Arab Future™ Energy Index

AFEX 2013

Renewable Energy

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

Index Report

Arab Future Energy Index™(AFEX) Renewable Energy

2013

Regional Center for Renewable Energy and Energy Efficiency (RCREEE)

RCREEE

Regional Center for Renewable Energy and Energy Efficiency

المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

The Arab sustainable energy trend starts now

Arab Future™
Energy Index

AFEX 2013

Renewable Energy

Forward

On behalf of our team across 13 Arab nations, it's a great pleasure to present to you the first index dedicated to monitoring and analyzing sustainable energy transition in the Arab region, the Arab Future Energy Index™ (AFEX). Launching its first issue this year, the initiative represents only the start of a long and challenging path to provide the Arab region with accurate, reliable, and comparable information regarding their renewable energy and energy efficiency capabilities.

His Excellency Sheikh Nawaf Bin Ibrahim Bin Hamed Al Khalifa
Chairman of the Board of Trustees
RCREEE

AFEX is a useful tool for our policy makers to help them shape national energy long term strategies, formulate laws and regulations, develop institutional capacity, enrich local scientific research, and attract investments. The index also helps local and international investors to know more about Arab states' readiness in the field.

Since our region carries diversified and special market characteristics for each country, collecting data and finding mutual benchmarking base was a challenging goal. RCREEE team collected AFEX data from both international and local resources to guarantee maximum accuracy and transparency. We hope that this initiative will help our member states in their efforts toward sustainable energy transitions through quality tracking of the progress made and challenges yet to be tackled.

Sincerely,

Nawaf Al Khalifa
Chairman of the Board of Trustees, RCREEE

About RCREEE

The Regional Center for Renewable Energy and Energy Efficiency (RCREEE) is an independent not-for-profit regional organization that 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 organizations to initiate and lead clean energy policy dialogues, strategies, technologies and capacity development in order to increase Arab states' share of tomorrow's energy.

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Disclaimer

About AFEX

The Arab Future Energy Index (AFEX) is the first native Arab index dedicated to monitoring and analyzing sustainable energy competitiveness in the Arab region. AFEX offers both quantitative and qualitative analysis for key renewable energy and energy efficiency market dimensions. Countries are ranked under more than 20 indicators that illustrate key energy market aspects including policies, institutional and technical capacities, strategies, socioeconomic data and investments. AFEX data is collected through both international and local resources to guarantee accuracy and transparency.

This year, AFEX ranks 13 Arab states and provides tailored recommendations for member states to help improve their sustainable energy competitiveness.

AFEX is published annually and consists of two core components: AFEX Renewable Energy and AFEX Energy Efficiency. AFEX is a product of the Regional Center for Renewable Energy and Energy Efficiency (RCREEE), an independent not-for-profit regional organization which aims to enable and increase the adoption of renewable energy and energy efficiency practices in the Arab region.

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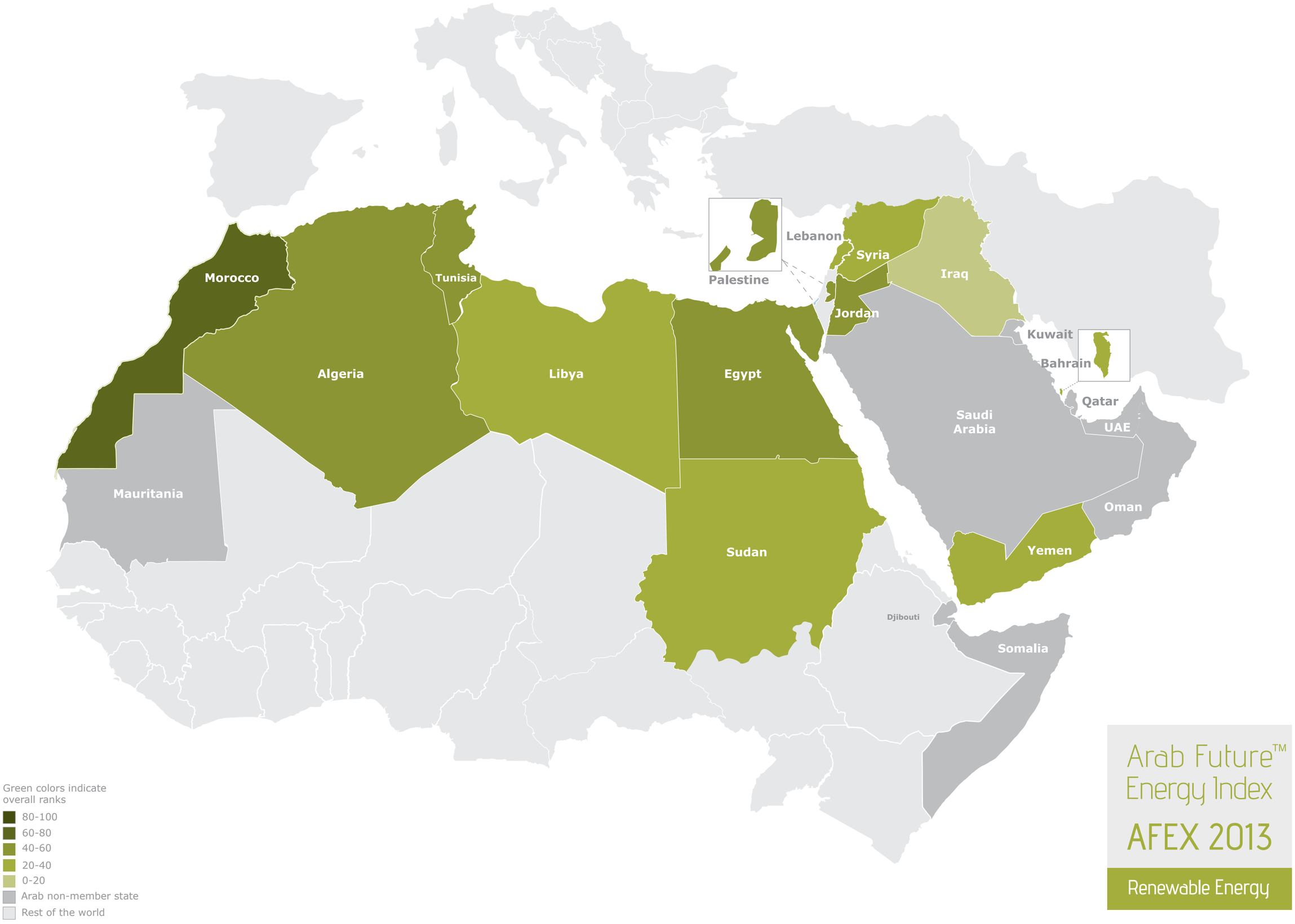
Dii
Renewable energy
bridging continents



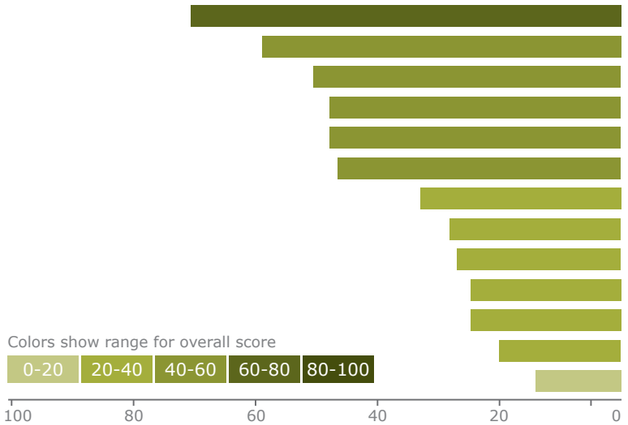
Arab Future Energy Index (AFEX)
Renewable Energy

Key Findings

AFEX Renewable Energy results:

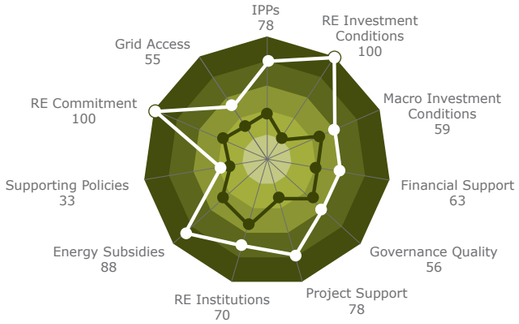
AFEX Renewable Energy 2013 provides an assessment of current conditions for development of renewable energy and progress to date in the Arab region according to four evaluation categories: Market Structure, Policy Framework, Institutional Capacity and Finance and Investment. These categories are divided into 11 factors, with the assessment being informed by 25 quantitative and qualitative indicators.

Figure 1: AFEX Renewable Energy Results



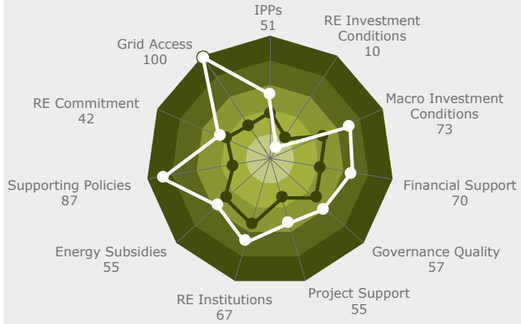
	Final Scores	Market Structure	Policy Framework	Institutional Capacity	Finance and Investment
Morocco	71	70	73	69	74
Jordan	59	68	56	61	51
Egypt	53	63	32	79	38
Palestine	47	58	61	49	27
Tunisia	47	30	43	56	58
Algeria	45	60	26	60	34
Lebanon	33	14	31	50	38
Syria	29	28	27	45	17
Bahrain	28	25	12	45	32
Sudan	25	18	22	29	33
Yemen	25	25	31	24	20
Libya	20	10	18	28	23
Iraq	13	18	14	12	10

Morocco 71



Morocco emerges as the leader for AFEX Renewable Energy 2013 due to success in several areas. It has demonstrated strong commitment for renewable energy by adopting ambitious targets and, more importantly, by supporting these targets with concrete actions. In the region Morocco generates the largest share of electricity from renewables and has the greatest number of renewable projects under construction. A major factor to its success is a strong institutional body consisting of strategic leadership and dedicated resources. Morocco pursues a market-driven approach to its energy development by keeping its prices almost unsubsidized. This creates a competitive marketplace for renewable energy, without entailing a heavy burden on the government budget. The combined effect of these efforts has attracted more investments to Morocco than other countries in the region. To accelerate development of renewables, Morocco will need to strengthen support mechanisms, ensure priority access to the grid and lift existing restrictions on commercialization of renewables.

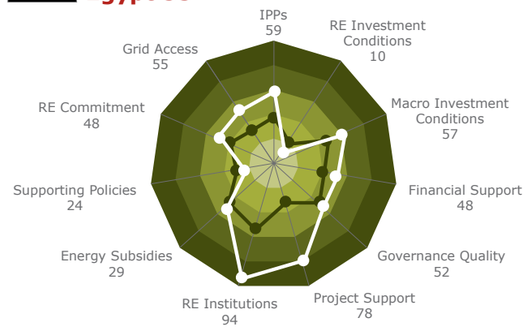
Jordan 59



Jordan ranks second after Morocco. Jordan has made substantial progress in the past year by adopting a quite progressive supporting policy framework for renewable energy: it introduced the Law on Renewable Energy and Energy Efficiency, feed-in tariffs, preferential purchase prices for net metering, provided a direct proposal submission option and exempted renewables from customs duty and sales tax. It is one of the few countries in the region that has provided a statutory guarantee of access for renewable energy to the grid. Jordan should now concentrate efforts on ensuring the functionality of these support mechanisms in order to maintain confidence amongst participants. Having created favorable conditions for investment, it should now also concentrate on strengthening institutional support to better facilitate deployment of renewable energy projects. This requires establishing a dedicated agency to promote renewable energy with sufficient resources and competent staff.

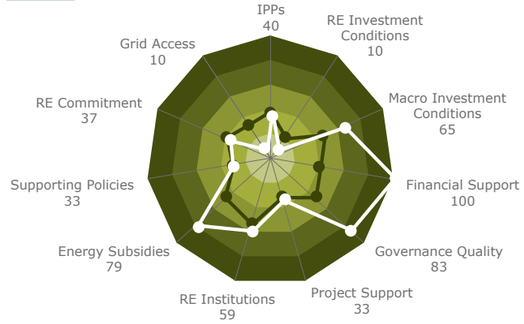
Average Country

Egypt 53



Egypt ranks third overall. Egypt presents an attractive market for development of renewables due to its demographics and strong natural resource potential. In the region, Egypt has by far the largest installed capacity of renewables and has an established institutional base. Due to NREA's efforts, Egypt has conducted a detailed resource quality assessment and has published a comprehensive wind atlas. It is the only country in the region that has officially allocated land specifically for development of renewables. To attract investments, Egypt will need to improve its policy landscape, including phase-out of current energy subsidies. To reach its stated goals, Egypt will need to speed up the government-led bidding processes and provide additional options for private developers to enter the market.

Tunisia 47

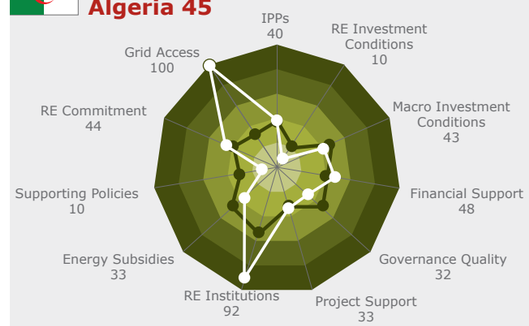


Tunisia is tied with Palestine in the fourth spot. Tunisia has contradictions within its renewable energy industry. On one hand it has adopted incentives for development of small-scale renewable projects by offering clearly stipulated financial support. On the other hand, the Tunisian electricity market remains closed for large-scale private development of renewable energy. Its current legal framework does not allow for unsolicited private generation of renewables, thereby preventing private developers from entering the market. Tunisia has the potential to attract investments in renewable energy based on their generally favorable business conditions. It scores high in ease of doing business, has a relatively high inflow of foreign direct investment and is perceived to have a strong institutional capacity, which all point to investor confidence in Tunisia.

Palestine 47

Palestine is tied for fourth place in the ranking. Palestine has a unique set of market conditions: it has essentially no local power generation; it has very limited physical space; and it lacks the resources to offer energy subsidies.Taken together, these conditions have motivated Palestine to introduce rather progressive policies for renewable energy. It has adopted feed-in tariffs, a net metering policy, a direct proposal submission process and, most importantly, Palestine opened its market for private development in an effort to improve its energy security. Palestine should now concentrate its efforts on strengthening institutional support and facilitating deployment of renewable energy projects.

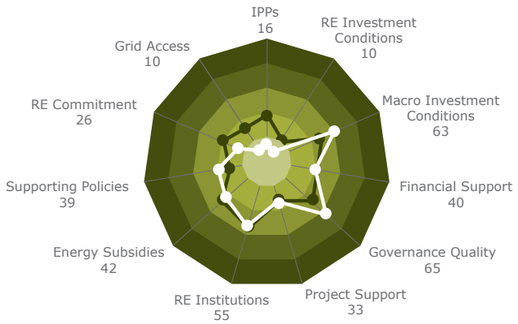
Algeria 45



Algeria also presents a contradictory picture. To its credit, it has adopted ambitious targets, embedded renewable energy legislation as far back as 2004, established dedicated institutions and created a renewable energy fund. And yet, it has shown little progress in deploying renewable energy projects and attracting private partners. Algeria has failed to completely overcome key barriers for renewable energy. Currently, there are no viable options for private developers to participate in renewable power generation. The government has not announced any tenders for public competitive bidding or offered any other instrument ensuring long-term power purchase agreements. In addition, the current low electricity prices do not allow renewables to have an attractive return on investment, thus private investments are unlikely to take place.

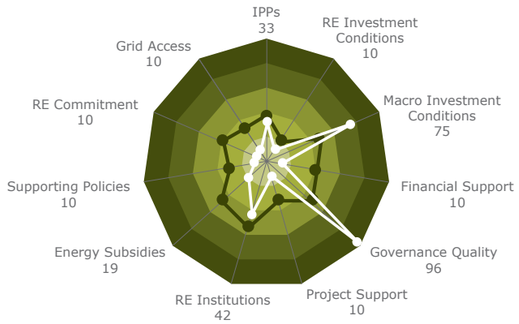
Average Country

Lebanon 33



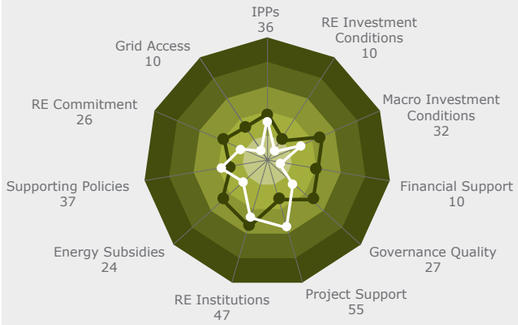
Lebanon has shown commitment for renewables through development of its net metering policy, and announcing tenders for the first large-scale wind and solar projects. However, the current power sector structure blocks investments in renewables. Because the required independent regulatory authority does not yet exist, power generation licenses for private developers cannot be issued. This stands as a main obstacle to private development of renewable energy in Lebanon.

Bahrain 28



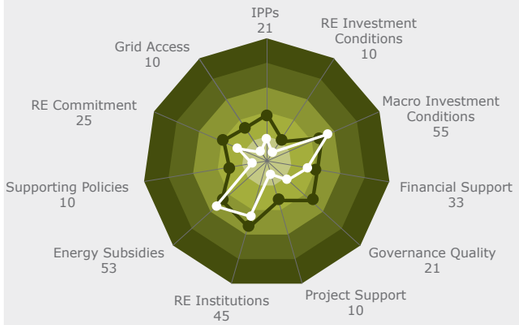
Bahrain has the most liberalized electricity market in the region, ranks first in ease of doing business and has favorable macro investment conditions. Bahrain has the potential to attract investments in renewables due to its compact size, available financial resources and relatively favorable business conditions. With the right focus, Bahrain could show leadership in innovative applications of renewable energy. The most decisive elements will be motivation and commitment.

Syria 29



Syria adopted progressive measures in 2011 to attract interest in renewable energy. It has opened its market for private developers, adopted feed-in tariffs and a net metering policy, authorized the business-to-business sale of renewable electricity, and announced tenders for public competitive bidding to develop first large-scale wind projects. However, due to the ongoing difficult political situation, all activities have been paused and the Syrian government has not had the chance to implement the newly introduced policies.

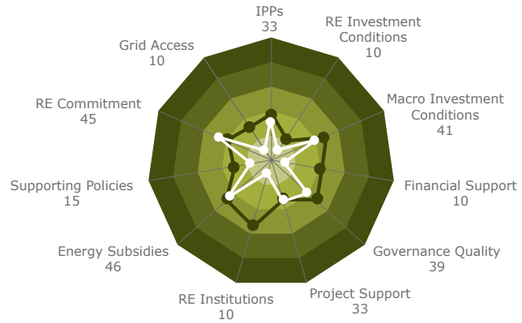
Sudan 25



Sudan faces the challenge of delivering electricity to a larger portion of its population. This also presents an opportunity to design innovative energy systems based on decentralized small-scale power generation. Microgrids could enable power supply to remote areas at lower costs than required by traditional infrastructure.

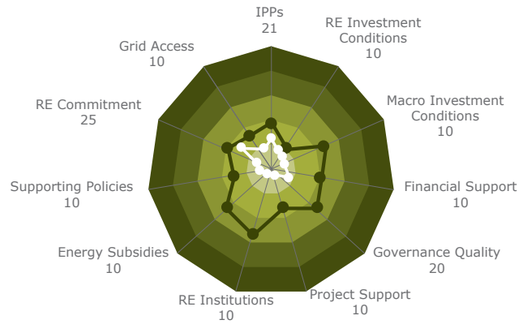
Average Country

Yemen 25



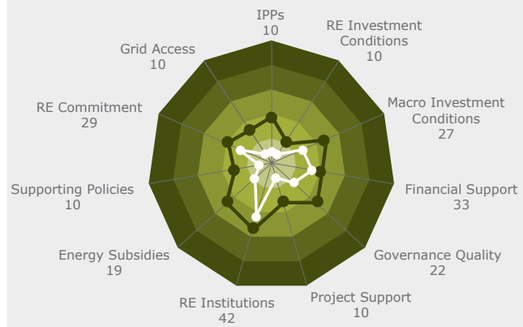
Similarly to Sudan, Yemen has an opportunity to implement decentralized small-scale power generation systems as a solution to rural electrification. Due to considerable risks for private investors, Yemen has not been able to make progress towards their long-term goals. To attract development, Yemen will need to build its institutional capacity to lead and support private and public development of renewables.

Iraq 13



Iraq's current challenges have limited its ability to initiate renewable energy development. However, the recent adoption of its energy strategy indicates Iraq's determination to make renewables a higher priority. Iraq needs to investigate which renewable energy solutions could suit best its conditions and focus resources in those areas.

Libya 20



Within the past two years, Libya has shown a strong commitment to renewable energy. It has established a dedicated agency for renewable energy and adopted renewable energy targets. Currently, the first large-scale wind and solar projects are under construction. However, Libya is the only country in the region that remains closed for independent power producers. Without opening its electricity market to private developers, Libya will have to rely entirely on its own resources to deliver renewable energy projects.

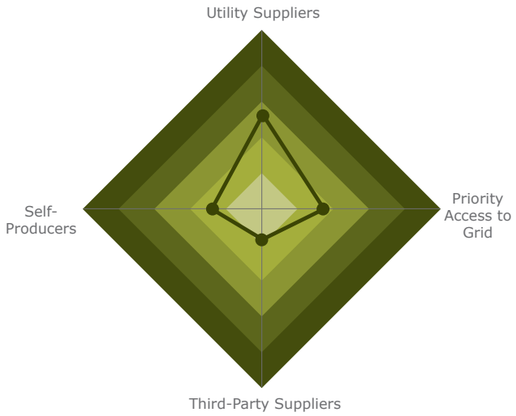
Average Country

Market Structure

Opening the electricity market to private power generation is one of the key pre-conditions for enabling private investments in renewable energy. Although power sector reforms have been initiated in almost all countries, the overall electricity market in the region still remains state-dominated with little participation from the private sector.

AFEX Renewable Energy assesses three forms of private participation in power generation: utility suppliers, self-producers and third-party suppliers. Of these three forms, the utility supply option appears to be relatively more developed. Eleven of the 13 countries have formally authorized private power generation from renewables. However, only Morocco has private developers of renewable energy in practice.

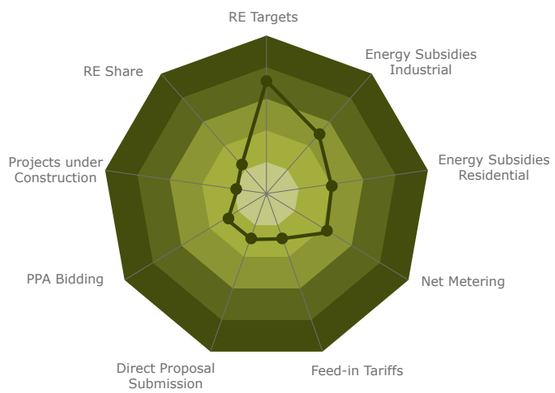
Third-party supply of electricity is the least available option, which indicates that private developers are still limited in their ability to provide business-to-business energy services. This option appears to be formally authorized in four countries, but so far it exists only on paper. Currently, only two countries in the region provide a statutory guarantee of priority access for renewable energy to the grid, which is an important building block for successful private participation.



Policy Framework

The Policy Framework category reports on practices that both support and impede the development of renewable energy. Almost all countries have shown commitment to renewable energy by adopting long-term technology-specific targets. However, efforts and progress of these countries in meeting their targets vary greatly. Currently there are more than 15 large-scale projects under construction with total capacity exceeding 1,550 MW, which is more than double the current installed capacity in the region. However, more than half of these projects are happening in just one country – Morocco. Eight of the 13 countries do not have any renewable energy projects currently under construction.

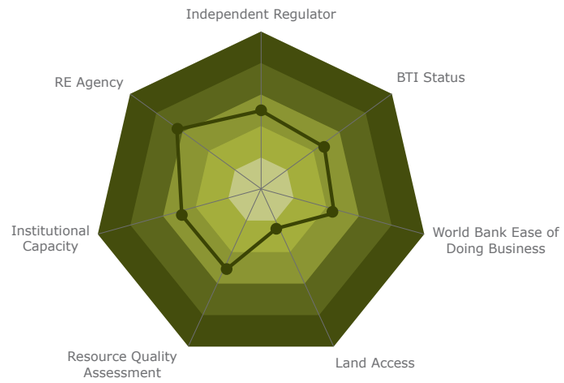
This means that in upcoming years, most likely no additional generation of renewable energy can be expected from these countries, aside from small-scale PV projects. Overall, the practice of competitive bidding for power purchase agreements appears to be the most strongly preferred policy instrument. However, this bidding process has been slow in some countries, which requires authorities to speed up and streamline their procedures. Direct proposal submission and feed-in tariffs are currently used in only two countries. Energy subsidy policies need to be reconsidered; phasing out fossil fuel subsidies will create a competitive marketplace for renewables and engage private investment.



Institutional Capacity

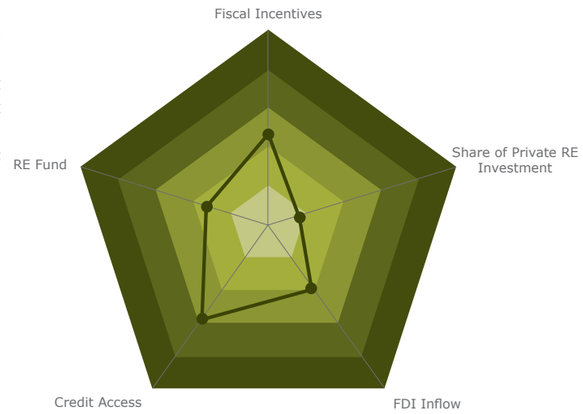
Institutional Capacity measures the ability of states to design and formulate renewable energy policies, and most importantly to provide institutional support for deployment of renewable energy projects. More than half the countries in the region have established dedicated agencies to support renewable energy. However, the resources and capacity of these agencies vary greatly. Independent regulators are still rare in the region. Well-functioning independent regulators are important for ensuring stable, reliable and transparent management of the power sector.

Countries should follow international best practices in establishing independent regulators. Those countries that have established independent regulators and designated agencies for renewables have taken an important step towards building a strong institutional base. However, this is only a beginning and major focus should be placed upon these institutions streamlining administrative procedures, eliminating institutional barriers and assisting in deployment of renewable energy projects. Currently this has not occurred in most Arab countries. Existing renewable energy institutions have been primarily focusing on leading public and demonstration renewable energy projects.



Finance and Investment

The region overall performs poorly in the Finance and Investment category, especially in the field of private investment in renewable energy. Although seven countries have identified over 5,000 MW of new generation for private development, to this day among the 13 countries, only Morocco has been able to attract private investment in renewables. Renewable energy projects in other countries have been built by public authorities, mostly with the support of donor institutions. This indicates that, overall, the Arab region has struggled to create an attractive environment for private investment. However, the share of private investment is expected to increase in coming years with the commissioning of private projects currently under construction.



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Abbreviations

ADEREE	Agency for the Development of Renewable Energy and Energy Efficiency
AUE	Arab Union of Electricity
BTI	Bertelsmann Transformation Index
CSP	concentrated solar power
DLR	German Aerospace Center
DNI	direct normal irradiation
EgyptERA	Egyptian Electric Utility and Consumer Protection Agency
ESMAP	Energy Sector Management Assistance Program
EU	European Union
EUR	Eurozone euro
FDI	foreign direct investment
FIT	feed-in tariff
GDP	gross domestic product
GHI	global horizontal irradiation
GW	gigawatt
GWh	gigawatt-hour
IEA	International Energy Agency
IFC	International Finance Corporation
ILS	Israeli new shekel
IMF	International Monetary Fund
IPP	independent power producer
km	kilometre
kW	kilowatt
kWh	kilowatt-hour
kWp	kilowatt peak
m^3	cubic metre
m^2	square metre
MAD	Moroccan dirham
MASEN	Moroccan Agency for Solar Energy
MW	megawatt
MWh	megawatt-hour
NREA	New and Renewable Energy Authority
OECD	Organization for Economic Co-operation and Development
ONE	Office National d'Electricité
PPA	power purchase agreement
PV	photo-voltaic
PWMSP	Paving the Way for the Mediterranean Solar Plan
RCREEE	Regional Center for Renewable Energy and Energy Efficiency
RE	renewable energy
SIE	Société d'Investissements Energétiques
TND	Tunisian dinar
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environmental Program
USD	United States dollar
WB	World Bank

1. Introduction

1.1 About AFEX Renewable Energy

The Arab Future Energy Index™ (AFEX) Renewable Energy is a policy assessment and benchmark tool that aims to provide a comprehensive assessment of the current conditions of renewable energy development and progress to date in the Arab region. AFEX Renewable Energy has been developed to:

- Provide a comprehensive assessment of the current conditions for RE development .
- Formulate targeted recommendations on improving regulatory and institutional frameworks for RE investment.
- Benchmark countries' performance to provide additional stimulus for more progressive RE development.
- Effectively communicate assessment results.
- Identify areas for possible intervention at the regional level in order to maximize the effects of promoting RE.

1.2 Scope of Assessment

AFEX Renewable Energy is designed with consideration of the private investor's perspective, thus assessment areas focus on barriers and challenges that private investors face in deploying RE in Arab countries. The AFEX Renewable Energy assessment scope includes:

1. Ease of accessing the electricity market for private investors, including grid access.
2. Effectiveness of incentive mechanisms initiated by governments for attracting investments in RE.
3. Level of public commitment to the pursuit of RE.
4. Level of institutional support available for private developers in RE deployment.
5. Level of financial risk associated with large-scale RE project deployment and the efforts of countries to mitigate such risks.

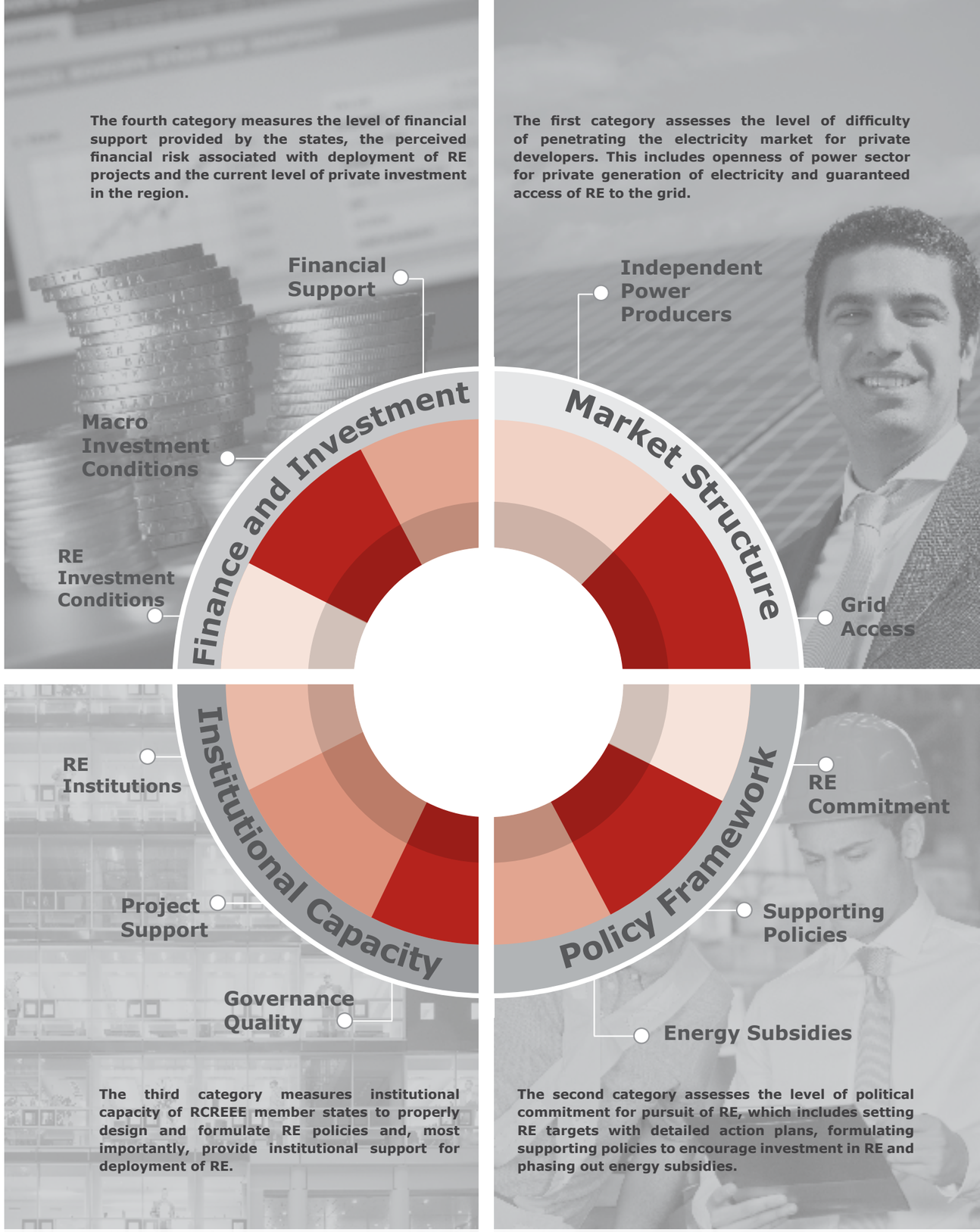
AFEX Renewable Energy measures the existence of policies, their implementation and, most importantly, their effectiveness. The focus of AFEX Renewable Energy is upon power generation from renewable sources, thus biofuels and the use of RE for cooling and heating purposes currently remain outside the scope of the assessment. AFEX Renewable Energy also does not assess countries' theoretical natural potential for power generation from renewable sources of energy, although this factor is surely an important element for investors' decision-making. Current conditions of grid infrastructure as well as available grid interconnections between Arab countries have a great impact on potential development of the RE market, however these aspects remain outside the scope of assessment until comprehensive data is available. AFEX Renewable Energy also does not assess the maturity of supply chain infrastructure.

1.3 Methodology

AFEX Renewable Energy is constructed in accordance with the OECD methodology for constructing composite indicators (OECD, 2008). Detailed description of methodology is presented in Annex A. The conceptual framework of AFEX Renewable Energy is presented in Table 1 below. It consists of four evaluation categories relating to the index objectives: (1) Market Structure; (2) Policy Framework; (3) Institutional Capacity; and (4) Finance and Investment.

Table 1: AFEX Renewable Energy scope of assessment

Category	Factors	Indicator	Score/Measuring Unit
Market Structure	Independent Power Producers	Utility Suppliers	Utility suppliers authorized by law Utility suppliers exist in practice Utility suppliers of RE exist in practice
		Self-producers	RE self-producer option authorized by law RE self-producers exist in practice
		Third-party Suppliers	RE supply to third-party authorized by law RE supply to third-party exists in practice
	Grid Access	Guaranteed Access to Grid	Priority access is guaranteed by law Priority access is granted in practice
		Grid Code for RE	
Policy Framework	RE Commitment	RE Targets	RE targets are officially adopted as part of RE strategy or action plan by higher political authorities RE targets are defined, but not officially adopted yet by higher political authorities or scattered in various documents No targets are adopted
		RE Share	% of total energy generated (GWh)
		RE Projects Under Construction	% of total installed capacity (MW)
	Supporting Policies	PPA Bidding	Resources identified for private development Tenders announced Contracts awarded
		Direct Proposal Submission	Policy adopted by law Proposals selected for private development
		Feed-in Tariffs	Officially adopted Implemented in practice
		Net Metering	Officially adopted Implemented in practice
	Energy Subsidies	Subsidy Amount in Residential Sector	% of Palestinian residential retail prices (benchmark)
		Subsidy Amount in Industrial Sector	% of Palestinian industrial prices (benchmark)
Institutional Capacity	RE Institutions	Independent Regulator	Established by law Non existent
		RE Agency	Established by law Non existent
		Capacity of RE institutions	Expert assessment from 1 to 10
	Project Support	Resource Quality Assessment	Detailed wind atlas published Detailed solar atlas published
		Land Access	Land allocated for private development of large-scale wind projects Land allocated for private development of large-scale solar projects
		Project Lead Time	
	Governance Quality	World Bank Ease of Doing Business Index	Rank under World Bank Ease of Doing Business Index
		Bertelsmann Stiftung's BTI Status Index	BTI Status Index scores
Finance and Investment	Financial Support	Fiscal Incentives	Number of fiscal measures
		RE Fund	RE fund established by law Sources of financing are clear Disbursement procedure is clear
	Macro Investment Conditions	Credit Access	Average interest on new external debt commitments (%)
		Inflow of Foreign Direct Investment	Ratio of inward FDI to GDP
	RE Investment Conditions	Share of Private Investment	%
		Growth Rate of Private Investment	%



The categories are comprised of 11 factors that are assessed by a set of quantitative and qualitative indicators. Individual indicators are presented and discussed in the subsequent chapters.

2. Category 1: Market structure

The Market Structure category assesses the openness of electricity markets to private generation of renewable energy. All countries in the region have state-managed power sectors, so this category considers the key aspects that can differentiate individual markets. These aspects include the ability for the private sector to generate electricity from renewable energy sources, have guaranteed access to the grid and have the ability to engage in various commercial transactions.

This category focuses on two factors: (1) independent power producers (IPPs); and (2) grid access. As illustrated in Table 2, these factors are further measured by four qualitative indicators. The fifth indicator shown has not been included in AFEX Renewable Energy 2013 results but will be added in future editions.

Table 2: Market Structure

Category	Factors	Indicator	Score/Measuring Unit
Market Structure	Independent Power Producers	Utility Suppliers	Utility suppliers authorized by law Utility suppliers exist in practice Utility suppliers of RE exist in practice
		Self-producers	RE self-producer option authorized by law RE self-producers exist in practice
		Third-party Suppliers	RE supply to third-party authorized by law RE supply to third-party exists in practice
	Grid Access	Guaranteed Access to Grid	Priority access is guaranteed by law Priority access is granted in practice
		Grid Code for RE	

2.1 Independent Power Producers

Why this indicator?

Openness of the electricity market for private power generation is one of the key pre-conditions for enabling private investments in renewable energy. Many countries in the world have authorized entry of IPPs to their electricity markets in order to mobilize private investment. The aim is to support meeting rapidly growing electricity demand and to improve both efficiency and quality of service (Woolf & Halpern, 2001). IPPs are an important catalyst in electricity sector reform as they often represent the first private investments in a market dominated by state-owned power utilities (Vagliasindi, 2012).

IPPs typically own facilities to generate electricity for sale in the wholesale market, usually to utilities. But there are also IPPs that generate electricity for self-consumption or for sale to other customers. IPPs generating electricity primarily for self-consumption, typically at large industrial sites, are usually referred to as self-producers (or auto-producers).
RE self-production can provide an interesting case for large consumers in the region because it is an opportunity to insure against power cuts. In order to encourage RE self-production, the regulatory framework should allow the producer to feed its excess electricity to the grid with the possibility of either net metering or selling at attractive prices, and should allow companies to locate the RE facilities outside their premises with the right to use the grid (Dii, 2013).

Normally, projects built by IPPs are dependent on connection to the electricity transmission and distribution grid. The key to successful integration of IPPs in electricity markets is the development of well-drafted power purchase agreements (PPAs), which define key conditions of sale and purchase of electricity. The overall number of IPPs in the market reflects the openness of energy systems, the level of competition and the access to the market for private generators. It furthermore conveys information about the investment climate for private developers within the existing structures.

Assessment results

Utility Suppliers

Most RCREEE member states are characterized by a single-buyer system, whereby a designated entity is the sole off-taker or purchaser of electricity. Despite the fact that almost all countries have started reforming their electricity systems and formally opened their markets for private sector participation, most of today's electricity generation remains state-owned. Table 3 illustrates in greater detail the current status of IPPs in the region.

Table 3: Status of IPPs in RCREEE member states

	Reference to the Policy	Installed Capacity (MW)		
		IPP	Public	Total
Algeria	Law No 02-01 (2002) on electricity and the distribution of gas, Article 26	2,886	8,504	11,390
Bahrain		2,284	825	4,009
Egypt	Law No 100 (1996)	2,049	27,027	29,076
Iraq*	Economic Affairs Commission Decree No S.L. 614, August (2008)	0	18,290	18,290[1]
Jordan	Electricity Law No 64 (2002)	740	2,360	3,100
Lebanon	No complete policy	0	2,313	2,313
Libya	No policy	0	8,907	8,907
Morocco	Law No 13-09 (2009) on Renewable Energies	1,704	4,915	6,723
Palestine	General Electricity Law No 13 (2009)	141	0	141
Sudan	Electricity Act (2001) Chapter II Article 3.2	0	2,723	2,723
Syria	Law No 32 (2010), Article 30	0	9,344	9,344
Tunisia	Law No 1996-27 (1996); Decree 1996-1125 (1996)	498	3,545	4,043
Yemen	Electricity Law No 1 (2009)	450	1,071.5	1,521.5

Source: RCREEE focal points, RCREEE Renewable Energy Country Profiles (2013)
*Data does not include Iraqi Kurdistan

This table shows that 11 of the 13 countries have adopted legislation authorizing IPPs. Countries that remain completely closed to the private sector are Libya and Lebanon. In Libya, there is currently a new electricity law under preparation that will allow private generation of electricity. In Lebanon, the current situation with power generation is complex.

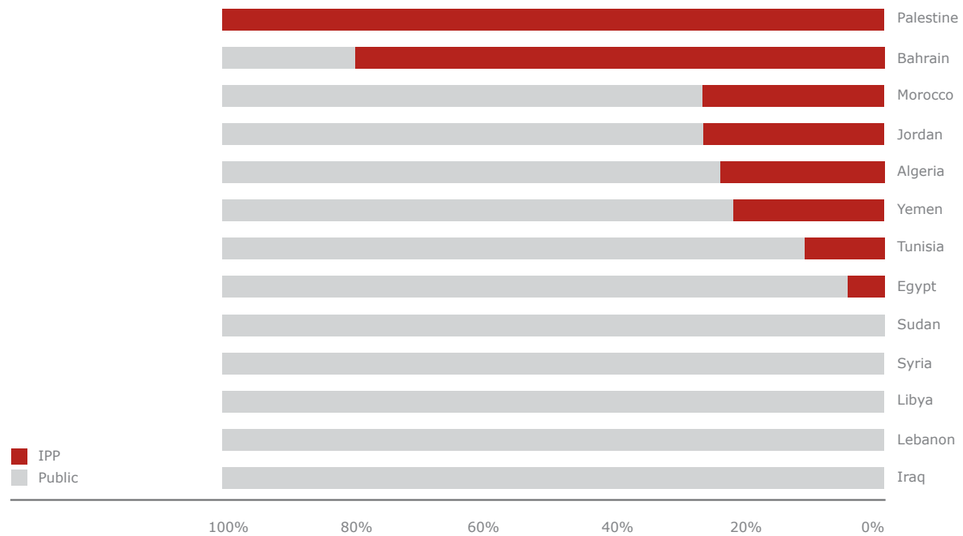
Lebanon adopted Law No 462 in 2002 in an attempt to reform the electricity sector and allow for private power generation. However, the law to this day remains ineffective because the electricity regulator responsible for granting generation licenses to IPPs has never been established. As a result, the electricity sector in Lebanon remains in a legal vacuum, where around 30% of its power is supplied by unofficial, private standalone generating units, which are often highly inefficient (PWMSP, 2012). A similar situation exists in Iraq; due to lack of reliable electricity supply, about 90% of Iraqi households supplement the public network with private generators. It is estimated that such unofficial private capacity in Baghdad alone amounted to about 900 MW in 2009 (IEA, 2012).

Another country worth mentioning in this discussion is Tunisia. While having progressive legislation in the area of energy efficiency, Tunisia lacks such legislation in RE. The current legal framework of Tunisia does not allow unsolicited private power generation from renewable sources. Private generation is possible only if authorized by the state through concessions. A new regulatory framework is currently under preparation to allow private generation from RE without a concession from the government (RCREEE, 2013).

The most liberalized electricity market in the region exists in Bahrain, where 80% of its electricity is produced by IPPs. The values reported in Figure 2 indicate that Palestine supplies 100% of its electricity through IPPs; however, this refers only to the local portion of its electricity supply, which amounts to 7% of domestic consumption. The remainder is imported from Israel and Jordan (RCREEE, 2013). Although legislation authorizing private power generation exists in Sudan, Syria and Iraq, currently no IPPs in these countries exist in practice. The reasons differ for this lack of IPPs, but in general administrative, financial and security complications are major contributors to delays in IPP development.

1 The available generation capacity at peak is estimated to be 50% less, around 9,000 MW

Figure 2: Share of installed capacities by IPPs and public utilities



Source: RCREEE based on data from RCREEE Renewable Energy Country Profiles (2013)

Among eight countries with an IPP presence, only one country, Morocco, has IPPs producing RE; the rest are active in conventional supply sources. In Egypt, the first private wind project in the Gulf of Suez is currently under public competitive bidding process. The pre-qualification documents were issued in 2009 and eight developers have been shortlisted. The 250 MW wind project is planned to be operational by 2015 under a build-own-operate scheme.

Self-producers

Although almost all countries in the region authorize private power generation for supply to the grid, not all authorize private generation for purposes of self-consumption or for sale to third parties. Table 4 shows the status of RE self-producers and RE third-party suppliers.

Table 4: Status of RE self-producers and third-party suppliers

	RE self-production is authorized by law with possibility of either net-metering or selling excess electricity to the grid	RE private generation is authorized by law with possibility of selling to third parties
Algeria	No	Yes, Law No 02-01 (2002) on electricity and the distribution of gas[2]
Bahrain	No	No
Egypt	Yes, Decision of EgyptERA adopted during its fourth session for 2012/2013 financial year on 29/01/2013	Yes, Decree no. 326 for the year 1997 for establishing "The Electric Utility and Consumer Protection Regulatory Agency"
Iraq	No	No
Jordan	Yes, Law No 13 (2012) on Renewable Energy and Energy Efficiency	No
Lebanon	No	No
Libya	No	No
Morocco	No	Yes, Article 26 of the Law 13-09 (2009) on Renewable Energies
Palestine	Yes, Decree No 13/127/16 (2012) on the Use of Renewable Energy	No
Sudan	No	No
Syria	Yes, Article 30 of the Law 32 (2010)	Yes, Article 30 of the Law 32 (2010)
Tunisia	Yes, Decree 1996-1125 (1996)	No
Yemen	No	No

Source: RCREEE focal points, RCREEE Renewable Energy Country Profiles (2013)

2 The Law 02-01 (2002) does not differentiate between export of power produced from conventional sources and renewables

Solar roofs at Tripoli Public Hospital
Image provided by: Rola Khazen, Lebanon

Only five countries authorize private self-production of RE with the possibility of feeding excess electricity to the grid. In Egypt, Syria and Palestine, the excess electricity is net-metered, whereas in Jordan and Tunisia excess electricity is purchased at preferential prices. However, none of these countries have RE self-producers in practice. The only country with any RE self-producer in practice is Morocco. Morocco was able to attract investments in RE self-producer projects mainly due to the program launched by its utility operator Office National d'Electricité (ONE) in 2006 – the EnergiPro project – which allowed industrial groups to produce their own electricity up to a capacity of 50 MW. ONE guaranteed the purchase of excess electricity at the preferential rates equivalent to 20% above the peak tariff.

One of the successful projects benefiting from that program is a 32 MW Lafarge wind plant in Tetouan with production of about 38 GWh per year, which represents about 40% of the factory's total consumption (OECD, 2013). However, the EnergiPro program ended in 2012. Today new RE self-producers are not eligible to benefit from these incentives. According to information from ONE, the existing grid cannot support any additional capacity (IRENA, 2013).

In Egypt, the first RE self-producer project, an Italgen wind farm in the Gulf El Zayt near the Red Sea area, is currently under construction. This wind farm with a capacity of 120 MW is expected to generate 500 GWh per year, satisfying approximately 35% of the Suez cement factories' needs (Italgen Italcementi, 2012).

Third-party Suppliers

The number of countries that allow private RE generation for the purposes of selling to third parties is fewer still. This option is available only in Morocco, Syria, Algeria and Egypt. In Morocco, however, this option is available with great limitations. According to Article 26 of the Law 13-09 (2009) on Renewable Energies, a private developer of RE can generate electricity from renewable sources for sale to a customer or a group of connected customers, provided that these customers consume the electricity supplied to them exclusively for their own use. In other words, re-sale of electricity under this provision is prohibited.

Syria introduced its law authorizing RE private generation only in 2010. Due to ongoing armed conflict, no developments have taken place since then. Third-party supply can be a particularly interesting option in providing electricity to large industrial facilities that have energy needs, but do not necessarily possess the required expertise in RE generation. This option should be fostered in order to start creating a more open market and to offer RE producers additional opportunities to market their electricity (Dii, 2013).

2.2 Grid Access

Why this indicator?

Guaranteed access to the grid is crucial for the viability of RE projects. Since RE electricity technologies rely on natural sources, the electricity generation is prone to fluctuation. The lack of dispatchability of RE introduces technical challenges for balancing the electrical grid. This has to be considered particularly for wind and PV technologies, as currently few storage options are available that can be complemented with wind and PV power plants. Concentrated solar power (CSP) plants, on the other hand, can be combined with thermal storage systems to shift electricity generation by several hours. As all RE technologies are still in an early stage of market penetration worldwide, priority dispatch and grid access is important to increasing competitiveness of RE sources and for guaranteeing transmission and distribution of RE electricity at time of production. This is necessary to provide private developers with the assurance and security that produced electricity can be sold at a fair value. By granting priority access to RE, resource efficiency can be maximized and constraints upon site selection can be minimized for the developer.

For private RE development efforts to be secure, governments should establish clear and consistent conditions for grid access. For investment decisions to be made, the path to market must be predictable and secure. Specifying the grid access details in national-level regulations is an effective approach. As recommended in the recently published Dii study "Desert Power Getting Started", the EU's Third Energy Package (EU Directive 2009/72/EC) provides a good example for specifying details of priority access of RE to the grid (Dii, 2013).

Assessment Results

In the region only two countries – Algeria and Jordan – provide a statutory guarantee of priority access to the grid for RE. Jordan has gone further in attracting investments in RE by taking responsibility for interconnecting and assuming costs of the interconnection line between the project and the nearest substation (RCREEE, 2013).

In all other countries, priority access is not yet explicitly provided by law. In some countries such as Morocco, there is even an explicit restriction on accessing transmission and distribution networks. According to the same Law 13-09 on Renewable Energies, private RE developers can access the national grid only for medium, high and extra high voltage, within the limits of the available technical capacity of the network. The current legal framework does not authorize RE developers to access low voltage lines, which generally prevents development of small-scale grid-connected RE projects. Table 5 outlines the current status of priority access and dispatch of RE in the region.

Table 5: Priority access and dispatch of RE to the grid

	Priority Access and Dispatch of RE to the Grid Guaranteed by Law
Algeria	Yes, 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
Bahrain	No
Egypt	No, but currently, Egyptian Electricity Transmission Company (EETC) purchases all existing RE
Iraq	No
Jordan	Yes, Law No 13 (2012) on Renewable Energy and Energy Efficiency, Article 8 C
Lebanon	No
Libya	No
Morocco	No
Palestine	No, but Palestinian electricity distribution companies are committed to purchase all produced electricity
Sudan	No
Syria	No
Tunisia	No
Yemen	No

Source: RCREEE Renewable Energy Country Profiles(2013)

2.3 Rank under Market Structure Category

The Market Structure category final scores are presented in Table 6. Morocco leads under the 'utility suppliers' indicator. Three aspects were considered under this indicator: (1) whether private generation is authorized by law; (2) whether conventional private power producers exist in practice to test the functionality of the law; and finally (3) whether RE private utility suppliers exist in practice. Whereas private power generation is authorized in most countries and conventional IPPs exist in half of them, only Morocco has private RE utility suppliers in practice. The lagging country under this indicator is Libya because the Libyan electricity market until now remains closed for private power generation.

The 'self-producer' indicator measures two aspects: (1) whether RE self-producers are authorized by law with possibility of feeding excess electricity to the grid; and (2) whether RE self-producers exist in practice. Under this indicator no country was awarded the full score as no country satisfies both criteria. Nevertheless, Morocco and Egypt lead under this indicator. Morocco because it is the only country in the region with RE self-producers in practice, and in Egypt the first RE self-producer is currently under construction.

The 'third-party suppliers' indicator also measures two similar aspects to the previous indicator. Under this indicator, again no country receives full score because no country has RE third-party suppliers in practice. The countries that receive higher scores are the ones that have authorized by legislation the RE third-party supplier option for private power producers.

Table 6: Final scores under Market Structure category

	Utility Suppliers	Self-producers	Third-party Suppliers	Guaranteed Access to Grid
Algeria	55	10	40	100
Bahrain	55	10	10	10
Egypt	78	70	40	55
Iraq	33	10	10	10
Jordan	78	40	10	100
Lebanon	21	10	10	10
Libya	10	10	10	10
Morocco	100	70	40	55
Palestine	78	40	10	55
Sudan	33	10	10	10
Syria	33	40	40	10
Tunisia	55	40	10	10
Yemen	55	10	10	10

Algeria and Jordan lead under the last indicator 'guaranteed access to grid' because only these two countries provide a statutory guarantee of priority access of RE to the grid.

Figure 3 presents the final aggregate scores and ranks of countries under the Market Structure category. Under this category Morocco is the leader because it is the only country in the region with an actual presence of RE private producers in practice. Jordan and Algeria rank second and third subsequently because they are the only countries in the region that provide a statutory guarantee of RE to the grid. The lagging country under this category is Libya. Libya is the only country in the region where reform of the electricity sector has not started and private power producers are not yet authorized to enter the market.

Figure 3: Final scores and rank under Market Structure category

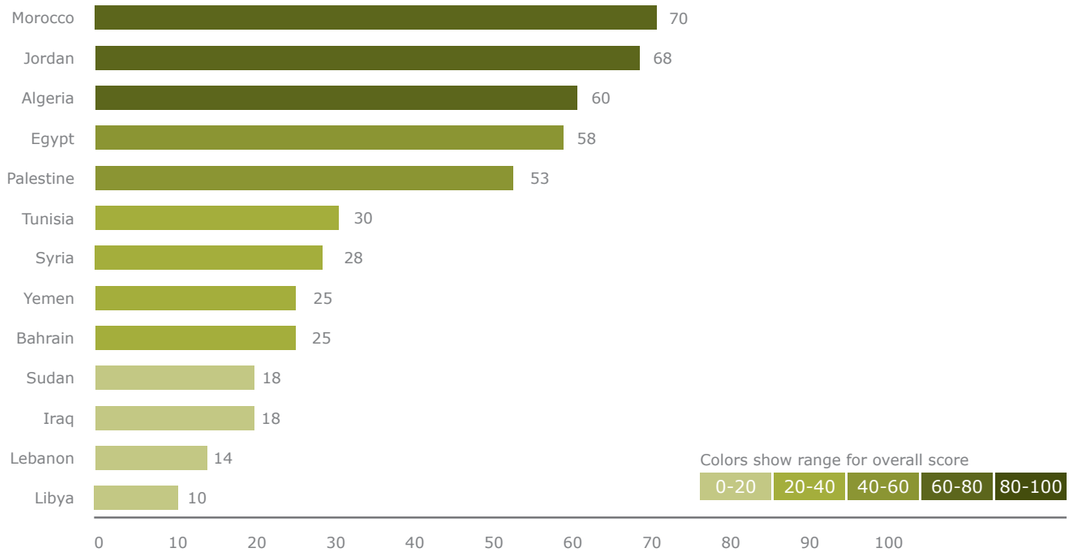
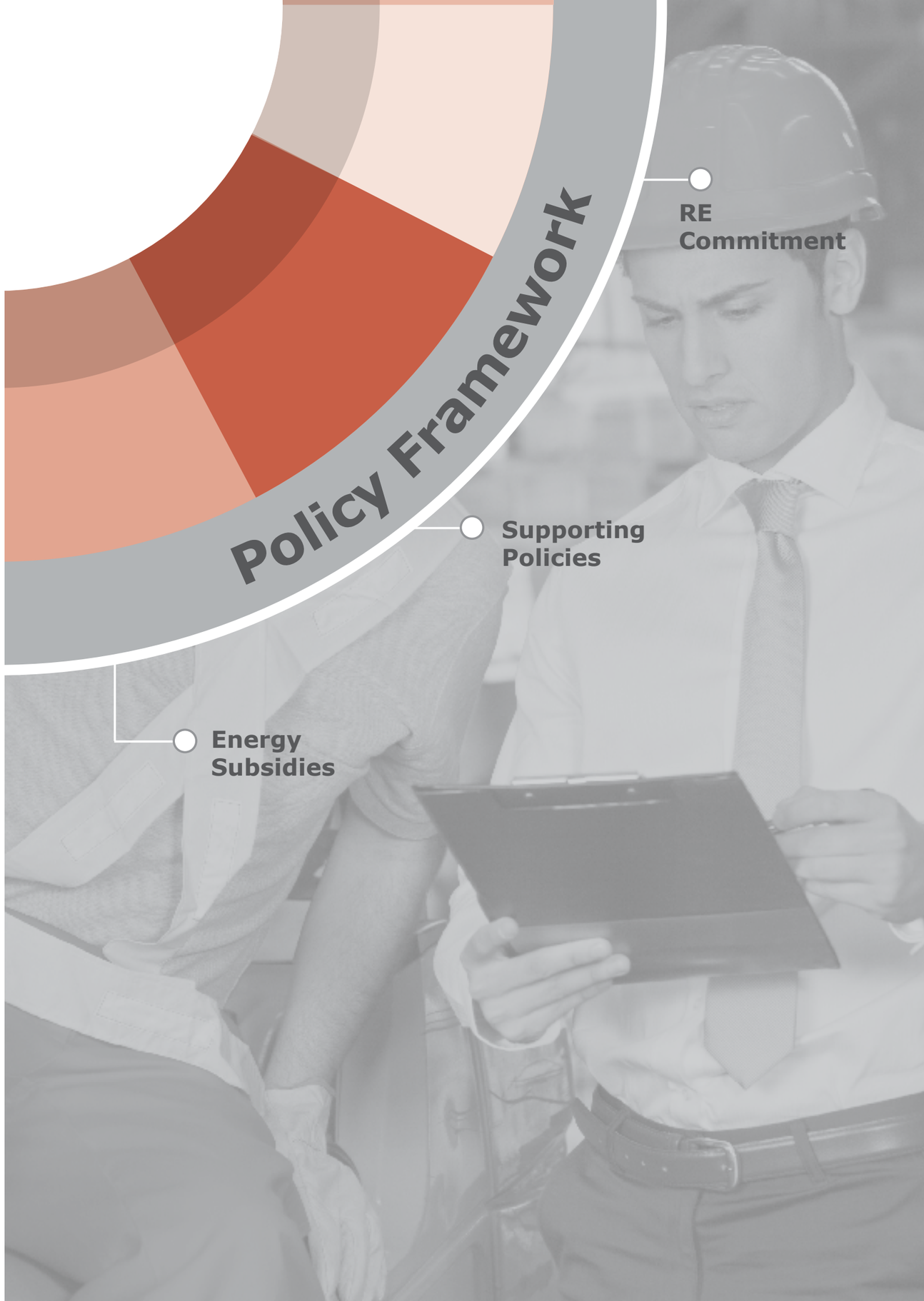


Figure 4 illustrates the average performance of all 13 countries under the Market Structure category. AFEX Renewable Energy results demonstrate that overall the electricity market in the region still remains state-dominated with little participation from private developers. Among the three measured forms of IPPs, the utility suppliers appear to be relatively more developed where both legislation and the existence of RE suppliers are in place. The least developed form of RE private generation is the third-party supplier option, which indicates that private developers are limited in their ability to provide business-to-business energy services.

Figure 4: Average performance of countries under Market Structure category



3. Category 2: Policy Framework

Creating a secure investment environment is a fundamental pre-condition for any private investment to occur, especially when the market is still immature. This requires demonstrating clear political commitment to the pursuit of RE through announcing ambitious and credible targets, establishing a predictable and transparent regulatory framework, streamlining administrative procedures, integrating fragmented RE strategies into an overall energy strategy and mobilizing funds for deployment of demonstration projects (IEA, 2011). It is important that RE policies are adopted at the highest political level and are embedded in official, legally binding documents. Demonstrating clear political commitment with effective support mechanisms is necessary to enhance investor confidence and avoid unnecessary risk premiums on leveraged capital. AFEX Renewable Energy includes the Policy Framework category to measure and report on these aspects. This category consists of three major factors: (1) RE commitment; (2) supporting policies; and (3) energy subsidies. Table 7 below presents in more detail the factors and indicators considered under this category.

Table 7: Policy Framework

Category	Factors	Indicator	Score/Measuring Unit
Policy Framework	RE Commitment	RE Targets	RE targets are officially adopted as part of RE strategy or action plan by higher political authorities RE targets are defined, but not officially adopted yet by higher political authorities or scattered in various documents No targets are adopted
		RE Share	% of total energy generated (GWh)
		RE Projects Under Construction	% of total installed capacity (MW)
	Supporting Policies	PPA Bidding	Resources identified for private development Tenders announced Contracts awarded
		Direct Proposal Submission	Policy adopted by law Proposals selected for private development
		Feed-in Tariffs	Officially adopted Implemented in practice
		Net Metering	Officially adopted Implemented in practice
	Energy Subsidies	Subsidy Amount in Residential Sector	% of Palestinian residential retail prices (benchmark)
		Subsidy Amount in Industrial Sector	% of Palestinian industrial prices (benchmark)

3.1 RE Commitment

3.1.1 RE Targets

Why this indicator?

Demonstrating political will and commitment to pursue RE is an important factor in creating favorable conditions for development of RE. Targets that are officially adopted, clearly formulated and ambitious, when supported with specific policy measures, can provide a basis for generating investor trust and confidence. Targets also motivate state authorities to be more proactive in creating favorable conditions for RE and to raise necessary funds.

Assessment results

In RCREEE member states, only a few countries have officially adopted RE strategies containing clear targets. Other countries have unofficial or working targets, mostly found in draft documents and one country, Bahrain, has no RE targets at all. In setting RE targets, countries are generally motivated by the aim to diversify their energy mix, increase security of supply, decrease dependence on fossil fuels and develop a RE industry capable of creating jobs and fostering industrial development (Dii, 2013). In light of high unemployment rates in the region, the latter motivation appears to be especially important in advocating for RE development. Table 8 lists the current targets in the region collected by RCREEE mainly through its focal points.

Table 8: RE targets

	RE Strategy/Action Plan/ Program	RE Targets							Target Date
		Wind	PV	CSP	Biomass	Geothermal	Total		
		MW	MW	MW	MW	MW	MW	%	
Algeria	National Program for Renewable Energy and Energy Efficiency 2030 adopted in 2011	50	280	325	0	0	660	6	2015
		270	800	1,500	0	0	2,570	15	2020
		2,000	2,800	7,200	0	0	12,000	40[3]	2030
Bahrain	None	0	0	0	0	0	0	0	none
Egypt	National RE Strategy 2020 adopted in 2008, updated in 2012; Egyptian Solar Plan; NEEAP (2012-2015); Master plan for RE 2025 is under preparation	7,200	1,320		0	0	11,320[4]	20[5]	2020
		0	700	2,800	0	0	3,500		2027
Iraq	Renewable Energy Plan 2013-2017, adopted in 2012 Master Plan of Energy 2030 adopted in June 2013 includes RE target of 5%	50	200	50	0	0	300	2	2017
								5	2030
Jordan	Master Strategy of Energy Sector in Jordan for the period (2007-2020) adopted in 2007	1,200	500	100	50	0	1,850	10[6]	2020
Lebanon	Policy Paper for Electricity Sector (2010); NEEAP (2011-2015)	60-100	10	0	15-25	0	125-165[7]	12	2015
Libya	National Plan for developing RE in Libya (2013-2025)	260	124	0	0	0	384	3	2015
		600	344	125	0	0	1,069	7	2020
		1,000	844	375	0	0	2,219	10[8]	2025
Morocco	National Energy Strategy adopted in January 2013 (2012-2020)	2,000	2,000				6,000[9]	42[10]	2020
Palestine	National Energy Strategy (2012-2020) Palestinian Solar Initiative	44	45	20	21	0	130	10[11]	2020
Syria	The 11th Five-Year Plan for 2011-2015	1,000	2,000	1,300	250	0	4,550	30	2030
Sudan	RE master plan is under development	680	667	50	68	54	1,582[12]	11[13]	2031
Tunisia	The study for energy mix in 2030 is currently under development	1,500	1,900	300	300	0	4,000	30[14]	2030
Yemen	National RE and Energy Efficiency Strategy adopted in 2009	400	8.25	100	6	160	674.25	15[15]	2025

Source: RCREEE focal points

3 Electricity generation
4 Including current installed capacity of hydro
5 Electricity generation
6 Primary energy
7 Including 40 MW hydro
8 Electricity generation
9 Including 2,000 MW hydro
10 Installed capacity
11 Electricity generation
12 Including additional 63 MW hydro
13 Installed capacity
14 Installed capacity
15 Installed capacity

For the region, which is almost entirely dominated by fossil fuel generation sources, the stated RE targets are quite ambitious, which is a welcomed initiative. However, adopting targets is only one part of promoting investments in RE; the more important work lies in adopting specific measures to overcome barriers and create a favorable environment for uptake of RE development.

One observation worth noting about targets in the region is their inconsistency. This may be due to several factors, including the fact that many RE targets in the region still are not officially adopted, ongoing changes in RE technology development, and availability of funding opportunities. Thus it should not be surprising to find conflicting values for targets in different sources. Also, countries have different target-setting methodologies and approaches to meeting these targets. Some countries express targets as a share of generation mix, others as a share of total installed capacity, or even as a share of total primary energy consumption. But at the same time, countries that express targets as a percentage of generation do not always provide details as to how it corresponds in GWh. To enhance the development of RE in the Arab region, the League of Arab States, during its 3rd Arab Economic and Social Development Summit in January 2013, approved "The Arab Strategy for the Development of Renewable Energy Uses (2010-2030)" (the Arab RE Strategy). The Arab RE Strategy aims to increase the share of renewables by 2030 through streamlining RE target-setting procedures, providing guidelines for development of national renewable energy action plans, strengthening regional and international cooperation and facilitating the exchange of expertise.

For ranking purposes, the targets are grouped into the following three categories:

RE targets are officially adopted as part of RE strategy or action plan by higher political authorities	Algeria, Egypt, Jordan, Morocco, Palestine and Yemen
RE targets are defined, but not officially adopted yet by higher political authorities or scattered in various documents	Lebanon, Libya, Sudan, Syria, Tunisia and Iraq
No targets defined and adopted	Bahrain

3.1.2 RE share

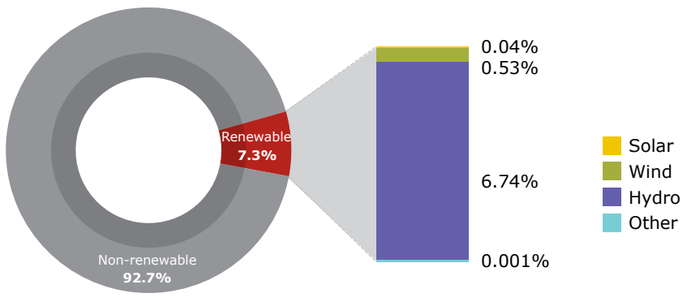
Why this indicator?

The ultimate outcome of all efforts to promote RE should translate to an increase in the share of RE in the power generation mix. The volume of installed RE projects reflects the effectiveness of support mechanisms, but also the general conditions for investment in RE. A large or growing share of RE demonstrates that a country is seriously working to meet its targets. On the other hand, an insignificant share of RE in light of promising statements and ambitious targets indicates lack of follow-through effort, and induces investor skepticism and distrust.

Assessment results

The current share of RE remains relatively low within the region. The energy generation mix of the countries has not changed substantially over the past five years. Countries continue to generate power predominantly from fossil fuel sources. RCREEE member states, in aggregate, generate about 7.3% of their electricity from renewable sources. Figure 5 breaks down the generation sources: hydro dominates with 6.74%, followed by wind at 0.53%, solar at 0.04%, and all others at 0.001%. Hydro is a mature technology, with most generation having been built several decades ago. It is not generally being looked to for appreciable amounts of new generation, while the others have significant growth targets attached.

Figure 5: RE sources as share of all electricity generation for RCREEE member states (2012)



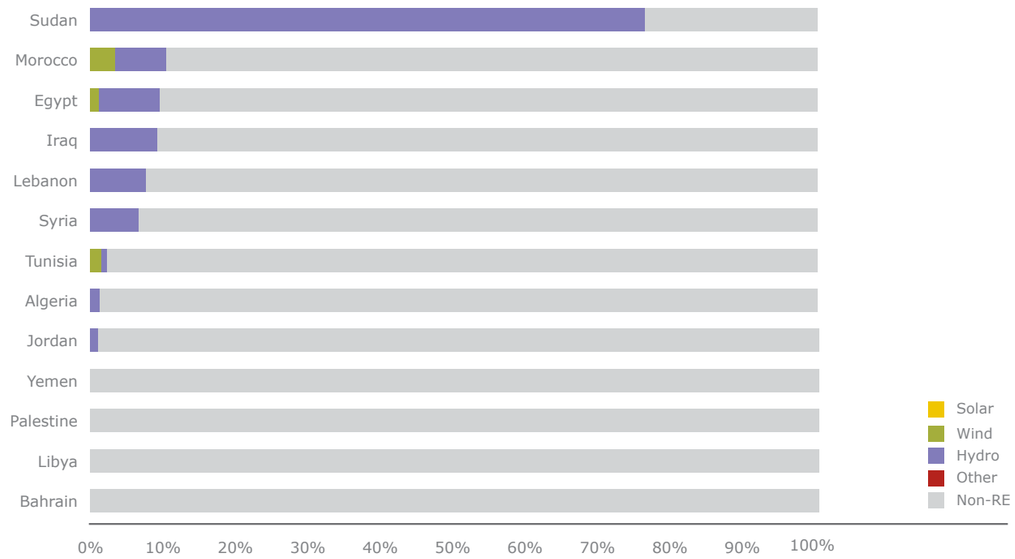
Source: AUE (2012), RCREEE focal points

Looking at the same data by country highlights the generation types currently in use. Referring to Figure 6, it is evident that hydro power leads all RE sources and also that some countries have a small or negligible installed RE capacity. Sudan is clearly ahead with total RE generation of 76%, which is supplied by hydro, primarily due to its access to the Nile River. No other types of renewables are currently reported in Sudan. For non-hydro renewables, the leader is Morocco, where wind contributes about 3% to total generation.

Although hydro is considered a renewable source of energy, due to its maturity and limited potential for further development hydro power is excluded from evaluation in AFEX Renewable Energy.

Solar system for home applications and street lighting, Sinai, Egypt
Picture provided by Ahmed Ragab, Egypt

Figure 6: RE sources as a share of electricity generation for RCREEE member states (2012)



Source: AUE (2012), RCREEE focal points

Percentage comparisons alone can lead to inaccurate impressions. Tables 9 and 10 provide an overview of each country's renewable mix (excluding hydro) in terms of both size of installed capacity and of percentage contribution. The leader for each type is highlighted. This makes clear the dominant generation position of Egypt in wind and PV, with Algeria leading in CSP. In percentage terms, however, the leader is Morocco.

Table 9: RE installed capacity in MW and percentages (2012)

	Wind		PV		CSP		Other RE		Total RE	
	MW	%	MW	%	MW	%	MW	%	MW	%
Algeria	0	0	0	0	25	0.22	0	0	25	0.22
Bahrain	0.5	0.01	0	0	0	0	0	0	0.5	0.01
Egypt	550	1.77	15	0.05	20	0.06	0	0	585	1.88
Iraq	0	0	0	0	0	0	0	0	0	0
Jordan	1.45	0.05	1.6	0.05	0	0	3.5[16]	-	6.55	0.10
Lebanon	0.5	0.02	0.6	0.03	0	0	0	0	1.1	0.05
Libya	0	0	5	0.06	0	0	0	0	5	0.06
Morocco	290	4.50	15	0.23	20	0.31	3,000 m[3][17]	-	325	5.08
Palestine	0	0	1.5	1.06	0	0	0.023[18]	0.02	1.523	1.06
Sudan	0	0	0	0	0	0	0	0	0	0
Syria	0.15	0	2	0.02	0	0	0	0	2.15	0.02
Tunisia	154	3.81	4	0.10	0	0	0	0	158	3.91
Yemen	0	0	1.5	0.10	0	0	0	0	1.5	0.10

Source: RCREEE focal points

Table 10: RE generated in GWh and percentages (2012)

	Wind		PV		CSP		Total RE	
	GWh	%	GWh	%	GWh	%	GWh	%
Algeria	0	0	0	0	43	0.08	43	0.08
Bahrain	1	0.01	0	0	0	0	1	0.01
Egypt	1,525	0.97	24	0.02	34	0.02	1,583	1.01
Iraq	0	0	0	0	0	0	0	0
Jordan	3	0.02	2.56	0.02	0	0	11.56	0.07
Lebanon	0.8	0.01	0.96	0.01	0	0	1.76	0.02
Libya	0	0	8	0.02	0	0	8	0.02
Morocco	728	2.76	24	0.09	55	0.21	807	3.06
Palestine	0	0	1.6	0.04	0	0	1.6	0.04
Sudan	0	0	3.2	0	0	0	3.2	0.01
Syria	0	0	0	0.01	0	0	0	0
Tunisia	196	1.17	6.4	0.04	0	0	202.4	1.21
Yemen	0	0	2.4	0.05	0	0	2.4	0.05

Source: AUE (2012), PWMSP (2012), NREL (2013)

16 Biogas
17 Biomass
18 Geothermal

3.1.3 RE Projects under Construction

Why this indicator?

RE strategy and targets lack value if not accompanied by specific actions. RE projects under construction indicate successful implementation of RE strategy and allow for assessment of the likelihood of achieving the stated targets. The rate of development provides feedback on the effectiveness of these efforts and can offer governments an opportunity to adjust strategy along the way.

Assessment results

Although almost all countries have some form of RE strategy with targets, only a few have actual projects identified in the pipeline and even fewer have projects already under construction. Table 11 shows the current projects under construction based on data from 2012. These range from none in several countries to over 16% of current installed generation capacity in Morocco when its projects are fully built out. Wind projects lead the efforts that are currently underway.

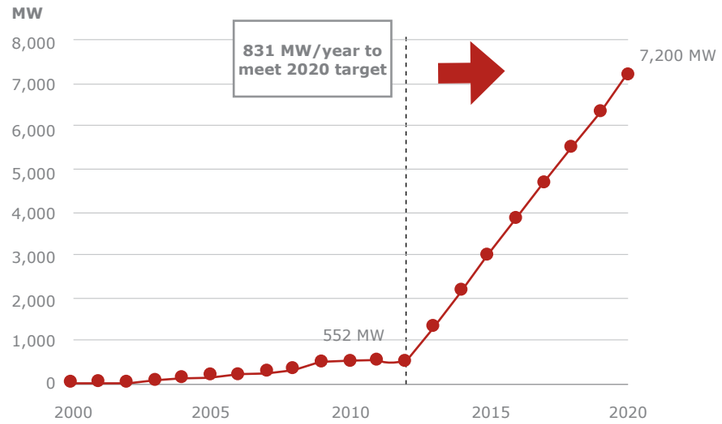
Table 11: RE projects under construction (2012)

	Wind	Solar	Other RE Technology	Total (MW)	Share of Current Capacity (%)
Algeria	Kabertene Wind farm, Adrar city (10.2 MW)	PV plant in Ghardaia (1 MW)	Geothermal project (5 MW)	16.2	0.14
Bahrain	None	None	None	0	0
Egypt	Gulf of Al-Zayt (200 MW) Gulf of Suez (120 MW)	None	None	320	1.03
Iraq	None	None	None	0	0
Jordan	None	None	None	0	0
Lebanon	None	9 PV sites (3kWp each)	None	0.02	0
Libya	Darnah (60 MW)	PV Plant in Al-Jofra (14 MW)	None	74	0.89
Morocco	Koudia Al Baida phase 1 (100 MW) Tarfaya (300 MW) Akhfenir (200 MW) Tanger 2 (150 MW) Taza (150 MW)	Noor 1 CSP (160 MW)	None	1,060	16.5
Palestine	Al-Ahli Hospital (south-western part of Hebron) (700 kW)	Small-scale PV installations (0.5 MW)	None	1.3	0.92
Syria	None	none	None	0	0
Sudan	None	none	None	0	0
Tunisia	Bizerte Stage B (70 MW)	Rural electrification with PV panels (11.3 MW)	None	81.3	2.01
Yemen	None	Wehda Hospital PV for lighting (0.48 kW)	None	0.00048	0

Source: RCREEE focal points

A distinct gap exists between the stated goals of national governments and the current course of development. For instance, in 2008 Egypt's Supreme Council of Energy set a target of generating 20% of Egypt's electricity from renewable sources by 2020 with 12% supplied by wind, and 8% from solar, hydro, and other sources combined (NREA, 2011). The plan is ambitious and well-articulated. But it implies a rather aggressive rate of development in Egypt. For wind the target translates to 7,200 MW, with 2,375 MW developed by NREA and 4,825 MW by private sector projects. This implies an average annual build-out rate of 739 MW in order to reach the 2020 goal. Realistically, deployment will likely accelerate in future years, showing an exponential growth curve as barriers are overcome. To put this accomplishment into perspective, at the end of 2012 the installed base for wind was 552 MW, with an additional 250 MW currently in late planning stage. Figure 7 shows the unprecedented growth required, at an average of 831 MW per year, to meet the wind power target for 2020.

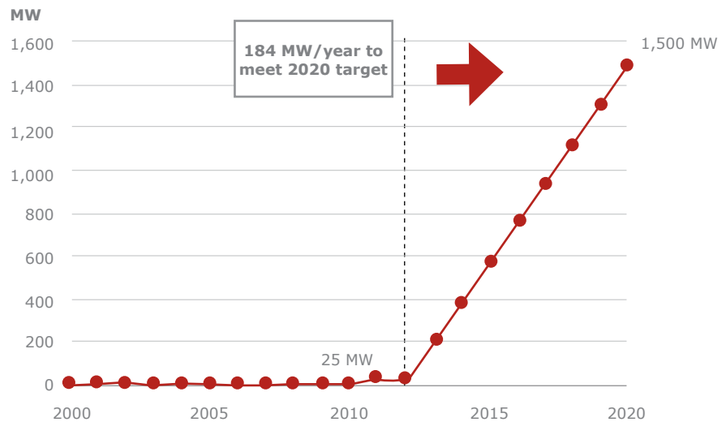
Figure 7: Egypt historical and targeted wind generation capacity (MW)



Source: BP (2012), NREA (2011)

Similarly in Algeria, the government target for RE development includes 1,500 MW of CSP by 2020, whereas the 2012 installed base was 25 MW. Figure 8 shows that from 2013 onward, this will require an average growth of 184 MW annually, which amounts to 738% of today's total capacity each year for the next eight years. While CSP is a technology still in its early stages of development with potential to grow, this plan will require significant engineering expertise, a strong project management focus, and supportive policy from the Algerian government. It seems evident that private partners will play a major role if this target, and those of other states across the region, are to be achieved.

Figure 8: Algeria historical and targeted CSP generation capacity (MW)



Source: RCREEE Renewable Energy Country Profile – Algeria (2013)

3.2 Supporting Policies

Despite progress in development of RE technologies in recent years, many of those technologies still remain in early stages of commercialization. Technology needs time to mature, not only to become more cost-effective in manufacturing and assembly methods, but also to build industries that support RE development including suppliers, installers, and financiers. Because deployment of RE technology requires high up-front capital costs (around 80% of total lifetime costs), these entities need to be confident that they will see a return on their investments over the project lifetimes. A major requirement for incentivizing the initial investments by these support industries is an assurance of continuing flow of projects in future years or even decades. Policies need to specifically target the risks associated with the financing and deployment of such projects and be cost-effective at the same time (IEA, 2011). The policy challenge is in developing public instruments that are effective at reducing financing costs, while not committing to public spending levels that are disproportionate to the benefit and perceived as politically unbearable.

Identifying an appropriate combination of policy tools to promote RE can, in itself, be very challenging. It is good practice to draft policies based on best international experiences, closely monitoring national, regional and global market trends, but carefully adjusting to fit the local context. This can be thought of as applying the best principles available to fit the particular scenario, based on the resources available and the unique constraints faced by each country.

According to the recently published UNDP report "Derisking Renewable Energy Investment. A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries", while there are numerous policies available to promote RE, certain types of instruments have achieved greater importance than others and are particularly essential for advancing RE. These instruments target key investment risks associated with deployment of renewables and are labeled 'cornerstone instruments' (Waissbein et al, 2013). Cornerstone instruments are usually referred to as instruments that provide RE developers with an assurance that generated electricity will be purchased at a fixed long-term price with guaranteed access to the electricity grid (Waissbein et al, 2013; Dii, 2013; OECD, 2013). Such instruments can be designed either around bidding processes or around defined price premiums such as feed-in tariffs. Each instrument possesses its own advantages and disadvantages. The Supporting Policies category of AFEX Renewable Energy evaluates the most significant of these cornerstone instruments and measures the current state of progress in regional policy.

3.2.1 PPA Bidding and Direct Proposal Submission

Why these indicators?

Power purchase agreements (PPA) are essential to advancing investments in RE, as they provide assurance to investors of secure revenues. For any private power developer, long-term secure revenue streams are a decisive factor, especially in capital-intensive technologies like wind and solar power (Dii, 2013).

PPA bidding, also known as public competitive bidding, refers to the process where government identifies and reserves an area with natural resources for private development. The developer is chosen through a tendering process and a PPA is signed with the successful bidder at the bidding price. The public competitive bidding process is government-led, thus it allows control over the rate of deployment and volume of renewables. Tenders can be effective in driving competition among project developers, which allows governments to choose the best offer. The PPA is also often used as a price-finding process for future possible feed-in tariff policies, as developers are encouraged to make the lowest bid possible (OECD, 2013). However, the public competitive bidding process can often be slow, lengthy and a bureaucratic procedure.

Once project proponents have won a bid, tenders can provide a high level of investment security. During the early stages of a project, however, tenders include broad uncertainty for investors relating to costs and schedule. These risks can prove to be barriers, especially for smaller developers (Müller et al, 2011). To provide more predictability to investors and to make the procedure less burdensome for the public administration, a streamlined process rather than a case-by-case approach to PPAs should be favored. Clear contract enforcement and, if necessary, guarantees to ensure against counterparty risk improve investors' security. In order to ensure that projects take place in due course, bidders should be required to comply with high legal, economic and technical standards.

Direct proposal submission, unlike PPA bidding, allows a PPA to be signed while avoiding the tendering process, thus the process is usually faster and more direct. The functionality of a direct proposal submission strongly depends on the offered price for RE electricity. The prices can either be current market electricity prices if they are sufficiently attractive or fixed in the form of feed-in tariffs.

Less preparatory work is required on the part of government in the direct proposal submission process. Prospective investors are required to identify an appropriate site and determine the resource quality and potential capacity of the project. Authorities may provide some guidance to applicants, such as in the case of Jordan, where priority is being given to proposals in the northern and eastern parts of the country. Generally speaking though, this approach puts greater onus upon the prospective developer to provide a proof of concept before a contract is offered.

Assessment results

In the region, PPA bidding has become a most favored approach to RE development. Seven of the 13 countries have identified resources for private development through a public competitive bidding process. Two countries – Morocco and Egypt – have even set targets for the total installed capacity of RE to be developed through this approach. Morocco plans to develop 1,000 MW of wind power and 1,000 MW of solar using this approach. It has already made substantial progress in meeting the wind energy target and is underway with developing solar. Egypt has officially approved a policy on public competitive bidding on 26 July 2009 by the decision of the Supreme Council of Energy.

According to this decision, Egypt plans to install 2,500 MW of wind generation through their public competitive bidding process. The tenders are planned to be issued in blocks of 250 MW. The first private large-scale wind project of 250 MW is currently in the tendering process. However, in contrast to Morocco, the process of public competitive bidding in Egypt has been lengthy. The pre-qualification documents for the first wind project were issued in 2009 and until today the winning bidder has not been announced.

Table 12 outlines the wind and solar project capacities that are officially planned for development through public competitive bidding processes and direct proposal submissions.

Table 12: Public competitive bidding and direct proposal submission

	PPA Bidding/Public Competitive Bidding						Direct Proposal Submission		RE Power Purchase Obligation
	Identified RE sites for private development (MW)		Announced tenders (MW)		Contracts awarded (MW)		Proposals selected for private development (MW)		
	Wind	Solar	Wind	Solar	Wind	Solar	Wind	Solar	
Algeria	0	0	0	0	0	0			Law No 02-01 (2002) on electricity and the distribution of gas
Bahrain	0	0	0	0	0	0			No
Egypt	2,500	200	250	0	0	0			Cabinet decision of 26 May (2010)
Iraq	0	0	0	0	0	0			No
Jordan	90	225	90	225	0	0	395	100	Law No 13 (2012) on RE and EE
Lebanon	60	10	60	0	0	0			Power rental agreement
Libya	120	50	0	0	0	0			No
Morocco	1,000	1,000	900	160	>500	160			1,000 MW Moroccan Integrated Wind Energy Project
Palestine	0	0	0	0	0	0	20	20	General Electricity Law No 13 (2009)
Syria	50	0	50	0	0	0	0	0	Law No 32 (2010), Article 30
Sudan	0	0	0	0	0	0			No
Tunisia	0	0	0	0	0	0			No

Source: RCREEE focal points, RCREEE Renewable Energy Country Profiles (2013)

The data indicate that direct proposal submission is currently available in two countries: Jordan and Palestine. Jordan, particularly due to the introduction of its policy, has experienced a sudden influx of applications from private developers.

3.2.2 Feed-in Tariffs

Why this indicator?

Among different instruments, feed-in tariffs (FITs) have become the most widely used supporting policy for development of RE worldwide (IEA, 2011). The REN21 Global Status Report identifies that FITs have been adopted by at least 65 countries and 27 states or provinces. A FIT is a subsidy aimed at generators – usually from a RE source – for producing electricity at a higher levelized cost of energy than the current default market price. This can motivate investment in new capacity if the FIT is priced high enough to compensate for the difference between production cost and retail sale price (Couture et al., 2010). FITs are usually technology-specific offerings, meaning the values paid per kWh are uniquely set for each RE type that has been targeted by the government.

FITs are favored by developers, as they establish secure long-term revenue streams, thus minimizing initial funding risks associated with RE projects. FITs provide a guaranteed purchase of electricity at a known fixed price over a long period of time, usually 15 to 25 years. Because investors receive fixed income for each unit of electricity, they are insulated from market price fluctuations and can more easily access the required start-up funds.

Because RE generation is not affected by fluctuations in future fuel prices, a FIT has the potential to improve the financial attractiveness of a RE investment compared to a conventional fuel-based alternative (Waissbein et al, 2013). FITs can establish a low risk environment, which is often required as a catalyst for markets, allowing new participants to enter the market (IEA, 2011).

Designing a FIT requires policymakers to define three important attributes (Lesser and Su, 2008):

- Payment amount specified for each technology,
- Payment structure, whether fixed or decreasing, and
- Payment duration for a guaranteed period

The process of assigning these values requires policymakers to make some long-term predictions and interventions into markets, which has the potential to result in picking winners and losers with respect to renewable technologies. The difficulty during design lies in assigning a reasonable value for the FIT over its lifetime. This value is fundamentally linked to the gap between the levelized cost of energy of the RE plant and the variable cost of generation with fossil fuels. Choices made during design commit a government to a policy path for an extended period – typically in the range of 10 to 20 years.

To avoid over-rewarding investors as the costs of RE technology decrease with time, regular tariff reviews can be built into the legislation. To provide market participants with certainty, the schedule of these reviews needs to be clear and transparent (Müller et al, 2011). An alternative way of ensuring the cost-effectiveness of FITs is to introduce a limit to the capacity supported at a particular price (IEA, 2011). Another option would be to automatically link the development of tariffs to transmission 'capacity corridors' on the grid.

Assessment results

In the region, only three countries – Jordan, Palestine and Syria – have adopted FITs for RE. However, since these FITs were only introduced in 2012, not many projects have been deployed yet. In Syria particularly, with the ongoing conflict, almost all activities related to RE development have stopped. Table 13 provides details on the status of FITs in the region.

Table 13: Feed-in tariffs

	Feed-in Tariffs				
Algeria	Under development				
Bahrain	n/a				
Egypt	Under development				
Iraq	n/a				
Jordan	The Reference Pricelist Record for the Calculation of Electrical Energy Purchase Prices from Renewable Energy Sources Issued by the Council of Commissioners of Electricity Regulatory Commission Pursuant to Article (2) of The Renewable Energy and Energy Efficiency Law No (13) for the Year 2012.				
	Feed-in Tariffs (Fils/kWh)				
	Wind	Solar	PV	Biomass	Biogas
	85	135	120	90	60
Duration	Article 5 reserves the right of the Council to review Feed-in Tariffs on an annual basis or whenever needed				
Operational	Yes				
Lebanon	n/a				
Libya	n/a				
Morocco	n/a				
Palestine	Decree 2012 approved by the cabinet decision No 13/127/16 on the use of Renewable Energy				
	Feed-in Tariffs (ILS/kWh)				
	PV	Concentrated PV	Wind	Biogas landfill	Biogas animal waste
	0.9 (15-50 kW)	0.73 (up to 5 MW)	1.07 (<1 MW)	0.29 (<6 MW)	0.29 (<50 kW)
	0.72 (50 kW-5 MW)	0.71 (up to 20 MW)	0.44 (>1 MW)	0.18 (>6 MW)	0.20 (>50 kW)
	0.68 (>5 MW)				
Duration	Feed-in Tariffs are valid for 20 years and include tax exemption				
Operational	Yes				
Syria	Cabinet decree No 16202 (2011)				
	Feed-in Tariffs (Syrian Lira/kWh)				
	Solar	Wind	Biogas (waste)	Biomass	
	17 (<30 kW)	8 (<2,500 full load hours	6.5 (<500 kW)	9 (<150 kW)	
	16 (>100 kW) 15 (<1,000 kW) 13 (1,000-10,000 kW)	8 – 0.28*(number of full wind hours – 2,500)/100 (>2,500 full load hours)	4.5 (>500 kW)	7 (150-500 kW) 6.5 (>500 kW)	
Sudan	n/a				
Tunisia	n/a				
Yemen	n/a				

Source: RCREEE focal points, RCREEE Renewable Energy Country Profiles (2013)

Policy Framework

Among the current policies, FITs have been adopted for almost all commercial RE technologies except for geothermal and hydro. The major difference between the Palestinian and Jordanian FITs is their duration. In Palestine, FITs are guaranteed for 20 years, whereas in Jordan the duration is not clear.

In Egypt and Algeria, FITs are currently under development. In Algeria, this will be a second attempt to introduce FITs. In 2004, through the executive decree 04-92 (2004), Algeria introduced technology-specific price premiums for electricity produced from renewable sources. The incentive scheme envisaged paying a premium to RE ranging from 5% to 300% above electricity market prices. However, this initiative has failed to attract any investments in renewables and until now no private projects have been deployed. This result might be explained by a few important factors. Primarily, the Algerian average price of electricity in 2011 was 5.5 US cents for residential customers and 4.4 US cents for industrial customers. The second important factor is the structure of the Algerian FIT, which appears to be modeled after the original German Renewable Energy Law system, later adopted by Spain. The tariff is set as a percentage of the retail price, with hydro set at 100%, CSP and waste at 200%, and wind and non-CSP solar at 300% of retail price (Gipe, 2009). However, the policy lacked a clear definition of market electricity upon which the calculation of price premiums were based (CREAD, 2010). The third factor is the maximum capacity eligible for tariff payment, which was set at 50 MW. The Algerian power market operator sets electricity prices, so any prospective developer needs to weigh the risks associated with an artificially set price acting as the benchmark for their FIT payments. Based on private developers' response, or lack thereof, the value proposition seems to be unattractive. The Algerian case illustrates the complexity of designing an effective FIT policy.

3.2.3 Net Metering

Why this indicator?

Net metering is a billing mechanism that allows residential and commercial customers who generate their own electricity to feed the excess unused electricity back to the grid. When more electricity is generated than consumed on-site, the excess is fed back to the grid, providing a credit against electricity consumed. Customers are billed only for their "net" energy use, or in other words the deduction of energy outflows from metered energy inflows. The possibility of exporting power to the grid reduces monthly electricity bills and can empower customers.

Net metering is distinguished from other policies that promote RE in several key ways. First, unlike many incentives, net metering is not short-term and does not have an end date. Second, net metering places the economic burden on the private utility industry and is of little to no cost to the state. Although some utilities perceive this system as a loss of revenue opportunity, net metering policies create a smoother demand curve for electricity and therefore allow utilities to better manage their peak electricity loads. Finally, by encouraging energy generation at the point of consumption – and consumption near the point of generation – it reduces the strain on distribution systems, hence preventing losses in long-distance electricity transmission, distribution and transformation (SEIA, 2013).

Assessment results

In the region, almost half of the countries have adopted a net metering policy. In Lebanon and Egypt excess electricity is fed to the grid and deducted from the bill for the following month. In Jordan, Palestine, Syria and Tunisia the excess electricity is purchased at preferential prices. Table 14 outlines the state of net metering policy in the region.

Table 14: Net metering policy

	Net Metering Policy
Algeria	n/a
Bahrain	n/a
Egypt	- Decision of Egyptian Electric Utility and Consumer Protection Agency on regulating rules to encourage the exchange and usage of electrical power produced from solar energy adopted during its fourth session for 2012/2013 financial year on 29/01/2013
Iraq	n/a
Jordan	- Law No 13 (2012) on Renewable Energy and Energy Efficiency - Directive governing the sale of electrical energy generated from RE 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)
Lebanon	- Decision of Board of Directors of Electricité du Liban (EDL)
Libya	n/a
Morocco	n/a
Palestine	- Decree approved by the cabinet in March 2012 decision No 13/127/16 on the use of Renewable Energy
Syria	- Electricity Law No 32 (2010)
Sudan	n/a
Tunisia	- Decree of the Ministry of Industry, Energy and Small and Medium-Sized Enterprises No 2009-2773 dated 28 September 2009, fixing the transport conditions of electricity produced from renewable energies and sale of its surpluses to the Tunisian company of electricity and Gas - Decision of Minister dated 1 June 2010
Yemen	n/a

Source: RCREEE focal points, RCREEE Renewable Energy Country Profiles (2013)

Of six countries with a net metering policy, it is implemented in only three: Palestine, Jordan and Tunisia. In these countries net metering is mostly used in small-scale decentralized PV systems. In Syria, net metering has not been implemented mainly due to the difficult political situation that has hindered all development in RE. In Egypt, the policy has not been implemented since it was just adopted in January 2013. The policy in Lebanon has been tested in very few cases, so it can hardly be considered as implemented. The major obstacle for wider implementation of net metering in Lebanon is the frequently interrupted power supply. Net metering is effective only if customers are consistently connected to the grid in order to have a two-way transfer of energy. Customers cannot feed-in excess electricity to the grid during outages, and subsequently cannot benefit from a net metering policy. In Lebanon, outages range from three hours a day in Beirut to 12 hours a day in rural areas (Hasbani, 2011).

It is important to note that net metering is more effective as an incentive mechanism for RE in markets with unsubsidized electricity prices. In countries with low electricity prices, net metering has a small effect as an incentive mechanism due to the wide gap between investment cost and potential for electricity savings.

3.3 Energy Subsidies

Why this indicator?

Fostering RE development is one step in transformation towards sustainable energy development. However, phasing out fossil fuel subsidies is essential to ensure the effectiveness of this transformation. A transition to sustainable energy development must happen with the 'system approach' in mind, where actions should be taken at all levels (Liebreich M., 2013). Keeping current fuel subsidies in place will keep fossil-dependent energy system embedded longer, causing tremendous damages to the environment and society as a whole (Ochs and Makhijani, 2012). Fossil fuel consumers worldwide continue to receive much higher subsidies than the RE industry. According to the IEA, global fossil fuel subsidies in 2011 amounted to USD 523 billion, five times higher than subsidies for renewables of USD 110 billion (EWEA, 2013). Considering that almost 50% of global fossil fuel subsidies take place in the Middle East and North Africa, and that the RE industry in this region receives very little support from governments, this subsidy difference is much higher in the region (IMF, 2013).
Energy subsidies are high in the Arab region for both oil exporting and importing nations (IMF, 2013). Subsidies on average constitute more than 20% of governments' expenditures (ESMAP, 2009). In Egypt, energy subsidies accounted for 21% of the 2010 fiscal year budget and 73% of total subsidies (Castel, 2012). All countries in the region subsidize fossil fuel products, and most subsidize electricity (ESMAP, 2009; RCREEE, 2010).

Various studies have been undertaken to assess the impact of energy subsidies on national economies. A general consensus exists that, despite social and economic goals that are targeted by subsidies for electricity and fuel, they have a negative net effect, both on individual countries and on a global scale (Ellis, 2010). The biggest negative impact of electricity and fuel subsidies is price distortion, which in turn creates inefficiencies that lead to negative environmental, economic and social impacts.

Energy subsidies encourage inefficient allocation of scarce resources, and wasteful and irrational consumption of energy. Furthermore, they discourage investments and efforts to develop more efficient systems. Fuel subsidies provided to power generators, through the sale of subsidized gas and oil to state-owned utilities, distort the competitiveness of renewables and prevent RE from competing on a level playing field with conventional technologies.

When governments set the prices at which electricity will be purchased from producers, there is a stability effect, but also a distortion of market pricing. Low prices currently tend to favor conventional power production, because initial costs are low with continuous fuel expenditures, which may be subsidized by the state if it has the resources available. Comparatively, RE requires high upfront investment with low expected operating expenditures. Private investment is thus

only likely if grid parity makes today's prices competitive with existing sources, which is currently not the case throughout most of the Arab countries.

How is this indicator measured?

Estimating the exact value of subsidies is a challenging task due to different forms they may take, modes of implementation, poor data quality and availability, secrecy of information and lack of transparency. The most common approach used in estimating subsidy levels is the so-called 'price-gap approach', which compares domestic retail prices for fuel products against a certain benchmark or reference price. The major limitation of this method is the existence of disagreements among various stakeholders of what constitutes the proper reference price because a benchmark price may involve taxes and other charges, which represent significant components of retail fuel prices (El-Katiri, 2012; ESMAP, 2009).

The price-gap approach has the advantage of capturing built-in consumer subsidies, especially those provided by net oil-exporting countries offering fuels at below-market prices to their citizens. The price-gap approach does not identify upstream subsidies to producers due to losses incurred by inefficient operation or discounted prices paid for fuel (IMF, 2013).

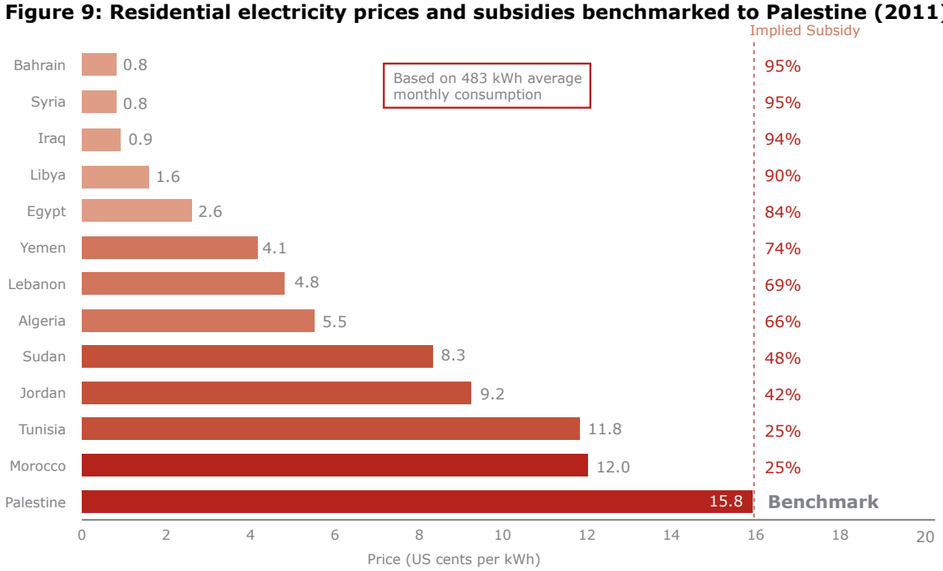
Given the complexity of the issue and the crucial importance of energy subsidies for development of RE, a proxy has been developed by RCREEE to estimate electricity subsidies in the region based on the price-gap approach, where Palestine's prices are used as a reference price. Palestine has very little power generation capacity and imports substantially all of its electricity. Electricity prices in Palestine are close to international prices and represent the approximate true retail cost. In all other RCREEE member states, prices are currently set by the national governments.

Assessment results

Data on Arab electricity prices for residential and industrial customers are presented in Figures 9 and 10, respectively. These represent a typical customer, based upon average monthly consumption in the 13 RCREEE member states. In 2011, for residential customers the average consumption was 483 kWh per month, and for industrial customers the average was 30,579 kWh per month (AUE, 2012). The price per kWh has been identified for an equal consumption level in each country using local utility rate structures. The electricity prices paid in each country are shown in the figures. The difference between Palestine's benchmark price and the price paid in each country is referred to as the implied subsidy.

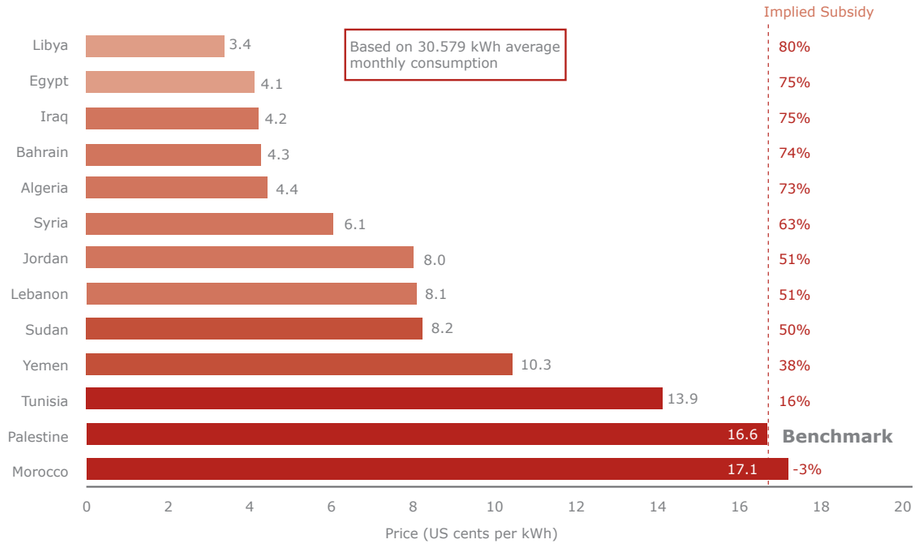
The residential electricity sector is the most heavily subsidized, with implied subsidies ranging from 25% in Morocco to 95% in Syria and Bahrain. For industrial customers, more of the true costs are passed through, with some countries charging a flat rate and others employing multiple price tiers. The implied subsidy levels reflect this, with the highest discount being 80% in Libya and the lowest in Morocco, where the price is actually 3% higher than the benchmark. There are several reasons for this situation in Morocco, including its high dependency on fuel imports, interconnection with the higher-priced Spanish market, a planned shift towards a deregulated market, and its pursuit of RE development. Taken together, these factors have led the government to set electricity prices higher than its Arab neighbors.

Figure 9: Residential electricity prices and subsidies benchmarked to Palestine (2011)



Source: Arab Union of Electricity (2012a, 2012b), developed by B. Samborsky, RCREEE

Figure 10: Industrial electricity prices and subsidies benchmarked to Palestine (2011)



Source: Arab Union of Electricity (2012a, 2012b), developed by B. Samborsky, RCREEE

A limitation of this method for estimating subsidy levels is the assumption that more or less similar fuel types are used for generation, and the cost of electricity production is similar within the region, which is not necessarily the case. In Sudan, for example, 58% of electricity is hydro-based and in Egypt 10.2% is produced from renewables, but on average 92.1% of the region's electricity is generated from fossil fuels (AUE, 2011). The goal of this indicator is not to provide a precise measure of subsidies, but rather depict the current situation of subsidies in the power sector on a relative basis.

Wind turbines shipping operation to Libya
Photo provided by: Marwan Assar, Egypt

3.4 Rank under Policy Framework Category

Tables 15 and 16 present final scores under the Policy Framework category. Morocco consistently leads in the RE commitment factor because it has clearly defined targets, with the largest share of RE generated and also the most RE projects under construction. Under the first indicator 'RE targets', Bahrain scores the lowest, as it is the only country in the region not having formulated any RE targets. Under the 'RE share' indicator three countries score the lowest: Bahrain, Iraq and Sudan. These countries currently have no RE generation in place. The least promising results are observed under the 'RE projects under construction' indicator where eight countries share the lowest score. This means that in upcoming years, most likely no additional generation of RE can be expected from these countries aside from small-scale PV projects.

Table 15: Final scores under Policy Framework category – RE commitment

	RE Targets	RE Share			RE Projects under Construction
		Wind	PV	CSP	
Algeria	100	10	10	44	11
Bahrain	10	10	10	10	10
Egypt	100	42	25	19	15
Iraq	55	10	10	10	10
Jordan	100	11	25	10	10
Lebanon	55	10	18	10	10
Libya	55	10	33	10	14
Morocco	100	100	100	100	100
Palestine	100	10	32	10	10
Sudan	55	10	10	10	10
Syria	55	10	16	10	10
Tunisia	55	48	48	10	20
Yemen	100	10	56	10	10

Under the supporting policies factor there are two leading countries: Jordan and Palestine. These countries have recently adopted quite progressive policies for RE development. They both introduced feed-in tariffs, net metering policies with preferential purchase prices for excess electricity, and the option for direct proposal submission. Now it remains to be seen if Palestine and Jordan can maintain the functionality of these support schemes.

Overall among the supporting policies, PPA bidding appears to be the most preferred policy instrument by countries, followed by net metering. Seven of the 13 countries have identified resources for private development through a public competitive bidding process. Under the energy subsidies factor, the leading countries are Morocco and Palestine with the highest electricity prices in the region, hence almost unsubsidized electricity markets. This creates realistic market conditions for uptake of RE projects.

Table 16: Final scores under Policy Framework category – supporting policies, energy subsidies

	PPA Bidding	Direct Proposal Submission	Feed-in Tariffs	Net Metering	Energy Subsidies Residential	Energy Subsidies Industrial
Algeria	10	10	10	10	37	29
Bahrain	10	10	10	10	10	29
Egypt	44	10	10	40	22	35
Iraq	10	10	10	10	11	10
Jordan	66	100	100	100	60	50
Lebanon	44	10	10	100	35	50
Libya	10	10	10	10	15	23
Morocco	100	10	10	10	76	100
Palestine	10	100	100	100	100	97
Sudan	10	10	10	10	55	51
Syria	33	40	40	40	10	39
Tunisia	10	10	10	100	76	82
Yemen	21	10	10	10	30	62

Figure 11 reports the final scores and ranks of the countries under the Policy Framework category. In this category Morocco continues to lead. Morocco has demonstrated strong commitment to RE by adopting ambitious targets and, more importantly, by supporting these targets with concrete actions. Morocco pursues a market-driven approach to its energy development by keeping its prices almost unsubsidized. This makes RE technology competitive and more attractive as an option for power generation. Morocco needs to strengthen its support mechanisms to facilitate accelerated development of RE. Palestine and Jordan rank second and third. Both countries have recently adopted progressive supporting policies for RE, which can hopefully lead to more rapid deployment of RE. Palestine performs better here mostly due to its higher electricity prices, which set the benchmark. Tunisia takes the next spot, with supporting policies for small-scale generation of RE and higher than average electricity prices; however it has no regulatory framework for development of large-scale RE. The lagging countries have very little or no RE generation in practice, have no effective supporting policies in place and are characterized by heavily subsidized electricity prices.

Figure 11: Final scores and rank under Policy Framework category

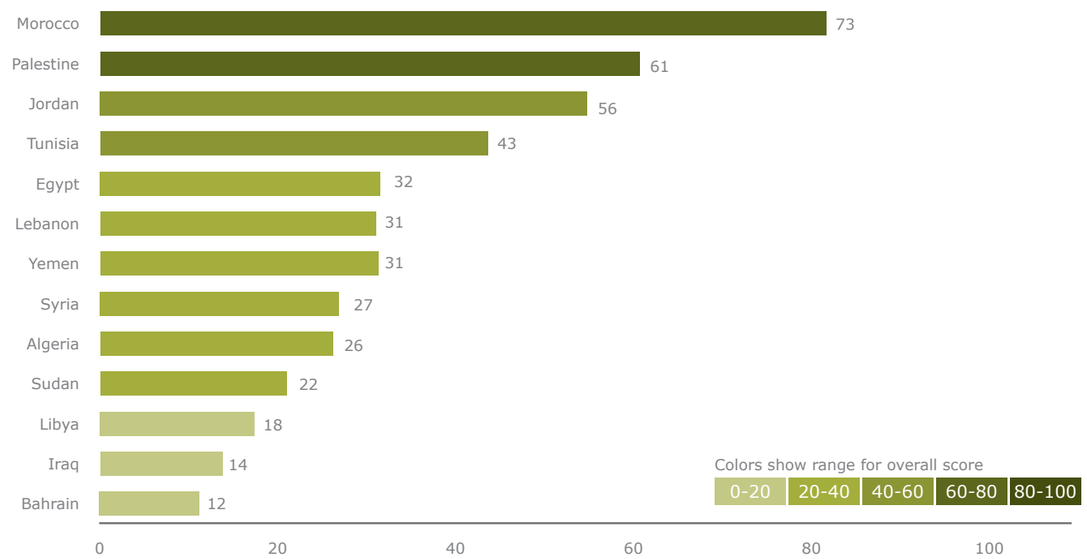
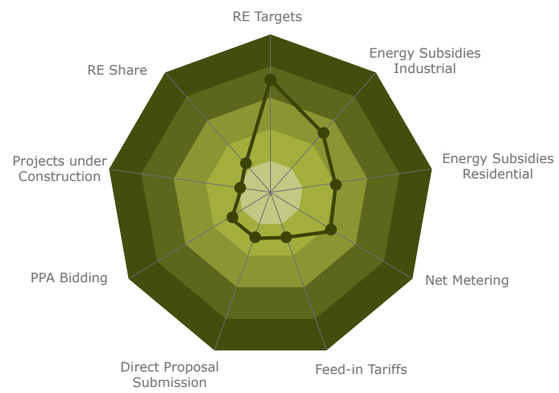
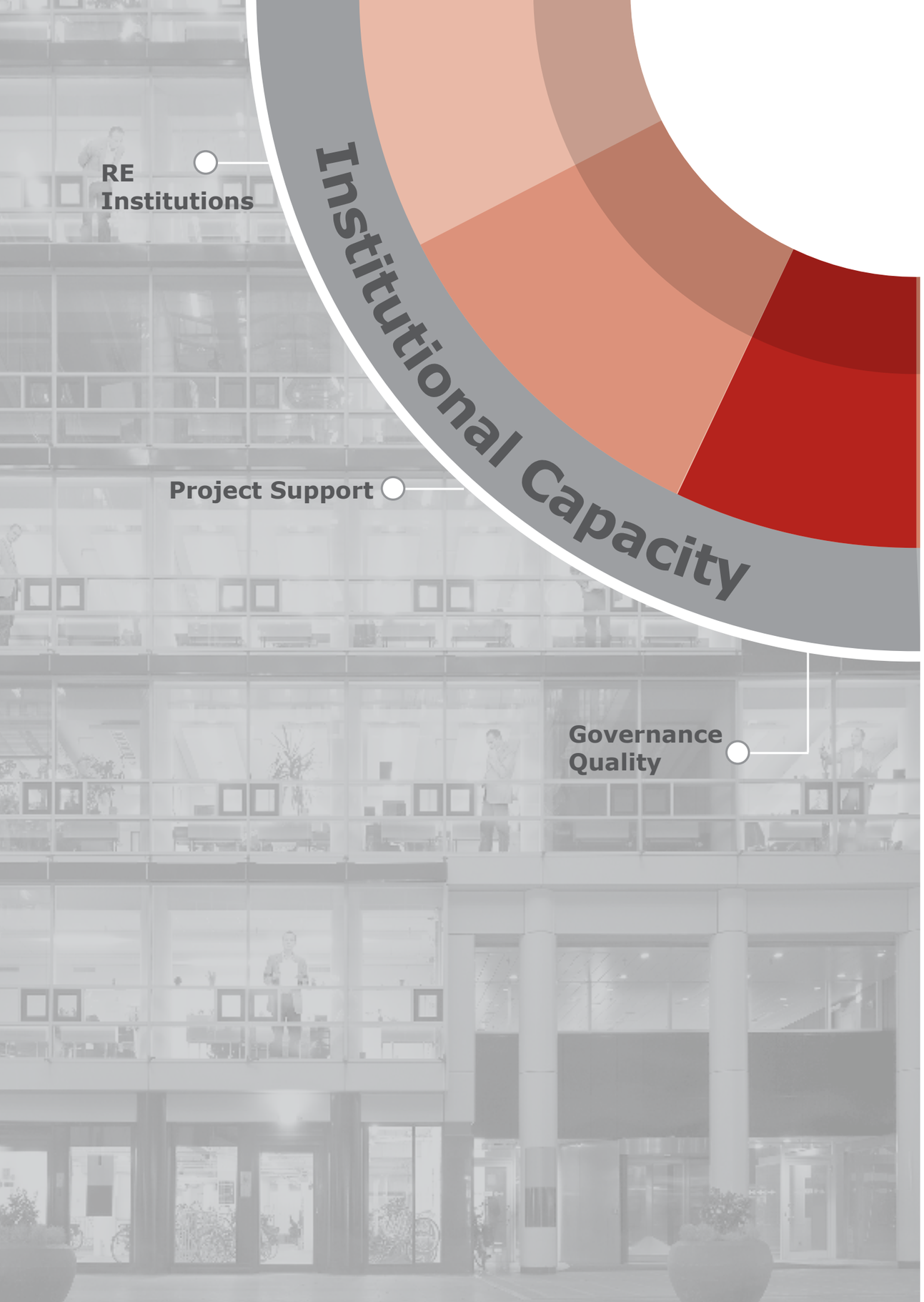


Figure 12 presents the average regional performance under the Policy Framework category. The assessment includes three main factors: the level of commitment for pursuit of RE, effectiveness of existing supporting policies and the current conditions for uptake of RE development. As can be observed from Figure 12, the level of commitment from countries in the region is relatively high, as most have adopted long-term RE targets. However, the supporting policies in most countries are still absent or ineffective. The region in general still has not created a policy framework that makes RE an attractive investment. Most countries also continue to subsidize electricity generation from fossil fuels, keeping alive the fossil-dependent energy systems and impeding the development of RE. Only Morocco can be highlighted as a country that has demonstrated real progress and commitment towards RE in the policy realm.

Figure 12: Average performance of countries under Policy Framework category



Arab Future Energy Index (AFEX)
Renewable Energy



4. Category 3: Institutional Capacity

Institutional setup requires both organization and implementation. This means that institutions need to be organized to effectively support the goals of the state, and also that the processes must align with those goals to deliver adequate results. Good governance requires transparency, accountability, stakeholder participation and capacity. The Institutional Capacity category assesses the capacity of states to design RE policies and provide institutional support to deployment of RE projects. Strong institutional capacity is critical to ensure meeting RE targets. It consists of three factors: (1) RE institutions; (2) project support; and (3) governance quality. These factors and the seven indicators that inform them are described in Table 17. An indicator for project lead time is not assessed this year due to lack of data, but will be included in the assessment for the next edition of AFEX Renewable Energy.

Table 17: Institutional Capacity

Category	Factors	Indicator	Score/Measuring Unit
Institutional Capacity	RE Institutions	Independent Regulator	Established by law Non existent
		RE Agency	Established by law Non existent
		Capacity of RE Institutions	Expert assessment from 1 to 10
	Project Support	Resource Quality Assessment	Detailed wind atlas published Detailed solar atlas published
		Land Access	Land allocated for private development of large-scale wind projects Land allocated for private development of large-scale solar projects
		Project Lead Time	
	Governance Quality	World Bank Ease of Doing Business Index	Rank under WB Ease of Doing Business Index
		Bertelsmann Stiftung's Transformation Index (BTI)	BTI scores

4.1 RE Institutions

4.1.1 Independent Regulator

Why this indicator?

Stable, reliable and transparent management of the power sector plays an important role in ensuring investor confidence and trust. This requires establishing a well-functioning independent regulator with sufficient competencies in key areas such as tariff-setting, license issuance, power sector monitoring and sanctioning (Bjork et al, 2011; Dii, 2013). The main role of an independent regulator in liberalized markets is to ensure a balance between competing interests of various stakeholders in electricity markets such as power producers, transmission and distribution companies and, most importantly, power consumers. Based on experience in Europe, the 3rd EU Energy Market Directive offers guidelines on best practices for well-functioning independent regulators. Independent regulators must be legally distinct and functionally independent from any private or public entity. Moreover, regulation should generally follow a common, clear and transparent methodology. Therefore, it is important for decisions to be rules-based. Case-by-case decisions based on the discretion of public bodies should be kept to a minimum (Dii, 2013).

Tariff setting is one of the key functions of independent regulators. They need to ensure that, on one hand, electricity tariffs are affordable to customers and, on the other, allow investors to recover costs of operation and earn a return sufficient to attract capital investment (Bjork et al, 2011). This role is especially important when developing FITs or other forms of purchase price mechanisms for RE. To implement these duties properly, an independent regulator needs to possess a high level of expertise and be equipped with needed powers, roles and responsibilities.

In promoting RE, independent regulators can play a key role because they have a deep understanding of the energy market, but also the powers to regulate it. As such, depending on the extent of their powers, independent regulators can set and approve transmission and distribution tariffs; create streamlined rules or exemptions for small RE producers and distributed generation; ensure open access to the network and facilitate interconnections; encourage RE through developing various preferential pricing mechanisms such as FITs; apply net metering policy to encourage distributed self-generation of RE; draft templates or model PPAs for RE; and issue other rules and regulations facilitating RE development (Bjork et al, 2011).

The existence of a well-functioning independent regulator contributes to predictability and stable, competitive framework conditions for investment in the market and therefore can reduce risks. Particularly in monopolized markets, independent energy regulators are needed to increase the engagement of investors by liberalizing the energy market and ensuring that all activities in the context of electricity generation, transmission, distribution, and

marketing are carried out in accordance with the laws and regulations.

Assessment results

Most countries in the region have started market liberalization processes. Although the extent of liberalization varies greatly, overall electricity markets in the region can presently be characterized as monopolies. Most power generation, transmission and distribution still remains heavily state influenced. Despite the fact that IPPs are authorized in most countries and already exist in half of them, only a few countries have established independent regulatory authorities. Table 18 describes the current status of independent regulators within the region.

Table 18: Independent regulators and transmission systems operators

	Independent Regulator	Transmission Systems Operator
Algeria	Commission de Régulation de l'Electricité et du Gaz (CREG)	Société Algérienne de Gestion du Réseau de Transport de l'Electricité (GRTE)
Bahrain	Electricity and Water Authority (EWA)	Electricity and Water Authority (EWA)
Egypt	Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA)	Egyptian Electricity Transmission Company (EETC)
Iraq	Non existent	Directorate of Transmission Directorate of Transmission Project
Jordan	Electricity Regulatory Commission	National Electric Power Company (NEPCO)
Lebanon	Non existent	Electricité du Liban (EDL)
Libya	Non existent	General Electricity Company of Libya (GECOL)
Morocco	Non existent	Office National d'Electricité (ONE)
Palestine	Palestinian Electricity Regulatory Council (PERC)	Palestinian Electricity Transmission Company Ltd. (PETL)
Sudan	Electricity Regulatory Authority (ERA)	Sudan Electric Transmission Company (SETCO)
Syria	Non existent	Public Establishment for Electricity Generation and Transmission (PEEGT)
Tunisia	Non existent	Société Tunisienne d'Electricité et du Gaz (STEG)
Yemen	Non existent	Public Electricity Corporation (PEC)

Source: RCREEE focal points

As can be noted in the table, only five countries have established independent regulators. However, the independence of these regulators from state authorities and political processes leaves room for improvement. Regulatory authorities in these countries often do not have clearly defined power and are not entirely independent. Governments often have powers to overrule the decisions of regulators. In countries where independent regulators do not exist, the functions are usually performed by national utility operators or transmission systems operators.

Of all countries, in Lebanon particularly the lack of an independent regulator has been a serious obstacle to improvement of the power sector and development of RE. As described earlier, Lebanon adopted the Law No 462 in 2002, entrusting the independent regulator with the power of issuing power generation licenses to IPPs. But because an independent regulator was never established there is no entity to issue power generation licenses, resulting in wide-scale illegal power generation.

4.1.2 RE Agency

Why this indicator?

Institutional and administrative barriers are major obstacles to RE development. This includes complicated, lengthy, non-transparent permitting procedures; involvement of too many public authorities; lack of clarity of institutional framework and others. Understanding what to expect during the development process is crucial for potential investors, and administrative tasks can act as significant barriers when they are not clearly defined. Many countries around the world have established dedicated RE agencies with the purpose of overcoming some of these barriers and accelerating the development of RE.

The RE agency should be a dedicated body with an ability to design RE policies, streamline administrative procedures, assist in deployment of private RE projects and lead deployment of demonstration and other public RE projects. An essential function of RE agencies is effective coordination among various stakeholders, including private developers and state institutions to ensure more efficient use of existing human, capital and technical resources in achieving RE targets. In countries where governments receive donor support for RE development, RE agencies can act as counterparts in negotiating and coordinating donor agreements. Dedicated RE agencies can also play an important role in raising awareness, conducting resource quality assessments, conducting feasibility studies and promoting research and development. This requires sufficient resources, competent and specialized staff and committed leadership.

Assessment results

In the region, again almost half the countries have established dedicated agencies for RE. However, these institutions vary greatly in their technical and human capacities. Some countries such as Morocco have established more than one agency to promote RE. Table 19 lists RE institutions in the region.

Table 19: RE institutions

	RE Policy Maker	Dedicated RE Agency	RE Research Institutions
Algeria	Renewable Energy and Energy Conservation Directorate within Ministry of Energy and Mines	Compagnie d'Engineering de l'Electricité et du Gaz (CEEG), filiale du Groupe Sonelgaz Sharikat Kahraba Takate Moutajadida «SKTM», filiale du Groupe Sonelgaz	Center for development of RE (CDER) Silicon Technology Development Unit (UDTS) Unit Development of Solar Equipment (UDES) Center for Research and Development of the Electricity and Gas (CREDEG)
Bahrain	Renewable Energy Unit within the Electricity and Water Authority	Non existent	
Egypt	Ministry of Electricity and Energy	New Renewable Energy Authority (NREA)	Energy Research Center, Cairo University
Iraq	Renewable Energy and Environment Center under the Ministry of Electricity	Non existent	Research Center for Energy and Environment under Ministry of Science and Technology Research Center under Ministry of Higher Education and Scientific Research (universities and institutes) Renewable Energy and Environment Research Center under Ministry of Industry
Jordan	Ministry of Energy and Mineral Resources	Non existent	National Energy Research Center (NERC)
Lebanon	Ministry of Energy and Water	Lebanese Center for Energy Conservation (LCEC)	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	Ministry of Electricity and Renewable Energy	Renewable Energy Authority of Libya (REAoL)	Center for Solar Energy Research and Studies (CSERS)
Morocco	Direction of Electricity and Renewable Energies within Ministry of Energy, Mines, Water and Environment	Moroccan Agency for Solar Energy (MASEN) Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE) Société d'Investissements Energetiques (SIE)	Institut de Recherche en Energie Solaire et Energies Nouvelles (IRESEN) Centre National pour la Recherche Scientifique et Technique (CNRST)
Palestine	Palestinian Energy Authority (PEA)	Palestinian Energy and Environment Research Centre (PEC)	Palestinian Energy and Environment Research Centre (PEC) Energy Research Centre (ERC) at An-Najah National University.
Sudan	Directorate for Renewable and Alternative Energy within Ministry of Water and Electricity	Non existent	National Center for Energy Research (NCR)
Syria	Ministry of Electricity	National Energy Research Center (NERC)	Scientific Studies and Research Center Higher Institute for Applied Sciences and Technology Research Centers in universities; mainly Damascus University Industrial Research and Testing Center
Tunisia	Ministry for Industry / General Directorate of Energy	Agence Nationale pour la Maîtrise de l'Energie (ANME)	Centre de Recherche et des Technologies de l'Energie (CRTEN)
Yemen	Renewable Energy Department within the Ministry of Electricity and Energy	Non existent	Renewable Energy and electronic design Centre, University of Science and Technology Technical Centre for Training and registration – Dhahban, Public Electricity Corporation (PEC)

Source: RCREEE focal points

As can be observed from the table, five out of 13 countries have established dedicated RE agencies. Of these countries, Morocco has three agencies dedicated to promoting RE: MASEN, ADEREEE and SIE. ADEREEE has a more general mandate covering both RE and energy efficiency, whereas MASEN has been created specifically to promote solar energy in Morocco and assist the government in achieving its target of 1,000 MW by 2020. SIE is a state-owned investment company established to assist Morocco in achieving its RE targets, mainly wind energy targets. In countries where there are no dedicated RE agencies, activities related to promoting RE usually fall under the auspices of one of the ministries such as electricity or energy.

4.1.3 Capacity of RE Institutions

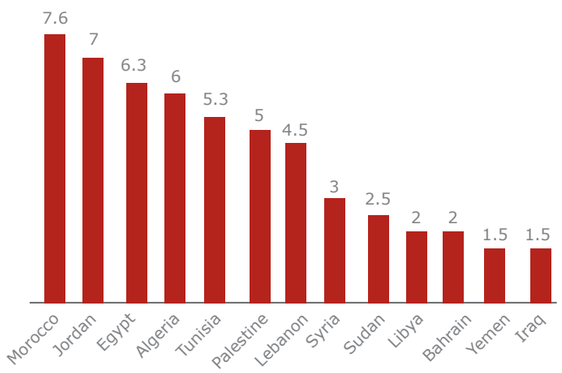
Why this indicator?

Establishing agencies dedicated to promoting RE is only part of the process in creating a strong institutional framework. The more important part is their output and success in addressing barriers to RE development, designing policies, streamlining procedures and creating favorable conditions for development of RE. This indicator is assessed by expert survey from three regional organizations working in the field of RE: Dii, Paving the Way for the Mediterranean Solar Plan (PWMSP) and RCREEE. Experts assessed the institutional capacity based on a number of criteria outlined below and on their own experience of working in the region and interacting with institutions. The criteria for assessment included: (1) number and quality of support policies designed; (2) level of institutional support available to RE projects; and (3) current share of RE in the energy mix. Experts were asked to assess institutional capacity from 1 to 10, where 1 stands for weak and 10 for sufficiently strong. This is the only indicator in AFEX Renewable Energy assessed through expert survey.

Assessment results

According to experts' assessment, no country in the region has an institutional capacity that could be evaluated as sufficiently strong. At the same time there is no country in the region that scored the lowest score possible. According to the aggregate average results of experts' assessment the highest score of 7.6 is given to Morocco, followed by Jordan and then Egypt. Figure 13 illustrates the aggregate average results of the experts' assessment of institutional capacity within the RCREEE member states.

Figure 13: Expert assessment of institutional capacity



Source: RCREEE

4.2 Project Support

4.2.1 Resource Quality Assessment

Why this indicator?

Identifying and assessing the power generation potential of natural resources is essential for establishing a business case. The local variation of wind and solar resources presents the greatest risk associated with electricity generation. Detailed data on wind speed and irradiation can reduce risk for developers, and potentially allow for lower costs during development (Dii, 2013). The accuracy of the data is important since the quality of renewable resources differs depending on the location, time, season and climatic zone, so inaccurate information can jeopardize the profitability of RE projects. Hence, a reliable, transparent, detailed and accurate mapping of resource quality is essential for site qualification, technology selection and optimum design of RE power plants. Site selection is an important step in assessing the viability of the project. The main purpose is to maximize output and minimize cost. It usually includes an assessment of the quality of the natural resource, local climate, available land area, land use, topography of the area, geotechnical and geopolitical considerations, accessibility, grid connection and other factors (IFC, 2012).

Data quality is particularly important for energy yield prediction: PV requires data on global horizontal irradiation (GHI), temperature, annual and inter-annual variation, impact of shading, and air pressure; CSP plants require data on direct normal irradiation (DNI) and also information on airborne dust, haze or smog. Wind plants require data on wind density, wind speed distribution, wind direction, and wind speeds at different heights to a minimum of 80 m. For each of the resources, data should ideally be collected for at least one year without interruption. For wind, two years is usually required to provide confidence. The quality of the collected data is highly dependent upon proper maintenance of the measurement devices. Since solar and wind resources can experience large fluctuations annually, for instance DNI can vary by up to 30% from one year to another, data series

of 10 years or more should ideally be compiled to increase confidence in the long-term yield prediction (Dii, 2013; IFC, 2012).

Although use of satellite and meteorological data can provide important information, satellite data on its own is not sufficient, as it can result in over-estimation of energy yield due to exclusion of the effects of near-ground haze. Hence, local data based on site measurements are important to generate more accurate data (IFC, 2012).

Assessment results

In the region, several countries have already issued detailed wind and solar atlases. It appears that these resource quality maps are based on data from measurement stations, although the number of stations installed varies significantly between the countries. Table 20 indicates the status of various national resource quality assessment initiatives.

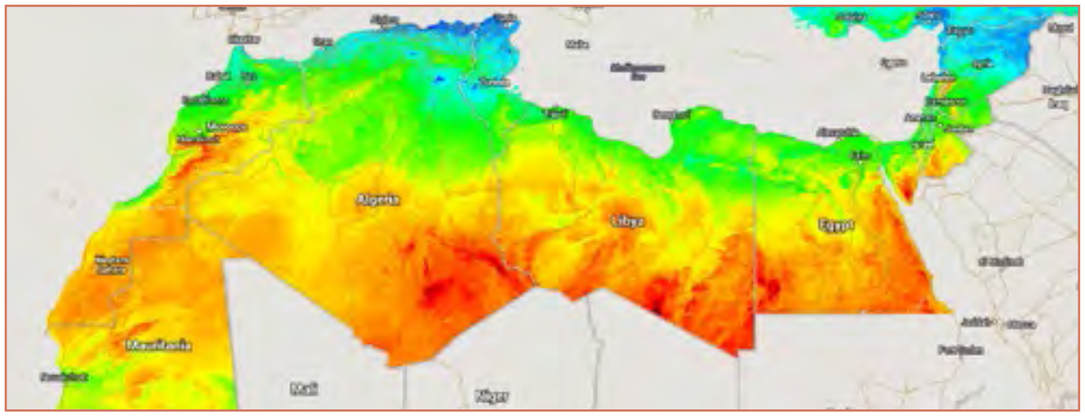
Table 20: Resource quality assessment

	Detailed Wind Atlas Published	Approximate Number of Stations	Detailed Solar Atlas Published
Algeria	No	17	yes
Bahrain	Assessment of wind resources were completed in 2012	Data not available	Assessment of solar resources were completed in 2012
Egypt	Yes in 2005	30	No
Iraq	No	Data not available	No
Jordan	Yes in 2007	38	Yes in 2007
Lebanon	Yes in 2012	Data not available	No
Libya	No	16	No
Morocco	yes	>50	yes
Palestine	No	Data not available	No
Syria	yes	49	Yes in 1994
Sudan	Wind measurements were completed in 2011, but detailed wind atlas is not published	Data not available	No
Tunisia	yes	75	No
Yemen	Yes in 2006	Data not available	No

Source: RCREEE focal points, Dii (2013)

Although the countries have done some resource quality assessment, the data are often not easily accessible by project developers, which undermines the value of resource quality assessment. Often, results are neither available in electronic format nor in hard copy. In many cases the data are outdated or lack the necessary quality and level of detail to allow for reliable energy yield prediction (Dii, 2013).

To assist countries in assessing the potential of their natural resources, the solar atlas for the Mediterranean project "Solar-Med-Atlas" has been launched, which is a web portal for GHI and DNI data for the Southern and Eastern Mediterranean region.[19] The Solar-Med-Atlas is a platform delivering easy access to free basic solar resource information with enhanced details and a number of tools to efficiently utilize the data. It provides high resolution, long-term solar resource maps for most of this region. The project brings 1x1 km resolution and 20 years coverage (1991 to 2010) data for the targeted area. The resource data are derived from Earth Observation satellite data where the data are validated with existing ground measurements in the region. The project was led by the German Aerospace Center (DLR) that cooperated with a consortium of firms including RCREEE and was funded by the German International Climate Initiative.



19 The web address of the Solar-Med-Atlas project: http://www.solar-med-atlas.org/solarmed-atlas/map.htm

It should be noted that the Solar-Med-Atlas available data and tools aim to increase the awareness and to lower the risk in the preliminary decisions for a wide spectrum of users. Governmental and public organizations can use the information to design successful policies to deploy solar energy in the local or national energy systems. Installers or planners of small systems, such as rooftop PV and solar water heating, and project development companies for larger projects can use the information as a first estimation to initiate the project development. By design, the Solar-Med-Atlas offers only basic information while allowing other companies and service providers to focus on customized and value-added services based on specialized commercial data products and consultancy services for specific sites and projects.

4.2.2 Land Access

Why this indicator?

One of the crucial elements for project developers is easy access to land. Unlike developers of conventional plants, RE project developers have less flexibility in choosing a location for RE deployment since the competitiveness of the project strongly depends on having access to the best natural resources. Thus securing access to land with high RE potential for the entire duration of the project is necessary for private developers. Complexity, non-transparency and instability of land regulations can substantially increase the transaction costs and discourage investment. Facilitating access to land is one of the central elements in unlocking investments in RE and should be facilitated without entailing excessive administrative burden for foreign investors (Dii, 2013). What is particularly important for investors is not freely available land for RE development, but rather having clear, transparent procedures in place to obtain the land and guarantee of non-expropriation of the land in later stages.

Best practices to facilitate land access for the development of RE projects include *ad hoc* instruments, which do not require substantial changes in the general framework. For this purpose, MENA countries can specify priority areas for the development of RE. The government should identify the landowners in these priority areas, and for state-owned sites should set up a transparent mechanism to grant access. Legal texts should explicitly provide for the right to acquire sites and rights-of-way that are necessary to implement authorized RE projects following a regulated process of legal expropriation.

Assessment results

Currently, the regime for land ownership in the region is complex, particularly in the regions where tribal communities have more control over the territory than government authorities, such as in Yemen and Libya. Land access is further complicated for foreign investors who, in most cases, need prior authorization or are obliged to have local partner company. In Tunisia, for example, prior approval from the government is required for land purchase, and in Egypt there is a 51% local ownership clause for purchase of desert land outside urban areas. Although for some sites such as industrial facilities and tourist resorts these barriers are being removed, the limitations for remote sites still remain (Dii, 2013).

An additional challenge involves identifying the current owner of property when considering a land purchase. Although most countries in the region have a register for titles of legal ownership, participation is not strictly mandatory and registration tends to be limited. This lack of adherence is typically most common in the non-urban areas that are most attractive for RE projects, which can complicate the process for a potential developer (Dii, 2013).

In the region, only Egypt and Morocco have undertaken initiatives to facilitate land access for private developers. In Jordan, the government has identified a special zone to spur industrial development and innovation called the Ma'an Development Area. Within this zone, Jordan has dedicated areas for development of solar projects. In Morocco the government has identified priority development zones for RE projects. In these particular zones the government facilitates access to land for investors. Identifying such zones is a good start in improving the process; however, it is still the individual responsibility of private developers to secure the land for RE generation.

In Egypt 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 and Renewable Energy Authority (NREA). NREA has already reserved 600 MW from this land for RE self-producers. Land is typically distributed to private developers through the PPA competitive bidding process.

Recognizing the importance of the land use agreements of public-owned lands to be used for RE projects as a legally binding agreements that needs to be carefully drafted, discussed, and reviewed, and the subsequent long-term effects on the public authority owning or possessing the land use right and also on the land itself. In 2012, RCREEE introduced a generic land use agreement model to its member states, where they can adapt and embed their particular considerations, their own legal context, local laws and tax obligations into the basic model to ensure that their objectives will be achieved and their legal interests will be protected before entering into any binding land use agreements.

4.3 Governance Quality

The countries of the Arab region are currently experiencing a transition within a transition. The landscape for RE worldwide is evolving into a mature, traditional energy industry, with a shift from reliance on government support to stand-alone economics that attract sophisticated utilities and engineering firms. At the same time in the Arab region, a political and cultural transition is occurring, where organizational structures are being reshaped to serve a different set of needs and goals for society. Aside from technical factors directly relating to RE, there are many other factors that can present a serious risk to investors and can influence their decisions. These include political stability, security of investment and risk of expropriation, regulatory environment, competitive landscape, currency rate fluctuations, war and civil disturbance.

The study conducted recently by UNEP titled "Financing renewable energy in developing countries" indicates a close link between country risk and related aspects of public governance. It stresses the connection between quality of administration, transparency and accountability of institutions and the resulting levels of private investment and especially foreign direct investment. The study comments specifically on governance: "As vague and all-comprising this category of risk may be, it is critical for foreign investors and financial institutions. It will often act as an early selection filter in many financial decision-making processes, and on the basis of broader macroeconomic, political or legal concerns, it often hinders the implementation of otherwise promising and high-potential projects on the ground" (UNEP, 2012).

To assess these factors, two global initiatives were chosen: World Bank's Ease of Doing Business Index and Bertelsmann Stiftung's Transformation Index (BTI). On their own, the rankings or scores under these two indices provide an incomplete view of the state of Arab institutions. However, due to the complexity and effort of conducting this type of research, for the time being these sources must be relied upon for guidance. As the research capabilities in the region evolve, more relevant indicators may be developed.

4.3.1 World Bank Ease of Doing Business

Why this indicator?

The World Bank publishes their Ease of Doing Business Index (World Bank and IFC, 2012), which reports on basic issues relating to starting and operating a commercial enterprise. While this index is not tailored regionally, and does not relate to RE directly, it provides feedback on the general conditions existing in countries in relation to one another. The Ease of Doing Business Index ranks economies from 1 to 185 according to whether the regulatory environment is conducive to business operation. The index averages the country's ranking on 10 topics, made up of several indicators: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency (World Bank and IFC, 2012).

Although this index has some limitations, for example it does not account for an economy's proximity to major markets, or the quality of infrastructure services, it allows for a comparison between countries and highlights economies that have made progress in their regulatory frameworks. Based on this index, the Doing Business report has achieved worldwide recognition as a leading tool to evaluate the business environment. The sub-indices provide suggestions for improvement and some countries have used it as a guide to design reform programs and to improve their regulations.

4.3.2 Bertelsmann Stiftung Transformation

Why this indicator?

The Bertelsmann Stiftung, the German think tank, provides another source of insight into institutional issues in the area of political and economic transformation. The Bertelsmann Stiftung Transformation Index (BTI) measures countries' state of democracy and market economy in international comparison. Focusing on what they term the developing and transition countries, Bertelsmann's bi-annual indices measure the state of 128 countries' progress and setbacks "on the path toward a democracy based on the rule of law and a market economy flanked by sociopolitical safeguards" (Bertelsmann Stiftung, 2012).

Countries are assessed according to 17 criteria by country experts guided by a standardized codebook. These assessments are then reviewed by second country experts, then each of the 49 individual scores are subjected to regional and inter-regional calibration processes to ensure robustness of the results. The BTI aggregates the results into two indices: the Status Index and the Management Index. The Status Index has two analytical dimensions assessing the country's state of political and economic transformation towards rule of law and market economy, and the Status Index is used as an indicator for this particular area of interest.

Assessment Results

Table 21 shows rankings of RCREEE member states under both indices. The results of the Ease of Doing Business Index provide insight into regulations relating to typical business

Institutional Capacity

tasks, such as registering property, obtaining licenses, contract enforcement, and trading across borders. A higher rank indicates a stronger performance. These results do not provide particular insight into RE development in the countries, and certainly some results are poorly correlated in this respect, such as Bahrain. But this can be considered an indicator of general institutional readiness for dealing with private project developers, which is a precondition for progress.

The BTI Status Index results offer an assessment of similar issues, but in a wider context. Higher scores indicate stronger performance. The dual focus on political and economic transformation provides valuable insight into the process of governance. These are questions that inform real-world decisions, if only subconsciously, with every investment that is made in the region. A strong emphasis is placed upon issues such as political participation, social integration, stability of institutions, organization of the market and competition.

Table 21: World Bank Ease of Doing Business and BTI Status scores

World Bank Ease of Doing Business Index		BTI Status Index	
38	Bahrain	Lebanon	6.2
46	Tunisia	Bahrain	5.9
94	Morocco	Jordan	5.0
96	Jordan	Tunisia	5.0
99	Yemen	Algeria	4.8
104	Lebanon	Egypt	4.8
110	Egypt	Morocco	4.5
131	Palestine	Libya	4.5
135	Sudan	Iraq	4.2
134	Syria	Syria	3.9
148	Algeria	Yemen	3.9
164	Iraq	Sudan	3.3
-	Libya	Palestine	-

Source: World Bank and IFC (2012), Bertelsmann Stiftung (2012)

4.4 Rank under Institutional Capacity Category

Table 22 presents final scores under the Institutional Capacity category. Unlike previous categories, there is no one evident leader. Although Morocco is perceived to have the strongest institutional capacity by experts, it is currently lacking an independent regulator in the market. The best group performance is observed under the 'designated RE agency' indicator, where eight countries share the top score. The poorest performance is observed under the 'land access' indicator; in the region, only Egypt has so far dedicated land specifically for development of RE.

Table 22: Final scores under Institutional Capacity category

	Independent Regulator	Designated RE Agency	Institutional Capacity	Resource Quality Assessment	Land Access	World Bank Ease of Doing Business	BTI Status
Algeria	100	100	76	55	10	20	55
Bahrain	100	10	17	10	10	100	89
Egypt	100	100	81	55	100	51	54
Iraq	10	10	10	10	10	11	38
Jordan	100	10	91	100	10	54	63
Lebanon	10	100	54	55	10	47	100
Libya	10	100	17	10	10	10	46
Morocco	10	100	100	100	55	60	46
Palestine	100	100	62	10	10	33	10
Sudan	100	10	25	10	10	27	10
Syria	10	100	32	100	10	26	28
Tunisia	10	100	66	55	10	94	61
Yemen	10	10	10	55	10	45	26

Bahrain shows poor results under indicators relating to RE institutions, but scores the highest under the general governance-related indicators. This suggests that Bahrain has generally favorable conditions for business operations, but RE still remains a low priority. Palestine is in a reverse situation. It demonstrates positive results under RE-related institutions, but ranks poorly under general governance indicators. This shows Palestine's strong interest in developing renewables, but reflects the difficulty of doing business there currently.

Figure 14 presents the final scores and ranks under the Institutional Capacity category. With slightly different rankings compared to previous categories, Egypt emerges as the leader under this category. Its success is due to several activities: Egypt has established an independent regulator and a dedicated agency to promote RE, has issued a detailed wind atlas and has allocated land for private and public development of wind energy. Thanks to its strong institutional base, Egypt has the largest number of public RE projects deployed among the region's countries.

Figure 14: Final scores and ranks under Institutional Capacity category

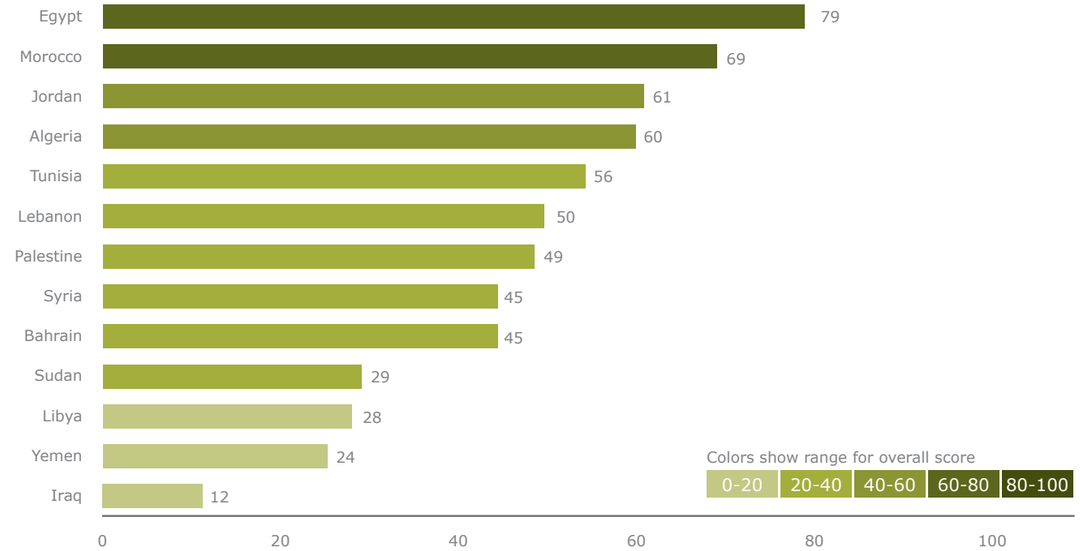
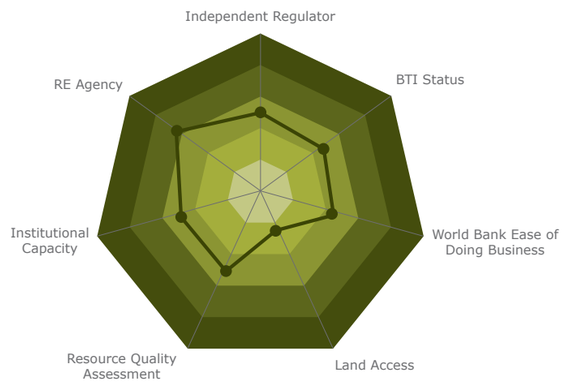


Figure 15 presents a summary of the RE institutional capacity of the Arab countries as a group. Those countries that have established independent regulators and designated RE agencies have taken an important step towards building a strong institutional base. However, this is only a beginning and the major focus should be placed upon these institutions streamlining administrative procedures, eliminating institutional barriers and assisting in deployment of RE projects. This has not yet occurred in most Arab countries. Existing RE institutions have been primarily focusing on leading public and demonstration RE projects until now.

Figure 15: Average performance of countries under Institutional Capacity category



5. Category 4: Finance and Investment

Unlike fossil fuel-based power generation plants, RE projects require intensive upfront capital investments, which is one of the biggest challenges to developers, especially in developing countries. RE projects are particularly sensitive to high costs of debt and equity (Waissbein et al, 2013). In addition, as RE projects tend to be smaller in scale than conventional energy plants, they often have relatively higher transaction costs (UNEP, 2012). With higher political, regulatory and macroeconomic risks, investors also require higher returns on their investments. In these circumstances, to make RE projects viable it is essential that governments mitigate investment risks by providing support to access financing and by creating a secure investment environment. The Finance and Investment category assesses three major factors: (1) the level of financial support provided by the state to RE projects; (2) the macro environment for investment; and (3) investment conditions specifically for RE. Factors and indicators are summarized in Table 23.

Table 23: Finance and Investment

Category	Factors	Indicator	Score/Measuring Unit
Finance and Investment	Financial Support	Fiscal Incentives	Number of fiscal measures
		RE Fund	RE fund established by law Sources of financing are clear Disbursement procedure is clear
	Macro Investment Conditions	Credit Access	Average interest on new external debt commitments (%)
		Inflow of Foreign Direct Investment	Ratio of inward FDI to GDP
	RE Investment Conditions	Share of Private Investment	%
		Growth Rate of Private Investment	%

5.1 Financial Support

5.1.1 Fiscal Incentives

Why this indicator?

Fiscal incentives in the form of tax-related measures are also policy support instruments. However, unlike cornerstone instruments they play an important complementary role in spurring development of RE. Fiscal incentives support RE by reducing the overall costs of RE projects, hence making investments more attractive (El-Karmi and Abu-Shikhah, 2013). The treatment of sales tax is particularly relevant during the construction phase. When operation begins, corporate tax is of importance with respect to impact on profits. Withholding tax, in some locations, is another consideration for lenders who receive interest or dividend income on their RE investments (Dii, 2013).

Fiscal incentives are best used as an element of a policy portfolio to support RE development. There are different options available for reducing the tax burden on RE projects. One approach is to reduce the liability of tax payment via deduction, which allows subtracting part of the investment expenses from the taxpayer's adjusted gross income. Another way is to provide tax credits, refundable tax credits and cash grants that either allow taxpayers to subtract part of the cost from the amount of taxes owed or provide a refund if the credit exceeds the amount of gross tax owed (Clean Energy Solution Center, 2011). Other options include tax holidays, import duty exemptions, and flexible or accelerated depreciation (Dii, 2013). Specially designed concessional tax rates and an allowance for depreciation can play a significant role in RE financial models. This is especially relevant in the first years of operation of RE projects.

Assessment Results

The Dii "Desert Power Getting Started" study provides useful insights into the fiscal situation of some MENA countries. According to this study, the rates of total tax in the region, as a percentage of profits, are relatively high and vary widely from 28.1% in Jordan to 72% in Algeria. Table 24 provides an overview of tax regimes in the region.

Table 24: Overview of tax regimes

	Corporate Tax Rate (%)	Withholding Tax on Interests (%)	Withholding Tax on Dividends (%)	Customs Duties (%) Most Favored Nations	Total Tax Rates (% of profits)
Algeria	25	10	15	0	72
Bahrain	Data not available				
Egypt	20-25	20	0	0	42.6
Iraq	Data not available				
Jordan	14	5	0	0	28.1
Lebanon	Data not available				
Libya	20	5	0	0.5	Data not available
Morocco	30	10	10	2.5	49.6
Palestine	Data not available				
Sudan	Data not available				
Syria	10-28	7.5	0	0	39.7
Tunisia	30	5	0	5	62.9
Yemen	Data not available				

Source: Dii (2013)

In the region, only a few countries have introduced fiscal incentives for RE. However, the fiscal incentives and the procedures to obtain them are not always clear. Algeria provides a grace period for profit tax under its general investment legislation. In Morocco investment projects over MAD 200 million can qualify for value-added tax exemption. Palestine provides exemption from customs duties and value-added tax for RE and energy efficiency equipment. However, the procedure for obtaining an exemption is complicated, as taxes are in general collected through Israeli authorities. The procedure requires prior authorization from the Israeli authorities.

In Egypt, RE projects enjoy customs duty exemption according to the decision of the cabinet on 26 May 2010. To qualify for an exemption, investors have to obtain a certificate from NREA verifying that imported equipment is for RE projects. Jordan is one of the few countries that has introduced in legislation clear fiscal incentives for RE. According to its Law No 10 (2013), RE and energy efficiency systems and equipment qualify for full exemptions from customs duty and sales tax. In Sudan the Investment Promotion Act of 1999, chapter I, articles 9-10, stipulates that all strategic projects, including electricity generation, are subject to exemption from customs duties and business profit tax for a period of ten years (RCREEE, 2013).

5.1.2 RE Funds

Why this indicator?

Besides fiscal incentives, governments can provide other forms of financial support to address the barrier of high initial costs of RE projects. Such incentives include grants, soft loans, subsidies, public financing and other incentives that either reduce the cost of a project or ease the access to financing. There is a trend worldwide to establish various funds to mobilize and facilitate financing of clean energy projects. The objectives of such funds vary greatly, from simple funding of clean energy projects that otherwise would not happen, to enabling market transformation toward sustainable energy development by creating attractive conditions for private investment. RE funds are especially important in reducing barriers for early market entrants, so that later investors and developers can subsequently enter the market without additional support (Sierra, 2011). RE funds can also be used as a vehicle to collect taxes and charges from fossil fuel-based industries and redirect them to funding of clean energy projects. In developing countries such funds are often used to mobilize and distribute funds from donor institutions.

Assessment Results

In the region, many countries have established, or are in the process of establishing, RE funds to administer various subsidy schemes for RE projects. RE funds *per se* do not ensure financing of RE projects, however, they are helpful in mobilizing all existing funds and streamlining financing activities. Table 25 illustrates the status of RE funds in the region.

Table 25: Status of RE funds

Country	RE Fund	Source of Financing
Algeria	National Fund for Renewable Energy and Cogeneration established by executive decree No. 11-423 in December 2011	- 1% of oil royalties - Other sources and donations
Bahrain	None	
Egypt	Renewable Energy Fund established by Cabinet in 2012	- Sources of financing and disbursement procedure are not defined yet
Iraq	None	
Jordan	Jordanian Renewable Energy and Energy Efficiency Fund (JREEEF)	-Annual budget allocations -Foreign donations
Lebanon	National Energy Efficiency and Renewable Energy Action (NEEREA) established by Central Bank of Lebanon in 2010	- EUR 12 million from EU grant for RE projects - Central Bank of Lebanon (low interest soft loans)
Libya	None	
Morocco	Energy Development Fund (EDF) with a total capital of USD 1 billion	- USD 200 million from Hassan II fund - USD 300 million from UAE - USD 500 million from Saudi Arabia
Palestine	None	
Sudan	None	
Syria	None	
Tunisia	National Fund for Energy Management (FNME) established by Law 2005-82 (2005) and Law 2005-106 (2005)	- Revenues from taxes on the first registration of cars and import or manufacturing of air conditioners according to the Law No 2005-2234 (2005) - Financial savings achieved as a result of EE activities - Private donations
Yemen	None	

Source: RCREEE focal points, RCREEE Renewable Energy Country Profiles (2013)

Six out of 13 countries have established, or are in the process of establishing RE funds. In most cases these initiatives represent a relatively recent trend. Thus, in half of these cases the funds are not yet operational, mostly because clear sources of financing and disbursement procedures have not been identified.

A successful case of a relatively well-functioning fund can be observed in Tunisia. Tunisia has one general fund supporting both energy efficiency and RE projects. The current RE financial support schemes available in Tunisia include:

Solar Water Heaters:

- TND 200 for solar water heaters if system surface is less than 3 m² (residential sector)
- TND 400 if system surface is between 3 and 7 m² (residential sector)

Small-scale PV systems:

- 30% of investment with a maximum of TND 150 per m²
- 40% of investment with a maximum of TND 20,000 per project for agricultural sector and rural uses (lighting and water pumping for irrigation)
- 30% of investment with a maximum of TND 15,000 per project for solar roofs

Biogas:

- 40% of investment with max of TND 20,000 per project for biogas production
- 20% of investment with max of TND 100,000 per project for biogas production intended for electricity generation

5.2 Macro Investment Conditions

To assess the macro-economic conditions for investment, two indicators are selected: the average interest rate on new external debt commitments from the World Bank Development Indicators, and the ratio of inward foreign direct investment stock to nominal GDP from the United Nations Conference on Trade and Development (UNCTAD) statistics.

5.2.1 Credit Access

Why this indicator?

The average rate of interest on new external debt commitments measures the cost of accessing funds. It is one of the development indicators measured by the World Bank. The value being measured is the average interest rate on all new public and publicly guaranteed loans contracted during the year. The average interest is calculated by weighting the interest rates for all those loans by the amounts of the loans.

Public debt is an external obligation of the national government, political subdivision or an agency of either, and autonomous public bodies. Whereas, publicly guaranteed debt is an external obligation of a private debtor that is guaranteed for repayment by a public entity (World Bank, 2013). Interest represents the average interest rate paid by the borrower in foreign currency, goods, or services in the specified year. This includes interest paid on long-term debt, IMF charges, and interest paid on short-term debt (Encyclopedia of the Nations, 2010).

5.2.2 Net Inflows of Foreign Direct Investment

Why this indicator?

Inflow of foreign direct investment (FDI) provides an indication of the general investment climate in a country. FDI stock is defined by the International Monetary Fund (IMF) as investments made to acquire lasting interest in enterprises operating outside the economy of the investor. Furthermore, the goal of the foreign entity or group known as the 'direct investor' is to gain an effective voice in the management of the enterprise. The IMF suggests a threshold of 10% equity ownership to qualify as a foreign direct investor (IMF, 1993). To allow for a relative comparison between countries, the net inflows of FDI are measured against countries' economies using nominal GDP values. Therefore this indicator reports the ratio of inflow of FDI to GDP.

Assessment Results

Table 26 provides results on the credit access indicator, stated in terms of interest paid on new external debt commitments for 2011. Higher interest rates indicate a higher cost for servicing debt and imply a greater credit risk for lenders. Lower interest rates allow easier access to credit for long-term and short-term debt from financial lenders. Some countries do not report results, potentially for one of several reasons. Bahrain, for instance, does not typically look to external markets to finance its spending and can generally self-fund its obligations. Iraq, Libya, and Palestine face a different situation, where they either cannot access credit markets or are dependent upon foreign donors for unconventional terms, which may not be adequately captured in this data set.

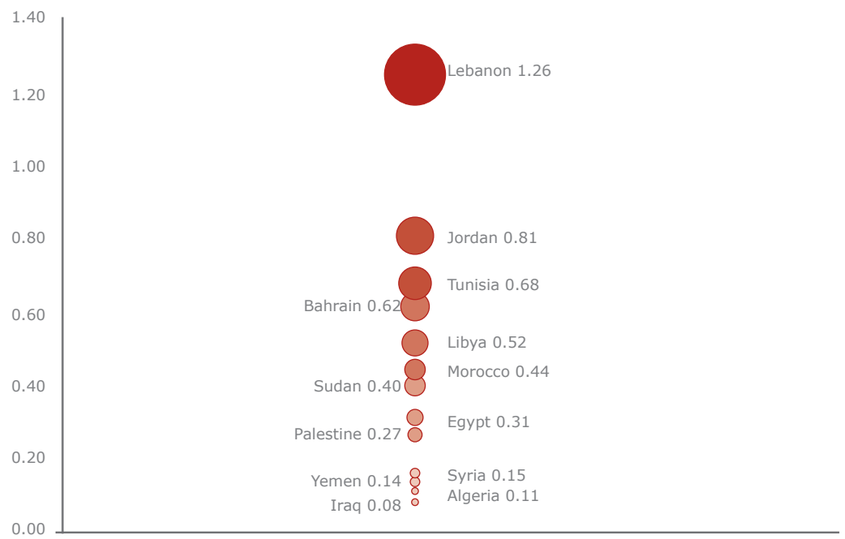
Table 26: Average interest on new external debt commitments (2011)

	Average Interest on New External Debt Commitments (%)
Algeria	2.00
Bahrain	-
Egypt	1.00
Iraq	-
Jordan	1.55
Lebanon	5.71
Libya	-
Morocco	1.59
Palestine	-
Sudan	1.90
Syria	4.00
Tunisia	2.01
Yemen	2.50

Source: World Bank (2013)

Figure 16 presents the results for the ratio of inward FDI stock to nominal GDP for 2011. Larger values indicate a stronger flow of foreign investment into countries in relation to domestic GDP. This provides some insight into the investment climate on a macro scale. FDI gives an indication of the long-term, lasting interest by foreign investors in an economy. When compared against GDP, a relative comparison can be made. A ratio of greater than 1 for this indicator is possible, since the FDI measures investment and GDP reflects value added to an economy. Indeed, Lebanon's ratio is 1.26, which implies a strong investment interest from outside the country.

Figure 16: Ratio of inward FDI stock to GDP (2011)



Source: UNCTAD (2013)

5.3 RE Investment Conditions

Why this indicator?

The ultimate results of supporting policies and countries' efforts in building a secure, attractive investment environment should translate to an increased share of private investment in renewables. The share of private investment in RE indicates not only the effectiveness of support mechanisms, but also the general investment climate in the country. A larger share of private investment indicates a higher level of investor confidence in the legal system, institutions, supporting mechanisms and ultimately the profitability of RE projects.

Assessment Results

The situation in the region regarding the share of private investment remains poor. Of 13 countries, only Morocco has so far been able to attract private investment in RE. Today, private RE investment in Morocco has resulted in approximately 1.3% of its total installed generation capacity. Table 27 provides details about the currently installed private RE projects in Morocco.

In Egypt, the first private wind project (250 MW) for utility supply is currently under public competitive bidding and the first self-producer wind project (120 MW) is already under construction.

Table 27: Private RE projects in Morocco

Project	Koudia Al Baida	Tétouan Wind Farm for Lafarge Cement Plant	Ciments du Maroc
Installed capacity	54 MW	32 MW	5 MW
Owner	Compagnie éolienne du Détroit (CED)	Lafarge SA	Ciments du Maroc
In operation since:	2000	2006 (10 MW) and 2011 (22 MW)	2011
Total investment costs:	EUR 50 million	EUR 44 million	EUR 9 million

Source: RCREEE

5.4 Rank under Finance and Investment Category

Table 28 presents the final scores under the Finance and Investment Category. Of the four categories, this category shows the poorest results. Almost all countries score low under the 'share of RE private investment' indicator. Lebanon stands out in the 'FDI inflow' indicator with the largest ratio of inward FDI stock compared to its GDP. This indicates relatively strong general investor confidence in Lebanon. Iraq consistently scores the lowest under all indicators.

Table 28: Final scores under Finance and Investment category

	Fiscal Incentives	RE Fund	Credit Access	FDI Inflow	Share of RE Private Investment
Algeria	55	55	74	12	10
Bahrain	10	10	100	51	10
Egypt	55	55	87	28	10
Iraq	10	10	10	10	10
Jordan	100	55	80	66	10
Lebanon	10	100	27	100	10
Libya	55	10	10	44	10
Morocco	55	100	80	38	100
Palestine	100	10	10	24	10
Sudan	55	10	76	35	10
Syria	10	10	49	16	10
Tunisia	100	100	74	56	10
Yemen	10	10	68	14	10

Figure 17 presents final scores and ranks under the Finance and Investment category. Morocco again leads in this category, being the only country in the region that has any share of private investment in RE. Tunisia ranks second on the strength of being the only country in the region to provide clear financial incentives for development of small-scale RE projects.

Figure 17: Final scores and ranks under Finance and Investment category

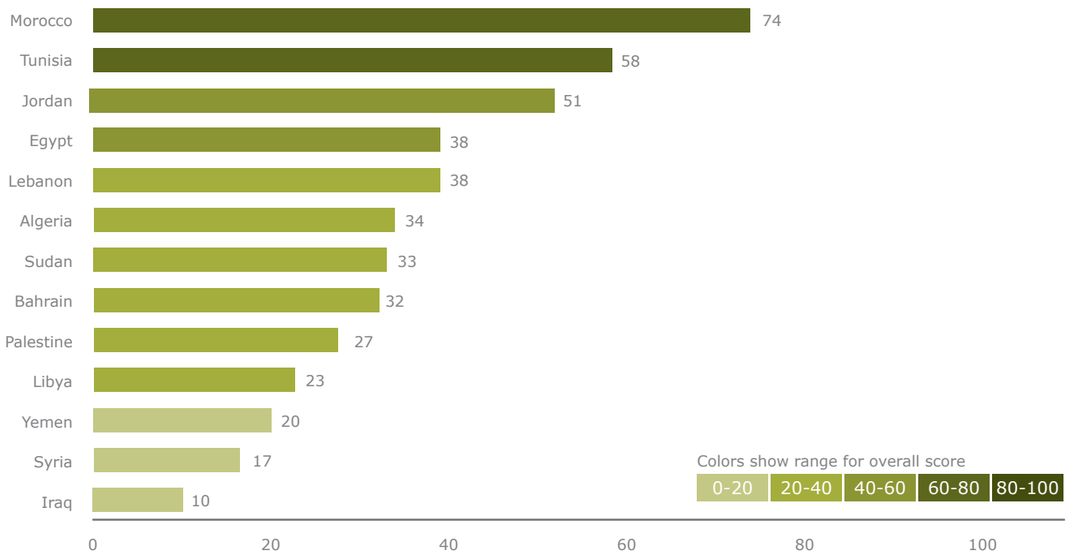
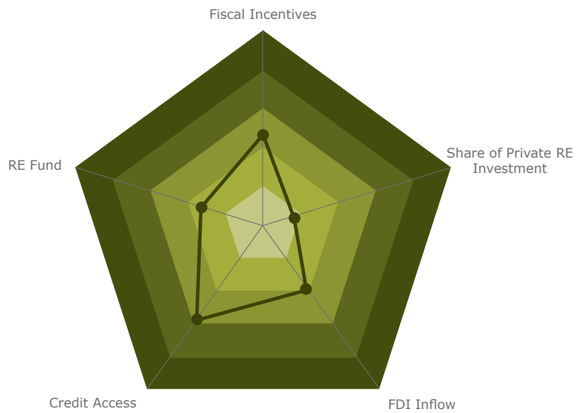


Figure 18 shows the average performance of all countries under the Finance and Investment category. Overall, the region performs poorly in this category, which points to the reality that private developers still face challenges in accessing financing for RE development. Although Arab countries can pursue success in their RE goals and targets through publicly-driven programs, the financial resources and technical capabilities of private investors can accelerate their progress. The aspects highlighted by this category deserve careful consideration by policy makers when developing RE strategies for the future.

Figure 18: Average performance of countries under Finance and Investment category

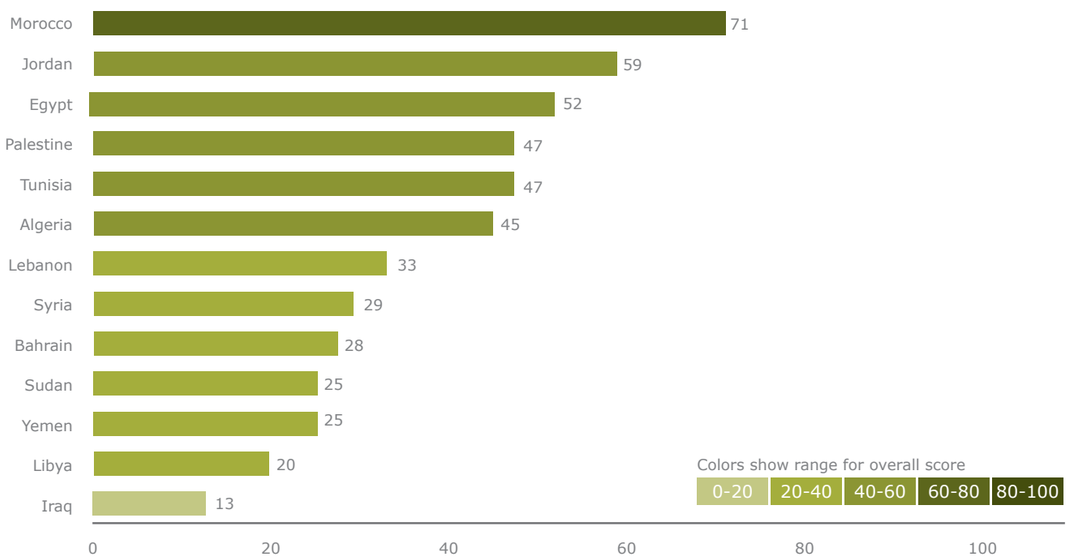


Final Scores and Trend Analysis

6. Final Scores and Trend Analysis

Figure 19 presents the final scores and ranks for AFEX Renewable Energy 2013 based on the aggregation of scores under the four evaluation categories.

Figure 19: AFEX Renewable Energy final scores and ranks



Morocco 71

In the final rankings for AFEX Renewable Energy 2013, Morocco emerges as the leader. This is due to Morocco taking top scores in three of four categories: within the region it generated the largest share of its electricity from renewables, has the greatest number of RE projects under construction, and is the only country that was able to attract private investment. It has demonstrated strong commitment to RE by adopting ambitious targets and, more importantly, by supporting these targets with concrete actions. A major factor to its success lies in a strong institutional body consisting of strategic leadership, dedicated resources and competent staff. Morocco pursues a market-driven approach to its energy development by keeping its prices almost unsubsidized. This creates a competitive marketplace for RE, without entailing a heavy burden on the government budget. To accelerate development of renewables, Morocco will need to strengthen support mechanisms, ensure priority access to the grid and lift existing restrictions on commercialization of renewables.

Jordan 59

Jordan ranks second after Morocco. Jordan has made substantial progress in the past year by adopting a quite progressive supporting policy framework for RE: it introduced the Law on Renewable Energy and Energy Efficiency, feed-in tariffs, preferential purchase prices for net metering, provided a direct proposal submission option and exempted renewables from customs duty and sales tax. It is one of the few countries in the region that has provided a statutory guarantee of access for RE to the grid. Jordan should now concentrate efforts on ensuring the functionality of these support mechanisms and strengthening institutional support. This requires establishing a dedicated agency to promote RE with sufficient resources and competent staff.

Egypt 53

Egypt ranks third overall. Egypt presents an attractive market for development of renewables due to its demographics and strong natural resource potential. In the region, Egypt has by far the largest installed capacity of renewables and has an established institutional base. Egypt is the only country in the region that has officially allocated land specifically for development of renewables. To attract investments Egypt will need to improve its policy landscape, including phase-out of current energy subsidies, speed up the government-led bidding processes and provide additional options for private developers to enter the market.

Palestine 47

Next in the ranking is Palestine. Similar to Jordan, Palestine within the last year introduced rather progressive policies for RE. It has adopted feed-in tariffs, a net metering policy, direct proposal submission and, most importantly, Palestine opened its market for private development in an effort to improve its energy security. Palestine should now concentrate its efforts on strengthening institutional support and facilitating deployment of renewable projects.

Tunisia 47

Tunisia is tied with Palestine in fourth spot. Tunisia has contradictions within its RE industry. On one hand it has adopted incentives for development of small-scale renewable projects by offering clearly stipulated financial support. On the other hand, the Tunisian electricity market remains closed for large-scale private development of RE. Its current legal framework does not allow for unsolicited private generation of renewables, thereby preventing private developers from entering the market. Tunisia has the potential to attract investments in RE based on their generally favorable business conditions. It scores high in ease of doing business, has a relatively high inflow of foreign direct investment and is perceived to have a strong institutional capacity, which all point to investor confidence in Tunisia.

Algeria 45

Algeria also presents a contradictory picture. To its credit, it has adopted ambitious targets, embedded RE legislation as far back as 2004, established dedicated institutions and created a RE fund. And yet, it has shown little progress in deploying renewables and attracting private partners. Algeria has failed to completely overcome key barriers for RE. Currently, no viable options exist for private developers to participate in renewable power generation. The government has not announced tenders for public competitive bidding or offered any other instrument ensuring long-term power purchase agreements.

Lebanon 33

Lebanon has shown commitment for renewables through development of its net metering policy, and announcing tenders for the first large-scale wind and solar projects. However, the current power sector structure blocks investments in renewables. Because the required independent regulatory authority does not yet exist, power generation licenses for private developers cannot be issued. This stands as a main obstacle to private development of renewable energy in Lebanon.

Syria 29

Syria adopted progressive measures in 2011 to attract interest in RE. It has opened its market for private developers, adopted feed-in tariffs and a net metering policy, authorized the business-to-business sale of renewable electricity, and announced tenders for public competitive bidding to develop first large-scale wind projects. However, due to the ongoing difficult political situation, all activities have been paused and the Syrian government has not had the chance to implement the newly introduced policies.

Bahrain 28

Bahrain has the most liberalized electricity market in the region, ranks first in ease of doing business and has favorable macro investment conditions. Bahrain has the potential to attract investments in renewables due to its compact size, available financial resources and relatively favorable business conditions. With the right focus Bahrain could show leadership in innovative applications of RE. The most decisive elements will be motivation and commitment.

Sudan 25 Yemen 25

Sudan and Yemen face the challenge of delivering electricity to a larger portion of their populations. This also presents an opportunity to design innovative energy systems based on decentralized small-scale power generation. Microgrids could enable supply of power to remote areas at lower costs than required by traditional infrastructure.

Libya 20

Within the past two years Libya has shown a strong commitment to RE. It has established a dedicated agency for RE, adopted RE targets and currently the first large-scale wind and solar projects are under construction. However, Libya is the only country in the region that remains closed for independent power producers. Without opening its electricity market to private developers, Libya will have to rely entirely on its own resources to deliver RE projects.

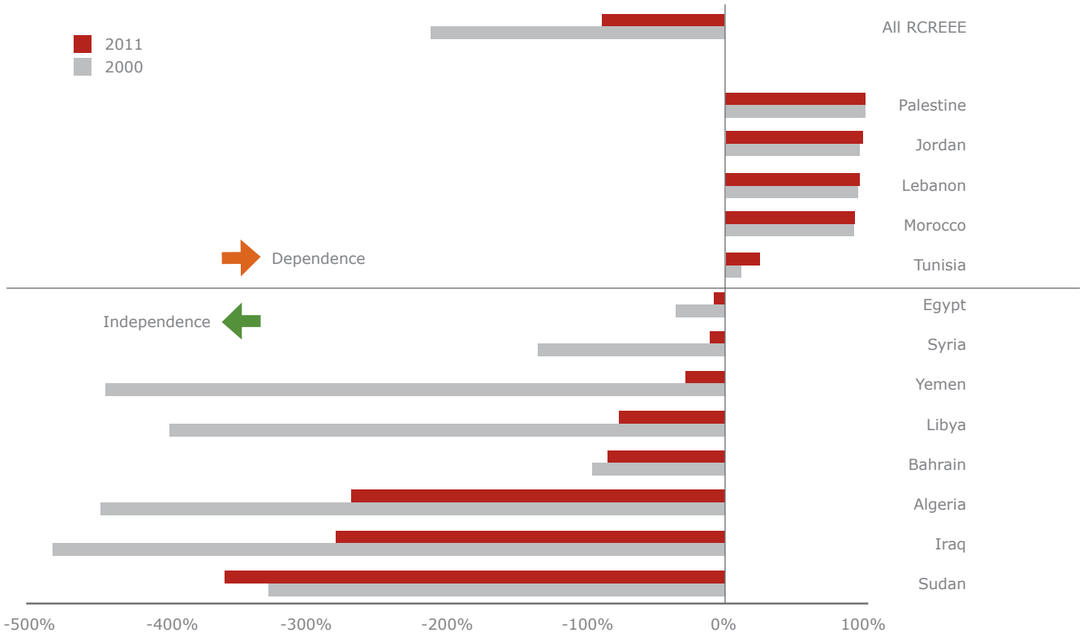
Iraq 13

Iraq's current challenges have limited its ability to initiate RE development. However, the recent adoption of its energy strategy indicates Iraq's determination to make renewables a higher priority. Iraq needs to investigate which RE solutions could best suit its conditions and focus resources in those areas.

Trends

The results of the index demonstrate a close relationship with countries' energy dependency ratios, illustrated in Figure 20. For each country, it considers the total energy imports, exports and consumption; positive values indicate dependence and negative value simply the ability to meet energy needs domestically. This relationship is not surprising. It indicates that more energy-dependent countries such as Palestine, Jordan, Morocco, Tunisia have greater motivation to pursue RE. Notably, the trend for almost all RCREEE member states is towards greater energy dependence. RE efforts can play an important role in achieving long-term stability in these countries.

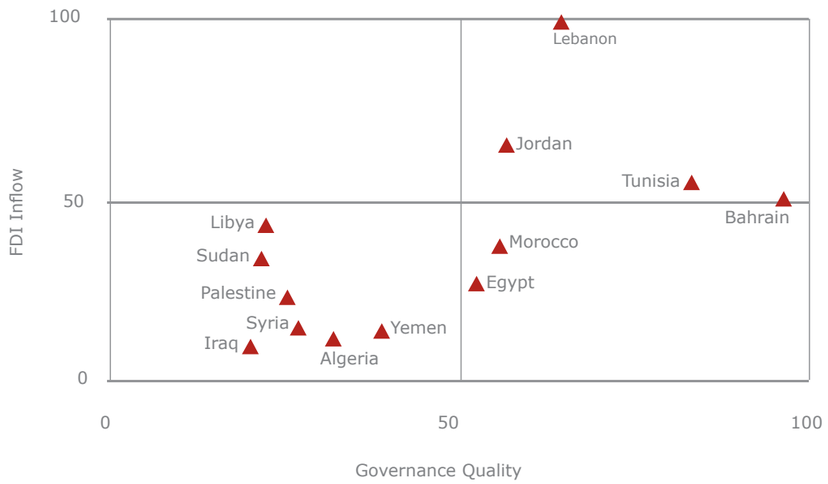
Figure 20: Energy dependency ratio of RCREEE member states (2000 to 2011)



Source: RCREEE estimation based on data from OAPEC (2005, 2012), EIA (2012)

Indicators used in AFEX Renewable Energy provide feedback on specific aspects of a country's status when considered individually. Additional insight can be gained from the connections between categories. One instructive relationship is between quality of governance and inflow of FDI, as shown in Figure 21. Countries that score high in both indicators appear in the top right quadrant, and conversely those scoring lowest appear in the lower left. This visualization makes clear where the highest level of investor confidence currently exists, and how this relates to the governance structures of the region's countries. Most of the top-performing countries are found in the upper right quadrant; the exceptions prove that motivated efforts can also have an impact, and that refocusing efforts on RE could still pay off for some countries.

Figure 21: Relationship between Governance and Inflow of FDI

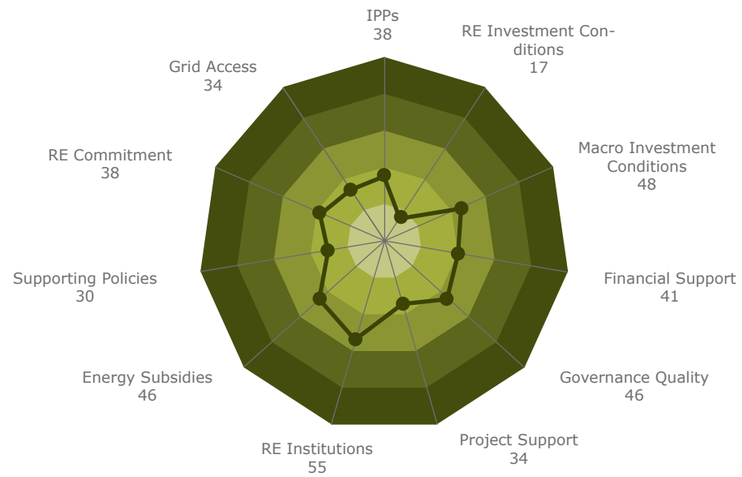


Final Remarks

Arab countries lag the world in general, despite having superior resources for solar power and, in some regions, wind. Although reform of the power sector has been initiated in almost all countries, the overall electricity market in the region still remains state-dominated with little participation from the private sector. Of 13 countries, five have no presence of private power producers. The supporting policies in most countries are still absent or ineffective. Less than half the countries provide policy instruments ensuring long-term power purchase agreements to private developers.

A central problem stems from the historically closed energy markets that are heavily subsidized. This single factor makes it difficult for RE to appear as an attractive alternative, unless further market distortions are attempted to neutralize the impacts of fossil fuel subsidies. This situation maintains the dominance of fossil-dependent energy systems, along with their inherent long-term costs and risks. Of 13 countries, only Morocco has so far been able to attract private RE investment. Figure 22 gives the summary of the regional performance under AFEX Renewable Energy 2013.

Figure 22: Average performance of countries under AFEX Renewable Energy



On the positive side, almost all countries have adopted long-term technology-specific RE targets. More than half the countries have established dedicated agencies to promote renewables. Currently there are more than 15 large-scale projects under construction with total capacity exceeding 1,550 MW, which is more than double the current installed capacity in the region. Seven countries have identified over 5,000 MW of new generation for private development. Six countries have now established RE funds to mobilize funding and accelerate the deployment of renewables.

Some governments have made proactive policy choices and attracted interest from external participants, while others are still in the early stages of opening their markets to the point where a dialogue with secondary actors might begin. Because government continues to play such a central role in the Arab states, the strength of institutional organizations will determine the success of RE development in the near term. Improvement in energy market structure and policy transparency, along with more meaningful participation from private developers will provide the catalyst for long-term progress.

Final Scores and Trend Analysis

References

The Arab RE Strategy. (2013). The Arab strategy for the development of renewable energy uses (2010-2030) was approved as a framework for joint Arab action in the field of renewable energy, pursuant to the 3rd Arab economic and social development summit (Riyadh - 21-22 January 2013).

AUE. (2012). Arab Union of Electricity. Statistical Bulletin.

Bjork, I., Connors, C., Welch, T., Shaw, D., & Hewitt, W. (2011). *Encouraging Renewable Energy Development: A Handbook for International Energy Regulators.* PIERCE ATWOOD LL.P. National Association of Regulatory Utility Commissioners.

Bertelsmann Stiftung. (2012). Transformation Index BTI 2012. Retrieved from: http://www.bti-project.org/index/

Clean Energy Solutions Centre. (2011). Summary of Renewable Energy Financial Incentive Best Practices. Retrieved from: https://cleanenergysolutions.org/tools/practices/renewables/incentives

CREAD. (2010). *Algeria – A Future Supplier of Electricity from Renewable Energies for Europe?* Algeria's Perspectives and Current European Approaches. Wuppertal Institute for Climate, Environment and Energy; Centre de Recherche en Economie Appliquee pour le Developpment.

Dii. (2013). *Desert Power: Getting Started*. The manual for renewable electricity in MENA. Full Report.

El-Katiri, B. F. (2012). Energy Subsidies in the Arab World. United Nations Development Programme.

El-Karmi, F. Z., & Abu-Shikhah, N. M. (2013). The role of financial incentives in promoting renewable energy in Jordan. Renewable Energy. Retrieved from: http://dx.doi.org/10.1016/j.renene.2013.02.034

ESMAP. (2009). Tapping a Hidden Resource Energy Efficiency in the Middle East and North Africa, Energy Sector Management Assistance Program. World Bank Group.

EWEA. (2013). *EU wind industry faces tough challenge - and politicians should not make it worse.* The European Wind Energy Association. Retrieved from: http://www.ewea.org/press-releases/detail/?tx_ttnews%5Btt_news%5D=2026&cHash=fb6d42b9f07c49b2ba583ea8a8c79b48

Hasbani, K.U. (2011). Electricity Sector Reform in Lebanon: Political Consensus in Waiting. Center on Democracy, Development and the Rule of Law (CDDRL). Stanford, CA. Retrieved from: http://iis-db.stanford.edu/pubs/23465/No._124_Electricity_Sector_Reform.pdf

IEA. (2011). *Deploying Renewables: Best and Future Policy Practice.* International Energy Agency.

IEA. (2012). World Energy Outlook. International Energy Agency.

IFC. (2012). Utility Scale Solar Power Plants. A guide for developers and investors. International Finance Corporation. World Bank Group.

IMF. (1993). Balance of Payments Manual. International Monetary Fund. Retrieved from: http://www.imf.org/external/pubs/ft/bopman/bopman.pdf

IMF. (2013). Energy Subsidy Reform: Lesson and Implications. International Monetary Fund.

IRENA. (2013). IRENA Case Study 2013. Morocco Wind Atlas.

Italgen Italcementi Group. (2012). *Gulf El Zeit - Egypt 120 MW - Wind Farm project.* Powerpoint presentation.

Liebreich, M. (2013). *The New Energy ROI: Resilience, Optionality, Intelligence.* Bloomberg Finance L.P. VIT comment.

Müller, S., Brown, A., & Ölz, S. (2011). *Renewable Energy. Policy Considerations for Deploying Renewables.* Information Paper. International Energy Agency.

NREL. (2013). *Concentrating Solar Power Projects.* National Renewable Energy Labaratory.

Ochs, A. & Makhijani, S. (2012). *Sustainable Energy Roadmaps: Guiding the Global Shift to Domestic Renewables.* Worldwatch report 187. Worldwatch Institute.

OECD. (2008). Handbook on Constructing Composite Indicators. Methodology and User Guide.

OECD. (2013). *Renewable energies in the Middle East and North Africa: Policies to support private investment.* MENA-OECD Task Force on Energy and Infrastructure.

PWMSP. (2012). Paving the Way for the Mediterranean Solar Plan, A Benchmark Regional Review.

RCREEE. (2010). Provision of Technical Support/Services for an Economical, Technological and Environmental Impact Assessment of National Regulations and Incentives for Renewable Energy and Energy Efficiency. Regional Center for Renewable Energy and Energy Efficiency.

RCREEE. (2013). Renewable Energy country profiles. Retrieved from: http://www.rcreee.org/

SEIA. (2013). Net Metering. Solar Energy Industries Association. Retrieved from: http://www.seia.org/policy/distributed-solar/net-metering

Sierra, K. (2011). *The Green Climate Fund: Options for Mobilizing the Private Sector.* A brief for the GCF Transitional Committee. Climate and Development Knowledge Network.

UNEP. (2012). *Financing renewable energy in developing countries.* Drivers and barriers for private finance in sub-Saharan Africa. A study and survey by UNEP Finance Initiative on the views, experiences and policy needs of energy financiers.

UNCTAD. (2013). UNCTADstat – Table view – Inward and outward foreign direct investment stock, annual, 1980-2012. United Nations Conference on Trade and Development. Retrieved from: http://unctadstat.unctad.org/TableViewer/tableView.aspx?ReportId=89

Vagliasindi, M. (2012). *Power Market Structure and Performance.* Policy Research Working Paper 6123. The World Bank Sustainable Energy Department Energy Unit.

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

Woolf, F., & Halpern, J. (2001). *Integrating Independent Power Producers into Emerging Wholesale Power Markets.*

World Bank. (2012). Doing Business 2012 : Doing Business in a More Transparent World. Washington, DC: World Bank Publications.

World Bank. (2013). DT.INR.DPPG - World Bank Search: Average interest on new external debt commitments. World Bank, International Debt Statistics. Retrieved from: http://search.worldbank.org/data?qterm=DT.INR.DPPG&language=EN

Annex A. Methodology

The structure of AFEX Renewable Energy is based on three main components to derive a final index score. It consists of 25 quantitative and qualitative indicators, which combine to provide higher-level results for 11 factors. The factors are aggregated to the highest level, supplying results for 4 categories. When the results of all categories for all countries are combined, the final index result is achieved.

AFEX Renewable Energy uses the OECD methodology for constructing composite indicators (OECD, 2008). The technical parts of the index construction are performed with guidance from the Joint Research Center's 10th JRC Annual Seminar on Composite Indicators.[1]

Data are organized in accordance with the established conceptual framework. Each indicator is assigned a desired direction depending on its nature and value, where '1' indicates a higher score is better and '-1' indicates a lower score is better. The indicators are assigned weights depending on their importance in relation to each other under the same category. The weights are then re-scaled to unity sum. Once data are organized, necessary statistical descriptors such as missing values, minimum, maximum, mean, standard deviation, skewness and kurtosis are calculated for each indicator.

In order to negotiate the direction and to be able to aggregate the data to develop index scoring, the 'min-max method' is used for indicator normalization. The directions and weights of the individual indicators are taken into account during this normalization. The following formula is used for normalization:

$$\text{new value} = \frac{(\text{old value} - \text{min})}{(\text{max} - \text{min})*\text{direction}} + 0.5*(1 - \text{direction})$$

where:

new value is the indicator's resultant value after normalization;

old value is the indicator's value supplied by measurement, statistical data, survey or other collection technique;

min is the minimum value observed in the 13-country group for the indicator;

max is the maximum value observed in the 13-country group for the indicator;

direction is the value of either 1 or -1 that indicates the direction of scoring for the indicator.

The normalized values for each indicator are combined to provide scores for each factor, and factors are combined to score each category. Results for the four categories are combined to develop final index scores and ranks based on the min-max method.

Ranks for individual indicators are also calculated, but not displayed in the report. Ranks are useful while interpreting the results and to argue why one country has performed better than another within a category. When the raw data are normalized using ranks, the directions of the indicators are also taken into account.

The arithmetic mean, applying variable weight to each normalized indicator value, is used to develop the rank and the performance of each country for the given set of indicators. Weights are assigned to each indicator, summing to unity for each category. The assignment is based on the relative impact each indicator is perceived to have upon the category being measured, and is based on the experience of RCREEE's regional experts.

[1] The guide is available at http://ipsc.jrc.ec.europa.eu/index.php?id=65

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