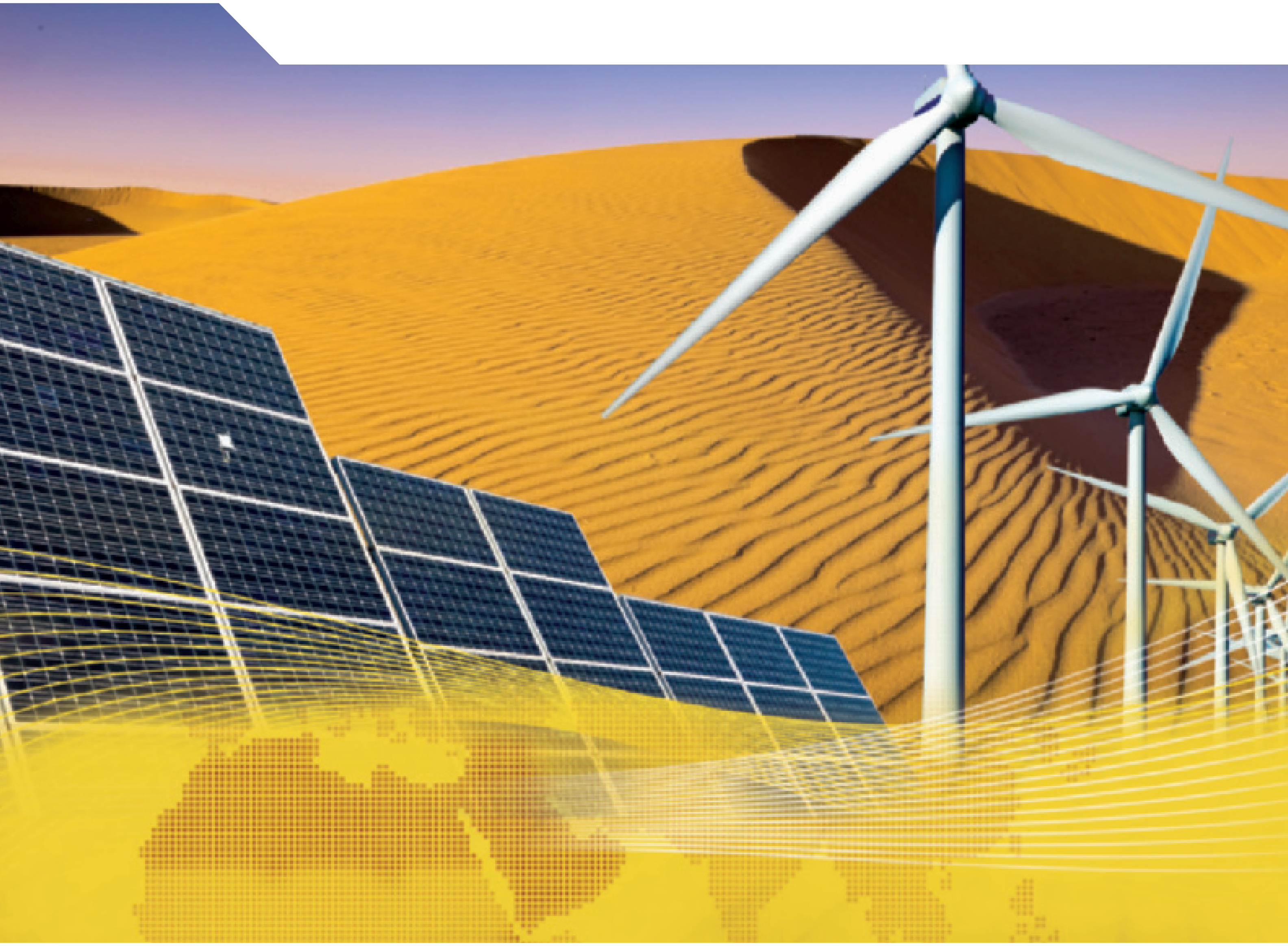
Competitiveness and Private Sector Development

Renewable Energies in the Middle East and North Africa

POLICIES TO SUPPORT PRIVATE INVESTMENT



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POLICIES TO SUPPORT PRIVATE INVESTMENT

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Foreword

The combined effects of the global financial and economic crisis and the recent popular uprisings in parts of the Middle East and North Africa have brought social and economic challenges to the centre of attention of policy makers. For governments seeking to stimulate economic growth in order to create jobs, to satisfy the growing energy demand of their populations and to diversify their economies, the appeal of renewable energies is strong. In the wake of the International Conference on Renewable Energies in 2004, most Middle East and North Africa (MENA) countries set targets for renewable energy deployment. Following on from the European Union's 2020 energy plan, and in the face of rising environmental concerns, there has been an increase in multilateral initiatives in support of the development of "renewables" in the Middle East and North Africa. However, the right policy framework and support need to be put in place if the region wants to attract private investment in the sector and reap the benefits of its favourable resource endowment, especially as regards solar and wind energy.

In this context, Renewable Energies in the Middle East and North Africa: Policies to Support Private Investment *makes the case for a stronger deployment of renewables in the MENA region and identifies the appropriate support policies required to stimulate the necessary private investment. Aimed at policy makers in the MENA region, the report contains an assessment of existing policy frameworks in the region and examples taken from good practice in OECD member countries which are used as pointers to help guide MENA governments in their choices.*

The analysis contained in this report suggests that policies that aim at supporting the life-cycle of renewable energy projects such as feed-in tariffs and power purchase agreements are more effective and less distortive than policies subsidising the initial investment, such as cost reductions. The optimal incentive scheme provides investors with stability through a guaranteed but declining minimum return while imposing enough market risk to foster technological progress.

This study is one among a number of studies and advisory projects currently undertaken by the MENA-OECD Investment Programme. To guide the work and pinpoint recommendations targeted at the private sector, the authors were supported by the MENA-OECD Task Force on Energy and Infrastructure.

Acknowledgements

This publication, *Renewable Energies in the Middle East and North Africa: Policies to Support Private Investment* is the result of a collaborative effort which commenced in April 2011.

The MENA-OECD Task Force on Energy and Infrastructure initiated the project under the joint chairmanship of Andrew Moorfield (Scotiabank, Canada) and Salem Moosa Hassan (Public Authority for Investment Promotion and Export Development, Oman).

The following individuals, members of the Task Force, provided input and material to the report at various stages of the drafting of the report. They also contributed to the elaboration of the conclusions and recommendations in the report through their active participation in the meetings of the Task Force: Eihab Ismail Amin, New and Renewable Energy Authority, Egypt; Jean-Charles Arrago, Total; Laetitia Balkany, Total; Julian Blohmke, Desertec Industrial Initiative; Amal Chevreau, Institut de prospective économique du monde méditerranéen (IPEMED); Marc Darras, GDF-Suez; El Habib El Andaloussi, Paving the Way for the Mediterranean Solar Plan; Nicolas Estay, Orascom Construction Industries; Coline Mignot, Total New Energies; Andrew Moorfield, Scotiabank; Pedro Moraleda, Observatoire Méditerranéen de l'Énergie; Thierry Mueth, Coruscant Group; Pol Arranz Piera, Trama TechnoAmbiental; Christopher Segar, International Energy Agency; Olivier Soupa, Schlumberger; Marc Strauss, Union of the Mediterranean; Ghada Waheed, Ministry of Investment in Egypt; Setsuko Wakabayashi, New Energy and Industrial Technology Development Organisation (NEDO); Fabian Wigand, Desertec Industrial Initiative; Yukitoshi Yamazaki, Sumitomo Metals; and Florian Zickfeld, Desertec Industrial Initiative.

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The report was written and edited by Ania Thiemann, Senior Economist at the MENA-OECD Investment Programme and the Division for Private Sector Development in the OECD's Directorate for Financial and Enterprise Affairs. Within the Directorate for Financial and Enterprise Affairs, the initial research was carried out by junior analysts Nathalie Sulmont, Friederike Barthe, and Rayann Koudaih, while Friederike Barthe added valuable material to chapter 3 and Rayann Koudaih helped prepare the graphs and the appendix and provided additional research for chapters 3 and 5.

Special thanks go to those who took the time to review the text and provide useful comments and input. The reviewers were Anthony O'Sullivan, Head of the Private Sector Development Division; Alexander Böhmer, Head of the MENA-OECD Investment Programme (DAF/PSD); Helen Mountford, Deputy Director of the OECD's Environment Division (ENV); Christopher Segar (Energy Analyst, IEA); Nicola Ehlermann-Cache, Senior Policy Analyst (DAF/PSD); Virginie Marchal, Economist/Policy Analyst (ENV); and Géraldine Ang, Junior Policy Analyst (ENV). The report was edited for publication by Barbara Zatlokal, and prepared for publication by Ania Thiemann, Rayann Koudaih, and Edward Smiley (DAF).

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Executive summary

Rising global energy demand: A need for alternative policies oriented towards energy efficiency

Between 2001 and 2011, world consumption of primary energy rose from 9 434 million tonnes of oil equivalent (Mtoe) to 12 275 Mtoe, an increase of 30.1%. The International Energy Agency (IEA) forecasts an increase in global energy demand from 12 132 Mtoe in 2009 to 16 961 Mtoe in 2035 – an increase of 33.6%. In its pessimistic scenario, assuming that current policies are maintained with no new climate mitigating elements added, energy demand is forecast to increase by 51% by 2035.

Rising energy demand and heightened geopolitical risks associated with the recent events in the Middle East and North Africa (MENA) region will increase upward pressure on energy prices in the coming years. At present, the region is characterised by low energy prices and high energy and fuel price subsidies. This has paved the way for a constantly rising and inefficient use of energy. With little policy emphasis on energy efficiency and an intensive use of fossil fuels, the countries in the MENA region will be particularly exposed to the negative consequences of rising energy prices in the longer term, especially the small oil producers and net oil importers. To embed sustainable, long-term economic growth in the MENA region, countries must diversify their energy sources.

The MENA region is rich in sources of renewable energy, yet its renewable energy power sector remains underdeveloped. In 2009, the share of renewable energy in the total energy mix in the region was around 4%.

This document concentrates on support policies to stimulate private investment in renewable energy in the MENA region[1] and makes the case for the development of renewable energy. For the sake of simplicity and given the region's natural endowment, the report deals exclusively with solar and wind power generation. It focuses on the incentives to attract investment into these sectors for countries to benefit from the positive externalities of renewable energy, including boosting local jobs.

Given the significant constraints on such investment, the report attempts to identify the best support mechanisms to stimulate private investment and guide policy makers towards the best policy choices, based on an assessment of the existing policy frameworks in the region and on OECD good practices. To guide the work and develop recommendations targeted at the private sector, the authors were supported by the MENA-OECD Task Force on Energy and Infrastructure (the task force).

MENA's geographical advantages for renewable energy

Energy consumption has risen by 5.2% a year since 2000 in the MENA region.[2] Rapid economic expansion, the energy intensive nature of the region's extractive industries and a rapidly growing population are spurring demand for electricity. The region's energy demand is expected to continue to rise above the world average, by around 3% a year from 2010 to 2030; electricity demand is forecast to rise by 6% a year over the same period.

The MENA region has one of the highest solar energy potentials in the world. The IEA estimates that concentrated solar power (CSP) plants could generate 100 times[3] the combined electricity consumption of the MENA region and Europe together. The Atlantic and Red Sea coasts and some parts of the Sahara Desert also have potential for large-scale wind farms; the wind speed in these areas exceeding 6.9 meters/second – the threshold for economic feasibility.

Some of the costs of developing renewable energy in the MENA region could be recovered by exporting electricity to Europe. With roughly 14% of the world's energy consumption, the European Union (EU) will continue to require energy over the next decades, despite slowing economic growth. The proximity of the MENA region makes it ideally situated to supply Europe with energy from renewable sources. A number of projects are currently under study, among them the Mediterranean Solar Plan of the Union for the Mediterranean,[4] and the Desertec Foundation (a non-profit foundation). Both are studying the feasibility of exporting electricity generated from vast solar power plants in the deserts of North Africa.

Renewable energy projects generate much-needed jobs and empower women

The MENA economies are facing high levels of unemployment especially among youth, women and the highly educated, and a rapidly growing labour force. Developing renewable energy for power generation would help the MENA governments address this challenge. Quantitative assessments of the impact of renewable energy projects on labour markets highlight that all forms of renewable energy projects have significantly higher labour intensity than fossil fuels or traditional energy per unit of installed capacity, per unit of power generated and per US dollar invested.

Developing the renewable energy sector can stimulate employment in various manufacturing activities, such as design and fabrication, and in research and development (R&D) of renewable energy technology components. These sectors require a wide variety of skills, ranging from maintenance of the premises to highly specialised jobs. These specific skills have to be developed through training and education which can be provided by private-public co-operation. Importantly, all jobs related to the installation of renewable energy power generating plants are local. Manufacturing components locally would generate additional jobs. This would require significant transfer of skills and technology from foreign investors, but could be a successful long-term strategy for governments.

The development of small-scale renewable energy units can stimulate local economic development by bringing electricity to remote, underdeveloped areas. Energy poverty constrains economic development outside urban areas and prevents female empowerment. The lack of energy sources mainly affects women, who traditionally have household and family responsibilities. Providing heating for the family is highly time-consuming and can act as an incentive to take girls out of school, limiting their ability to find skilled jobs in the future. Access to energy is also a trigger for local economic activities, enabling local entrepreneurs to start up small businesses.

Renewable energy projects need a sound policy framework and well-targeted support mechanisms

The investment in renewable energy projects still faces major constraints. The typical high production costs resulting from mainly new or novel technologies lead to high costs. These costs are borne by the MENA governments which usually support the energy market in the MENA region by subsidising energy prices (fuel oil and electricity) for end-users. This creates barriers for investors, ranging from market failure to domestic policy frameworks that continue to favour fossil fuels.

Well-targeted government support mechanisms can support private investment in renewable energy. The OECD's *Policy Framework for Investment* states that investment promotion and facilitation measures, including incentives, can be effective instruments to attract investment, provided they aim to correct market failures. The OECD breaks down investment incentives into three broad categories: regulatory, financial and fiscal. The work of the task force focuses mainly on the first two categories (regulatory and financial); this report looks particularly at financial support measures.[5]

Two more categories of incentives can be considered: market-based instruments that account for the full costs of externalities from fossil fuel-based power generation such as carbon tax and cap-and-trade systems; and strategic goal-setting to reduce uncertainty about the policy and regulatory frameworks that directly affect business opportunities, costs, risks and returns on investment.

Private investors' primary motive is profits. Investment decisions are thus generally driven by the expected return, adjusted for risks (such as client risk, political and regulatory risk, market risks and the risks of new technology or capital market barriers) on investment opportunities. This report emphasises economic viability and profitability as the underlying criteria for renewable energy projects. Incentives can only supplement an already attractive enabling environment for investment or can be a compensation for proven market imperfections that cannot be otherwise addressed. Any incentives for renewable energy, such as feed-in tariffs (FiTs), need to be embedded in a stable and sound domestic policy framework. Such a framework must exist to ensure that policies are transparent and predictable, uniformly applied and non-discriminatory.

The MENA-OECD Task Force on Energy and Infrastructure seeks to represent the private sector's point of view. It is clear from the work of the Task Force that private investors are actively looking for opportunities in the area of renewable energies. Investing in renewable energy projects in MENA would allow companies to build leadership in the field and secure first-mover advantage, as the renewable energy sector is still underdeveloped. More importantly, providing the right policy instruments is a key challenge to MENA governments to attract private investors.

Support measures (financial, regulatory, fiscal and market-based) for renewable energy are meant to help attract private investment to reduce the stress on government budgets in resource-poor countries, and create incentives for renewable energy investments in oil- and gas-producing countries. Investment can also provide opportunities to transfer technical expertise and the positive externalities associated with renewable energy technology.

Box 0.1. **Summary of support instruments**

One can distinguish between several tools and instruments to support renewable energy:

- financial instruments and mechanisms to increase market liquidity (such as capital grants and loan guarantees);
- transitional tools such as tax credits/subsidies/FiTs that provide short-run direct transitional support to renewable energy generation (note that even though FiT are pricing instruments, they do not remove incentives to invest in fossil fuel generation unlike cap and trade);
- regulatory instruments;
- market-based instruments that account for the full costs of externalities from fossil fuel-based power generation, such as carbon tax and cap-and-trade systems that apply to power generation.

For more information, please refer to Corfee-Morlot et al., 2012 forthcoming, available online as a draft on *www.oecd.org/env/climatechange/ENV-WKP(2012)5-ENG.pdf*.

Source: OECD/Environment Directorate.

The use of incentives and support mechanisms is often associated with negative externalities. The OECD publication "Checklist for Foreign Direct Investment Incentives Policies" identifies a list of such "side effects" related to the use of investment incentives. Importantly, support mechanisms are intended to help the investor to reduce the risk associated with investment in a sector that suffers both from its relative novelty and strong competition from domestic subsidies.

The level of support is important, too. If an investment incentive is set too high, or if the criteria for qualifying are too lax, unprofitable companies may enter the market leading to a high number of failures and bankruptcies. These can be avoided if incentives are monitored over the duration of the project.

Incentives applied to renewable energy projects aim at overcoming the barrier of the high risks of such projects. Interviews with private sector actors revealed three main inter-related barriers to private investment in renewable energy in the MENA region:[6] the lack of profitability of renewable energy projects with insufficient positive cash flow to recover the investment costs of installation; high investment costs due to the long installation life of renewable energy projects; and, as a result, difficulties for investors in accessing finance.

The main support mechanisms for developing renewable energy in the MENA region are divided into: **financial incentives** including feed-in tariffs, power purchase agreements, capital subsidies (grants, investment tax credits and training incentives); **regulatory incentives** such as net metering; **market-based incentives** including tradable clean development mechanisms (CDMs) and competitive bidding processes; and **fiscal incentives** including various reductions in taxes.

Table 0.1. **Support mechanisms in the MENA region**

	Algeria	Egypt	Jordan	Morocco	Tunisia	UAE
Public competitive bidding		▲		▲		▲
Feed-in tariffs	▲(enacted but not yet implemented)	▲ approved but not implemented				
Net metering			▲	▲	▲	
Tradable CDM		▲		▲	▲	
Capital subsidies, grants and premiums		▲		▲	▲	
Investment tax credit					▲	
Training incentives				▲		
Reduction in sales taxes or VAT; Customs taxes			▲		▲	

Source: Global *Renewable Energy Policies and Measures Database* of the IEA; the "*Renewables 2011 Global Status Report*" of REN 21; the official gazettes of Algeria, Egypt, Jordan, Morocco, and Tunisia. For each country, specific sources of information have been used. For Algeria, the Ministry of Energy and Quarrying, the National Agency of Investment Development; for Egypt, the sources include the New Renewable Energy Authority, the General Authority for Investment and Free Zones; for Jordan; the Ministry of Energy and Mineral Resources; the Jordanian Investment Board; for Morocco, Office National de l'Électricité, MASEN, The Ministry of Energy and Quarrying, the Moroccan Investment Development Agency; Economical, Technological and Environmental Impact Assessment of National Regulations and Incentives for Renewable Energy and Energy Efficiency Country Report Morocco (DRAFT) January 2010, and for Tunisia, The Ministry of Industry, Energy and SMEs, *www.profiscal.com*; the Foreign Investment Promotion Agency (FIPA); Directorate-General for Energy and Transport: Market Observatory for Energy, Report 2008: *Europe's energy position, present & future*, European Commission, 2008.

Some MENA governments are setting targets for renewable energy power generation. However, compared to the practice in most OECD countries, these targets are non-binding. Moreover, even the countries that do have targets are experiencing delays in attracting sufficient interest in renewable energy projects. The unattractiveness of the local business climate, political choices that favour cheap fossil fuels and a general lack of transparency in the support mechanisms available for investors often account for delays. The underlying challenges include insufficient capacity and training and a lack of transparency. Beyond providing attractive incentives, a lack of state guarantees decreases the attraction of all long-term infrastructure projects in the MENA region.

There are various possible scenarios for using support mechanisms as case studies and interviews with investors have shown. A large project in Abu Dhabi – Shams 1 (Box 3.10) and a project for rural electrification in Morocco – Temasol (Box 3.11) demonstrate both the wide range of solar energy projects, and some financing models that may attract investors.

Among the various incentives analysed, a *power purchase agreement resulting from a competitive bidding process* currently stands out as being the most useful tool to encourage private (foreign) investors to invest in renewable energy projects. However, there is often little information of what incentives are available. This is likely to undermine competition and discourage investors.

Based on the inventory of support measures and the private sector input from the task force, this publication presents policy recommendations to help policy makers in the MENA region design the best mix of support measures, breaking them down into general recommendations for investment incentives, and recommendations specifically for renewable energy support mechanisms.

Recommendations to enhance the regulatory and institutional frameworks

In a sound and secure regulatory framework, higher tariffs are attractive to private investors and encourage competition. Authorities should ensure that adequate legal frameworks are in place to offer a harmonised legal regime of investment protection and dispute resolution to private investors.

To guarantee an effective use of incentives, authorities should define national energy strategies focusing on setting targets for the share of renewable energy in the domestic energy mix and establishing clear production and consumption targets.

Establishing a national renewable energy agency can ensure that the feasibility and cost of renewable energy projects are assessed up-front, thereby determining the correct level of the tariff.

In creating effective incentive schemes, policy makers should consider the schemes themselves, the environment in which they will function, tailor them to benefit both investors and the local community and review them regularly. The main recommendations are to:

Create an enabling environment, particularly by:

- defining transparent and predictable regulations;
- setting up independent energy regulators;
- considering renewable energy generation at different sizes and scales;
- favouring access to the grid for renewable energy producers;
- facilitating grid integration by establishing smart grids and priority access.

Choosing the adequate support measure and increase efficiency

To encourage productivity, the incentive tariff should be neither too low to prevent profits, nor too high to discourage unprofitable companies from entering, and should be guaranteed for a certain period of time. The design mechanism providing this balance is crucial to both encourage investors and reduce policy costs.

Any support measures implemented should be clear and predictable, uniform and non-discriminatory, non-permanent, continuously monitored and adapted to the size of the project. Competitive bidding processes should also be used wherever possible.

Focus on *additionality*. To generate additionality from an incentive scheme, policy makers must ensure that it has the following characteristics:

- Efficiency:
  - ❖ Investment incentives must drive the investment decision; and be sufficiently well-targeted to attract the kind of investment that would not have been made otherwise.
- Least costly for the state:
  - ❖ Investment incentives must offer the most cost-effective solution for the state while remaining attractive to the investor. They should aim to reduce moral hazard and information asymmetries and limit the waste of public funds.

- Snowball effect:
  - ❖ The incentives chosen should generate follow-on investment and lead to as many as possible add-on benefits for the local economy.

Choose the best possible incentive scheme: A single optimal incentive scheme for investment in renewable energy in MENA does not exist, but depends on the government's renewable energy objectives and on its capacities; the public budget, the business environment, and the state of development of renewable energy technology on the domestic territory. Nevertheless, some measures are more efficient and more appropriate for the private sector than others. Based on the existing investment incentives observed in the MENA region, incentives offering higher tariffs for the duration of the project (also known as **cash-flow incentives**) have a higher impact on the decision to invest in renewable energy power generation. Such incentives lift several key barriers to private investment at once, including the lack of profitability, uncertainties regarding future cash flows and client risks, all restricting access to finance.

Cash-flow incentives should be guaranteed by the state (or a state agency) for the duration of the contract. Mechanisms in which the government guarantees the commitment of the state agency are generally necessary, but the reliability of such guarantees varies among MENA authorities according to the financing capacity of the public sector, the size of its debt, the quality of the relationship between the private and the public sector, political stability, etc. MENA governments should design their cash-flow incentives to match the perceived strength of the guarantee. Guarantees seen as too weak by investors can be supplemented by soft loans from a supranational development agency, loan guarantees, or guaranteeing the tariff in foreign currency.

Tailor incentive schemes to *benefit the local economy.* This involves:

- Encourage R&D and innovation within firms to generate more investment and create a regional advantage in the sector.
- Prioritise local labour. The lack of skilled local workers remains an obstacle to investment and training available local ones, including women to new technologies is a challenge.
- Encourage the development of a local manufacturing base of renewable energy components. This will deliver high-quality products, create jobs, increase exports and boost economic growth.
- Consider regional disparities by promoting renewable energy projects that target underdeveloped areas. To increase decentralisation, smaller projects for rural areas can be singled out for special investment incentive packages, including a corporate social responsibility (CSR) component.

Monitor, evaluate and review the schemes regularly: this implies setting up a public centre of expertise; establishing a clear framework for policy evaluation of incentives; and establishing a schedule for revision of incentives ahead of their inception.

Notes

1. This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.
2. *Source:* BP, *BP Statistical Review of World Energy 2011,* June 2011. The data include Middle East countries, Algeria and Egypt.
3. *IEA, World Energy Outlook*, 2010.
4. The Union for the Mediterranean is a multilateral partnership gathering 43 countries from Europe and the Mediterranean Basin.
5. The issue of fiscal investment incentives is discussed in detail in other OECD publications: Tax Incentives for Investment – A Global Perspective: experiences in MENA and non-MENA economies, July 2007 *www.oecd.org/mena/investment/38758855.pdf*; Incentives-based competition for foreign direct investment: the case of Brazil, Directorate for financial, fiscal and enterprise affairs, March 2003, *www.oecd.org/investment/investmentfordevelopment/2500995.pdf*.
6. These were identified in an Energy Task Force work meeting and detailed during one-to-one interviews with private sector actors.

Introduction

The Middle East and North Africa region[1] (MENA) is rich in renewable energy sources, not least solar energy; yet the renewable energy power sector remains underdeveloped. The share of renewable energy in the total energy mix in the region is estimated at just 4% by the International Energy Agency (IEA).

There is little doubt that the demand for renewable energy worldwide is set to increase over the next couple of decades, driven by the relentless increase in energy prices, the gradual depletion of fossil fuel reserves and the consequences of global warming, including the need to mitigate greenhouse gas (GHG) emissions.[2]

In order to honour current national commitments to reduce emissions, the total investment required to produce electricity from renewable energy sources is estimated, by the IEA, at USD 5.7 trillion worldwide over the period 2010-2035.[3] Nevertheless, market forces alone are unlikely to be sufficient to spur investment in renewable energies, as the technology for many types of renewable energy is not yet commercially viable compared to traditional energy resources. In addition, even where existing technology is competitive, the price of electricity generated from renewables simply cannot compete with the subsidised energy prices for end-users that are found in most MENA economies. To correct this market imperfection, government intervention is needed to support investment in the sector. The OECD already has a large body of work dealing with investment incentives. An OECD publication (OECD, 2003) deals specifically with investment incentives for foreign direct investment (FDI). However, little work has been done on support mechanisms or investment incentives specifically targeted at renewable energy projects in the MENA region.

In recent years, several MENA economies have started to implement pro-active renewable energy policies and programmes to develop power generation from renewable energy. Many of those projects have involved a degree of public-private partnerships. However, recent developments have put such developments on hold in some countries. The global financial crisis and liquidity squeeze have increased the cost of investing in renewable energy and other infrastructure projects. Moreover, the 2011 political recent events have highlighted economic challenges and governance issues that MENA governments need to overcome to continue to attract investors. These issues include a lack of transparency in investment policy and in available support schemes; regional economic disparities; poorly skilled workforces, and a short-term decrease in economic growth and private investment in the countries undergoing transition. In this context, some may believe that encouraging investment in the renewable energy sector is a luxury that many MENA economies currently cannot afford.

This paper argues, on the contrary, that investing in renewable energy can bring both skills and jobs to the region. The MENA-OECD Task Force on Energy and Infrastructure was created in 2010 in order to stimulate a public-private dialogue on ways and means to improve investment policies to attract private investment in renewable energy in the MENA region. Through working papers such as this and public-private dialogue, including joint seminars with the working groups of the MENA-OECD Investment Programme, the task force seeks to represent the private sector's point of view, from MENA and OECD countries, and to share good practices, on-the-ground experience and case studies between OECD and MENA companies and government officials.

Previous work of the task force dealt with a set of general recommendations to spur investment in renewable energy in MENA (MENA-OECD, 2010). The recommendations included an appropriate regulatory and institutional framework; clear targets for renewable energy production; constructing smart grids; supporting policies for innovation, infrastructure and human capital in renewable energy; and the creation of specific and targeted support mechanisms for renewable energy. Indeed, the task force acknowledges that the sector presents specific features that entail a need, at least in the short term, for investment incentives or subsidies of some form, in order to stimulate investment in the sector.

This paper has two objectives: First, it intends to illustrate for policy makers that public policies supporting private investment in the renewable energy sector can help address some of the key economic issues faced by MENA governments. Well-targeted development of the renewable energy sector does not only bring environmental benefits but can also generate jobs, stimulate local economic development, provide energy security and contribute to sustainable economic growth in the region. While the case for "green" or sustainable development is generally well understood, the specific need for renewable energy and its positive externalities is generally less known. This paper hopes to further support the case for renewable energy also in emerging markets, and specifically in the MENA region.

Second, the paper attempts to identify the type of support mechanisms that most favour long-term projects in the renewable energy sector. The paper does not deal in any detail with the more general type of investment incentives, such as tax breaks or other fiscal incentives. Instead its focus is on the type of support mechanisms – such as power purchasing arrangements – that lock in long-term investments in infrastructure. In addition, for the sake of simplicity, this report deals exclusively with solar and wind power generation as these are the most abundant natural resources in the region. Taking into account the MENA region's political context and the need to limit public spending in many of the region's economies, the study represents a first attempt to take stock of policies and measures already used by governments in the region. The study aims to use this information to identify incentives that are cost-effective while also maximising positive spill-over effects. Indeed, incentives are policy measures directed at the private sector and "designed to influence the size, location or industry of an investment project by affecting its relative cost or by altering the risks attached to it through inducements that are not available to comparable domestic investors" (OECD, 2003).

Having discussed in detail the potential benefits to the MENA economies accruing from supporting investment in renewable energy in the first part of the report, the second part of the paper looks at the reasons why public support measures for private investment are needed in the first place. Although the OECD recognises that investment incentives can have a market distorting effect, a special case can be made for a sector such as renewable energy where many barriers to investing exist, including market failure, limited knowledge of technology, spill-overs in the research and development phase, capital market barriers, and existing policy instruments which favour fossil fuels, to name a few.

The third chapter looks at the type of measures typically implemented to support investment in renewable energy, including feed-in tariffs and net metering, and discusses examples of good practice among OECD member countries. It then goes on to describe an inventory of the existing incentives in the MENA region and looks into the necessary conditions for such support mechanisms to be efficient drivers of investment. To help decision makers attract private investment and limit public expenses, this report seeks to select the best-possible mix of support mechanisms to guide private investment to the renewable energy sector, ensuring profitability for the investor and minimum cost for the government. The fourth and final chapter outlines a set of recommendations based on the conclusion from the previous chapters and further developed by the Task Force at a series of roundtable meetings during 2011 and 2012.

An early draft of these recommendations was presented, at the Fifth Euro-Mediterranean Energy Forum organised in Barcelona in October 2011 by the European Institute of the Mediterranean, (IEMed), a think tank which advises the Union for the Mediterranean. In April 2012, the paper was also presented in a revised version at the Arab Forum for Renewable Energy and Energy Efficiency, hosted by the League of Arab States in Cairo. Both forums contributed to refining the recommendations and conclusions of the report and allowed the authors to benefit from experiences and good practices shared by participants.

Notes

1. This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.
2. The need to reduce greenhouse gases is supported by several international commitments including the Kyoto Protocol, the Copenhagen Agreement and the Cancun Agreements.
3. In year 2009 dollars; IEA (2010).

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Renewable Energies in the Middle East and North Africa
Policies to Support Private Investment

Chapter 1

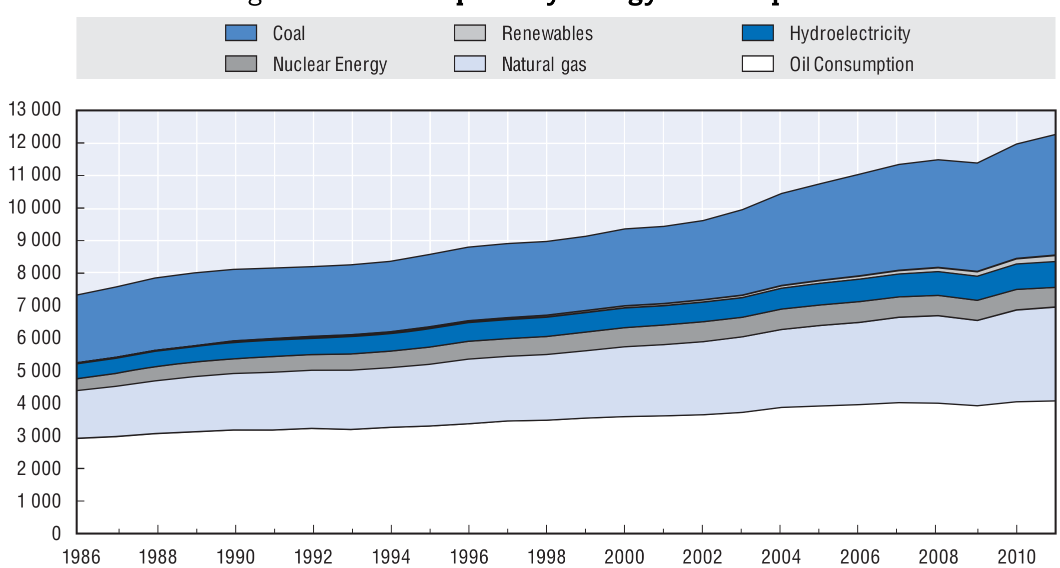
A growing need for investment in renewable energy in the Middle East and North Africa

Worldwide energy demand is rising, and even more rapidly in the MENA region. The region's geographical location provides great potential for the development of renewable energy (in particular for wind and solar) and export of any surplus energy to Europe. Additional benefits include direct and indirect increases in employment, rural electrification and the empowerment of women. MENA economies would also benefit from technology transfers, more diversified economies and a better environment. However, the development of these technologies is hampered by their high cost and imperfect market conditions. This can be addressed by using investment incentives and support measures specially targeted to the development of renewable energy.

1. Introduction

Energy demand worldwide is set to rise. World consumption of primary energy rose from 9 434 million tonnes of oil equivalent (Mtoe) in 2001 to 12 275 Mtoe in 2011, an increase of 30.1%, according to BP's annual *Statistical Review of World Energy* (2012).[1] Despite a slowdown in global economic growth, especially within the OECD member countries, energy demand rose by 5.6% from 2009 to 2010 and by 2.5% from 2010 to 2011 (BP, 2012). This trend is set to continue, according to the IEA. In its benign scenario, assuming that all energy-saving policies announced by mid-2011 will be implemented, the IEA forecasts that energy demand will increase from 12 132 Mtoe in 2009 (similar levels to those assumed by BP) to 16 961 Mtoe in 2035, an increase of 33.6%. In its pessimistic scenario, assuming no changes in policy, energy demand is forecast to increase by a whopping 51% by 2035 (IEA, 2011a). Electricity demand is forecast to increase even more steeply, by 57.7% between 2009 and 2035 in the benign scenario and by 73.6% in the pessimistic scenario. Similar trends are observable in the MENA region.

Figure 1.1. **World primary energy consumption**



Source: BP, *Statistical Review of World Energy*, June 2012.

Within Europe, energy demand will also continue to increase, albeit at a lower rate – economic growth is not forecast to be very swift while energy intensity is expected to continue to improve, resulting in more efficient use of energy. Even so, the European Commission forecasts that energy consumption will rise by between 5% and 9% until 2020, depending on the oil price, with a higher increase in case of "moderate oil prices" (of around USD 61/barrel) (European Commission, 2008). The European Commission expects fuel for the transport sector to be the strongest driver of energy demand, with demand expected to rise by 17-21% by 2020.

As a result of these demand pressures on energy and electricity, combined with a gradual depletion of fossil fuel reserves and heightened geopolitical risks, energy prices will face strong upward pressures, eventually eroding citizens' purchasing power and public budgets in OECD countries and emerging markets alike. The MENA region, with its intensive use of fossil fuels and policies that currently tend to place little emphasis on energy efficiency, will be particularly exposed to the negative consequences of rising energy prices. In order to ensure sustainable long-term economic growth in the MENA region, oil importers and exporters alike need to diversify their energy sources.

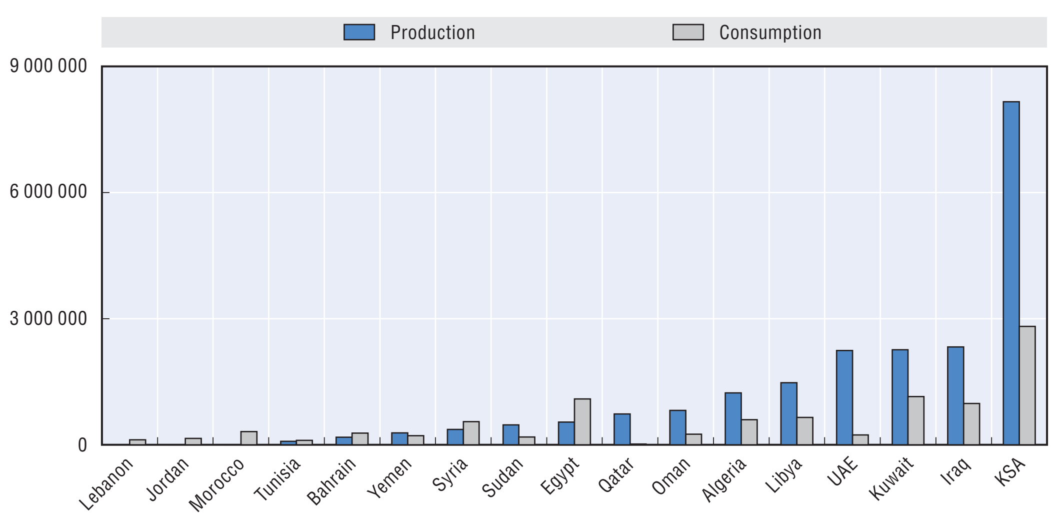
The renewable energy sector has the potential to alleviate these pressures and thereby contribute to long-term sustainable growth. The MENA region is ideally located to make the most of its abundance of wind and solar energy.

2. Rising energy needs across the Middle East and North Africa

Energy consumption is high in the MENA region. Since 2000, primary energy consumption in MENA has risen on average by 5.2% a year (BP, 2012). Rapid economic expansion, the energy intensive nature of the region's extraction industries and the growing petro-chemicals industry, in addition to rising living standards are lifting the demand for power, helped by generous government subsidies which keep end-prices for users low. Low energy prices in the region supported by high subsidies will most likely lead to an increasing and inefficient use of energy. Moreover, demand for electricity is further spurred by a growing population, on average increasing at around 2% a year in the region.[2] Althrough forecasts vary, the region's energy demand is expected to continue to rise above the world average, by around 3% per year from 2010 to 2030, and electricity demand is forecast to rise by 6% per year over the same period.[3] This implies significant increases in the need for power-generating capacity, and the energy resources to match.

Figure 1.2. **Crude oil consumption and production levels in the MENA region**

Barrels/day, 2009

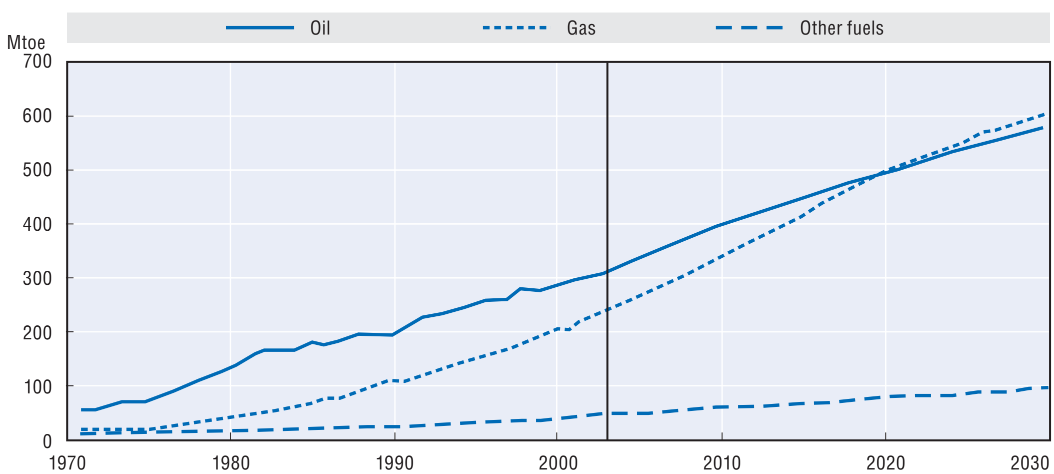


Note: UAE: United Arab Emirates, KSA: Kingdom of Saudi Arabia.
Source: IEA, *World Energy Outlook 2011*.

The MENA region can be segmented into three broad "types" according to the availability of hydrocarbon resources in their countries. With regard to energy consumption, there is a wide gap between those that are rich in energy resources and those that are net importers. Oil exporter countries tend to have higher energy consumption than the others. For illustration, the demand in gas of the members of the MENA Gulf Co-operation Council (GCC), which owns around 79% of MENA gas reserves, represents 69% of the total MENA gas demand. Three categories of countries can be distinguished:

- Net oil-exporter countries whose oil production is well above their national consumption. This includes: Algeria, Saudi Arabia, Iraq, Kuwait, Libya, Qatar, United Arab Emirates and Yemen.
- Oil-producer countries whose oil consumption corresponds approximately to their own production. This includes: Bahrain, Egypt, Tunisia and Syria.
- Net oil-importer countries: They do not produce oil or their oil production is well below their own oil consumption. This includes: Jordan, Lebanon and Morocco.

Figure 1.3. **MENA primary energy demand by fuel to 2035**



Source: IEA, *World Energy Outlook 2011*.

Despite being the world's most energy-rich region in terms of proven reserves,[4] an estimated 21.7 million people still lack access to electricity across the MENA region.[5] Yemen and Iraq have the lowest electrification rates of 39.6% and 86% respectively. Apart from Iraq, Morocco and Syria have the largest populations without access to electricity (a total of 2.5 million). Moreover, in the MENA region about 8 million people[6] still rely on traditional biomass (collecting dung) for all their energy needs. Meeting electricity demands has become a big challenge for MENA governments to avoid severe blackouts and eventually social instability.

The demand for electricity in the MENA economies rose at an average annual rate of about 6.16% from 1998 to 2010, rising at a higher rate of around 8% in the United Arab Emirates (UAE), Qatar and Egypt.[7] Electricity demand is expected to continue to rise in the region at a compound annual growth rate of 2.5% in the Middle East and 2% in Africa from 2008 to 2035.[8] At this rate, electricity demand is expected to double in Morocco alone by

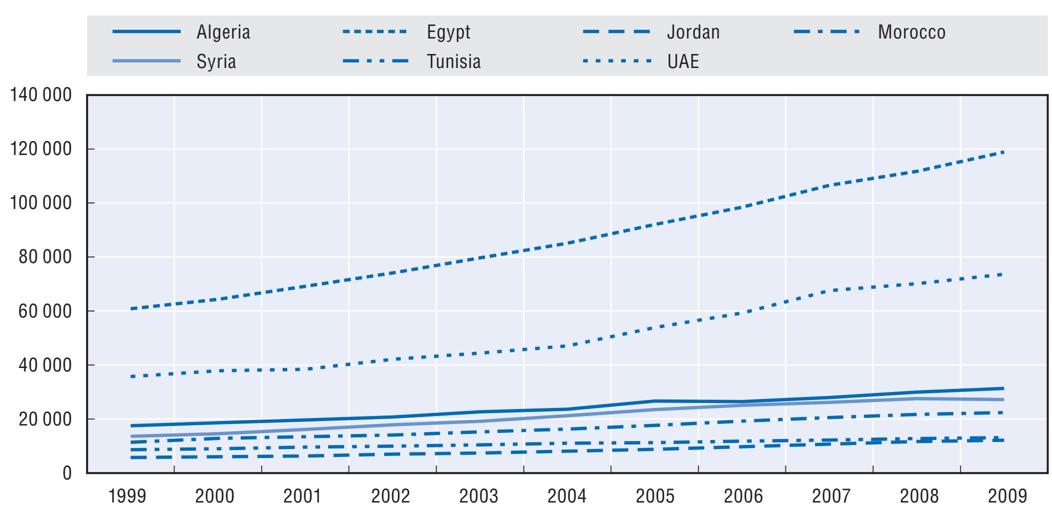
Table 1.1. **MENA electrification rate, 2009**

	Electrification rate (%)	Population without electricity (million)
Algeria	99.3	0.24
Bahrain	99.4	0.00
Egypt	99.6	0.33
Iraq	86.0	4.05
Jordan	99.9	0.01
Kuwait	100.0	0.00
Lebanon	99.9	0.00
Libya	99.8	0.0
Morocco	97.0	0.96
Oman	98.0	0.06
Qatar	98.7	0.02
Saudi Arabia	99.0	0.25
Syria	92.7	1.54
Tunisia	99.5	0.05
United Arab Emirates	100.0	0.00
Yemen	39.6	14.24
Middle East	**92.1**	**21.7**
North Africa	**99.0**	**1.6**
MENA	**94.3**	**23.3**

Note: Despite these rates, some countries witness brownouts and have no steady energy supply. For countries in which electrification rates are lower than 100%, 0 million corresponds to fewer than 5 000 people without electricity.
Source: IEA, *Electricity Access Database*.

2020. According to the IEA, a sister-organisation of the OECD, Iraq, Libya, Saudi Arabia and the UAE are expected to have the highest electricity-demand growth rate in the long term, mainly because they are large oil producers with low production costs; oil-extracting economies being more energy intensive than oil-importing economies.

Figure 1.4. **Electricity demand (GWh) in selected MENA economies**

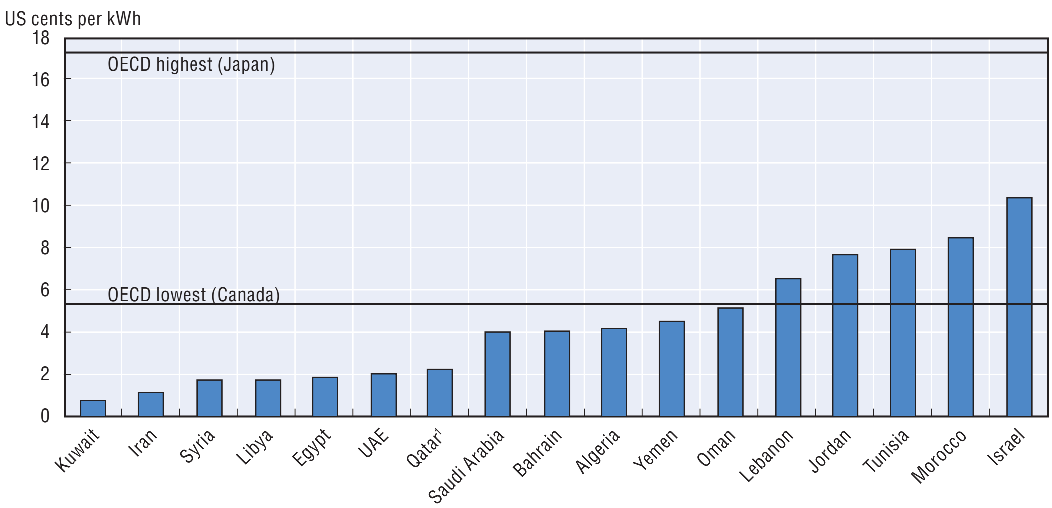


Saudi Arabia is not included owing to scale differences.
Source: IEA Statistics, 2012.

Depending on the resources of each MENA country, a resource-rich country such as Saudi Arabia could reduce gradually its consumption of oil and export more and more oil and use the generated revenues to shift progressively to renewable energies and develop the required technology.

The residential and services sectors account for most of the energy consumption in the majority of the MENA economies. In the Gulf states, the demand for power more than doubles in summer due to air conditioning, a trend that is progressively developing in other MENA economies. Summer also corresponds to the intense use of the highly energy-intensive desalination plants in the Gulf. As such, power plants in the Gulf face a very unbalanced seasonal energy demand with a high summer demand peak.

Figure 1.5. **Residential electricity prices in MENA and the OECD, 2003**



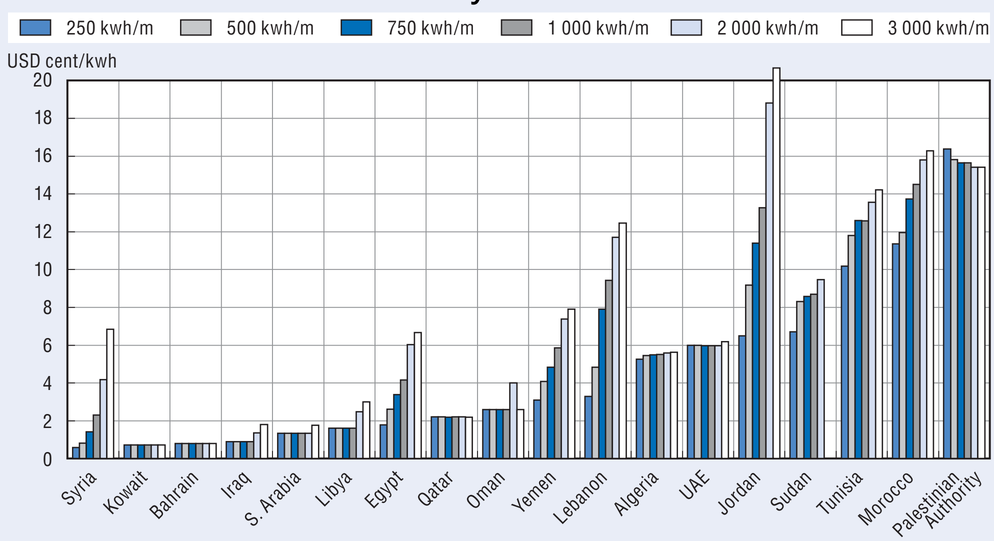
Source: IEA, *World Energy Outlook 2005*.

In the MENA region, 90% of total electricity generation comes from hydrocarbons. Figure 1.6 illustrates the expected evolution of the power-generation mix up to 2035 for the region. The share of gas will generally increase at the expense of oil, as gas is cheaper (and cleaner) to use domestically while oil is easier to transport for export. Under the IEA's Current Policies Scenario, i.e. with no new pro-renewable energy policies, the share of renewable energy in total power generation in MENA is expected to increase, but nonetheless to remain below or around 11% by 2035.[9] This indicates that there is ample scope to increase the use of renewable energies in the region. Moreover, as discussed, developing such sources of energy will also help the more resource-poor countries meet their energy needs, especially in rural or less developed regions.

Box 1.1. **Electricity tariffs in the MENA region**

In some countries of the Arab world, electricity tariffs are generally fixed according to the rate of consumption, and prices differ substantially from one country to another. According to the graph below, the average price is between USD 0.045/kWh for small consumers who do not exceed 250 kWh/month and USD 0.07/kWh for households consuming more than 2 000 kWh/month.

Electricity tariffs 2012



Source: Arab Union for Electricity, RCREEE.

The figure above shows that electricity tariffs are the highest in the resource-poor countries such as Morocco and Tunisia, all rates of consumption included. Apart from high costs of oil imports and high dependence on oil, high electricity tariffs are caused by inefficient energy infrastructure and a rapidly growing energy demand facing insufficient energy supply. The key drivers for energy demand in the region are related to fast economic growth in the last decade, increasing per-capita income, and high population growth.

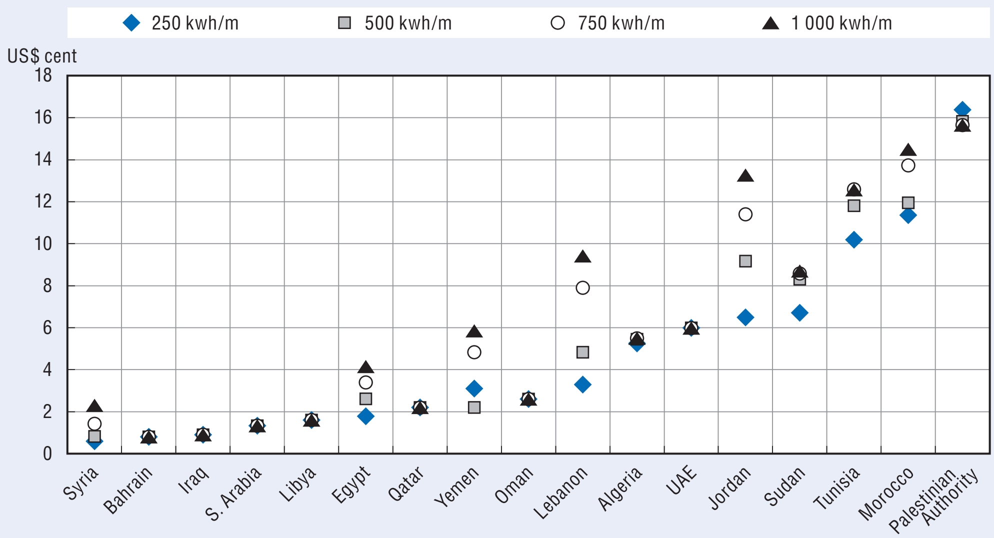
Countries can be placed in three groups by electricity pricing:

- Kuwait, Bahrain, Iraq, Saudi Arabia and Libya. Prices are low, (between less than USD 0.01 to around USD 2 for all rates within the residential sector). Sometimes there is only one tariff for all households consuming up to 1 000 kWh/month.
- Egypt, Qatar, Oman, Algeria and Yemen. Prices vary from around USD 0.02 to USD 0.07 per kWh, depending on the rate of consumption.
- Lebanon, Jordan, Sudan and Tunisia. Electricity tariffs are higher. Morocco and the Palestinian Authority have the highest prices. In the Palestinian Authority, they exceed USD 0.15 per kWh for all categories of consumers while for households consuming 3 000 kWh/month or more in Jordan they reach USD 0.20 per kWh.

Box 1.1. **Electricity tariffs in the MENA region** *(cont.)*

In Egypt, Yemen, Lebanon, Jordan, Tunisia and Morocco, tariffs increase according to consumption, rising in step with consumption. However in Bahrain, Iraq, Saudi Arabia, Libya, Qatar, Oman, Algeria and the UAE, prices remain unchanged regardless of consumption. This is demonstrated in the figure below:

Electricity tariffs 2012: Tariff variation



Source: Arab Electricity Union.

Knowing that the average consumption of electricity is around 200 kWh/month in the Arab region (except in the Gulf countries) and focusing on a comparison between the different tariffs of the first rate (250 kWh/month), the following can be observed:

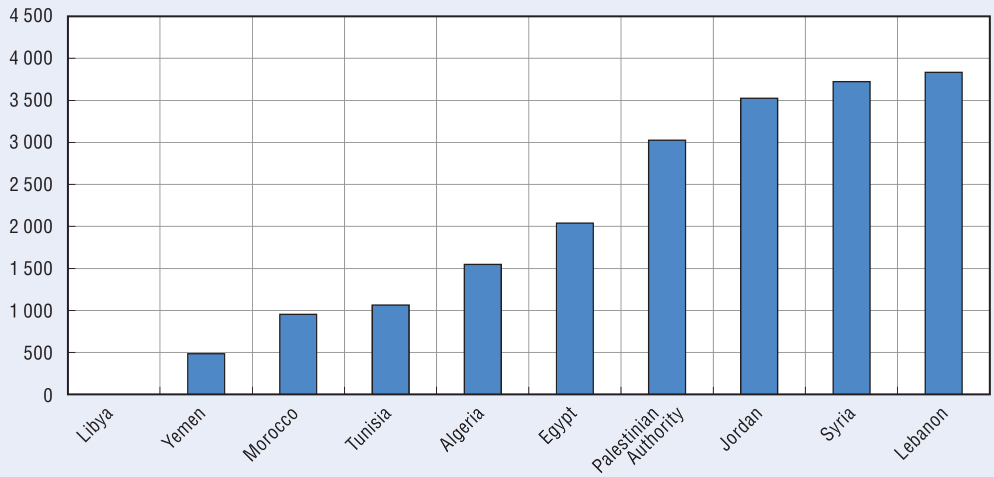
- In Jordan, the tariff represents around 3 to 4 times the tariffs in Egypt and Libya, respectively. It is equivalent to 6 times the tariffs in the Gulf countries.
- Electricity prices in Morocco and Tunisia are more than 10 times the price of electricity in the Gulf countries, 5 times the price in Egypt and more than 6 times the price in Libya.
- In the Palestinian Authority the tariff is more than 15 times that of the Gulf countries, around 8 times higher than the tariffs in Egypt and 9 times the tariffs in Libya.

However, comparing two countries with roughly similar electricity prices, i.e. Lebanon and Algeria, we see that a Lebanese dwelling consumes 2.5 times the quantity of electricity as an Algerian one. In Lebanon, with a higher GDP per capita, the annual consumption by household is equivalent to the annual consumption by household in Syria where the price of electricity is 4 to 5 times lower. Likewise, while the price in Jordan is 10 times higher than in Syria, the average consumption per dwelling in the residential sector is very close to that in Syria. This is shown in the following graph:

Box 1.1. **Electricity tariffs in the MENA region** *(cont.)*

Electricity consumption per dwelling

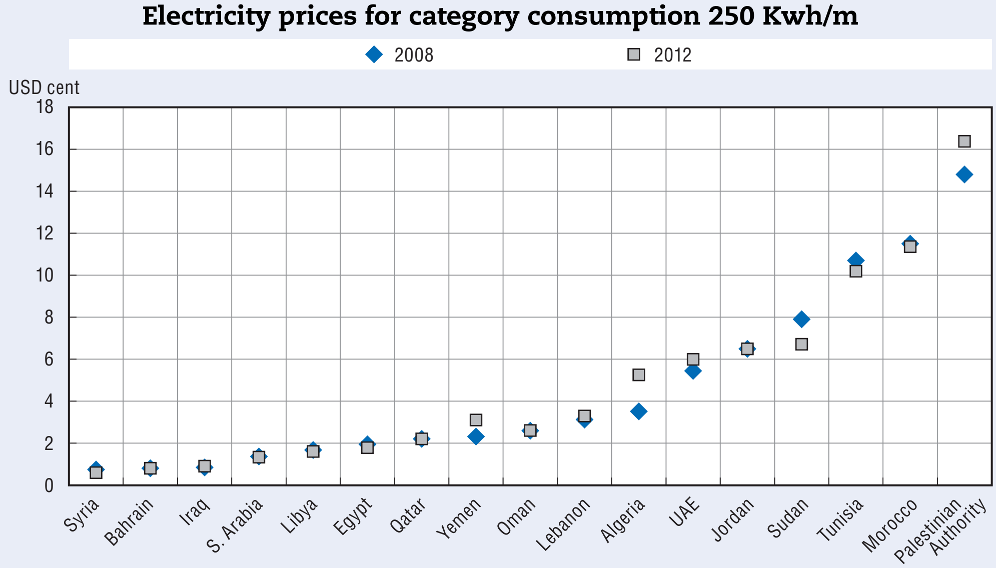
Average 2003-2009



Source: RCREEE and Plan Bleu.

Comparing prices of 2008 and 2012, we observe that the tariffs in the Arab region remained unchanged despite an increase in consumption, with the exception of Algeria, the Palestinian Authority and Yemen, as shown below.

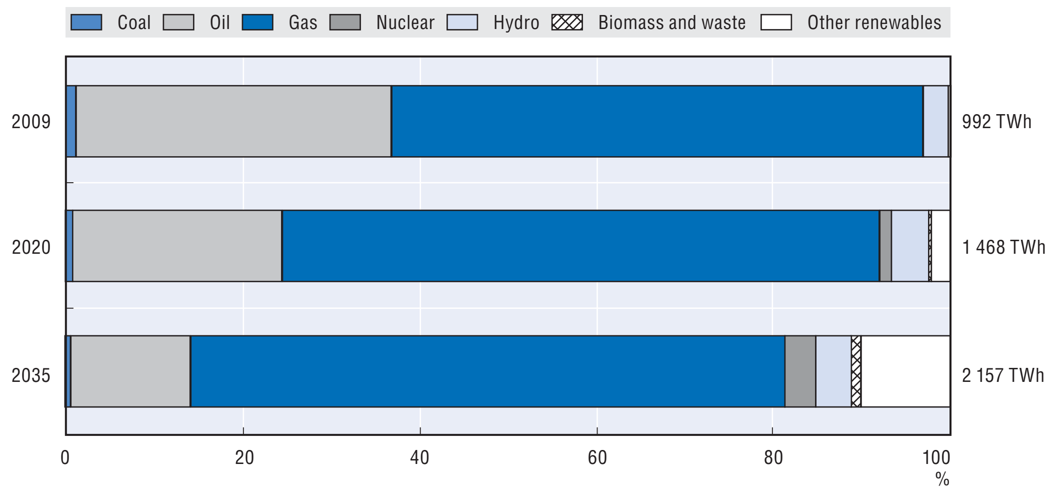
Electricity prices for category consumption 250 Kwh/m



Source: Arab Electricity Union.

Box based on input from RCREEE and the Arab Union of Electricity.

Figure 1.6. **MENA electricity generation mix by fuel in the New Policies Scenario, 2009-2035**



Source: IEA, *World Energy Outlook 2011*.

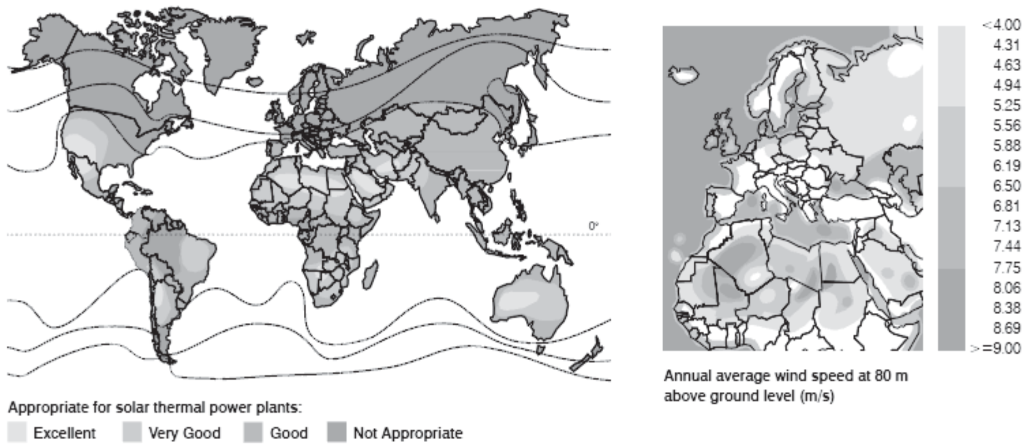
3. Market potential for renewable energy development in MENA

A natural competitive advantage

The MENA region's geographical position endows it with a high potential for the development of renewable energies for power generation. The region has one of the highest potentials for solar energy anywhere in the world. The IEA estimates that concentrated solar power (CSP) plants could generate 100 times[10] the combined electricity consumption of MENA and Europe together. The Atlantic and Red Sea coasts and some parts of the Sahara Desert also have potential for large-scale wind farms as the wind speed in these areas exceeds 6.9 meters/second, the threshold for economic feasibility.[11] Hence several countries in the region have the possibility of shifting their energy mix towards a larger share of renewable energy. Mixing energy sources, such as solar and wind power, would strengthen the reliability and sustainability of the energy supply, as would a regional power generation scheme throughout the MENA region. This scheme could stretch from Oman in the east to Morocco in the west (increasing the total number of hours of sunshine in the day). Renewable energy would also increase energy efficiency, meaning that less energy would be used to produce one unit of economic activity (e.g. the energy used per unit of GDP).

Despite its high potential, in 2009 renewable energy only represented 4% of the electricity generated in the region. However, this figure includes hydropower and rather flatters a country such as Egypt which has the large Aswan High Dam.[12] Without hydropower, the figure is closer to 1% for the MENA region (see Figure 1.8). However, some MENA economies are starting to develop the sector. Seven MENA economies – Algeria, Egypt, Jordan, Libya, Morocco, Tunisia and the UAE – have adopted national plans with quantitative targets to expand the share of renewable energy in their national electricity generation and are setting up national agencies to oversee and promote the use of renewable energies. For instance, Morocco launched a National Renewable Energy and Efficiency Plan in 2008 which sets a target to produce 15% of its energy using renewable energies by 2020. The programme is expected to create up to 40 000 jobs (including indirect

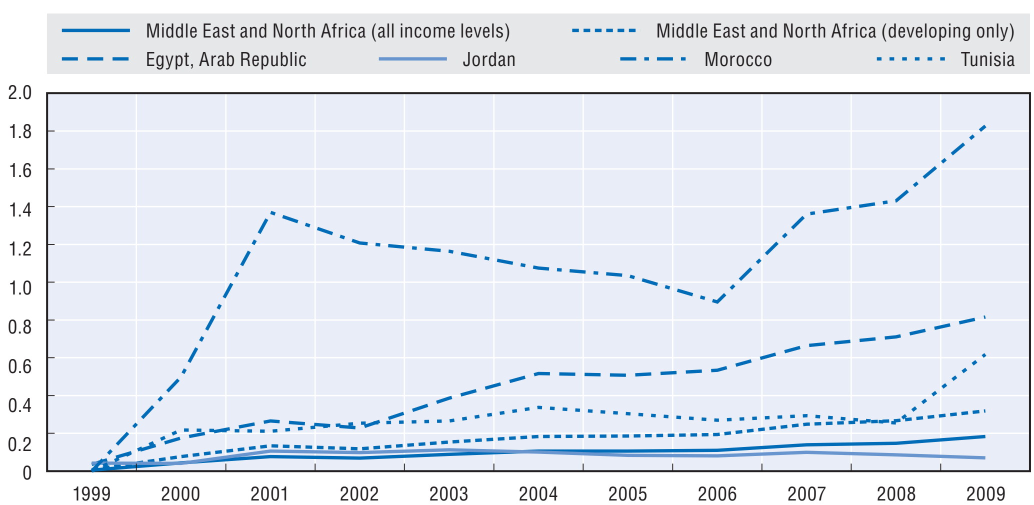
Figure 1.7. **Natural advantage of the MENA region in both solar and wind energy**



Sources: (Left panel) Solar Millennium AG, 2009. (Right panel) German Aerospace Agency (DLR), 2009.

Figure 1.8. **Electricity production from renewable sources, excluding hydro-electric**

% of total

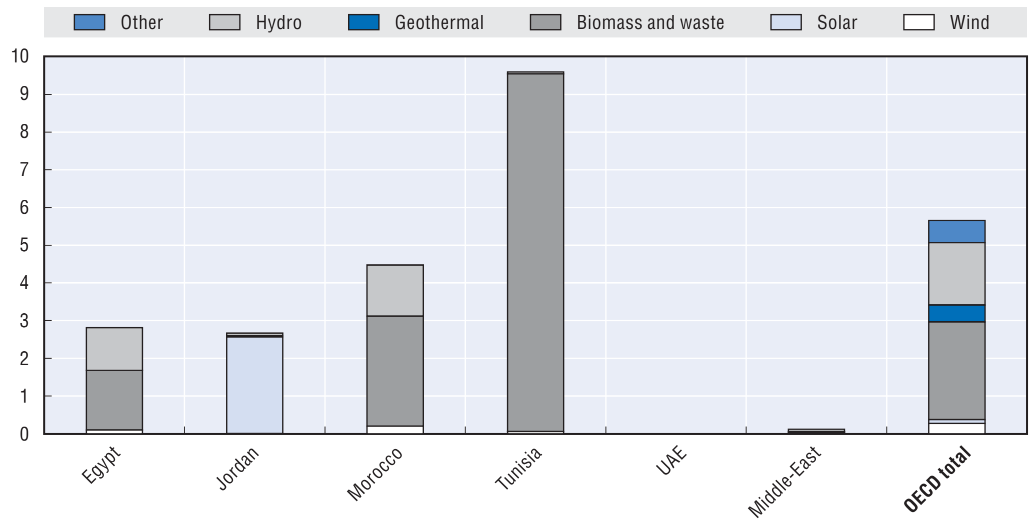


Note: Electricity production excludes hydro-electric and includes geothermal, solar, tidal, wind, biomass and bio fuels.
Source: *IEA Statistics*, 2012.

jobs) and stimulate USD 550 million in investment.[13] A further discussion of national energy policies follows in Chapter 3.

There are several reasons for this low uptake of renewable energy, not least the fact that the innovative technology required remains expensive in many cases, and local energy subsidies create a distorted and uncompetitive market for private investors. This will be discussed in detail in Chapter 2. However, when it is possible to combine public and private sector ambitions, there is ample potential for the development of large-scale projects, as illustrated by the Shams 1 Solar Project in Abu Dhabi (see Box 3.10).

Figure 1.9. **Share of renewable energy production (% of total energy) in selected MENA economies, 2009**



Source: IEA Statistics, 2012.

Europe: A potential market for MENA's renewable energy

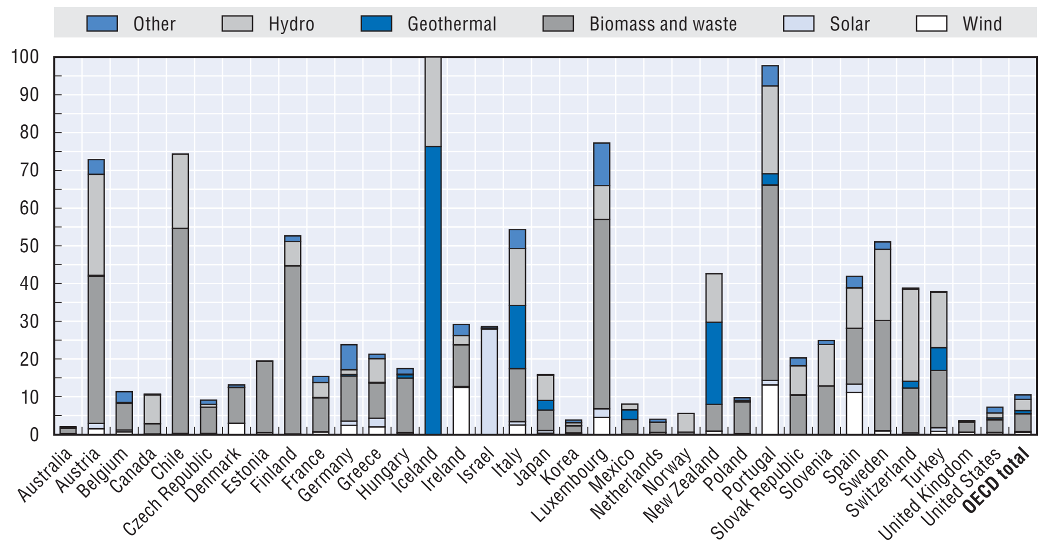
Energy demand in Europe is set to rise by less than global demand. Nonetheless, representing roughly 14% of the world's energy consumption, the European Union will still have sizeable energy needs in the future. The IEA forecasts that primary energy demand in Europe will rise from 1 777 Mtoe in 2009 to 1 904 Mtoe in 2035 (8%), in its benign scenario. This rather optimistic forecast makes important assumptions regarding improvements in energy efficiency, and the implementation of the EU's "2020 Vision" that aims to meet 20% of the EU's energy needs with renewable energy by 2020.

On the other hand, the European Commission forecasts that energy consumption will rise by between 5% and 9% until 2020, depending on the oil price, with a higher increase in case of "moderate oil prices" (European Commission, 2008). The EC expects demand for fuel for transport to increase by 17%-21% by 2020 compared with 2009. The EU has set national targets for the overall share of energy from renewable sources in the gross final consumption of energy of member states in 2020.

The proximity of the MENA region to the European continent means that the MENA region is ideally situated to supply Europe with energy from renewable energy sources. This would greatly contribute to energy security while reducing Europe's GHG emissions. Several such projects are currently being developed:

- The Mediterranean Solar Plan (MSP) was launched in Paris on 13 July 2008 in order to reinforce Euro-Mediterranean co-operation. It is one of six key initiatives of the Union for the Mediterranean (UfM) that aims to meet the major energy and climate challenges confronting both the Mediterranean region and the EU in the coming decades. The MSP has two complementary targets: developing 20 gigawatts (GW) of new renewable energy production capacities, and achieving significant energy savings around the Mediterranean rim by 2020, thus addressing both supply and demand.
- Among the projects that contribute to the development and the implementation of the MSP, Paving the Way for the Mediterranean Solar Plan (PWMSP)[14] is a regional project funded

Figure 1.10. **Share of domestic renewable energy production (% of total energy) in selected OECD member countries, 2010**



Note: Portugal and Luxembourg have high imports of energy.
Source: IEA, 2012.

under the European Neighbourhood and Partnership Instrument of the European Union. PWMSP provides a platform to strengthen the regional energy dialogue and co-operation in the Mediterranean region. In particular, it performs the necessary analytical work on key issues as policy, institutional and regulatory frameworks for sustainable energy. One of the concrete outputs of PWMSP is the realisation of Regional and National Road Maps for Legal and Regulatory Reforms, focusing on renewable energy policy and energy efficiency. The project covers MENA economies such as Algeria, Egypt, Jordan, Israel, Lebanon, Libya, Morocco, Palestinian Authority and Tunisia. The PWMSP has updated the list of renewable energy projects in the region, which was prepared by the *Facilité euro-méditerranéenne d'investissement et de partenariat* (FEMIP) study in 2010, under the European Investment Bank (EIB) initiative. PWMSP is currently working in close co-ordination with MED-TSO (the Association of the Mediterranean Transmission System Operators) on the preparation of the Master Plan for Electricity Transmisssion in the Mediterranean.

- The MedGrid project[15] is an industrial initiative which focuses on energy transmission systems. The project was initiated by the French Government in 2010 and falls within the framework of the MSP. It brings together a consortium of 20 main shareholders,[17] including power companies, network operators and manufacturers of high-tension equipment headed by EDF, a French utility company. It contributes to the Union for the Mediterranean Solar Master Plan, and aims eventually to set up a Trans-Mediterranean super-grid consisting of high-voltage direct current cables between the southern shores of the Mediterranean and Europe, capable of exporting 5 GW to Europe by 2020.
- The Desertec Foundation is a global civil society initiative aiming to "shape a sustainable future".[16] It was established on 20 January 2009 as a non-profit foundation that grew out of a network of scientists, politicians and economists from around the Mediterranean Sea, who together developed the Desertec Concept. At the time of writing, the Desertec Foundation had already made some headway in the Mediterranean region by initiating and co-founding the industrial initiative Dii GmbH and the DESERTEC University

Table 1.2. **EU national targets for renewable energy**

Targets by country for the share of renewable energy in final energy consumption by 2020

	Renewable energy %[1]		
	2006	2010	2020 target
Austria	26.6	30.1	34
Belgium	2.7	3.8	13
Bulgaria	9.6	13.8	16
Cyprus	2.5	4.8	13
Czech Republic	6.5	9.2	13
Denmark	16.5	22.2	30
Estonia	16.1	24.3	25
Finland	29.9	32.2	38
France	9.6	12.4	23
Germany	6.9	11.0	18
Greece	7.0	9.2	18
Hungary	5.1	9.5	13
Ireland	2.9	5.5	16
Italy	5.8	10.1	17
Latvia	31.1	32.6	40
Lithuania	16.9	19.7	23
Luxembourg	1.4	2.8	11
Malta	0.2	0.4	10
Netherlands	2.7	3.8	14
Poland	7.0	9.4	15
Portugal	20.8	24.6	31
Romania	17.1	23.4	24
Slovak Republic	6.6	9.8	14
Slovenia	15.5	19.8	25
Spain	9.0	13.8	20
Sweden	42.7	47.9	49
United Kingdom	1.5	3.2	15
EU27	**9.0**	**12.4**	**20**

1. As a share of gross final energy consumption. Note: the figures for Belgium, France and Hungary are from 2009.
Source: Eurostat 2012.

Network. The Desertec Foundation believes that clean power from the MENA deserts can provide the region with sufficient energy for seawater desalination. In addition, their calculations show that desert power can supply around two-thirds of the region's rising energy demand, while still leaving enough electricity for export, meeting 15% of European consumption. The Desertec Foundation claims that studies by the German Aerospace Centre (DLR) show that this aim is technologically and economically feasible with economic and environmental benefits for all partners.

- The Desert Energy Industrial Initiative (Dii GmbH)[18] is an initiative launched by a network of private sector companies from Europe and MENA as well as the Desertec Foundation. It aims to enable renewable energies and particularly solar and wind energies in the MENA region that would supply both Europe and MENA as a result of a comprehensive Desert Power Perspectives 2050 power systems analysis. The initiation of several reference projects in MENA in this context is another focus of activities of Dii GmbH. Dii will not build power plants itself. Instead it focuses on four core objectives:
  - ❖ developing a long-term plan for the period up to 2050 providing investment and financing guidance;
  - ❖ carrying out specific in-depth studies;

- developing a framework for feasible investments into renewable energy and interconnected grids in EU-MENA;
- initiating pilot projects to prove feasibility. Dii differentiates between early pilot projects that need upfront finance and for which it is generally difficult to engage private investors and large-scale projects which are facilitated by cash-flow incentives such as concessional loans and grants.

An EU-MENA co-operation on renewable energy projects is expected to play an important role to reach the CO_2 emissions targets (80-95% below 1990 level), defined in Europe by the Energy Roadmap 2050. Article 9 of the EU Directive on the Promotion of the Use of Energy from Renewable Sources enables the implementation of joint projects which help member states achieve their renewable energy targets more cost-efficiently through electricity imports.[19] However, these joint projects present several challenges. Based on the experience of joint projects between EU members states and Morocco, the MENA-OECD Task Force on Energy and Infrastructure has identified the main following challenges: regulatory uncertainty as Article 9 have not been transposed into member states' national laws; missing support schemes as Article 9 does not connect to the current support schemes; political complexity as joint projects require agreements between EU members states and MENA economies that are often linked to long political processes; lack of incentives as 2020 targets do not entitle members states such as Italy and Spain, to make use of co-operation mechanisms; and infrastructure bottlenecks as importing electricity into the EU member states puts pressure on their power systems.

A number of measures have been developed by the EU to overcome the aforementioned challenges and make joint projects more operational. These measures provide clarity on the legal and institutional frameworks for joint projects in order to facilitate investment and trade in renewable energy in the region. Despite that, an EU-MENA co-operation should be considered as a long-term strategy for the deployment of renewable energy sources. The Northern Mediterranean countries have a large surplus of energy capacity and the Southern Mediterranean countries have a large deficit of energy capacity, which puts high barriers to establishing joint projects on the short term. Moreover, the recent financial crisis does not facilitate public subsidies, especially in the Northern Mediterranean countries.

4. Expected benefits from the development of renewable energies

The use of renewable energy technologies has long been recognised for having positive environmental effects such as contributing to a reduction in greenhouse gas (GHG) emissions and less local air pollution. From a climate-change perspective, investing in renewable energies would allow countries to avoid a situation of energy infrastructure lock-in into carbon intensive and climate vulnerable development patterns. In MENA economies, a large part of the infrastructure needed for such development is yet to be built. Given the need to scale up infrastructure investment in the coming years to support development and economic growth, there is an opportunity to leap-frog developments in the OECD by introducing greener and more efficient infrastructure, particularly in the energy sector to support renewable energies (see also Corfee-Morlot et al., 2012).

From an economic perspective, developing renewable energy technologies offers many advantages for MENA economies. Renewable energies are considered to be a long-term alternative energy strategy for resource-poor countries such as Morocco or Jordan because they improve energy security and reduce oil import dependency, leading to improved trade balances for net oil-importers. With regard to oil producers, investing in renewable energies helps increase diversification and technology transfers in the local economy. In addition, renewable energies help maintaining hydrocarbon exports and thus the associated revenues for exporting countries, and reduce, as a substitution to other traditional energy sources, energy import costs for importing countries.

An additional economic advantage arising from renewable energy investment is that renewable energy sectors are labour-intensive and thus lead to the creation of domestic jobs.

Creation of local jobs

Promoting the development of renewable energies has an impact on the economy as a whole. It does not only influence the energy sector but it also affects all economic agents directly and indirectly. One economic variable of interest in the MENA region is employment. What follows is an analysis of the economic mechanisms reflecting the correlation between renewable energy development and employment creation (European Commission, 2009). A promotion policy for renewable energies leads to the following changes:

- The demand for investment in the energy sector is affected, which has an impact on employment depending on the productivity of the sector.
- Fluctuations in energy prices affecting income and consumption and production costs of intermediary inputs delivered from the energy sector to the industry.
- An increase in the productivity due to new investments and technologies leading to more competitiveness.

All these mechanisms have an impact on the economic output and thus affect employment. The effect on gross employment includes all positive effects from renewable energy investments while the effect on net employment is estimated by the difference between all positive and negative effects in the whole economy (European Commission, 2009).

Direct impact on employment in the renewable energy sector

Quantitative assessments of the impact of renewable energies on labour markets (ILO, 2008) highlight that all forms of renewable energy projects have significantly higher labour intensity than fossil fuels or traditional energy per unit of installed capacity, per unit of power generated and per US dollar invested. Table 1.3 below, based on findings from a range of studies published from 2001 to 2004, shows that for the production of the same quantity of megawatt hours, solar photovoltaic (PV) plants will use on average seven times more labour than coal-fired plants; and wind power will use on average 1.83 times more labour than natural gas. Overall, renewable energies are estimated to be more labour intensive than traditional energy sources.

Looking at the past experiences in Europe, renewable energy development contributed to 0.6% to total GDP and employment in the EU27. In absolute numbers, it led to the employment of 1.4 million people. Small and medium-sized enterprises had a significant share of employment estimated at 0.9 million people. Renewable energies are expected to create 115 000 to 201 000 jobs in 2020 and from 188 000 to 300 000 jobs in 2030. These estimations are based on a scenario developed by the European Commission DG Energy and Transport, including moderate export expectations. Other scenarios consider energy costs as a main determinant of employment generation (European Commission, 2009).

According to the "Climate Change and Energy in the Mediterranean" study conducted by *Plan Bleu* with the support of the European Investment Bank (EIB) in the South and East

Mediterranean countries (SMECs) (Plan Bleu, 2012), renewable energy sources would become the second employer in the power generation, after gas power plants by 2030. More importantly, the total potential job creation in the SEMCs through energy efficiency measures in the construction sector is estimated to reach 1.9 million to 2.5 million by 2030. The sustained population growth in the SMECs is expected to increase the demand for housing and goods and thus energy. Plan Bleu estimates that 42 million new housing units will be needed by 2030. If new efficient buildings are to be built, this would create 1.5 million jobs by 2030 (Plan Bleu, 2012).

Table 1.3. **Estimated employment per megawatt: renewable and fossil fuel power plants**[1]

	Average employment over life of facility (jobs per megawatt of average capacity)		
	Manufacturing, construction, installation	Operation and maintenance/fuel processing	Total
Solar PV	5.76-6.21	1.20-4.80	6.96-11.01
Wind power	0.43-2.51	0.27	0.7-2.78
Biomass	0.40	0.38-2.44	0.78-2.84
Coal-fired	0.27	0.74	1.01
Natural gas-fired	0.25	0.7	0.95

1. UNEP/ILO/ITUC, 2008, p. 102.
Source: UNEP, ILO, IOE, ITUC 2008.

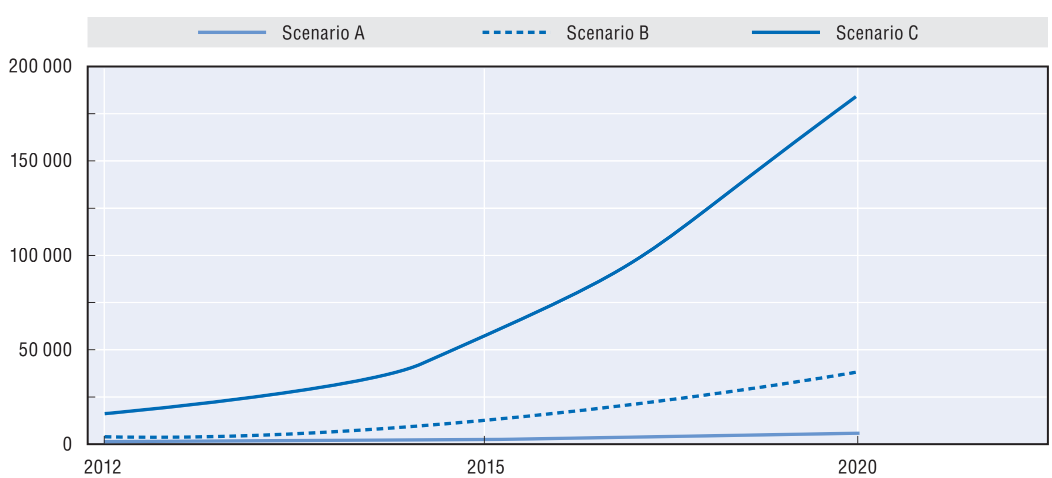
Part of this gap can possibly be explained by the fact that renewable energy requires the use of relatively new technologies, some of which are still in their early stages of development. Moreover, better technology means that between 2000 and 2009 the fossil-fuel sector increased its output while the number of jobs in the sector declined owing to factors such as improved recovery techniques and automation. This led to an increase of productivity and reduced labour inputs for electricity production. In Saudi Arabia, production of electricity continuously increased between 2001 and 2009, but employment in the electricity and gas sector decreased by 13%[20] during the same period. In Egypt in the mining and quarrying sector, employment was reduced by 40% between 2001 and 2007, from 595 000 workers to 355 000 workers. In the UAE, employment in the sector dropped by 13%, going from 407 640 to 359 280 during 2000-2008. In Saudi Arabia, employment in the extraction industries accounted for only 1% of the country's workforce in 2008. These data outline the capital-intensive nature of the hydrocarbons sector, suggesting that job creation in the sector will remain minimal in the future, and that a transition to the more labour-intensive renewable energy sector is likely to lead to a net increase in employment, at least in the short-to-medium term.

Indirect impact on employment

Developing the renewable energy sector can stimulate employment in various manufacturing activities such as design and fabrication, and in the research and development (R&D) of renewable energy technology components. These sectors require a wide variety of skills, ranging from lower-skilled jobs, such as maintenance of the premises to highly specialised, skilled jobs (World Bank, 2011). Moreover, all jobs related to the installation of renewable energy power generating plants are local. If, in addition, the components could be manufactured locally, several more jobs would be generated. Indeed, the high shipping costs of the bulky components used in solar panels and wind turbines would tend to make the construction of large renewable energy plants more cost-effective if the components were manufactured locally. The development of local production and employment resulting from renewable energy projects is only possible if contractual requirements are flexible and barriers to local content reduced. Initial strict requirements for local content are most likely to delay renewable energy projects and discourage investors. Even through governments usually require large local shareholding to protect the property of natural resources such as oil and gas, this could lead to less foreign investors in the host economies and less technology transfers. However, at present this is rarely an option for renewable energy projects, owing to the generalised lack of skills in most of the countries with high renewable potential across North Africa, for instance. Hence, MENA economies would benefit greatly from technology transfers related to renewable energy projects in order to extend the value chain and develop the appropriate skills through education and training programmes. A study commissioned by the World Bank in 2010 (World Bank, 2011) shows that over 48 700 new local jobs for manufacturing components could be created by 2025 with high development of factories for CSP components in five MENA economies (Algeria, Egypt, Jordan, Morocco and Tunisia). This assessment is based on a conservative calculation and assumes that the manufacturers use the same number of employees as comparable factories in Europe.

A study by Ernst & Young on behalf of the World Bank regarding the local manufacturing potential of CSP in five MENA economies includes a broader assessment of the total jobs created, including the direct job creation related to the CSP plant construction, operation and maintenance, and the indirect job creation in the factories of local manufacturers. Figure 1.11 below describes the impact on employment according to the stage of development of the CSP sector: scenario A shows stagnation, scenario B shows small deployment and scenario C shows high development.

Figure 1.11. **Total number of annual jobs created by CSP deployment in the five MENA economies**



Source: Ernst & Young (2011), *Middle East and North Africa Region, Assessment of the local manufacturing potential for Concentrated Solar Power (CSP) Projects,* Washington, DC.

Rural electrification with solar panels helps alleviate poverty

In addition to the direct and indirect employment opportunities related to the manufacturing and installing of renewable energy plants, the development of small-scale renewable energy units in rural areas has the potential to stimulate economic development through the provision of electricity and heating/cooling to areas previously without access to electricity. Indeed, with renewable energy technology, it is possible to combine small energy plant units in rural areas with increased local employment.[21] Energy poverty constrains local economic development and prevents female empowerment.[22] The lack of energy sources mainly affects women, since they are usually responsible for providing heating and cooking for the family (through the collection of firewood or manure for burning) which is highly time-consuming.[23] This workload can act as an incentive to take girls out of school and thus limit their ability to find skilled jobs in the future. Access to energy acts as a trigger for local economic activities enabling local entrepreneurs to start up small businesses such as electronic devices and repair shops. It also improves the prospects of future generations by freeing up time for children and women that can be used for education and to increase their overall standard of living. A well-known initiative is the Grameen Shakti Microloans Solar PV programme. It has helped to install more than 100 000 solar home systems and trained of over 1 000 women as solar PV technicians and maintenance workers in rural communities in Bangladesh.[24]

5. Conclusion

Estimates, based on available data, point to significant economic benefits deriving from developing renewable energy in the MENA region. The region offers great potential for the development of solar and wind power and the proximity of Europe assures a large external market for any surplus energy produced. Developing these technologies locally would also have a strong positive impact on employment. In addition, there are substantial economic benefits to the economies of the region in supporting and developing renewable energy projects. For oil importers, developing renewable energies is likely to have a strong positive effect on the domestic economy, including an improvement of the balance of payments and public finances. For instance, Morocco relies on oil and coal imports for 95% of its energy needs and the government allocates roughly EUR 4.4 billion for oil imports in its annual budget.[25] The cost of oil imports represents nearly 5% of Morocco's GDP (with a budget deficit estimated at 2.2% of GDP in 2009).[26] Surplus energy exports would also boost the trade balance in countries such as Egypt, Oman, Tunisia and Yemen, where domestic hydrocarbon resources are limited.

For MENA oil exporters, the development of renewable energies could help their policy efforts to diversify the economy, thanks to technology and the transfer of skills. It would also help reduce the current high dependence on hydrocarbons (nearly 40% of the average oil exporter's GDP and 80% of export earnings[27]). There will be purely environmental benefits from increasing the share of renewable energies as well, such as less urban air pollution and fewer CO_2 emissions, thereby decreasing the environmental stress on human health and reducing the carbon footprint of these economies.

In addition, private companies investing in R&D and manufacturing of components create positive externalities for other local (domestic) companies: they share the benefits of improving technologies with companies which had not invested in improving the technology in the past; hence the wider economy would benefit.

Even so, and despite the benefits of developing renewable energy projects, large-scale development of these technologies continues to be hampered by their cost and by imperfect market conditions. To alleviate this, there is an acknowledged need for government subsidies and specific support mechanisms or investment incentives.

However, these may be costly for the state to invest in on the one hand, and difficult to assess for the private investor on the other. Chapter 2 looks at the argument in favour of incentives and support measures from the point of view of the OECD's investment policy recommendations. Using investment incentives and support measures, despite their potential for market distortion, can be justified under certain circumstances which will be outlined here. Generally speaking, there is an argument in favour of supporting the new technologies involved in renewable energy, until such time as renewable energy power production becomes competitive, especially in the MENA region.

Notes

1. BP's annual *Statistical Review of World Energy* contains historical data on energy consumption and production going back to 1965 and is generally considered a reference for observers of energy trends.
2. *http://data.worldbank.org/indicator/SP.POP.GROW*.
3. Al Masah Capital Limited, 2010, p. 8.
4. At end-2010, the Middle East (not including North Africa) had 54.4% of the world's proven oil reserves and 40.5% of the world's proven gas reserves. These numbers increase to 58.9% and 45.5% respectively, when Algeria, Egypt and Libya are added.
5. IEA, *Electricity Access Database*.
6. *http://web.worldbank.org/wbsite/external/countries/menaext*.
7. *Source:* BP, June 2011. This data includes Middle East countries, Algeria and Egypt.
8. IEA, *World Energy Outlook 2010*, p. 679.
9. IEA, *World Energy Outlook 2010*, p. 333.
10. IEA, *World Energy Outlook 2010*.
11. *http://glengro.com/wind_energy/Major_issues.html*.
12. Egypt (12%), Syria (7%), Morocco (6%) and Lebanon (3.5%) are the most pro-active countries in this regard; for the other MENA economies, the share of electricity sourced from renewables is below 2%.
13. Deuxième assises de l'Énergie du Maroc, Oujda, 31 mai 2011, "Les énergies vertes : un élan pour le Maroc", Ministère de l'Énergie, des Mines, de l'Eau et de l'Environnement.
14. PWMSP states: "These views are the sole responsibility of the authors, and can in no way be taken to reflect the views of the EU."
15. *www.medgrid-psm.com*.
16. *www.desertec.org/organization*.
17. Abengoa, Alstom Grid, Areva, Atos WorldGrid, CDC Infrastructures, EDF, Ineo, Nemo, Nexans, Nur Energie, ONE, Pan Med Trading and Investment, Prysmian, Red Electrica, RTE, Siemens, Soitec, Taqa Arabia, Terna and Walid Elias Establishment. The French development agency (AFD) has also concluded a strategic partnership with MedGrid.
18. *www.dii-eumena.com*.
19. Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources.
20. Laborsta: *http://data.un.org/Data.as:2B*
21. AEA Technology Group,2010.
22. Energy poverty mainly affects the local female workforce since they are usually responsible for providing energy for the household: ILO, gender equality at the heart of decent work campaign (2008-2009), *"Green jobs: Improving the climate for gender equality too!"*, ILO, Geneva.
23. ILO, gender equality at the heart of decent work Campaign (2008-2009), *"Green jobs: Improving the climate for gender equality too!"*.

24. Grameen Shakti, Diversification and Scaling Up GS Activities through Entrepreneur Development, *www.gshakti.org*.
25. *www.gwec.net/index.php?id=174*.
26. 2009 estimates*www.state.gov/r/pa/ei/bgn/5431.htm*.
27. *www.cia.gov/library/publications/the-world-factbook/geos/xx.html*.

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Renewable Energies in the Middle East and North Africa
Policies to Support Private Investment

Chapter 2

Helping to remove barriers: The rationale for support measures

Investors usually encounter several barriers to investment in renewable energy in the MENA region and elsewhere; governments can help overcome them by using various support measures. Key barriers include a lack of profitability (due to the high cost of the technology used, and government subsidy of utilities), the high risks associated with long-term investment, such as client risk, political and regulatory risks, market risks and the risks of new technology, capital market barriers, and existing policy instruments which favour fossil fuels. The lack of access to finance by potential investors can be attributed to the long-term nature of projects and the high up-front payment and risks associated with them. Barriers can be removed through regulatory, financial or fiscal incentives. However, policy makers need to be aware of the negative externalities associated with the use of certain support measures if they are not carefully targeted.

1. Introduction

In general, private investors are motivated by profits, and in order to embed renewable energy projects and further their development in the MENA region, the authors of this report highlight that the underlying criterion for renewable energy projects has to be their economic viability and profitability. Despite the substantial economic potential of renewable energy across the Middle East and North Africa region (MENA), a number of factors and barriers currently make such projects economically unfeasible without targeted government support, both in MENA and elsewhere. Occasionally, under very specific circumstances, private investors might accept to carry out a renewable energy project with a profit margin close to zero in order to penetrate a promising market or to reinforce their corporate image, but such examples are rare. Hence, as a result of the structure of the energy market in the region and the fact that energy prices, ranging from fuel oil to electricity, are subsidised for end-users, there is an identifiable need for well-targeted government investment incentives and support mechanisms in order to develop private investment in renewable energy in MENA.

The OECD's *Policy Framework for Investment* states that investment promotion and facilitation measures, including incentives, can be effective instruments to attract investment, provided they aim to correct for market failures.[1] That said, and following OECD guidelines for FDI incentives, the authors highlight that the "usage of tax incentives, financial subsidies and regulatory exemptions directed at attracting foreign investors is no substitute for pursuing the appropriate general policy measures". In some circumstances, of which renewable energy projects form part, "incentives may serve either as a supplement to an already attractive enabling environment for investment or as a compensation for proven market imperfections that cannot be otherwise addressed".[2]

The OECD defines investment incentives as government measures directed at the private sector and "designed to influence the size, location or industry of an investment project by affecting its relative cost or by altering the risks attached to it through inducements that are not available to comparable domestic investors".[3]

Throughout the remainder of the paper, the discussion draws on the experience and examples provided by the members of the MENA-OECD Task Force on Energy and Infrastructure.

2. Key barriers to investing in renewable energy in MENA

Since its inception in 2010, the work of the task force makes it clear that private investors are keenly interested in the renewable energy market in MENA. Investing in renewable energy projects in these countries can help companies build leadership in the field and secure first-mover advantage in future markets.

However, there are still major constraints on the development of renewable energy projects. In August and September 2011, the authors conducted several interviews with individual private companies (and members of the task force)[4] to identify some of the main constraints that private investors have encountered when investing in renewable energy. The interviews revealed three main inter-related barriers to private investment in renewable energy in the MENA region:[5] the lack of profitability of renewable energy projects and an inability to generate enough positive cash flow *per se* to recover the installation investments costs; the high project risks as a result of the long duration of renewable energy projects; and, as a result, difficulties for investors to access finance.

The lack of profitability results from factors specific to the renewable energy sector and related to the energy market in MENA. In most cases, the production of electricity from renewable energy sources is more expensive than electricity produced from traditional energy sources.[6] Indeed, most renewable energy technologies are still at the early commercial development stage. Renewable energy technologies are expected to become competitive[7] in the coming decades as the price of fossil-fuels keeps increasing[8] and further innovations in renewable energy technologies are made through their increased deployment, eventually leading to lower costs of electricity generated by renewable energy.[9]

At present, electricity prices across most countries in MENA tend to be too low to enable the investor to recover the cost of generating electricity from renewable sources. Energy and electricity subsidies in the MENA region[10] widen the price gap between the cost of producing electricity from renewable energy and the price of electricity for end-users. As long as renewable energies are less price-competitive than traditional sources of energy, private renewable energy projects will require the support of the authorities in order to be profitable. That is not to say that genuine grid parity is not feasible (see Box 2.1 below). However, owing to the presence of subsidised electricity prices, in the short term most renewable energy projects will not be viable without support.

The high risks associated with private investment in renewable energies can also be a barrier. Members of the task force have identified specific risks associated with renewable energy projects that, if not addressed, can strongly undermine their feasibility. As previously mentioned, the high cost of renewable energy projects implies a long payback period, typically between eight and 17 years,[11] given the marginal profit derived from each unit of electricity sold.

Furthermore, the typical structure of a renewable energy business plan, which involves high up-front costs and small operating costs, exposes the project to certain types of risks. For instance, the instalment costs of renewable energy power plant correspond broadly to the costs of building a gas power plant and the gas supply needed for the entire operation period of the power plant. Unlike the case for the gas supply investment, it is not possible to space out investments in renewable energy in order to split the risks related to the project: the costs are front-loaded. As a result, investors need strong guarantees from the client, typically a government or a governmental authority, from the onset of the project to ensure that they will be able to recover their investments. The following risks linked to renewable energy projects, listed by order of importance, have been highlighted by investors in the MENA region:

- **Client risk:** Most renewable energy projects have only one client, the state, which usually purchases the totality of electricity produced and guarantees the profitability of the project under a specific contract. As such, investors need to make sure that the state will abide by its commitment to buy the electricity under all circumstances. In the MENA region, oil-exporting countries are at an advantage because of their strong budget

Box 2.1. **Grid parity: Just around the corner?**

Grid parity is feasible within a few years: The example of Europe

"Grid parity" describes the situation when power generated from solar energy can be sold for the same price as the electricity in the domestic grid. Reaching grid parity is considered to be an important milestone in the development of renewable energy generated power. Within the industry it is believed that a wholesale shift to renewable energy power generation is possible once renewable energies are viable without subsidy support.

Taking the example of solar power, the economic equilibrium or break-even cost of a generating plant depends on the following parameters:

- The overall cost of the investment (price of the solar panels and the equipment).
- The cost of the debt (interest rate on bank loan or other financing).
- Solar intensity (the more hours of sunlight, the higher the turnover).

In Europe, the price of solar panels has gradually fallen by an average of EUR 2.51/Wp (Watt-peak) over the past decade (2006-2012[1]). The drop in the price of equipment over the past decade has been less pronounced, but the maturing market, increased competition and the rising number of solar panels installed have all led to downward pressure on prices.

The profitability of solar power plants with the same installed capacity (and hence the same investment cost) is a result of the quantity or intensity of sunlight and the selling price of the electricity generated. The more intensive the sunlight the cheaper the energy. Solar intensity varies considerably with geographical location.

For this reason, the annual energy generated in two power plants with the same installed capacity will be twice as high in Johannesburg, South Africa (1 800 hours sunshine/year) as in Rouen, Northern France (900 hours sunshine/year). This also means that the cost of electricity would have to be twice as high in Rouen (e.g. EUR 0.40/kWh) as in Johannesburg (*e.g.* EUR 0.20/ kWh) in order to reach the same level of profits.

For current average investment costs (2012) and aiming for an internal rate of return (IRR) of 8%, the authors estimate that grid parity is possible in Europe with a sunshine value of 1 600 hours/year, and an energy price of EUR 0.20/kWh. These are estimates and may fluctuate according to the financing mode of the investment, especially the interest rate charged on any loan.

In France, the current grid price (2012) is EUR 0.12/kWh. A report from the outgoing French administration under the then president Nicolas Sarkozy (May 2012), indicates that electricity prices are likely to rise to EUR 0.16/kWh in 2016 in France. With a continuous fall in the price of solar panels and an improved electricity yield, this would allow for grid parity in southern France by 2016, with sunshine of around 1 600 hours/year. In other words, grid parity is almost a reality in France. In May 2012, project developers Gehrlicher Solar announced their intention to realise a 250 megawatt (MW) photovoltaic plant without any feed-in tariffs or other economic incentives. The generated electricity will be sold at market price.[2]

Grid parity for solar power in the MENA region?

Solar intensity in most of the countries in the MENA region is above that in France. However, in order to achieve real grid parity and hence genuine profitability, it is the real cost of power generation that must be taken into account, rather than the price charged to end-users (which is often subsidised). In many countries in the MENA region, electricity is considered a staple good similar to food items, and as such benefits from generous state subsidies. In Morocco, for example, there are no domestic hydrocarbon resources and all fossil fuels for power generation are imported. Consequently, the real cost of domestic energy generated is well above EUR 0.20/kWh while the grid price for domestic consumers is around EUR 0.10/kWh.

1. 2012 forecast.
2. *www.pv-magazine.com/news/details/beitrag/spain--gehrlicher-aims-at-pv-without-fits_100006368/#ixzz22Iy4rXue*.

Source: Coruscant Group, OECD, *PV Magazine*.

positions, which reduces the risk of default of payment. Investors are generally more inclined to trust governments with whom they have built a relationship through prior work. From the private sector's point of view, MENA economies with an improved business climate for a certain period of time represent a lower risk.

- **Political risk and regulatory risk:** Linked to the *client risk*, renewable energy projects in MENA are highly sensitive to political risks, such as unexpected policy reversals and associated uncertainty about the future direction of policy. While these risks are shared by all types of investment, they are exacerbated for renewable energy projects as a result of the long payback period. In addition, during the lifetime of a renewable energy project, it is likely that the investor/the company will experience changes of regulation. It therefore needs strong government guarantees to ensure that the profitability (or the very existence) of the project is not affected. This means that the MENA economies that are currently undergoing political transition as part of the 2011 events are seen as potentially riskier in the short-to-medium term. Generally speaking, investors abhor uncertainty. Hence, the more predictable the business environment, the more likely investors are to back projects, especially longer-term projects such as renewable energy power plants.
- **Market risks:** Owing to the long lifetime of renewable energy projects, the usual market risks (interest rates, exchange rates, inflation, commodity price changes, and counterparty credit risks), tend to be exacerbated. Compared with OECD countries, MENA economies generally experience wider fluctuations of macroeconomic indicators making their investment climates harder to forecast for investors.
- **Technology risks associated with the novelty of the technology:** New technologies have higher risks than tried and tested ones. The lack of embedded expertise and experience can lead to misjudgements and an unexpected increase in incurred costs. Furthermore, with state-of-the-art technology there is more uncertainty regarding the ability to find a work force with the appropriate skills in the MENA region, which could decrease the productivity of the renewable energy project. As a region where such projects are few and far between, these risks are also perceived to be higher in MENA owing to the lack of experience of the labour force.
- **Access to finance:** Because of the high up-front payment and risks associated with renewable energy projects, banks are often reluctant to provide finance and will typically charge a premium.[12] As a result, conventional energy companies usually have better access to finance for renewable energy projects than newly established renewable energy companies.

3. The rationale for government support: Helping remove barriers

From a government's perspective, the general objective of providing investment incentives is to attract private investment to a specific economic sector. With regard to renewable energy in MENA, there are two broad motives for wanting to attract private investment. In some countries, such as Morocco, Egypt and Jordan, the authorities hope to take advantage of the private sector's financing capacity in order to reduce the cost to the state budget of increasing the share of renewable energy in the national electricity mix. In addition, by encouraging private investment MENA governments are hoping to benefit from the positive externalities associated with renewable energy. Apart from the environmental externalities (an outright reduction in the country's carbon footprint), these also potentially include technology transfers, support of industrial development in the energy sector,[13] an improved trade balance for oil importers and an increase in skilled jobs for the local community.[14]

To this end, authorities provide specific and direct advantages to private (foreign) investors to encourage them to carry out investment projects that they would not have implemented otherwise. The private investor is the ultimate beneficiary of the incentives and the cost of the incentive is typically borne by the authorities.[15] The magnitude of the impact on the public budget of an investment incentive depends on the characteristics of the incentive itself: its nature, size, threshold and conditions of implementation. The OECD sorts investment incentives into the following broad categories:[16]

- **Regulatory incentives** are policies that aim to attract investment through measures to enhance the business environment in general or introduce regulations targeted at specific sectors, such as legislation facilitating access to a previously strictly-controlled market. They can also take the form of regulatory exemptions and dispensations granted to specific sectors. Regulatory incentives generally do not entail any major public expenses.
- **Financial incentives** aim to offset market imperfections and to diminish transaction costs for investors. They include, among others, soft loans and loan guarantees, capital subsidies, premiums and grants in order to compensate the investor for market deficiencies. Financial incentives generally involve public funds being directed to the private investor, except if the incentive is distributed from a foreign or international financial institutional.
- **Market-based incentives** consist of encouraging market actors, particularly consumers, producers or suppliers to use or produce a share of electricity from renewable energy sources by offering tradable commodities such as Tradable Green Certificates and Carbon credits as a proof of compliance and as a way to internalise market externalities.
- **Tax or fiscal incentives** consist of an easing of the tax burden on the investing company or its employees. Fiscal incentives usually take the form of specific tax exemptions or targeted reductions items such as import levies, sales tax, value-added tax, and so on. According to its budget line, the government manages those incentives in order to minimise the burden of the incentives on the public budget while guaranteeing the stimulus effect on the investment. Tax incentives typically result in losses of tax revenues for the government.

When implementing an investment incentive, the government wishes to create a positive stimulus for the private investor while attempting to minimise the budgetary cost, thus ensuring that the long-term benefits to the domestic economy outweigh the resources disbursed. However, there are significant drawbacks associated with investment incentives, due to problems such as asymmetric information and moral hazard, which may lead to a waste of public resources.

With regard to subsidies in particular, the members of the task force emphasise that if a subsidy or investment incentive is set too high; or if the criteria for qualifying are too easy (as was the case for Photovoltaic [PV] subsidies in France in recent years) (see also Box 3.2), there is a risk that unprofitable companies will enter the market. This can potentially lead to a high number of failures and bankruptcies that can be avoided if incentives are allocated and monitored over the duration of the project. This argument is also supported by the Business and Industry Advisory Committee to the OECD (BIAC).

Box 2.2. **Negative externalities associated with investment incentives**

The wrong choice of investment tool or incentive can lead to public resources being unnecessarily wasted. This can also happen when the tool chosen does not lead to productive private sector practices. Wastage may occur from the way a given policy action influences future "rules of the game". The OECD publication *Checklist for Foreign Direct Investment Incentives Policies* lists the following types of unintended wastefulness resulting from investment incentives:

Ineffectiveness: This is the basic case of wastefulness: the application of renewable energy incentives fails to produce benefits to the host economy that exceed the budgetary costs. This situation may arise where authorities apply faulty cost-benefit analysis (or no cost-benefit analysis at all) to their incentive programmes or where promised benefits do not materialise and conditions applied do not prevent reduced, non-payment or recovery of incentives paid.

Inefficiency: This is the case where incentives produce benefits that outweigh the costs, but authorities fail to properly maximise the benefits and minimise the costs. In other words, similar results might have been obtained at a lower cost, whereby the difference between the actual and the potential cost must be characterised as a waste.

Opportunity costs: When the resources available to attract investment in renewable energy are scarce, the issue arises of alternative use of funds. Incentive schemes that are both effective and efficient may nevertheless be wasteful if the funds that are sunk into financing them could have been used more profitably.

Deadweight loss: This term refers to the situation when:

- Authorities find themselves subsidising investment projects that would, with the benefit of hindsight, have taken place anyway in the absence of incentives.
- Authorities fail to specify adequately the intended recipients and to circumscribe the application to that group only; this has resulted in spillover to non-target groups.
- Authorities, in order to maintain a reasonably level playing field in their domestic business sector, feel obliged to match renewable energy incentives by offsetting subsidies to other enterprises.
- Authorities, by offering particularly generous incentives to some projects, effectively "raise the bar", creating a reference point that future investors will use to demand a similar degree of generosity.

Triggering competition: Long-term costs of an incentive scheme include the economic burden that arises if other jurisdictions put in place matching measures. This is of particular concern when introducing new measures or significantly increasing the generosity of the ones already in place. Doing so without properly assessing the likely reactions of other jurisdictions can in many cases amount to a wasteful practice.

Adverse selection: The intervention of the government in the market increases the risk of adverse selection through asymmetrical information. The government faces difficulties in identifying the most efficient technologies and companies in the renewable energies sector. As a result, incentives can end up supporting the less efficient technologies. Hence there is the risk that incentives allow non-efficient private investors to survive and even win over more efficient incentives.

Source: OECD (2003), *Checklist for Foreign Direct Investment Incentives Policies*, OECD, Paris.

4. Conclusion

Addressing the investors' concerns in the renewable energy sector – what investment incentives do

There are a number of arguments in favour of the use of government support schemes for the development of renewable energy, especially in the MENA region. Resource allocation based on market forces alone may not be efficient owing to the "free rider" effect: companies will hold off investing in new technologies because they expect to benefit from positive spill-over effects from investment by other companies. This example from economic theory applies to the renewable energy sector which, in common with other new technologies with economic impact, needs to rely on government support systems.

Government support mechanisms or investment incentives, applied to renewable energy projects, primarily aim at boosting the profitability of the investment. A project is profitable when the present value (PV) of a project is equal or superior to the cash flows (CF) received during the time of the project updated at the discount rate (r) of the project less the investments incurred. The basic equation of a payback period is given below:

$$PV = -\text{Initial investment cost} + CF1 / (1 + r) + CF2 / (1 + r)^2 + CFn / (1 + r)^n$$

The discount rate aggregates the different underlying risks of the project. As such, the less risky a project is, the higher the degree of feasibility for the same amount of cash flows received. Based on this equation, there are three ways in which support mechanisms can boost the profitability of a renewable energy project:

- reducing the cost of the investment by bearing part of the project costs through direct subsidies or fiscal incentives;
- increasing the positive cash flows by providing incentives for the private sector to produce energy through renewable energy technologies;
- reducing the overall risks associated with the project (represented by the discount rate) through soft loans, loan guarantees and contract guarantees.

The work of the Energy Task Force has focused on identifying the measures most likely to attract private investors into long-term renewable energy infrastructure projects. Hence this report focuses mainly on **measures that address the issue of cash flow during a project's life cycle**. The choice of focusing on these measures is partly that they are specific to renewable energy projects and partly because, in interviews with the OECD, private sector operatives have clearly identified them as the most attractive for investors in renewable energy power generation.

The next chapter outlines some of the support measures that have been used by OECD countries and gives examples of good practices developed over time, essentially the provision of price-driven and quantity-driven measures. It then goes on to compile an inventory of the measures currently applied in the MENA region and whether they appear to have yielded results so far.

Notes

1. *Policy Framework for Investment*, OECD, 2006, p. 14.
2. *Checklist for Foreign Direct Investment Incentive Policies*, OECD, 2003, p. 8.
3. Ibid. p. 7.

4. The companies interviewed include: GDF-Suez, Total SA, Schlumberger, Lloyds Banking Group and Trama Tecno Ambiental.
5. These barriers were identified during the work meeting of the Energy Task Force and detailed during one-to-one interviews with private sector actors.
6. Al Masah Capital Management Limited (2010), "Unlocking the Potential of Alternative Energy in MENA".
7. German Aerospace Center, 2005.
8. The International Monetary Fund estimates that Saudi Arabia, the world's largest oil exporter, needs at least USD 80/barrel to balance its budget, up from about USD 50/b in 2008. A decade ago Saudi Arabia was able to balance its budget with oil prices averaging USD 20-25/b. Reported in the *Financial Times* on 17 January 2012: *www.ft.com/intl/cms/s/0/af13f09c-405f-11e1-9bce-00144feab49a.html#axzz1jcM3WXNQ*.
9. IEA, *World Energy Outlook*, 2010.
10. "Dangers of Electricity Subsidies in Arab Countries", *Middle East Economic Survey*, July 2010.
11. *Sources:* Estimate based on interviews with members of the Energy Task Force carried out in August and September 2011.
12. Kalamova, Kaminker and Johnstone, 2011.
13. Ministère de l'Énergie, des Mines, de l'Eau et de l'Environnement, 2011.
14. Al Masah Capital Management Limited, 2010.
15. In the MENA region the cost of support measures is unlikely to be passed on to the end-consumer via electricity prices, as is the case in most European countries.
16. OECD, 2003.

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Renewable Energies in the Middle East and North Africa
Policies to Support Private Investment

Chapter 3

Support mechanisms for the renewable energy sector in the Middle East and North Africa

Support for renewable energy development in OECD countries most often takes the form of feed-in tariffs and net metering as these are measures which address the issue of cash flow during a project's life cycle. To help decision makers attract private investment and limit public expenses, an optimal mix of support mechanisms must be selected to guide private investment to the renewable energy sector, ensuring profitability for the investor and minimum cost for the government. These measures are specific to renewable energy projects and have been developed specifically to attract investors to renewable energy power generation. In the MENA region, a number of countries are implementing some support measures, but they vary in consistency across the region. A perfect incentives scheme as such does not exist. The optimal incentives scheme for a country needs to take into account national circumstances such as a country's renewable energy potential, its energy policy framework, the existence of non-economic barriers, the degree of market liberalisation and its energy system infrastructure. These exogenous features are all likely to influence the effectiveness of any national incentive scheme.

1. Introduction

By the end of 2011, 109 countries worldwide had policies or specific targets in place to support renewable energy power generation; roughly half of those countries were in the developing world.

Government support for renewable energy projects can take different forms. Public authorities frequently choose to support renewable energy by **reducing part of the costs of a renewable energy project** through incentives such as direct subsidies, grants and premiums that aim at reducing installation costs, investment costs or operating expenses borne by the private sector. **Fiscal support** is another means: authorities can reduce the investor's total tax expenses through tax reductions or exemptions. In order for such incentives to work as intended, they require a good understanding of the drivers of profitability in the renewable energy project's business plan along with a thorough assessment of the strengths and weaknesses of the business environment.

This kind of individual tailoring significantly increases the transaction costs of the incentive. In addition, this type of direct support can be distortive in the sense that it is not necessarily the original target which benefits from the mechanism but rather other stakeholders in the value chain. For instance, in the case of a supply market with few competitors, financial support to help renewable energy investors purchase supplies can lead to an increase in the price of the supply due to the improved purchasing power of the investor. Consequently, the supplier sees rising profitability, while the investor still has to bear the same supply cost and the government has increased its spending. Precautions must be taken when designing such support mechanisms to ensure that a sudden increase in demand does not lead to a price increase and wasted public resources.

Rather than reducing the investment cost, authorities can provide incentives that **make the production of renewable energy more attractive and profitable throughout the entire project life cycle**. Within this logic, two approaches are possible: offering a higher price (tariff) for the electricity produced (**price-driven incentives**) to support earning, or mandating market actors to produce a certain quantity of renewable energy-derived power at unspecified prices (**quantity-driven incentives**, also known as market-share policies), thereby creating a market where renewable energy can be sold with an acceptable profit margin. These incentives are transitional tools to support the different stages of the development of renewable energy projects. They are usually used in the short run to ensure cost competitiveness to private investors and help them develop mature technologies until they become competitive enough to operate without any subsidies.

A third approach consists of directly **targeting and reducing the risks associated with renewable energy projects** using financial incentives. Soft loans or loan guarantees, for instance, reduce the financial risks associated with projects. When purely financial incentives are associated with measures to reduce the risks, there is *additionality*, increasing the attractiveness to the private investor. However, most financial support mechanisms automatically have an impact on the risks associated with the project. A power purchase agreement, for instance, reduces client risk by effectively guaranteeing that the state will buy the electricity produced for the entire duration of the project while feed-in tariffs greatly reduce the market risk.

This chapter will focus on support mechanisms geared towards renewable energy power production.

2. Price-driven incentives: Offering higher tariffs

With price-driven incentives government authorities fix prices but the quantity of energy produced is unconstrained. Compared to quantity-driven incentives these are considered to be a less market-oriented type of incentive scheme.

Feed-in Tariffs (FiT)

How does it work?

Feed-in tariffs (FiTs) and feed-in premiums are the dominant support policies for wind power and solar PV in the majority of OECD countries, especially in Europe. According to Bloomberg New Energy Finance (BNEF), 59% of global wind capacity and 87% of global solar PV capacity have been deployed in FiT markets (BNEF, 2011, as quoted in Corfee-Morlot, et al., 2012, forthcoming). FiTs are acknowledged as one of the most efficient short-run incentive mechanisms for private investment in renewable energy.[1] This mechanism addresses some of the key issues related to private renewable energy projects while attempting to limit the waste of public resources. However, governments are faced with an important information gap that makes it difficult to set the appropriate price level. An FiT combines regulatory and financial incentives. In particular it guarantees to the producer *i) grid access*; *ii)* long-term contracts for the electricity produced (typically 15-25 years); and *iii)* fixed purchase prices based on the cost of renewable energy generation.

The FiT sets up a long-term contract between the authorities and the renewable power generators; a fixed price is paid to renewable generators for each MWh produced and supplied to the grid. The FiT price is generally set by the government and aims to reward renewable-based electricity generators. It reflects the cost of the technology.

Tariffs are based on the production costs of each technology, augmented by a premium which allows investors to obtain a reasonable return on their renewable energy investments. As a result, the price is set at a higher level than the spot price of electricity. The support given to renewable energy producers corresponds to the difference between the feed-in tariff and the market price for electricity. These costs are passed on to the consumer.

The cost-based dimension of the tariff is a key efficiency factor which enables projects with differing levels of market-competiveness (wind, solar, etc.) to be developed.

One of the key policy challenges related to FiT is the lack of information necessary to setting the appropriate price level. A too-low price is unprofitable for the investor, whereas a too-high tariff leads to the selection of unprofitable companies. Also, the efficiency of FiTs relies on the ability of governments to assess the cost of projects and to keep the payment levels in line with actual costs. Therefore differentiating the tariff levels according to renewable energy generation costs is the best way to avoid wastefulness. However, this approach implies a high degree of technical capacity in the client government agency that sets the tariff. Another challenge is that FiT costs usually are passed on to consumers, which is a more sensitive issue in the MENA region where end-user electricity prices tend to be subsidised.

Where is it used?

At present, 22 out of the OECD-30 countries have some form of FiT in place. Pioneer FiT schemes were implemented in the US (1978), Portugal (1988), Germany (1991) and Denmark (1992). These schemes based tariff levels on the avoided costs[2] not on actual costs. Good practice consists of setting different FiT according to the technology used and the plant size. Even in countries relying mainly on quantity-driven incentives, FiTs are becoming increasingly popular to support small-scale power generation, especially from solar photo voltaic technology (solar PV). This is the case of the UK and Italy which have both introduced FiTs for small renewable energy generation.[3] In the US, seven federal states have adopted FiTs[4] and Japan is considering extending its current FiT scheme to smaller generators.

What are the best practices?

Differentiating FiT payments according to renewable energy generation cost. At present, differentiating the tariff levels according to renewable energy generation costs (e.g., by technology, by project size, by location – such as onshore or offshore wind – and by resource quality) is a widely recognised best practice.

The efficiency of the FiT mechanism relies on the ability of policy makers to assess the cost of projects and to keep the payment levels in line with actual generation costs over time as technology changes, and improved energy savings and the use of smart grids lead to cost reductions. There is a risk that the fixed price is either too high or too low, leading to wastefulness or inefficiency. Differentiation encourages renewable energy deployment of a variety of technologies and reduces windfall profits for producers. A high level of differentiation also ensures that jobs, manufacturing opportunities and associated economic activities are equally spread over several renewable energy technology sectors.[5] The possibility of providing specific support for each renewable energy technology is a major advantage of feed-in tariffs over other support mechanisms, such as quota based systems.

- The German Renewable Energy Act of 2000 was the first FiT mechanism that calculated the remuneration for all technologies, including solar power, based on the technology-specific generation costs.

Using degressive tariffs. In order to encourage innovation, technological change and to avoid windfall profits, many FiT schemes have sunset clauses which automatically reduce tariff payment annually on the basis of the anticipated technological learning curve over time. Next to a fixed decrease, the tariff evolution can be coupled with effective deployment of renewable energies ("breathing cap mechanism").

- In Germany for instance, the tariff for wind energy is reduced by 1% every year. In the case of solar PV the degression rate can reach 11% due to the higher potential for technological advances.

- In France, degression of FiTs was not practiced before 2008. This led to a situation whereby guaranteed FiTs for solar PV were 7 to 14 times higher than the market prices for electricity. Two reductions in tariffs for solar energy and in particular for solar PV were implemented in 2010 and are designed to eventually make FiTs converge with market prices.[6]

Stabilising revenues with FiT premiums. Although FiTs were originally designed to be the only remuneration for the energy producer, five OECD-30 countries now have a scheme containing FiT premiums. Premiums are additional payments which supplement revenues from the sale of electricity for the FiT.

Premiums are either fixed (Czech Republic, Slovak Republic and Spain), or vary according to market prices (Denmark and Netherlands). Varying premiums guarantee fixed or more stable revenues for producers. In addition, premiums can be the only available FiT option (Denmark, Netherlands and Slovak Republic) or producers can choose a premium or a fixed rate (Spain and Czech Republic).

Box 3.1. **Solar power support measures in Spain are constrained by debt crisis**

Spain is considered to be one of the more advanced countries with regard to the development of solar energy and its associated policies. Spain is one of the European countries with the most hours of sunshine. In 2008 the Spanish government set a target of obtaining 12% of its primary energy from renewable energy by 2010. The target was complemented by another target of having an installed solar generating capacity of 10 000 MW by 2020. The Spanish feed-in tariff, under Real Decreto (Royal Decree) 661/2007 differs from the more habitual (German) model in that it offers the option of premium sales into the wholesale electricity spot market, in addition to fixed incentives.

Initially, the Spanish policy was hugely successful, leading to the launching of several large-scale projects. In March 2007, Europe's first commercial concentrated solar power tower plant was opened near Seville (Andalusia). The 11 MW plant, known as the PS10 solar power tower, produces electricity with 624 large heliostats. Each of these mirrors has a surface measuring 120 m^2 that concentrates the sun's rays and sends them to the top of a 115m-high tower where a solar receiver and a steam turbine are located. The turbine drives a generator, producing electricity.

The Andasol 1 solar power station is Europe's first parabolic trough commercial power plant (50MWe), also located in Andalusia. The plant came online in November 2008 and has a thermal storage system which absorbs part of the heat produced in the solar field during the day. The heat is then stored in a molten salt mixture and used to generate electricity during the night or in cloudy weather.

Abengoa Solar began commercial operation of a 20MW solar power tower plant near Seville in April 2009. The plant, the PS20, is adjacent to the PS10 plant.

Several other projects are under way, including a 15MW solar-only power tower plant, the Solar Tres project, owned by SENER (a Spanish developer). The plant employs molten salt technology for energy storage. Its 16-hour storage system will be able to deliver power around the clock. The Solar Tres project has received an EUR 5 million grant from the European Commission's Fifth Framework Programme.

Box 3.1. **Solar power support measures in Spain are constrained by debt crisis** *(cont.)*

However, the Spanish incentives have been severely affected by the domestic debt crisis. In the wake of the 2008 financial crisis the Spanish government drastically cut its subsidies for solar power and capped future increases in capacity at 500 MW per year, with effects upon the industry worldwide. In 2010, the Spanish government went further, retroactively cutting subsidies for existing solar projects to avoid paying arrears of several billion Euros to the industry. According to the Photovoltaic Industry Association, several hundred photovoltaic plant operators faced bankruptcy. As a result, a Spanish association of solar power producers has announced its intention to go to court over the government's plans to cap solar subsidies.

In addition, in January 2012 The Spanish Council of Ministers implemented a temporary suspension of the renewable energy feed-in tariffs for new installations.*

The retroactive nature of Spain's subsidy reduction has damaged investor confidence and is threatening to undermine the government's long-term targets for renewable energy production.

* *www.pv-magazine.com/news/details/beitrag/spain-suspends-fits_100005605/#ixzz1ytkyhV62.*
Source: OECD research and *www.pv-magazine.com/news/details/beitrag/spain-suspends-fits_100005605/#ixzz1ytkyhV62.*

Targeting certain policy objectives through specific tariffs.

- *Location-specific tariffs:* This approach has been tested in the case of wind energy in Germany. The policy objective was to achieve a more even distribution of wind power plants in a given territory by decoupling profits from the electricity production capacity. All wind power producers were provided with a flat-rate tariff for the first years of operation. A concentration of windfall profits for producers at very good locations could thus be avoided. A location-specific tariff scheme should nonetheless preserve somewhat higher profitability rates at the most windy locations in order to maintain the overall efficiency of the feed-in tariff scheme.

Adapting financing of FiTs to the needs of developing countries

- The cost of implementing FiTs is generally passed on to all consumers. It might be difficult to predict the number of market players and therefore the number of renewable electricity projects that are attracted by a certain tariff level. When implementing FiTs in developing countries, the financing mechanism might need to be modified in light of the fact that electricity consumers in these countries, especially the poorest, are usually more vulnerable to electricity price increases. Mendonça, Jacobs and Sovacool (2009) suggest two specific design options:
- *Capacity caps:* Limiting the capacity of installed renewable plants can limit costs for the final consumer. These "capacity caps" can have disruptive effects but are the only possibility for governments to control the deployment rate and volume of renewable energy under an FiT.
- *Cost sharing:* The additional costs (or parts of them) for the consumer could be covered by a national fund for renewable energy deployment or other types of cost-sharing.

Box 3.2. Germany, a leader in renewable energy deployment: The case of FiTs

The German Renewable Energy Sources Act came into effect in 2000 and has been copied by many countries around the world. It triggered a domestic boom in solar electricity production. This success is largely due to the creation of a favourable political framework and a smart incentive design based on the following three factors:

1. The German Renewable Energy Law of 2000 was the first feed-in tariff (FiT) mechanism that calculated the remuneration for all technologies, including solar power, based on technology-specific generation costs. It has been amended several times since then to follow developments in renewable energy technology.
2. German FiTs are degressive in order to take into account the development of technology and the learning curve of the industry. The tariff for wind energy, for instance, is reduced by 1% per annum. In the case of solar PV, the degression rate can reach 11% due to the higher potential for technological learning.

In comparison, France only started using degression of FiTs in 2008. This led to an oversupply of energy as guaranteed FiTs for photovoltaic energy were 7 to 14 times higher than the market price of electricity. Two reductions in tariffs for solar energy and in particular for PV were implemented in 2010. They were designed to make FiTs converge with market prices over time.*

The German FiT has a "breathing cap" mechanism. If deployment exceeds a certain amount, tariffs are cut more; if deployment is falling behind the national scenario, tariffs are reduced by less than anticipated. This procedure, however, only takes into account domestic market data. Incorporating global data (module price index) may lead to some further refinements of the mechanism.

* OECD, 2011.
Source: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany at: *www.deutschland.de/en/environment.*

Net metering

How does it work?

Net metering is a mechanism that encourages consumers to produce their own electricity from renewable energy sources and sell any surplus production for higher tariffs. Under this scheme, independent power producers, such as an energy-intensive industry, are allowed to produce renewable energy electricity to offset some or all of their energy use and transport it to the point of consumption through the national electricity grid. Furthermore, they are allowed to sell the surplus energy produced to the national electricity company at an incentive tariff. To this end, a device (a meter) is set up to measure the difference between the energy produced and the energy consumed by the industry, and determine the price difference. The benefit of this incentive for the government is a higher share of renewable energy in the national energy mix while subsidising only the excess energy produced.

Where is it used?

Net metering has been applied in a number of countries and regions, including a large number of states in the US, most Australian provinces, Japan, Mexico, Thailand and Denmark. Two of the most successful net metering schemes were implemented in

California and in New Jersey, which led to the installation of more than 23 000 solar systems by early 2008 (Mendonça, Jacobs and Sovacool, 2009). Net metering is a concept primarily applied to the promotion of decentralised solar electricity. Theoretically, other technologies can also be eligible for net metering mechanisms.

What is the best practice?

Allowing unlimited total installed capacity. The most successful net metering schemes do not limit the total installed capacity eligible under the system. Under most net metering mechanisms in the US, producers of renewable electricity cannot sell more electricity to the grid than they consume. However, this provision tends to favour small-scale producers only and could be left out to avoid restricting production.

Box 3.3. **Colorado's net metering scheme**

Colorado's net metering policy, established in 2004 and subsequently amended, is widely considered to be one of the best in the United States. Colorado allows net metering for systems sized up to 120% of the customers' average annual consumption for all customers of investor-owned utilities. For customers of municipal utilities and electric co-operatives, the limits are 10 kilowatts (kW) for residential systems and 25 kW for non-residential systems. There is no stated limit on the aggregate net metering capacity in Colorado. Any net excess electricity generated by a customer during a billing period is carried forward to the customer's next bill as a full kWh credit (i.e. at the utility's retail rate). At the end of a 12-month period, the utility purchases any remaining excess electricity from the customer at a rate lower than the retail rate. Alternatively, customers can choose to roll over the net excess generation credits indefinitely. Customers own the Renewable Energy Credits associated with the electricity they generate.

Source: US department of Energy, *Database of State Incentives for Renewables & Efficiency*.

3. Quantity-driven incentives

The idea behind quantity-driven incentives is that the government prescribes a certain quantity of energy to be produced by renewable energy technology but allows prices to be defined by market forces. This approach is considered more market-oriented than price-driven incentives.

Competitive bidding process: a regulatory incentive

How does it work?

In the case of competitive bidding processes, the regulator defines a reserved market for a given amount of renewable energy to be produced and organises an auction to allocate this amount to renewable producers. Electric utilities are then obliged to purchase the electricity from the selected power producers. The bidder with the best offer wins the tender and has the exclusive right to profit from the support granted. The financial support can either be based on the total investment cost or the power generation cost per electricity unit.

The competitive bidding process allows the public authorities to assess the project based on different evaluation criteria: quality of the project, cost of the electricity produced and benefits to the local economy (i.e. percentage of domestic content, local jobs created). Competitive bidding stimulates competition and improves the competitiveness of the project while reinforcing the government's ability to choose the best offer. Another advantage is that public bidding encourages price discovery.

Where is it used?

Tender systems have been used in a number of countries by independent conventional power producers. The United Kingdom was the first country to establish a tender mechanism under the Non-Fossil Fuel Obligation (NFFO) in 1991. Similar schemes exist in France with the EOLE 2005 programme, set up in 1996, and in Denmark, with the Promotion of Renewable Energies Act from 2008, to promote wind energy in particular.[7]

What are the best practices?

Combining competitive bidding with a power purchase agreement. Competitive bidding can be combined with a power purchase agreement (PPA), by which the national electricity agency commits to purchasing the electricity produced by a selected company at a fixed price higher than the local market price of electricity for a certain period (usually 20-25 years).

Combining the competitive bidding process with a PPA allows minimising of subsidies while encouraging investment in the deployment of renewable energy. However, the bidding process must follow the right procedures in order to ensure appropriate competition and the ability of the private sector to produce the best offer. With the right conditions in place, competitive biddings are expected to drive advances in technological innovation, cost reduction and competitiveness in the long run. The members of the task force identified this combination of support measures as the one most likely to attract sustainable investment for large renewable energy projects, especially in the solar sector.

Regular issuance of calls for tender. Tenders have a tendency to create stop-and-go development cycles in the renewable energy industry as legislators have called for tenders irregularly. A lack of continuous support can offset the establishment of a national industry, so the legislator should ensure continuity and issue calls for tenders periodically. This involves a high degree of national energy planning, including having annual targets for installed capacity for renewable energy power generation.

Penalties for non-compliance. Occasionally, projects allocated through competitive bidding have not been carried out, mainly because competitors had issued bids too low to profitably run the planned power plants. Consequently, these projects were abandoned by the developers. Under the 1990 UK tendering scheme, less than one-third of all projects were installed by 2003, a good decade later (Butler and Neuhoff, 2004). To avoid such delay, good practice recommends that policy makers should implement penalties for non-compliance, so that a bidder who wins a public tender will have a strong deterrent to discontinuing the project. In Brazil, several penalties are applicable in

Box 3.4. **Fostering wind power generation through auctions: The Brazilian experience**

After experimenting with various incentive schemes* to increase investment in renewable energy, Brazil has launched technology-specific auctions to deploy renewable energies.

In 2009, the National Agency for Electrical Energy held the country's first wind-only power auction where more than 1 800 MW of wind power was contracted for. The success of the auctions was partly due to large price drops because of the strong reduction in demand for wind equipment in Europe and increased competition among suppliers since the 2008 economic crisis. This made 2009 the ideal moment to start the development of this technology in Brazil on a large scale. Other success factors were the 20-year contracts offered which specifically catered to the peculiarities of wind power generation. In particular, specific accounting mechanisms allowed the wind farms to compensate in the long run for seasonal and inter-annual wind fluctuations, without compromising the project's yearly cash flow.

In 2011, the government again organised two energy auctions – a regular and a reserve energy auction. While the reserve energy auction remained exclusive for non-conventional renewable sources, in the new energy auction wind power was allowed to compete directly with natural gas-fired thermal plants. In an important landmark for the full development of the technology, wind power was able to successfully compete with these thermal plants. Without any particular support for wind energy, wind farms were able to sell power at prices 50% lower than the average price during the period of government incentives. New technology, tax breaks, and more local manufacturing of turbines were important contributors to this success.

* In particular the Brazilian government established the Programme of Incentives for Alternative Electricity Sources (PROINFA) in 2002, a feed-in tariff policy to encourage the use of other renewable sources, such as wind power, biomass and small hydroelectric power stations.

Source: World Bank (2011), "Design and Performance of Policy Instruments to Promote the Development of Renewable Energy: Emerging Experience in Selected Developing Countries", Energy and Mining Sector Board *Discussion Paper, Paper* No. 22, April, 2011, World Bank, Washington, DC; Cunha, Barroso, Porrua and Bezerra (2011), "Fostering Wind Power Through Auctions: the Brazilian Experience", *International Association for Energy Economics*, 2nd Quarter 2012.

case of delays: during the period of delay the contract price is reduced and the regulator has the right to ask for contract termination if there is a delay longer than one year in any of the project milestones.

Encouraging local economy input. The competitive bidding process allows public authorities to take into account the lowest production price/kWh but also to consider the benefits for the local economy (i.e. percentage of domestic content, local jobs created) when choosing a producer. In the UK the tender mechanism has been criticised for not promoting local renewable energy development as all necessary equipment has been imported from other countries (Mendoça, Jacobs and Sovacool, 2009).

Box 3.5. **The UK experience with tendering schemes**

In 1990, the government launched several rounds of competitive bidding for renewable energy contracts, known in England and Wales as the Non-Fossil Fuel Obligation (NFFO). This support mechanism has had only limited success.

One of the effects of the scheme was that the NFFOs resulted in intense competition which favoured large and well-funded companies while discouraging small investors and independent developers.

Moreover, the intensive competition of the bidding process led to the importation of the cheapest technologies from abroad which made it difficult for the UK to establish a national renewable energy industry. Developers are likely to rely on technological advancements in other countries. The lack of a domestic renewable manufacturing industry was a serious impediment to reaping the economic development benefits that renewables can provide.

Another issue was that the bidding scheme incentivised many competitors to bid lower than what was profitable for them in order to gain the bid. For this reason many projects were abandoned. Although the government awarded contracts for 3 270 MW of declared net capacity (DNC) in England and Wales between 1990 and 1998, figures for September 2003 show a DNC of only 960 MW.

For these reasons, the UK abandoned this approach and switched from a tender scheme to a quota-based mechanism in 2003 which has recently been complemented by a FiT scheme for small-sized power plants.

Source: Butler and Neuhoff (2004), “Comparison of Feed in Tariff, Quota and Auction Mechanisms to Support Wind Power Development, *Cambridge Working Papers in Economics CWPE 0530, CMI Working Paper*, 70, Cambridge, University of Cambridge and MIT.

4. Quotas

How do they work?

Under quota-based mechanisms the legislator obliges a certain market actor (consumer, producer or supplier) to provide a certain share of electricity from renewable energy sources. The choice of the obliged party usually depends on the market design. The obliged party can either produce electricity itself or buy it from other green electricity producers.

In order to increase the flexibility of the system, it is common to give the obliged party the option to reach its share of renewable energy by trading certificates which serve as proof of compliance.

Quotas with Tradable Green Certificates

Quota-based mechanisms can be combined with Tradable Green Certificate (TGC) schemes. TGCs are a tradable commodity proving that electricity is generated using renewable energy sources. Typically one certificate represents generation of 1 MWh of electricity.

Certificates which attest to the renewable origin of an energy source become a tradable commodity based on renewable energy production but traded separately from the energy produced.

Quotas with carbon credits

Carbon credits are based on the idea that by pricing environmental damage through tradable permits and taxes market externalities can be internalised by being traded as a commodity. Carbon credits attribute a sellable credit certificate equivalent to the amount of GHG reduction from the projects to the owner of the project who can then freely trade this for a profit.

Carbon credits alone are generally not powerful enough to entice investors into the renewable energy sector in the MENA region or elsewhere, but combined with other incentives such as quota obligations, they can help attract private investors, particularly large emitters of GHGs and private sector projects,[8] without an additional public contribution. By creating a market for carbon emissions[9] carbon credit trading is seen to be closer to the market economy, compared to incentives like FiTs.

Box 3.6. **Clean Development Mechanism (CDM) as a financial incentive for private investors**

The Clean Development Mechanism (CDM) developed under the Kyoto Protocol is an example of the principle of integrating negative externalities from GHG emissions on a general scale.[1]

The scheme offers operating support to projects through the provision of a market for the certificates of Carbon Emission Reduction. This is a complex project cycle but can be useful for large projects. It aims to encourage developing countries to implement projects that contribute to the reduction of GHG emissions through the possibility of additional funding. It associates to emission-reduction projects in developing countries, certified emissions credits, each equivalent to one tonne of CO_2. Developing countries can then sell them worldwide. When the developing countries grant the ownership of those credits to the private investor involved in the emission-saving project, e.g. a landfill gas mitigation measure or a renewable energy project, they provide an additional financial incentive to the private sector.

As of September 2011, six MENA economies were developing CDM projects. For example, Egypt had 16 registered Carbon Emission Reduction (CER) projects. Renewable energy projects account for about one-third of the estimated emission reductions, while the remainder are savings from energy efficiency measures or partial substitution of fossil fuels by renewables. So far, the Mediterranean region accounts for a very minor share (about 1%) of CER certificates by 2020 issued at world level, as well as only 2% of the total number of projects registered.[2]

1. *http://cdm.unfccc.int/about/index.html.*
2. Observatoire Méditerranéen de l'Énergie (OME), 2011.

Source: OECD, UN, OME (2011), "Mediterranean Energy Perspectives", Paris, UNFCCC, 1992.

Where are they used?

A number of OECD-30 countries support renewable energy production for electricity through TGCs. Poland and Sweden use TGCs exclusively. The UK, Italy, Japan, Norway and the US (at local state level) use TGCs as the main support instrument, but also have FiTs in place for the support of small producers or rely on tax incentives and grants for support. In Belgium, several TGC schemes are in place (depending on the region), with some certificates having a fixed price.

What are the best practices?

Certificate banding. An important innovation to ensure effective TGC support of technologies in the early stages of market deployment was the introduction of banding[10] which has been introduced in Italy and the UK.

Under a quota-based mechanism each form of renewable energy technology receives the same level of support. For instance, in the UK one renewable obligation certificate (ROC) is granted per MWh of electricity generated. This market-led approach aims to encourage competition between technologies to minimise cost (Wood and Dow, 2011). However, this technology-neutral approach favours the deployment of the more established, near-market technologies such as landfill gas and onshore wind, which are currently the most economically efficient, over and above less developed technologies that are further from commercial viability (but may have more potential in the long term). To favour the less mature technologies, certificate banding was introduced in the UK in 2009 to provide differing levels of support to groups of technologies depending on their relative maturity, development cost and associated risk.

Combining quotas with pre-defined ratios for different technologies. A different way to diversify the renewable energy technologies that benefit from quota-based mechanisms has been tested by several TGC programmes in the US. Utilities are obliged to purchase renewable energy electricity from different sources according to pre-defined ratios in order to foster more cost-efficient renewable energy technologies.

Penalties for non-compliance. Experience in Poland and Sweden shows that the legislator needs to set a sufficiently high penalty payment to enforce compliance with the quota obligation. The penalty should exceed the marginal generation costs for renewable electricity.

Combining quotas with other incentives. Quota-based mechanisms sometimes operate without certificate trading and can also be combined with tender mechanisms or feed-in tariffs (FiT).

- In the UK, a FiT scheme was introduced in 2010.[11] The use of FiTs is designed to encourage the deployment of additional small-scale (less than 5MW) low-carbon electricity generation, particularly by organisations, businesses, communities and individuals that have not traditionally engaged in the electricity market. FiTs work alongside the Renewables Obligation (RO) which is currently the primary mechanism to support deployment of large-scale renewable electricity generation.
- The US approach relies mainly on quota obligations on the state level, while relying on tax incentives and, most recently, cash grants on the federal level.

Box 3.7. How policy influences industry capacity and renewable energy deployment

The deployment of photovoltaic technology and installations in Germany has been characterised by a continuous roll-out of installations, backed by clarity in the design of support measures. In neighbouring the Netherlands, however, an erratic pattern of installations over the past years can be observed mainly because of discontinued policy support (Montfoort and Ros, 2008).

Germany and the Netherlands have both implemented a subsidy tariff for renewable energies. One major difference between their support policies was the funding structure. In the Netherlands, the system relied on taxation, whereas in Germany, funding for the scheme was covered by end-users paying a higher price for their electricity. Germany managed to execute its Photovoltaic (PV) research and development (R&D) roadmap which was developed in the 9th R&D strategy meeting of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, together with industry and research institutes. For the roadmap, the emphasis was put on lowering PV electricity cost. Research institutes in the Netherlands also designed a PV R&D roadmap which was not implemented then, by the government.

By contrast, the German government support for renewable technologies followed an interactive approach. The development of photovoltaic installations was also promoted for industrial policy reasons which led to a more consistent and less erratic support programme of the energy system than in the Netherlands (Vasseur and Kemp, 2011).

The experience from the Netherlands suggests that policy support should include areas beyond fragmented research and development and be oriented towards creating a holistic energy innovation system.* Policies should support a wide range of technologies and cover an innovation portfolio, not only particular steps in the value chain (Grubler et al., 2012).

German support policies were funded independently from government household which rendered more stability to the support scheme whereas in the Netherlands, state budget determined the flows of subsidy which were relatively less reliable.

Consultation between industry, research institutions and the government was more broad in Germany than in the Netherlands regarding R&D policy and support. This resulted in a wider and stringer innovation system in Germany, also due to higher R&D support by the government.

It can be concluded that creating a stable renewable energy market goes beyond incentivising technology installations but also fostering the energy innovation system as a whole, including associated industry capacity promotion, which should be supported both in a continuous, non-disruptive manner.

* A technology innovation system is "a network of agents interacting in the economic/industrial area under a particular institutional infrastructure and involved in the generation, diffusion, and utilisation of technology" (Carlsson and Stankiewicz, 1991).

Source: Dii GmbH.

Now we will turn our attention to the schemes currently used in the Middle East and North Africa (MENA) in order to identify whether governments are using the best array of policies, in the light of the best practices used in OECD countries that this chapter has outlined.

5. Existing renewable energy policy frameworks in the MENA region

The main use of renewable energy in the MENA region is for electricity generation, primarily from hydropower (thanks to Egypt's Aswan High Dam, the output of which tends to skew regional figures). Governments in the MENA region started setting up targets for renewable energy deployment in the early 2000s (see Table 3.1). However, compared to the targets of the majority of OECD member countries for renewable energies these MENA targets are non-binding.

The MENA Concentrated Solar Power scale-up Investment Plan (MENA CSP IP), supported by the World Bank Group and the African Development Bank (AfDB), is intended to strategically utilise concessional financing from the Clean Technology Fund (CTF) to accelerate global adoption of the technology in the region. It was endorsed by the CTF Trust Fund Committee on 2 December 2009.

The CSP IP is a landmark climate change mitigation programme aimed at co-financing nine commercial-scale power plants (with total installed capacity of around 1.2 GW) and two strategic transmission projects in five countries of the MENA region (Algeria, Egypt, Jordan, Morocco and Tunisia, known as the MENA CTF countries). The vision is for the Mediterranean MENA economies ultimately to become major suppliers and consumers of CSP-generated electricity. The MENA CSP IP is conceived as a transformational programme, leading to the installation of at least 5 GW of CSP capacity in MENA by 2020, based on the 1.2 GW triggered by the MENA CSP IP. The first projects are expected to start commercial operations by 2014, and will initially supply domestic markets in MENA economies.

A regional centre was created in Cairo in 2008 with the aim of promoting renewable energy efficiency, the Regional Center for Renewable Energy and Efficiency (RCREEE). Its members are Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Palestinian Authority, Syria, Tunisia and Yemen.

Saudi Arabia recently passed a decree establishing the King Abdullah bin Abdulaziz City for Atomic and Renewable Energy in Riyadh. As announced by the City during the Fourth Saudi Solar Energy Forum, held on 8-9 May 2012, the target solar capacity is 41GW, divided into 25 GW for Solar CSP and 16 GW for Solar PV.

The institutional setting

Although the institutional setting for renewable energies is rather weak or quasi-inexistent in some MENA economies, it is worth noting that Algeria, Egypt, Jordan, Lebanon, Morocco and Tunisia have or are in the process of defining the general principles for a national energy strategy including for renewable energies and energy efficiency (PWMSP, 2012). The national energy policies aim to diversify energy sources, provide security and availability of energy supply and take into consideration social and environmental aspects. However, these principles are not always clearly defined, and they are usually non-binding.

According to a study conducted by Paving the Way towards a Mediterranean Solar Plan[12] (PWMSP) to benchmark the institutional setting for renewable energies in selected Mediterranean countries (PWMSP, 2012),[13] Tunisia is well-advanced in terms of establishing a national strategy, particularly for energy efficiency, compared to Algeria, Egypt, Jordan and Morocco. Tunisia also appears to have more means than the other MENA economies to achieve the objectives stated by the strategy. Not only does it have several financial and fiscal incentives for energy efficiency and renewable energies, but it also has a legal framework set for these incentives. Moreover, Tunisia has established a National Fund for Energy Management *(Fonds National de Maîtrise de l'Énergie, FNME)* that provides private resources and bilateral credit lines for the development of energy projects (PWMSP, 2012).

With regard to the institutional framework, by November 2012 only Algeria and Morocco had legal instruments to regulate the promotion of renewable energy and energy efficiency. For instance, the Decree No. 11-33 of January 27, 2011 in Algeria, was set to administer the Algerian Institute of Renewable Energy. Another decree establishes the procedure for the preparation of the National Programme of Energy Efficiency. In Morocco, a law has been voted for the regulation of the Moroccan Agency for Solar Energy (MASEN).

However, in general, authorities in charge of the enforcement of renewable energy and energy efficiency regulations tend to be insufficiently staffed in these countries except for Tunisia and Algeria. Also, local administrations have a limited role in the promotion of renewable energy and measures to support energy efficiency policies or are inexistent or ill-defined (PWMSP, 2012).

Finally, several bodies exist to monitor and evaluate the progress made regarding the strategy for renewable energies and energy efficiency. Algeria, Jordan, Morocco and Tunisia are particularly active on this matter. They involve several public entities such as the Ministry of Energy and Mines in Algeria, the Supreme Council of Energy in Egypt and the Ministry of Energy and Mineral Resources in Jordan, etc. (PWMSP, 2012).

Annex H and Annex I provide more details on renewable energy policies and regulation in selected MENA economies.

The League of Arab States has formulated a strategy for the development of renewable energy in the Arab states. The strategy has four components:

1. **Assessment.** An initial assessment of the current power generation capacity in the region, focusing on the contribution of renewable sources to electricity generation. The strategy also lists the several international and regional initiatives that were launched to help develop renewable energy projects in the Mediterranean region.
2. **Targets.** Setting targets for the share of renewable energy sources in the energy mix of Arab countries, by 2020 and 2030. The strategy presents three scenarios for the contribution of renewable energy sources in the electricity power production. The first scenario expects a contribution of 2.3% by 2020, the second scenario, 4.7% by 2020 and the third scenario 9.4% by 2030. Reaching these targets depends on 1) the legal and legislative frameworks regulating investment in renewable energy projects; 2) the role of the League of Arab States as a coordinator among all parties; 3) the degree of private-public co-operation to increase the industrial capacities of Arab countries; and 4) the policies in place for natural resources and environment protection.
3. **Implementation.** The third component presents the steps for the implementation of the strategy. These include 1) adopting national and regional policies to allow for a larger contribution of renewable sources in electricity generation; 2) exchanging expertise and good practices in the region; 3) strengthening international and regional co-operation through forums such as the Electricity Regulators Forum and; 4) involving the domestic private sector in the development of renewable energy technologies. The process is monitored by an Experts Committee for Renewable Energy and Energy Efficiency, which operates under the umbrella of the Arab Ministerial Council for Electricity.
4. **Evaluation.** The fourth and last component presents indicators for assessing the declared national objectives. These indicators aim at 1) compiling and monitoring activities and events executed by member countries to achieve the goals of the strategy and 2) assessing the results of these activities both in economic (increased investment

and industrial and commercial competitiveness), environmental (reduced greenhouse emissions) and social (reduced unemployment) terms.

The League of Arab States calls for all countries to develop a unified mechanism to follow-up and assess the implementation and conformity of developments with the objectives of the strategy. Also, frequent consultation and regional co-operation are needed to ensure the deployment of renewable energy in the region.

Energy targets in selected MENA economies

Table 3.1. **Energy targets in selected MENA economies**

	Algeria	Egypt	Jordan	Libya	Morocco	Tunisia	Syria
Time frame	2030	2020	2020	2020	2020	2016	2030
Actual installed capacity (MW)	4	517	6	1.5	274	54	1
Target	22 GW	7 GW wind, 1 GW of solar and other RE	600 MW wind, 300-600 MW solar, 30-50 MW biomass	2 000 MW wind, 7 000 MW PV	2 000 MW solar 2 000 MW wind	350 MW wind 110 MW solar 25 MW biomass	2 500 MW wind 3 000 MW solar

Source: OME (2011), *Mediterranean Energy Perspectives 2011*.

According to Table 3.1, Algeria and Egypt appear to be the most ambitious countries in terms of defining targets for renewable energy projects for 2030 and 2020, respectively. However, by 2011, Algeria had only installed 4 MW (0.018%) of its total targeted capacity (22 GW) (OME, 2011). Algeria is one of the first countries in the region to have announced the implementation of Feed-in tariff (FiT) mechanisms as a support to private production of electricity from renewable energy sources. While the introduction of this scheme is encouraging, it appears that the FiT tariffs have not been set sufficiently high to attract investors (Wuppertal, 2010). Furthermore, the incentive mechanism lacks flexibility and clarity as to the time span for the remuneration scheme, which can dissuade investors (Wuppertal, 2010).[14] These may be some of the reasons why the scheme has still not been implemented. Also, the reluctance of the private sector to embrace the Algerian FiT scheme may also be a result of the absence of protection from wholesale market price volatility and the influence of domestic fuel subsidies on electricity prices (World Bank, 2011a).

Egypt, on the other hand, has implemented 6.4% of its announced projects (i.e. 8 GW by 2020). The country's current incentive support programme for renewable energy is divided into two phases: an international competitive tendering for large-scale wind projects with guaranteed long-term power purchase agreements (PPAs) to reduce investor financial risk, and FiTs for small and medium projects, to be implemented in the future (OME, 2011).[15] In February 2008, the Supreme Council of Energy approved a plan to generate 20% of electricity from renewable energy sources including 20% from wind energy, 6% from hydro and 2% from solar energy (NREA, 2012). The renewable energy market in Egypt faces several challenges, including insufficient grid infrastructure and the fact that energy subsidies continue to mask the real cost of energy (OME, 2011). Among the countries that use public competitive bidding, Egypt is the only country in the region which has projected to put in place FiTs. This leaves the authors to assume that across the region tariffs are decided on a case-by-case basis, potentially increasing uncertainty for investors in an already relatively unattractive market. In July 2012, the Egyptian Solar Plan was approved by the Cabinet which defined a target of 3 500 MW by 2027, divided into 2 800 MW for CSP and 700 MW for PV. 67% of investments in the solar plan will come from the private sector. Private sector projects are being implemented reaching a capacity of 1 370 MW from renewable energy sources. In addition, several projects are being implemented by the government, in coordination with international organisations and European countries reaching a capacity of 1 340 MW of renewable energy sources (NREA, 2012).

Generally, governments use a combination of different incentives to attract investors and respond appropriately to their different needs while minimising public spending. Table 3.2 summarises the main set of incentives adopted by some of the most active MENA governments for the promotion and the deployment of renewable energy sources (Algeria, Egypt, Jordan, Morocco, Tunisia and the UAE).[16] The Annexes provide fuller details of the incentives and support mechanisms in four selected countries: Algeria, Egypt, Morocco and Tunisia.

Support mechanisms in selected MENA economies

Table 3.2. **Renewable energy support mechanisms in selected MENA economies**

	Algeria	Egypt	Jordan	Morocco	Tunisia	UAE
Public competitive bidding		▲		▲		▲
Feed-in tariffs	▲ 2004 (enacted but not yet implemented)	▲ 2012 approved, but not implemented				
Net metering			▲	▲	▲	
Tradable CDM		▲		▲	▲	
Capital subsidies, grants and premium		▲		▲	▲	
Investment tax credit					▲	
Training incentives				▲		
Reduction in sales taxes or VAT; Customs duty, taxes			▲		▲	

Source: *Global Renewable Energy Policies and Measures Database* of the IEA; the "*Renewables 2011 Global Status Report*" of REN 21; the official gazettes of Algeria, Egypt, Jordan, Morocco, and Tunisia. For each country, specific sources of information have been used. For Algeria, the Ministry of Energy and Quarrying, the National Agency of Investment Development; for Egypt, the sources include the New Renewable Energy Authority, the General Authority for Investment and Free Zones; for Jordan; the Ministry of Energy and Mineral Resources; the Jordanian Investment Board; for Morocco, Office National de l'Électricité, MASEN, The Ministry of Energy and Quarrying, the Moroccan Investment Development Agency; Economical, Technological and Environmental Impact Assessment of National Regulations and Incentives for Renewable Energy and Energy Efficiency Country Report Morocco (DRAFT) January 2010, and for Tunisia, The Ministry of Industry, Energy and SMEs, *www.profiscal.com*; the Foreign Investment Promotion Agency (FIPA); Directorate-General for Energy and Transport: Market Observatory for Energy, Report 2008: *Europe's energy position, present & future*, European Commission, 2008.

Morocco has no price incentives to attract investors to the development of renewable energies. The country aims at installing 2 000 MW of solar power generation capacity by 2020, the equivalent of 38% of its current total installed capacity in the country and 42% of the installed capacity foreseen in 2020 (OME, 2011). Morocco is setting up a legal, institutional and regulatory framework for project implementation, such as the 2009 Renewable Energy Law for the commercialisation of electricity generated using renewable energy, and the creation, in early 2010, of the Moroccan Agency for Solar Energy (MASEN) for solar projects. MASEN is entrusted to develop at least 2 000 MW of grid-connected solar power by 2020, and in particular to conduct technical, economic and financial studies, as well as to support relevant research and fundraising, to seek local industrial inputs into each solar project and to establish an associated infrastructure (World Bank, 2011a). Project implementation will involve public-private partnerships including international partners.

Morocco also has several other incentive schemes for renewable energy development. Through the use of support measures such as net metering and competitive bidding, the government aims to boost the total renewable energy produced in the economy with lower public spending.

In terms of announced projects, the Jordanian authorities are planning to install 600 MW of new wind generation capacity, 600 MW of solar power generation capacity and 30-50 MW of biomass projects by 2020 (OME, 2011). Only 0.5% of the target had been achieved by the time of writing. However, Jordan is showing efforts to increase private investment in renewable energy through more flexible and accelerated incentive schemes. With new rules in place since 2010 (Energy Charter, 2010),[17] companies are now allowed to bypass the long process of competitive bidding and deal directly with the Ministry of Energy to implement new projects. The new legislation also allows net metering and fiscal packages as a support to renewable energy projects and stipulates that the National Electric Power Company will be obligated to purchase all power produced by renewable energy power plants.

Tunisia's target is to reach 10% of primary energy from renewable energy sources (solar, wind and biomass) by 2016. So far, Tunisia has installed 54 MW of the announced target of 485 MW renewable energy capacity, representing 11% of the target. In terms of achieved targets, Tunisia has made the most progress compared with other MENA economies surveyed for this report. It provides several attractive mechanisms for renewable energy power projects: it does not have a specific incentive system comparable to feed-in tariffs but uses direct financial and tax incentives instead, with capital subsidies, grants and reduction of customs duty and VAT exemptions.[18] Its incentive schemes also involve many national and international investment programmes such as the Tunisian Solar Plan, which is a PPP spanning 2011-2016, and the Mediterranean Solar Plan, developed by the Union for the Mediterranean (see Chapter 1).

The UAE, on the other hand, which officially wishes to enhance its "green" policies, does have a public competitive bidding process, however, it has no other support mechanism typically associated with renewable energy power projects in place.

Limits to implementation of announced renewable energy projects

In the MENA region, many of the renewable energy projects announced in recent years have not yet been developed. This may be a result of missing regulatory frameworks. The implementation of appropriate incentive schemes tends to depend on the quality of institutional and regulatory frameworks in order to attract the necessary capital. The main problem observed in the MENA economies, especially Algeria and Morocco (World Bank, 2011a), is the lack of a clear and defined regulatory framework for incentive schemes. This can become a problem for future private investments.

Feed-in tariffs are usually successful (see discussion earlier in this chapter) if favourable political and structural scheme conditions are created, and if the question of asymmetric information can be addressed in a cost-effective manner. However, the application of FiTs in the MENA region is more difficult, because FiTs lead to more expensive energy being produced by the renewable energy technology. This expense is generally borne by consumers. The region has long benefited from heavily subsidised domestic energy prices and a policy that would lead to higher electricity prices for domestic users is not socially or politically possible to implement in the current

Box 3.8. **The Tunisian Solar Plan**

The Tunisian Solar Plan from 2009 seeks to develop energy efficiency and renewable energy technology measures in two phases. A first phase, from 2011 to 2016, targets 24% of energy saving and a 16% share of renewable energy production of the total electric power capacity. It involves some 40 actions including six solar thermal energy projects, 11 PV projects, three wind-power projects, seven energy efficiency projects and other initiatives including power interconnections (OME, 2011). The second phase, from 2016 to 2030, targets 40% energy saving and a 40% share of renewable energy production of the total electric power capacity. The 40 projects will be run under public-private co-operation. The capital required for this project is estimated by the Tunisian authorities to be around EUR 2 billion. The first phase (2011-2016) will be co-financed by the National Agency for Energy (*Agence Nationale pour la Maîtrise de l'Énergie, ANME*), the Tunisian Company for Electricity and Gas (*Société Tunisienne de l'Électricité et du Gaz*), private investors and international co-operation under the World Bank Clean Technology Fund (CTF).* By means of its Solar Plan, Tunisia aspires to become an international platform for green energy projects and for exports of renewable energy, particularly to the European countries bordering the Mediterranean. Tunisia has also announced several plans for Clean Development Mechanism (CDM) projects, but only two projects have been started and one of them is still being validated.

The Climate Policy Initiative, an analysis and advisory organisation that assesses, diagnoses and supports national efforts to achieve low-carbon growth, has evaluated the Tunisian Solar Plan in terms of technology development, environmental benefits and economic outcomes. Results of the evaluation show that public financial support to investments in renewable energies helped shift energy demand away from fossil fuels. This resulted in positive effects on public finances due to decreased subsidies in fossil fuels improving the public budget's net balance. It is estimated that the Programme will not only help achieve savings but also compensate the original amount invested by the government. Other benefits expected to derive from the Programme is reduced fuel consumption and thus reduced CO_2 emissions. In terms of economic development, the Solar Plan contributed to the development of domestic solar thermal industrial clusters and it is estimated that over 3 000 jobs were created.

* *www.espacemanager.com/macro/le-plan-solaire-tunisien-pour-une-economie-denergie-de-22-a-lhorizon-2016.html*.
Source: Agence Nationale pour la Maîtrise de l'Énergie, Tunisia, The World Bank, The Climate Policy Initiative.

environment. Therefore, the usual concept of FiTs (as used in OECD countries) should be adjusted to suit the particularities of the MENA region. In the case of wealthier economies such as the Gulf Co-operation Council (GCC) countries,[19] additional costs would be borne by the government. In the case of less wealthy countries such as most of the North African economies or those in the Eastern Mediterranean, such an incentive structure would require additional support, for instance through involvement of multilateral institutions in the start-up phase. The World Bank is already involved in several schemes, including two CSP projects in Egypt at Kom Ombo and Kureimat, and two similar projects in Morocco, at Ouarzazate and at Ain Beni Mathar, both to develop CSP. The involvement of the World Bank enabled these projects to attract private finance as well as donor funding. MENA governments may also be reluctant to use FiTs because the quantity of electricity generated would not be controlled, which could lead to either shortages or oversupply.

There is a variety of support mechanisms in use for renewable energy power generation, as demonstrated in case studies and interviews with investors. Two examples are a large project in Abu Dhabi (Shams 1, Box 3.10) and a project for rural electrification in Morocco (Temasol, Box 3.11). These two very different examples demonstrate both the wide range of solar energy projects, and some of the financing models that may attract investors.

Towards a green investment policy framework

In the face of growing renewable energy infrastructure needs and fiscal constraints, several support mechanisms, developed earlier, can be implemented by the MENA region. However, these cannot be considered without a sound policy framework and should therefore be integrated in a broader national policy context which includes investment policies. A green investment policy framework was designed to integrate support mechanisms such as financial, regulatory, fiscal and market-based incentives (see Box 3.9 below).

According to the Box 3.9 there are five elements that define the green investment policy framework. The support mechanisms developed earlier in this chapter can fit in each of the framework's elements.

The first element is related to defining the overall public energy strategy to better align policies. This helps to guide MENA governments in setting their renewable energy targets and defining their long-term visions. Most of the MENA economies discussed above have set targets for 2020 or 2030 for renewable energy generation levels, although in many cases these cases remain vaguely defined and/or non-binding. The second element is a tool to monitor market-based and regulatory incentives such as Tradable Green Certificates, competitive bidding schemes or net metering, to address market failures, reduce unnecessary subsidies and enhance the functioning of competitive markets. The third element is specific to financial policies. It establishes policies to regulate transitional incentive schemes such as feed-in tariffs or capital subsidies through which project risks are reduced and market liquidity is increased for the support of new green technologies.

While Shams 1 is a large concentrated solar power (CSP) project, which demonstrates the potential for solar power to be used on a par with other energy sources for power generation, solar power also has the flexibility to be used for small-scale projects. This is the case in Morocco, where solar power is being used for rural electrification, as the next example in Box 3.11 illustrates.

6. Conclusion

Choosing the right incentives scheme

This chapter outlines the support measures most often used by OECD governments to support the production of power from renewable energy. It has discussed in detail the most commonly used support measures for renewable energy projects. In theory, being a more market-oriented incentive mechanism, quantity-driven systems, e.g. quotas with tradable green certificates, should be more cost-efficient than other schemes, in the sense that market forces should lead to the best allocation of resources and the exploitation of the most cost-efficient technology options. However, a study carried out by the IEA in 35 countries[20] has shown that so far – with the single notable exception of support for solid

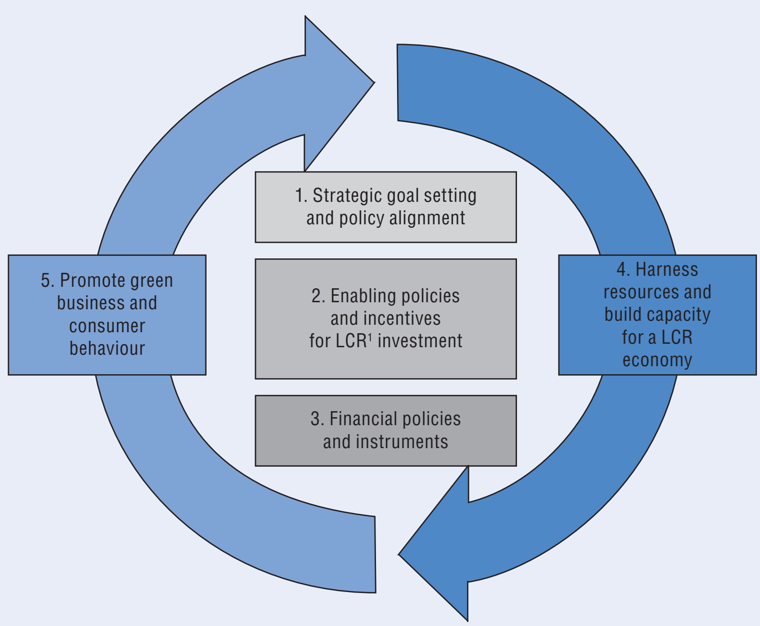
Box 3.9. **Elements towards a Green Investment Policy Framework: The Case of Low-Carbon, Climate-Resilient Infrastructure**

MENA governments have a central role in mobilising private investment in renewable energies through domestic policy support, even under tight budgetary constraints. A forthcoming OECD publication, "Towards a Green Investment Policy Framework: The Case of Low-Carbon, Climate-Resilient Infrastructure" (Corfee-Morlot et al., 2012, forthcoming) provides an initial checklist for action to help governments mobilise private investment in low-carbon, climate-resilient infrastructure such as renewable energies.

From the perspective of private sector engagement in renewable energy projects, a green investment policy framework could potentially influence three key investment conditions: *i)* the existence of investment opportunities; *ii)* the return on investment, including boosting returns and limiting costs; and *iii)* the risks faced by investors throughout the life of renewable energy projects. It recognises that country contexts matter and that instrument mixes and policy design will need to be tailored to unique national characteristics and institutions. Yet regardless of the country context, the main elements for good practice are likely to be similar.

The proposed approach towards a green investment policy framework consists of five elements (see the figure below):

1. strategic goal setting (e.g. with renewable energy targets) and align policy goals across and within levels of government;
2. reform policies to enable investment and strengthen market incentives to invest in low-carbon, climate-resilient infrastructure (e.g. with competitive bidding process for renewable energy tenders);
3. establish financial policies and instruments to provide transitional support for low-carbon, climate-resilient infrastructure investments (including transitional support to renewable energies such as subsidies and feed-in-tariffs);
4. harness and build resources that can increase the social returns for private investment (e.g. training and R&D, risk assessment tools); and
5. establish practices that can promote green business and consumer behaviour, such as information and education policies.



1. LCR = low-Carbon, Climate-Resilient

Source: Corfee-Morlot et al. (2012, forthcoming), "Towards a Green Investment Policy Framework: The Case of Low-Carbon, Climate-Resilient Infrastructure", *Draft Working Paper*, OECD.

Box 3.10. **Shams Power Company: Generating synergies to build a concentrated solar power plant in the UAE**

Shams 1 is one of the largest concentrated solar power (CSP) plants in the world with an estimated energy capacity of 109 MW and an actual energy production of around 210 GWh/year. The plant will provide renewable energy to Masdar City, a low-carbon city under construction in close proximity to Abu Dhabi. A joint venture, Shams Power Company PJSC, was created between Masdar (Abu Dhabi), Total (France) and Abengoa Solar (Spain) to share the construction and operating costs of Shams 1. This ambitious project required substantial investment estimated at USD 600 million to build the plant using parabolic trough technology.

Masdar, an Abu Dhabi government-owned enterprise, is the initiator of and the main contributor to the Shams 1 project with a 60% share of equity in the Shams Power Company. Masdar's rationale for participating in this flagship project is to contribute to the objective of the United Arab Emirates government to increase the share of renewable energy in the domestic power sector and to diversify its economy.

The other partners, Total and Abengoa Solar, made a joint proposal to each contribute 20% of the total project equity. Total sees the project as an opportunity to diversify away from conventional energy (fossil fuels) in a well known business environment.[1] For Abengoa Solar it represents an opportunity to expand its solar energy activities into new markets.

Implementation of competitive bidding in UAE for renewable energies: Key success factors[2]

1. An efficient competitive bidding process

The efficiency of the competitive bidding for Shams 1 is in large part due to the strong negotiating skills of the UAE authorities stemming from their experience in similar processes in other industries. Indeed, competition was strong with four bidders in the pre-selection phase. Throughout the project proposal development process Masdar continuously stimulated the pre-selected bidders to make the best offer. Once the Total-Abengoa Solar consortium had been selected, the terms of the agreement were renegotiated with Masdar in order to get the best price. The agreement between Total, Abengoa Solar and UAE was signed in May 2010.

2. An effective incentives scheme

The only investment incentive used by the authorities for the construction and operation of Shams 1 is the power purchase agreement (PPA). Under this contract, the Abu Dhabi Water and Electricity Company (ADWEC) commits to buying the electricity produced over 25 years from Shams Power Company through a PPA. The tariff is mainly divided into two elements: a component for the capital cost investment which is fixed throughout the duration of construction and a component for other costs which is indexed on inflation. In exchange, Shams Power Company carries out the construction, operation and maintenance of the power plant.

The PPA is also associated with a Green Payment Agreement, a payment undertaking from the UAE Government to compensate for the difference between the PPA price and the market tariff at which ADWEC buys the electricity from Shams 1 for the length of the economic life of the project. This Green Payment Agreement is a highly credible support for the predictability of the future cash flows associated with the Shams 1 project. Based on the project structure, an international club of banks has agreed to finance the project. At the end of this 25-year contract, the project can either be decommissioned or continue to run under a new contract with the authorities.

3. Results for the local economy

For the two-year plant construction period 1 300 jobs have been created, mainly sourced in the local market. This project is expected to create 100 jobs, both local and international for operation and maintenance of Shams 1.

1. Total already produces 10% of its total oil output in the UAE.
2. Information on success factors has been gathered from the different shareholders of the project.

Source: Total S.A.

Box 3.11. **Rural electrification in Morocco**

Project objectives

Based on the 2004 census of Morocco, 45% of the population lived in rural areas. In 2004, 16.4% of the rural inhabitants were living on less than USD 2/day, and many of these rural residents lacked access to modern services, including utilities. This was partly because of the centralisation of the Moroccan power system. While the government recognised that access to reliable energy could enhance both human and economic development, incorporating rural households into the grid was too costly. Currently, demand is unevenly distributed throughout the country and the distance between homes and from homes to the grid makes it difficult to incorporate them into the national network.

Using solar power to provide rural homes with electricity was therefore a more viable option. The primary objective of the solar project was to provide photovoltaic (PV) kits to over 109 000 households in rural Morocco to enable them to meet their basic energy needs. In turn, rural electrification provides local development benefits in terms of health, education, economic development and also reduces macroeconomic strains on the economy through processes such as rural-urban migration. Additionally, the project was expected to create jobs in sales, installation and after-sales services in the rural areas where employment is scarce.

Project description

1. Partners

The private operator is a Renewable Energy Service Company (RESCO), made up of a French oil company (Total), a French electricity company (EDF) and one of their joint subsidiaries (TENESOL) which provides design, production, installation and operation of PV solar power systems. The private operator participating in this co-operation, TEMASOL, selected through a competitive tendering process, is in charge of implementing the solar programme, managing its technical and financial aspects, carrying out maintenance on the installed systems, replacing equipment and collecting user fees in 23 Moroccan provinces.

The *Office National de l'Électricité (ONE)* manages the overall coherence of the rural electrification project. Prior to implementation, ONE defined the specifications of the project and selected the solar systems' operator. Currently, ONE ensures that the solar power operator maintains its commitments to the project and measures the satisfaction of the operator's customers. The agency also provides subsidy funding, which enables the operator to provide the service at a rate that is more affordable for rural Moroccan residents. The subsidy is made possible through grants and loans from bilateral aid agencies, hence mixing free market operation and public-private partnership.

2. Implementation environment – legislative and administrative

In 1995, the Rural Electrification Pilot Programme (PPER) was launched in Morocco under a Franco-Moroccan memorandum of understanding and a four-party agreement made by the Moroccan General Directorate of Local Communities (*Direction Générale des colectivités locales, DGCL*), the Moroccan Energy Ministry, the French Ministry of Foreign Affairs (*Ministère des Affaires étrangères, MAE*) and the French Agency for the Environment and Energy Management (*Agence de l'environnement et de la maîtrise de l'Énergie, ADEME*). This programme led to the installation of 2 000 PV systems, funded in part by the users, as well as several group systems such as small hydraulic or diesel power plants linked to micro-networks. Utility companies were also set up in the villages to maintain and oversee the facilities. Customers of these micro-network systems were guaranteed electrical service in return for their payments.

Significant lessons were learned from the PPER programme. It demonstrated that rural customers could become accustomed to making payments with the help of an appropriate organisational structure, and that solar power was an appropriate means of rural electrification in Morocco. The key issue raised by PPER concerned the long-term maintenance of the facilities. Even so, at the end of 1995, the Moroccan government decided to move from pilot programmes to larger-scale operations in order to meet the growing need for electrification.

Box 3.11. **Rural electrification in Morocco** *(cont.)*

In 1996, ONE launched the Global Rural Electrification Programme (PERG) to bring electricity to most households by 2007. In 1995, the village connection rate was only 18%, hence the programme's goal entailed providing energy to 80% of the rural population, or approximately 12 million people. After prior feasibility studies, ONE decided to provide electricity to 91% of the villages by connecting them to the national power system, and to the other 9% by means of a decentralised system of electrification based on mini-networks driven by wind and hydroelectric power or individual PV systems.

Because of the large scale of the solar project, ONE decided to form public-private partnerships with private operators who would contribute to the operating costs, manage electricity services (supply, installation and maintenance of the PV kits) and be in charge of fee recovery. The Moroccan government provided financial support to make the programme viable for the operators and affordable for consumers. The government also established a legal framework to define the local operator's mission: whenever it costs more than 27 000 dirhams (USD 3 250) at maximum to connect a household up to a grid, the house would be electrified using a PV kit.

3. Financial agreement

The initial investment budget of the solar electrification project was USD 35.5 million. An equipment grant from ONE covered 66% of the costs. The equipment grant was mainly financed by international agencies: a USD 6.5million grant from the German Bank KfW, a USD 6.5 million soft loan from the French Development Agency (*Agence Française du Développement, AFD*) and a USD 1.5 million grant from the French Fund for the World Environment (*Fonds Français pour l'Environnement Mondial, FFEM*) which was used in the start-up phase to provide technical assistance for the project.

TEMASOL contributed 24% of the project's cost. USD 1.5 million came from self financing, while USD 2.5 million was borrowed in the form of loans. TEMASOL's shareholders provided USD 4.5 million in additional financing. Monthly fees collected by TEMASOL enabled it to cover the amortisation of its initial investment, replace equipment and cover running costs. Customers provided 10% of the initial financing through connection fees (see tables, below). However, the cost to users was much reduced thanks to the government subsidy. Rural solar customers receive a 40% subsidy which makes the cost close to what city dwellers pay for the electricity they receive from the grid. It was calculated that the fees were affordable for a rural household that normally would spend 15-20% of its income on energy.

4. Contract provisions

TEMASOL was selected following the initial call to bid to install 16 000 solar home systems in rural households. Since 2004 TEMASOL has won two more contracts, for a total of 58 500 households to be supplied with PV systems by 2007. The rural electrification programme is based on a sale-of-service model ("Fee for Service") to ensure the long-term viability of the PV systems. The rural household signs a contract both with ONE and the private operator. The private company buys and installs the equipment within 15 days of the signing of the contract. Installation is performed by local technicians, trained by TEMASOL.

Once it is installed and working, the ownership of the solar equipment is transferred to ONE. The consumer is considered to be a customer of ONE, even though the operator is responsible for managing the technical and financial aspects of the programme. The operator is compensated for these services through the monthly fee that it collects from the consumers. The monthly fee provides users with annual routine system maintenance and breakdown service within 48 hours after a maintenance call is placed. The equipment is dismantled if the customer fails to pay the monthly fee for three consecutive months. The operator also guarantees the solar equipment for 10 years after purchase, so the company is also responsible for all equipment replacement. Replacement costs are built into the initial connection fees. The state is able to collect revenue from the project through taxes. A 20% value-added tax (VAT) is placed on service charges; income taxes are collected on salaries and benefit taxes are collected from private companies.

Box 3.11. **Rural electrification in Morocco** *(cont.)*

5. Implementation

For the first phase of the project, 16 000 customers in four provinces had a choice between three types of service. Each client received a 50 W solar panel, one battery of 100 amp-hours, one PWM regulator and one 12 volt outlet with two sockets, but those who were willing/able to pay for higher capacity systems were able to install more lamps (overhead lights). The battery can store enough power to last up to five days, allowing the equipment to run year round, even when the weather is not favourable.

Capacity	Lamps	Connection fee	Monthly service fee (USD)
		USD	
50 Wp (Watt peak)	4	80	7.50
75 Wp	6	200	10.00
100 Wp	8	350	15.00

During the second phase of the project, 42 500 customers throughout 25 provinces were able to choose between two types of service. Once again the solar panel, battery, regulator and 12 volt outlet were standard equipment, but the higher capacity system could now handle the voltage demands of a refrigerator (which was also supplied).

Capacity	Lamps	Connection fee	Monthly service fee
		USD	
75 Wp	4	100	7.50
200 Wp	4	450	18.00

The fees are adapted to the budgets of the local households: approximately the same amount was being paid for candles, gas, batteries or battery recharging prior to electrification. However, families are less inclined to restrict their use of energy while using solar power, because the monthly fee is fixed, regardless of the amount used. In 2005, the payment rate exceeded 98% (95% today).

The 16 000 customers of the first phase were connected before the end of 2005, one year in advance of the contract schedule. All scheduled households were connected by the end of 2007.

6. Impact

When the project started in 2002, the private operator's first actions were to promote the new energy service, and to find and train local personnel. The business created jobs in rural areas where unemployment is high. Today, TEMASOL employs 73 people working in 14 local agencies and in headquaters (HQ), while also employing 31 subcontractors. The company invests heavily in staff development – all workers receive in-house training in technical skills (equipment, installation, maintenance and management), quality control and customer relations.

According to TEMASOL, its head office in Rabat recruits and trains employees and deals with supplies and logistics. The local branches are responsible for sales, installation, repair or maintenance and collecting monthly fees. Each local agency manages between 500 and 3 000 customers. Customers can contact the operator by telephone or by stopping in at the local agency, but most company/customer interaction occurs at the weekly markets (souks). This is also where most customers pay their monthly fees.

According to United Nations Development Programme (UNDP), as of June 2007, 24 800 rural households totalling 170 000 individuals were given access to solar electricity with all the advantages that such access entails including: better lighting, access to information through TV and radio sets, better access to education for children and in particular for girls, increase in productivity, strengthening of social ties thanks to exchanged family visits and improvement of communication.

Box 3.11. **Rural electrification in Morocco** *(cont.)*

Key success factors

The government subsidy was necessary

One of the main barriers to solar adoption in rural areas is the cost. In Morocco, the average cost (including equipment, instalment and maintenance) of a PV kit was twice the cost of connecting a household to a mini-grid supplied by a diesel generator system. Without the subsidy from ONE, the solar project would not have been implemented at the scale desired by the Moroccan government. The subsidy also provided an incentive to households which were unsure about the performance quality of the solar home system. To help sustain the subsidy, Moroccan consumers already connected to the grid pay a tax of 2% of their monthly bill to help promote the rural regions' access to solar power.

Close proximity to customers

The fact that solar powered households would be customers of ONE and not the private operator created a challenge. This is because the private company bears the responsibility of recruiting clientele and providing customer service. A sub-concession was developed to address this issue. In order to be as close as possible to its customers, TEMASOL's teams are present in each weekly souk (market) which the inhabitants of these regions regularly frequent. This presence provides an outlet for sales information and provides the opportunity for contracts to be signed with new customers, monthly fees to be collected and any repair requests to be logged. By maintaining an informative marketing and sales presence at souks, the operator has strengthened its contacts with existing and potential customers.

Prior studies and cost-benefit analyses

The various studies and pilot programmes carried out by ONE prior to implementation of the large-scale solar electrification project provided technical, social and economic data validation about climatic conditions, needs of the rural population, purchasing power and geographical distribution. This information assisted the Moroccan government in opting for the fee-for-service model, instead of the sale of equipment model that has been adopted in other countries implementing rural solar electrification projects. The fee-for-service business model helped to make the project viable and sustainable. TEMASOL also used the previously-gathered information to develop its marketing campaigns. Knowing that a large part of the target population for solar energy is illiterate, they produced a promotional cassette that inserted publicity material between songs on local radio broadcasts.

Hiring and training a local workforce

Installation and maintenance of the solar equipment could have been a costly venture for the private partner. Its decision to train and hire local technicians allows TEMASOL to provide prompt and reliable services to its customers at affordable rates. Additionally, having local offices and local representation at the weekly souks has helped the company develop a positive relationship with local communities. This attention to customer support has resulted in a low payment default rate.

Cash flow is critical

Finally, cash flow is critical to the smooth running of the private partner's operations; as a medium-sized enterprise, it does not have access to unlimited resources. In the electrification scheme in Morocco, RESCO is obliged to advance the money for the equipment before being reimbursed through the subsidy from ONE. Notable delays in payment for the installation of the equipment have led to major cash-flow problems. Fortunately for the investor, the project has the backing of Total and EDF, major French companies, which has allowed TEMASOL to survive their short-term cash-flow crisis. However, ensuring regular, timely payments of external subsidies by funding partners remains a challenge.

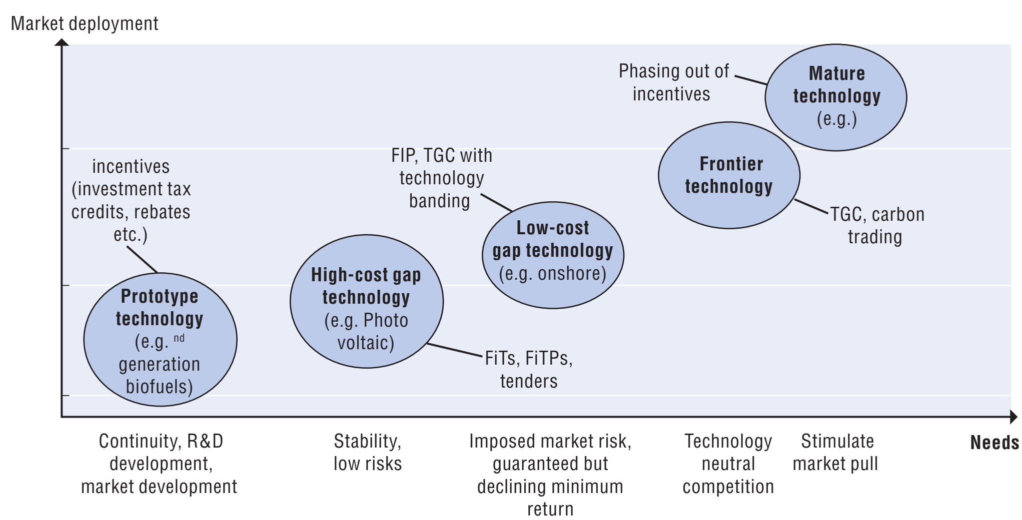
Source: TEMASOL & United Nations Development Programme, TEMASOL. A full presentation of TEMASOL can be found at *www.portail-gref.org/upload/documents/2010326144514_BisPrsentationTEMASOLXIRencontresMditerranennes28102010.pdf* (French).

biomass electricity in Sweden – the quota obligation systems applied led to higher transaction costs and turned out to be less effective and more costly than expected (in terms of specific level of remuneration per kWh).

Technology-specific support schemes, such as well-designed feed-in tariffs (FiT) which give the investor predictability of income thanks to the long-term tie-in of prices, have proven to be both effective and cost-efficient, provided they are implemented within an appropriate policy framework properly addressing non-economic barriers. FiTs are also the most widely used support measures in both OECD and non-OECD countries.

Nevertheless, much depends on the type of technology that is to be developed. According to the degree of maturity of the technology, different schemes are expected to yield optimal support (see Figure 3.1). A perfect incentives scheme as such does not exist. The optimal incentives scheme for a country needs to take into account national circumstances such as a country's renewable energy potential, its energy policy framework, the existence of non-economic barriers, the degree of market liberalisation and its energy system infrastructure. These exogenous features are all likely to influence the effectiveness of any national incentive scheme.

Figure 3.1. **Combination framework of policy incentives as a function of technology maturity**



FIP: Feed-in-premium; TGC: Tradable Green Certificate.
Source: IEA (2008), *Deploying Renewables: Principles for effective policies*, IEA, Paris.

- As a general principle, less mature, high-cost technologies further from economic competitiveness, such as solar PV, need highly stable, low-risk incentives such as capital cost incentives, FiTs or tenders in addition to continued R&D support.
- For low-cost gap technologies such as onshore wind or biomass combustion, other more market-oriented instruments like feed-in-premiums (FIP) and TGC systems with technology banding may be more appropriate.
- Once the technology used is competitive with other CO_2-saving alternatives and ready to be deployed on a large scale and when appropriate carbon incentives are in place, these support mechanisms can be phased out altogether. At that stage, renewable energies will compete on a level playing field with other energy technologies.

Focus on foreign direct investment

Moreover, in addition to purely supporting the application of new technologies for renewable energy, this report focuses in particular on the measures deemed most attractive to private (foreign) investors. As discussed in Chapter 2, investors in renewable energy tend to favour support schemes that address the issue of country and political risk, in addition to providing a steady cash-flow throughout the duration of the project life cycle. To meet these objectives, the work of the Energy Task Force indicates that among the various support measures discussed, **a long-term power purchase agreement resulting from a competitive bidding process currently stands out as being the most useful tool to encourage private foreign investors to invest in renewable energy projects.**

However, in the MENA region, the current political climate in many of the so-called transition countries (Egypt and Tunisia for instance) is increasing political risk perceptions. In addition, investors are faced with further difficulties such as a lack of transparency and little or no communication surrounding national energy policies and available support measures and investment incentives. Such a lack of communication and transparency is likely to undermine the competitive process and discourage investors. The issue of transparency will be discussed further in the fourth and final chapter of the report.

In addition to the observations made in Chapter 3, the Energy Task Force also notes the following observations on risk associated with renewable energy projects:

"Price-driven incentives place more risk on the supplier, while a competitive bidding process with a power purchase agreement tends to put the risk on the client."

If the aim of the policy measures is to attract private investors into the market for renewable energy generation, it seems desirable that the state (the main client) should bear the larger share of the risk, as only such guarantees as can be provided through long-term power purchase agreements are likely to prompt investment in the current political and economic climate.

Notes

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   International Energy Agency, 2008.

   Policy Instrument Designed to Reduce Financing Costs in Renewable Energy Technology Projects. Work performed by ECOFYS, Utrecht, The Netherlands.

   European Renewable Energy Federation, 2007, available at *www.eref-europe.org*.
2. Avoided costs refer to the cost that the utility would have incurred if it had produced the same amount of energy.
3. International Energy Agency, 2011b.
4. These states are California, Hawaii, Minnesota, Oregon, South Carolina, Vermont and Washington, DSIRE, 2010.
5. Diekmann, J. (coordinator), 2008.
6. OECD, 2011d.
7. *www.energy-regulators.eu/portal/page/portal/FSR_HOME/ENERGY/Policy_Events/Executive_Seminars/Edition1/2011.04.07-LENE.pdf*.
8. OECD (2011), *Towards Green Growth*, OECD, Paris.
9. OECD (2011) *Towards Green Growth*, OECD, Paris.

10. This concept means that the same amount of RES-Electricity is worth a different number of certificates depending on what technology produces it. For example, producers get more certificates per kWh produced from solar PV than for a kWh produced from wind power.
11. Energy Act, 2008.
12. PWMSP states: "These views are the sole responsibility of the authors (PWMSP) and can in no way be taken to reflect the views of the EU".
13. Algeria, Israel and Morocco have the most advanced legal frameworks for renewable energy, particularly for renewable energy exports. Egypt, Jordan and Tunisia are in the process of liberalising their energy markets.
14. *www.wupperinst.org/uploads/tx_wiprojekt/Iran6_WP1-final.pdf*.
15. Because of the political transition in Egypt underway since 2011, the target for implementing FiTs has slipped.
16. The information on existing renewable energy incentives in MENA economies was taken from the following sources: *Global Renewable Energy Policies and Measures Database* of the IEA; the "*Renewables 2011 Global Status Report*" of REN 21; the official gazettes of Algeria, Egypt, Jordan, Morocco, and Tunisia. For each country, specific sources of information have been used. For Algeria, the Ministry of Energy and Quarrying, the National Agency of Investment Development; for Egypt, the sources include the New Renewable Energy Authority, the General Authority for Investment and Free Zones; for Jordan; the Ministry of Energy and Mineral Resources; the Jordanian Investment Board; for Morocco, Office National de l'Électricité, MASEN, The Ministry of Energy and Quarrying, the Moroccan Investment Development Agency; Economical, Technological and Environmental Impact Assessment of National Regulations and Incentives for Renewable Energy and Energy Efficiency Country Report Morocco (DRAFT) January 2010, and for Tunisia, The Ministry of Industry, Energy and SMEs, *www.profiscal.com*; the Foreign Investment Promotion Agency (FIPA).
17. *www.encharter.org/fileadmin/user_upload/Publications/Jordan_EE_rr_2010_ENG.pdf*: A new Renewable Energy and Energy Efficiency Law was approved by the Cabinet of Jordan in 2010. This Law allows the Ministry of Energy and Mineral Resources to work with other specialised entities to conserve energy and increase energy efficiency in different sectors (Article 3c). The Council of Ministers will issue the bylaws necessary for execution of the provisions, including procedures and measures for energy conservation and energy efficiency in the various sectors (Article 17). The law also sets incentives to promote renewable energy use in Jordan. [Is this correct?]
18. *www.ey.com/GL/en/Industries/Power---Utilities/RECAI---Tunisia*.
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Renewable Energies in the Middle East and North Africa
Policies to Support Private Investment

Chapter 4

Key Energy Task Force recommendations: The right mix of support measures for renewable energy projects

The design and implementation of support mechanisms and investment incentives vary across countries and there is no single optimal incentive scheme for renewable energy projects. The choice of the right policy tool for attracting private investors is crucial as public resources could be unnecessarily wasted if an inappropriate incentive is implemented. Cash-flow incentives have a higher impact on the decision to invest in renewable energy power generation. Among the incentive schemes identified in the report, power purchase agreements are considered most useful, in the right conditions. Various investment incentives such as feed-in tariffs, net metering, competitive bidding, power purchasing agreements and quotas, or combinations of these, are evaluated for their effectiveness.

Based on the discussion in the preceding chapters, this chapter aims to draw out the main conclusions from the report in order to help decision makers in MENA governments select the best possible support measures to encourage private investment in the renewable energy sector.

The OECD[2] and the OECD's Business and Industry Advisory Committee (BIAC)[2] have developed general recommendations for the implementation of investment incentives. The recommendations in this chapter are based on the general framework outlined by OECD and BIAC, with further details added to reflect the special nature of the renewable energy sector and the business operating environment in the Middle East and North Africa.

To support the analytical work, the authors are also drawing on the collective private sector experience from the MENA-OECD Task Force on Energy and Infrastructure (the task force). An early draft of the recommendations was presented at the Fifth Energy Forum organised by the European Institute of the Mediterranean (IEMed) in Barcelona on 23 October 2011. Feedback and comments from delegates and from the 8th and 9th meetings of the task force (9 March and 23 May 2012) have been integrated into this version. An edited version of the key findings from the report was presented to the Arab Forum for Renewable Energy and Energy Efficiency, hosted by the League of Arab States on 23-24 April in Cairo, Egypt.[3] Finally, the present draft was presented for final discussions at the 10th meeting of the task force which took place in Paris on 23 November 2012. Members were given the opportunity to provide written comments which have been added to this version.

Box 4.1. **The policy framework for investment**

The *Policy Framework for Investment* is a tool developed by the OECD providing a checklist of important policy issues for consideration by governments to create an attractive environment to all investors and to benefit from the positive externalities of investment. It aims to support the vital role of private investment in effective development strategies. Building on good practices from OECD and non-OECD experiences and the OECD's instruments, the framework covers the following areas: investment policy; investment promotion and facilitation; trade policy; competition policy; tax policy; corporate governance; policies for promoting responsible business conduct; human resource development; infrastructure and financial sector development; and public governance.

There are four policy challenges that affect renewable energy investments: investment policy; investment promotion and facilitation; competition policy and infrastructure and financial sector development.

The quality of investment policies directly influences the decisions of all investors, be they small or large, domestic or foreign. Transparency, property protection and non-discrimination are investment policy principles that underpin efforts to create a sound investment environment for all.

Box 4.1. **The policy framework for investment** *(cont.)*

Investment promotion and facilitation measures, including incentives, can be effective instruments to attract investment provided they aim to correct for market failures and are developed in a way that can leverage the strong points of a country's investment environment.

Competition policy favours innovation and contributes to conditions conducive to new investment. Sound competition policy also helps to transmit the wider benefits of investment to society.

Sound infrastructure development policies ensure scarce resources are channelled to the most promising projects and address bottlenecks limiting private investment. Effective financial sector policies facilitate enterprises and entrepreneurs to realise their investment ideas within a stable environment.

Source: OECD (2006), *Policy Framework for Investment,* OECD, Paris.

The main recommendations of the task force are as follows:

1. Create an enabling environment for investors

A large body of evidence shows that foreign investors are principally motivated by the quality of a host country's enabling environment when they make the investment decision. Hence, policies to enhance macroeconomic stability, transparency, property rights, other elements of good governance, openness to trade, good infrastructure and the level and availability of know-how in the domestic economy are all potent tools for attracting investors into the renewable energy sector.[4] To reap the optimal benefits from the use of investment incentives for renewable energy, the authorities should first of all pay attention to **removing non-economic barriers**. These include administrative hurdles, grid access, electricity market design, lack of information and training and social acceptance. In particular, the authors of this report recommend that authorities should:

- establish an adequate legal framework to guarantee a harmonised legal regime for investment protection and dispute resolution to private investors, on the basis on an integrated body of case law and in a timely manner;
- define a national energy strategy, with the following characteristics;
  - defining the share of renewable energy in the domestic energy mix;
  - taking into account renewable energy generation at different sizes and scales, including locally; and
  - establishing clear production and consumption targets for renewable energy in the national energy mix. Setting national renewable energy targets is an important condition for a stable policy framework (IEA, 2008b).

In addition, authorities should:

- set up independent energy regulators and allow independent electricity producers;
- establish a national renewable energy agency to oversee all projects to ensure that the feasibility and cost of a renewable energy project are assessed up-front, thereby determining the correct level of the incentive tariff;
- upgrade grids to allow for the uptake of energy from a number of different and varying sources; and

- favour access to the grid for renewable energy producers and facilitate grid integration through smart grids and priority access.

Building trust with clear information flows

In addition, authorities should aim to strengthen trust between the private and public sector. Trust in the government's will to implement and maintain support measures, improves the impact of the incentives on investors' decision to invest. The risk of a change in public support policies for renewable energy can have harmful consequences for businesses. As a result, consistency and clarity of government policies are important drivers for investors' decision making. Transparency surrounding policy making and policy direction has a similar effect. The process of building an attractive investment framework for renewable energy projects would also be helped if the authorities take steps to provide easy and equal access to information regarding all available incentives for renewable energy projects. This facilitates the investor's feasibility assessment. Above all, clear information flows encourage competition and thus help spur increased productivity in the renewable energy sector.

2. Choose the right incentive scheme(s)

A single optimal investment incentive scheme for renewable energy does not exist. This is particularly true for the Middle East and North Africa (MENA), a region with a wide variety of geography and political and governmental set-ups.

Design appropriate support measures

To design the best type of support measure, the analysis in the previous chapter demonstrates that cost-benefit studies, including of different technologies, should be carried out regularly in order to avoid continuing to support technologies that have become competitive. As a corollary to this principle, tariffs should be designed to decline over time.

- *Map regional potential.*
  A good incentive mechanism starts with a clear definition of the eligible technologies and plants. In order to choose the eligible technologies the policy maker should have a good idea of the resource potential in a given country or region. Investment incentives used in the MENA region should be clear and predictable, with transparent and easily available rules.
  - "*A transparent and predictable regulatory framework dealing with investment helps businesses to assess potential investment opportunities on a more informed and timely basis, shortening the period before investment becomes productive.*"[5]
- *Investment incentives schemes should be transitional.*
  Incentive schemes should be phased out after a predetermined period of time. Authorities should specify the minimum duration of incentive schemes at the moment of implementation. In the case of renewable energy projects, it is common for some of these measures to last up to 20 to 25 years. They should only remain in place until the technology is competitive. However, when the purpose of a subsidy is to help a company to deliver a public service (e.g. rural electrification) for people that could not afford it otherwise, the incentive should remain in place until the support of the government is no longer necessary.

- *Authorities should avoid counter-productive overlaps of investment incentives.*[6]
  Investment incentives overlap when the same firm is covered by at least two instruments that essentially address the same issue. When implementing several sets of incentives, one of the two instruments may well be redundant. Authorities should set out to ensure that incentives are complementary: Each incentive needs to address a specific and separate barrier related to private investment in renewable energy in order to generate *additionality* and limit the overall cost to the state.
- *Investment incentives should be applied in a uniform and non-discriminatory manner to the eligible group.*

Focus on additionality

The task force considers that support policies for renewable energy must be driven by a desire to achieve *additionality*. The following elements are considered essential in order to choose a support scheme:

- **Efficiency:** Investment incentives must drive the investment decision and be sufficiently well-targeted to attract the kind of investment that is desired. Such incentives should be able to attract private investment in renewable energy that would not have been possible otherwise.
- **Least costly for the state:** Support measures must offer the most cost-effective solution for the state while remaining attractive to the investor. Incentives should aim to reduce moral hazard and information asymmetries and limit the waste of public funds.
- **Snowball effect:** The incentives chosen should generate follow-on investment and lead to as many add-on benefits for the local economy as possible.

Combining support measures to achieve optimal solutions

Cash-flow incentives tend to be costly to implement for the government. One of the ways to keep costs down consists of combining a cash-flow incentive (feed-in tariff, for instance, or power purchase agreement) with other support measures which can be adapted to the characteristics of the project. The elements to take into consideration for the national authority/client include:

- **The size of the project.** The drivers of the profitability of a renewable energy project vary with the size of the project. For small projects, transaction costs are an important impediment to their profitability. Incentives that accelerate administrative procedures, such as easy access to land and to administrative authorisations are central elements to unlocking investments for small-scale projects. For large-scale projects, and particularly for high-growth renewable energy companies, access to finance is a major issue. Measures which facilitate access to finance and reduce the creditor' costs (soft loans, loan guarantees) often lift a significant barrier for large projects and new, fast-developing firms.
- **The type of investor/firm.** Start-ups need more support than mature firms. If the authorities aim to develop the national private sector in renewable energy and target start-up renewable energy firms, tax exemptions on profits for their first years of profitability are useful measures to add to the support scheme.
- **The technological capacity of the domestic sector.** When implementing incentives, authorities should also consider the capacity of the private sector to actually produce

energy from renewable sources in order to build on it and maximise its effect on the local economy. This includes:

- ❖ *The maturity of the technology:* A special caveat concerns renewable energy development. In the early stages of development, investment incentives are necessary in order to support the improvement of the technology in the transitional phase between its development and its commercialisation. Indeed, the gap between those two stages is known as the "Valley of Death" by investors and venture capitalists as a result of the substantial number of aborted renewable energy projects during this gap. The role of the investment incentive is to help bring the renewable energy technology to the commercialisation stage until that technology approaches the production cost of traditional electricity.
- ❖ *The innovative capacity of the firms in the domestic economy:* If the domestic renewable energy sector has the capacity to conduct extensive high-level research on renewable energies, tax exemption on research and development (R&D) in renewable energy can be a driver for reinforcing national expertise in renewable energy. It can also accelerate technology development and the commercialisation of renewable energy technology, thus reducing its dependency on public support.
- ❖ *The capacity to manufacture renewable energy components locally:* In order to encourage a developing local manufacturing sector of renewable energy components, tax exemptions on locally manufactured components can be effective and help increase local economic activity and job creation. Exemptions from taxes for local components are efficient as long as their final price is inferior to the imported goods. However, when the components needed for the project are highly sophisticated, investors prefer to refer to their usual commercial partners.
- ❖ *The available local workforce:* If there is a skills gap between the requirement and the actual skills of the local workforce, training incentives in which the price of the training is shared between the authorities and the company could incentivise companies to use more local workers.

- **Country-specific risks:** Project risks differ according to the country in which they are implemented. For instance the risk of default for MENA oil exporters is usually significantly lower than for oil importers. Thus an investor in an oil exporting country will usually require fewer guarantees to carry out a project. Countries in the region currently undergoing political transition are also assessed to be riskier for investors, due to the lack of predictability of future policy direction.

3. Best-in-class: Investors' choice

The choice of the optimal incentive or support mechanism depends on the renewable energy objectives of the relevant authorities, budget constraints, the business environment and other factors such as the types of renewable energy technology available.

Nevertheless, within the range of available investment incentives directed at the renewable energy sector, it is possible to identify some that are more efficient and more attractive for the private sector when investing in renewable energy.

Based on the existing investment incentives in MENA, the task force emphasised that incentives offering higher cash flow for the duration of the project (also known as **cash-flow incentives**) have a higher impact on the decision to invest in renewable energy power generation, as opposed to one-off financial incentives at the start-up phase of the

Table 4.1. **Incentive schemes: Costs and benefits to private and public sectors**

		Price-based incentive schemes		Quantity-based incentive schemes	
		Net-metering	Feed-in tariffs	Competitive bidding + PPA	Quotas
Public sector	Government control over deployment rate and volume	**Medium** Capacity caps are a frequent feature in net metering.	**Low** Fixed prices + unconstrained quantities –> low volume control (could be increased with cap reductions) Risk of capacity explosion if tariffs are set too high.	**High** Volume control is a built-in feature of competitive bidding.	**Low** Constrained quantities+ unconstrained prices –> high volume control.
	Government control over price	**High** Fixed prices.	**High** Fixed prices + unconstrained quantities –> strong price control.	**Low** Prices are put forward by industry.	**Low** Only quantities are fixed. Prices are market-dependent. However, reducing caps and setting the right penalty are usually the way to control prices.
	Efficiency of resource allocation	**Medium** Potential for windfall profits if the tariff is set too high. Risk of no deployment if tariff is set too low.	**Medium** Potential for windfall profits if the tariff is set too high. Risk of no deployment if tariff is set too low. Reduces policy costs.	**Medium** Risk of too low bidding leading to price renegotiation.	**High** Investor bears certificate market risk + electricity market risk.
	Risk allocation	Technological risk borne by the private sector.	Technological risk borne by the private sector.	Technological risk borne by the public sector.	Technological risk borne by the private sector.
	Complexity of implementation	**Medium** Expertise needed to set prices and, if necessary, capacity caps.	**High** Need for strong expertise in the public sector to define and monitor tariffs.	**High** Need for strong expertise in the public sector for the bidding process.	**High** Need for strong expertise in the public sector to define and monitor quotas and set up certificate trading.
Private sector	Investor stability	**High** Long-term policy. Investors do not bear market risk.	**High** Long-term policy. Investors do not bear market risk.	**Low** Increases if combined with a long-term PPA.	**Medium** Long-term policy but investors bear market risk.
	Inclusiveness regarding types of investors	**Medium** Favours energy-intensive companies with high financing capacity.	**High** Low transaction costs favour access by different types of investors.	**Low** High transaction costs of the bidding process favour large companies.	**Low** High transaction costs favour large companies.
	Inclusiveness regarding types of technology	**High.** Tariffs can be tailored to type of technology.	**High.** FiTs can be tailored to type of technology.	**High** Favours mature technologies close to market competitiveness.	**Low** Favours mature technologies close to market competitiveness.
	Encourages innovation	**Low**	**Medium** Learning curve grows proportionally to total installed capacity which grows fast with FiTs.	**Medium** Innovation is not necessarily rewarded as price competiveness is the main criteria for technology selection.	**Medium** Innovation is rewarded through higher profit margins only if it leads to cheaper production.
Community	Impact on productivity	**Low**	**Medium** Productivity is rewarded through higher profit margins.	**High** Favours the most productive companies.	**High** Favours the most productive companies.
	Impact on energy efficiency	**High** Positive spill-over effect.	**Low**	**Low**	**Low**
	Impact on local private sector	**Low**	**High** Encourages the local private sector.	**Medium** Potential positive impact.	**Low** Encourages import of cheap intermediary goods from abroad.

Source: Authors' research.

investment. This is due to the nature of renewable energy projects that is substantially different from that of similar "traditional" power generation investments, in gas-fired plants for example.

Indeed, cash-flow incentives lift several key barriers to private investment at once, including the risk of losses owing to the cost of the technology, uncertainties regarding future cash flows and client risks (higher in this region), all of which together restrict access to finance. In a sound and secure regulatory framework, higher tariffs also encourage competition to enter the market.

Within the category of cash-flow incentives government authorities should choose the incentive that best matches their policy objectives.

Competitive bidding processes help the government to keep the deployment rate and volume of renewables under control and thus limit the costs of incentive schemes. Competitive bidding processes have the advantage of encouraging price discovery as the industry is incentivised to make the lowest bid possible. Therefore, competitive bidding can be a useful means to pave the way for a feed-in tariff (FiT) which will lead to larger deployment of renewables. Egypt, for example, has relied on competitive bidding for years and is currently about to introduce its first FiT scheme. It worth noting that the shift towards FiTs is specially beneficial to large-scale projects as this incentive tends to lead to economies of scale after some time, as more and more investors enter the market thanks to the implicit cash-flow guarantees, making future access to projects easier.

State guarantees can be necessary to bring about the investment decision

Best practice indicates that cash-flow incentives such as FiTs or a power purchase agreement (PPA) should be guaranteed by the state (or the state agency) for the duration of the contract. Mechanisms in which the government guarantees the commitment of the state agency are generally necessary, but the reliability of those types of guarantees varies from one MENA authority to another, according to features such as the financing capacity of the public sector, the size of its debt, the quality of the relationship between the private and the public sector and political stability.

Given the particular political context, MENA governments should design their cash-flow incentives to match the perceived strength of the guarantee. If the guarantee is perceived by investors to be weak, government authorities should consider introducing additional support measures such as soft loans from a supranational development agency or loan guarantees. Other support measures, such as guaranteeing the tariff in foreign currency, can reduce the risk borne by the investor.

4. Tailor incentive schemes to benefit the local economy

In order for national authorities to reap the maximum benefit from the renewable energy investment for the local economy, the analysis contained in this report indicates that special attention should be paid to the following:

- *Encourage research and development and innovation (R&D) within firms in the renewable energy sector.*

  The faster firms are able to improve their renewable energy technology, the faster the sector will be able to develop unaided, and in turn generate more investment. This would also help the host country develop a regional advantage in the sector. Tax exemptions for R&D activities (such as the "Crédit impôt recherche" implemented in France) can be an option.

- *Prioritise the use of the local workforce.*
  Incentive measures should encourage private investors to hire local workers for the implementation of renewable energy projects and to ensure that they acquire the skills and technical knowhow required. The lack of a skilled local work force as an obstacle to investment was highlighted by the Energy Task Force. This could be remedied through human capital-oriented investment incentives and targeted training programmes with the cost shared between investors and authorities. The example of TENESOL's programme in Morocco (Box 3.11) shows the positive impact of providing training for local workers.
- *Encourage the development of a local manufacturing base of renewable energy components.*
  The Energy Task Force identified the lack of a local manufacturing base for components and the concomitant imports of components for wind or solar projects as a key impediment preventing MENA economies from enjoying the full benefits of the abundant renewable energy resources in their countries. Developing competitive manufacturing of such components represents a substantial challenge for MENA governments, but the potential benefits are high: the ability to deliver locally-manufactured, high-quality products would have an immediate and substantial impact on the local economy, including job creation, rising exports and economic growth. Adopting a set of incentives to reinforce a supplier network of local SMEs could pave the way for a network of business linkages.

  Egypt's National Supplier Programme for the automotive industry, which was jointly implemented by General Motors, a large US car manufacturer, and the Egyptian Ministry of Trade and Industry, could be imitated for the energy sector. Careful study of the local economy would be required to assess the economies of scale and export opportunities. The members of the Energy Task Force consider this to be a feasible option for most of the countries in North Africa.
- *Incentives should take into account regional disparities.*
  Renewable energy projects that target underdeveloped regions and that would potentially improve their economic conditions should be promoted. Incentives facilitating access to these areas, combined with grants under a stringent cost/benefit assessment, would be suitable to develop the more remote areas, as has been the case with the rural electrification scheme in Morocco. Extending renewable energy to remote areas can have positive spill-over effects, too, including a growing local market for other products and a slowdown of the rural exodus in many areas. To improve decentralisation, smaller projects for rural areas could be singled out for special investment incentive packages, with a particular corporate social responsibility (CSR) component included.

5. Monitor, evaluate and review incentive schemes

- *Continuously monitoring incentive schemes.*
  Incentive schemes should be continuously monitored and regularly reviewed to ensure that they continue to address the main barriers encountered by the investor.
- *Limit the risk of adverse selection: setting up a public centre of expertise.*
  When implementing investment incentives, carrying out regular scientific, economic and strategic studies of the renewable energy sector is necessary to reduce the impact of information asymmetries, uncertainties and the risk of market distortions. Policy makers should work closely with energy experts to identify the opportunities and the

corresponding incentives. Studies should be regularly carried out to assess the adequacy of the incentives being used. Public expertise should also assist in the monitoring of projects and can enhance cost-benefit analyses.

- *A clear framework for policy evaluation of incentives should be established.*
  This framework should assess the efficiency of incentives from the public authority's point of view. By nature, not all investments in new activities are successful and there is a risk of incentives being directed to non-efficient businesses, leading to a waste of public resources. Supporting renewable energy investment while assessing the productivity of the private investment is a delicate balancing act. A clear impact assessment framework should consider the impact of the investment on the local economy and its productivity to avoid wastefulness.
- *Revisions of incentive schemes should be scheduled and announced ahead of their inception.* Revisions of incentive schemes, such as the decrease of an FiT, should only affect new plants while tariffs already promised to investors should be paid until the end of the legally foreseen period. Retro-active changes must be avoided as they irrevocably damage investor confidence.

Notes

1. *www.arfree.net/indexen.html.*
2. OECD, 2003.
3. BIAC, 2002.
4. OECD, 2003.
5. See also the OECD Investment Declaration, and the Policy Framework for Investment (Annotations to the *Policy Framework for Investment*), OECD 2006, p. 23.
6. OECD (2011), "Tools for delivering Green Growth", OECD, Paris.

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Renewable Energies in the Middle East and North Africa
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Chapter 5

Conclusion

This report attempts to provide an overview of the existing support mechanisms for investment in renewable energy power projects in the Middle East and North Africa region (MENA). The study shows that there are significant differences in renewable energy policy among the countries surveyed (Algeria, Egypt, Jordan, Morocco, Tunisia and the UAE). Support mechanisms and incentives available to investors vary across the countries, while domestic application of existing policies is not always clear and transparent for businesses.

Against a backdrop of economic slowdown and a complex political transition process in many of the MENA economies during 2011-12, for investors in renewable energy – which is already a challenging market – the combination of weak investment policy frameworks and a challenging political context can be uninviting, despite the significant potential of renewable energy as a source for power generation across the region.

This report is an attempt to help close the gap between foreign investors who would like to reap the benefits of investing in renewable energy and the governments of the MENA region that are eager to push ahead with ways to embed sustainable development in their policy mix. Chapter 1 of this report demonstrates not only the huge potential for renewable energy projects in the MENA region, mainly in solar and wind power, but also the real benefits to the MENA economies in terms of job creation, both directly and indirectly, through stimulating investment in the sector. In addition, with many MENA economies facing huge demands on their domestic energy resources owing to economic expansion and population growth pressures, developing the renewable energy sector will help rebalance domestic energy needs and free up valuable hydrocarbons for export.

In Chapter 2, the report looks at some of the obstacles that continue to limit investment in the sector. In fact, there are several barriers to investment in renewable energy, and these are in many cases exacerbated by the particular investment climate in the MENA region: the high risks associated with long-term investment, such as client risk, political and regulatory risk; market risks and the risks stemming from new technology; capital market barriers, and existing policy instruments which favour fossil fuels. Hence the report identifies a need for government-sponsored support mechanisms to spur investment in renewable energy in the MENA region, such cash-flow incentives, and long-term off-take agreements, to sustain such long-term investments over time.

Chapter 3 discusses some of these measures. The OECD member countries have accumulated a body of experience which can be used to select the most appropriate support measures to attract private investment in the sector in the MENA region. While many support schemes exist, the inventory of such measures compiled in the second part of Chapter 3 reveals that mechanisms are unevenly used by governments in the region. Moreover, they are not always subject to competitive bidding processes, although our research appears to demonstrate that in order to minimise wastage of public resources and ensure that the most competitive technology and investment projects are supported, some form of competitive process, augmented by a long-term power purchase agreement, seems to yield the best outcome for government and investor alike.

This finding leads to the recommendations found in the final chapter of the report, Chapter 4. Members of the MENA-OECD Task Force on Energy and Infrastructure, who contributed to the research, emphasise the need for clear and transparent investment regimes and the need for governments to put in place national energy policies with clear targets for the share of renewable energy in the domestic energy mix. In addition, in order to be able to use the energy generated from clean sources, the national grids must be upgraded and enhanced to allow for the uptake of energy from various sources. Finally, in order to stimulate investment in the sector, a number of support mechanisms must be in place. Whether they take the form of net metering, feed-in tariffs, or tradable carbon mechanisms, the most important feature is that the investor and the state should reach a mutual long-term agreement, providing visibility and predictability for the private investor.

1. Lessons learned: Implementing effective support measures

The Energy Task Force highlights that there is no single optimal incentive scheme for renewable energy projects in MENA. This is because renewable energy power generation can exist in a variety of forms, ranging from the very small scale (solar panels on a roof in a remote village) to the mega-project (such as vast fields for concentrated solar power or off-shore windmill parks). This has implications for governments. The choice of the right tool for attracting private investors is crucial as public resources could be unnecessarily wasted if the wrong incentive is implemented.

Based on what already exists in the MENA region in terms of renewable energy incentive mechanisms, the task force concludes that cash-flow incentives offering higher tariffs for the duration of the project have a higher impact on the decision to invest in renewable energy power generation. Indeed, cash-flow incentives help to improve profitability and increase competition, reduce client risks and therefore facilitate access to finance. In addition, to guarantee efficient cash-flow incentives, some factors should be taken into account such as the final energy production targets (including for renewable energy) of MENA governments, their capacities, their business climate and the state of development of renewable energy technology on their territories. Moreover, price-driven incentives should not be set so low as to hinder profit-taking, nor so high as to lead to a selection of unprofitable companies entering the market. Because of asymmetrical information, there is also a risk of adverse selection which could lead governments to pick less efficient technologies and companies in the renewable energy sector.

Among the incentive schemes discussed in the report, the task force members identify power purchase agreements, or similar long-term off-take commitments by the government, resulting from a competitive bidding process, as the most useful tool to attract private investment. However, incentive schemes are efficient only if they are accompanied by adequate legal frameworks and national energy strategies. The task force emphasises the fact that incentives should be clear, predictable, uniform and non-discriminatory, non-permanent, continuously monitored and adapted to the size of the project.

Feed-in tariffs (FiT)

Learning from the experiences of OECD countries, the efficiency of FiTs relies on the ability of policy makers to assess the cost of projects and to keep the payment levels in line with actual energy generation costs over time as technology changes and greater energy savings and the use of smart grids lead to cost reductions. There is a risk that the fixed price may be either too high or too low, leading to wastefulness or inefficiency. Thus, differentiating the tariff levels according to renewable energy generation costs is recognised as a best practise. The authorities should also be able to anticipate the decreasing costs of technology and thus use degressive tariffs accordingly. Moreover, adding FiT premiums – as some OECD countries do – increases revenues from the sale of electricity and attracts more investors. The German experience in implementing FiTs has been a success: the incentive design was based on technology-specific generation costs and degressive tariffs. France, on the other hand, did not use degressive tariffs which led to guaranteed FiTs for photovoltaic energy 7 to 14 times higher than the market price of electricity.

As the cost of FiTs is generally passed on to consumers, the financing mechanism for most MENA economies needs to be modified. Consumers in this region are vulnerable to electricity price increases; hence limiting the capacity of installed renewable plants or covering additional costs by a national fund would be solutions to deal with this issue. Very few lessons can be learned from FiT projects in Algeria and Egypt, as both countries are still in the early stages of their project implementation. The FiTs appear not to be set sufficiently high to attract investors. Moreover, their implementation lacks visibility and clarity, especially with regard to the remuneration scheme. Moreover, an insufficient grid infrastructure in Egypt is a significant add-on cost that will have to be borne by the government, if it is not improved.

Net metering

In general, net metering is a lesser financial burden for the government, compared with FiT schemes. If implemented correctly, it may lead to a higher share of renewable energy in the national energy mix while subsidising only the excess energy produced. One of the most successful net metering schemes was established in Colorado, US. It is considered as a best practise example as it does not limit the total installed capacity eligible under the system. However, in order for net metering to work optimally, the national grid needs to be upgraded to "smart" grids in order to cope with the variation in supply. Until the issue of storing power generated from renewable energy, producers of renewable energy power also need to be granted preferential access to the grid (to be able to supply power when climate conditions allow).

Competitive bidding

The competitive bidding process stimulates competition, improves the competitiveness of the projects submitted, and reinforces the government's ability to choose the best offer from the private investors. Also, it allows public authorities to discover prices through the tendering process. Competitive bidding combined with power purchase agreements, regular issuance of calls for tender and penalties for non-compliance are keys to designing a successful scheme. The UK tendering scheme experience shows that the intense competition in the bidding process led to the import of the cheapest technologies from abroad which made it difficult for the UK to establish an efficient domestic renewable energy sector. Moreover, because of the lack of penalties for non-compliance, not even one-third of all projects were carried out in the UK, leading to the abandonment of the scheme. In the MENA region, the government of Abu Dhabi, a UAE emirate, has implemented a successful competitive bidding scheme through the Shams

Power Company. The project relied on a PPA to come to fruition, and includes measures to stimulate local job creation.

Quotas

It is often useful to combine quota mechanisms with credits or certificates such as Tradable Green Certificate (TGC) schemes or carbon credits, to give incentives to producers and provide proof of compliance. The Clean Development Mechanism (CDM) developed under the Kyoto Protocol, is an example of quotas integrating negative externalities on a global scale. Through this scheme, developing countries are allowed to sell emission credits worldwide. When the developing countries grant the ownership of those credits to the private investor involved in the emission-saving project, e.g. a landfill gas mitigation measure or a renewable energy project, they provide an additional financial incentive to the private sector. Moreover, best practice as developed in OECD member countries, indicates that quotas should be combined with other incentive schemes such as FiTs to encourage the deployment of additional small-scale, low-carbon electricity generation locally.

Taking carbon credits as an example, the mechanism alone is generally not powerful enough to entice investors into the renewable energy sector in the MENA region or elsewhere. However, combined with other incentives such as quota obligations, they can help attract private investors, particularly large emitters and private sector projects, without any additional public contribution. As of September 2011, six MENA economies are currently developing CDM projects. Egypt, for example, has 16 registered Carbon Emission Reduction (CER) projects. Renewable energy projects account for about one-third of the estimated emission reductions, while the remainder are savings from energy efficiency measures or partial substitution of fossil fuels by renewables.

Concluding remark

In view of the analysis in this document and the combined experience of the Energy Task Force members, the authors of the report would recommend that governments in the MENA region, who desire to make the most of the massive potential afforded to them by their natural endowments in renewable energy sources, move quickly to formulate energy policies with clear targets for the share of power generated from renewable sources. Such targets should be specific both with regard to the kilowatt produced and types of renewable energy used. Now is the time to move forward with such projects. As the report indicates, developing the renewable energy sector will help address some of the challenges that MENA governments are facing at the moment, including the need to create jobs and boost technological transfers. In addition, a robust renewable energy sector will also contribute to a better energy balance for both importers and exporters of hydrocarbons.

The events of the past two years in the region have commanded the attention of international organisations and bodies. At present, scores of international financing institutions are looking to provide funding and technical assistance to MENA governments wishing to move forwards with the development of the renewable energy sector. The report tries to draw on the combined experience in renewable energy development from both OECD and MENA economies. Harnessing this experience and pushing forward with green energy development in this crucial moment in time may well allow the region to leap-frog other regions and take the lead in renewable energy power production, to the benefit of the region’s large and young population.

ANNEX A

Investment incentives for renewable energy

Table A.1. **List of commonly-used investment incentives for renewable energy**

Type of incentive	Benefits for the investor	Specific costs and risks for public authorities
Regulatory incentives		
Privatisation measures for the power sector	New market opportunity	Loss of control of a strategic economic activity
Financial incentives		
Green Certificate (Clean Development Mechanism)	Increase of positive cash flows	No national public expenses incurred under a CDM
Feed-in tariff	Increase of positive cash flows Reduce clients risk Reduce regulatory risk Facilitate access to finance	Require substantial public spending Risk of ineffectiveness Risk of inefficiency Risk of deadweight loss Risk of triggering competition
Power purchase agreement under a competitive bidding	Increase the amount of positive cash flows Reduce clients risk Reduce regulatory risk Facilitate access to finance	Require substantial public spending Risk of ineffectiveness Risk of inefficiency
Subsidies on investment, installation expenses	Reduce installation costs of the project Facilitate access to finance	Require public spending Risk of deadweight loss
Soft loans and loan guarantees	Facilitate access to finance	N/A – does not involve a public authority in most cases
Net metering	Increase of positive cash flows Reduce clients risk Reduce market risk	Require public spending
In-kind incentives		
Access to land	Reduce technical risks Reduce installation costs and operating costs	Require little public spending
Job trainings incentives	Reduce technical risks Reduce operating costs	Require little public spending
Administrative assistance	Reduce prospects costs	Require little public spending
Fiscal incentives		
Investment tax credits	Reduce installation costs	Loss of fiscal benefits Risk of deadweight loss
Tax reductions on operating expenses	Reduce operating costs	Require loss of fiscal benefits Risk of deadweight loss
Green taxes (tax abatement for GHG mitigation)	Can help improve the bottom line for the investor	Require loss of fiscal benefits Risk of deadweight loss
Tax reduction or exemption on corporate income	Reduce general costs	Require loss of fiscal benefits Risk of deadweight loss

Table A.1. **List of commonly-used investment incentives for renewable energy** *(cont.)*

Type of incentive	Benefits for the investor	Specific costs and risks for public authorities
Tax holidays	Reduce general costs for the installation period	Require loss of fiscal benefits Risk of deadweight loss
Exemption from import tariffs on inputs	Reduce supply expenses	Require loss of fiscal benefits Risk of deadweight loss Possible loss of local manufacturer's competitiveness
Exemption from VAT on supply	Reduce supply expenses	Require loss of fiscal benefits Risk of deadweight loss

Source: Authors' research.

Reference

New and Renewable Energy Authority (2001), "Implementation of Renewable Energy Technologies – Opportunities and Barriers", Egypt Country Study, UNEP, Roskilde, Denmark.

ANNEX B

National targets for renewable energy in Mediterranean Partners Countries

Table B.1. **National targets on renewable energy in Mediterranean Partners Countries**[1]

	Existing non-hydropower Renewable Energy Sources (RES) capacity (MWe) and share in electricity mix (%)	National RES targets
Algeria	• 34 MW (2012) of which 30 MW CSP (ISCC plant Hassi Rmel, 150 MW). • 0.1% of electricity mix (2009).	• 15% of total electricity to be generated from RES by 2020 and increasing to 40% by 2030. • By 2020, a total of 63 projects to be developed with a capacity of 2 700 MW estimated at EUR 11.5 billion. • Renewable Energy (RE) Programme 2011-2030 targets 12 000 MW (2 800 MW PV; 7 200 MW CSP and 2 000 MW Wind). – A capacity of 10 000 MW is reserved for electricity exports.
Egypt	• 570 MW (2012) of which 550 MW wind and 20 MW CSP (ISCC plant Kuraymat, 140 MW). • 1% of electricity mix (2009).	• 2020 target: 20% of total electricity from RES including 7.2 GW wind and 1.2 GW of solar. A total of 24 projects under development by 2020 estimated at EUR 11 580 million.
Jordan	• 13 MW (2012) including 10 MW biogas, 1.5 MW PV and 1.5 MW wind. • 0.1% of electricity mix (2009).	• Target of 7% for the share of RE in primary energy by 2015 and 10% by 2020 to be provided by 600 MW from wind power, 600 MW from solar power and 30-50 MW from waste. Out of 66 project proposals received in the competitive bidding for private investors on Build-Operate-Own (BOO) basis – with a PPA, progress has been limited. • A net-metering programme with a target PV capacity of 3 MW has been launched. The penetration rate of SWH to increase from 12% to 30% in 2020. • A National Energy Efficiency Action Plan (NEEAP) has been developed by National Center for R&D/Energy Research Programme(NERC).
Lebanon	• Micro PV (150 kW) and wind generation. • 0.1% of electricity mix (2009).	• By 2020, 12% of electricity and thermal energy to be produced from RE. • A National Energy Efficiency Action Plan (NEEAP) 2011-15 developed by the Lebanese Center for Energy Conservation (LCEC) was approved by the Government in 2011. • The Ministry of Energy and Water plans to launch 2012 a wind power rental project. Target of 100 000 square meters of SWH by 2020.
Libya[2]	• Several PV installations. • 0.1% of electricity mix (2009).	• The share of RE in installed power generation capacity to reach 3% in 2015, 7% by 2020 and 10% by 2025 corresponding to 1 050 MW by 2020 and 2 200 MW by 2025 (of which 1 000 MW wind, 800 MW PV and 400 MW CSP and 450 MW of SWH).
Morocco	• 287 MW of wind farms, several PV installations, 20 MW CSP (ISCC plant Ain Beni Mathar – 450 MW). • 3% of electricity mix (2009).	• According to the National Energy Strategy, 42% of total installed capacity to come from RES by 2020 including 2 000 MW solar, 2 000 MW wind and 2 000 MW hydro). A total of 3 160 MW is under development by 2020 for an estimated cost of 9.7 billion euros. • The 14 wind energy projects account for 1 150 MW, and the 6 solar projects account for 2 010 MW. An important step forward was made recently with the selection of the offer for the Ouarzazate-1 CSP project (160 MW).

Table B.1. **National targets on renewable energy in Mediterranean Partners Countries**[1] *(cont.)*

	Existing non-hydropower Renewable Energy Sources (RES) capacity (MWe) and share in electricity mix (%)	National RES targets
Palestinian Authority	• Several PV installations (50 KW). • 0.1% of electricity mix (2009).	• The 2020 target for RES electricity generation is 5% equivalent to a total of 25 MW (10 MW PV, biogas 6 MW, 5 MW CSP). • The Palestinian Solar Initiative projects (PSI) project, which aims at installing 5 MW PV panels on the rooftops of households throughout the West Bank.
Tunisia	• 260 MW (2012) of which 250 MW wind, 2 MW PV and biogas. • 1% of electricity mix (2009).	• By 2016, 16% of total power generation capacity to be generated from RES and 40% in 2030. • The Tunisian Solar Plan is under revision. The project list contains a total of 11 projects with a capacity of about 514 MW (330 MW wind, 105 MW CSP and 80 MW PV) estimated to EUR 1.4 billion. • The Tunisian Government builds on the success of the PROSOL Solar heater programme (2011: 550 000 m^2 or 390 MW, 10% of total installed capacity), with the Prosol Elec project (PV) targeting 15 MW.

1. PWMSP states that "these views are the sole responsibility of the authors (PWMSP) and can in no way be taken to reflect the views of the EU".
2. Libya recently joined the PWMSP. Data from presentation of the Ministry of Electricity and RE/REAOL during PWMSP Team Leaders visit to Tripoli on October 2012.

Source: The EU funded project PWMSP. Except where otherwise specified, data derived from the *National Road Map[s] for Legal and Regulatory Reform* (PWMSP, 2012a); and the on-going draft report on the up-dated "MSP-MPC RES-e investment project pipeline".

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Paving the Way for the Mediterranean Solar Plan (PWMSP) Project Consortium (2012a), National Road Map[s] for Legal & Regulatory Reform (country reports for Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Authority, and Tunisia), February 2012 (*www.pavingtheway-msp.eu/index.php?option=com_downloads&task=category&cid=8&Itemid=56*).

Paving the Way for the Mediterranean Solar Plan (PWMSP) Project Consortium (2012b), Regional Road Map on Regulatory and Legislative Harmonization, May 2012 (*www.pavingtheway-msp.eu/index.php?option=com_downloads&task=view&id=32&Itemid=56*).

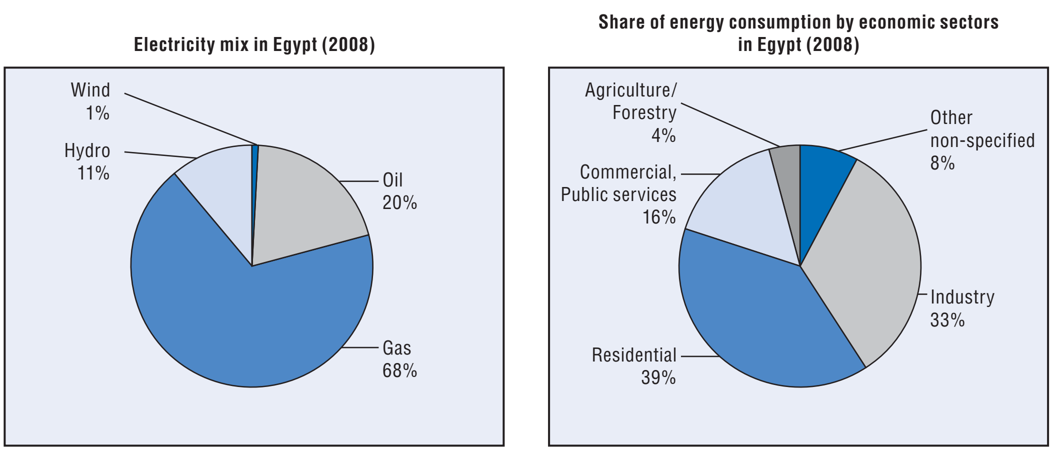
Paving the Way for the Mediterranean Solar Plan (PWMSP) Project Consortium (2012c), National Road Map[s] Sustainable Energy Policy Road Map (country reports for Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, oPT and Tunisia), November 2012 (*www.pavingtheway-msp.eu*).

IEA (2009), Renewable Energy share in electricity mix.

ANNEX C

Incentive schemes for renewable energies in Egypt

Figure C.1. **Energy overview for Egypt**



Source: *IEA Statistics*, 2010.

Expected depletion of gas reserves: Around 57 years[1]

Access to electricity: 99.6% of the population.

Share of renewable energy in total electricity generation: 12%.

Staff in the renewable energy sector: 1 011 including engineers, technician, accountants, administrators, physicians and lawyers.[2]

Renewable energy potential in Egypt: Egypt owns vast unused lands. The Red Sea Coast and especially the Gulf of Suez area is one of the windiest places in the world with annual average wind speeds between 7 m/s[3] to above 10 m/s.[4] The wind power potential of this area is estimated at 20 000 MW, which is almost equal to the overall installed capacity in 2004/2005. Egypt has important available solar energy with global solar radiation between 1 900-2 600 kWh/m^2.[5]

National renewable energy strategy

The government's renewable energy strategy was approved in February 2008. Its aim is for renewable energies to contribute 20% of total electricity generation by the year 2020. The target share of grid-connected wind power is 12% of total electricity generation, representing about 7 200 MW total capacity. The remainder is to come from hydropower and solar power.[6]

This objective requires a substantial increase of renewable energy plant. For instance, the installed hydro capacity currently represents 11% of electricity generation and by the year 2020 is expected to account for 8%, meaning that 12% of electricity generation will have to come from other renewable energies. Priority is being given to the expansion of wind power mainly because it is currently the most cost-effective renewable energy source compared to other renewable energy sources available in Egypt. The programme requires the implementation of more than 7 200 MW grid-connected wind farms by 2020 to produce 12% of the generated electricity from wind power.[7]

In parallel, the government aims to develop the local production of wind turbines (i.e. blades) and wind towers. This is intended to help meet the expected increase in demand for wind turbines but also to reduce the cost of wind power installations; presently most wind turbine components in Egypt are imported, and increasing local production would limit overall costs by reducing the substantial shipping costs. The government also plans to build on the opportunity of the emerging MENA renewable energy markets to export the high-value-added wind turbine components to its neighbours. Egypt's General Authority for Investment (GAFI) estimates that the blade-manufacturing project requires an investment of USD 59 million, while the tower industry is estimated at USD 147 million per year, providing employment for 400 workers.[8]

Small-scale biomass projects are also expected to be developed in co-operation with the UNDP, the Ministry of Environment and the Ministry of Municipalities and Urban Planning. The overall biomass energy potential from agricultural waste and garbage is estimated at 1 000 MW. Production of solar power is not considered to be an immediate priority by the government due to its high costs which are expected to decline sharply over the next five to seven years. Nevertheless, several pilot solar projects have been implemented such as the 150 MW Solar Thermal project in Korimat, financed in 2008 by the World Bank's Environmental Facility Operational Program. The government is also involved in regional initiatives for the development of solar power such as the Mediterranean Solar Plan and DESERTEC.

The goal of reaching total renewable energy capacities of 7 200 MW is expected to be achieved through two main paths:

- State-owned projects accounting for 33% (2 375 MW) of the renewable energy production target by 2020. They will be implemented by the New and Renewable Energy Authority (NREA) and financed through governmental agreements with the support of international development agencies.
- Private sector projects representing 76% (4 825 MW) of the renewable energy production target by 2020.

Main incentive mechanisms used in Egypt

To ensure the involvement of the private sector in realising the goal of 20% of generated electricity by renewable energy by 2020, the Supreme Council of Energy in Egypt has established a comprehensive incentive scheme targeting private sector needs through the adoption of a new electricity law in April 2007. It was completed by a set of resolutions in July 2009. Two incentive mechanisms,[9] detailed below, have been adopted to increase private sector participation in the development of renewable energies.

Competitive bidding

To implement the new energy strategy, the Egyptian Electricity Transmission Company (EETC) has been granted permission by the central authorities to issue ten international tenders requesting the private sector to produce 250 MW of wind energy power for a total capacity of 2 500 MW of renewable energy. Under Build-Own-Operate (BOO) agreements, the private investor shoulders the cost of the project, constructs, operates and owns the wind plant and is required to sell the energy to the national electricity company.

The selection of competitive bids takes place in two phases. Phase 1 corresponds to the pre-qualification of renewable energy projects based on the experience and the financial status of the investors. During this one-year period, precise wind measurements, soil testing and assessment of the environmental impact are undertaken. Phase 2 is characterised by the launch of the wind projects. In May 2009, a short list of investors submitted their pre-qualification documents for the first competitive bid for a 250-MW wind farm based on the BOO scheme. The bid evaluation favours proposals with a higher share of locally manufactured components. Competitive tenders of wind projects are expected to be launched regularly until 2017 to achieve the government's energy target by 2020.

Incentives

The NREA of Egypt is the single point of interface dealing with requests for private generation of renewable energy and land-related issues to ensure timely management of permits and resources. The different incentives attached to the bids are available on the website[10] of the NREA. They include:

Power Purchase agreement (PPA)

Under such contracts, the Egyptian Electricity Transmission Company (EETC) guarantees to buy the electricity for a 20-25 years period at a tariff set on a case-by-case basis between the grid operator and the power producer. The tariff that the national electricity company pays to the private investor is set up in foreign currency. A portion covering operation and maintenance costs is settled in local currency. The Central Bank of Egypt guarantees all financial obligations contracted by the EETC.

Green certificate

Investors receive the carbon credits associated with the project and can trade them on the international market.

Tax incentives

All renewable energy equipment and spare parts are exempted from customs duty and sales tax.

Access to the grid

The authorities are in charge of the connection of the electricity generation site to the national electricity network and allow companies to use it.

Land allocation on favourable terms

In May 2010, the government allocated more than 7 600 square kilometres of desert land for implementing future wind projects and delivered all the permits for land allocation to the NREA. The government also decided to base the price of the land used on the electricity production of the wind plant: the investor's lease payment for land use is equivalent to a certain percentage of the annual energy generated from the project to be decided by the government.

Feed-in tariffs (FiT)

The Supreme Council of Energy in Egypt approved the implementation of FiTs for small and medium projects with maximum capacities of 50 MW for a total renewable energy generation of 2 500 MW. The objectives of this mechanism are first to support the local private sector while maximising the impact on the local economy. Second, it encourages energy-intensive industries to produce their own energy at a competitive price and thus reduce their carbon footprint. The FiTs are expected to include the following incentives:

- *Incentive tariff:* The tariff is proposed by the Egyptian Electric Utility and Consumer Protection Regulatory Agency and approve by the Supreme Council of Energy. It takes into consideration the cost of the renewable energy technology and the energy capacity in the area. Depending on the renewable energy area, different tariffs are proposed.
- *Guaranteed tariff:* The EETC guarantees to buy renewable electricity from selected participants for a fixed maximum quantity for 15 years.
- *Access to the grid:* Under the FiTs, the EETC ensures access to the grid for participants.
- *Access to land:* The EETC has already allocated desert land to renewable energy projects under the FiT scheme. The land is provided to the selected participants.
- *Financial guarantee:* The Central Bank of Egypt guarantees all financial obligations contracted by the EETC.
- *Green certificate:* Investors receive the carbon credits associated with the project and can trade them on the international market.
- *Tax incentives:* All renewable energy equipment and spare parts are exempted from customs duty and sales tax.

Government incentives for wind projects

The Egyptian government has set up different incentives to support the profitability of wind projects including:

- *Tax incentives:* Renewable energy equipment and spare parts of companies are exempted from customs duty and sales tax.
- *Green certificate:* Investors receive carbon credit certificates and can sell them on the market. The emission reduction contained in the certificates is calculated from the project.
- *Financial guarantee:* All the financial obligations that the EETC has taken under the PPA are guaranteed by the Central Bank of Egypt.

In parallel, a renewable energy fund has been established to cover the deficit between the renewable electricity costs and the market price and to provide financial support to pilot projects.

Mechanism	Competitive bids	Feed-in-Tariff
Description	The EETC issues international tenders requesting the private sector to supply renewable energy power. Private investors own, build and operate wind farms and sell electricity to the EETC.	The EETC guarantees to buy renewable electricity from selected participants for a fixed maximum quantity. It ensures access for participants.
Project size	Large projects with an objective of renewable energy generation of 2 500 MW issued in 10 blocks of 250 MW each.	Medium and small projects with maximum capacities of 50 MW and an objective of renewable energy generation of 2 500 MW.
Others objectives	Attracting highly competitive and qualified international investors with strong financial capacity. Supporting local manufacturing through business linkages. Bid evaluation favours the proposals with the higher share of locally manufactured components to spur technology transfer.	Supporting local private sector and SME's and maximising the impact on local economy Encouraging energy-intensive industries to produce their own energy at a competitive price and reduce their carbon print.
Developer	Private (most probably international).	Private.
Finances	Private finance. The government guarantees all financial obligation under the PPA.	Commercial finance.
Tariff Setting	Tariff is set according to the bid outcome. The selling price for energy generated in renewable energy projects is set up in foreign currency. A portion covering operation and maintenance costs is settled in local currency.	Proposed by the Egyptian Electric Utility and Consumer Protection Regulatory Agency and approved by the Supreme Council of Energy. The tariff takes into consideration the wind speed and energy capacity of the area.
Contracting	Long -term PPA (20-25 years).	15 years.
Offtaker	Grid.	Grid or distribution system.
Construction responsibility	Developer.	Developer.

Institutional support for the development of renewable energy

The presece of complementary energy institutions with a well-defined mandate are an advantage for the investor. They facilitate the co-ordination of renewable energy measures. In Egypt, the

re are several such bodies.

The Egyptian Supreme Council of Energy (SCE)

The SCE is the ministerial committee guiding and overseeing the energy sector in Egypt. The SCE was established in 1979; the 2006 decree has substantially reinforced its power to become the highest policy-making body in the energy sector in Egypt. It brings together 12 ministers in the following areas: Defence, Finance, Petroleum, Electricity, Economic Development, Environment, Investment, Housing, Trade and Industry, Transport, Intelligence and Foreign Affairs. It provides guidance to reform the energy sector and establishes and implements the national energy strategy. Its main activities include the issuing of decrees to support renewable energy development, removing market barriers such as reforming subsidies, and supporting market initiatives through incentives schemes.

The New and Renewable Energy Authority (NREA)

The NREA was established in 1986 by the Egyptian government to act as the national focal point for developing renewable energy technologies in Egypt on a commercial scale and implementing renewable energy programmes within the framework of its mandate which includes:[11]

- Providing energy data, resource assessment and technical support to assist in the feasibility studies of potential renewable energy projects. For example, it published the Wind Atlas in 2005 in co-operation with the National Laboratory RESO (Denmark).

- Implementing renewable energy projects.
- Setting up Egyptian standards for renewable energy equipment and systems along with testing and certifying renewable energy-related apparatus and equipment.
- Organising, training, upgrading courses and workshops both independently and in co-operation with international partner organisations.
- Promoting technology transfer and development of local manufacturing of renewable energy equipment and information dissemination.

The Egyptian Wind Energy Association (EGWEA)

EGWEA is an umbrella organisation representing the wind energy sector in Egypt. It promotes the development of wind energy principally in Egypt but also in developing countries in general. It also focuses on wind energy solutions – either grid-connected and/or stand-alone systems – which benefit local communities. EGWEA is a pro-active global network of all relevant stakeholders involved in the field of wind energy. It facilitates the exchange of technical information, expertise and experience among its stakeholders by conducting studies, providing information on tenders and conferences and organising workshops for interested parties.

Notes

1. IEA.
2. *www.nrea.gov.eg/english1.html*.
3. Meters per second.
4. *www.punchdown.org/rvb/wind/C_WNDH3.GIF*.
5. New and Renewable Energy Authority in Egypt, 2001 UNEP, Denmark.
6. GAFI, 2010.
7. *www.nrea.gov.eg/english1.html*.
8. GAFI, 2010.
9. Hatem Amer, 2011.
10. *www.nrea.gov.eg/english%5Cpage61e.htm*.
11. *www.nrea.gov.eg/english1.html*.

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Amer, Hatem (2011), *Renewable Energy Strategy for 2020 and Regulatory Framework*, Egyptian Electric Regulatory and Consumer Protection Agency.

General Authority for Investment (GAFI) (2010), "Renewable energy", *Invest in Egypt*, GAFI, Cairo.

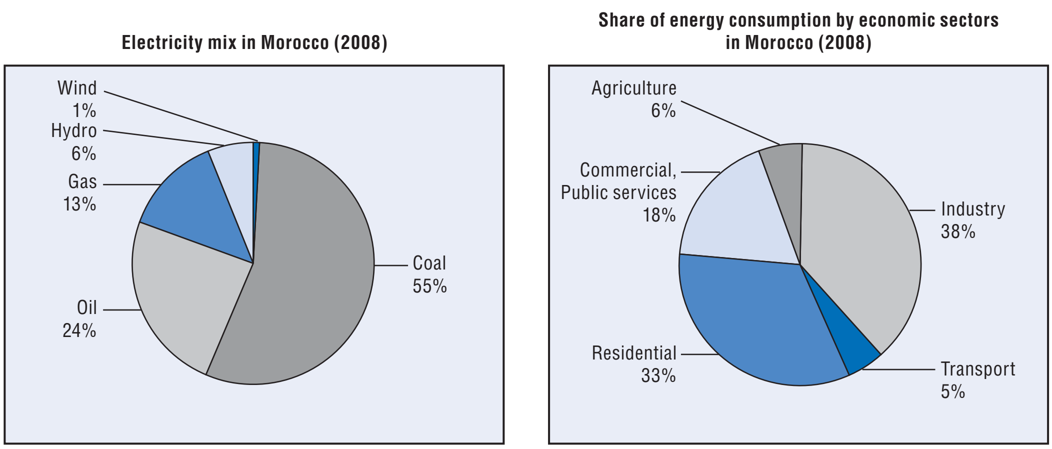
DATABASE:

IEA Statistics, 2010.

ANNEX D

Incentive schemes for renewable energies in Morocco

Figure D.1. **Energy overview for Morocco**



Source: *IEA Statistics*, 2010.

Access to electricity: 97% (one million inhabitants without access to electricity).

Energy imports: 95%.

Share of renewable energy in total electricity generation: 7%.

Expected evolution of electricity demand: electricity demand is expected to double by 2020.[1]

Expected employment generation: by 2020 in the renewable energy sector: 13 300.[2]

Renewable energy potential in Morocco:[3] Morocco has significant potential for solar energy with radiance on average of 2 300 kWh/m²/year. The vast inhabited lands in the south and east of Morocco also have the highest potential for solar energy. Wind energy farms can be developed along the Atlantic coast where the average annual wind speed is superior to 6 m/s. According to the results of a study conducted by the Renewable Energies Development Center (Centre du Développement des Energies Renouvelables, CDER) with GTZ of Germany, the wind power wind potential is 5 290 TWh/year (2 645 GW) and the technical potential is 3 264 TWh/year (1 632 GW).[4] However the areas with the highest potential for renewable energy have poor access to the power grid which limits their power potential in the short term.

National energy strategy in Morocco

In March 2008, a new comprehensive strategy for the energy sector launched by the Moroccan government prioritised the development of renewable energy and aimed to increase the share of renewable energy from 4% to 8% of the primary energy supply by 2012. The strategy targets especially the development of those wind energy fields that can be developed rapidly and at low cost. In 2009, the government adopted a more ambitious programme for renewable energy in which the portion of installed capacity of renewable energy in the power system will represent 42% of the total installed capacity by 2020, reaching a capacity of 400 MW by 2020.[5] Part of this programme consists of the Integrated Solar Energy Generation Project which focuses on the implementation of concentrated solar power (CSP) to generate electricity.

The objectives of the programmes are: to increase the energy independence of Morocco, which currently relies heavily on imported energy; to guarantee broad access to electricity at a fair price for the country's population; and to protect the environment. The energy programmes to be implemented by 2020 are detailed in the table below.[6]

	Solar energy programme	Wind energy programme
Capacity	2 000 MW (between 100 MW and 500 MW).	2 000 MW (of which 1 000 MW are either built or under development).
Annual production	4 500 GW.	6 600 GWh.
Investment	USD 9 billion.	USD 3.5 billion.
Sites	Five identified sites accounting for 10 000 hectares: Ain Beni Mathar, Ouarzazate, Sebkate Tah, Foum Al Ouad, Boujdour.	Five identified sites: Taza, Koudia Al Baida, Seuouk, Tiskrad, Boujdour.
Timeline	First new solar plant: 2014. Finalisation: 2019.	First new wind farm: 2015. Finalisation: 2020.
Economic impact	Approximately 1 million of toe per year saved 3.7 million tonnes of CO_2 emissions saved per year. 6 100 job created.	Approximately 1.5 million of toe per year saved. 5.6 million tonnes of CO_2 emissions saved per year 1 100 job created.

Incentives to the private sector for the development of renewable energies

Prior to the adoption of the National Energy Strategy, the Moroccan government had developed two other mechanisms to encourage the development of renewable energy plants.

As part of a national rural electrification programme starting in 1996, the Moroccan government entered into a public private partnership with an energy company to supply 16 000, then 37 000 more rural households of solar PV systems to produce electricity, given that incorporating them into the general electrical grid was too expensive (see Box 3.11 on the TEMASOL case study). Under this fee-for-service partnership, the private operator, selected through a competitive tendering process, is in charge of implementing the solar programme, managing the technical and financial aspects of the programme, performing maintenance on the installed systems, replacing equipment and collecting user fees in 24 Moroccan provinces. Customers pay an initial connection fee and a monthly service fee.

In September 2006, ONE launched the EnergiPro programme directed at energy intensive industrial groups to promote the auto-production of renewable electricity. The scheme was extended by a new law in 2009, which now allows the relevant companies to produce their own energy for up to 50 MW of installed capacity. This initiative is supported by the following incentives:[7]

- *Administrative assistance:* ONE provides the company with land and with the required natural conditions for renewable energy if the production site of the company does not meet this requirement.
- *Infrastructure subsidies:* The transit of the renewable energy produced by the industry to the place of consumption through the electrical grid of ONE at fixed tariff of 0.06 MAD/kWh.
- *Price incentives:* The guaranteed purchase by ONE of all energy produced in excess of the company's energy consumption at an incentive tariff. This fixed tariff is equivalent to 20% more of the peak tariff applied by ONE. This tariff has since been revised to take into account the off-peak tariff as well.

There have been successful initiatives under the EnergyPro programme. For instance, the Lafarge wind plant in Tetouan has an energy capacity of 32 MW and its annual production is estimated at 38 GWh/year. This represents about 40% of the total consumption of the factory.[8] However, the overall impact of EnergyPro is limited because companies must have important capital reserves in order to launch an industrial activity that goes beyond their day-to-day operation.

In addressing its renewable energies targets, Law 16.08, adopted by Morocco in 2008 to promote large scale renewable electricity generation projects, offers the possibility for industrials to develop and produce electricity from renewable energy on a concession basis with ONE. For the most part, ONE is responsible for the procurement and management of the renewable energy plant; it publishes calls for tender and presides over the attribution of contracts. The type of contract and related incentives vary from one contract to another. In general, the private sector builds the plants as an independent power producer under a build-operate-transfer agreement which includes the following incentives:[9]

- *Infrastructure subsidy:* ONE endeavours to grant access to its grid and to the interconnections with regional markets to the extent that it is reasonably feasible in order to increase export opportunities of the company.
- *Contract guarantee:* During a 20-year period, ONE will purchase electric energy from the project company pursuant to a PPA to be entered into with the project.
- *Price subsidy:* Under the PPA, the price of electricity bought by ONE from the company is higher than the price for end-users. As such it is an indirect price subsidy.
- *Carbon credit:* The company owns the carbon credits associated with the project. Once monetised, they increase the company's profits.
- *Administrative assistance:* ONE assists the company in selecting the site, receiving the permits and authorisations it needs.
- *Financial support:* In some circumstances ONE can provide an equity contribution capped to a certain percentage.
- *Special tax privilege zone:* The investor must use 35% of its equipment sourced locally from Morocco. The Kyoto Pole, currently under construction, will be a tax-free manufacturing zone dedicated to energy efficiency. Investors are strongly encouraged to have equipment and parts manufactured locally, either through setting up/developing a local manufacturer, or through the Kyoto Industrial Pole.

To support private sector participation in Morocco's National Renewable Energy Strategy, the government has established several institutions and programmes which can provide incentives to private investment in renewable energies. In addition to incentives discussed elsewhere, the government has implemented an investor credit for R&D/job training: the government has created specialised courses in wind energy at major engineering schools and universities. It also provides training of technicians in wind and solar energy at vocational training institutes.

Competitive bidding

ONE has been in charge of the generation and transmission of electricity in Morocco under the authority of the Ministry of Energy and Mining since 1963. Since 1994, the Decree 2-94-503 allows power plants with ratings above 10 MW to be built and operated by private enterprises, on condition that the project is subject to open tendering and that the power produced is sold to ONE.

Private investors are allowed to develop and produce electricity from renewable energy through concessions obtained from ONE. ONE is responsible for the procurement and management of wind plants; it publishes calls for tender and presides over the attribution of contracts which consists of two phases: pre-qualification, and short-listing of the best proposals.

The type of contract and related incentives offered varies from one contract to another. Generally, the private investor builds the plants as an independent power producer under a build-own-operate-transfer agreement and obtains the incentives outlined in Article 17 of the Framework Investment Law,[10] including:[11]

- contribution of 20% to the operating expenses;
- contribution of 5% to investment costs and;
- contribution of 20% to staff training costs, both for new hires (MAD 15 500 [USD 1 800] to 40 000 [USD 4 700]/employee/year) and for in-service training (MAD 5 000 [USD 590] to 20 000 [USD 2 300]/person/year).

The competitive bidding contracts apply to both solar and wind power capacity. Companies are also given incentives to use local equipment, either through the bidding requirements or through a preference for proposals with a higher share of local equipment. According to the features of each contract, the investor can also benefit from a number of additional incentives including:

- *Power Purchase Agreements (PPA):* The price of the electricity bought by ONE from the company is determined on a case-by-case base, and any tariff that may be in excess of the usual cost of electricity is not visible. The tariff may be negotiated between the operator and the distributor, or may be already fixed. The agreement typically is binding for 20-25 years and ownership of the renewable energy electricity plant is generally transferred entirely to ONE at the end of the contract.
- *Access to the national grid:* ONE endeavours to grant access to its grid and to the interconnections with regional markets to the extent that it is reasonably feasible in order to increase the exports opportunities of the company.
- *Grants:* The government provides grants of up to 10% of capital expenditure with a ceiling of MAD 200 000 (USD 23 700).
- *Carbon credit:* The investor owns the carbon credits associated with the project and can trade them freely.

- *Access to land:* ONE assists the investor in selecting the site, receiving the permits and authorisations for the land.
- *Access to finance:* ONE, as well as the Société d'Investissements Énergétiques (SIE) and the Fonds du Développement de l'Énergie (FDE) (both financed by sovereign funds) can have an equity stake in the project.
- *Soft loans or loan guarantees:* Development agencies and banks can grant the developer a soft loan or a loan guarantee. In the past Proparco (the financing arm of the AFD), and the European Investment Bank, amongst others, have participated in such projects.
- *Tax-free zones:* According to the area where the project is set up, it may be exempted from taxes and VAT. The authorities are currently working on setting up a Kyoto Industrial Pole which would be a tax-free zone dedicated to energy efficiency and renewable energies.[12] Investors are encouraged to develop the local manufacturing of equipment for renewable power generation.

Net metering

The Moroccan "EnergiPro" programme[13] is similar to FiT schemes but differs in the sense that it applies only to companies producing their own electricity. In September 2006, ONE launched the EnergiPro programme, which allowed energy-intensive industrial groups to produce their own electricity through renewable energy resources up to 10 MW of installed capacity. This was later expanded to 50 MW of installed capacity in 2009 by Law 13.09. This initiative is supported by the following incentives:[14]

- *Incentive tariffs:* ONE purchases all energy produced in excess of the company's own energy consumption at an incentive tariff set by ONE. The set tariff used to be 20% above the peak tariff applied by ONE. This tariff has since been revised and is now 20% above average prices during normal hours.
- *Guaranteed tariffs:* ONE guarantees to purchase the excess electricity produced by the company for a period up to 20 or 25 years. In return the company is obliged to sell all its excess electricity to ONE.
- *Administrative facilitation:* For smaller installations, with a capacity below 2 MW, a simple declaration is sufficient in order to produce electricity. Sites exceeding an installed capacity of 2 MW need official authorisation.
- *Access to land:* ONE provides land with the required natural conditions for renewable energy if the original production site of the investor does not allow for efficient power generation.
- *Access to the grid:* The transit of the renewable energy produced by the company to the place of consumption through the electrical grid of ONE is at a fixed tariff of MAD 0.06/kWh for all plants in service before 2011, and at MAD 0.08/kWh for plants commissioned after that date.
- *Green certificate:* The investor is entitled to the carbon credits associated with the project.

In certain circumstances, the investor is allowed to sell the electricity surplus to local and foreign consumers, particularly in Europe, via the national electricity grid.

The interest of the measures is twofold: First, investors who wish to sell their excess power face a known, clear, regulatory framework within which they plan their investments. They are also encouraged to reduce their own electricity consumption in order to be able to sell more electricity to ONE. For the authorities, the interest lies in the fact that they obtain an increase in the share of renewable energy in the national energy mix without paying a large subsidy, given that the subsidised tariff is only applied to the energy produced in excess of the company's own consumption.

Small renewable energy units

As part of a national rural electrification programme which began in 1996, the Moroccan government launched a scheme to roll out photovoltaic (PV) home solar systems. Such a system was well suited to the geographical location of homes in remote mountainous areas. ONE entered into a public-private partnership with a private operator to carry out the programme. The chosen method was a fee-for-service partnership. Under this scheme, the private operator, selected through a competitive tendering process, is in charge of implementing the project, managing the technical and financial aspects of the programme, performing maintenance on the installed systems, replacing equipment and collecting user fees in 24 Moroccan provinces. Customers pay an initial connection fee and a monthly service fee. In order to make this project profitable for the private investor, ONE set up the following incentives (see also Box 3.11 for a detailed case study):

- *Equipment grant:* ONE's equipment grant covers 66% of the equipment costs enabling electrical service at affordable rates. In fact, the final connection fees of rural solar customers were reduced by 40%, bringing them closer to urban electricity rates.
- *Administrative assistance:* ONE had previously identified the eligible households for the electrification service, saving time and resources for the investor.

The programme was successful in its objective insofar as the electrification rate which was around 15-20% in 1996 is now estimated at 98% and has encouraged the use of renewable energy. However, the subsidies and costs to the state related to such a programme are significant. In Morocco most of this has been financed by international donors including the European Investment bank, the Japan Bank for International Co-operation, the Inter-American Development Bank, and the *Agence Française de Développement*. For the partner energy company the benefits consist mostly of the positive association with renewable energy and a closer relationship with the public authorities, rather than a substantial profit.

Notes

1. 2[e] Assises de l'énergie du Maroc (31 mai 2011), "Les énergies vertes, un élan pour le Maroc", Ministère de l'Énergie, des Mines, de l'Eau et de l'Environnement, Oujda.
2. 2[e] Assises de l'énergie du Maroc (31 mai 2011), "Les énergies vertes, un élan pour le Maroc", Ministère de l'Énergie, des Mines, de l'Eau et de l'Environnement, Oujda.
3. *www.siem.ma/en/energy/moroccan-potential*.
4. Regional Centre for Renewable Energies and Energy Efficiency, January 2010.
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6. 2[e] Assises de l'Énergie (May 2011), "Strategie énergétique : Bilan d'étape", Ministère de l'Énergie, des Mines, de l'Eau et de l'Environnement, Morocco.
7. Fonds d'investissement climatiques (September 2009), "Fonds pour les Technologies propres : Plan d'investissement pour le Maroc".
8. *www.evwind.es/noticias.php?id_not*=5632.

9. Office National de l'Électricité (2008), "The Chourouk Initiative: 500 MW solar by 2015 – Invitation for the expression of interest and prequalification of companies and consortia".

10. Loi-Cadre n° 18-95, Formant Charte de l'Investissement : *www.maghrebarabe.org/admin_files/unpan005731.pdf*.

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12. *www.one.org.ma/FR/pdf/Dakhla%201-3%20MW.pdf*.

13. *www.leconomiste.com/article/energies-renouvelablesbrl-offre-energipro-amelioree*.

14. Fonds d'investissement climatiques (September 2009), "Fonds pour les Technologies propres : Plan d'investissement pour le Maroc".

DATABASES

IEA Statistics, 2010.

ANNEX E

Competitive bidding schemes in Egypt and Morocco

Table E.1. **Comparative table of competitive schemes in Egypt and Morocco**

Competitive bidding schemes	Egypt		Morocco	
Investor's decisions	Impact on private sector	Impact on public budget	Impact on private sector	Impact on public budget
Increase margin	**Yes**		**Yes**	
Increase revenues	Yes	Direct financial support	Yes	Direct financial support
Reduce installation costs	Yes	Public technical assistance	Yes	Direct financial support Public technical assistance
Reduce operating expenses	Partly	Loss of lease revenues Infrastructure expenses	Yes	Direct financial support Infrastructure expenses
Reduce tax expenses	Partly	Loss of tax revenues	Partly	Loss of tax revenues
Reduce risks	**Yes**		**Yes**	
Reduce client risks	Yes	Direct financial support Public guarantees	Induced effect	
Reduce business and market risks	Partly	Public guarantees	No	
Reduce political risks	No		No	
Reduce regulatory risks	Partly	Public guarantees	Partly	Public guarantees
Reduce risks and uncertainties related to new technology	Yes	Public technical assistance	Yes	Public technical assistance
Facilitate access to finance	**Induced effect**		**Yes**	**Direct financial support International organisations expenses**

Source: OECD (2012), *Investment Policy Reviews: Tunisia*; OECD (2010), *Investment Policy Reviews: Morocco*; OECD (2007), *Investment Policy Reviews: Egypt.*

Table E.2. **Strengths and weaknesses of the competitive bidding process in Egypt and Morocco**

Effects on the private sector in Egypt	
Strengths	Weaknesses
Clear incentive scheme easily available to investors which stimulates competition. Many guarantees reducing substantially the risks related to this project and encouraging companies to propose a smaller tariff under a PPA.	The scheme relies on the public authority. Given the increased perception of uncertainty of the policy direction in Egypt related to the Arab Spring, supranational guarantees for financial obligations of the national electricity company would help reduce this risk for the investor.
Effects on the economy in Egypt	
Advantages	Disadvantages
Encourages technology transfer: This scheme particularly targets multinational enterprises in Egypt. Encourages local manufacturing: Companies with a higher share of local components are favoured in the selection process. Given that the portion of the tariff covering operation and maintenance costs is settled in local currency, companies are encouraged to use local components to reduce exchange-rate risk over time. Optimisation of public expenses: The principal expenses item is the tariff PPA. Other supports are either temporary or indirect costs (loss of tax revenues or technical assistance) which reduce the risk of wastefulness of public resources.	Little incentive for the investor to hire local workers. Customs-tax exemptions should be applied only to non-locally available components. Need to ensure the efficiency of the public assistance directed to the investor. Moderate risk of moral hazard regarding customs and VAT exemptions. Moderate risk of adverse selection (the state cannot be omniscient).
Effects on the private sector in Morocco	
Strengths	Weaknesses
Strong incentives scheme which encourages private sector participation. Wide range of financial support vehicles from authorities that substantially help to reduce the costs related to the project. Incentives scheme encouraging participation of medium-sized enterprises through the possible equity participation of various entities.	A lack of visibility of available incentives for each project may reduce competition to only a few investors. Few incentives targeting the risks of the project leading to a higher discount rate and a high proposed tariff under the PPA.
Effects on the economy in Morocco	
Advantages	Disadvantages
Encourages companies to hire and train local human resources. Encourages local manufacturing: Energy companies are encouraged to both build and use local manufacturing components. The competition process encourages lower public expenses in the long term by encouraging bidders to lower their tariffs under the PPA.	There are numerous incentives that constitute direct financial support to reduce costs and increase revenues for investors. This leads to: • Higher opportunity costs for the government. • Higher risk of inefficiency: If there were more measures, such as government guarantees targeting investor risks, public expenses could be reduced. • Higher risk of deadweight loss: By offering several subsidies for the same projects, investors are more tempted to require the same financial support for other projects in the future.

Source: OECD (2012), *Investment Policy Reviews: Tunisia*; OECD (2010), *Investment Policy Reviews: Morocco*; OECD (2007), *Investment Policy Reviews: Egypt*.

ANNEX F

Incentive schemes for renewable energies in Algeria

Algeria's Decree on the Diversification of Power Generating Costs adopted in 2004[*] introduced FiTs to support the private production of electricity from renewable energy sources, but has not yet been implemented. The types of renewable energy covered include hydropower, wind power, geothermal and solar power and electricity from waste. The Commission of Electricity authorises power companies to produce electricity from renewable energy up to a capacity of 50 MW. The authorities bear the additional costs related to the use of these technologies through FiTs. The mechanism includes the following incentives:

- *Incentive tariff:* Article 12 of the Decree specifies the premium tariff granted to private production of renewable energy in a percentage of the price of electricity fixed by the operator on the national market per kWh. This mechanism also encourages hybrid production of electricity. Indeed a specific incentive tariff scheme is proposed for the combined use of solar energy and natural gas based on the percentage of contribution of renewable energy to the total electricity generated by the plant. Renewable energy producers that use such a system are granted an incentive tariff of 200% of the current price of electricity if it accounts for 25% or more of the total electricity produced by the plant. If it accounts for 20% to 25%, the incentive tariff is 180%. The rationale for using this mechanism is that the authorities find it one of the most effective ways of making use of renewable energies.
- *Guaranteed tariff:* The authorities guarantee to buy the quota of renewable energy stipulated in the authorisation contract at the incentive tariff. This quota is established by the commission based on a percentage of the power capacity of electricity produced by the plant. There is no indication whatsoever regarding the duration of the contract.
- *Access to the national grid:* The energy company is allowed access to the national grid and the national electricity distributor has the responsibility to connect the plant to the national grid under the condition that it is "reasonably feasible". The costs of extending the electricity network to connect the electricity production are shared as follows:
  - The cost of the study for the connection of the site to the national grid is borne by the electricity generating company.
  - The connection cost to the electricity network is borne by the network operator.

* *www.mem-algeria.org/francais/index.php?page=decret-executif-couts-de-diversification-de-la-production-d-electricite-2.*

- *Market priority:* The excess of electricity produced by the electricity generating company can be distributed through the national grid and is prioritised on the market.

This mechanism is close to the original FiT form. Furthermore, the advantageous tariff granted to hybrid solar energy and natural gas electricity generation, provides an incentive to current gas-fired power plants to start developing renewable energy as well. However there is a lack of clarity regarding the length of the contract, which represents a key aspect in the decision-making process of the investor. Furthermore, the lack of flexibility of the incentive tariff which fails to take into account the energy-producing capacity of the particular area of production leads to overpriced or underpriced incentives according to the situation of the land.

ANNEX G

Incentive schemes for renewable energies in Tunisia

A similar system exists in Tunisia. Law 2009-7 on Energy Efficiency allows companies in the industry, agriculture and services sectors to produce electricity from renewable energy for their own consumption and sell the excess produced to the public utility Société Tunisienne de l'Électricité et du Gaz (STEG). The law includes the following incentives:

- *Incentive tariffs:* The investor is allowed to sell their excess of energy production, up to 30%* of its annual electricity production to STEG at an incentive purchase price validated by the Regulatory Authority. In 2009, the annual average price was TD 92 000/kWh for power produced from renewable energy.
- *Guarantees:* The terms of the contract stipulate the engagement period during which STEG will buy the excess of electricity. However, the purchase price is reviewed annually by the Ministry of Industry, Energy and Small- and Medium-sized Enterprises.
- *Access to the grid:* STEG guarantees to private producers access to the national electricity grid at an incentive price of TD 5 000/kWh (in 2009, latest data).

Those investments also benefit from other incentives specified in the Investment Code of Tunisia, including:

- Reduction of customs duties to a minimum rate of 10% (from a general rate of 18%) and exemption from VAT for imported equipment for renewable energy power generation, where no locally manufactured equipment exists.
- Exemption from taxes equivalent to customs duty and VAT below 10% for locally manufactured equipment.

Box G.1. **Tunisia's policy initiatives for green energy development**

As part of the 2012-2016 Plan for economic and social development, the priority of the Tunisian authorities includes the development of renewable energy within their green growth initiatives. Although green energy investments have so far been public, Tunisia has recently implemented a series of measures favouring private sector participation. The aim is to save energy, develop new "non-conventional" sources of energy and increase five-fold the consumption of renewables in the total consumption of energy through PPPs and the contribution of professional organisations.

* Décret n° 2009-2773 du 28 septembre 2009 : *www.profiscal.com/newfisaf/decret/D_2009-2773_af.pdf*.

Box G.1. **Tunisia's policy initiatives for green energy development** *(cont.)*

Legal and institutional incentives

A political and regulatory framework promoting green investments has been implemented by Tunisia in recent years. The framework is crucial to attract private investors and reflects Tunisia's position in relation to multilateral environmental agreements such as the United Nations Framework Convention on Climate Change and the Kyoto Protocol, which have been ratified by Tunisia.

Given the country's growing dependence on oil imports, Tunisia has progressively implemented a legal and regulatory framework for energy control. The Law on energy control, established in 1990, was modified in 2009 to allow renewable energy production. It also gives individual producers the right to produce electricity from renewable energy sources and sell it to the Tunisian Company for Electricity and Gas (STEG), at a pre-determined quantity and price. Other modifications are expected to be applied allowing energy production by the private sector, including renewables, for both the local market and export.

On an institutional level, the National Agency for Energy Control (ANME) was created in 1985 to promote renewable energies, control the use of energy, and encourage energy substitutes. Also in 1985, the National Agency for Environment Protection (ANPE) was established to reduce pollution. The *Commission du développement durable* and the *Observatoire tunisien de l'environnement et du développement durable* are also institutions which have convergent objectives for achieving energy efficiency and sustainable development.

Financial incentives

In order to support renewable energies, since 2009 Tunisian authorities have been offering premiums on specific activities that promote energy effiency and the use of renewables. To finance these premiums, a National Fund For Energy Control (FNME) based on a taxation system was set up. It includes three types of taxes: a tax on first-vehicle registration, a tax on air conditioner sales and a tax on incandescent lamps to align its prices with the prices of low-consumption lamps.

Moreover, investments in energy control benefit from international donations and loans such as a USD 55 million World Bank multilateral credit line to support industrial projects and another USD 85 million World Bank donation for energy efficiency projects in the industrial sector. Also, as a public incentive, the government reduced import tariffs to 10% on raw materials and semi-finished products used for the production of renewables.

Finally, the Clean Development Mechanism (CDM), initiatied by the Kyoto Protocol to reduce gas emissions, is another source of financing. More than 40 projects are in the process of development for energy efficiency purposes and renewable energy production (wind, solar and biomass).

Private sector participation

As mentioned above, private sector participation in renewable energy investments is limited. The private sector has limited financing schemes to develop and supervise PPP projects in green infrastructure. Reforms will be implemented to improve administrative and financing schemes for the private sector. Public companies also lack the financial ability to invest in water sector development, for instance; costs are high and tariffs are very low and have not been re-evaluated in a long time. Therefore, the participation of the private sector in green infrastructure such as the water sector has a huge positive impact on the sector's development. It has the necessary capital to invest and greater expertise than public companies in water management. As part of its 2012-2016 Plan, the Tunisian authorities intend to encourage private sector participation in several water projects.

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ANNEX H

Summary: Commonly-used investment incentives for renewable energy

Regulatory incentives

Power sector privatisation measures

Financial incentives

Green certificate (Clean Development Mechanism)

Feed-in tariff

Power purchase agreement

Subsidies on initial investments costs

Subsidies on Investment costs

Soft loans and loan guarantee

Net metering

In-kind incentives

Access to land

Job trainings incentives

Administrative assistance

Infrastructure subsidies

Fiscal incentives

Investment tax credit

Tax reduction on operating expenses

Green taxes (Tax abatement for GHG mitigation)

Tax reduction or exemption on corporate income

Green taxes (Tax abatement for GHG mitigation)

Tax reduction or exemption on corporate income

Tax holidays

Accelerated or free depreciation

Exemption from import tariffs on inputs

Exemption from VAT on supply

ANNEX I

Main findings on Renewable Energy Sources policies in Mediterranean Partner Countries

(EU funded project, Paving the Way for the Mediterranean Solar Plan)*

The following table provides an overview of the Mediterranean Partner Countries' (MPCs) progress on policies and regulation for Renewable Energy Sources (RES), using a colour code, indicating for each country and item the level of progress.

- The "Red Light" indicates the Basic level of progress whereby the MPCs have envisaged a programme of actions but not yet proceeded towards implementation or enactment.
- The "Amber Light" indicates an Advanced level of progress whereby programmes have been initiated but nevertheless require additional supportive or complementary measure to be introduced in order to proceed to a more mature convergence status.
- The "Green Light" indicates a Mature level of progress whereby the MPC has successfully completed the fundamental aspects of its convergence programme.

The details and texts of the Regional and National Road Maps for Legal and Regulatory Reform are available and can be downloaded on the project website: *www.pavingtheway-msp.eu*

Table I.1. **Overview of the MPCs' progress on policies and regulation for Renewable Energy Sources**

	Algeria	Egypt	Jordan	Lebanon	Morocco	Palestinian Authority	Tunisia
RES General Policy and Legal Framework							
RES policy and targets for 2020	Green	Amber	Amber	Amber	Green	Amber	Amber
Specific legislation on RES and EE	Green	Amber	Green	Amber	Green	Amber	Green
Specific targets for different Sources of RES	Green	Green	Green	Amber	Green	Amber	Green
Specific targets for Solar and Wind Energy	Green	Green	Amber	Amber	Green	Green	Green
Concrete periodic RES targets	Green	Amber	Red	Amber	Green	Green	Red

* PWMSP states: "These views are the sole responsibility of the authors (PWMSP) and can in no way be taken to reflect the views of the EU."

Table I.1. **Overview of the MPCs' progress on policies and regulation for Renewable Energy Sources** *(cont.)*

	Algeria	Egypt	Jordan	Lebanon	Morocco	Palestinian Authority	Tunisia
Rules to monitor RES progress	Amber	Amber	Amber	Green	Green	Amber	Red
RES Support Schemes							
RES Tariff Support Schemes (e.g.) Feed in Tariffs and/or Premiums)	Amber	Amber	Red	Red	Red	Amber	Green
RES Fiscal Support Schemes	Green	Amber	Amber	Red	Red	Amber	Amber
RES Quota Schemes	Amber	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other RES Support Schemes	Green	Amber	Amber	Amber	Amber	Amber	Green
Schemes for solar and wind projects	Green	Amber	Red	Red	Green	Red	Amber
Rules on Feed-in Tariffs (FITs)							
Existence of feed-in tariffs	Amber	Amber	Red	Red	Red	Amber	Green
Specific Tariffs for different RES	Red	Amber	Red	Red	Red	Amber	Green
Period of the fixed tariff guaranteed	Red	Amber	Red	Red	Red	Amber	Green
Tariff adjustment mechanism	Amber	Amber	Red	Red	Red	Red	Green
Rules on RES Tendering							
Framework rules on RES tendering	Green	Green	Green	Red	Amber	Amber	Green
Type/Scope of RES Tendering Options	Amber	Amber	Green	Red	Amber	Red	Amber
RES Technologies eligible for tendering	Amber	Green	Green	Red	Green	Green	Amber
Integration of RES tendering with grid planning	Green	Amber	Amber	Red	Amber	Red	Green
Rules on RES Development							
Framework rules for RES development	Green	Amber	Green	Red	Amber	Red	Green
Integration of RES development with grid planning	Green	Amber	Green	Amber	Green	Red	Green
Interconnections with neighbouring countries	Green	Green	Amber	Green	Green	Green	Green
Rules relevant to Permits, Approvals and Licenses	Green	Green	Amber	Red	Amber	Red	Amber
Grid Connection for RES Projects	Green	Amber	Green	Red	Green	Red	Green
Cost allocation rules for technical grid adaptations and reinforcements for RES	Green	Green	Green	Red	Green	Red	Amber
Access to information for RES system operators	Green	Amber	Green	Red	Amber	Amber	Amber
Rules on RES System Operation							
Key Legislation relevant to RES system operation	Green	Amber	Green	Red	Green	Red	Green
Guaranteed grid connection, distribution and transmission for RES electricity	Green	Amber	Green	Red	Amber	Red	Green
Priority connection, distribution and transmission for RES electricity	Green	Amber	Red	Red	Red	Red	Amber
Non discriminatory and transparent rules on grid connection costs	Green	Amber	Red	Red	Red	Red	Green
RES system priority in case of congestion and dispatch	Green	Red	Red	Red	Red	Red	Red
Integration of RES into the electricity market	Green	Amber	Green	Red	Green	Red	Red
Cost rules for RES electricity transmission and distribution	Green	Green	Amber	Red	Green	Red	Green
Investment Climate							
Legislation relevant to safeguarding private and foreign Investments	Green	Green	Amber	Amber	Green	Green	Green
Admissibillity of RES PPP Schemes	Green	Green	Amber	Red	Green	Red	Green

Source: Paving the Way for the MSP, National Road Map[s] for Legal and Regulatory Reform (PWMSP, 2012a and 2012b).

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Paving the Way for the Mediterranean Solar Plan (PWMSP) Project Consortium (2012b), Regional Road Map on Regulatory and Legislative Harmonization, May 2012 (*www.pavingtheway-msp.eu/index.php?option=com_downloads&task=view&id=32&Itemid=56*).

ANNEX J

Members of the MENA-OECD Task Force on Energy and Infrastructure

The following individuals attended the 7th, 8th, 9th and 10th meetings of the Energy Task Force, thereby greatly contributing to the final draft of the present report.*

Co-chairs

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