian Energy Plan - Plan Energético de Andalucía 2003-2006 (PLEAN)** and other previous works on energy planning.

The Andalusian energy planning and the action lines that result from it, depend, in turn, on the policies in the energy field that are developed at European and national level, establishing its reference framework.

On the other hand, **Law 2/2007 for the Promotion of Renewable Energies and Energy Saving and Efficiency in Andalusia** and its regulatory development, contributes to fulfilling, within its legislative framework, the objectives of the PASENER. This Law is defined as an instrument to promote the use of renewable energy, energy saving and efficiency, from its production to its consumption, as well as the rational use of energy

resources in the territory of the Autonomous Community of Andalusia, under the principle of collective solidarity in energy use.

Support Schemes:

1. ENERGY SAVING AT HOME

Eligible technologies

- Renovation of windows by others that reduce the energy demand of the house (*)
- Renovation of HVAC systems and air conditioning units by others of maximum energy efficiency.
- Incorporation of renewable energy installations (solar and biomass)
- Acquisition of vehicles of maximum energy efficiency (hybrid, electric, etc.).
- Renewal of white range domestic appliances by others of maximum energy efficiency (*)

(*) this line is currently not open; however, it is expected that a new line is to be opened in the next weeks.

The target group /sector is the residential one.

Financial support is offered through non-refundable grants. The innovative character of this financing system is found in:

- Subsidies are applied as a **discount** at the time of the purchase or acquisition of the item of system. All the administrative steps of the subsidy are carried out by the collaborating partner companies so that the citizen does not have to realise any further steps.
- The programme is developed with the participation of installer companies ("**collaborating partner companies**") which facilitates the process for final users to opt for subsidies. Most of the collaborating partner companies are SMEs, which contributes to generating economic activity in the weaker business environment. In total there are more than 2,000 collaborating partner companies throughout Andalusia.

Results of ENERGY SAVING AT HOME, from 2011 to 2013: in total, 333,695 citizens have received subsidies, with a total investment of 300.1 million euros and subsidies of 71.9 million euros. The energy saving achieved amounts to 14,180 toe/year and the contribution of renewable energy to 13,696 toe/year. The reduction of CO₂ emissions has been 70,016 tons/year.

The results have shown a leverage effect of the financing for subsidies valued at 5.4 (this is, that the induced investment associated to the projects supported, was 5.4 times higher than the public funds used). Equally important, it is necessary to indicate that the cost benefit rate of the projects supported, reached the value of 16 (that is, the total benefits expected will be 16 times higher than the funds used).

2. SUSTAINABLE SMEs

Eligible technologies

- Renewal of lighting systems for other more efficient systems.
- Renovation of HVAC systems for other of maximum energy efficiency.
- Incorporation of renewable energy installations (solar and biomass)
- Acquisition of vehicles of maximum energy efficiency (hybrid, electric, etc.).

It is expected that new lines are to be opened in the next weeks (renovation of fans, pumps, etc.).

Target group/sector : Enterprises (Industrial, tertiary, etc.)

Financial support is offered through non-refundable grants. The innovative character of this financial support is found in:

- Subsidies are applied as a **discount** at the time of the purchase or acquisition of the item of system. All the administrative steps of the subsidy are carried out by the collaborating partner companies so that the citizen does not have to realise any further steps.
- The programme is developed with the participation of installer companies ("**collaborating partner companies**") which facilitates the process for final users to opt for subsidies. Most of the collaborating partner companies are SMEs, which contributes to generating economic activity in the weaker business environment. In total there are more than 2,000 collaborating

partner companies throughout Andalusia.

Procedures

SUSTAINABLE SMEs is an innovative initiative, integrating energy saving and efficiency and renewable energy actions in one single simplified programme, in which participation of the collaborating partner companies is key to ensuring an agile and efficient management of the funds.

The steps to be followed to obtain a subvention under this programme are the following:

1. The SME goes to a collaborating partner company and requests an offer of services
2. The collaborating partner company checks online the availability of funding
3. In case there is funding, the collaborating partner confirms it to the SMEs and manages the grant in its name, at no additional cost.
4. A discount equal to the Grant will be applied automatically on the purchase price for the service
5. The collaborating partner company will install the new equipment and withdraw the substituted systems for its correct environmental treatment.
6. Once the services have been completed, the Andalusian Energy Agency pays to the collaborating partner company the discount applied to the SME.

Results of **SUSTAINABLE SMEs**, from 2011 to 2013: in total, 2,367 SMEs have received subsidies, with a total investment of 26.6 million euros and subsidies of 4.6 million euros. The energy saving achieved amounts to 3,043 toe/year and the contribution of renewable energy to 1.710 toe/year. The reduction of CO2 emissions has been 13,778 tons/year.

The results have shown a leverage effect of the financing for subsidies valued at 5.4 (this is, that the induced investment associated to the projects supported, was 5.4 times higher than the public funds used). Equally important, it is necessary to indicate that the cost benefit rate of the projects supported, reached the value of 16 (that is, the total benefits expected will be 16 times higher than the funds used).

7.2. Case study 2: Italy - White Certificates scheme for energy saving and energy efficiency

The new mechanism for the promotion of energy saving and energy efficiency has its basis on the fact that large gas and electricity distribution companies must meet annual mandatory targets for energy savings in final uses.

The scheme, which operates at national level, aims at reaching energy saving targets for both electric and thermal energy; therefore any project leading to heat or electricity savings, in principle, could be included in this scheme.

The promoter of this scheme is the Ministry of Industry, but several different actors are involved in the operation of the mechanism.

The main actors involved are the following:

- the Ministry of Industry (MAP): it was responsible for developing the general framework for the scheme operation;
- the Ministry of Environment (MATT): it helped MAP in developing the regulatory framework;
- the Italian Authority for Gas and Electricity (AEEG): it is in charge of delivering the technical guidelines;
- large gas and electricity distribution companies, which are obliged to meet the established targets;
- the Energy Service Companies (ESCOs): they can carry out energy saving and efficiency projects, then selling the obtained savings to the distribution companies;

Description of the scheme

The white certificates are documents certifying the energy savings achieved by various actors through the implementation of specific projects of energy efficiency, for which the Government provide an economic incentive. The goal consists of stimulating the energy efficiency and the reduction of consumption.

The White certificates in Italy have been launched in 2004 and are operative since 2005. The certificates can be bought and sold in the market, and the price depends on the fluctuations of the market even though originally the price was fixed at 100Euro/tep – the energy value of one tep is equivalent to the annual consumption of an average family

The energy saving to target in order to have access to the incentives of white certificates depend on the typology of project and its components. For most of intervention the incentives period is 5 years. 4 types of intervention are envisaged.

- Electrical energy saving
- Gas saving
- Saving of fuels for transport
- Saving of fuels non for transport

The amount of incentive is established on yearly basis by the Authority for Energy. In addition it is possible to sell the certificates in excess if savings exceed the established target. On other hand,

those unable to meet the established target are obliged to fulfill the gap by acquiring certificates in the market until they reach the minimal established objective.

The measures that could be used include everything which brings to real energy savings, e.g. replacing old lamps with high efficiency bulbs or electric boilers with gas boilers, use double glasses, improve walls and roof insulation, improve electric motors efficiency, use low-consumption electrical appliances (fridges, washing machines, etc.), adopt water-saving devices (e.g. flow reducers or air/water mixers), install solar thermal collectors or photovoltaic modules, use heat pumps, etc.

In order to meet their obligation, the involved companies can, first of all, build up their own energy saving projects. For instance, an electric utility could distribute low consumption bulbs to all their customers, then certifying the overall savings.

Another possible solution for the companies is to buy “White Certificates”, which correspond to energy saving projects carried out by other subjects, the ESCOs (Energy Service Companies). Therefore, the White Certificates system works very similarly to the Green Certificates scheme.

The White Certificates scheme has been widely advertised, thanks to the large number of stakeholders involved (MATT; MAP, AEEG; ESCOs, etc.). The scheme is operational since 2005 and has been recently modified (28 December 2012), by introducing new national saving target for the years 2013-2016. In Europe the white certificates are operational in Italy, and France, while other countries such as UK, Denmark and Netherland are considering the introduction of the scheme.

The replication potential of the White Certificates scheme is quite high, given the following reasons:

- in most of the countries, the potential of energy saving and energy efficiency in reducing consumption and polluting emissions is very high;
- the selling of White Certificate is done on a market basis, so it could be adapted to national conditions; however, this kind of “market-based” incentives are quite dangerous, since they create general uncertainty about the prices, therefore not promoting easily the diffusion of renewables and energy saving measures.

Lessons Learned

Several positive issues should be already highlighted:

- the involvement of ESCOs is leading to the birth of new companies;
- the improvement of an “energy efficiency culture”;
- the White Certificate acts as an additional incentive for the installation of solar thermal systems.

The negative sides are:

- the working principle is not so “user-friendly” and for a small operator, typical of the Italian market, not always easy to be understood; this is due above all to the large amount of actors involved and to the high number of deadlines and papers to be submitted.

- as in the Green Certificates schemes, ESCOs prefer to carry out energy saving projects with a low payback time; therefore the “competition” among different solutions is based almost completely on the economic issue; this could lead to a mass spreading of, for instance, low consumption bulbs and to a very few solar thermal installations.

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