League of Arab States

IRENA
International Renewable Energy Agency

Pan-Arab Renewable Energy Strategy 2030

Roadmap of Actions for Implementation

About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international cooperation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.
www.irena.org

About the League of Arab States

The League of Arab States is a regional intergovernmental organisation of 22 Arab member states. It was established in Cairo on 22 March 1945. The League's main goal is to "draw closer the relations between Member States and co-ordinate collaboration between them, to safeguard their independence and sovereignty, and to consider in a general way the affairs and interests of the Arab countries". The League of Arab States facilitates political, economic, cultural, scientific and social programmes designed to promote the interests of the Arab world. It has served as a forum to coordinate policy positions and to deliberate on matters of common concern.

The Arab Ministerial Council of Electricity (AMCE) was established by the League of Arab States in 1993 as a council in charge of overlooking issues related to the production, transmission and distribution of electricity as well as renewable energy and energy efficiency. The objective of the council is promoting cooperation and coordination and aligning polices among the Arab states to enhance the use of renewable energy and energy efficiency.
www.las.int

About RCREEE

The Regional Center for Renewable Energy and Energy Efficiency (RCREEE) is an independent not-for-profit regional organisation, which aims to enable and increase the adoption of renewable energy and energy efficiency practices in the Arab region. RCREEE teams with regional governments and global organisations to initiate and lead clean energy policy dialogues, strategies, technologies and capacity development in order to increase Arab states' share of tomorrow's energy.
www.rcreee.org

Acknowledgement

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Pan-Arab Renewable Energy Strategy 2030

Roadmap of Actions for Implementation

RCREEE
Regional Centre for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

IRENA
International Renewable Energy Agency

'Prepared with the assistance of the Regional Centre for Renewable Energy and Energy Efficiency'

States need to improve institutional frameworks, upgrade grid infrastructure, ensure the availability of finance and build the skilled workforce for accelerated renewable energy deployment.

The considerable economic growth that many Arab countries have experienced over the past decade, combined with rapidly rising populations, is expected to continue in the decades ahead. Across a region that encompasses both oil-rich economies and those with a scarcity of conventional energy resources, power demand is expanding between 3% and 8% annually. Energy demand is ramping up so rapidly that even energy exporters are facing the prospect of becoming energy importers.

While the Arab region depends heavily on fossil fuels, it has also been identified as especially vulnerable to one effect of global climate change: the spectre of worsening water scarcity.

Looked at another way, however, the region enjoys geographic and climatic advantages. Notably, it has the world's greatest technical potential for solar power generation, as well as good wind speeds and, in some cases, high potential for waste-to-energy and hydropower development.

This array of renewable energy sources could replace the oil or gas currently used for power generation, with surpluses becoming available for more profitable downstream applications and export. The renewable energy supply chain, meanwhile, has the potential to drive economic diversification and create new jobs in local economies.

The Pan-Arab Renewable Energy Strategy, adopted by the Arab Economic and Social Development Summit in January 2013, signals a consensus on key goals to improve the region's energy future. Moving forward, the International Renewable Energy Agency (IRENA) aims to support Arab countries in attaining their agreed targets for the year 2030. States need to improve institutional frameworks, upgrade grid infrastructure, ensure the availability of finance and build the skilled workforce for accelerated renewable energy deployment.

IRENA has been closely engaged with its member countries in the region on strategies, readiness assessments, capacity building and resource mapping. At the same time, IRENA is working with the League of Arab States and the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) to identify priorities for the implementation of the Pan-Arab strategy, with this study representing the first step in such collaboration.

The region stands to fulfil a globally important role in the renewable energy market, which will be the cornerstone of the low-carbon green economy of the future.

Adnan Z. Amin
Director-General, IRENA

Recognising the importance of regional coordination, IRENA collaborated with the Arab League and RCREEE to create a regional process that will accelerate the implementation of the Pan-Arab Renewable Energy Strategy and support Member States with achieving renewable energy targets.

The League of Arab States, in its capacity as an intergovernmental organisation continuously striving to advance and promote the best interest of its Member States, has joined forces with many regional and global organisations to ensure sustainable development. This was complemented by the adopting of the Pan-Arab Strategy for Development of Renewable Energy at the level of Heads' of States in January, 2013. It was a confirmation of the political commitment to advancing this sector. The Arab League (Energy Department) embarked on a partnership with the International Renewable Energy Agency (IRENA) and the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) to ensure the proper implementation of this strategy.

Realisation of the Arab strategy requires concerted efforts not only on the policy and regulatory levels, but also on the technical and financial support levels. Recognising the importance of regional coordination, IRENA collaborated with the Arab League and RCREEE to create a regional process that will accelerate the implementation of the Pan-Arab Renewable Energy Strategy and support Member States with achieving renewable energy targets.

A course of action is proposed as a roadmap for different Arab countries to fill their gaps and fulfil national targets. These country-specific actions are based on recommendations from the Arab Renewable Energy Framework (AREF) and the template for the National Renewable Energy Action Plans (NREAP) and are specifically tailored to conditions in the Arab region. This represents the recipe for a regional framework of coordination among the various actors currently involved in the region, including but not limited to national authorities, regional and international institutions.

Jamila Matar
Director of the Energy Department, League of Arab States

We are proud of our cooperation with the International Renewable Energy Agency and the League of Arab States on implementing this study.

Faced with demand for power and energy above the global average, the Arab region has tremendous potential for developing clean, renewable sources of energy. The appeal for developing these resources combined with energy efficiency and cleaner technologies goes beyond meeting growing power demand and energy security. On a regional scale the market potential is promising for new industries, new businesses and new jobs.

The Pan-Arab Strategy for the Development of Renewable Energy Applications 2010-2013 presents an important milestone in forging regionally coherent commitments towards developing renewable sources of energy. However, in order to leverage the regional scale effect of markets, more coordinated efforts will be required in moving forward on these commitments.

In this context, this study, while providing a roadmap of actions for the Arab countries on implementing the Pan-Arab Strategy, identifies key actions and initiatives on a regional scale that can both enhance the market potential for renewable resources in the Arab region and make better use of the resources available for the benefit of the countries. It is also an invitation to development partners and international financial institutions to consider the proposed initiatives that were identified based on extensive consultation with national and regional actors.

We are proud of our cooperation with the International Renewable Energy Agency and the League of Arab States on implementing this study. For the Regional Center for Renewable Energy and Energy Efficiency, it exemplified the needed coordination among regional and international organisations for the benefit of a sustainable energy future in the Arab region.

Dr. Tareq Emtairah
Executive Director, RCREEE

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LIST OF ABBREVIATIONS

AFED	Arab Forum for Environment and Development
AREF	Arab Renewable Energy Framework
AMU	Arab Maghreb Union
AUE	Arab Union of Electricity
BOO	Build, Own, Operate
CPV	Concentrated Photovoltaic
CSP	Concentrated Solar Power
Dii	DESERTEC Industrial Initiative
EBRD	European Bank for Reconstruction and Development
EETC	Egyptian Electricity Transmission Company
EIB	European Investment Bank
FiT	Feed-in-Tariff
GW_{th}	Gigawatt Thermal
IEA	International Energy Agency
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
JREEF	Jordanian Renewable Energy and Energy Efficiency Fund
K.A. CARE	King Abdullah City for Atomic and Renewable Energy
KIA	Kuwait Investment Authority
KSA	Kingdom of Saudi Arabia
LAS	League of Arab States
MASEN	Moroccan Agency for Solar Energy
MENA	Middle East and North Africa
MSP	Mediterranean Solar Plan
NREA	New and Renewable Energy Authority
NREAPs	National Renewable Energy Action Plans
OME	Observatoire Méditerranéen de l'Energie (Mediterranean Energy Observatory)
ONEE	Office National de l'Electricité et de l'Eau potable (National Office of Electricity and drinking Water)
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
PV	Photovoltaic
R&D	Research and Development
RCREEE	Regional Center for Renewable Energy and Energy Efficiency
RDD&D	Research, Development, Demonstration and Deployment
REC	Renewable Energy Certificate
REN21	Renewable Energy Policy Network for the 21st Century
RETs	Renewable Energy Technologies
SHAMCI	Solar Heating Arab Mark and Certification Initiative
SWH	Solar Water Heaters
SWOT	Strengths, Weaknesses, Opportunities, and Threats
UAE	United Arab Emirates
UNECA	United Nations Economic Commission for Africa
UNESCWA	United Nations Economic and Social Commission for Western Asia

Summary

The adoption of the "Pan-Arab Strategy for the Development of Renewable Energy Applications: 2010 – 2030" by the 3rd Arab Economic and Social Development Summit of January 2013 represents an important milestone for the deployment of renewable energy technologies (RETs) in the region with a focus on electricity generation. For the first time, Arab governments have come to a broad political consensus on long-term targets for RET deployment in the region. Based on the approved national targets, the strategy includes cumulative targets to increase renewable energy that translate into about 75 gigawatts (GW) of installed power generation capacity in the Arab countries by 2030.

In support of the strategy realisation, the Energy Department of the League of Arab States recently introduced the Arab Renewable Energy Framework (AREF) to provide guidance to member states in developing their medium to long-term national renewable energy action plans (NREAP). The AREF also aims to create a regional framework for reporting on renewable energy progress in a coherent and harmonised way. During its 10th meeting in April 2013, the Arab Ministerial Council for Electricity requested the circulation of AREF and accompanying NREAP templates to the member states for comments.

Realisation of the strategy requires a concerted effort not only at a policy and regulatory levels, but also in terms of technical and financial support. More importantly, the success of the strategy depends on regional coordination at all levels and among all stakeholders in order to avoid duplication of efforts.

Recognising the importance of regional coordination, the International Renewable Energy Agency (IRENA) collaborated with the League of Arab States and the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) to create a regional process to advance the implementation of the Arab renewable energy strategy and support the member states with the implementation of AREF. This report, Pan-Arab Renewable Energy Strategy: Roadmap of Actions for Implementation, is an outcome of this collaboration. The process of developing the actions roadmap involved stakeholder consultations with national governments and many regional actors. This process was enabled by IRENA's efforts to help countries move towards renewable energy by focusing on key regional priorities and supporting countries to identify their renewable-energy readiness.

This report mainly targets national and regional decision-makers as well as regional and multilateral organizations, in an attempt to formulate a regional set of priorities for all stakeholders. It presents the results of the study that covered all Arab countries (22 States including Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, UAE and Yemen). The report summarizes the Pan-Arab Renewable Energy Strategy and highlights the main motives for its adoption, and its relation with the AREF key provisions and NREAP template as tools for implementation. Furthermore, this report provides an updated and comprehensive overview of the renewable energy situation in the Arab countries. This overview includes an assessment of the region's renewable energy resource potential, current installed renewable energy capacity and project pipeline, national renewable energy targets, institutional and market frameworks for renewable energy deployment, and an assessment of local manufacturing potential. An overview of renewable energy financing in the region and support policies for private sector investment is also presented.

The report analyses the main gaps concerning renewable energy deployment in the region. Three categories of gaps have been identified: (1) political, legal, regulatory and institutional; (2) financial, market and economic; and (3) technological, infrastructure and human capacity. In addition, key strengths, weaknesses, opportunities and threats (SWOT) for the Pan-Arab Renewable Energy Strategy and possibilities to maximise renewable energy deployment in the region are illustrated.

A set of actions is proposed as a roadmap for individual Arab countries to fill their gaps and help achieve their national targets. These country-specific actions are consistent with AREF and NREAP and tailored to the conditions in the Arab region. It is worth mentioning here that these national targets do not represent the maximum possible deployment in the region. On the contrary, IRENA's REmap 2030 initiative shows more is possible beyond the national targets of the power sector as well as in the end-use sectors. However, the focus of this study is to help countries realize their politically endorsed targets particularly in the electricity sector.

Based on commonalities in these country-specific actions, a regional roadmap of actions and a list of priority regional interventions are further provided to support the deployment of renewable energy in the

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region. The proposed roadmap will serve as a guideline for the Arab renewable energy market to accelerate its rate of development, support governments' efforts towards fulfilling future renewable energy targets, and overcome potential gaps and barriers. The study recommends focusing regional cooperation activities in the next couple of years on several initiatives that can influence and expedite the countries' readiness to prepare their NREAPs:

- Create technical and financial assistance programmes to support Arab states in designing their respective NREAPs.
- Develop and fund a comprehensive, holistic capacity-building project covering the entire renewable energy development life cycle, including planning, resource assessment, feasibility studies and implementation.
- Explore potentials and opportunities for untapped renewable energy options, including heating and cooling, water desalination, biomass, geothermal, small hydro and pumped storage options.
- Launch the grid integration initiative (Clean Energy Initiative in the Arab Region) to integrate greater amounts of renewable electricity in the power systems.
- Enhance renewable energy administrative and spatial planning governance.
- Create a framework for improving financial cooperation in the Arab region to accelerate renewable energy deployment, and to mitigate investment risks for public and private sectors.
- Conduct regional studies to assess the situation of local manufacturing and future integration plans.

The success of this roadmap of actions will depend on the level of coordination among the various organisations active in renewable energy promotion in the region. A clear coordination and follow-up mechanism is needed to ensure that regional actions support this roadmap without duplication of effort. While the details of this mechanism need to be developed collectively by willing stakeholders, its general outlines are clear. IRENA, the League of Arab States and the Regional Center for Renewable Energy and Energy Efficiency are advised to convene a regional working group with representatives from all major stakeholders (*e.g.,* AMU, AUE, UNECA, UNESCWA, EIB, MEDGRID, MSP, Dii, and OME). The working group will be responsible for horizontal coordination among these various organisations in support of implementing the recommendations of this study.

This strategy represents the first time that broad political consensus has been reached in the Arab region on long-term renewable energy targets.

The availability of enormous renewable energy potential in the Arab region, coupled with a number of other factors, has stimulated many Arab countries to develop renewable energy projects and declare national targets for deployment of renewable energy technologies. These factors vary from one country to another, but in general include population growth, economic expansion, industrialisation, urbanisation, rural development, scarcity of water resources and climate change vulnerabilities. These, in turn, have triggered the creation of small but promising renewable energy markets in power generation and water heating in different Arab countries.

To enhance the development of renewable energy in the Arab region, the League of Arab States during its 3rd Arab Economic and Social Development Summit in January 2013 in Riyadh, adopted "The Pan-Arab Strategy for the Development of Renewable Energy Applications: 2010 – 2030". This document represents the first time that broad political consensus has been reached in the Arab region on long-term renewable energy targets. The Pan-Arab Renewable Energy Strategy aims to increase the share of renewables by 2030 through streamlining renewable energy target-setting procedures, providing guidelines for developing national renewable energy action plans, strengthening regional and international cooperation and facilitating the exchange of expertise. If accomplished, the agreed strategy targets will increase installed renewable energy power generation capacity in the region from about 12 GW in 2013 to 75 GW by 2030.[1]

The successful implementation of this strategy requires concerted efforts from multiple players on different levels, including regulatory, technical, and financial levels. To facilitate this process, the Energy Department of the LAS recently introduced the Arab Renewable Energy Framework (AREF) as a guideline for member states to develop their National Renewable Energy Action Plans (NREAPs) and report on the progress made in a coherent and harmonised way. During its 10th meeting in April 2013, the Arab Ministerial Council for Electricity requested the circulation of the AREF and NREAP templates to the member states for comments (see Annex 1).

The AREF document provides Arab League member states with a common framework for drafting NREAPs to ensure countries address and cover all essential elements of the AREF in their national plans. These elements include an overview of projections for non-renewable energy production, renewable energy targets and trajectories up to 2030, measures for achieving the targets, administrative procedures and planning, and electricity infrastructure development. To ensure future periodic reports remain comparable, countries are encouraged to use the proposed template and apply recommended definitions, calculation rules and terminology.

Through solid cooperation, the International Renewable Energy Agency (IRENA), the League of Arab States and RCREEE agreed to prepare this joint study report on "Pan-Arab Renewable Energy Strategy 2030: Roadmap of Actions for Implementation". The study gives an overview of the Pan-Arab Renewable Energy Strategy, presents a full picture of the current state of renewable energy development in the Arab region, and identifies the main barriers to further development by discussing the following gaps and needs: (i) country-specific targets and strategies; (ii) country-specific knowledge, infrastructure and human capacity; (iii) country-specific financial support policies; and (iv) country-specific legal and regulatory frameworks. Based on these gaps and needs, a set of actions has been recommended to guarantee a smooth implementation of the Pan-Arab Strategy and increase the share of renewables to the future Arab region energy mix.

1 The targets indicated in the "Pan Arab Strategy for the Development of Renewable Energy Applications: 2010 - 2030" are provided mostly as percentages of installed capacities or generated electricity, and in several cases from primary energy. The authors reviewed the corresponding installed capacities declared by the countries.

1.1 Study Methodology

A shared objective among the study partners was to differentiate the study from the current overload of region-wide analyses, by providing practical actions and prioritised initiatives to kick-start accelerated deployment of renewable energy in the Arab region. To reach this common objective, the approach described below and illustrated in Figure 1 was followed:

A. A literature review was undertaken and updated information collected from different sources for the 22 members of the League of Arab States (Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, UAE and Yemen). In addition, data collection was complemented with stakeholder interviews, as needed.

B. Understanding the current renewable energy situation in the Arab countries with a focus on electricity generation as stipulated by the Pan-Arab Renewable Energy Strategy.

C. Conducting a gap analysis based on the AREF and NREAP requirements, as well as a SWOT analysis for the Pan-Arab renewable energy strategy and possibilities to bridge the gap between the current situation and national targets.

D. Recommending national and regional courses of actions to reach the announced targets.

E. Discussing the analysis and proposed actions with stakeholders (for this purpose a workshop was held in October 2013 in Manama, Bahrain).

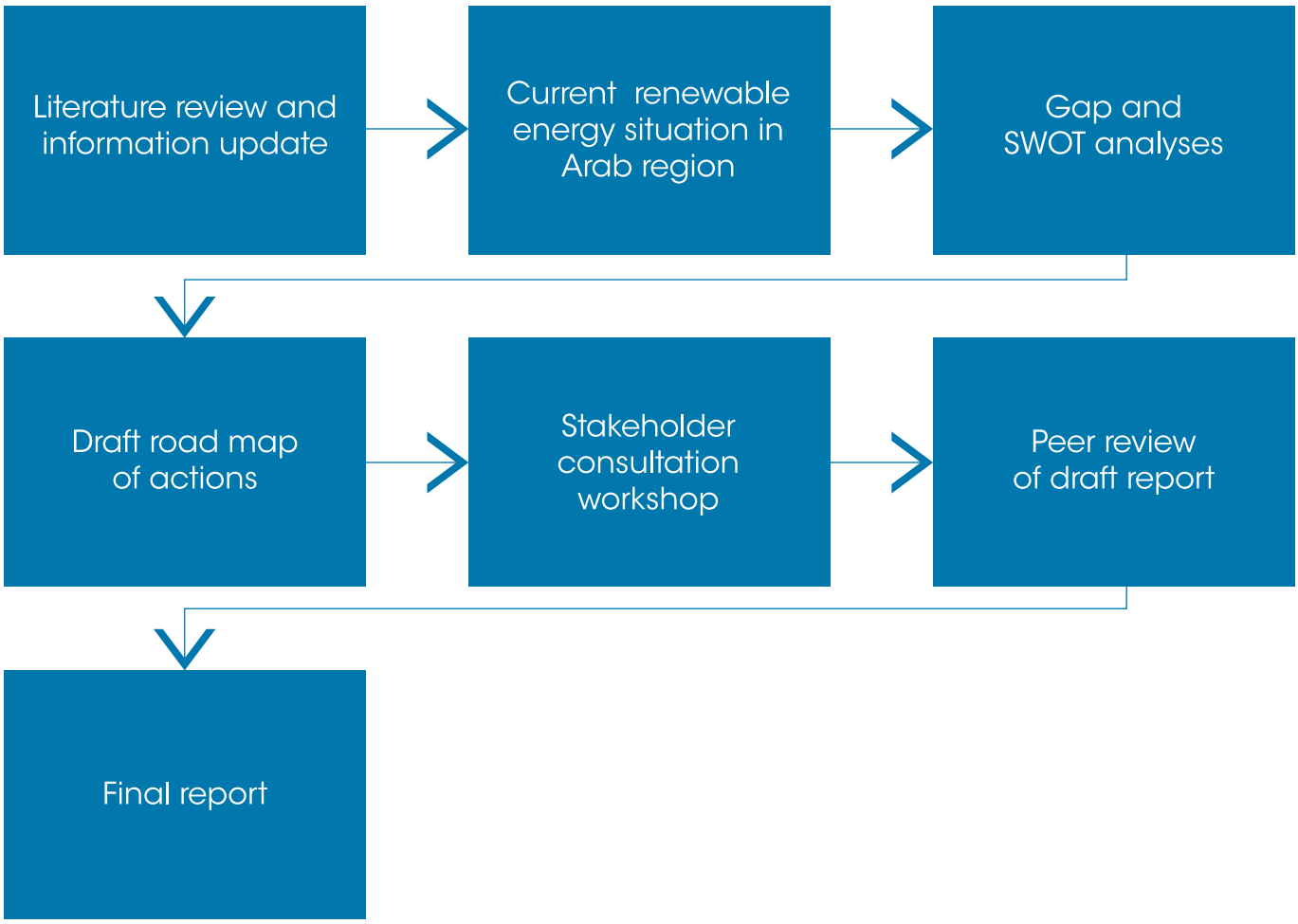
F. Submitting the draft final report for peer review by experts from:

- League of Arab States (LAS)
- Regional Center for Renewable Energy and Energy Efficiency (RCREEE)
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
- United Nations Economic and Social Commission for Western Asia (UNESCWA)
- United Nations Economic Commission for Africa (UNECA)
- African Development Bank (AfDB)
- European Bank for Reconstruction and Development (EBRD)
- European Investment Bank (EIB)

G. Submitting the draft final report to IRENA's focal points for comments and updates

Finally, the study results and recommendations are expected to be introduced in one or more of the regional meetings organised for agreement as part of the 'next steps'.

Figure 1: Sequence of work



The strategy also reflects the call for increased private sector engagement in the electricity markets, given that most renewable energy plans in the Arab countries include a significant share for the private sector.

Initially, the Arab Ministerial Council for Electricity adopted a resolution on boosting cooperation and coordinating efforts in the field of electricity production from different sources. Workshops and meetings were held to promote renewable energy applications in the region and resulted in the approval of the "Pan-Arab Strategy for the Development of Renewable Energy Applications: 2010 – 2030". Given the mandate of the Arab Ministerial Council of Electricity, the main focus of the strategy is the electricity sector.

The primary motive for the Pan-Arab Strategy is to tap into the region's significant renewable energy resources to supplement the existing electricity supply. Most of the Arab states view renewable energy deployment as one of the alternatives to help meet part of the rising electricity demand; calculated at about 6% annually during the past decade. According to the League of Arab States and the World Bank, electricity demand in Arab countries in 2020 is expected to increase by 84% compared to 2010 demand levels (Beides, 2013), which would require an additional 135 GW of generating capacity. To meet this additional generating capacity by 2020, the required infrastructure investment in Arab countries for electricity alone will cost about USD 450 billion.

Several shared objectives motivated Arab decision makers to endorse the Pan-Arab Strategy: satisfying increasing energy demand, diversifying the electricity generation mix, reducing the dependency on fossil fuels, contributing to economic and social development, creating industrial growth opportunities, addressing the water scarcity challenge and preserving the environment. Furthermore, the strategy offered Arab countries and third parties an opportunity to develop cooperation and robust partnerships, which was met with clear interest.

The strategy also reflects the call for increased private sector engagement in the electricity markets, given that most renewable energy plans in the Arab countries include a significant share for the private sector.

2.1 Overview of the Pan-Arab Renewable Energy Strategy

The Pan-Arab Renewable Energy Strategy presents the targeted renewable energy contributions from Arab countries to the electricity mix during two periods: from 2010 to 2020, and from 2020 to 2030. Three scenarios are outlined in the strategy for these two periods based on official national targets declared by the Arab countries at the time of the strategy preparation in 2011:

Low scenario:

This scenario is based on the announced targets and expects that renewable energy will contribute to around 2.3% of total electricity generation by 2030 in the Arab region.

Medium scenario:

This scenario is based on the assumption that Arab countries' growing interest in renewable energy resources stems from either a desire to diversify the electricity mix or to reduce dependency on fossil fuels. In this scenario, the growth in the deployment of renewable energy generation capacity during the period 2020 - 2030 will be the same as the previous ten years. Accordingly, the contribution of renewable energy to total electricity generation will reach around 4.7% by 2030 in the Arab region.

High scenario:

This scenario assumes that the growth rate of the deployment of renewable energy generation during the period 2020-2030 will be double that achieved during 2010 - 2020. This will lead to a share of renewable generation of around 9.4% by 2030.

The strategy's goals are the following:

- utilising the abundance of renewable energy resources;
- enhancing future energy security through diversification of energy resources;
- meeting the requirements of national and regional development;
- keeping indigenous oil and natural gas as strategic reserves for as long as possible; and
- contributing to resolving environmental issues associated with oil and gas exploration, transportation and use.

2.2 AREF Key Provisions

As mentioned before, the League of Arab States introduced the AREF as a guideline and platform for countries to develop their NREAPs. AREF lays down key principles behind any successful regional transition towards more renewables in the energy mix. It encourages countries to adopt NREAPs based on specific renewable energy targets for electricity generation, heating and cooling by 2020 and 2030. The NREAP needs to take into account:

- the impact of all energy policies, including those related to energy efficiency;
- cooperation between local, regional and national authorities; and
- joint projects with other countries (Article 2, AREF).

In the same context, AREF encourages countries to ensure that any national rules concerning the authorisation, certification and licensing procedures applied to power plants and associated transmission and distribution network infrastructures are appropriate and necessary (Article 4). Countries are encouraged to streamline administrative procedures, and ensure transparency and cost-effectiveness of various authorisation, certification and licensing procedures.

AREF also stresses the importance of availability of information and guidance on support measures to all relevant actors, including consumers, builders, installers, architects and suppliers. This includes information on the benefits of energy efficiency and renewable energy equipment, rules on certification and qualification schemes, and lists of qualified installers and suppliers (Article 5).

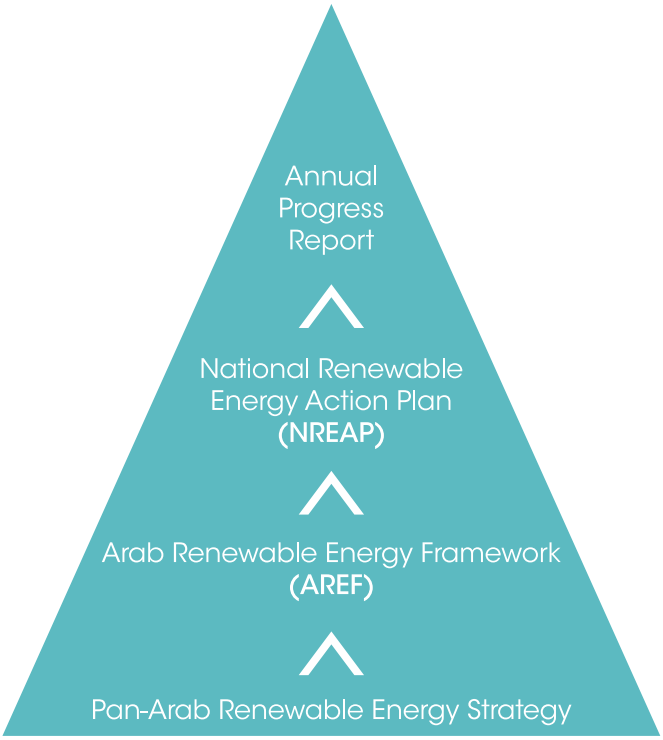
Secure operation of the electricity system in Arab countries is further encouraged by defining the appropriate steps to develop transmission and distribution grid infrastructure, intelligent networks, storage facilities and the electricity system (Article 6). Countries will also need to take appropriate steps to accelerate authorisation procedures for grid infrastructure and to coordinate approval of grid infrastructure with administrative and planning procedures.

Article 7 of AREF requires countries adopting the Renewable Energy Strategy to provide the League of Arab States with annual reports on progress of implementation of the NREAPs, including details about the sector and overall renewable energy shares, available support schemes and authorisation procedures. The progress will be compared to the indicative trajectory prescribed in the NREAPs.

Finally, Article 8 of AREF requests the establishment of an information platform that will serve to increase, facilitate and promote cooperation between countries.

The hierarchy of developing renewable energy in the region can be illustrated as shown in Figure 2. The strategy works as the foundation for both national and regional activities of renewable energy. AREF works as a regional framework for countries to develop their NREAPs, which in turn is the baseline for annual progress reports.

Figure 2: Pan-Arab Renewable Energy Strategy, AREF, NREAP and Progress Reports



2.3 NREAP Requirements

The NREAP represents a valuable tool for national renewable energy planning in the Arab region. The purpose of the NREAP template[2] is to ensure that the renewable energy action plan developed by any country is covering all essential elements for the successful implementation of the plan, and is consistent with future periodical reports issued by the country or other Arab countries willing to use the template. The NREAP template also helps to identify needs to enable the implementation of the NREAPs.

However, a significant number of Arab countries may not be able to use this tool without technical assistance and communication among Arab League member states. The required areas of support vary, based on its each country's context and phase of development. However, most Arab countries need technical support to:

1. Assess renewable energy resource base and available technologies.
2. Develop sufficient institutional and human capacities, as well as financial resources, to carry out national renewable energy planning and implementation.
3. Articulate a national renewable energy strategy that includes clear and realistic renewable energy targets for: (a) electricity production; (b) specific sectors within the energy system such as heating and cooling; and (c) specific technologies.
4. Implement medium- to large-scale, as well as distributed renewable energy projects, to develop institutional and human capacities in the country and to acquire the practical knowledge necessary for wide-scale deployment.
5. Adopt a set of financial and fiscal incentives to overcome economic barriers to renewable energy deployment and encourage private sector participation.
6. Put in place the necessary regulations to ensure access to the market for renewable energy developers.
7. Create standards and codes for renewable energy technologies (RETs), as well as certification programmes for renewable energy installers and equipment manufacturers.
8. Assess the readiness of the grid infrastructure to transmit and distribute renewable power to the end-consumer, and to put in place plans to improve the infrastructure, as required.

2 The NREAP template is inspired by the template annexed to European Commission (EC) Decision of 30 June 2009, under Directive 2009/28/EC of the European Parliament and of the Council (notified under document number C (2009) 5 174).

Some countries have created public investment instruments such as national renewable energy funds or companies to contribute to the financing of renewable energy projects.

Although the Arab region enjoys abundant renewable energy resources, the current share of renewable energy in power installed capacity remains small, at approximately 6% including large-scale hydro power and less than 1% if hydro power is excluded. However, this situation appears to be changing as many Arab governments have committed to ambitious renewable energy targets for the coming two decades. These targets reveal a strong emphasis on solar and wind power generation technologies, which is to be expected given the region's renewable energy resource base.

In order to support the deployment of renewable energy, most Arab governments have created dedicated institutions or departments within their energy ministries to promote and oversee the deployment of RETs. Many Arab governments have also adopted policies to encourage private sector investment in renewable energy deployment, such as Feed-in Tariffs (FiTs),[3] net-metering[4] and competitive bidding.[5]

Furthermore, some countries have created public investment instruments such as national renewable energy funds or companies to contribute to the financing of renewable energy projects. However, low electricity prices in most of the Arab countries continue to impede renewable energy deployment. Similarly, the large footprint and inertia of the public sector in the electricity market have slowed the wide-scale private sector investment and have tightened domestic industrial growth in renewable energy. The sections that follow shed more light on the current state of renewables in the region.

3 In the Feed-in Tariffs (FiTs) policy the state determines the tariff per unit of energy produced from a renewable source. These tariffs are higher than those granted to producing energy from traditional sources and they ensure the achievement of an adequate return for investors in renewable energy production. Usually there is a tariff for each type of renewable energy. For example there will be a tariff for electricity produced from wind or sun, and others.

4 In the net-metering policy the electricity generated by a consumer from own generating facility and delivered to the grid may be used to offset electricity provided by the utility to the consumer during a specific billing period.

5 In the competitive bidding system (also called auctioning system) investors are invited to develop electricity from renewable energy projects, within a certain period and size defined by the bid or tender. Contracts with the lowest cost of production are selected and the electricity networks (carriers / network operator) are obliged to buy from these stations based on prices that have been reached through those tenders and periods that have been agreed upon in accordance with the tender.

3.1 Renewable Energy Resources

Overall, the Arab region enjoys a rich endowment of renewable energy resources, particularly solar and wind energies. In fact, the region's conditions are so favourable to electricity production that "a transition to a renewable-based power system is economically more feasible and more attractive than in most other regions of the world" (Desertec Industrial Initiative (Dii), 2013).

Direct Normal Radiation (DNR), the main measure of a region's suitability for solar thermal concentrated applications, ranges between 2 050 and 2 800 kilowatts-hour per square metre per year (kWh/m^2/year) in the Arab region (Figure 3), with limited cloud cover lasting less than 20% of the year (League of Arab States, 2013). These rates are among the best in the world making the region suitable for solar heating and cooling, Concentrated Solar Power (CSP) and Concentrated Photovoltaic (CPV) applications. The International Energy Agency (IEA) estimates that CSP technologies alone could generate a hundred times more electricity in the Middle East and North Africa (MENA) region than the electricity consumption of the Arab region and Europe combined (IEA, 2010). Furthermore, the region's solar conditions are also favourable to PV applications. Global horizontal irradiance (GHI), a measure of a place's suitability for PV, ranges between 1920 kWh/m^2/year (Lebanon) and 2 450 (Egypt) kWh/m^2/year (Figure 4). These are some of the highest values observed in the world.

Evaluation of spatial and temporal availability and variability of the solar energy potential is essential for site qualification, technology selection and optimum design of solar power plants. High-resolution, long-term solar resource maps for Arab southern and eastern Mediterranean countries have been introduced by the Solar Atlas for the

Figure 3: Map of direct solar radiation in the Arab region[6]

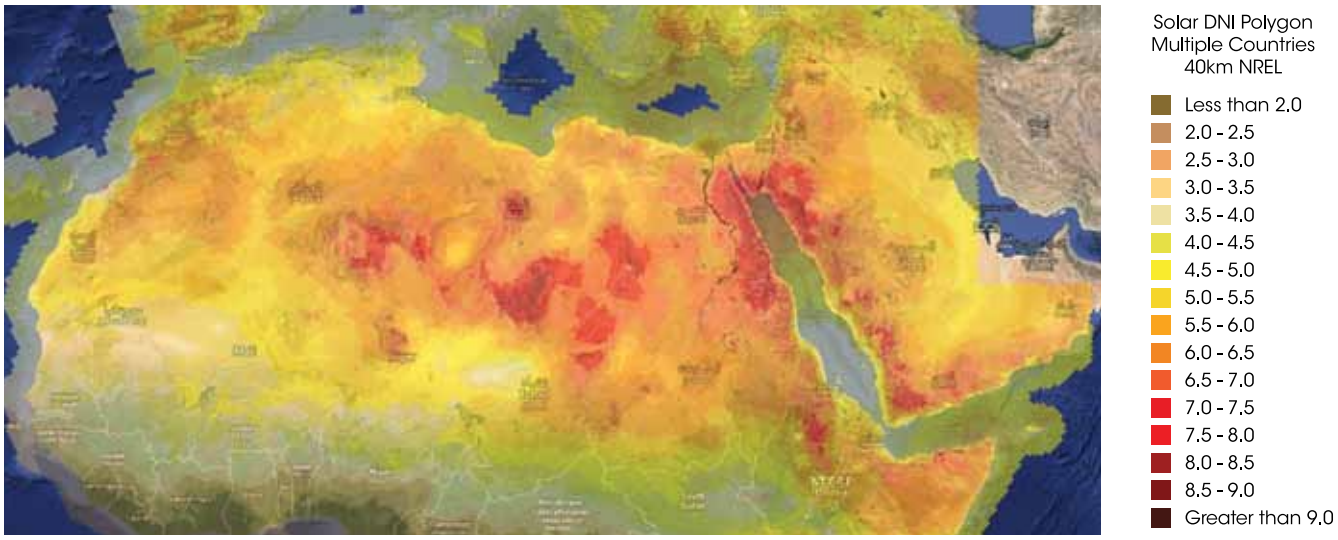
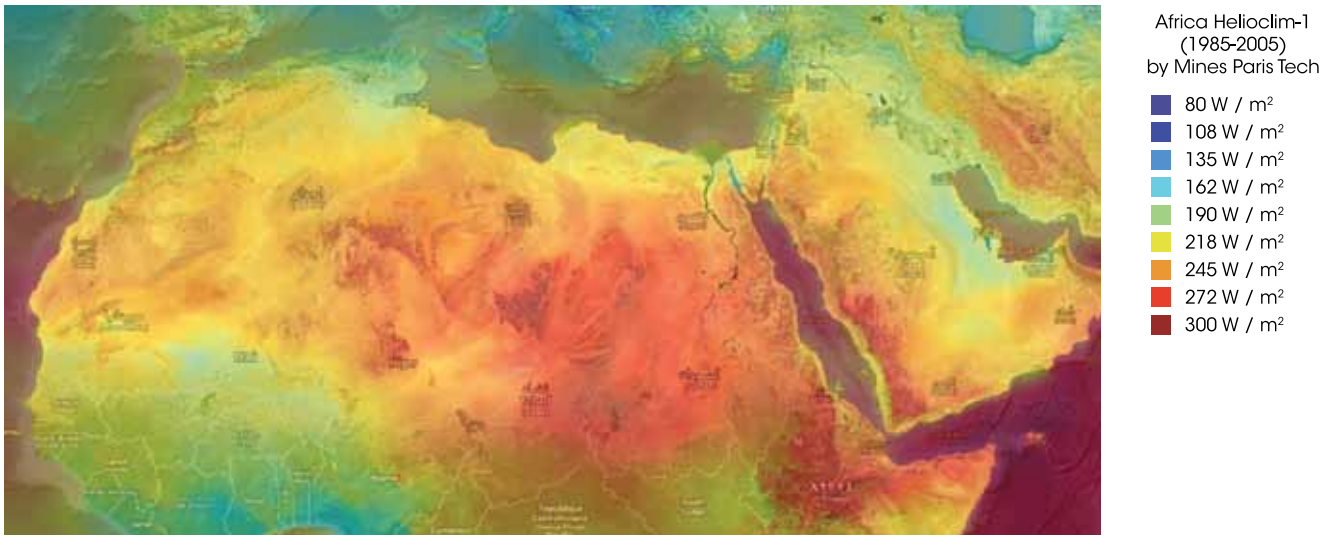


Figure 4: Map of global solar radiation in the Arab region[7]



Mediterranean (Solar-Med-Atlas), a web portal for global horizontal and direct normal irradiance data.[8] The portal brings 1x1 km resolution and 20 years' coverage (1991-2010) data for the whole target region. The project was led by the German Aerospace Center, which cooperated with a consortium of reputable firms and RCREEE, and was funded by the German International Climate Initiative. Installers or planners of small systems (rooftop PV and solar water heating) and project development companies for larger projects can use the information as a first estimation to initiate project development.

A wider-spectrum initiative of relevance is the Global Atlas for Renewable Energy, introduced and led by IRENA and supported by a high-profile international consortium.[9] The development of the project has strong links with the Solar-Med-Atlas. It also provides a web-based platform that includes homogeneous solar and wind data with global coverage, and enables users to overlay additional information on, for example, protected areas, roads or infrastructures. This enables users to highlight areas of opportunity for developing projects and also supports policy formulation, planning and stimulating investment in pre-feasibility studies for wind and solar projects.

6 www.nrel.gov/gis/images/swera/africa/africa_dir.jpg
7 www.nrel.gov/gis/images/swera/africa/africa_glo.jpg
8 See for further information, www.solar-med-atlas.org/
9 www.irena.org/globalatlas/

Both the Solar-Med-Atlas and the Global Atlas for Renewable Energy provide basic information, while allowing other companies and service providers to focus on customised and value-added services based on specialised commercial data products and consultancy services for specific sites and projects.

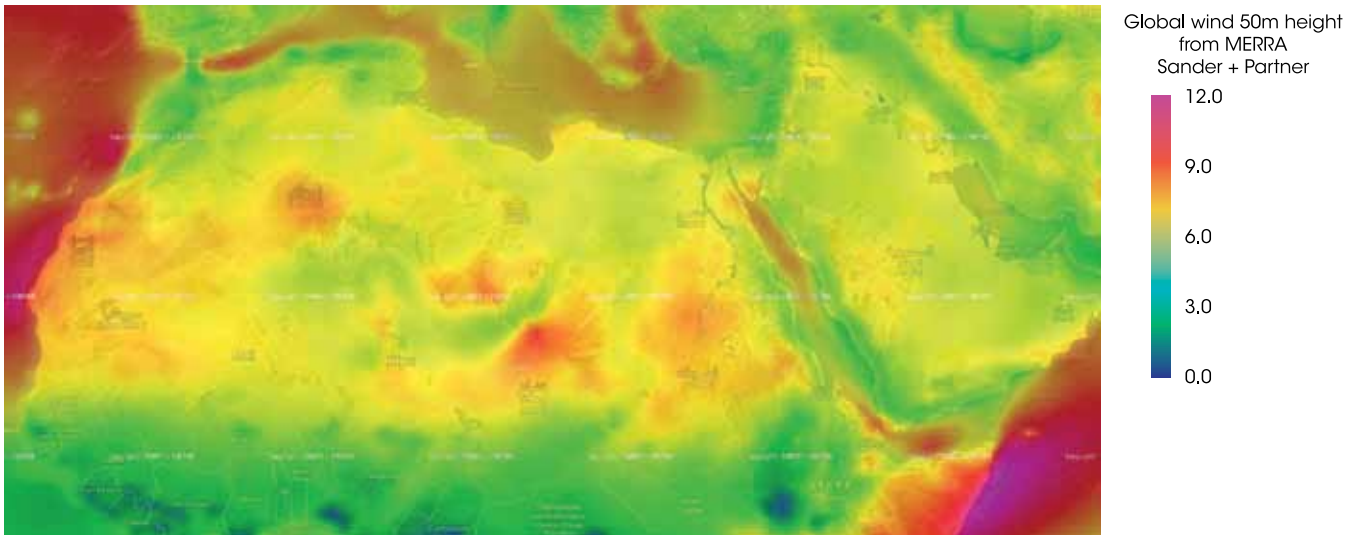
As shown in Figure 5, the region's wind resource is similarly rich, although more concentrated within certain geographical pockets. In particular, the Atlantic and Red Sea coasts show potential for large-scale wind farms, as the wind speed in these areas frequently exceeds the 6.9 m/s economic feasibility threshold (OECD, 2013). For example, the Gulf of Suez area in Egypt enjoys annual average wind speeds of between 7 metres per second (m/s) and 10 m/s, well above the 6.9 m/s threshold. Morocco and Oman have also demonstrated significant wind potential, with speeds that meet the threshold and full-load wind hours of 2 708 and 2 463, respectively. In Mauritania, measures have indicated an average speed of 7.5 m/s in the coastal regions and 5-6 m/s for other regions.

In 2012, within the Global Atlas initiative, IRENA commissioned RCREEE to prepare two national case studies on the role of resource assessment in designing policies in Egypt and Morocco.[11] The case studies explained the concrete development of the national wind atlases and maps, and detailed selected programmes with large measurement campaigns over the two countries. Both showed how information on renewable energy potential was collected and processed, and how it was used for policy-making including identification of specific sites for further exploration, and the allocation of specific land areas for future projects.

There is also good potential for geothermal, biomass and waste-to-energy applications in certain parts of the region. Algeria, Morocco, Saudi Arabia, and Yemen have sites with temperatures above 200 degrees Celsius (°C) at 5 000 metres depth. Countries with sufficient agricultural activity such as Sudan have an opportunity to develop sustainable biomass renewable energy.

Table 1 presents some renewable energy resource indicators, reflecting the significant potential in the Arab countries.

Figure 5: Map of wind speeds at 50m height in the Arab region[10]



10 http://irena.masdar.ac.ae/
11 Both case studies can be downloaded from:http://globalatlas.irena.org/CaseStudies.aspx

Table 1: Renewable energy resource indicators in the Arab countries

Country	Global Horizontal Irradiance (kWh/m²/year)	Direct Normal Radiation (kWh/m²/year)	Wind - Full Load Hours/year	Geothermal - Temperature (°C) at 5 000 m
Algeria	1 970	2 700	1 789	213
Bahrain	2 160	2 050	1 360	100
Comoros	N/A	N/A	N/A	N/A
Djibouti	N/A	N/A	N/A	N/A
Egypt	2 450	2 800	3 015	180
Iraq	2 050	2 000	1 789	100
Jordan	2 320	2 700	1 483	100
Kuwait	1 900	2 100	1 605	100
Lebanon	1 920	2 000	1 176	100
Libya	1 940	2 700	1 912	100
Mauritania	N/A	N/A	N/A	N/A
Morocco	2 000	2 600	2 708	281
Oman	2 050	2 200	2 463	100
Palestine	N/A	N/A	N/A	N/A
Qatar	2 140	2 200	1 421	100
Saudi Arabia	2 130	2 500	1 789	275
Somalia	N/A	N/A	N/A	N/A
Sudan	N/A	N/A	N/A	N/A
Syria	2 360	2 200	1 789	100
Tunisia	1 980	2 400	1 789	188
UAE	2 120	2 200	1 176	100
Yemen	2 250	2 200	1 483	295

Source: German Aerospace Centre (2005)

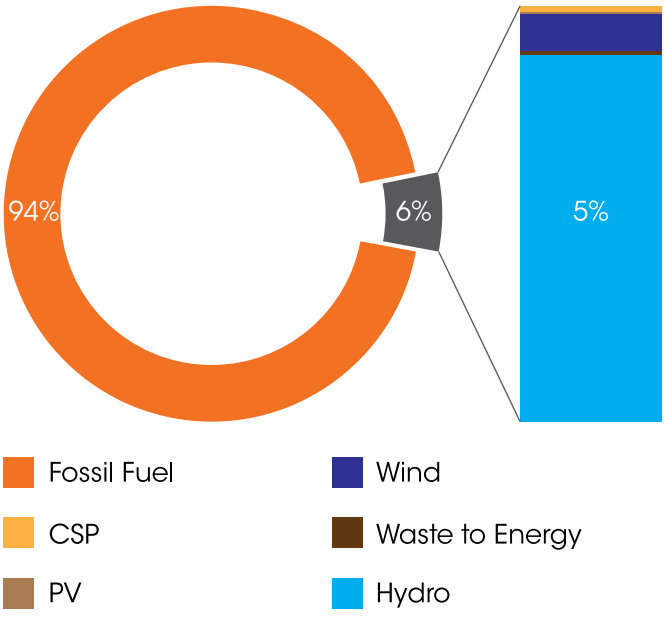
3.2 Share of Renewable Energy

Despite the Arab region's rich endowment of renewable energy resources, its installed base of RETs remains limited. As shown in Figure 6, in 2012, the share of renewables (including large- scale hydro) in installed electricity capacity was about 6% or about 12 GW. In addition, total solar water heating installed capacity reached 3.3 Gigawatt thermal (GW_{th}).

Hydropower installed capacity

Hydropower currently stands at 5% of the installed capacity for electricity generation in the Arab region. In terms of generation, it represents around 3.44%. About 2.8 GW of installed hydro capacity are in Egypt. Whereas Iraq, Morocco, Sudan and Syria account for over 1.5 GW of hydropower each (Arab Union Electricity (AUE), 2013). Massive expansion of hydropower capacity is currently not foreseen,

Figure 6: Share of installed power generation capacity by technology in 2012



Source: AUE 2013, REN21 2013, RCREEE, 2013

as most of the resource base has been exploited, while the availability of the resource itself has been declining.

However, there is a possibility in the future for utilising hydropower to balance the variability of other renewable energy resources, such as wind and solar, by establishing pumped storage power plants. The first project in the Arab region with such technology is already operational in Morocco: a 460 MW power plant in Afrouer (ONEE, 2013). Egypt and Tunisia are also studying the possibility of building pumped storage projects.

Non-hydro renewable energy installed power capacity

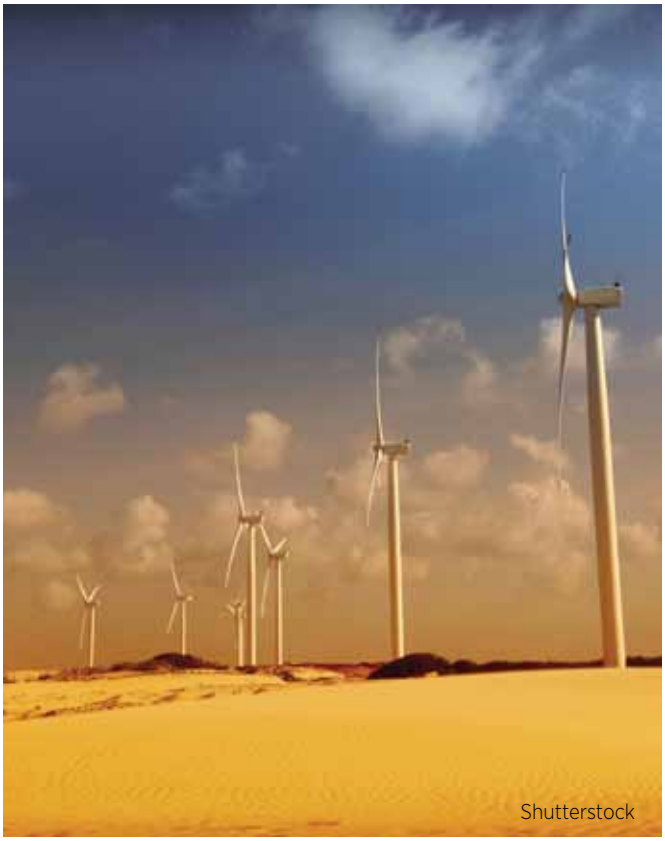
Wind and solar energies account for 0.5% of the region's total installed capacity for electricity (AUE, 2013). At the end of 2013, Arab countries combined had over 1 000 MW of wind power capacity. With 550 MW of wind power installed capacity, Egypt has the largest deployed capacity, followed by Morocco with more than 290 MW, and Tunisia with 154 MW. The highest growth rates for wind were achieved during the period 2005 to 2010.

Supported by the high potential of solar irradiation and a continuous decrease in prices, production of solar PV electricity is growing at high rates in the region. The United Arab Emirates (UAE) had 33 MW of installed capacity by end of 2013, while Saudi Arabia followed with 19 MW. Egypt, Mauritania, and Morocco had about 15 MW each.

In 2013, four Arab countries used CSP technologies for electricity production. The most common use of CSP technology in the region is integrated solar combined cycle (ISCC) plants, which can be found in Algeria, Egypt and Morocco. The UAE inaugurated the largest stand-alone CSP plant, Shams 1 (100 MW), in January 2013.

Jordan, Qatar and the UAE are the only countries producing electricity from modern biomass and waste technologies albeit on a relatively small scale (MENA Renewables Status Report, 2013).

Table 2 contains a breakdown of renewable electricity installed capacity by country and technology.



Wind turbines in Morocco

Shams-1- a 100 MW CSP plant in Abu Dhabi
Photograph: Masdar

Table 2: Renewable energy installed capacity in the Arab countries - 2012

Country	Solar – CSP	Solar – PV	Wind	Other
Algeria	25 MW*	7.1 MW (2010)	N/A	228 MW hydro
Bahrain	N/A	5 MW	0.5 MW	N/A
Comoros	N/A	N/A	N/A	1 MW hydro
Djibouti	N/A	1	N/A	N/A
Egypt	20 MW*	15 MW	550 MW	2 800 MW hydro
Iraq	N/A	3.5 MW (2009)	N/A	2 513 MW hydro
Jordan	N/A	1.6 MW	1.5 MW	3.5 MW biomass; 12 MW hydro
Kuwait	N/A	1.8 MW (2010)	N/A	N/A
Lebanon	N/A	1 MW	0.5 MW	282 MW hydro
Libya	N/A	5 MW	N/A	N/A
Mauritania	N/A	15 MW (2013)	4.5 MW	N/A
Morocco	20 MW*	15 MW	290 MW	1 770 MW hydro
Oman	N/A	0.7 MW	N/A	N/A
Palestine	N/A	1 MW	N/A	N/A
Qatar	N/A	1.2 MW	N/A	40 MW waste to energy
Saudi Arabia	N/A	19 MW (2013)	N/A	N/A
Somalia	N/A	N/A	N/A	N/A
Sudan	N/A	N/A	N/A	1 593 MW hydro
Syria	N/A	0.84 MW	N/A	1 505 MW hydro
Tunisia	N/A	7.2 MW	154 MW	66 MW hydro
UAE	100 MW (2013)	33 MW (2013)	N/A	1 MW biogas (2013)
Yemen	N/A	3 MW (2013)	N/A	
Total	165 MW	136.9 MW	1 002 MW	~10 814.5 MW (~10 770 MW hydro and ~44.5 MW biomass and waste)

Sources: RCREEE (2013); REN21 (2013); League of Arab States (2014) *solar fraction of ISCC plants

Solar water heater (SWH) installed capacity

While the main focus of the region is on the deployment of RETs for electricity generation, solar water heating (SWH) has also been given due attention in many Arab countries. Its simple technology means a significant part of the system equipment is manufactured locally. This leads to a direct effect of increasing the share of RETs and creating jobs in the region.

According to the Arab Forum for Environment and Development (AFED) report (2013), the total collector area of SWHs reached around 4.8 million square metres (m^2); most SWHs are located in Palestine, Egypt and Tunisia, although with different levels of penetration. For example, almost 70% of households in Palestine are equipped with SWHs. North Africa's Maghreb region (Algeria, Libya, Mauritania, Morocco and Tunisia) has increased its share of SWHs through some exemplary promotional schemes, such as the Tunisian Solar Programme (PROSOL) and the Shamci[12] programme in Morocco, both of which have been in place for some years now. Table 3 presents the distribution of installed SWH capacity by country.

12 Preceded by a development programme called PROMASOL that aimed to improve the use of renewable energies through the implementation of appropriate financial mechanisms thereby creating a more efficient local market for solar water heating systems. For more details: www.shamci.net/wp-content/uploads/2013/09/Morocco_ArSol_country-report.pdf

Table 3: Solar Water Heating installed capacity in selected Arab countries

Country	Total Capacity (MW_{th})	Solar – PV (m^2)
Egypt (2012)	525.0	750 000
Jordan (2012)	350.0	500 000
Lebanon (2012)	245.0	350 000
Morocco (2012)	245.0	350 000
Palestine (2012)	120	1 600 000
Saudi Arabia	25.0	36 000
Syria (2010)*	420.0	600 000
Tunisia (2012)	437.5	625 000

Sources: RCREEE (2013); *Observatoire Méditerranéen de l'Energie (OME), Nanterre, France (2012).

3.3 Projects in Pipeline

While the current installed capacity of renewable energy technologies in the Arab states is relatively small compared to other regions, a different picture emerges when evaluating the project pipeline. Most Arab states are procuring significant utility-scale renewable power projects. In fact, almost 6.4 GW of renewable energy projects (excluding hydropower) are currently under construction or being planned throughout the Arab countries (REN21, 2013). As shown in Figure 7, the large majority are wind and solar projects, with aggregate capacities of 4.5 GW and 1.8 GW, respectively. These projects are expected to be commissioned or implemented before 2017.

With over 1 700 MW, Morocco's project pipeline is the most significant in the region. Egypt's pipeline comes in second with over 1 200 MW. The rest of the Arab states have project portfolios that are smaller yet growing substantially. Table 4 provides an overview of project portfolios for the Arab states covered in this study.

Figure 7: Renewable Energy Project Pipeline (MW) Announced in 2013

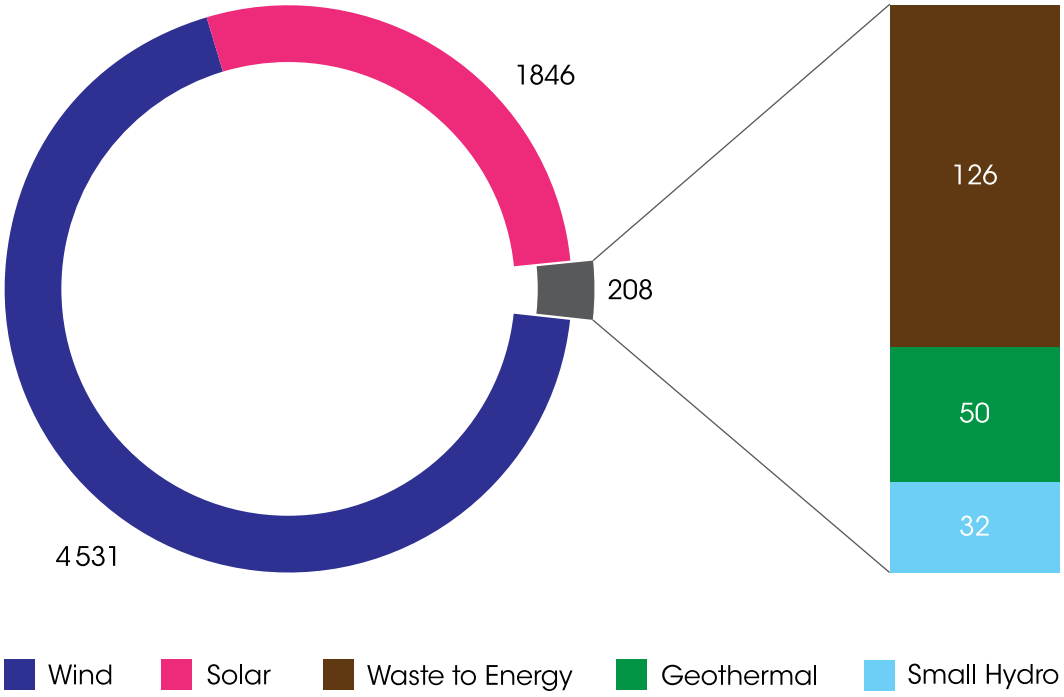


Table 4: Renewable energy projects in Arab countries announced in 2013

Country	Solar (type)	Wind	Other (type)
Algeria	175 MW	20 MW	
Bahrain	3 MW	2 MW	25 MW (biomass and waste)
Djibouti	N/A	N/A	50 MW (geothermal)
Egypt	100 MW (CSP) 240 MW (PV)	1 070 MW	32 MW (small hydro)
Jordan	400 MW	360 MW	N/A
Kuwait	50 MW (CSP utility scale) 10 MW (PV utility scale) 3 MW (PV building integrated)	10 MW	N/A
Lebanon	<1 MW (PV)	60-100 MW	N/A
Libya	N/A	610 MW	N/A
Morocco	172.7 MW	1 553 MW	N/A
Palestine	10 MW (CSP); < 1 MW (PV)	0.35 MW	N/A
Saudi Arabia	125 MW	-	N/A
Sudan	20 MW	320 MW	N/A
Syria	N/A	290 MW	N/A
Tunisia	5 MW	100 MW	N/A
UAE	113.8 MW	30 MW	101 MW waste-to-energy
Yemen	N/A	60 MW	N/A
Total	= 1 846	= 4 531	= 208

Sources: Kuwait from EU-GCC Clean Energy (2013); Lebanon, Palestine and Sudan from RCREEE (2013); all other countries REN21 (2013).

3.4 Targets

Most Arab countries have announced renewable energy targets for future deployment. General renewable energy targets represent an important first step in long-term renewable energy planning, as they demonstrate political commitment to future deployment of RETs. Technology-specific targets are also valuable for investors and implementing agencies, because they offer more detail about what types of technologies the country finds appropriate for its context. The following subsections provide more detail about the different targets that have been set by Arab governments.

General targets

Twenty Arab states have announced renewable energy targets. Most of these targets represent fractions of electricity generation or installed capacity. However, in the cases of Jordan, Mauritania and Syria, the targets represent fractions of primary energy consumption. Table 5 provides a detailed list of general renewable energy targets announced by Arab countries. Morocco's clean power target of 42% installed capacity by 2020 stands out as the most ambitious target in the Arab region. Algeria, Egypt, Qatar, Saudi Arabia, and Tunisia have also announced ambitious targets in excess of 20% of electricity generated for different horizons.

Combined-cycle gas / Concentrated Solar Power 150MW (25MW Solar)
Hassi Ramel, Algeria
Photograph: RCREEE

Table 5: Renewable Energy Targets[13]

Country	2020 Target	2030 Target
Algeria	6% of electricity generation	40% of electricity generation
Bahrain	N/A	5% of electricity generation*
Comoros	N/A	N/A
Djibouti	100% renewable energy	N/A
Egypt	20% of electricity generation	N/A
Iraq	10% of electricity generation	N/A
Jordan	10 % of primary energy	N/A
Kuwait	5% of electricity generation	10% of electricity generation
Lebanon	N/A	12% of electrical and thermal energy
Libya	7% of electricity generation	10% of electricity generation**
Mauritania	20% of primary energy (excluding biomass)	N/A
Morocco	42% of electricity installed capacity	N/A
Oman	N/A	N/A
Palestine	10% of electricity generation	N/A
Qatar	6% of electricity generation*	20% of electricity generation*
Saudi Arabia	N/A	30% of electricity generation***
Somalia	N/A	N/A
Sudan	N/A	11% of electricity installed capacity (excluding large-scale hydro)****
Syria	N/A	4.3% of primary energy
Tunisia	N/A	30% of electricity generation
UAE	Dubai: 1% of electricity installed capacity	Dubai: 5% of electricity installed capacity
	Abu Dhabi: 7% of electricity generation	N/A
Yemen	N/A	15% of electricity installed capacity**

13 Includes hydro
Sources: Algeria, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Palestine, Sudan, Saudi Arabia, Tunisia, and Yemen from League of Arab States (2013, RCREEE (2013a,b), REN21 (2013); Dubai and Qatar (2020) from EU-GCC Clean Energy, and Masdar Institute (2013); Qatar (2030) from Eversheds, and Ernst and Young (2013); Kuwait 2030 target from Alsayegh, *et al.* (2012).
* Unofficial targets ** 2025 target *** 2032 target **** 2031 target

Technology-specific targets

Fourteen Arab states have committed to one or more technology-specific targets. These targets reveal a regional focus on solar rather than wind technologies. The combined CSP and PV targets are more than double the wind targets. Among solar technologies, CSP's targets are almost 40% higher than PV targets. Targets for other renewable energy technologies such as geothermal and waste-to-energy are substantially lower than solar or wind. Table 6 provides a detailed list of announced technology targets thus far for all states covered in this study.

Table 6: Technology-specific targets in the Arab countries

Country	Solar – CSP	Solar – PV	Wind	Other
Algeria	25 MW by 2013; 325 MW by 2015; 1 500 MW by 2020; 7 200 MW by 2030	6 MW by 2013; 182 MW by 2015; 831 MW by 2020; 2 800 MW by 2030	10 MW by 2013; 50 MW by 2015; 270 MW by 2020; 2 000 MW by 2030	N/A
Bahrain	N/A	N/A	N/A	N/A
Comoros	N/A	N/A	N/A	N/A
Djibouti	N/A	N/A	N/A	N/A
Egypt	1 100 MW by 2020; 2 800 MW by 2027	220 MW by 2020; 700 MW by 2027	7 200 MW by 2020	2 800 MW hydro by 2020
Iraq	N/A	N/A	N/A	N/A
Jordan	300 MW by 2020	300 MW by 2020	1 200 MW by 2020	N/A
Kuwait	1 150 MW by 2030	~3 000 MW by 2030	127 MW by 2030	N/A
Lebanon	N/A	N/A	60-100 MW by 2015; 400-500 MW by 2020	15-25 MW biogas by 2015; 40 MW hydro by 2015
Libya	125 MW by 2020; 375 MW by 2025	129 MW by 2015; 344 MW by 2020; 844 MW by 2025	260 MW by 2015; 600 MW by 2020; 100 MW by 2025	N/A
Mauritania	N/A	N/A	31,5 MW by 2014	N/A
Morocco	2 000 MW by 2020	2 000 MW by 2020	2 000 MW hydro by 2020	N/A
Oman	N/A	N/A	N/A	N/A
Palestine	20 MW	45 MW	44 MW	21 MW Waste to Energy
Qatar	N/A	100 MW by 2015; 640 MW by 2020	N/A	N/A
Saudi Arabia	25 000 MW by 2032	16 000 MW by 2032	9 000 MW by 2032	3 000 MW waste-to-energy and 1 000 MW Geothermal by 2032
Sudan	50 MW by 2031	667 MW by 2031	680 MW by 2031	54 MW biomass, 63 MW Small scale hydro, 68 MW waste-to-energy by 2031
Syria	50 MW by 2025	45 MW by 2015; 380 MW by 2020; 1 100 MW by 2025; 1 750 MW by 2030	150 MW by 2015; 1 000 MW by 2020; 1 500 MW by 2025; 2 000 MW by 2030	140 MW biomass by 2020; 260 MW biomass by 2025; 400 MW biomass by 2030
Tunisia	500 MW by 2030	140 MW by 2016; 1 500 MW by 2030	430 MW by 2016; 1 700 MW by 2030	40 MW biomass by 2016; 300 MW biomass by 2030
Yemen	100 MW by 2025	4 MW by 2025	400 MW by 2025	200 MW geothermal and 6 MW Biomass by 2025

Sources: RCREEE (2013); REN21 (2013); Alsayegh, *et al.* (2012).

Solar water heating targets

Solar water heating targets have been announced in at least eight Arab countries, as shown in Table 7. In many cases they are part of the energy efficiency plans.

Table 7: Solar Water Heating targets in the Arab countries

Country	Solar – CSP
Algeria by 2015 by 2020	 70 000 m^2 of collector area 490 000 m^2 of collector area
Jordan by 2015 by 2020	 25% of households equipped (from 14% in 2011) 30% of households equipped
Lebanon by 2020	 1 050 000 m^2 of collector area
Libya by 2015 by 2020 by 2025	 80 MW_{th} of installed capacity 250 MW_{th} of installed capacity 450 MW_{th} of installed capacity
Morocco by 2020	 1 700 000 m^2 of collector area
Syria	Installation of 100 000 m^2 of collector area per year
Tunisia by 2016	 1 000 000 m^2 of collector area
UAE (Dubai)	For all new villas and labour accommodations, a SWH system must be installed to provide 75% of domestic hot water requirements

Source: REN21 (2013)
As an approximation, IEA suggests an average conversion factor of 0,7kWth/m^2 (see http://www.iea-shc.org)

3.5 Institutional Framework

The institutional framework for renewable energy deployment varies widely from one Arab country to another based on a number of factors including political will, the presence of a regulatory agency, the political strength of the national utility, and the level of involvement of the ministry of energy in renewable energy deployment. In fact, when looking at different Arab countries, one finds that the same function is handled by institutions with different profiles. For example, in Algeria bid evaluation for renewable energy tenders is handled by the power sector regulator, Commission de Régulation de l'Electricité et du Gaz (CREG). In Jordan, the Ministry of Energy and Mineral Resources is in charge of issuing calls for tender and evaluating bids for renewable energy power plants. In Morocco, the national utility l'Office National de l'Electricité et de l'Eau Potable (ONEE) evaluates bids for wind energy, while another agency, Moroccan Agency for Solar Energy (MASEN), evaluates bids for solar energy.

Given the diversity of institutional actors involved in renewable energy deployment in the region, six Arab states have created dedicated renewable energy agencies to streamline the promotion and implementation of renewable energy projects: Algeria, Egypt, Libya, Morocco, Palestine and the UAE (Emirate of Abu Dhabi). Similarly, Saudi Arabia has created the King Abdullah City for Atomic and Renewable Energy (K. A. CARE), although this agency has been assigned a wider mandate that includes the nuclear power portfolio in addition to the renewable energy policy portfolio. Tunisia's National Agency for Energy Conservation (ANME), Lebanon's Center for Energy Conservation (LCEC), and Syria's National Energy Research Center (NERC) were initially energy-efficiency agencies whose mandate was expanded to include renewable energy.

It is important to note here that countries have opted to structure their dedicated renewable energy agencies differently. For example, Egypt's New and Renewable Energy Authority (NREA) is a government agency that falls under the auspices of the Ministry of Electricity. Similarly, Syria's NERC is a government agency that reports to the Ministry of Energy. In contrast, other countries have chosen to structure their renewable energy agencies as state-backed private entities. For example, Abu Dhabi's Masdar is a wholly owned subsidiary of the Emirate's sovereign wealth fund management company Mubadala. Algeria's Sharikat Kahraba Taqa Mutajadida (SKTM) is a subsidiary of the country's national utility Sonelgaz. Morocco's MASEN and Société d'Investissements Energétiques (SIE) are government-owned joint stock companies established to assist Morocco in achieving its renewable energy targets. Qatar Foundation for Education, Science and Community Development has been established to support Qatar's journey from a carbon economy to a knowledge economy by unlocking human potential.

The rest of the Arab states either have not created dedicated renewable energy agencies, or have assigned the renewable energy portfolio to existing ministries and departments or state-owned utilities. Annex 2 provides an overview of the institutional framework for renewable energy in Arab countries.

3.6 Support Policies

Only six Arab countries have passed renewable energy laws: Algeria, Jordan, Morocco, Palestine, Syria, and Tunisia. Of these, only two countries – Algeria and Jordan – provide a statutory guarantee of priority access to the grid for renewable energy. Egypt's draft electricity law contains a chapter for renewable energy but is still awaiting parliamentary approval. Sudan, Tunisia and Yemen are in the process of drafting a renewable energy law. Renewable energy laws can reduce risk to private investors as they give the full force of the law to the governments' renewable energy targets and strategy.

With or without a renewable energy law, Arab governments have adopted various support policies for renewable energy projects. These policies constitute a positive development as they encourage private investment in renewable energy. Public financing is the most popular category of financial support policies. Two main policies fall into this category: (1) public competitive bidding resulting in a power purchase agreement to procure utility-scale renewable energy; and (2) public investments in renewable energy projects through grants, soft loans or research and development (R&D) activities.

While public competitive bidding encourages private sector investment in large-scale renewable energy projects, there are other policies such as FiT and net-metering that benefit small producers of electricity. FiT programmes reward small power producers with premium prices for each unit of renewable energy electricity produced. Net-metering allows small renewable energy self-producers to send excess electricity to the grid and deduct it from the monthly bill.

The comparison in Table 8 reveals a regional bias in favour of supporting large-scale renewable energy projects. Thirteen Arab states have adopted public competitive bidding policies. Only four Arab states have adopted FiT. Net-metering can be found in only six states.

Table 8: Renewable energy support policies

Country	Public Competitive Bidding	FiT	Net Metering
Algeria	Exists for development of large-scale private renewable energy projects.	FiT adopted in 2002. However the Algerian FiT programme is being reintroduced.	No
Bahrain	No	No	No
Comoros	No	No	No
Djibouti	No	No	No
Egypt	Exists for development of large-scale private renewable energy (wind and solar) projects.	FiT under preparation.	In January 2013, EgyptERA adopted a net-metering policy that allows small-scale renewable energy projects to feed in electricity to the grid. Generated surplus electricity will be discounted from the balance through the net-metering process.
Iraq	No	No	No
Jordan	Exists for development of large-scale private renewable energy projects.	The Reference Pricelist Record for the Calculation of Electrical Energy Purchase Prices from Renewable Energy Sources Issued by the Council of Commissioners of ERC to The Renewable Energy and Energy Efficiency Law No (13) for the Year 2012.	Net-metering is authorised in the Directive governing the sale of electrical energy generated from renewable energy systems issues by the Council of Commissioners of Electricity Regulatory Commission pursuant to Article 10 (b) of the Renewable Energy and Energy Efficiency Law No (13) (2012).
Kuwait	Exists for development of large-scale private renewable energy projects.	No	No
Lebanon	Exists for development of large-scale private renewable energy projects.	No	Decision of Board of Directors of Electricité du Liban (EDL) legalised net-metering since 2011. As of late 2013, 120 applications were received and 119 two-way meters were donated by LCEC.
Libya	No	No	No

Country	Public Competitive Bidding	FiT	Net Metering
Mauritania	No	No	No
Morocco	Available for large-scale renewable energy projects.	No	Net-metering is not available through the low to medium-voltage lines. Auto producers can sell electricity to the grid on the high-voltage and extra high-voltage lines.
Oman	Exists for the development of large-scale private renewable energy projects.	No	No
Palestine	Available for large-scale private renewable energy projects.	FiT for renewable energy adopted by the same decree (2012), but it is not in operation yet.	Decree approved by the cabinet in March 2012 decision No 13/127/16 on the use of renewable energy.
Qatar	No	No	No
Saudi Arabia	Yes - municipal and national levels.	Under discussion. Saudi Arabia is considering a FiT programme for small- scale renewable energy power producers.	No
Somalia	No	No	No
Sudan	Procurement and contracting law, chapter 5, article 13.2 (2010) provides a legal basis for organising a public competitive bidding process for renewable energy projects. No tenders have been announced yet.	No	No
Syria	Exists for the development of large-scale private projects.	FiT enacted in 2012.	Net-metering is approved.
Tunisia	No	No	Net-metering policy for small-scale grid connected renewable energy projects is approved by decree N°2009-2773 (2009) and decision of Minister (2010). Net-metering policy allows feeding excess electricity to the grid; if the balance of the producer is positive, it gets banked.

Country	Public Competitive Bidding	FiT	Net Metering
UAE	Exists for the development of large-scale private renewable energy projects.	Dubai is considering a FiT.	No
Yemen	Available for large-scale private renewable energy projects.	No	No

Sources: RCREEE (2013) Renewable Energy Country Profile; RCREEE (2013) AFEX Renewable Energy

3.7 Finance and Investment

Up to now, investments allocated to renewable energy in the region's countries have been mainly financed by governments, international renewable energy development assistance and regional development banks. More recently and in support of the mission of IRENA, UAE, through the Abu Dhabi Fund for Development (ADFD), committed concessional financing of up to USD 350 million to seven rounds of renewable energy projects.[14]

Algeria, Egypt, Jordan, Morocco and Tunisia have created national renewable energy and energy efficiency funds to invest in, and provide grants to such projects. Dubai and Saudi Arabia are currently considering the establishment of such funds. The existing funds are at various levels of maturity and financial sustainability. For example, Morocco's Energy Development Fund (FDE) has been capitalised with USD 1 billion from other governmental funds and contributions from Saudi Arabia and UAE. Algeria's National Renewable Energy Fund is being financed through a 0.5% levy on oil tax revenues. In contrast, the Jordanian Renewable Energy and Energy Efficiency Fund (JREEF) is still in the early stages of capitalisation, and its sources of financing are still unclear, particularly the anticipated foreign donation stream of finance. Table 9 presents a summary of some renewable energy funds in the Arab countries.

14 http://adfd.irena.org

Table 9: Selected Renewable Energy Funds

Algeria	Egypt	Jordan	Morocco	Tunisia
Renewable energy fund has been established by executive decree N. 11-423 (2011); In 2009 the Ministry of Energy and Mines implemented a National Renewable Energy Fund to be financed through a 0.5% levy on oil tax revenues.	In June 2012, the cabinet approved establishing a renewable energy fund for financing renewable energy projects. Clear determination of sources of financing and procedures for disbursement of funds to renewable energy projects are still under discussion.	The Ministry of Energy And Mineral Resources established the Jordanian Renewable Energy and Energy Efficiency Fund (JREEEF), which is to be financed through budgetary allocations and foreign donations.	Energy Development Fund (FDE) was established in 2010. The fund contains a capital of USD 1 billion: 200 million from Hassan II fund, 300 million from UAE and 500 million from Saudi Arabia.	The National Fund for Energy conservation (FNME) provides financing for renewable energy and energy efficiency projects.

Sources: Jordan, Egypt, Morocco and Tunisia from RCREEE(2013); Algeria from REN21 (2013)

Some Arab states have created state-backed private sector entities to channel funds into domestic and international renewable energy projects. These entities are created to substitute for, or complement, public funds. For example, UAE (Emirate of Abu Dhabi) has created Masdar, a privately structured company, to direct portions of the emirate's sovereign wealth fund to renewable energy projects in UAE and internationally.[15] Masdar is the primary investment vehicle for clean energy for Abu Dhabi. Similarly, Morocco created SIE, a privately structured renewable energy investment company.[16]

Instead of creating new entities, some Arab states have opted to use existing financing channels to fund renewable energy projects. Libya, for example, has earmarked a portion of the public budget to finance new renewable energy projects.[17] Kuwait Investment Authority (KIA), the country's sovereign wealth fund, has announced plans to invest an unspecified amount in domestic renewable energy projects.[18] One subsidiary of KIA, the National Technology Enterprises Company, has already been active in private equity and venture capital investments on the international market in energy, water and clean technology.[19]

Many Arab states have directed state-owned energy companies to launch investment programmes in renewable energy. This approach has been typical, but not exclusive, of oil-exporting states, which have large, well-capitalised energy companies. State-backed energy companies in Algeria, Kuwait, Morocco, Qatar, Saudi Arabia, Syria, Tunisia and UAE have created renewable energy investment units.[20]

15 MENA Renewables Status Report (2013), ibid
16 RCREEE (2013) Morocco Renewable Energy Country Profile
17 RCREEE (2013) Libya Renewable Energy Country Profile
18 MENA Renewables Status Report (2013), ibid
19 Bachellerie, Imen (2012), Renewable Energy in the GCC Countries: Resources, Potential, and Prospects, Gulf Research Center, p 69
20 MENA Renewables Status Report (2013), ibid

3.8 Power Market Structure

Arab power markets are characterised by centralisation and heavy involvement of the public sector in most activities, including generation, transmission and distribution. Most utilities in the region are owned by the public sector and are vertically integrated. However, the past decade has witnessed a strong push in the Arab region toward power and water market deregulation. Faced with fast-growing demand for electricity and water, the region's countries have liberalised their laws to varying degrees to allow the participation of the private sector in adding new electricity and water capacity.

Most Arab countries allow the private sector to participate in power generation activities. Only six Arab states (Iraq, Kuwait, Lebanon, Libya, Sudan and Syria) have remained without officially licensed private generation activities. In the other Arab states, IPPs produce a portion of the generated electricity from conventional sources.

However, private participation in the renewable power sector remains relatively limited. Only Morocco and UAE have operational renewable energy power plants in which the private sector is a partner. In both cases, the ownership structure of these plants follows the PPP formula, in which ownership is shared between the public and private sectors. PPP has emerged as a means to encourage private sector participation in renewable energy power generation because it reduces risks to the private sector. Furthermore, this business model prevents the monopolisation of renewable energy power generation by either the private or public sectors, which contributes to the overall stability of the system.

The increasing share of the private sector in power generation should not be mistaken for true liberalisation of energy markets in the region. Transmission, bulk supply and distribution have remained largely closed to the private sector. In fact, Egypt, Jordan and Morocco are the only countries in the region that have privately owned distribution companies. In most other countries, distribution has remained in the hands of subsidiaries of the national public utility or the ministries of electricity. Similarly, transmission and bulk supply activities have remained in the hands of state-owned monopolies in every country.

Heavy subsidisation of electricity is also a common characteristic of the Arab region. The most subsidised power markets are found in net energy exporting countries in the Gulf region: Algeria, Iraq, Libya and Syria. These countries use nearly flat tariff structures with electricity prices for end users below USD 0.03 per kWh. In contrast, the least amount of subsidisation of power is common in net energy importing countries such as Jordan, Morocco and Palestine, where slab tariff structures are used. Electricity prices in these

countries increase with the level of consumption, and exceed USD 0.15 per kWh for the biggest residential and commercial consumers. The rest of the Arab countries, such as Egypt, Lebanon, Sudan, Tunisia and Yemen, fall in the middle with varying levels of subsidisation.

Annex 3 provides an overview of the power market structures, central actors, tariff structures, and level of IPP participation in the Arab states covered in this study.

3.9 Rural Electrification

Rural electrification rate differs widely in the Arab countries. Around half of the countries have access rates above 90%, while the remaining countries' access rates are still less than 50%.[21]

The lowest electrification rates occur in Comoros, Djibouti and Mauritania. In this regard, PV solar systems and other off-grid applications could be the appropriate solutions, especially if extending the electricity grid is coupled with high cost and hard geographic landscape. Thereby, both economic and social development could be achieved in these countries.

Fast deployment of off-grid applications could escalate the rate of electrification and economic development in Arab countries if applicable and innovative policies are applied. Such policies could establish a creative energy market by inheriting attractive financing mechanisms, balanced policies and local manufacturing aspects.

21 MENA Renewables Status Report (2013), ibid

3.10 Local Manufacturing of Renewable Energy Systems

Many Arab countries have been able to localise parts of the renewable energy supply chain. It is reported[22] that 66 local companies participated in the construction of Shams 1 CSP plant in UAE, while the 160 MW CSP project in Morocco recently awarded to ACWA Power targets a local content of about 42%. Similarly, about 40% of the solar field of the CSP plant Kuraymat in Egypt was generated locally. Also, the local content reaches 20-30% of the wind farms in Egypt.[23] It is commonly known that most of the SWH systems traded in Jordan and Tunisia are locally manufactured.

There is considerable interest among Arab governments to enhance local supply chains of RETs. The reason behind this interest is the belief that local manufacturing of renewable energy equipment could lead to job creation, which is one of the main political drivers for renewable energy deployment in the region. For example, the White Paper detailing the proposed competitive procurement process of Saudi Arabia K.A.CARE programme, released in February 2013, specifies local content as a key condition in the evaluation of project bids with an objective to have 50% local content or higher, in introductory call, and reaching to 60% or higher in the first tender round, then 70% afterwards.

In fact, according to the World Bank 2010 study,[24] CSP systems offer promising local manufacturing possibilities in many Arab countries. The MENA CSP scale-up Investment Plan (MENA CSP IP), supported by the World Bank and the AfDB, is intended to strategically utilise concessional financing from the Clean Technology Fund (CTF) to accelerate CSP expansion programmes in five Arab countries: Algeria, Egypt, Jordan, Morocco and Tunisia. The vision is for these countries to ultimately become major suppliers and consumers of CSP-generated electricity. The MENA CSP IP is conceived as an ambitious 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. Currently, the fierce competition with the "lower cost" PV projects seems to be slowing down realising this ambition. However, if tangible growth in CSP is reached in the Arab region, it could become home to a new industry leading to lower costs in CSP equipment manufacturing.

22 AFED, 2013, Arab Environment 6: Sustainable Energy, ibid
23 Based on interviews at the NREA, September 2013
24 http://siteresources.worldbank.org/INTMENA/Resources/CSP-Job-Study-Eng-Sum.pdf

200 MW El Zayt Wind Farm, Egypt
Photograph: RCREEE

More recently, the European Investment Bank (EIB) and IRENA agreed to promote renewable energy manufacturing in some countries in the southern Mediterranean through a study aiming to assess the region's current RET manufacturing base and proposing an action agenda to support the expansion of RET manufacturing. The study will make recommendations for international institutions to support the development of renewable energy manufacturing in the region. The joint study results are expected in 2014.

3.11 Regional Cooperation

Electricity interconnections represent a cornerstone in regional cooperation. Table 10 provides an overview of interconnection between Arab countries. The League of Arab States cooperated with the World Bank in a "Study on Arab Electricity Integration, Institutional and Regulatory Framework,"[25] which highlighted that although electrical interconnections exist, trade among Arab countries has been minimal, at less than 2% of capacity. The study proposed a transition path with the long-term objective of harmonising development of the national and sub-regional markets during a multi-year transition period and to promote regional electricity market integration consistent with goals of sustainability, reliability/security of supply and competition over several years.

25 Beides H. (2013), ibid

Table 10: Overview of interconnections between Arab countries

Country	Existing	Interconnector (status)	Planned
Algeria	Tunisia Morocco	90 kV, 150 kV, 220 kV, (operational) 400 kV, ready since 2008 from Algeria side. 225 kV, 400 kV (operational) Both within Maghreb countries interconnection project	Tunisia: Upgrade the existing 225 kV line to 400 kV Libya: 400 kV, feasibility study ready
Bahrain	KSA	400 kV (operational, KSA connected to other GCC: Kuwait, Qatar and UAE. UAE is connected to Oman on 220 kV)	N/A
Egypt	Jordan, Libya, Palestine	400 kV (operational) 220 kV (operational) N/A All part of 8 countries interconnection project	Saudi Arabia: 500 kV,(tendering) Sudan:220 kV feasibility study ready
Iraq	Syria Turkey	400 kV, ready from Iraq side since 2010 400 kV (operational for isolated parts in Iraq) Part of 8 countries interconnection project	Turkey :400 kV, (tendering)
Jordan	Egypt, Syria,	400 kV (operational) 230 kV, 400 kV (operational) within 8 countries interconnection project	Palestine
Kuwait	KSA	400 kV (operational, KSA connected to other GCC: Bahrain, Qatar and UAE. UAE is connected to Oman on 220 kV)	N/A
Lebanon	Syria	400 kV (operational but no exchange in 2012, 8 countries interconnection project)	N/A
Libya	Egypt Tunisia	220 kV (operational) 220 kV (not working due to technical issues)	Algeria: 400 kV, feasibility study ready
Morocco	Algeria Spain	225 kV, 400 kV (operational) 400 kV, (operational)	Spain (400 kV, feasibility study underway)
Oman	UAE	220 kV (operational, the UAE is connected to other GCC on 400 kV: KSA, Kuwait, Bahrain, and Qatar)	N/A
Palestine	Egypt	N/A	Jordan
Qatar	KSA	400 kV (operational, KSA connected to other GCC: Kuwait, Bahrain and UAE. UAE is connected to Oman on 220 kV)	N/A
Saudi Arabia	Bahrain Kuwait Qatar UAE	400 kV (operational) 400 kV (operational) 400 kV (operational) 400 kV (operational, UAE is connected to Oman on 220 kV) Part of GCC interconnection project	Egypt (500 kV, tendering) Yemen
Sudan	N/A	N/A	Egypt (220 or 500 kV, feasibility study ready)

Country	Existing	Interconnector (status)	Planned
Syria	Lebanon	400 kV (operational but no exchange in 2012) 230 kV, 400 kV (operational)	Iraq (400 kV)
	Jordan	400 kV (operational)	
	Turkey	Part of 8 countries interconnection project	
Tunisia	Algeria	90 kV, 150 kV, 220 kV, (operational) 400 kV, ready since 2008 from Algeria side.	Algeria: Upgrade the existing 225 kV line to 400 kV
	Libya	220 kV (not working due to technical issues)	
UAE	KSA Oman	400 kV (operational) 220 kV (operational) Part of the GCC interconnection: KSA connected to Bahrain, Qatar and Kuwait	None
Yemen	N/A	N/A	KSA: 400 kV line

Source: Arab Interconnection Projects Update Report, Energy Department, League of Arab States, April 2013.

Efforts are underway to create sub-regional networks through the Gulf Cooperation Council Interconnection Project and the Eight Countries Interconnection Project, which aims to connect the grids of Egypt, Iraq, Jordan, Lebanon, Libya, Palestine, Syria and Turkey. Such interconnections could support renewable energy deployment, where interconnected grids can absorb higher shares of renewables.

In 2012, the League of Arab States initiated a study on "Pan-Arab Interconnection" to investigate the best electric energy and natural gas trade scenario for each Arab country separately and for all Arab countries, as well as to determine the best options for new electricity and gas interconnections until 2030. The study is financed by the Arab Fund for Economic and Social Development and initial results communicated recently[26] showed a scenario where the percent of RES generation will reach 6% of total installed capacity by 2030, and if KSA installs 23 GW of RES (8,000 MW PV and 15,000 MW CSP), the ratio of RES to total installed generating capacity will go up to around 11%. Another interesting result is that the reserve generation margin, for all scenarios considered in the study, does not drop below 15% in any of the years studied. Therefore, sudden loss of large amounts of wind or solar generating capacity should not be a major concern.

As the interest of Arab governments in RETs has grown over the past decade, many regional and international organisations have been created to contribute to the promotion of renewable energy. Most notably, the Arab region is home to IRENA, the intergovernmental agency with the mandate to promote renewable energy worldwide.[27] IRENA recently launched several initiatives and tools that could help countries to scale up renewable energy. The Renewables Readiness Assessment process (RRA) and the REmap 2030 initiative are, among others, suitable tools at country level.

The RRA[28] is a central pillar of the work of IRENA. It is a country-driven process, with IRENA helping to engage with all relevant stakeholders in a national or regional dialogue, in order to pinpoint renewable energy drivers, comparative advantages, enabling policies and measures. The aim is to set out a concrete action plan to enable the development and scale-up of renewable energy.

26 Farahat M., "The Pan Arab Interconnection Project Latest Update", presentation to the Experts Workshop on Renewable Integration with Electricity Grids in the Arab Region, organised by the League of Arab States and RCREEE, Manama, Kingdom of Bahrain, October 2013

27 130 members (129 countries plus the European Union) and 37 countries in the process of accession

28 http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=335

The first two pilot RRAs were conducted in Senegal and Mozambique in late 2011, with other African countries and regional groupings following suit. Meanwhile, countries as diverse as Grenada, Kiribati, Oman and Peru have also completed RRAs, expanding the range of reports available for comparison. All these studies will help IRENA provide country-specific support and continued advice to the participating countries. More broadly, the RRA series spreads the knowledge of good practices that is essential for a successful global energy transition. IRENA will continue to support countries in RRA, with a greater use of regional pools of experts to broaden and enhance this process. In 2014, two new RRAs will be initiated in the Arab region namely in Mauritania and Tunisia.

REmap 2030 is a global roadmap for energy transition. Through a continually expanding set of reports and analyses, it shows how the share of renewable energy in the energy mix can be doubled by 2030. It has been put together by IRENA based on consultations with governments, industry and other stakeholders and experts in countries around the world. Starting with national renewable energy plans, REmap 2030 outlines a business-as-usual Reference Case, which includes countries' existing targets for renewables, along with the policies in place or under consideration. From there, additional technology options are investigated for each country and aggregated with Reference Case developments to illustrate ways that a doubling of the share of renewables at the global level can be achieved. In 2013, IRENA analysed 26 countries that account for three-quarters of the projected total final energy consumption in 2030.

Rather than a target-setting exercise, REmap 2030 is an exploratory study that lets countries make informed choices. IRENA's aim is to be practical and to cooperate directly with countries in order to analyse and discuss their specific cases in detail, while also enhancing REmap analysis year after year. A first Summary of Findings was published in January 2014 (IRENA, 2014), followed by a full report and a range of related studies containing country, sector and technology-specific findings. See irena.org/remap for the growing range of REmap 2030 reports and analysis. To date, IRENA has collaborated with three Arab League member states in the REmap 2030 project: Morocco, Saudi Arabia and the United Arab Emirates. The plan for 2014 is to expand the scope and collaborate with other large energy users in the region. With more complete coverage, IRENA can develop more detailed pathways to raise the share of renewable energy in Arab countries between today and 2030.

RCREEE was created in 2008 to enable and increase the adoption of renewable energy and energy efficiency practices in 13 Arab states. Furthermore, existing regional institutions like the League of Arab States, UNESCWA, the Arab Maghreb Union (AMU), UNECA, the Arab Union of Electricity (AUE) and others have created programmes to promote renewable energy development and cooperation in the Arab region.

Interest in promoting RETs in Arab states has not been limited to Arab governments and organisations. The European Union has demonstrated considerable interest in participating in renewable energy deployment in the region. Over the last two decades, many Arab countries have benefitted from bilateral and multilateral cooperation technical and financial assistance to develop their renewable energy projects. Project examples extend beyond Research, Development, Demonstration and Deployment (RDD&D) towards large-scale commercial power plants.

In the last few years, Euro-Mediterranean cooperation has crystallised in some initiatives and associations relying mostly on European Commission neighbourhood policies and framework programmes. Clear examples are the Mediterranean Solar Plan (MSP) shaped through governments' cooperation to foster and facilitate the development of 20 GW of renewable energy projects by 2020 in the southern and eastern Mediterranean countries, and the DESERTEC Industrial Initiative (Dii), joined by several industrial companies to promote exporting significant quantities of green electricity from North Africa to Europe.

Both MSP and Dii initiatives have recently been confronted with the challenge of surplus green electricity in Europe, which entailed focusing more on opportunities for solar and wind power projects for domestic supply in the Arab region.

Several other associations and industry initiatives are also active and reflect the high interest in cross-regional cooperation. These include MEDELEC,[29] MEDENER,[30] MED-TSO,[31] OME,[32] IPEMED,[33] MEDGRID[34] and RES4MED.[35] Most of them promote cooperation within their specific fields: power generation, transmission systems and grids, regulations and policies, etc.

Coordination among these various organ-isations has been relatively limited. However, actions have been taken recently to improve the situation. In an important development, these Euro-Med energy associations and industrial initiatives together with RCREEE and Dii issued a common declaration committing to further strengthen their efforts to work in a coordinated manner by exploiting the complementarity of their activities, and supporting the investigation of the possibility of establishing a Mediterranean energy community.

On a more global level, many of the Arab countries are members of IRENA and participate in its initiatives and projects. Furthermore, IRENA and RCREEE have partnered in several projects – the most recent is a project targeting the energy subsidy in the Arab region. In January 2013, IRENA and the League of Arab States engaged in the South American and Arab countries' initiative, which is expected to facilitate technology transfer of the latter and promote partnerships between Arab and South American countries, and where IRENA was solicited to ensure technical assistance to both regions in order to catalyse partnerships and attract investments.

Still, there are many gaps to be overcome in order for renewable energy deployment to take off in the region. The following chapter discusses some of these gaps.

29 MEDELEC is a liaison committee grouping different electricity associations in the Mediterranean basin. For more information: http://www.medelec.org/

30 MEDENER is the Mediterranean Association of National Agencies of Energy Conversation. For more information: http://www.cres.gr/medener/

31 MED-TSO is the association that groups transmission operators in Mediterranean countries. For more information: http://www.terna.it/default/home_en/the_company/about_terna/Terna_in_Europe_and_the_Mediterranean/medtso_en.aspx

32 OME (Observatoire Méditerranéen de l'Energie) is the association gathering thirty two leading Mediterranean energy companies from fourteen countries around the Mediterranean. For more information: http://www.ome.org/

33 IPEMED is a Euro-Mediterranean think tank aiming to build an integrated, sustainable and socially responsible Euro-Mediterranean area. For more information: http://www.ipemed.coop/

34 MEDGRID is a consortium of industry leaders in electricity generation, transmission and distribution as well as in infrastructure financing and climate change services. For more information: http://www.medgrid-psm.com/

35 RES4MED is an association of industrial leaders aiming to act as as an additional reference point for Mediterranean stakeholders committed to renewable energy promotion. For more information: http://www.res4med.org/

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While targets and national strategies constitute an important first step in national renewable energy planning, these elements need to be supported by an appropriate legal framework in order to be effective. Without this framework, governments will find it difficult to translate their long-term visions into concrete, actionable plans.

Various obstacles hinder accelerated deployment of renewable energy in the region. In this chapter, gaps in political, legal, regulatory and institutional domains are highlighted, as well as those related to economic, financial and market aspects. Technology, human capacity and infrastructure barriers are also examined.

4.1 Political, Legal, Regulatory and Institutional Gaps

Demonstrating clear political commitment to renewable energy is an important pre-condition for creating a secure investment environment. This requires setting ambitious and credible targets, establishing a predictable and transparent regulatory framework, streamlining administrative procedures, integrating renewable energy strategies into an overall energy strategy and mobilising funds for the deployment of demonstration projects. Effective support mechanisms are necessary to enhance investor confidence and avoid unnecessary investment risks.

Renewable energy strategy and targets

A renewable energy strategy and targets play a foundational role in renewable energy planning. They provide a long-term overview of what the country aims to accomplish and how it plans to do so. Without clear targets and a well-articulated strategy, renewable energy planning and implementation would lack vision and clarity, leading to unsystematic expansion of public renewable energy projects and little private sector participation. NREAP recognises the importance of strategy and target-setting, and dedicates two whole sections to these items: Section (1) Summary of National Renewable Energy Policy; and Section (3) Renewable Energy Targets and Trajectories.

Most Arab states, with the exception of Comoros and Somalia, have announced targets for renewable energy deployment. However, the format in which these targets have been expressed varies from one country to another. Most countries have expressed their targets as a share of electricity generation or installed electric capacity, and the corresponding shares of gross final energy consumption are typically not documented. For comprehensive description and positioning of renewables in the national energy mix, the NREAP requires identifying the three shares (gross final energy consumption, electricity generation and installed capacity). Furthermore, the NREAP requires targets to be set for 2020 and 2030. Only one country, Algeria, has announced clear targets for these two periods. Some countries have announced targets for either 2020 or 2030. Other countries have even chosen different years for their targets, such as 2032 for Saudi Arabia and 2025 for Yemen.

Gaps:

- The lack of comparable national targets across the region is a gap that needs to be addressed in the process of preparing NREAPs. However, a bigger gap exists with regards to heating and cooling targets. Only eight countries have announced targets for solar water heating and no targets have been announced for cooling.
- Many countries lack clear and officially endorsed targets that are adopted by higher political authorities, embedded in legally binding documents, and supported by a detailed strategy or action plan to achieve them.

Renewable energy legal framework

While targets and national strategies constitute an important first step in national renewable energy planning, these elements need to be supported by an appropriate legal framework in order to be effective. Without this framework, governments will find it difficult to translate their long-term visions into concrete, actionable plans.

A renewable energy law can often be considered a cornerstone of the renewable energy legal framework. It delineates the roles and responsibilities of the various actors, frames future legislative and regulatory actions, and brings the full force of the law to the country's renewable energy plan.

Gap:

- The lack of a clear renewable energy law creates uncertainty in the eyes of investors. Only six Arab countries have passed renewable energy laws: Algeria, Jordan, Morocco, Palestine, Syria and Tunisia. Egypt's draft electricity law contains a chapter for renewable energy but is still awaiting parliamentary approval. Two more states are in the process of drafting renewable energy laws: Sudan and Yemen.

Supporting policies

For a region that is almost entirely dominated by fossil fuel, the stated renewable energy targets are quite ambitious, which is a welcome initiative. However, adopting targets is only part of promoting renewable energy; the more important work lies in adopting specific measures to overcome barriers and create favourable conditions for the uptake of renewable energy development. A key policy challenge lies in developing public instruments that are effective in covering the incremental costs of renewable energy, if any, while not committing to public spending levels that are disproportionate to the intended benefits and seen as politically unsustainable.

The policies that are particularly important for advancing RETs, especially in immature markets, are the ones that provide developers with assurance that generated electricity will be purchased at a fixed long-term price with guaranteed access to the electricity grid. Such policies include public competitive bidding (provided that the process is not too lengthy and bureaucratic), FiTs and direct proposal submissions.

Public competitive bidding currently remains the most preferred policy instrument for promoting large scale renewable energy projects. However, the current PPA bidding processes in the region are too lengthy and do not allow massive and accelerated development of renewable energy.

Gaps:

- Lack of clear signals from the governments on the total number of projects to be developed through the public competitive bidding process creates uncertainty for investors. In many countries the public competitive bidding process is currently planned only for one or two renewable energy projects. And only two countries, Egypt and Morocco, have announced targets for projects to be developed through the bidding process.
- Procedures for the public competitive bidding process are slow and lengthy.
- Absence of direct incentives for renewable energy consumers threatens the auction approach.

Price support measures:

Only four countries in the region have adopted price support measures such as FiTs: Algeria, Jordan, Palestine and Syria. However, since these FiTs were introduced only in 2012 for all except Algeria, not many projects have been deployed yet. In Syria particularly, with the ongoing conflict, almost all activities related to renewable energy development have stopped. Only three countries – Egypt, Saudi Arabia and the UAE – are considering the introduction of FiTs. Among different instruments, FiTs have become the most widely used support policy for the development of renewable energy worldwide. This instrument has been applied in around 65 countries and 27 states or provinces. FiTs might not be the best instrument for the development of large-scale projects, due to the possible risk of over-rewarding investors. FiTs are still important in promoting small and medium-size projects. In countries with low energy prices, the role of FiTs is even more important.

Gaps:

- RET costs are still non-competitive and require additional support in most of the countries.
- Lack of FiTs or other price support mechanisms make the current investment climate for renewable energy unattractive.
- Heavily subsidised electricity tariffs for consumers make investment in renewable energy more unattractive.

Net-metering: Five countries in the region have adopted a net-metering policy, mostly for small-scale renewable energy projects. Net-metering allows renewable energy producers to feed excess electricity to the grid at a price determined by the power supplier and to deduct this amount from the utility bill from the following month. In Lebanon excess electricity is fed to the grid and deducted from the bill for the following month. In Morocco for self-producers connected on high voltage and extra high voltages, excess electricity is bought by the national utility,

ONEE, at pre-agreed prices. In Jordan, Palestine, Syria and Tunisia the excess electricity is purchased at preferential prices. However, net-metering in the Arab region remains a relatively 'unattractive' instrument for private developers mostly due to low electricity prices and lack of uninterrupted power supply.

Gaps:

- In countries where electricity tariffs are low, net-metering without introducing preferential purchase prices for excess electricity is insufficient to create incentive for investment in RETs. The current electricity prices are too low to motivate additional gains that could be achieved as a result of a net-metering policy.
- Many Arab countries experience regular power outages which prevent customers from feeding excess electricity to the grid and benefiting from the net-metering policy.

Other supporting policies:

Only two countries – Jordan and Palestine – have introduced additional effective policies to promote renewable energy, *i.e.,* direct proposal submission, which allows private developers to submit unsolicited applications to the governments for renewable energy site development.

Gap:

- No other policy instruments exist in the region that would provide private renewable energy developers with assurance that generated electricity will be purchased at a fixed long-term price with guaranteed access to the electricity grid.

Institutional setup

Institutional setup requires both organisation and implementation. This means that institutions need to be organised to effectively support the implementation of goals set up by governments, and also that the processes must align with the goals to deliver adequate results. As stated earlier in the report, only 6 out of 22 Arab countries have established agencies dedicated specifically to promoting renewable energy in the country. A few more countries have assigned this responsibility to a national energy efficiency agency or alternative energy agencies. But most countries still lack dedicated renewable energy agencies.

Gaps:

- Fourteen countries in the region have not established well-functioning independent regulators with sufficient competencies in key areas such as tariff-setting, license issuance, power sector monitoring and sanctioning.
- Most electricity markets remain state-dominated with non-transparent management.
- There are unclear permitting procedures and difficulties in securing land for renewable energy projects.
- There is a lack of detailed resource quality assessment or lack of access to such assessment.
- Eleven countries have not established designated renewable energy agencies capable of designing renewable energy policies, streamlining administrative procedures, assisting in deployment of private renewable energy projects, and leading deployment of demonstration and other public renewable energy projects.

Figure 8: Summary of political, legal, regulatory and institutional gaps

- Lack of comparable, **officially endorsed national** targets and respective national plans is a gap in some countries. A bigger gap exists with regards to **heating and cooling targets.**
- Lack of a clear **renewable energy legal framework** creates uncertainty for investors in most countries.
- Vagueness of **project pipeline** to be developed through the IPP process with clear **timeframes** except for few cases.
- Slow and lengthy **procedures** for tendering, licensing, and permitting.
- **Project development support** from government institutions is a concern in many cases.

4.2 Economic, Financial and Market Gaps

Despite the decline in RET costs, power generation from most renewable energy sources (RES) remains more costly than that of conventional power plants.[36] This is especially true in countries with very low fuel costs for fossil fuel power plants. The challenge particularly lies in the fact that renewable energy projects require relatively high upfront capital investments, while offering variable generation (except PV with battery and CSP with thermal storage). With higher political, regulatory and macro-economic risks, investors also require higher premiums on their returns. In these circumstances, to make renewable energy project viable it is essential that governments mitigate investment risks by providing support in accessing financing and creating a secure investment environment.

In the region several countries have undertaken initiatives to provide financial support to renewable energy projects through fiscal measures and renewable energy funds. However, the fiscal incentives and the procedures to obtain them are not always clear. In Egypt renewable energy projects enjoy customs duty exemption according to the decision of the cabinet in May 2010. To qualify for an exemption, investors must obtain a certificate from NREA verifying that the imported equipment is for renewable energy projects. In countries where renewable energy funds are formally established, not all of the renewable energy funds are operational yet, mostly because clear sources of financing and disbursement procedures have not been identified and no fund manager has been established. Examples include JREEEF and the Egyptian renewable energy fund.

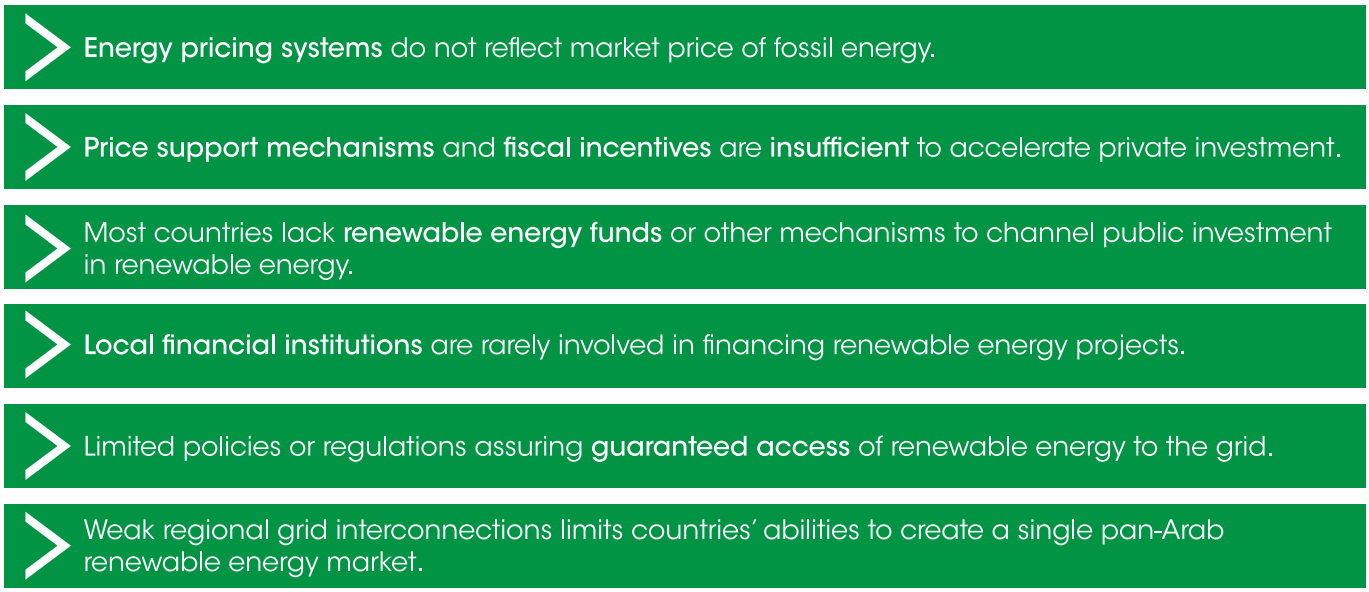
Gaps:

- Fourteen countries in the region do not have fiscal measures (tax exemptions, tax credits, tax reduction, and customs duties exemption) to reduce the costs of renewable energy projects and support renewable energy development.
- Most countries in the region lack well-funded renewable energy funds or other mechanisms that facilitate access to financing by private developers.
- High investment risk is inherent in sudden changes in applicable policies and instability in most of local currencies.
- There is a low share of private investment and active policies able to attract local and/or international firms.

With the exception of a few countries such as Morocco, local financial institutions are not involved in financing renewable energy projects. Bank credit departments are inadequately prepared to assess renewable energy project proposals.

36 For more insight on recent RET costs, see IRENA publications "Renewable Energy Cost Analysis Series" and "Renewable Power Generation Costs – Summary for Policy Makers" , 2012, available at http://www.irena.org/Publications .

Figure 9: Summary of economic, financial and market gaps



4.3 Technology, Human Capacity and Infrastructure Gaps

Technological gaps

Although being continuously developed, the technological maturity has been proven for many of the renewable technologies such as wind, PV, and CSP based on parabolic troughs. Most of the technologies being deployed on a large scale today are the result of years of continuous research and development (R&D) and industrial development worldwide. However, in many of the Arab states there are some clear challenges related to the limited technical knowledge and relatively weak and non-integrated industrial chains, as well as scarcity of technology-targeted R&D activities and technology transfer.

Technological challenges related to the suitability of the technology under the climatic conditions prevailing in the region, such as high temperatures, dusty climate and high humidity, are real concerns of technology providers.

Diffusion of technologies and technology co-operation across and within countries is relatively weak. There is a need to strengthen the comprehensive technology transfer process of learning, utilising and replicating the technology while improving the capacity to choose and adapt to local conditions and integrate them with domestic technologies and supply chains to increase the local content.

Knowing that in many cases the renewable energy resource-rich areas are far from the load centres (*e.g.,* wind in Egypt), and the grid is not prepared for absorbing significant quantities of the variable renewable energy electricity from decentralised small-scale deployment (as a result of FiTs and net-metering), another key challenge is the limited capacity of national grids and supranational interconnections. Advanced and smart controls, as well as a combination of the conventional AC grid with High Voltage Direct Current (HVDC) transmission technologies will be necessary if significant contributions of renewable energy are to be integrated in the electricity markets.

Gaps:

- Technical knowledge is limited and industrial chains are relatively weak and non-integrated.
- Certain RETs are not proven enough for deployment in some Arab regions (*e.g.,* CSP in dust-concentrated and sandy areas, and PV in hot climate).
- There is a lack of support for R&D activities to investigate options of various renewable energy applications in the local context.

Human resources and capacity building

Human capacity in the renewable energy field has improved in Arab countries in the past few years. The implementation of large utility-scale projects in Egypt, Morocco, Tunisia and UAE has given these countries the opportunity to build their capacities in various aspects of renewable energy deployment, including project design and development, rule-setting, permitting and licensing, finance, management and

administration. Similarly, many countries that have not yet implemented large-scale renewable energy projects were able to boost their human capacity through pilot projects and R&D activities.

Gaps:

- Energy policy is usually set in the region by a small group of technocrats without consulting other stakeholders including environmental groups, consumer advocates and even elected parliamentarians.
- Renewable energy has not been sufficiently incorporated into the educational systems of the region. Specialised programmes may exist in science and engineering departments, but renewable energy has not yet been incorporated into management, policy, economics and other social science programmes.
- Government agencies outside energy ministries and utilities are not sufficiently prepared to deal with renewable energy -related issues. Ministries of planning, finance and education, to name a few, need capacity building in renewable energy.
- Quality assurance systems are not sufficiently prepared for RET standardisation, testing, accreditation and certification.

Infrastructure and grid integration

Most countries in the region have high electrification rates for over 99% of the population. However, six countries have electrification rates below 50%: Comoros, Djibouti, Mauritania, Somalia, Sudan and Yemen. Iraq's distribution and transmission networks are still recovering from the damage caused by the economic sanctions and the war. Technical and commercial losses in Iraq are estimated to be between 25% and 40%.

Some of the national power networks are interconnected, but the region as a whole is not interconnected. Guaranteed access to the grid is crucial for the viability of renewable energy projects. Since renewable energy electricity technologies rely on natural sources, the electricity generation is prone to fluctuation. By granting priority access to renewable energy, resource efficiency can be maximised and constraints upon site selection can be minimised for the developer. Only two countries in the region, Algeria and Jordan, provide statutory guarantee of priority access of renewable energy to the grid.

Gaps:

- Most countries in the region have not adopted policies or regulations assuring guaranteed access of renewable energy to the grid.
- The capacity of the current grid infrastructure is insufficient to absorb renewable energy.
- Lack of regional grid interconnections limits countries' abilities to create a single Pan-Arab renewable energy market.

Figure 10: Summary of technology, human capacity and infrastructure gaps

- Technical knowledge is limited and industrial chains are relatively weak and non-integrated.
- Certain RETs are not proven enough in the local context (*e.g.*, CSP in dusty areas, and PV in hot climate) and R&D to find alternatives is lacking.
- Renewable energy has not yet been sufficiently incorporated into management, policy, economics and other social science programmes.
- Government agencies outside energy ministries *e.g.*, planning, finance and education, need capacity building in renewable energy.
- Quality assurance systems are not prepared for RET standardisation, testing, accreditation and certification.
- The capacity of the current grid infrastructure in some high renewable energy resource sites cannot absorb renewable energy without substantial enforcement.

4.4 Regional SWOT Analysis for Arab Renewable Energy Strategy

Based on the overview of renewable energy situation in the Arab region and the gaps identified, Annex 4 presents a SWOT analysis for the development of an Arab Renewable Energy Strategy.

The main strengths of the Arab region include high resource potential, political commitment by declaring national strategies, targets and policies, land availability in many countries, regional experiences in project development, and the availability of regional funding from a number of Arab and international banks and financing institutions.

The main weaknesses of the region include lack of coordinated and integrated energy planning, highly subsidised electricity prices, insufficient support mechanisms, absence of detailed bylaws, regulations codes and standards to encourage private sector engagement, the limited capacity of electricity networks to handle large renewable energy quantities and the lengthy administrative procedures to authorise renewable energy projects.

Some threats can slow down the adoption of renewable energy in the Arab region, such as the possible decline in fossil fuel prices or the increased reliance on new conventional sources (such as shale gas), and in some countries political, economic and social instabilities, as well as sudden changes in national energy and investment policies. However, with the trend of decreasing renewable energy technology costs, increasing energy demand in all Arab countries, declining reserves of fossil fuel in some Arab countries, possible savings or revenues of avoided fuel consumption, and rising interest in renewable energy by the private sector and international institutions, countries have an opportunity to grow their renewable energy market substantially.

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Dedicated renewable energy entities have been created in some countries to lead the charge in improving horizontal coordination among various stakeholders and expand renewable energy awareness outside of specialised renewable energy institutions.

The NREAP represents a valuable tool for national renewable energy planning in the Arab region. However, a significant number of Arab countries will not be able to use this tool without support. The required areas of support vary, depending on the country's unique context and deployment phase. However, broad patterns are observed among Arab countries, which make it possible to identify major actions that would benefit many Arab states.

This chapter attempts to provide a roadmap of actions that would facilitate the process of national renewable energy planning. Given the heterogeneity of Arab states, the proposed roadmap of actions is neither strict nor exhaustive. It provides recommendations that Arab governments may choose to consider in the process of preparing their NREAPs. Furthermore, the roadmap may assist international and regional organisations in designing targeted interventions that will benefit most Arab countries.

5.1 Institutional and Human Capacity

Arab states have already started the process of institutional capacity building in the field of renewable energy. There is a renewable energy unit or department in key energy institutions such as the ministries of energy and national utilities in almost every Arab State. Similarly, specialised research programmes focusing on renewable energy can be found in at least one university or research centre in almost every Arab country.

However, renewable energy institutional capacity remains scattered and limited to energy institutions in most Arab states. Dedicated renewable energy entities have been created in some countries to lead the charge in improving horizontal coordination among various stakeholders and expand renewable energy awareness outside of specialised renewable energy institutions. While it may not be necessary for every country to create such an entity, its existence tends to have a positive effect on the overall deployment of RETs in the country. If a dedicated entity is deemed unnecessary, it is recommended that a multi-stakeholder coordination committee be created to improve horizontal communication and coordination, which would facilitate the process of national renewable energy planning.

NREAP methodology emphasises the importance of inclusive renewable energy planning that is led, but not dominated, by specialists in energy ministries. This methodology encourages the participation of local governments, civil society and the private sector in national renewable energy planning through public and multi-stakeholder consultations. However, weak capacity outside of energy ministries is an impediment to truly inclusive renewable energy planning. Actions need to be taken to build renewable energy capacity in governments, civil society and the private sector, as follows:

- Expand renewable energy expertise outside of energy ministries and utilities into other public agencies such as the ministries of finance, planning, water, irrigation and education, as well as regional and local authorities.
- Provide capacity-building activities to private sector parties interested in entering the renewable energy market.
- Launch public awareness campaigns to sensitise different stakeholders to the main issues related to renewable energy planning, and offer training programmes in renewable energy and lobbying to interested civil society organisations in order to improve their ability to represent their constituencies in the NREAP process.

Table 11: Actions related to institutional and human capacity

No.	Action	Key countries
1	Create/designate a dedicated entity and/or a multi-stakeholder coordination committee to facilitate horizontal coordination and promote renewable energy outside of specialised energy institutions.	Bahrain, Comoros, Djibouti, Iraq, Jordan, Kuwait, Mauritania, Oman, Somalia, Sudan, and Yemen
2	Build renewable energy capacity in ministries (*e.g.,* finance, investment), civil society and private sector.	All countries
3	Launch public awareness campaigns to sensitise different stakeholders.	All countries

5.2 Resource and Technology Assessment

General solar and wind data exist for all Arab states. However, site specific solar and wind data are only available for countries which have conducted deeper mapping and feasibility studies. While it may not be necessary for every Arab country to conduct such in-depth mapping of solar and wind resources, the availability of such data can assist in the process of setting national and sector renewable energy targets. This recommendation is especially relevant for countries that plan to deploy utility-scale renewable energy power projects, where site-specific and grid capacity data are particularly useful in optimising the selection of project sites.

Information about renewable energy resources other than solar and wind is more scarce in the region. Therefore, countries with observed geothermal, small-hydro, and bioenergy potential may choose to conduct feasibility studies to assess this potential. Similarly, information about non-power applications of RETs such as heating and cooling as well as desalination and water pumping is very limited in the region. Arab countries, jointly or individually, may choose to conduct further analysis in this area.

Without mapping both solar and wind resource potential, it would not be wise to engage in long-term national renewable energy planning. However, this mapping may not be necessary for countries such as Palestine and Djibouti, which have chosen a deployment path that focuses on distributed generation.

Table 12: Actions related to resource and technology assessment

No.	Action	Key countries
4	Map both solar and wind resource potential.	Comoros, Djibouti, and Somalia
5	Conduct feasibility studies to explore the potential of: Resources other than solar and wind such as geothermal, waste-to-energy and bioenergy.	Algeria, Mauritania, Morocco, Saudi Arabia, Sudan, and Yemen
	Technologies for sectors other than electricity such as heating and cooling, as well as desalination and water pumping.	All countries

5.3 Targets and Strategy

Most Arab states have announced renewable energy targets for the power sector. However, fewer countries have integrated these targets into clearly articulated national strategies; and no Arab country has announced a target for the heating and cooling sector although great potential exists in the Gulf region and North Africa. The NREAP template requires clear targets for electricity and heating and cooling, along with an overview of the main strategic lines of action that the state plans to pursue. Therefore, actions must be taken by Arab states to calculate these targets and embed them in clearly articulated national energy strategies.

National renewable energy strategies must describe the objectives of pursuing renewable energy deployment (such as security of supply, environmental, economic and social benefits) and the main strategic lines of action to accomplish these objectives.

Table 13: Actions related to targets and strategy

No.	Action	Key countries
6	Formulate and announce renewable energy targets for: The power sector based on resource availability and technology cost.	Comoros and Somalia
	Heating and cooling based on resource availability and technology cost.	All countries
7	Design and publish national renewable energy strategies with articulated target.	Bahrain, Comoros, Djibouti, Kuwait, Mauritania, Oman, Qatar, Saudi Arabia, Somalia, and Sudan.

5.4 Financial and Fiscal Incentives

The NREAP recognises the importance of financial and fiscal support mechanisms for the deployment of RETs. The NREAP does not prescribe specific measures for Arab states to adopt. It leaves it up to the planners to determine the most appropriate measures, based on the country's unique circumstances. In this roadmap of actions we recommend broad categories of support measures based on the country's deployment phase. For example, countries that have little experience in renewable energy deployment are advised to adopt measures that are fit for early market entrants, such as grants and soft loans. For countries that have already implemented some measures of support, the roadmap recommends that these measures be consolidated into coherent, holistic frameworks of financial and fiscal incentives to support the private sector in overcoming economic and market barriers. The programmes included in this framework should be targeted at the most important bottlenecks and barriers.

This roadmap also recommends the creation of a national renewable energy fund. As with other recommended actions, this recommendation does not need to be followed by every country. However, the fund could play an important role in mobilising financing for clean energy projects. In order for this fund to be effective, a clear source of financing must be identified. Furthermore, a fund manager must be assigned and held accountable in order to enhance the transparency of the process.

For low-income nations in this group, the fund can be used to mobilise and distribute donor funding. It is important to provide the fund with a clear source of internal financing. Fossil fuel taxes and levies on royalties from oil and natural gas extraction are particularly well suited for this purpose.

Table 14: Actions related to financial and fiscal incentives

No.	Action	Key countries
8	Apply financial and fiscal actions that include:	
	Needs of early market entrants. *e.g.,* grant programmes, soft loans, micro-financing.	Bahrain, Comoros, Djibouti, Iraq, Kuwait, Mauritania, Oman, Qatar, Somalia, Sudan, and Yemen
	Coherent and holistic framework of financial and fiscal incentives to support the private sector.	Algeria, Lebanon, Libya, Saudi Arabia, and UAE
	Renewable energy fund to mobilise and facilitate financing of clean energy projects.	Bahrain, Comoros, Djibouti, Iraq, Kuwait, Libya, Mauritania, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, and Yemen

5.5 Market Access

Financial and fiscal incentives alone are not enough to speed up deployment of RETs. This roadmap of actions recommends the identification and removal of restrictions on access to the market for renewable energy projects. Furthermore, this roadmap recommends taking the necessary steps to phase out subsidies gradually and decrease the share of fossil electricity without risking energy and electricity supply security and affordability. Accordingly, the following actions are recommended:

- Identify unnecessary obstacles related to authorisation, certification and licensing procedures applied to renewable energy power plants, and take the necessary steps to eliminate them.
- Create procedures to facilitate horizontal coordination between different administrative bodies responsible for the different parts of power-generation permitting. Create a one-stop shop for coordinating all steps in the permitting process.
- Adopt regulatory frameworks that allow for other power project setups in addition to utility supply (PPA) models. These project setups may include self-production and third-party sales.
- Take the necessary steps to reform, phase out or reduce fossil fuel subsidies. These steps include calculating the subsidies, assessing the impact of phasing out these subsidies on the economy and society, designing plans for the phase-out that minimise negative consequences, and launching a public awareness campaign to create public acceptance for the eventual phase-out.

Table 15: Actions related to market access

No.	Action	Key countries
9	Perform the following to facilitate market access:	
	Identify obstacles related to authorisation, certification and licensing procedures.	All countries
	Create procedures to facilitate horizontal coordination between different administrative bodies.	All countries
	Adopt regulatory frameworks that allow for other power project setups in addition to utility supply (PPA) models.	All countries except Algeria, Egypt, Jordan, Morocco, Saudi Arabia, Syria and Tunisia
	Take the necessary steps to reform, phase out or reduce fossil fuel subsidies.	All countries except Palestine

5.6 Land Access

Access to land is also a major area of action where governments can play an important role in accelerating deployment. The actions recommended are to:

- Identify the best sites for renewable energy development and investigate the ownership of these lands. If they are publicly owned, these lands can be allocated to renewable energy development. This type of renewable energy zoning is one of the main objectives IRENA's Clean Energy Corridor.
- Pass regulations to facilitate access to public and private land for renewable energy developers.

Table 16: Actions related to land access

No.	Action	Key countries
10	Carry out the following procedures to facilitate land access: Identify the best sites for renewable energy development and investigate the ownership of these lands.	All countries except for Egypt, Kuwait, and Morocco
	Pass regulations to facilitate access to public and private land for renewable energy developers.	All countries

5.7 Codes, Standards and Quality Control

The NREAP recognises the importance of standards and quality control for successful renewable energy planning and deployment. The Arab region does not currently have robust training and certification schemes for installers of renewable energy equipment. Similarly, there are hardly any certification schemes for renewable energy equipment, with the exception of solar water heaters. As a start, regional and international standards can be adapted and used as a guide to draft national standards/measures.

Furthermore, the NREAP template focuses on the role of building codes in increasing the share of renewable energy in the direct supply of electricity, heating and cooling to buildings. Currently, most building codes in the region do not require minimum levels for the use of renewable energy. Governments may choose to include such requirements in building codes.

Table 17: Actions related to codes, standards, and quality control

No.	Action	Key countries
11	Create certification schemes for: • Installers of renewable energy equipment. • Renewable energy equipment.	All countries
12	Include minimum levels of renewable energy use, particularly energy-efficient RETs (such as solar water heaters) in building codes.	All countries except for Jordan and UAE (Emirate of Dubai)

5.8 Grid Readiness, Access and Codes

Grid readiness and access are of particular importance to successful renewable energy planning and deployment. The NREAP template urges governments to clarify the rules on access to the grid and cost bearing or sharing for such access. Furthermore, the template asks governments to consider grid upgrades and expansion during renewable energy planning. States are asked to conduct studies to:

- Assess the readiness of the grid to integrate the targeted amount of renewable power, and identify the major bottlenecks and capacity constraints between renewable energy sites and load centres.
- Assess the potential for smart grid applications in the power systems in these countries.
- Develop cross-border grid connection projects and harmonise grid codes among interconnected countries. These projects maximise the role of renewable energy in both national and regional levels, where electricity grids work as energy banks.

Table 18: Actions related to grid readiness, access and codes

No.	Action	Key countries
13	Design and publish renewable energy grid codes	All countries except Jordan and Tunisia
14	Enact regulations, measures and rules to: • Ensure guaranteed grid access for producers of all sizes. • Ensure cost sharing or bearing for network technical adaptations to connect renewable energy production facilities.	 All countries except Algeria, Jordan All countries except for Jordan
15	Conduct studies to: • Assess the readiness of the grid. • Assess the potential for smart grid applications. • Develop cross-border grid connection projects.	All countries
16	Put in place plans to develop national transmission and distribution grids with a view to integrate the targeted amount of renewable electricity while maintaining the secure operation of the electricity system.	All countries

Important note:
It is important to note that until Arab countries develop their respective NREAPs, a country-specific roadmap of actions remains elusive. Many gaps that need to be addressed through these country-specific action roadmaps are currently unknown. The process of developing the NREAP will reveal these gaps, thus allowing for specific actions to be taken to address them. Therefore, the best form of intervention is to provide Arab states with the necessary technical support to develop their own NREAPs. Once real gaps are revealed, more targeted interventions may be designed.

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Financial cooperation among Arab states in the field of renewable energy deployment is a growing trend. For example, Jordan, Mauritania and Morocco have received grants from Gulf countries to develop renewable energy projects.

The detailed gaps and SWOT analysis in Chapter 4 highlights the need to stage interventions to support renewable energy deployment not only on the national level, but also on the regional one. Furthermore, these interventions need to be performed simultaneously and in a coordinated manner in order for them to be most effective. Therefore, cooperation among the various actors currently involved in the region, including but not limited to national governments, IRENA, the League of Arab States, RCREEE, UNESCWA, UNECA, EBRD and AMU, is of the utmost importance in order to avoid duplication of efforts and to ensure that available resources are used optimally for the benefit of the countries.

6.1 Detailed Regional Actions

Institutional and human capacity

Institutional and human capacity varies among Arab countries. A cornerstone for improving these capacities is to assess and share the experiences and lessons learned through different activities, especially those of the dedicated renewable energy agencies. The ultimate objective is to enhance the institutional effectiveness in setting and achieving renewable energy goals. The practices related to projects' bidding, licensing, permitting and authorisation should be analysed with the objective to avoid lengthy procedures. Standard agreements for private sector projects should be available. Achieving tangible renewable energy growth is closely linked to the skills of the human resources. Development of human capacities can be sustained by rooting the knowledge locally. Train-the-trainer programmes and exchange of expertise can serve this objective.

1. Assess the regional experience with dedicated renewable energy agencies in order to identify and disseminate best practices, particularly how such an agency could serve as a one-stop shop for private developers.
2. Conduct a study on best practices in bid-evaluation, licensing, permitting and authorisation of renewable energy projects, with the goal of reducing project lead time to international standards.
3. Prepare templates for standard agreements needed for implementing renewable energy projects.
4. Launch training courses for trainers in different fields to disseminate national renewable energy capacity-building programmes and ensure that national capacities are available to launch renewable energy programmes.
5. Support regional expert exchange and networks to facilitate knowledge transfer and regional dialogue on renewable energy issues.

Resource and technology assessment

While regional governments and other stakeholders have focused their attention on the renewable electricity potential in the region, little has been done to assess the renewable energy potential in heating and cooling. Given the region's desert climate, which is characterised by hot summers and cold winters, more should be done in order to explore the applicability of RETs in the heating and cooling sector, desalination and water pumping.

6. Conduct a detailed regional analysis of the potential for district heating and cooling applications.
7. Create regional funding programmes for RD&D in the field of renewable energy storage, heating and cooling, and water desalination technologies.

Financing

Financial cooperation among Arab states in the field of renewable energy deployment is a growing trend. For example, Jordan, Mauritania and Morocco have received grants from Gulf countries to develop renewable energy projects. Although some Arab funds exist that provide opportunities for different projects including renewable energy, to date there are no clear and systematic Pan-Arab programmes to mobilise and facilitate funding for renewable energy in the entire region.

8. Conduct studies to:

- assess the potential opportunities for financial cooperation in the Arab region for renewable energy deployment; and
- reduce investment risks and enhance private sector involvement.

9. Create a Pan-Arab renewable energy fund to coordinate Arab-Arab renewable energy funding activities in order to eliminate redundancy, improve the efficiency of funding allocations for projects and support research, development, demonstration and deployment programmes.

Codes, standards, and quality control

Typically for large-scale wind projects, international standards are followed. However, there are no national standards for PV and wind. A few countries have developed SWH standards. The Solar Heating Arab Mark and Certification Initiative (SHAMCI) aims to create a regional standards and certification framework for SWH. Similar initiatives need to be launched for PV in particular. Such standards will improve adoption rates of PV technology for distributed generation, especially in countries that have access problems such as Sudan and Yemen.

10. Support the development of regional standards, certification and quality frameworks for renewable energy systems.
11. Create a building-code template that includes a minimum level of renewable energy use in order to help governments in the region to create their own codes.
12. Develop comprehensive Arab guidelines for renewable energy grid connection requirements and assist national governments in creating their own national codes based on the regional code.

Grid readiness

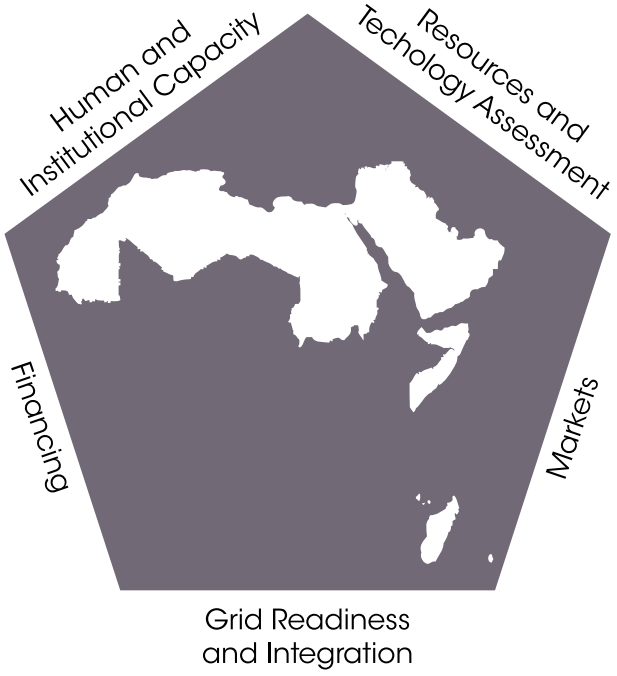
Planning for tangible growth in renewable electricity generation in the Arab region is often accompanied by concerns regarding their integration with existing transmission and distribution grids and the additionally related investments to maintain grid security, reliability and operability. Alleviating these concerns requires proper understanding of the possible impact of renewable energy production variability on installed capacity, reserve requirements, frequency control, reactive power/voltage control, system stability, demand variation, network operation and control, and others.

13. Conduct studies to assess the grid readiness for renewable energy deployment and potential for smart grid applications in the power systems in the region.
14. Cooperate with regional initiatives for renewable energy and extending grid ring between northern and southern Mediterranean countries.

6.2 Regional Initiatives Supporting NREAPs

It is anticipated that the implementation of the Pan-Arab Renewable Energy Strategy will be facilitated by the political endorsement and adoption of AREF by different Arab countries as a guideline. Such adoption will encourage countries to develop their NREAP based on specific renewable energy targets for renewable energy based electricity generation, heating and cooling by 2020 and 2030.

Figure 11: NREAP support framework



The actions outlined earlier are anticipated to support the proper setting of NREAPs and unblock different barriers to pave the way for well-recognised achievements. However, it is recommended that in the next couple of years, a few initiatives be focused on that can influence and expedite the countries' readiness to prepare their NREAPs. Examples are listed below.

Table 19: Short-term regional renewable energy initiatives

No.	Action	Key countries
1	Technical and financial assistance programme to support Arab states in designing their respective NREAPs.	General
2	Comprehensive, holistic capacity development project covering the entire lifecycle of the project including planning, resource assessment, feasibility studies and implementation.	Human and Institutional Capacity
3	Potentials and opportunities for untapped renewable energy options including heating and cooling, water desalination, biomass, geothermal energy, small hydro and pumped storage options.	Resource and Technology Assessment
4	Grid integration initiative (Clean Energy Initiative in the Arab Region) to integrate greater amounts of renewable electricity in the power systems.	Grid Readiness and Integration
5	Enhancement of renewable energy administrative and spatial planning governance.	Human and Institutional Capacity
6	Studies to assess the potential opportunities for improving financial cooperation in the Arab region to accelerate renewable energy deployment, and mitigate investment risks for public and private sectors.	Financing
7	Promote renewable energy local manufacturing and services in the Arab countries.	Markets

Technical and financial assistance for NREAP design

The objective of regionally coordinated efforts, in this regard, should be to help countries avoid failing to produce credible NREAPs due to a great extent to the incomplete implementation of key AREF provisions. It is crucial to ensure that planned measures are aligned with targets and growth paths so that continued growth is guaranteed. The commitment of different stakeholders through actions should also be ensured. The proposed initiative will include:

- Direct financial and technical supports.
- Capacity building and expert workshops at national and regional levels for national experts to engage in NREAP development, including civil servants and consultants. In this regard, the Renewables Readiness Assessment (RRA) methodology introduced by IRENA can be used to support developing and following up the proposed action plans.
- As stipulated in AREF, creation of a multilingual (Arabic-English-French), web-based Arab NREAP platform that offers advice on possible support for NREAP preparation at national and regional levels, as well as useful resources (*e.g.,* studies, projects, sample action plans) to help countries to design the action plan. The platform will also include the NREAPs and reports of the Arab states. In addition, the platform may be used to publicise information which the League of Arab States or Arab countries deem to be key.
- Preparation of template for progress monitoring, including performance indicators, and a reporting system to the League of Arab States.

Comprehensive, holistic capacity development initiative

This capacity development initiative will be covering the entire lifecycle of the project, including planning, resource assessment, feasibility studies and implementation. The proposed initiative will include:

- Modernisation and accreditation of training centres.
- Training and certification of technical renewable energy instructors.
- Creation of renewable energy training material for non-technical staff in regulatory and financial institutions.

The initiative should use "Train the renewable energy Trainer" concept to lower costs and encourage thorough dissemination of expertise.

Potentials and opportunities for untapped renewable energy options

Part of the prerequisites for preparing the NREAP is to explore a wide range of technologies and check their appropriateness for each sector. Such appropriateness should not be judged only based on "first movers" that are frequently mobilised by price signals or financiers desires, but it should also be a result of analysis and optimisation of short- and long-term goals.

Based on the available information, it is clear that several RET options are still untapped in most Arab countries. Most of the targets are linked to wind and solar electricity, as well as most of the support schemes, weather-adopted or under discussion. It is recommended that a regional project be launched on the untapped potentials and opportunities for RETs in:

- Heating and cooling
- Water desalination
- Biomass
- Geothermal energy
- Small hydro and pumped storage options.

Grid integration initiative in the Arab region (Clean Energy Initiative in the Arab Region)

Major parts of the AREF and NREAP template deal with grid issues. Furthermore, successful implementation of the Pan-Arab Renewable Energy Strategy requires significant investment in new renewable power plants and transmission system infrastructure. IRENA is working with the League of Arab States and other organisations to identify the key actions needed to put this investment in place. In this context, IRENA and the League of Arab States are planning to launch a regional initiative to integrate greater amounts of renewable electricity in the power systems.

The Clean Energy Initiative in the Arab Region aims to move forward an action agenda which could include key regional elements such as:

- Zoning and resource assessment to identify renewable power development zones in areas of high resource potential and routes for efficient transmission of electricity to load centers.
- Country and regional planning to fully consider cost-effective renewable power options for optimising investment in electricity generation and transmission infrastructure.
- Enabling frameworks for investment to open markets to renewable power producers, reduce the costs of renewable power financing, and facilitate renewable power trade.
- Capacity building to develop the human and institutional capacity build, plan, operate and maintain power grids with higher shares of renewable electricity generation.
- Information sharing to inform decision makers, investors, developers and entrepreneurs about investment opportunities in renewable energy in the region

Enhancing renewable energy administrative and spatial planning governance

It is quite common for renewable energy development to be slowed down due to lack of administrative knowledge and confidence in renewable energy solutions in different sectors. Typically these are reflected in unclear and complex permitting and licensing procedures, poor involvement of local finance and discriminatory regimes in fiscal incentives. Dedicated knowledge-sharing activities coupled with good and reliable access to data reflecting the realities and opportunities offered by renewables are obvious needs. Linked to these is creating or recovering confidence through the initiation and enforcement of quality standard related to products and installers.

Detailed NREAP preparation would lead to better predictability of national policies and support schemes, with clear criteria on duration, levels, beneficiaries, etc. This would address the common investors' complaint about the unstable "stop and go" nature of national policies and support schemes.

The proposed project will include:

- A comprehensive benchmarking study on lead time for large- and small-scale projects in Arab countries in comparison to international experiences.
- Awareness campaigns and capacity building for different stakeholders, focusing on overcoming myths around renewable energy, process improvement and institutional effectiveness.
- Fostering regional programmes on certification or equivalent qualification schemes for products and installers of small-scale renewable energy systems.

Upscaling financial cooperation within the Arab region

Financing of renewable energy is fundamentally a choice between different alternatives coupled with certain risks. The context for that choice includes the need for high capital and market growth, and the applicable policies.

Despite the availability of many banks and financial institutions in the Arab countries, the share of local financing in renewable energy projects is still marginal. Also, there are possibilities for engaging other financial mechanisms, such as insurance funds, pension funds, and sovereign guarantee funds, along with new mechanisms for financial risk mitigation. Many new business models are conceivable. It is proposed that a regional project be launched to:

- Investigate the financial capacities within the Arab countries to assist national and regional renewable energy projects.
- Introduce case studies on the ability of individual countries to mobilise bundled local and foreign financial resources for renewable energy projects.
- Recommend and promote a list of creative financial mechanisms to be applied at national and regional levels.

Promoting renewable energy local manufacturing and services

As indicated earlier, IRENA and EIB are currently cooperating to promote renewable energy manufacturing in some of the southern Mediterranean countries, through a study that assesses the situation and will ultimately make recommendations for international institutions on how to support the development of renewable energy manufacturing in the region. It is strongly recommended that this initiative be extended to include all Arab countries and, if possible, have it include the wider local content aspects, reflecting the value created along the life cycle of different activities: manufacturing, trading, insurance and transportation services, installations including civil, mechanical and electrical works, operation and maintenance. The key objectives would be to:

- Analyse the status quo including profiles of the national industries, services and supply chain of large- and small-scale renewable energy systems. The profile should highlight relevant industrial infrastructure such as metal fabrication and glass industries, experts and research centers, technical know-how, standards, testing and certification, as well as industrial support policies.
- Map the gaps in regional capacities and special concerns of the renewable energy industry, with a focus on technical, legislative and growth barriers, as well as marketing considerations.
- Recommend practical actions to develop renewable energy systems' local manufacturing and services in the region, including technology and knowledge transfer mechanisms that would be most suitable for the existing industries and services. Possible interventions of different stakeholders for improving the current situation should also be outlined.

6.3 AREF and NREAP Implementation: the Way Forward

The political endorsement of AREF and NREAP templates at the regional level is expected in 2014 through the League of Arab States official channels. This will be followed by the introduction of AREF and NREAP to national bodies and agreement with some countries to kick-start the preparation of their detailed NREAPs.

These countries will nominate a national contact point, the national authority or body responsible for the development and follow-up of the NREAP.

The League of Arab States, RCREEE and other interested regional and international actors will be engaged in leading national bodies, and consequently other stakeholders, to support the preparation of the NREAP.

It is anticipated that NREAP completeness will vary from country to country; however, the objective in the initial NREAP preparation phase will be to help countries to sharpen and align their intermediate objectives and measures, as well as to identify and plan for different areas for improvement. After advising on the NREAP structure and requirements, due attention will be given to analysing the details with NREAP authors and competent stakeholders to ensure easier drafting of the NREAP:

- Targets announced and technological priorities.
- Renewable energy electricity support measures.
- Renewable energy heating and cooling support measures.
- Infrastructure development and electricity networks.
- Administrative procedures and spatial planning.

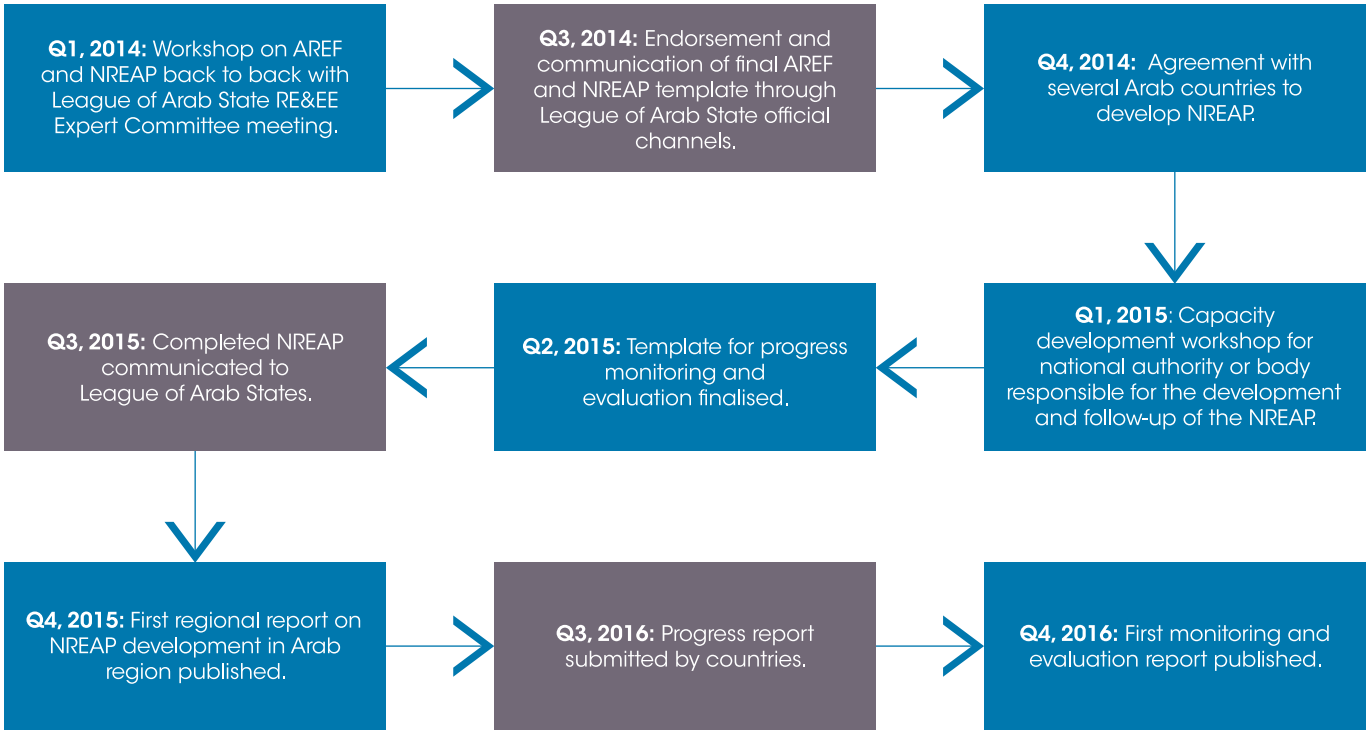
The NREAP national authors will take the lead and prepare the draft NREAP, including responsible entities and allocated resources for different measures indicated. They will ensure the proper collection of data and information related to the above items in consultation with national and local authorities and other relevant stakeholders. In addition, a monitoring system, including indicators for individual measures and instruments, should be designed to follow up the implementation of the NREAP.

The draft NREAP should be subject to public consultations carried out during the preparation and finalisation of the Action Plan. When finalised, the NREAP should be politically endorsed by the relevant supreme governmental entity and published.

Accordingly, and as stipulated in the AREF, the NREAP should be communicated to the League of Arab States, and should be made available on the information platform that includes the NREAPs and reports of the Arab states.

The anticipated key dates and milestones associated with AREF and NREAP adoption and implementation are outlined in Figure 12.

Figure 12: Key proposed dates for NREAP development



6.4 Reinforcing the Role of the Regional Organisations

The potential and promise of the Pan-Arab Renewable Energy Strategy and its implementation instruments, AREF and NREAP, rest on the development of an integrated regional market for sustainable energy among Arab countries and with neighbouring regions; particularly Europe and Sub-Saharan Africa. This implies that at least a minimum level of integration and coordination be achievable among Arab countries (not that it needs to be comparable or of the same quality in terms of coordination/governance available to countries north of the Mediterranean). The chain is as strong as its weakest links.

What should be recognised in this process of promoting an integrated regional market for sustainable energy is to what extent Arab regional institutions are empowered to facilitate the transition. Furthermore weak coordination processes at Pan-Arab level might lend justification for Arab countries to pursue narrow bilateral solutions, in order to avoid being bogged down in ineffective coordination mechanisms. This in return would further limit the potential of different regional initiatives.

To address these structural weaknesses within the context of a trans-regional relationship, the energy transition process needs to be looked at as a whole (complex system), and the case for regional coordination / cooperation. Making the transition toward sustainable energy systems in the Arab region – encompassing principles of access to clean and affordable energy for all and an efficient use of energy resources – involves sustained efforts on a number of fronts. In addition to a fundamental "rethink" of national energy strategies, there are the accompanying institutional reforms, energy pricing and subsidies regimes review, industrial policies, infrastructure, investments and technological adsorptive capacity considerations, to mention a few.

As a regional response to this structural South-South coordination challenge, and to bring the Arab region to a level playing field in terms of strengthening the South-South chain in the context of an integrated sustainable energy market, four layers of action are proposed.

The institutional setting for regional coordination and governance

The Arab region needs to build regional coordination mechanisms to articulate coherent strategies and positions for the future. Work is needed here in terms of enhancing current regional coordination mechanisms in the context of an integrated Arab sustainable energy market at the political level (*e.g.,* Arab Ministerial Council for Electricity, The League of Arab States Energy Department), at the technical level (*e.g.,* coordination on technical standards and capacity building, policy coherence, RCREEE, UN ESCWA) and at the industry level (*e.g.,* enabling effective industry groups and associations, the Arabian Industrial Development and Mining Organization, AUE), the cascading of goals and commitments to national implementation strategies.

This review and the emerging interventions in terms of support for regional coordination bodies should rest on a higher sensitivity to the decision-making processes among various influencing actors involved in the transition nationally and regionally. More bluntly, because Arab Ministerial Council decisions are not necessarily nationally binding, regional bodies need to work creatively to facilitate the adoption of regionally agreed goals at national levels. This could mean a higher degree of engagement from regional bodies in coaching or mentoring for the incubation of ideas at national level – a resource-intensive process.

Coordination on industrial and innovation polices and knowledge infrastructure for energy transitions

Again here, the regional case for coordination is evident due to complementaries of resources, economies of scale and the small-scale base of national markets. The League of Arab States and RCREEE are already cooperating on a regional database to enable comparable and consistent quality data on renewable energy and energy efficiency, a needed baseline for decision making. Furthermore, the coordination of industrial policies for creating regional innovation system for RET has been extensively debated through networks such as the Desertec University Network. However, these efforts still need effective mechanisms for follow-up and channelling of recommendations to policy makers at national level, which can be achieved through regionally coordinated efforts.

Community biogas facility

Convergence on market integrating measures

Adequate regional support structure is needed to facilitate convergence and harmonisation of market integrating measures. RCREEE started with a simple experiment on the quality certification of SWH systems. SHAMCI is a quality certification scheme for the solar thermal products and services initiated by RCREEE with the support of Arab Industrial Development and Mining Organization based on the request of the Arab Ministerial Council of Electricity of the League of Arab States. The latter blessed the establishment of the network and initially accepted SHAMCI certification rules in early 2013, as it provides a regional, industrial and regulatory compliance framework for policy makers, the industrial sector and consumers. In fact, it is the first Arab certification scheme for solar thermal products. SHAMCI is inspired by Solar Keymark, the European certification scheme, but built around specific characteristics and needs of Arab states.

However, while reaching a consensus on a regional quality mark, it was recognised that more sustained efforts are required beyond the means available to RCREEE to cascade this certification scheme to national implementation in Arab countries. Other areas currently on the agenda: compatibility of grid codes, labels and standards; joint testing infrastructure to ensure economies of scale; etc.

Institutional support and capacity development

Institutional support to member states and national capacity-building programmes can benefit from a regional approach initiative in two fundamental ways. First, the benefits from economies of scale in these programmes help lower the costs on the member states. A by-product is the regional learning through Arab-Arab exchange of experiences (for example, RCREEE knowledge exchange missions were very popular).[37] Another benefit is the opportunity to align institutional support, such as policy design, planning or permitting systems, with regional market integrating strategies. Related to this is the potential to align bilateral support programmes with regional market integration strategies. Currently, many of these work counter-productive to these efforts.

Proposing these four layers of action is a call for a "rethink" of the regional support initiatives. It is an invitation to reconsider the approach to a regional cooperation strategy, where strengthening the regional coordination institutions and governance mechanisms in a South-South context becomes core to these efforts. Programme-based initiatives, where institutional memory and learning can be lost after the programmes end, have shown to deliver limited change potential in the region.

37 Since 2012, RCREEE has been organising South-South knowledge exchange missions between Arab countries. These missions rely on sharing experiences and lessons learned from one Arab country with deep knowledge in a certain field to another country initiating activities in the same field.

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The proposed roadmap will serve as a guideline for the Arab renewable energy market, to accelerate market development, support governments' efforts towards fulfilling future renewable energy targets, and overcome potential gaps and barriers.

The Arab region has several strengths to pave the way for wide deployment of renewable energy: high resource potential; political commitment through declaring national strategies, targets and policies; land availability in many countries; regional experiences in project development in some countries; and the availability of regional funding from a number of Arab and international banks and financing institutions.

Furthermore, the current decrease in RET costs worldwide, growth of energy demand in all Arab countries, declining reserves of fossil-fuel in some Arab countries, and rising interest in renewable energy by the private sector and international institutions, mean that countries have an opportunity to grow their renewable energy market substantially. Nevertheless, to date renewable energy deployment in the region has been inadequate. With the exception of a few utility-scale projects in North Africa and UAE, RETs have been largely used for the purposes of research, development, demonstration and deployment. This trend is changing. Arab governments have been giving growing attention to RETs since the turn of the century. At the regional level, multiple initiatives have emerged to support the integration of national activities into a regional effort. This national and regional attention has culminated in the Pan-Arab Renewable Energy Strategy 2030. By adopting this strategy, Arab countries have sent a clear political message about their commitment to de-carbonising a portion of their energy systems by 2030. Furthermore, the development of the AREF and NREAP template demonstrates the willingness of national governments to implement this strategy.

However, Arab governments are facing significant national and regional gaps that limit their ability to properly develop and implement national renewable energy plans. The report has identified three main categories of gaps: (1) political, legal, regulatory and institutional; (2) financial, market and economic; and (3) technological, infrastructure and human capacity. Unless these gaps are bridged, the majority of countries in the region will not be able to take the action plan through its full cycle, from development to implementation to monitoring and evaluation.

Well-designed, timely interventions are needed to bridge these gaps and enable Arab states to develop their renewable energy markets to their full potential.

Interventions to support renewable energy deployment in the region need to be staged at national and regional levels. Furthermore, the interventions need to be introduced in a coordinated manner in order for them to be most effective. As part of this effort, IRENA, the League of Arab States and RCREEE have formed a three-way collaboration to create a process for regional coordination in renewable energy development. This study, which is the first outcome of the collaboration, proposes a roadmap of actions to support Arab countries' implementation of the Pan-Arab Renewable Energy Strategy. This roadmap has been the subject of extensive consultations and reviews by national governments and regional organisations in order to ensure its consistency with a regional vision.

The proposed roadmap will serve as a guideline for the Arab renewable energy market, to accelerate market development, support governments' efforts towards fulfilling future renewable energy targets, and overcome potential gaps and barriers. The study recommends focusing regional cooperation activities in the next couple of years on several initiatives that can influence and expedite the countries' readiness to prepare their NREAPs:

- Create technical and financial assistance programmes to support Arab states in designing their respective NREAPs.
- Develop and fund a comprehensive, holistic capacity-building project covering the entire lifecycle of the project including planning, resource assessment, feasibility studies and implementation.
- Explore potentials and opportunities for untapped renewable energy options, including heating and cooling, water desalination, biomass, waste to energy, geothermal, small hydro and pumped storage options.

- Launch the grid integration initiative (Clean Energy Initiative in the Arab Region) to integrate greater amounts of renewable electricity in the power systems.
- Enhance renewable energy administrative and spatial planning governance.
- Create a framework for improving financial cooperation in the Arab region to accelerate renewable energy deployment, and to mitigate investment risks for public and private sectors.
- Conduct regional studies to assess the situation of local manufacturing and future integration plans.

The success of this roadmap of actions will depend on the level of coordination among the various organisations active in renewable energy promotion in the region. A clear coordination and follow-up mechanism is needed to ensure that regional actions support this roadmap without duplication of effort. While the details of this mechanism need to be developed collectively by willing stakeholders, its general outlines are clear. IRENA, the League of Arab States and RCREEE are advised to convene a regional working group with representatives from all the major stakeholders (*e.g.,* AMU, AUE, UNECA, UNESCWA, EIB, MEDGRID, MSP, Dii, and OME). The working group will be responsible for horizontal coordination among these various organisations in support of implementing the recommendations of this study.

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Annex 1:

Arab Renewable Energy Framework and National Renewable Energy Action Plan Standard Report Structures – Unofficial Translation.

DRAFT
Arab Renewable Energy Framework (AREF)

Contents

DRAFT
Template for National Renewable Energy Action Plans in the Arab Region

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Annex 2:

Examples of renewable energy institutional framework in the Arab countries

Country	Overview of Institutional Framework
Algeria	Renewable Energy and Energy Conservation Directorate within Ministry of Energy and Mines. The Electricity and Renewable Energy Company (SKTM), affiliated to SONELGAZ is responsible for promoting and supporting renewable energy development.
Bahrain	Bahrain does not have a designated authority to promote renewable energy. The Electricity and Water Authority handles all issues relating to power and water, including renewable energy.
Comoros	Comoros does not have a designated authority to promote renewable energy.
Djibouti	Djibouti does not have a designated authority to promote renewable energy.
Egypt	New and Renewable Energy Authority (NREA) is responsible for promoting and supporting renewable energy.
Iraq	Currently, there is no dedicated renewable energy agency in Iraq. However the Iraqi Ministry of Electricity created in 2010 the Center for Renewable Energy and the Environment to handle issues relating to renewable energy.
Jordan	Jordan does not have a dedicated agency to promote and regulate renewable energy projects. Activities relating to renewable energy promotion fall under the auspices of the Ministry of Energy and Mineral Resources and Electricity Regulatory Agency.
Kuwait	Kuwait does not have a renewable energy agency. However, Kuwait Institute for Scientific Research (KISR) has focused on studying/formulating regulations and policies that the Kuwaiti government may adopt to promote renewable energy development.
Lebanon	Currently, all activities related to supporting and promoting renewable energy in Lebanon fall under the auspices of the Lebanese Center for Energy Conservation (LCEC). LCEC is established and supported by UNDP, a national organisation affiliated with the Lebanese Ministry of Water and Energy.
Libya	The Renewable Energy Authority of Libya (REAOL) was established in 2007 with the goal of promoting and supporting renewable energy in the country.
Mauritania	Mauritania does not have a designated authority to promote renewable energy. The Ministry of Petrol, Energy and Mining is responsible for the development of energy policy. However, two non-dedicated agencies have been active in the promotion of distributed renewable energy generation in underserved areas: the Agence de Promotion de l'Accès Universel aux Services (APAUS); and the Agence de Développement de l'Électrification Rurale (ADER). La Société Mauritanienne d'Electricité (SOMELEC) is also involved in the 30 MW wind project, currently underway.
Morocco	The Ministry of Energy, Mines, Water and Environment is responsible for the development of energy policy. The Moroccan Agency for Solar Energy (MASEN, established by law 57-09 (2009)) is responsible for the implementation of the Solar Plan and for supporting the development of solar energy in Morocco. The Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE) is responsible for facilitating the implementation of renewable energy policies. The Société d'Investissements Energetiques (SIE) is a state-owned investment company responsible for supporting the Moroccan government in achieving renewable energy targets.
Oman	Oman has not created an independent renewable energy agency. Current activities related to renewable energy promotion and deployment are handled by the Public Authority for Water and Electricity (PAWE) and the Authority for Electricity Regulation (AER).
Palestine	The Palestinian Energy and Environment Research Center (PEC) is responsible for promoting and supporting renewable energy in Palestine.

Country	Overview of Institutional Framework
Qatar	Qatar does not have a dedicated renewable energy agency. Currently, activities related to renewable energy are handled by the renewable energy units at the national utility Kahramaa and the Qatar Petroleum Company. Also, the Qatar Environment and Energy Research Institute was launched in 2011 with a mandate to develop knowledge to help advise policy- and decision-makers, to assess and develop solutions to critical energy and environmental challenges, to develop efficient oil and gas solutions, to commercialise new technologies, and to foster coordination and outreach initiatives.
Saudi Arabia	King Abdullah City for Atomic and Renewable Energy (K.A. CARE) has been assigned the responsibility to coordinate national and international energy policy, including renewable energy. K. A. CARE was established by Royal Decree in 2010 to "guide Saudi Arabia towards a new era of sustainable energy, leading the way in atomic and renewable energy to ensure the best possible use of Saudi Arabia's abundant energy resources".
Somalia	Somalia does not have a designated authority to promote renewable energy.
Sudan	Sudan does not have a designated authority to promote renewable energy. Activities related to promoting renewable energy fall under the auspices of the Ministry of Water and Electricity. In 2010, the Ministry established a Directorate for Renewable and Alternative Energy which consists of four divisions: (1) Solar energy division; (2) Wind energy division; (3) Geothermal energy division; and (4) Alternative energy division.
Syria	National Energy Research Center (NERC).
Tunisia	Currently, all activities related to supporting and promoting renewable energy in Tunisia fall under the auspices of the Ministry of Industry and Technology, the National Agency for Energy Conservation (ANME), and the national electricity operator Société Tunisienne d'Electricité et du Gaz (STEG) through its subsidiary STEG-ER which was created in 2010.
UAE	The UAE has not created a national renewable energy agency. However, the Emirate of Abu Dhabi has created Masdar as a privately structured company to promote RETs. Also, the Emirate of Dubai has the Supreme Council of Energy, which is the governing body tasked with policy development, planning and coordinating with concerned authorities and energy bodies to deliver new energy sources while employing a balanced approach to protecting the environment.
Yemen	In 2002, the Renewable Energy Department under the Ministry of Electricity and Energy (MEE) was established with the goal of promoting and supporting renewable energy projects in Yemen. In 2009, the department was extended and reorganised into two departments: Solar Energy and Wind Energy.

Sources: RCREEE (2013); EU-GCC Clean Energy, and Masdar Institute (2013); the League of Arab States (2013)

Annex 3:

Power market structure in the Arab region

Country	Power Market Overview	IPP Situation
Algeria	Algeria's power market has been liberalised since 2002 to allow for the inclusion of the private sector in generation activities. First steps toward complete unbundling of power market activities have been taken; however, the national utility Sonelgaz remains the central player in the market. The power sector is regulated by Commission de Régulation de l'Electricité et du Gaz (CREG), which is tasked with tariff-setting. Residential electricity prices are heavily subsidised at USD 0.03 per kWh. The tariff structure is flat.	Total conventional capacity by IPPs constitutes 2,886 MW, but no IPPs producing from RES exist yet.
Bahrain	The Bahraini power market has been partially liberalised since 2004. However, there is no independent regulatory agency and residential electricity prices are heavily subsidised at USD 0.01 per kWh. The tariff structure is flat.	80% of the Kingdom's power is produced by IPPs. No renewable energy IPPs exist.
Comoros	N/A	N/A
Djibouti	N/A	N/A
Egypt	Egypt's power market has been liberalised to allow for private sector participation. The Egyptian Government has taken first steps towards unbundling power market activities. However, generation, transmission and distribution are still handled by different subsidiaries of the state-owned Egypt Electricity Holding Company. The sector is regulated by the Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA). Tariff-setting is the responsibility of the Supreme Energy Council affiliated with the Cabinet, and comes into force by Prime Minister Decree. Egypt uses a slab tariff structure. Residential prices are subsidised especially for lower slabs, which start at USD 0.02 per kWh.	Private generation of electricity has been authorised by law No 100 (1996). Total generation capacity of conventional electricity by IPPs constitutes 2049 MW. No IPPs producing renewable energy exist yet. The first private wind project (250 MW) is currently under public competitive bidding process. In August 2013, the Egyptian Electricity Transmission Company (EETC) launched a PV project with total capacity 200 MW to be implemented through 10 projects, 20 MW each. Also, NREA announced 6 pieces of land to host 600 MW, 100 MW each, for the private sector to either feed their own loads or sell the produced electricity to their own consumers.
Iraq	Iraqi law allows the participation of the private sector in power generation. However, the country has not yet implemented any IPP projects. There is no regulatory agency for the power sector. Electricity prices are heavily subsidised at USD 0.008 per kWh. The tariff structure is flat.	Iraq has attempted to procure electricity from IPPs, but the process has not been successful.

Country	Power Market Overview	IPP Situation
Jordan	Since 2003, power sector activities have been fully unbundled. Generation, transmission and distribution are performed by different companies. The power market is regulated by the independent Electricity Regulation Commission, which is tasked with tariff-setting. Jordan uses a slab tariff structure with prices ranging from USD 0.05-0.23 per kWh. Lower slabs are moderately subsidised. However, the subsidy is phased out for higher slabs.	Total conventional generation capacity by IPPs constitutes 740 MW. Renewable energy IPP projects are currently under bidding process.
Kuwait	Kuwait's power structure has not been liberalised. However, Kuwaiti law allows the participation of the private sector in conventional power and water projects. The Ministry of Electricity and Water is responsible for all activities in the power sector. Kuwait's residential tariff structure is flat with heavily subsidised prices at USD 0.01 per kWh.	There are no IPPs in Kuwait. All power plants have been publicly funded. The first IPP in conventional power generation is expected to come on line in 2015, There are no plans for renewable energy IPPs in the near future.
Lebanon	A restructuring law has been in place since 2002; however, the law has not been implemented and no independent regulator established for the power sector. All activities in the power sector are handled by the national utility Electricité du Liban (EDL). The tariff structure is slab with subsidised prices ranging from USD 0.023-0.13 per kWh.	In 2002, Lebanon adopted law No 462 authorising electricity generation by private companies. To date, the law remains unenforced as there is no regulator existing to issue licenses for electricity generation.
Libya	The Libyan power sector has not been restructured. However, currently there is a new electricity law under preparation that will allow private sector companies to generate electricity. All activities in the power sector are handled by the General Electricity Company of Libya (GECOL). Libya's tariff structure is flat with a heavily subsidised price of USD 0.02 per kWh.	All power companies in Libya remain state-owned. The power generation market is still closed for private investors. Currently, there is a new electricity law under preparation that will allow private sector companies to generate electricity.
Mauritania	The Mauritanian electricity market is dominated by the state-owned vertically integrated utility SOMELEC. The market is regulated by the Regulatory Authority, which regulates telecommunications, post and water in addition to electricity.	N/A

Country	Power Market Overview	IPP Situation
Morocco	Morocco's power structure is partially liberalised. Private generation of electricity was authorised by decree No. 2-94-503 (1994). However, there is no independent regulatory commission. The national utility ONEE handles most of the functions in the power sector, although a new agency has been created to handle solar power. Morocco uses a slab tariff structure ranging from USD 0.11-0.17 per kWh.	Total generation capacity of conventional electricity by IPPs constitutes 1704 MW. Law 13-09 (2009) on renewable energies specifically authorises private generation of power from renewable sources of energy. Total capacity of IPPs producing renewable energy is 124 MW.
Oman	The Omani power and water sectors have been reformed since 2004. The Authority for Electricity Regulation (AER) is tasked with regulating the power sector. The state-owned Electricity Holding Company handles most of the functions in the power sector. The Public Authority for Water and Electricity (PAWE) is also a major governmental actor in the power market, although its main focus is water supply regulation.	At least one conventional power IPP is operational and many more have been tendered.
Palestine	In 2009, Palestine adopted General Electricity Law No 13, which unbundles the power sector into generation, transmission and distribution. It also allows private power generation. The sector is regulated by the Palestinian Electricity Regulatory Council (PERC). Electricity prices in Palestine are largely unsubsidised.	Palestine has one IPP in Gaza.
Qatar	Qatar deregulated its power and water markets in 2000, leading to the privatisation of electricity generation and water production services. The power market is dominated by the state-owned utility Kahramaa. Power is heavily subsidised. The tariff structure sector is almost flat at USD 0.03 per kWh.	The deregulation of Qatar's power and water sectors in 2000 has given private investors and international developers a role in growing Qatar's power generation and water production. PPP is the preferred model for procuring new capacity.
Saudi Arabia	The Electricity Law of 2005 establishes an independent regulator and a market operator, authorises IPPs, grants third-party access to the grid, and creates the legal context for unbundling. However, unbundling has not yet been implemented. The power market is dominated by the state-owned utility Saudi Electricity Company (SEC) and regulated by the Electricity and Cogeneration Regulatory Authority (ECRA).	IPPs have been allowed in Saudi Arabia Since 2007. The Kingdom has successfully procured additional power capacity from IPPs.
Somalia	N/A	N/A
Sudan	Sudan's electricity sector was restructured in 2001. However there is no private sector participation. The Ministry of Water and Electricity is the main body responsible for electricity generation, transmission and distribution. The sector is regulated by the Electricity Regulatory Authority (ERA). Sudan uses a slab tariff structure with prices ranging from USD 0.03-0.06 per kWh.	In 2001, Sudan adopted a new electricity law authorising private sector power generation, but to this day no IPPs exist in practice. All power producers in Sudan remain state-owned.

Country	Power Market Overview	IPP Situation
Syria	Electricity Law 32 of 2010 authorises private generation of electricity, opening the door for private sector participation through IPP and PPP mechanisms. However, transmission, generation and distribution are controlled in practice by state monopolies Public Establishment for Distribution and Exploitation of Electrical Energy (PEDEEE) and Public Establishment for Electrical Generation and Transfer (PEEGT).	Transmission, generation and distribution are controlled by state monopolies PEDEEE and PEEGT. No conventional or renewable energy IPPs exist.
Tunisia	The Tunisian power market is partially liberalised. Law 96-27 (1996) and Decree 1996-1125 (1996) authorise private generation of electricity through concessions given by state authorities. The main actor in the power sector is the state-owned utility Société Tunisienne d'Electricité et du Gaz (STEG), which dominates all functions in the power market. There is no regulatory agency in the power market. The tariff structure is flat with prices ranging from USD 0.084-0.144 per kWh.	Total generation capacity of conventional electricity by IPPs constitutes 498 MW. No IPPs producing renewable energy exist.
UAE	The UAE power sector is dominated by two Emirates – Abu Dhabi and Dubai. Their electricity markets are structured differently. Abu Dhabi's market is partially liberalised. The market is regulated by the Regulation and Supervision Bureau (RSB); however the state-owned Abu Dhabi Water and Electricity Authority dominates the markets. There are 8 IPPs operating in Abu Dhabi. Dubai's power market is not liberalised. There are no IPPs in Dubai. In the rest of the UAE, the dominant actors are Sharja Electricity and Water Authority (SEWA) and Federal Electricity and Water Authority (FEWA)	Abu Dhabi has extensive experience in IPP procurement in the conventional power sector. Furthermore, the recently commissioned CSP plant Shams-1 is an IPP. Dubai is also considering the IPP model for future renewable energy projects.
Yemen	The Yemen power market is partially liberalised. Private power generation was authorised in 2009 with the adoption of Electricity Law No. 1. The power sector is dominated by the state-owned utility Public Electricity Corporation (PEC). There is not an independent regulatory agency in the power market. Yemen uses a slab tariff structure with prices ranging from USD 0.03-0.06 per kWh.	Today, total generation capacity of conventional electricity by IPPs constitutes 450MW. No IPPs producing renewable energy exist.

Sources: Bachellerie, Imen (2012); Eversheds, and Ernst and Young (2013); Dii (2013); Koryakovtseva, K & Bamieh, R (2013)

Annex 4:

SWOT analysis for Arab renewable energy Strategy

Strengths	Weaknesses
• High potential of renewable energy resources (*e.g.,* solar radiation, wind speed). • Clear national targets (20 countries). • Desert areas are available to build renewable energy projects in many Arab countries (no need to harm green areas). • Availability for regional electricity transfer. • Human resources are available in some countries and specific fields. • Governmental incentives exist. • Revenues due to high prices of oil and gas could have two positive impacts: make renewable energy more competitive; and use it, partially, to incentive renewable energy projects. • Availability of regional funding from a number of Arab and international banks.	• Regional grid is weak and need more enhancements. • Few countries have adopted dynamic incentive mechanisms, *e.g.,* FiT and renewable portfolio standards. • Lack of well-financed renewable energy funds to support developing renewable energy projects. • Subsidisation of fossil fuel impedes growth of renewable energy. • Absence of national obligations for using solar applications, *e.g.,* SWHs and PV, in designated sectors (*e.g.,* residential, tourism). • Absence of attractive mechanism to promote micro-finance. • Energy policy is usually set in the region by a small group of technocrats without consulting with other stakeholders, including environmental groups, consumer advocates, and even elected parliamentarians. • Renewable energy has not been sufficiently incorporated into the educational systems of the region. • Very few local financial institutions are currently involved in financing renewable energy projects. Banks' credit departments are inadequately prepared to assess renewable energy project proposals. • Government agencies outside energy ministries and utilities are not sufficiently prepared to deal with renewable energy related issues. • Quality assurance systems are not sufficiently prepared for RET standardisation, testing, accreditation and certification.

Opportunities	Threats
• Decreasing prices of renewable energy technologies (*e.g.,* PV and wind) could add recognised capacities each year. • Electricity shortage in some countries could be an opportunity for renewable energy to feed some loads. • Use PV systems to power streets, advertising and remote areas. • For short term: focus on low technology applications and equipment in promoting local manufacturing market, *e.g.,* SWHs, civil and electrical components in large-scale projects. • For long term: focus on R&D applications and link them with market needs, *e.g.,* PV and wind. • Allocate regional loans with soft conditions. • Most local investors are willing to enter into partnership with international investors. • Increasing interest of international, regional and national organisations. Availability of international initiatives such as MSP and Dii.	• Decrease in development growth rate due to shortage of available energy. • Low share of local financing schemes will lead to full dependency on international loans, which have lengthy procedures. • Decline in oil prices and its impact on the competitiveness of renewable energy. • The discovery of new sources of energy that could threaten the future of renewable energy. • Political instabilities in some countries. • Sudden change of policy at the national level, which will affect the attraction of investments. • The weakness of human, financial and investment capacities. • Slow growth in domestic market for RETs. • Dispersion of R&D efforts.

Annex 5: Summary of renewable energy gaps in Arab countries

Resource Assessment

Country	Wind Atlas	Solar Atlas
Algeria	N/A	Yes
Bahrain	No atlas has been published. However, resource assessment studies have been done. Some site specific measurements exist.	No atlas has been published. However, resource assessment studies have been done. Some site specific measurements exist.
Comoros	Information Not Available	Information Not Available
Djibouti	Information Not Available	Information Not Available
Egypt	Egypt published three wind atlases, of which one covers all of Egypt and was published in 2005.	No detailed solar atlas has been published, although an atlas was published in 1991.
Iraq	No atlas has been published. However, resource assessment studies have been done.	No atlas has been published. However, resource assessment studies have been done.
Jordan	Yes in 2007	Yes in 2007
Kuwait	Yes	Yes
Lebanon	Lebanon published a detailed wind atlas in 2011.	N/A
Libya	General wind and solar maps exist based on satellite data. However, no detailed wind atlas has been published yet.	General wind and solar maps exist based on satellite data. However, no detailed solar atlas has been published yet.
Mauritania	Information Not Available	Information Not Available
Morocco	Yes	Yes
Oman	No renewable energy atlas has been published. However, the Authority for Electricity Regulation (AER), the Public Authority for Water and Electricity, and the Ministry of Environment and Climate Change are working on renewable energy resource assessment studies.	No renewable energy atlas has been published. However, the Authority for Electricity Regulation (AER), the Public Authority for Water and Electricity, and the Ministry of Environment and Climate Change are working on renewable energy resource assessment studies.
Palestine	No wind atlas has been published. The Palestinian Energy Authority is in the process of launching the bid for wind and solar energy resource mapping and geospatial analysis to prepare wind and solar atlases.	No Solar atlas has been published. The Palestinian Energy Authority is in the process of launching the bid for wind and solar energy resource mapping and geospatial analysis to prepare wind and solar atlases.
Qatar	Renewable energy atlas has not been published but mapping of resources is ongoing.	Renewable energy atlas has not been published but mapping of resources is ongoing.
Saudi Arabia	In progress; late 2013	In progress; late 2013
Somalia	Information Not Available	Information Not Available
Sudan	Wind atlas published in 2012.	Solar atlas published in 2012.
Syria	Yes	Yes in 1994
Tunisia	Detailed wind atlas published.	N/A
UAE	Renewable energy atlas has not been published but mapping of resources is ongoing. The UAE Solar Atlas is outcome of the agreement signed between Masdar Institute and IRENA.	Renewable energy atlas has not been published but mapping of resources is ongoing. The UAE Solar Atlas is outcome of the agreement signed between Masdar Institute and IRENA.
Yemen	Wind data has been published but no Atlas has been published.	N/A

Human/Institutional Capacity

Country	Electricity Regulator	Dedicated renewable energy Agency	Research Centers
Algeria	Commission de Régulation de l'Electricité et du Gaz (CREG)	Sharikat Kahraba Takate Moutajadida (SKTM), subsidiary of Groupe Sonelgaz	Center for the Development of renewable energy (CDER); Silicon Technology Development Unit (UDTS); Unit Development of Solar Equipment; Center for Research and Development of the Electricity and Gas (CREDEG).
Bahrain	N/A	N/A	Bahrain Center for International, Strategic and Energy Studies, University of Bahrain; Bahrain Petroleum Company.
Comoros	N/A	N/A	Information Not Available
Djibouti	N/A	N/A	Information Not Available
Egypt	Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA)	New Renewable Energy Authority (NREA) is responsible for promoting and supporting renewable energy in Egypt.	Energy Research Center, Cairo University
Iraq	N/A	N/A	Research Center for Energy and Environment under the Ministry of Science and Technology; Research Center under the Ministry of Higher Education and Scientific Research (universities and institutes); Renewable Energy and Environment Research Center under the Ministry of Industry.
Jordan	Electricity Regulatory Commission	Jordan does not have a dedicated agency to promote and regulate renewable energy projects. However, the National Energy Research Center carries out research and awareness activities.	National Energy Research Center (NERC); Water, Energy and Environment Center at Jordan University; Jordan University of Science and Technology Energy Center (JUSTEC).

Human/Institutional Capacity (continued)

Country	Electricity Regulator	Dedicated renewable energy Agency	Research Centers
Kuwait	N/A	Kuwait does not have a renewable energy agency. However, the Kuwait Institute for Scientific Research (KISR) has focused on studying/formulating regulations and policies that the Kuwaiti government may adopt to promote renewable energy development.	Kuwait Institute for Scientific Research (KISR); Kuwait Foundation for the Advancement of Science (KFAS).
Lebanon	N/A	Currently, all activities related to supporting and promoting renewable energy fall under the auspices of the Lebanese Center for Energy Conservation (LCEC). LCEC is established and supported by UNDP, a national organisation affiliated with the Lebanese Ministry of Water and Energy.	Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of Lebanon (CEDRO); the Lebanese Solar Energy Society (LSES); Energy Research Group (American University in Beirut); Industrial Research Institute (IRI); National Council for Scientific Research (CNRS); Apave Liban; Beta Engineering; Eco consulting.
Libya	N/A	The Renewable Energy Authority of Libya (REAOL) was established in 2007 with the goal of promoting and supporting renewable energy in Libya.	The Center for Solar Energy Research and Studies (CSERS) was founded in 1978 to research potential renewable energy applications in Libya.
Mauritania	Regulatory Authority	Mauritania does not have a designated authority to promote renewable energy. However, two non-dedicated agencies have been active in the promotion of distributed renewable energy generation in underserved areas: the Agence de Promotion de l'Accès Universel aux Services (APAUS); and the Agence de Développement de l'Électrification Rurale (ADER).	Information Not Available

Human/Institutional Capacity (continued)

Country	Electricity Regulator	Dedicated renewable energy Agency	Research Centers
Morocco	Morocco is in the process of setting up an independent power regulator which should become operational starting in 2014.	The Moroccan Agency for Solar Energy (MASEN), established by Law 57-09 (2009), is responsible for the implementation of the Solar Plan and for supporting the development of solar energy in Morocco. The Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE) is responsible for facilitating the implementation of renewable energy policies.	Institut de Recherche en Energie Solaire et Energies Nouvelles (IRESEN); Centre National pour la Recherche Scientifique et Technique (CNRST).
Oman	The Authority for Electricity Regulation	Oman has not created an independent renewable energy agency. Currently activities related to renewable energy promotion and deployment are handled by the Public Authority for Water and Electricity and the Authority for Electricity Regulation.	Renewable & Sustainable Energies Research Group (RASERG), based in Sultan Qaboos University; Middle East Desalination Research Centre (MEDRC); The Renewable & Sustainable Energies Research Group.
Palestine	Palestinian Electricity Regulatory Council (PERC)	Palestinian Energy and Environment Research Centre (PEC)	Palestinian Energy and Environment Research Centre (PEC) Energy Research Centre (ERC) at An-Najah National University.
Qatar	N/A	Qatar does not have a dedicated renewable energy agency. Currently, activities related to renewable energy are handled by the renewable energy units at the national utility Kahramaa and the Qatar Petroleum Company. Also, the Qatar Foundation has been active in renewable energy promotion and deployment through its affiliates Qatar Environment and Energy Research Institute and Qatar Solar.	Qatar University; Qeeri; Chevron Center for Sustainable Energy Efficiency (CSEE); Qatar Science and Technology Park.

Human/Institutional Capacity (continued)

Country	Electricity Regulator	Dedicated renewable energy Agency	Research Centers
Saudi Arabia	Electricity & Co-generation Regulatory Authority (ECRA)	KA - CARE has been assigned the responsibility to coordinate national and international energy policy, including renewable energy policy. King Abdullah City for Atomic and Renewable Energy (K. A. CARE) was established by Royal Decree in 2010.	King Abdullah University for Science and Technology (KAUST)
Somalia	N/A	N/A	Information Not Available
Sudan	Electricity Regulatory Authority (ERA)	Sudan does not have a designated authority to promote renewable energy. However, there is a law under consideration that would establish such an agency.	Information Not Available
Syria	N/A	National Energy Research Center (NERC)	The National Center for Energy Studies
Tunisia	Tunisia is in the process of setting up an independent power regulator which should become operational in 2014.	Currently, all activities related to supporting and promoting renewable energy in Tunisia fall under the auspices of the Ministry of Industry and Technology, the National Agency for Energy Conservation (ANME) and the national electricity operator Société Tunisienne d'Electricité et du Gaz (STEG).	R&D activities are carried out by Borj-Cedria Science and Technology Park, consisting of three components: Research and Innovation Park; University Park; and Production Park. Centre de Recherche et des Technologies de l'Energie (CRTEN).
UAE	Abu Dhabi Regulation and Supervision Bureau	MASDAR	Masdar Institute of Science and Technology
Yemen	N/A	In 2002, the Renewable Energy Department under the Ministry of Electricity and Energy (MEE) was established with the goal of promoting and supporting renewable energy projects in Yemen. In 2009, the department was extended and reorganised into two departments: Solar Energy and Wind Energy.	Renewable Energy and Electronic design Centre, University of Science and Technology; Technical Centre for Training and Registration – Dhahban, Public Electricity Corporation (PEC).

Targets and Strategy

Country	Target	Technology-specific Electricity Targets	Heating and Cooling Targets	Strategy
Algeria	6% of electricity by 2015; 15% by 2020; 40% by 2030.	Technology-specific Targets for Solar and Wind.	70,000 m^2 collector area by 2015; 490 000 m^2 by 2020.	National Programme for Renewable Energy and Energy Efficiency 2030 adopted in 2011.
Bahrain	No official target. Unofficial target 5% of electricity by 2030	N/A	N/A	N/A
Comoros	N/A	N/A	N/A	N/A
Djibouti	100% renewable by 2020	N/A	N/A	N/A
Egypt	20% of electricity generation by 2020, of which 12% is wind.	Technology-specific Targets for Solar and Wind	N/A	National renewable energy Strategy 2020 adopted in 2008, updated in 2012; Egyptian Solar Plan; NEEAP (2012-2015); Master plan for renewable energy 2025 is under preparation.
Iraq	2% of electricity by 2015; 10% by 2020	N/A	N/A	Renewable Energy Plan 2013-2017, adopted in 2012; Master Plan of Energy 2030 adopted in June 2013 includes renewable energy target of 5%.
Jordan	7% of primary energy by 2015; 10% by 2020	Technology-specific Targets for Solar and Wind	25% of households by 2012; 30% of households 2020	Master Strategy of Energy Sector in Jordan (2007-2020) adopted in 2007.
Kuwait	Official target is 5% of electricity by 2020; Unofficial targets: 1% of electricity by 2015; 10%-15% of electricity 2030.	Technology-specific Targets for Solar and Wind	N/A	Kuwait does not have a clearly articulated strategy for renewable energy deployment. However, the Government of Kuwait has announced a 2 000 MW renewable energy project known as Shagaya Renewable Energy Park that is due for completion in 2030. Kuwait has placed strong emphasis on CSP in the first phase of the project.

Targets and Strategy (continued)

Country	Target	Technology-specific Electricity Targets	Heating and Cooling Targets	Strategy
Lebanon	12% of electrical and thermal energy by 2020.	Technology-specific Targets for Wind and biogas.	1.05 million m^2 of collector by 2020	Policy Paper for Electricity Sector (2010); NEEAP (2011-2015).
Libya	3% of electricity by 2015; 7% by 2020; 10% by 2025	Technology-specific Targets for Solar and Wind.	80 MWth installed capacity by 2015; 250 MW_{th} by 2020; 450 MW_{th} by 2025	National Plan for developing renewable energy in Libya (2013-2025).
Mauritania	20% of primary energy by 2020 (excluding biomass)	N/A	N/A	Under development
Morocco	42% of installed capacity by 2020	Technology-specific Targets for Solar and Wind.	1.7 million m^2 of collector by 2020	National Energy Strategy adopted in January 2013 (2012-2020).
Oman	Unofficial target 10 % of generation by 2020	N/A	N/A	Oman does not have a national renewable energy strategy or plan. However, The Authority for Electricity Regulation (AER) of Oman has outlined a roadmap for the Development of Renewable Energy Projects in its 2008 report "Study on renewable energy resources, Oman".
Palestine	25% of total energy by 2020	Technology-specific Targets for Solar, Wind, and Waste- to-Energy	N/A	National Energy Strategy (2012-2020) Palestinian Solar Initiative.
Qatar	Unofficial targets 6% of electricity by 2020; 20% of electricity by 2030.	Technology-specific Targets for Solar PV	N/A	N/A
Saudi Arabia	Unofficial target 7% - 10% of electricity by 2020; 30% by 2030.	Technology-specific Targets for Solar, Wind, Geothermal, and Waste-to-Energy.	N/A	K.A. CARE, the Saudi agency in charge of implementing the country's renewable energy plan, published a draft White Paper on the process of competitive procurement of renewable energy. Stakeholder feedback will be incorporated in the final document.

Targets and Strategy (continued)

Country	Target	Technology-specific Electricity Targets	Heating and Cooling Targets	Strategy
Somalia	Information Not Available	N/A	N/A	Information Not Available
Sudan	11% of installed capacity (excluding large scale hydro) by 2031 .	Technology-specific Targets for Solar, Wind, Biomass, and Waste-to-Energy.	N/A	renewable energy master plan is under development.
Syria	4.3% of primary energy by 2030.	Technology-specific Targets for Solar, Wind and Biomass.	100,000 m^2 of collectors per year.	The 11th Five-Year Plan for 2011-2015 emphasises the importance of renewable energy and lays out plans to develop it.
Tunisia	20% of electricity by 2020; 30% of generation by 2030.	Technology-specific Targets for Solar, Wind, and Biomass.	1 million m^2 of collector by 2016.	Action Plan for the Development of Renewable Energy in Tunisia.
UAE	Dubai 1% of installed capacity by 2020 and 5% by 2030; Abu Dhabi 7% of electricity by 2020 and approximately 1.6 GW by 2020.	N/A	Dubai - New building meets 75% of water heating needs from SWH.	Each Emirate develops its own independent policies and procurements subject to federal laws. The two key markets in UAE are Abu Dhabi and Dubai. Both Emirates have developed renewable energy strategies.
Yemen	15% of installed capacity by 2025.	Technology-specific Targets for Solar, Wind, Geothermal and Biomass.	230 GWh thermal per year.	National renewable energy and Energy Efficiency Strategy adopted in 2009.

Financial and Fiscal Incentives

Country	Dedicated State Renewable Energy Fund	Feed-in-Tariff	Tax Incentives	Public Competitive Bidding for Private Renewable Energy Development (announced tenders)
Algeria	renewable energy fund has been established by executive decree N. 11-423 (2011); in 2009 the Ministry of Energy and Mines implemented a National Renewable Energy Fund to be financed through a 0,5% levy on oil tax revenues.	FiT adopted by law No. 02 - 01 (2002). However, the Algerian government is currently revising and reintroducing the programme.	N/A	N/A
Bahrain	N/A	N/A	N/A	N/A
Comoros	N/A	N/A	N/A	N/A
Djibouti	N/A	N/A	N/A	N/A
Egypt	In June 2012, the cabinet approved establishing renewable energy fund for financing renewable energy projects. The Fund will be financed through fuel savings from renewable energy use. Procedures for disbursement of funds to renewable energy projects are still under discussion.	FiTs are under preparation.	According to the decision of cabinet of 26 May 2010, renewable energy projects enjoy customs duty exemption. Investors have to apply to NREA with the list of equipment that needs to be imported. NREA certifies equipment as eligible for customs duty exemption. No internal tax benefits are provided to renewable energy projects.	250 MW of wind capacity
Iraq	N/A	N/A	N/A	N/A
Jordan	The Ministry of Energy And Mineral Resources established the Jordanian Renewable Energy and Energy Efficiency Fund (JREEEF), which is to be financed through budgetary allocations and foreign donations.	FiTs exist	Regulation No. 10 (2013) provides full exemptions from custom duty and sales tax to renewable energy and EE systems and equipment. Furthermore, there is a 75% exemption of income tax for the first ten years of operation.	90 MW wind and 225 MW solar

Financial and Fiscal Incentives (continued)

Country	Dedicated State Renewable Energy Fund	Feed-in-Tariff	Tax Incentives	Public Competitive Bidding for Private Renewable Energy Development (announced tenders)
Kuwait	N/A	N/A	N/A	N/A
Lebanon	National Energy Efficiency and Renewable Energy Action (NEEREA) established by Central Bank of Lebanon in 2010; EUR 12 million from EU grant for renewable energy projects; Central Bank of Lebanon (low interest soft loans).	N/A	No customs duties or internal tax benefits provided to renewable energy projects. Lebanon is compiling a list of renewable energy equipment for future customs duty exemption.	60 MW wind
Libya	N/A	N/A	According to the new tax legislation, all renewable energy equipment and components are fully exempted from customs import duty. No internal tax privileges are provided to renewable energy projects.	N/A
Mauritania	N/A	N/A	N/A	Information Not Available
Morocco	Energy Development Fund (FDE) was established in 2010. The fund contains a capital of USD 1 billion: USD 200 million from Hassan II fund; USD 300 million from UAE; and USD 500 million from Saudi Arabia.	N/A	N/A	900 MW wind and 160 MW solar.

Financial and Fiscal Incentives (continued)

Country	Dedicated State Renewable Energy Fund	Feed-in-Tariff	Tax Incentives	Public Competitive Bidding for Private Renewable Energy Development (announced tenders)
Oman	N/A	N/A	Duty and tax exemptions are granted for renewable five-year periods for investments in manufacturing, mining, agriculture, aquaculture, tourism, exports, education and healthcare.	No tenders have been officially announced yet. However, a senior official mentioned in 2013 that two tenders were awaiting approval.
Palestine	N/A	Decree 2012 approved by cabinet decision No 13/127/16 on the use of Renewable Energy authorised FITs.	Renewable energy equipment enjoys an exemption from import duties and Value Added Tax according to the taxation law. The procedure for obtaining an exemption is complicated because taxes are collected through the Israeli authorities. Tax and custom duties exemption require prior authorisation from the Israeli authorities.	N/A
Qatar	N/A	N/A	N/A	200 MW was due to be tendered in the first quarter of 2013. To date, it has not been tendered.
Saudi Arabia	Under Discussion	Under Discussion. Saudi Arabia is considering a FiT programme for small scale renewable power producers.	N/A	100 MW solar plant in Mecca
Somalia	Information Not Available	Information Not Available	Information Not Available	Information Not Available

Financial and Fiscal Incentives (continued)

Country	Dedicated State Renewable Energy Fund	Feed-in-Tariff	Tax Incentives	Public Competitive Bidding for Private Renewable Energy Development (announced tenders)
Sudan	N/A	N/A	According to the Investment Encouragement Act of 2013, Chapter 6, Articles 19, 20 and 21, all strategic projects, including electricity generation, are subject to an exemption from custom duties on capital goods.	N/A
Syria	N/A	Syria enacted an FiT in 2012 to complement the 2010 renewable energy law.	Law No 3 (2009) includes general language about tax incentives for renewable energy but details are not clear.	50 MW wind
Tunisia	The National Fund for Energy Saving (FNME) provides financing for renewable energy and energy efficiency projects; revenues from taxes on the first registration of cars and import or manufacturing of air conditioners according to Law No 2005-2234 (2005); financial savings achieved as a result of EE activities; private donations.	N/A	According to tax legislations, all renewable energy equipment and components that do not have locally manufactured substitutes are fully exempted from customs import duty and internal taxes.	N/A
UAE	Dubai is considering an renewable energy fund.	Dubai is considering a FiT. Abu Dhabi already has a "green tariff" programme, which pays a premium for renewable power. SHAMS-1 developers are already benefitting from this programme.	N/A	100 MW solar PV

Financial and Fiscal Incentives (continued)

Country	Dedicated State Renewable Energy Fund	Feed-in-Tariff	Tax Incentives	Public Competitive Bidding for Private Renewable Energy Development (announced tenders)
Yemen	No renewable energy fund has yet been established for financing renewable energy projects. Currently, a draft resolution on a renewable energy fund prepared by the Ministry of Electricity and Energy is under consideration by the cabinet for final approval.	N/A	Generally, renewable energy projects do not enjoy customs duty exemptions or internal tax privileges; however in some cases the Government of Yemen provides customs duty exemption to renewable energy projects.	60 MW wind

Initial Deployment

Country	Renewable Energy Installed Capacity % of Total Installed Capacity	Existence of Large-scale Projects	Renewable Energy Projects under Construction % Current Total Installed Capacity
Algeria	0.25%	Yes	0.13%
Bahrain	0.14%	No	0.08%
Comoros	0.00%	No	Information Not Available
Djibouti	1.19%	No	Information Not Available
Egypt	2.00%	Yes	1.09%
Iraq	0.02%	No	0.00%
Jordan	0.29%	No	0.00%
Kuwait	0.01%	No	0.00%
Lebanon	0.04%	No	0.00%
Libya	0.06%	No	0.84%
Mauritania	7.71%	Yes	13.64%
Morocco	4.85%	Yes	20.74%
Oman	0.01%	No	Information Not Available
Palestine	0.98%	No	0.96%
Qatar	0.47%	Yes	Information Not Available
Saudi Arabia	0.01%	No	0.02%
Somalia	0.00%	No	Information Not Available
Sudan	0.00%	No	0.00%
Syria	0.01%	No	0.00%
Tunisia	4.35%	Yes	2.08%
UAE	0.49%	Yes	0.00%
Yemen	0.10%	No	0.03%

Market, Grid and Land Access

Country	Subsidisation Level	Net-Metering	Renewable Energy Priority Grid Access	Land Access policies
Algeria	High	N/A	Priority access to the grid for renewable energy project is granted. Executive decree No. 06-428 of 26 November 2006, executive decree No. 06-429 of 26 November 2006, and the order of 21/02/2008.	N/A
Bahrain	High	N/A	N/A	N/A
Comoros	Information Not Available	N/A	N/A	N/A
Djibouti	Information Not Available	N/A	N/A	N/A
Egypt	High	In January 2013, EgyptERA adopted a net-metering policy that allows small-scale renewable energy projects to feed in electricity to the grid. Generated surplus electricity will be discounted from the balance through the net-metering process.	No priority access to renewable energy is granted by law; however the Egyptian Electricity Transmission Company (EETC) currently purchases all existing renewable energy.	The Government has allocated more than 7 600 km^2 of desert land for deployment of future public and private wind farms. All permits for distributing this land are given to the New Renewable Energy Authority (NREA).
Iraq	High	N/A	N/A	N/A
Jordan	Medium	Directive governing the sale of electrical energy generated from renewable energy systems issued by the Council of Commissioners of Electricity Regulatory Commission pursuant to Article 10 (b) of the Renewable Energy and Energy Efficiency Law No 13 (2012).	Priority access to the grid for renewable energy projects is granted by executive law No 13 (2012), Article 8 c. Furthermore, Jordan has taken responsibility for interconnecting renewable energy projects and has committed to cover the costs of the interconnection line between the project and the nearest substation.	N/A

Market, Grid and Land Access (continued)

Country	Subsidisation Level	Net-Metering	Renewable Energy Priority Grid Access	Land Access policies
Kuwait	High	N/A	N/A	N/A
Lebanon	High	Net-metering was legalised in 2011	N/A	N/A
Libya	High	N/A	N/A	N/A
Mauritania	Information Not Available	N/A	N/A	N/A
Morocco	Low	N/A	N/A	The Government has identified priority development zones for renewable energy projects. In these zones the Government facilitates access to land for investors, but the investor still needs to secure the land.
Oman	High	N/A	N/A	Land at two sites has been allocated for solar projects
Palestine	Low	Decree approved by the cabinet in March 2012 decision No 13/127/16 on the use of Renewable Energy.	Priority access to renewable energy is not granted by law, but Palestinian electricity distribution companies are committed to purchase all produced electricity.	N/A
Qatar	N/A	N/A	N/A	N/A
Saudi Arabia	High	N/A	N/A	N/A
Somalia	Information Not Available	Information Not Available	Information Not Available	Information Not Available
Sudan	Medium	N/A	N/A	N/A
Syria	High	Council of Ministers Decision no. 3766 approves net-metering.	N/A	N/A

Market, Grid and Land Access (continued)

Country	Subsidisation Level	Net-Metering	Renewable Energy Priority Grid Access	Land Access policies
Tunisia	Low	Net-metering policy for small-scale grid connected renewable energy projects was approved by decree N°2009-2773 (2009) and decision of Minister (2010). Net-metering policy allows feeding excess electricity to the grid; if the balance of the producer is positive (production more than consumption) the excess electricity is postponed to the next electricity bill.	N/A	N/A
UAE	High	N/A	N/A	N/A
Yemen	High	N/A	N/A	N/A

Codes, Standards, and Quality Control

Country	Certification of Installers	Grid Code for Renewable Energy Projects
Algeria	N/A	Renewable energy grid code is under preparation.
Bahrain	N/A	N/A
Comoros	N/A	Information Not Available
Djibouti	N/A	Information Not Available
Egypt	N/A	Renewable energy grid code is under preparation.
Iraq	N/A	Information Not Available
Jordan	N/A	Grid code for wind power has been developed.
Kuwait	N/A	Information Not Available
Lebanon	Lebanon has a certification programme for SWH.	N/A
Libya	N/A	N/A
Mauritania	N/A	Information Not Available
Morocco	PROMASOL programme to promote SWH has a certification component.	Renewable Energy grid code is under preparation.
Oman	N/A	Information Not Available
Palestine	N/A	Renewable energy grid code is under preparation.
Qatar	N/A	Information Not Available
Saudi Arabia	N/A	Information Not Available
Somalia	N/A	Information Not Available
Sudan	N/A	N/A
Syria	N/A	Information Not Available
Tunisia	The Tunisian government has mandated a quality labelling system called Qualisol for installers who wish to participate in PROSOL programme to promote SWH use.	Renewable energy grid code was developed by a decision of the Minister of Industry and Technology dated 12 May 2011. The decision is related to approving technical specifications related to connecting electricity produced from renewable energy and cogeneration to the grid.
UAE	N/A	Information Not Available
Yemen	N/A	N/A

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