Arab Future™ Energy Index

AFEX 2016

Renewable Energy

RCREEE

Regional Center for Renewable Energy and Energy Efficiency

المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

UNDP

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About AFEX

The Arab Future Energy Index (AFEX) is the first Arab index dedicated to monitoring and analyzing sustainable energy competitiveness in the Arab region. AFEX offers both quantitative and qualitative analysis on key renewable energy and energy efficiency markets across 20 Arab countries. Countries are ranked by over 20 different indicators to shed light on key energy market characteristics including policies, institutional and technical capacities, strategies, and investments. AFEX data has been collected and sourced locally and internationally to guarantee accuracy and transparency.
AFEX has two publications, each updated and published once a year: AFEX Renewable Energy and AFEX Energy Efficiency. In its 2016 edition, AFEX Renewable Energy ranks 20 Arab states and provides tailored recommendations for countries to help improve their sustainable energy markets.
Countries of assessment include: Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, UAE, and Yemen.
AFEX is produced by 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.
AFEX Renewable Energy 2016 is produced with the support of United Nations Development Program (UNDP) and its Arab Climate Resilience Initiative (ACRI).

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Arab Future Energy Index™(AFEX) Renewable Energy 2016

Regional Center for Renewable Energy and Energy Efficiency (RCREEE)

RCREEE

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المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

Arab Future Energy Index 2016
UNDP Foreword

The United Nations Development Programme (UNDP) is pleased to partner with the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) in producing this 2016 edition of the Arab Future Energy Index. Support is provided under UNDP's Arab Climate Resilience Initiative, which seeks to expand the knowledge base in the region on climate change and sustainable energy goals.

The production of the report is very timely, following passage of the new Paris Climate Change Agreement, the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs).

Low carbon, sustainable energy pathways are critical for achieving these frameworks, and AFEX helps track progress among Arab countries in this regard. With over 20 indicators and in depth analysis and recommendation, AFEX helps rank countries on regulatory and institutional structures, progress on financial innovations, expanding access to sustainable energy, and ways to achieve local results in line with the Arab Regional Strategy on Renewable Energy.

As seen in this year's AFEX rankings, impressive results are starting to be seen in making the shift to a sustainable energy future, but more needs to be done. The energy challenges faced in the region are complex. In most countries, renewable energy can help achieve local development goals and build resilience of poverty reduction efforts. In crisis contexts, energy is a key factor for meeting basic needs of conflict-affected communities and for supporting resilient recovery. Meanwhile in oil-exporting countries, renewable energy is a strategic means to reduce carbon footprints and the energy intensity of growth.

UNDP stands with our regional and national partners in all such efforts. Through our capacity development initiatives, UNDP helps put in place new policies that lower the risks faced by investors for scaling-up investment into renewable energy, developing institutional capacities to expand the share of renewable energy in the national energy mix, and raise awareness on the role of sustainable energy solutions in achieving resilient recovery from crisis.

The upcoming 22nd Conference of the Parties to the UN Climate Convention (COP22) in Morocco will be an important milestone for the region, and we look forward to partnering on the important implementation agenda set to emerge for the region and the world. UNDP is proud to support the League of Arab States, RCREEE, and our national partners achieve the vision for a new low-carbon, sustainable energy future at this important juncture in the region's development.

Khaled Abdelshafi, Manager UNDP Regional Hub for Arab States

Arab Future Energy Index 2016 RCREEE Foreword

In 2014, the "Road Map of Action for Implementation" of the "Pan-Arab Strategy for Renewable Energy 2030" introduced a holistic methodology to advise Pan-Arab governments on implementation national energy strategies that are built on a country's specific technical potentials; that consider the Pan-Arab countries unique investment climate and financial barriers; and that are in the social and economic interest of its people.

In introducing these Renewable Energy Roadmaps for the Pan-Arab countries, it was that clean energy solutions—renewable energy,energy efficiency, and smart energy distribution—are the approaches that are best equipped to create the sustained, reliable economic development that is critically needed to meet human needs and aspirations. Pan-Arab region substantially hinges on depleting fuel sources, it has also been classified as especially vulnerable to the global climate change effect: the threat of worsening water scarcity.

Alternatively, Pan-Arab region acquires one of the world's supreme potential for wind speeds, solar power generation, and waste-to-energy especially for large-sized economies like Arab Republic of Egypt. The huge resources of the Pan-Arab renewable energies represent the major players for helping the Pan-Arab countries combating the climate change effect and also shifts their energy mix towards more diversified sustainable resources.

The Arab Energy Future Index 2016 "AFEX 2016" focuses on the update of the current status of renewable energy, country programme, national targets, enforced policies and technologies in the Pan-Arab Region and analyses the conditions for their advancement in the future. It identifies important knowledge, information on supporting policies for renewable energy transition and subsequently evaluates key finance and policy barriers, making suggestions for how to overcome both. As such, AFEX 2016 scopes the improvements took place over past two years, and also define – on substance – further improvements that are needed with regard to the key components of a sustainable energy systems in the Pan-Arab countries, complementing modus-operandi and groundwork for speeding up national energy programme and strategies by the Pan-Arab countries.

This report is launched in partnership between Regional Center for Renewable Energy and Energy Efficiency – RCREEE and the United Nation Development Programme UNDP. RCREEE and Development Partners in the Pan-Arab Region, especially UNDP will continue future updates so as to provide more country-specific renewable energy knowledge of the Pan-Arab region and will also continue provide more concrete suggestions for financial and regulatory reforms at the regional and national levels with regard to sustainable energy sector including those related to associated with climate change effect.

The ultimate goal of this timely regular update renewable energy in the Pan-Arab region represented by the AFEX is to integrate and synchronize the available technical, socioeconomic, financial, renewable energy policy expertise into one comprehensive energy planning tool, hence charting – at both national and pan-Arab regional levels – a climate-compatible energy development path that enables a sustainable social, economic, and environmental future for the Pan-Arab region, so-called "Intended Nationally Determined Contributions – INDCs". The insights, analyses and recommendations of this report is targeting all relevant stakeholders in the arena renewable energy of the Pan-Arab region including governments, non-governmental decision makers, industry and academic experts, community and local-level leaders, and the media and general public—to ensure that all Pan-Arab countries understand the many potential routes forward.

Dr. Ahmed Badr

Executive Director, RCREEE

About UNDP

The United Nations Development Programme (UNDP) is the United Nations' global development network, working inover 170 countries and territories to achieve the eradication of poverty, and the reduction of inequalities and exclusion. UNDP helps' countries to develop policies, leadership skills, partnering abilities, institutional capabilities and build resilience in order to sustain development results. Through UNDP's extensive work at global, regional and national levels, UNDP has learned that tackling climate change and expanding access to sustainable energy and water must be central to efforts to make results of development sustainable and resilient. UNDP is the UNs largest provider of assistance on climate change, with over $2.8 billion of grants to countries around the world. In support of the new Paris Climate Change Agreement and Sustainable Development Goals, UNDP helps countries transition to a low-carbon, climate-resilient development future. Support to countries is led by UNDPs extensive system of Country Offices and five UNDP Regional Hubs.

In the Arab region, UNDP has been present supporting development for over 50 years, including the past 25 years of experience supporting countries on climate change, energy and environment agendas. UNDP support in the region has helped establish new policies and regulations to scale-up energy efficiency in key sectors like buildings and transport; new public-private partnerships for scaling up renewable energy technologies like solar and wind; new institutions and centers of excellence for low-carbon, sustainable energy solutions; and has helped expand access to solar energy for the poor including those displaced by conflict. UNDPs Arab Climate Resilience Initiative has played an important role at the regional level, including strategic partnerships with the League of Arab States, the Regional Center for Renewable Energy and Energy Efficiency, the Arab Water Council, the OPEC Fund for International Development and the Islamic Development Bank.

UNDP Regional Hub for Arab States

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About RCREEE

The Regional Center for Renewable Energy and Energy Efficiency (RCREEE) is an intergovernmental organization with diplomatic status 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.

Through its solid alliance with the League of Arab States, RCREEE is committed to tackle each country's specific needs and objectives through collaborating with Arab policy makers, businesses, international organizations and academic communities in key work areas: capacity development and learning, policies and regulations, research and statistics, and technical assistance. The center is also involved in various local and regional projects and initiatives that are tailored to specific objectives.

Having today 17 Arab countries among its members, RCREEE strives to lead renewable energy and energy efficiency initiatives and expertise in all Arab states based on five core strategic impact areas: facts and figures, policies, people, institutions, and finance.

RCREEE is financed through its member state contributions, government grants provided by Germany through the German Development Cooperation (GIZ) GmbH, Denmark through the Danish International Development Agency (DANIDA), and Egypt through the New and Renewable Energy Authority (NREA). RCREEE is also financed through selected fee-for-service contracts.

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Table of Contents

Arab Future™ Energy Index

AFEX 2016

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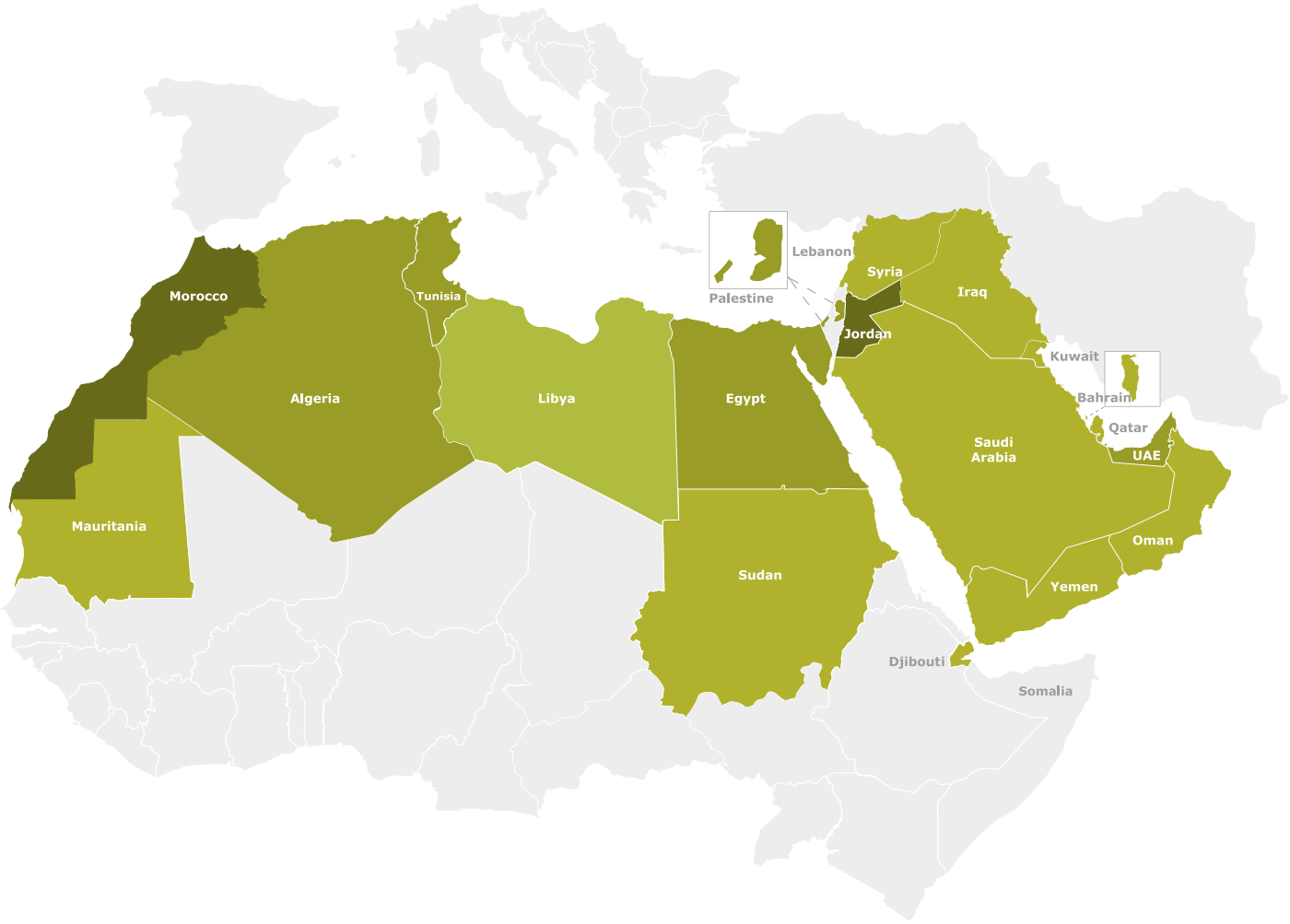


Green colors indicate overall ranks

- 80-100
- 60-80
- 40-60
- 20-40
- 0-20
- Other Arab states
- Rest of the world

Key Findings

Regional

The AFEX 2016 Renewable Energy edition reveals the robust commitment of Arab countries to develop financially, socially, and environmentally sustainable energy systems through the wider deployment of renewable energy solutions. The Arab countries voiced vibrant pledges to climate action following the Paris Conference of Parties (COP21) Agreement, with many concrete measures that will strongly contribute to achieving the Sustainable Development Goal on energy (SDG7): Ensure access to affordable, reliable, sustainable and modern energy for all. SDG7 is one of 17 goals adopted by the United Nations to address the social, economic, and environmental dimensions of sustainable development by 2030. The AFEX comprehensive assessment of the investment climate for renewable energy development links further to other green SDGs including SDG 1 poverty reduction and job creations, SDG6 water and sanitation, SDG 11 sustainable cities and SDG13 climate change. As a matter of fact, AFEX as a monitoring tool has gained deeper meaning by crystalizing the relevance of renewable energy targets and executed projects to sustainable development and to climate change actions under the UNFCCC.

Since the second Edition of AFEX 2015 and given the rapid demographic growth and rising economic development needs, many Arab countries have made perceptible progress towards creating better conditions for the uptake of renewable energy investments. Several Arab countries have improved the market structure and have embraced measures to ease access to the power generation market for private investors. A dozen of the Arab countries, including most of the oil-rich states implemented energy subsidy reforms. Almost all Arab countries are currently allowing for some sort of private participation in power generation activities, and have adopted legislation authorizing IPPs. Libya, the only country with a fully closed electricity sector, is now preparing to open up its market through a new electricity law. At least six countries have allocated dedicated areas for the development of renewable energy projects, and all countries have dedicated institutions or Ministry-level departments to promote the development of renewable energy. Seven countries are working on developing grid codes for renewable energy projects.

The policy frameworks reflecting the political commitment to foster the RE transition have noticeably improved where RE targets with detailed action plans and supporting policies such as feed-in-tariffs, net-metering, and competitive bidding, are continuously being adopted. By mid-2016, the total installed capacity in the Arab countries of new renewables (excluding hydro) surpassed for the first time 3000MW. Wind generation is currently dominated by utility scale installations in Egypt and Morocco, while solar PV and CSP have been most developed in Algeria, Morocco, Egypt and the UAE. In terms of renewable energy share in the overall installed capacity, Sudan is leading with around 51 percent share attributed to its large hydro capacity. If hydro is excluded, Morocco and Mauritania stand first with around 12 percent share. It is important to note that by mid 2016, Algeria, Egypt, Jordan, Morocco, Palestine and UAE (Abu Dhabi) were the only countries in which private actors practically owned and operated utility scale renewable energy power plants. Other Arab countries relied on state owned utilities and institutions to own and operate projects.

Particularly, competitive bidding for private utility scale renewable energy projects is becoming the preferred option for the Arab region in terms of financial efficiency. Developers are running a cost race under competitive bids all over the region, reflecting the competitiveness of wind and PV power. The lowest bid of the third phase of UAE's Mohammed bin Rashid Al Maktoum Solar Park resulted in a price of 2.99 USD cents/kWh. Egypt's 250 MW Gulf of Al Zayt wind project received offers of about 4 USD cents/kWh and Morocco's 850MW of large-scale wind energy projects tender received an average bid of just 3 USD cents/kWh, with the lowest offer at around 2.5 USD cents/kWh. It is important to note that such prices are possible because of the region's excellent solar and wind energy potential, together with measures to mitigate investment risks backed by some concessional finance.

Distributed generation is gaining an increased momentum in the Arab region, not only in traditional markets characterized by low overall access to electricity such as Djibouti, Mauritania, Sudan and Yemen, but also in those markets typically known as utility scale focused. In Algeria and Egypt several small and medium sized PV plants came on line in 2015 under the feed-in tariff schemes adopted in the two countries. Net metering policies have been adopted in Jordan, Lebanon, Tunisia, UAE and to some extent in Morocco and Egypt. Jordan and Tunisia have relatively simple schemes that have attracted smaller system investors. Other countries are still in early stages of implementation off their net-metering policies. In Lebanon, the financial support through the National Renewable Energy and Energy Efficiency Action stimulated the distributed generation market of PV and solar water heaters. Similarly, in the UAE where several programs are launched in different emirates like Dubai and Abu Dhabi are leveraging funds to RE based distributed generation.

While most Arab states have announced targets for RE deployment, only a handful of them have been officially adopted by a higher political authority. The 2016 edition of the AFEX documents several target changes in various countries.

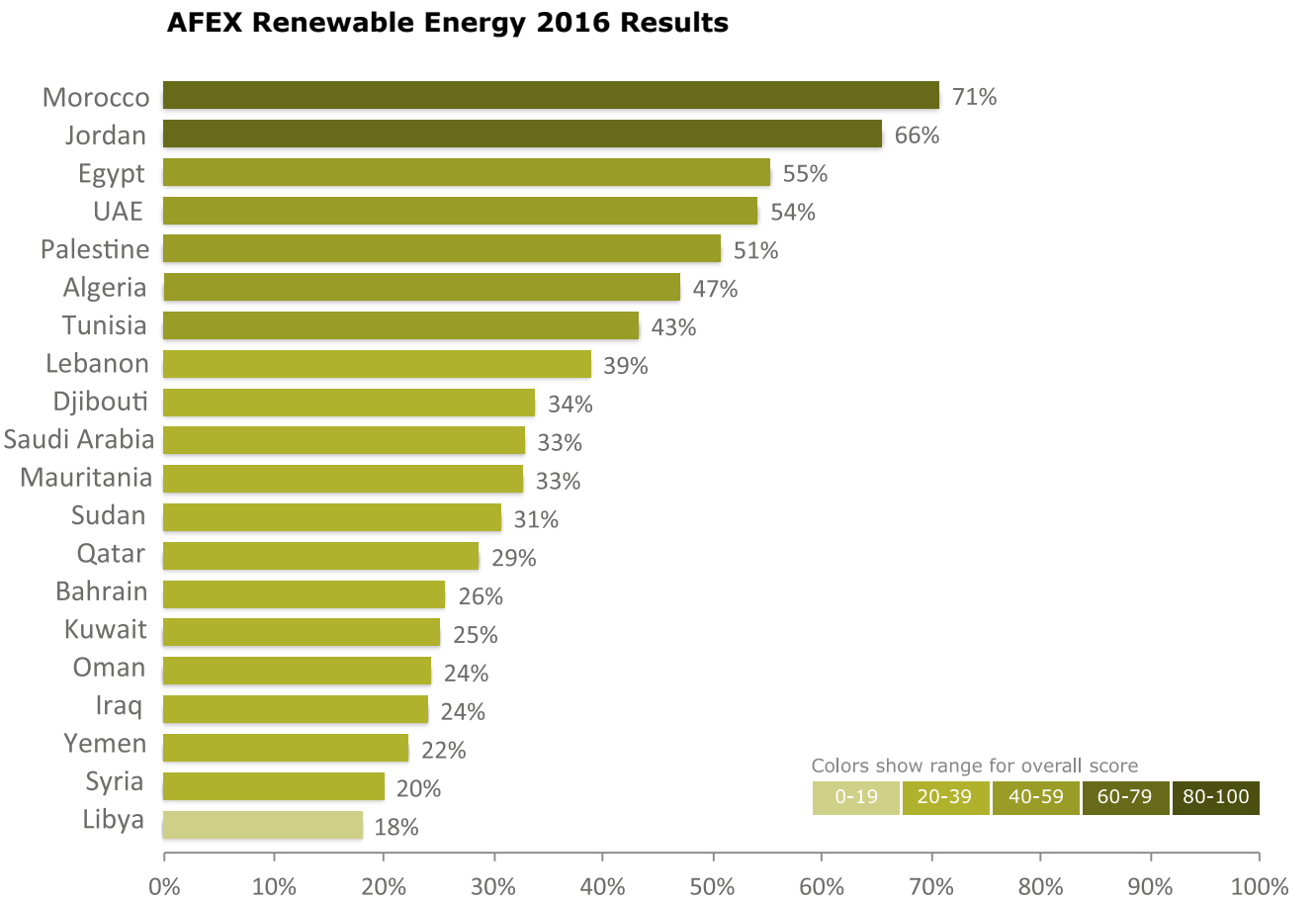
Morocco's previously announced target to produce 42% of its energy needs through RE by 2020 has been ratcheted up to 52% by 2030. Egypt leads the Arab countries in terms of aimed installed capacity for the 2020 timeframe with its plan to develop 10 GW of wind and solar projects by 2022. Lately, as part of the "Saudi Arabia Vision 2030" policy paper a target of 9.5 gigawatts of renewable energy by 2023 was set. Algeria announced an ambitious official 2030 target of 12000 MW of RE. Algeria's target was revised in 2015 to 27% of electricity generated by 2030 from a previous 6% percent. Other officially adopted targets can be found in Jordan, Palestine, Tunisia and Yemen. An interesting shift can be noted for Jordan compared to AFEX 2015, where the PV target for 2020 has been increased from 800MW to 1000MW, while CSP is no longer part of the 2020 target. Most of the expressed Arab countries targets are relatively ambitious, especially in relation to the high regional reliance on fossil fuels. Interestingly, the targets confirm an overall preference for solar rather than wind and bioenergy in the region.

Regionally coordinated actions are getting increased impetus in the region. Implementation and monitoring tools for the 'Pan-Arab Strategy for the Development of Renewable Energy 2010-2030' were recently introduced and politically endorsed by the Arab Ministerial Council of Electricity. These tools are stipulated in the Arab Renewable Energy Framework (AREF) which provides a regional guideline for countries to develop their National Renewable Energy Action Plans (NREAPs) based on a customized template, which in turn is the baseline for annual progress reports. Since the adoption of AREF and NREAP's template by the League of Arab States' member states in mid-2015, two countries (Lebanon and Sudan), have taken the lead and drafted a national plan with support of RCREEE based on these documents and several other Arab countries expressed interest in developing their respective action plans.

Several interrelated challenges are observed in the Arab region. Uncertainties about grid infrastructure readiness to absorb renewable energy and grid access conditions in the regulations remain critical, as detailed grid maps and renewable energy access conditions are still not easily available to private developers in most countries. Another challenge lies in the capacity to provide institutional support to streamline the administrative procedures and in the availability of financial and fiscal incentives to private RE developers; in both utility scale and distributed generation projects. Facilitation of land access, enhancing stakeholders coordination to obtain required permits, setting standardized contractual documents, while correctly designing incentive mechanisms to mobilize finance are among the priorities that most Arab countries should pay attention to.

AFEX RE 2016, shows that renewable energy growth in the Arab region can be driven by socio-economic considerations alongside energy supply and security drivers. Political actors and promoters rest on the promise of greater positive socio-economic benefits of renewable energy, such as securing local high quality jobs and local business development opportunities. Many countries in the region have the assets of the human resources and the industrial base that could be adapted to serve the renewable industry locally and regionally. Gradually progressing local content ratios achieved in Morocco, Egypt and Jordan's wind and solar projects draw attention to this possibility. AFEX 2016 portrays some off-grid decentralized RE projects in the Arab region highlighting that the implementation of renewable projects would also contribute to developing rural and new communities, through improved access to electricity ,by providing new opportunities of learning improvement through evening house and school lighting, as well as with the provision of appliances and solutions fostering improved health conditions.

The Arab region renewable energy deployment model is heavily based on large-scale projects, while decentralized renewable energy solutions received sporadic attention. Among different renewable energy technologies, the PV market in the Arab region is taking the lead, where several hundreds of companies are currently providing the services of supply, installation and maintenance of PV systems. Some donor supported programs also piloted decentralized PV, solar water heaters and biogas systems within developmental oriented projects, targeting rural and poorer areas. However, a key challenge to the region is to increase the public appetite and subsequently the market volume for decentralized renewable energy solutions in different sectors, such as solar pumping for irrigation, hybridization of renewables with diesel for electricity and heat generation in industry and tourism sectors, etc. The added value of establishing RE projects exceeds the value of electricity and jobs created. There is a clear need to research, in sufficient details, the impact of existing and proposed renewable energy plans on different valued socio economic components, such as equitable business and employment opportunities, adequate services and infrastructure, health and well-being, sustainable land access and traditional/ alternative use, protecting heritage and cultural resources, and adequate sustainable income and lifestyle. It is highly recommended to initiate such research on both national and regional levels. An example of job creation impact based on a robust methodology in Tunisia is annexed to this year's edition of AFEX.

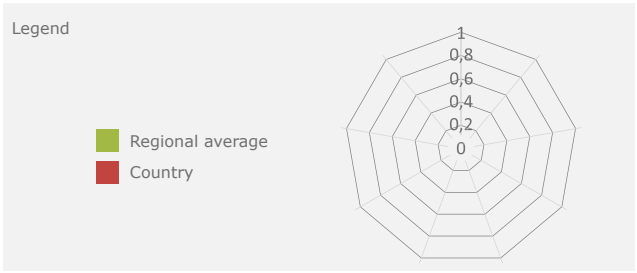


	Final Score	Market Structure	Policy Framework	Institutional Capacity	Finance and Investment
Morocco	71%	63%	55%	76%	89%
Jordan	66%	56%	61%	69%	76%
Egypt	55%	63%	49%	69%	41%
UAE	54%	50%	38%	72%	57%
Palestine	51%	45%	58%	46%	55%
Algeria	47%	48%	32%	63%	46%
Tunisia	43%	38%	44%	49%	42%
Lebanon	39%	45%	41%	46%	24%
Djibouti	34%	15%	47%	34%	39%
Saudi Arabia	33%	30%	24%	65%	12%
Mauritania	33%	37%	37%	47%	10%
Sudan	31%	28%	25%	40%	29%
Qatar	29%	30%	17%	49%	20%
Bahrain	26%	23%	21%	48%	10%
Kuwait	25%	18%	25%	47%	10%
Oman	24%	21%	24%	42%	10%
Iraq	24%	18%	29%	38%	10%
Yemen	22%	18%	27%	26%	17%
Syria	20%	23%	16%	30%	10%
Libya	18%	10%	16%	34%	12%

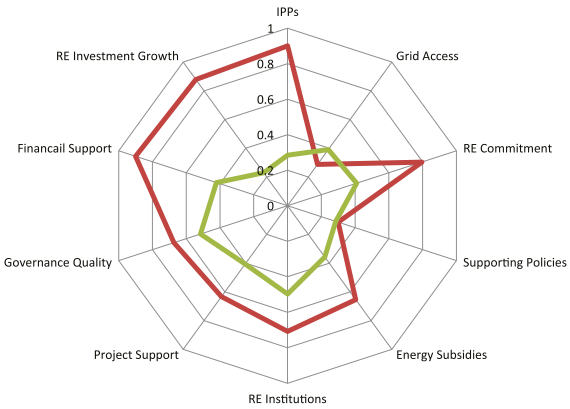
By Country

AFEX Renewable Energy 2016 provides an assessment of countries' progress in renewable energy according to four evaluation categories: Market Structure, Policy Framework, Institutional Capacity, and Finance and Investment. Under these categories, countries are assessed according to nine different factors and 30 quantitative and qualitative indicators.

The following diagrams illustrate total scores attributed to each country assessed. The countries are presented in order according to their final ranking.

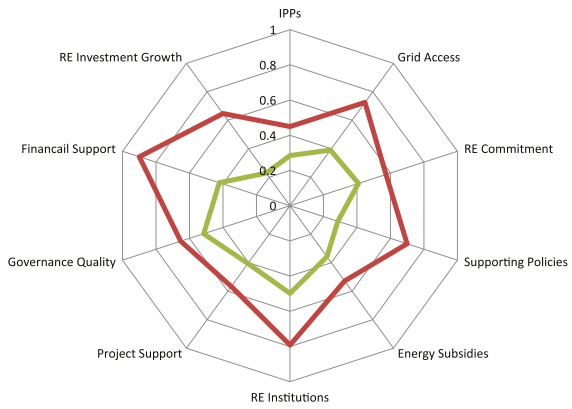


MOROCCO SCORE 71



Morocco continues to lead this eddition of AFEX renewable energy due to its success in several areas. It has made significant progress towards meeting its ambitious targets by installing additonal wind and CSPpower capacity and issuing tenders for more projects. Morocco's renewable energy installed capacity has increased by 2% since 2015, now accounting for twelve percent 12% of its mix excluding hydro. This is by far the highest share of installed capacity in the region togther with Mauritania. In 2016, Morroco moved forward with implementing wind and solar programs and has tendered more than 1000MW of large-scale renewable energy projects through its IPP public competitive bidding process. The year 2015 included some important developments: Commissioning of the largest CSP projects in the world, Noor 1 160MW project in operation; Morocco had private RE projects in operation "large scale projects". However, the market for small-scale distributed renewable energy generation in Morocco remains slow. Morocco should move faster with opening up its power market for small-scale generation of renewable energy projects and let small and medium enterprises enter into the business of development of the sector. This reform will help Morocco to improve the socio-economic impacts of renewable energy.

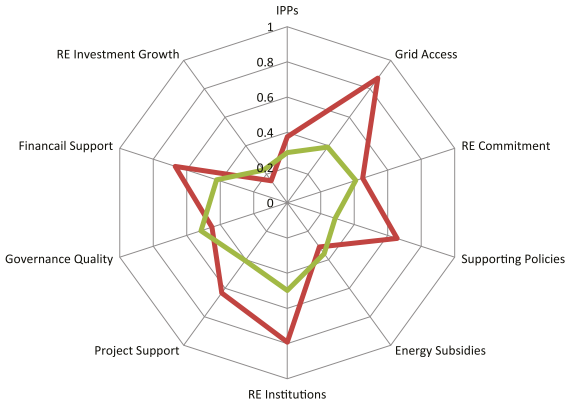
JORDAN SCORE 66



Jordan appears second in the ranking. Jordan has made substantial progress in the past year in attracting private investment for renewable energy development. The Masdar-developed Tafila wind farm commenced commercial operations in September 2015 at full capacity of 117MW. Jordan continues to be the only country in the region to have operated a full ownership separation of its power sector, with notable performance of its dedicated RE fund. Jordan has improved its Grid Access factor since last AFEX by being the most advanced in establishing grid codes and their related technical specifications for RE producers, from small-scale to large-scale. Energy prices in Jordan are also among the highest in the region, which allowed the country to move forward with the implementation of its net metering scheme. The electricity pricing reform, together with the supporting policies will continue to attract investments in renewable energy. The government in Jordan has identified a special zone to spur industrial development and innovation called the Ma'an Development Area. Within this zone, Jordan has delineated specific areas for development of solar projects. In addition, project developers can freely select sites for projects under the direct proposal scheme. Jordan should also open its power generation market to allow private-to-private sale of electricity from renewable sources.

EGYPT

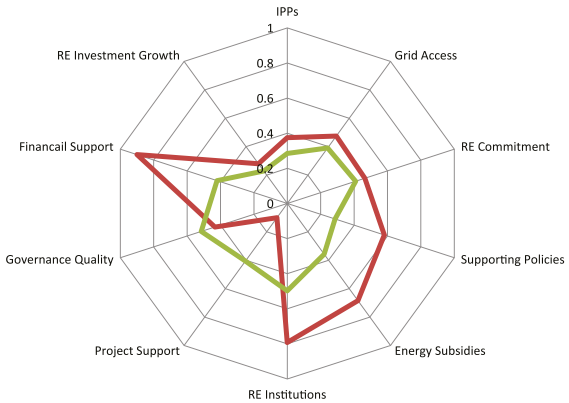
SCORE 55



Egypt ranks third. Egypt presents an attractive market for the development of renewables due to its market size and strong renewables potential. In 2015, Egypt made substantial improvements to its renewable energy policy framework and attracted the attention of private investors. In early December 2015, Egypt inaugurated its new 200MW, 100 turbines wind farm in Gulf El-Zayt, which will boost the country's wind capacity by 35%. This wind farm brings Egypt's total wind capacity to 800MW. Egypt IPP's competitive bids (Auctioning) proved successful in reaching competitve price records in wind energy. Nevertheless, Egypt 's performance is lower than expected when it comes to the implementation of the feed-in-tariff, where delays have been encountered in sealing agreements with qualified developers. Nevertheless, on a parllel direct proposals track Egypt awarded Siemens a contract to develop 12 wind farms with a total capacity of 2GW. Egypt needs to put more efforts in advancing small-scale generation of renewable energy and improving the buisiness case for citizen's investment in renewable energy.

PALESTINE

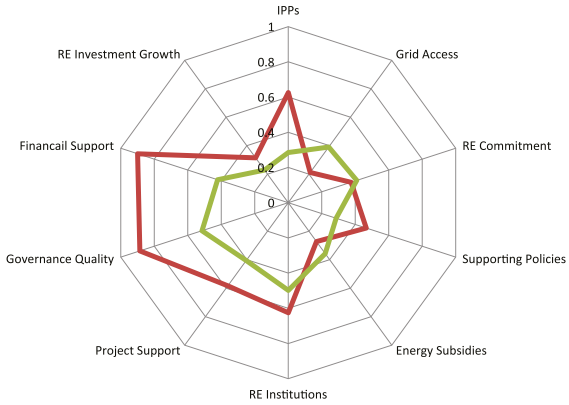
SCORE 51



Palestine has a unique set of market conditions: it has essentially limited local power generation; very limited physical space; and it lackes the resources to offer energy subsidies. Palestine has sufficiently attractive renewable energy policies in place such as; the net metering scheme and the direct proposal submission process. The revolving fund helped also the governmental entities to lead by example through installing RE and EE systems. Existing policies allowed RE to face the energy shortage challenges and fostered growth in distributed generation. However, Palestine needs to focus on ensuring the functionality of these schemes from the more powerful distribution companies in realtion the regulatory agency.

UNITED ARAB EMIRATES

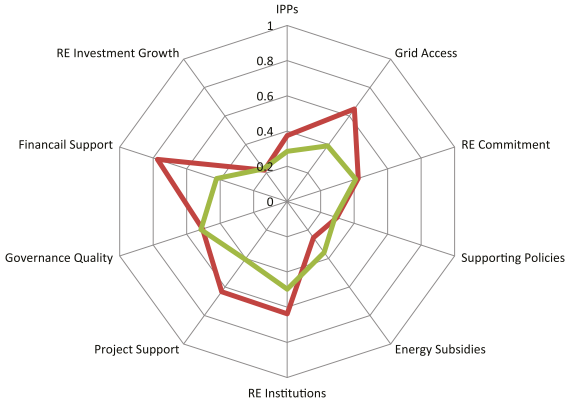
SCORE 54



UAE ranks fourth, and the highest among GCC countries. UAE scores very well in the "Governance Quality" factor, Dubai Electricity and Water Authority (DEWA) has awarded the 800MW third phase of the Mohammed bin Rashid Al Maktoum Solar Park with a new record of the lowest cost of PV production in the world. The solar park is based on the Independent Power Producer (IPP) model. Shams Dubai initiative is gaining momentum in promoting small scale distributed generation systems. In general, UAE has favorable conditions for business operation, including liberal fiscal and trade policies. UAE should focus on creating more options for the private sector to enter the renewable energy market and expand its renewable energy policies to all UAE emirates.

ALGERIA

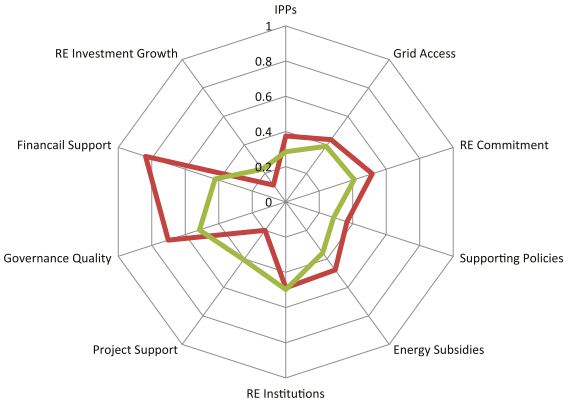
SCORE 47



Similar to Eygpt, Algeria presents an attractive market for development of renewables due to its market size and strong natural resource potential. The key accomplishments of Algeria was in 2014 include the adoption of feed-in-tariff scheme, and creating a series of renewable energy projects. Currently there are about more than 95 MW of renewable energy projects underconstruction. Algeria's RE projects have now a guaranteed access to the grid, but aren't given a priority access over conventional power producers. However, the pool of investors in Algeria remains limited. Algeria's new FIT scheme is eligible for both solar PV and wind energy projects and applies fixed tariff rates. In Algeria, renewable power projects will be subjected to a specific regime based on a 20-year power PPA with one of the four distribution grid operators, which all are subsidiaries of the State-owned Sonelgaz Group. These projects will receive preferential regulatory FIT applicable to the electricity produced. The Algerian investment framework can be improved to allow participation of more foreign investors.

TUNISIA

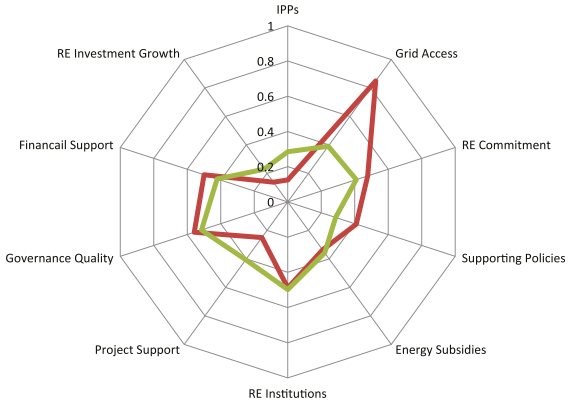
SCORE 43



Tunisia has made serious improvements in the "Governance Quality" factor. As of 2016, Tunisia leads the BTI Index for Arab countries, by ranking 50 on 129 countries with a score of 6.2 on a scale of 10. Tunisia has non-hydro renewable energy installed capacity of about 265MW since 2014, reaching a 6% share of its energy mix. The smartly designed Tunisian net metering scheme has led to the deployment of small-scale PV projects in the residential sector with a total capacity of 23 MW. However, the Tunisian power market still remains closed for large-scale private generation of renewable energy. The new renewable energy law that entered into force in 2015 is expected to change this sitiuation. Tunisia has the potential to attract investments in renewable energy based on its generally favorable business conditions. Tunsia should focus on implementing the provisions of this law and creating a pipleline of private renewable energy projects. Since the energy prices in Tunisia are relatively high, the next consideration should be further opening the power generation market to allow private-to-private sale of electricity from renewable sources.

LEBANON

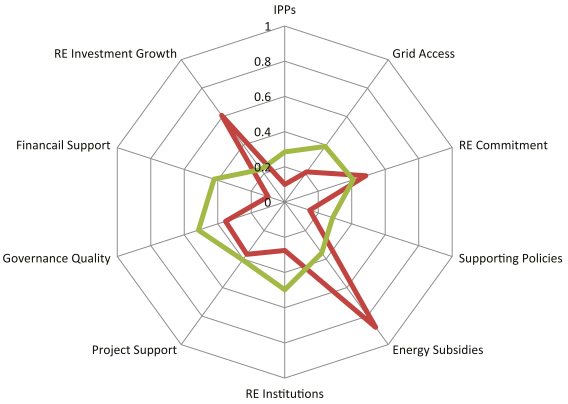
SCORE 39



Since 2014, Lebanon's biggest accomplishment has been the leveraging of private funds for financing small-scale projects through its innovative financing mechanism "National energy efficiency and renewable energy action"NEEREA". The first utility scale wind project award is expected in 2016. The country still lackes the required independent regulatory authority to grant power generation licenses to private developers. This has largely prevented the country from substaintially increasing its renewable energy capacity. Having around 33% of the power supplied by unofficial private diesel generators, Lebanon presents a great market for the development of distributed solar projects. Lebanon should introduce more legal channels to allow and operationalize private sector participation in both utility scale and small-scale power generation projects and in giving more additional momentum to schemes such as a net metering and competitive bidding schemes.

DJIBOUTI

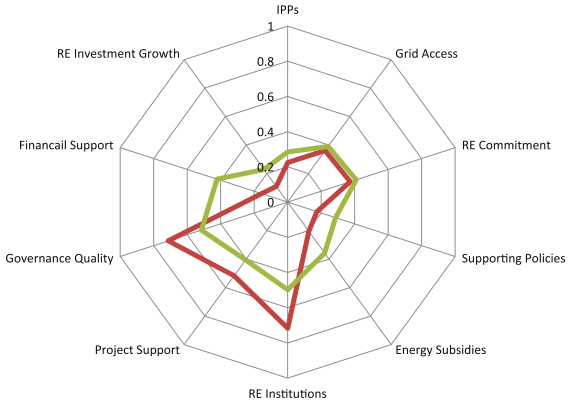
SCORE 34



Djibouti has a a small base of conventional capacities and has announced an ambitious target of 100% renewable electricity in line with its Vision 2035. Governmental policies focus on remote communities that will not benefit from grid-extension in the near future to develop electrification through a mix of RE and non-renewables where several small projects are operational. There is moreover the IPP 50MW Grand Bara Phase I project currently under construction, which will increase the renewable energy share substantially. Djibouti has very limited experience with wind so far. Additionally, its institutional and regulatory frameworks need to be developed.

SAUDI ARABIA

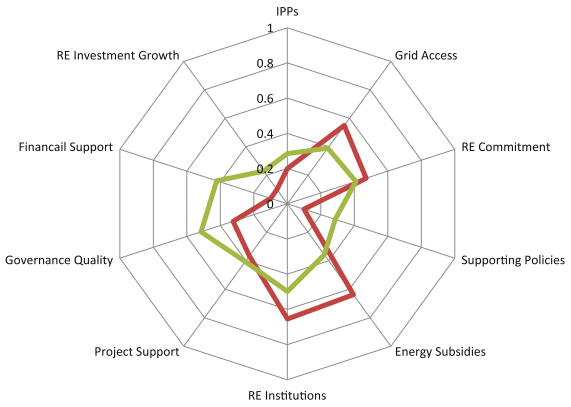
SCORE 33



Saudi Arabia presents an attractive market for renewables due to its market size, resource potential, land availability and high energy demand. Saudi Arabia has shown commitment for renewable energy by adopting ambitious targets, establishing a dedicated institution for development of renewable energy projects and attracting private developers to participate in renewable energy power generation. Saudi Arabia has installed a capacity of 23MW in the year 2016 and several small renewable energy projects are underconstructon. The first public IPP competitve bid opportunity has been issued for 100MW (2x50MW) projects in 2016. Hopefully, this would help as a first step to accelerate the market for private development of renewable energy projects.

MAURITANIA

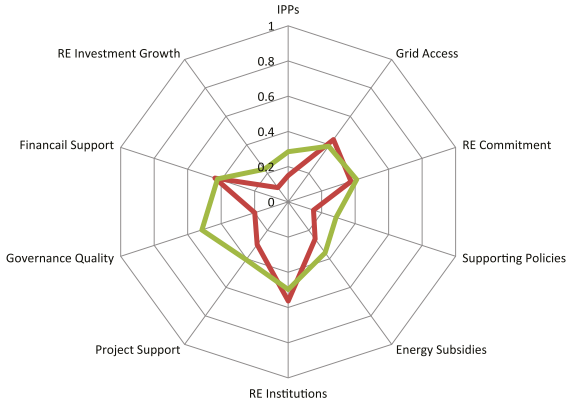
SCORE 33



Mauritania has a total RE installed capacity 52MW reaching a 12% share of its energy mix in 2016, which is the largest share in the Arab region. Mauritania has 30MW under-constraction project and planning to increase its capacity in the near future. In Mauritania, a large country with a small population that does not require an extensive electricity network, load centers are spread throughout the country, wich implies a strong need for decentralized services. Numerous programs and electrification projects in Mauritania focus on poor rural areas not connected to the grid. Mauritania has a functioning regulator and developed a unique system to finance a portion of the cost of extending services to rural areas through the Fund for Universal Access to Services (FAUS), which is supplied by telecommunication sector revenues. There is a need to set the regulatory framework and necessary administrative processes to create more options for private investments.

SUDAN

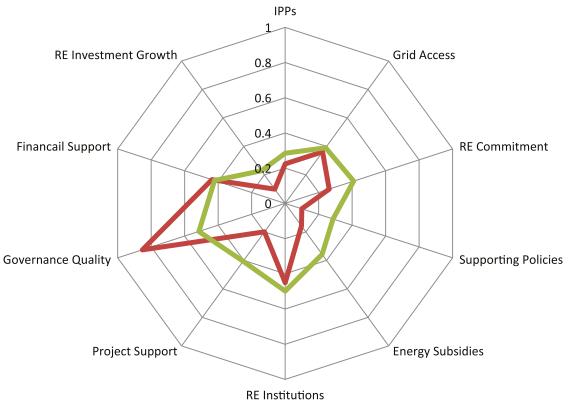
SCORE 31



Sudan's larger portion of its population still has to gain access to electricity. Diesel is often used in rural and urban areas for electricity production and water pumping. Sudan has already initiated a rural PV electrification program, which aims to electrify 1.1 million homes with PV by 2031. This initiative is a step in the right direction. Sudan is one of the few countries with a technology-specific RE grid code .As of 2016, Sudan has 12MW of installed capacity. Sudan should continue to promote decentralized small-scale power generation, including small-scale PV, mini hydro and Biomass. This includes eliminating barriers to the deployment of renewable energy projects. Sudan is currently drafting its national RE action plan, and policies, which should help creating better buisiness case for RE once.

QATAR

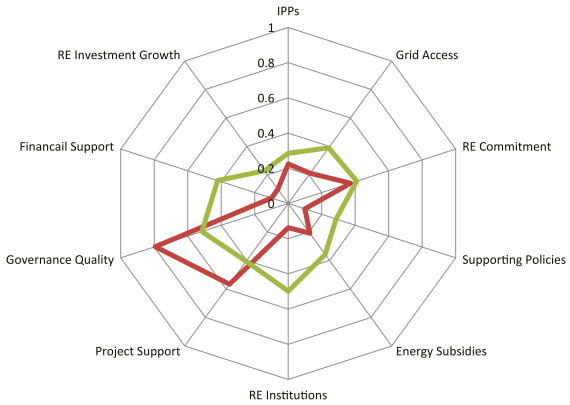
SCORE 29



Qatar currently has a very small share of renewable energy projects, and the private sector has no viable options to enter the power generation market. Qatar has a strong foundation, however, in its favorable business conditions. Among Arab countries, Qatar ranks high in the global competitive and is ease of doing business index. Much like other GCC countries, Qatar has the potential to attract investments in renewable energy due to its relatively favorable business climate and financal resources availability. The most decisive elements will be motivation and commitment.

BAHRAIN

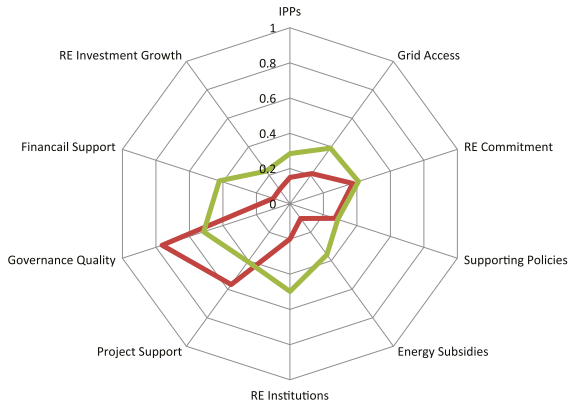
SCORE 26



Bahrain is one of the few countries in the region that has still in the process of creating clear targets and action plans. the institutional framework needs to be developed. At the same time, Bahrain ranks 65out of 189 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 on its long-term energy systems, Bahrain could show leadership in innovative applications of renewable energy.

KUWAIT

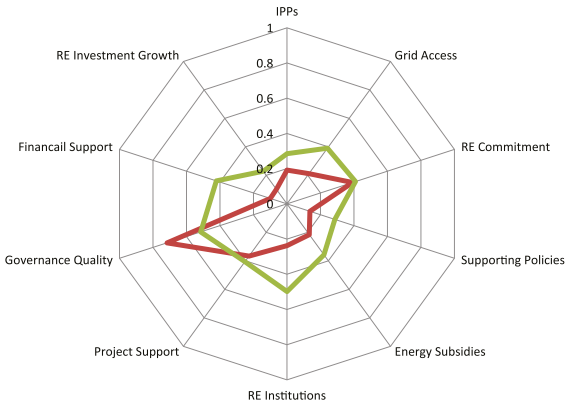
SCORE **25**



Kuwait has shown commitment for renewable energy deployment by adopting targets and identifying a vast desert area for the development of large–scale renewable energy projects with a total capacity of more than 2000MW, the Shagaya renewable energy park. The first plot phase of the park, 70MW of wind, PV and thermal storage, is already under construction. The second and the third phases of the park are planned to be developed through an IPP public competitive bidding process. Looking ahead Kuwait should focus on the successful implementation of its plan and ensure no delays in the tendering process.

OMAN

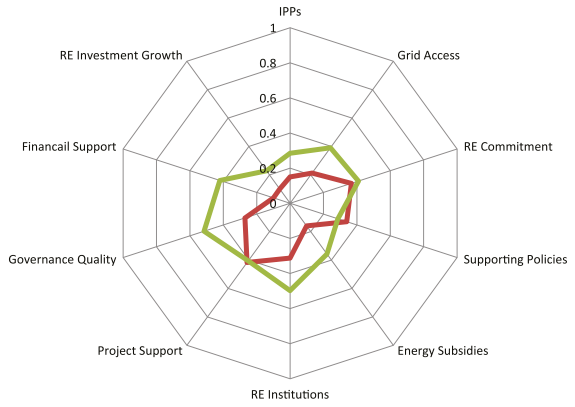
SCORE **24**



Oman has a good track in engaging IPPs in the power sector, although this experience has not until now been reflected on the renewable energy sector. Oman's largest producer of oil and gas, Petroleum Development Oman (PDO), announced in 2015 plans to build one of the world's largest solar plants for enhanced oil recovery (EOR) to extract heavy and viscous oil at the Amal oilfield. Such project is an exemplary project for the rest of the GCC. Oman's need to develop its institutional capacity and set the necessary frameworks for promoting RE on both utility and distributed generation scales.

IRAQ

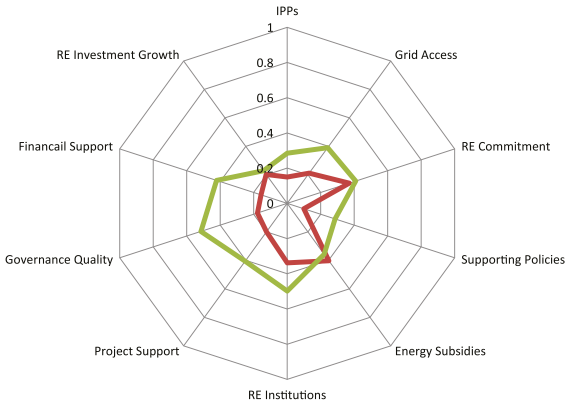
SCORE **24**



Iraq's political situation has limited its ability to make substantial progress in renewable energy. Nevertheless, by mid 2016, potential investors were invited to submit expressions of interest of 50 MW solar project and it is expecting to make a progress during 2016. Iraq is establishing the renewable energy and energy efficiency department within the Ministry of electricity, which is currently working with UNDP and other Iraqi stakeholders in developing the needed frameworks to continue enhancing the institutional base and exploring opportunities for the most suitable renewable energy applications and private investment promotion schemes.

YEMEN

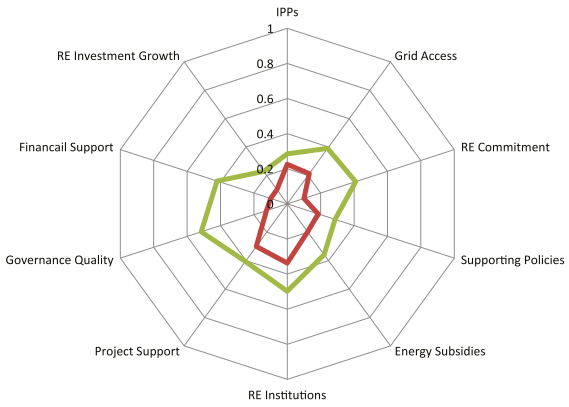
SCORE **22**



Yemen faces the challenge of delivering electricity to a larger portion of its population. The current difficult political situation which directly affected electricity access around the country, has stimulated a new market for small scale solar energy projects for both residential and agriculture sectors. Since 2014, Yemen has substantially increased the prices of diesel. Switching from diesel to solar can help the people improve their livelihood conditions. Yemen should focus on exploring the opportunities of designing innovative energy systems based on decentralized small-scale power generation. Distributed photovoltaic systems are now the key solution to have access to electricity in current complex. Due to the war, Yemen has not been able to make progress in attracting large scale investments in renewable energy.

SYRIA

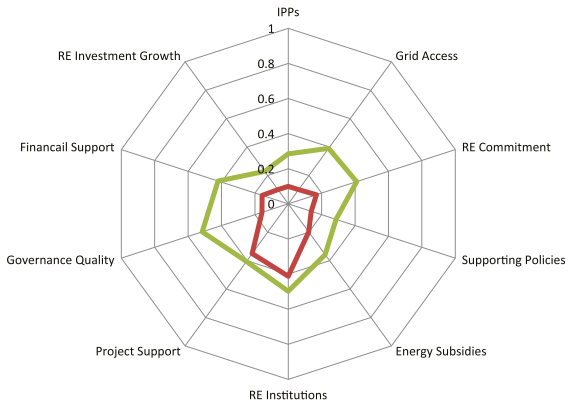
SCORE **20**



Syria adopted progressive measures in 2011 to attract interest and activity in the renewable energy sector. It has opened its market for private developers, adopted feed-in-tariffs and a net metering policy, authorized private-to-private sale of renewable electricity, and announced tenders for public competitive bidding to develop the first larg-scale wind projects. These were all positve foundational activities. However, due to the deteriorating political sitiuation, all activities have been paused and the Syrian government has not had the chance to implement the newly introduced policie

LIBYA

SCORE **18**



Although Libya is the only country in the region with a fully closed electricity sector, it is finally preparing to open up its market. The Renewable Energy Authority of Libya (REAOL) have started defining a national plan intended to finance small-scale RE projects through a dedicated fund. Libya has 328MW large-scale state owned renewable energy project under construction but having these projects in operation depends on the political situation in the country. Institutional stability will be the first necessary step in supporting Libya's long-term renewable energy goals.

Arab Future™ Energy Index

AFEX 2016

Renewable Energy

1 Introduction

1.1 About AFEX Renewable Energy

AFEX Renewable Energy is a policy assessment and benchmark tool that aims to provide a comprehensive assessment of the investment climate for renewable energy development, and ranks the Arab region's ongoing progress. The assessment is based on the compilation and analysis of detailed, country-specific data according to the set of pre-defined indicators listed in Table 1.

AFEX Renewable Energy aims to:

- Provide a comprehensive assessment of the current investment climate for RE development,
- Formulate targeted recommendations on improving regulatory and institutional frameworks for RE investment,
- Benchmark countries' performance in creating better conditions for RE investment,
- Highlight developments and progress made by each country toward RE since the first and second editions of AFEX in 2013 and 2015,
- Effectively communicate RE success stories and highlight areas for improvement, and
- 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 to embrace the perspective of private investors and as such focuses on barriers and challenges they may face in the various phases of RE deployment in Arab countries. The conceptual framework of AFEX Renewable Energy is presented in Table 1. It consists of four evaluation categories relating to the index's objectives and scope of assessment:

1. **Market Structure:** assesses the ease of accessing the power generation market for private investors, including grid access.
2. **Policy Framework:** assesses the level of political commitment to pursue the development of RE, which includes setting RE targets with detailed action plans, formulating supporting policies to encourage investment in RE, and phasing out fossil fuel subsidies.
3. **Institutional Capacity:** measures institutional capacity of Arab states to design and formulate RE policies and, most importantly, provide institutional support for private developers in RE deployment.
4. **Finance and Investment:** assesses financial incentives available to private RE developers and measures private investment growth in RE.

For each of those four categories, 10 factors are evaluated and broken into sets of quantitative and qualitative indicators.

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, although this factor is surely an important element for investors' decision making.

Another aspect that is left out of this report is the level of maturity of the supply chain. The current state of the grid infrastructure in each country and the potential of grid interconnections between various countries, while having an impact on the development of the RE market, won't be included in this report until comprehensive data become available.

1.3 What is new in AFEX Renewable Energy 2016?

Scope of assessment: In 2016, a focus on regional efforts in the field of off-grid, decentralized energy generation has been added to this report. It takes an in-depth look into the different off-grid energy systems used across the region, especially electricity access in rural and remote areas. In addition, the scope of the report has been broadened to include a review of socio-economic aspects related to sustainable energy, demonstrated by lessons learnt from the Tunisian and experiences.

Geographical scope: In its 2013 edition, the AFEX Renewable Energy report assessed the RE development in 13 Arab countries. The 2015 edition expanded its geographical scope by adding four more countries: Kuwait, Qatar, Saudi Arabia and UAE. AFEX 2016 analyzes the RE development of three additional countries, namely Djibouti, Mauritania and Oman, expanding its scope to 20 Arab countries.

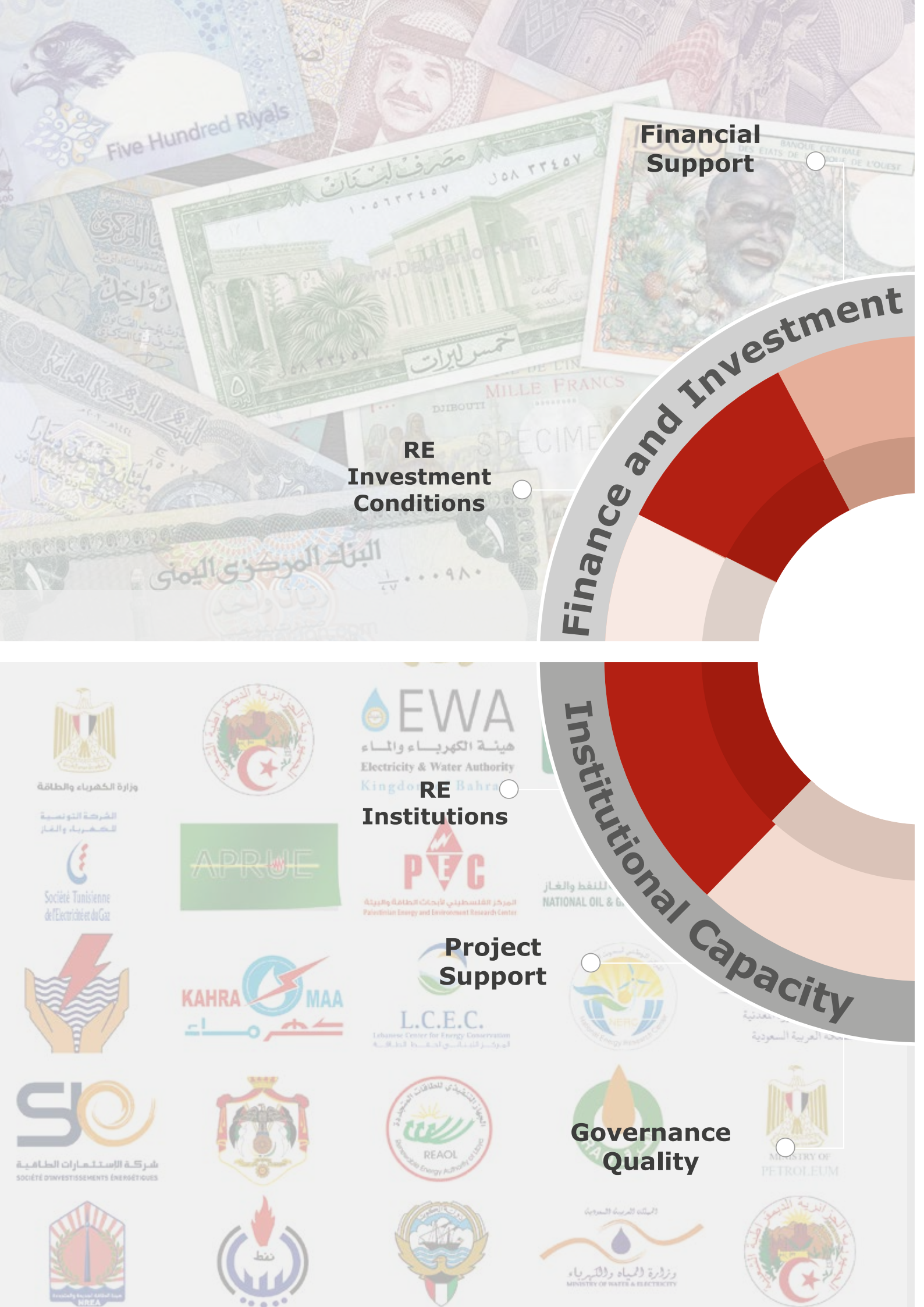
AFEX Renewable Energy is constructed in accordance with the OECD methodology for constructing composite indicators (OECD, 2008). A detailed description of the methodology is presented in Annex A.

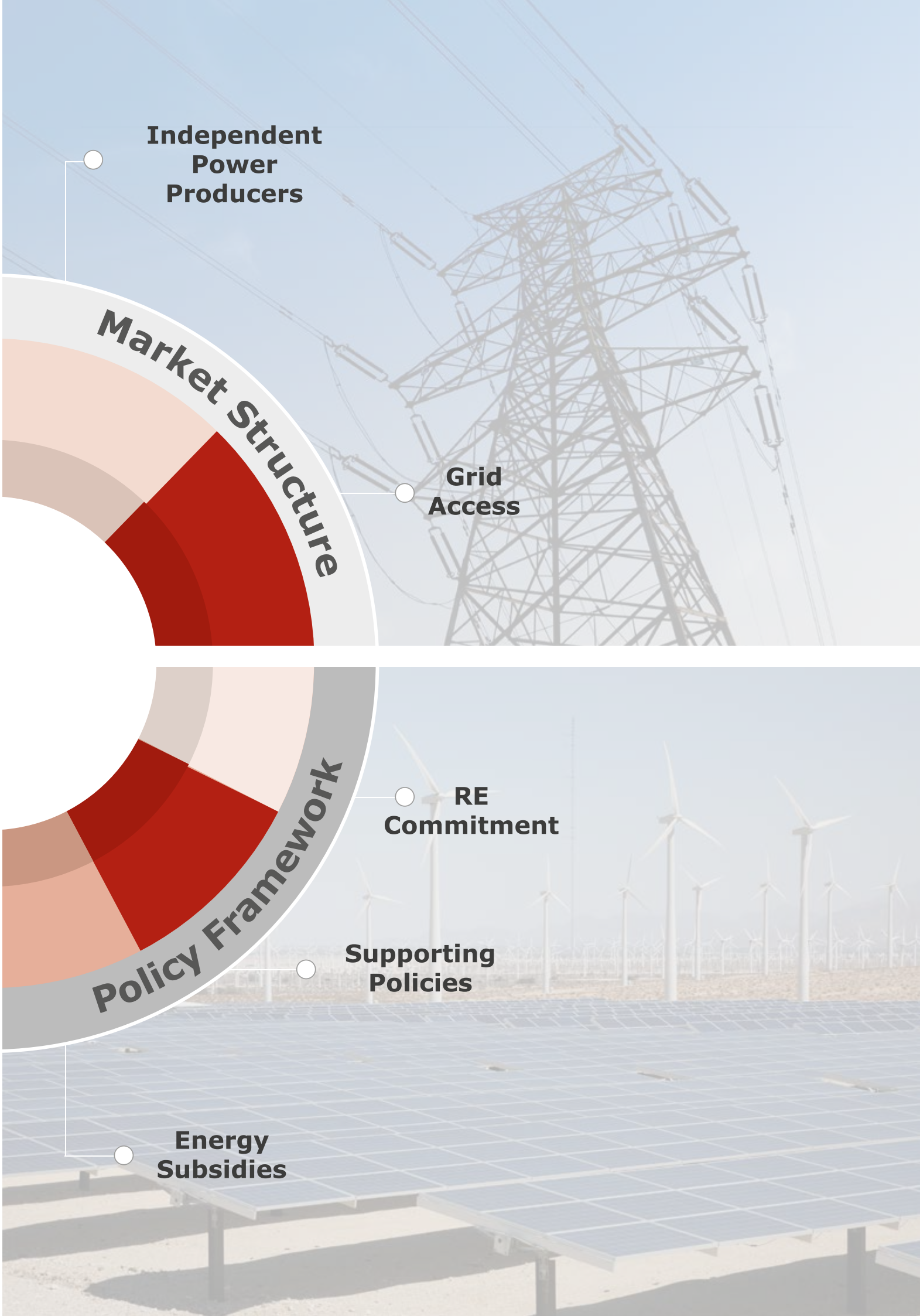
AFEX 2016 has expanded its geographical scope to include three new countries to its assessment: Djibouti, Mauritania and Oman

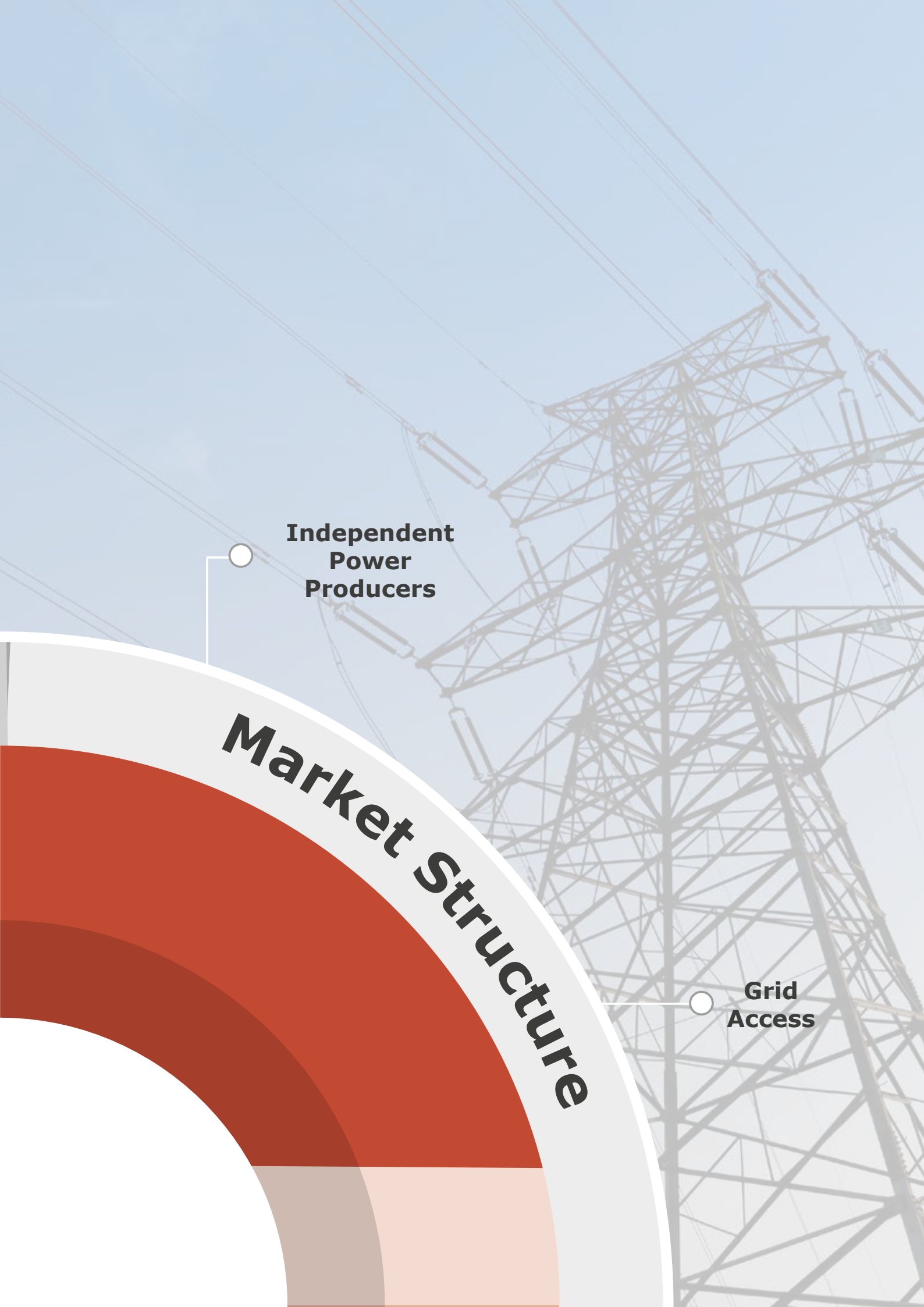
Arab Future Energy Index (AFEX) | Renewable Energy

Table 1: AFEX Renewable Energy Conceptual Framework

Category	Factors	Indicator	Score/Measuring Unit
Market Structure	Independent Power Producers	Utility Suppliers	Utility supply authorized by law. Utility suppliers exist in practice. Utility suppliers of RE exist in practice.
		Third-party Suppliers	RE third-party supply is authorized by law.
		Direct Export	Direct export of RE authorized by law. Direct exporters of RE exist in practice.
	Grid Access	Guaranteed Access to Grid	Priority access guaranteed by law. Priority access guaranteed in practice. Priority dispatch guaranteed by law. Priority dispatch guaranteed in practice.
		Grid Code for RE	Technical guidelines to connect distributed smaller PV systems to low-voltage grid adopted. Technical guidelines to connect utility -scale PV systems to medium -and high-voltage grids adopted. Technical guidelines to connect wind parks to medium and- high-voltage grids adopted.
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.
		RE Share Operational	Percentage of total installed capacity (MW).
		RE Projects under Construction	Percentage of total installed capacity (MW).
		RE Projects under Tendering	Percentage of total installed capacity (MW).
	Supporting Policies	IPP Public Competitive Bidding	Resources identified for private development. Tenders announced. PPA signed (MW).
		Direct Proposal Submission	Policy adopted by law. Proposals selected for private development. PPA signed (MW).
		Feed-in Tariffs	Officially adopted. RE projects implemented through feed-in tariffs (MW installed).
		Net Metering	Officially adopted. RE projects implemented through net metering scheme (MW).
	Energy Subsidies	Residential Electricity Subsidies	Percentage of Palestinian residential retail prices (benchmark).
		Commercial Electricity Subsidies	Percentage of Palestinian commercial retail prices (benchmark).
		Industrial Electricity Subsidies	Percentage of Palestinian industrial retail prices (benchmark).
Institutional Capacity	RE Institutions	Independent Regulator	Established by law or similar sovereign act. Under establishment. Not considered yet.
		RE Agency	Established by law. Under establishment. Non-existent.
		Capacity of RE institutions	Expert assessment from 1 to 10.
	Project Support	Resource Quality Assessment	Detailed wind atlas published and available to public. Detailed solar atlas published and available to public.
		Land Access	Land allocated for private development of large-scale wind projects. Land allocated for private development of large-scale solar projects.
	Governance Quality	World Bank Ease of Doing Business Index	Rank under World Bank Ease of Doing Business Index.
		Global Competitiveness Index	GCI scores.
		Bertelsmann Stiftung's BTI Status Index	BTI Status Index scores.
Finance and Investment	Financial Support	Fiscal Incentives	Number of fiscal and/or financial incentives for RE projects.
		RE Fund	RE fund established by law. Sources of financing are clearly defined. Disbursement procedure is clearly defined. RE fund has collected and disbursed funds.
	RE Investment Growth	Share of Private Investment	Percentage of total installed capacity.
		Growth Rate of Private Investment	Percentage increase in installed capacity of RE.


Financial Support
RE Investment Conditions
Finance and Investment
RE Institutions
Project Support
Governance Quality
Institutional Capacity


Independent Power Producers
Market Structure
Grid Access
RE Commitment
Policy Framework
Supporting Policies
Energy Subsidies


Independent
Power
Producers
Market Structure
Grid
Access

2 Market Structure

The market structure category assesses how open the electricity markets across the Arab region are to private generation of RE. Power sectors in most of the Arab countries are characterized by a high degree of vertical integration and state control. With this in mind, this chapter will look into what are the key elements that make one individual market stand out from another, and assess its degree of openness. To better understand the possibility for private sector participation in renewable power generation, AFEX 2016 provides updates on competitive power market status through the progress made to unbundle vertically integrated power utilities.

This chapter focuses on two key elements: (1) independent power producers (IPPs); and (2) grid access. Those are further measured by a set of qualitative indicators as shown in Table 2.

Table 2: Power Market Structure Evaluation Factors and Indicators

Category	Factors	Indicator	Score/Measuring Unit
Market Structure	Independent Power Producers	Utility Suppliers	Utility supply authorized by law Utility suppliers exist in practice Utility suppliers of RE exist in practice
		Third-party Suppliers	RE supply to third-party authorized by law RE suppliers to third-party exist in practice
		Direct Export	Direct export of RE authorized by law Direct exporters of RE exist in practice
	Grid Access	Guaranteed Access to Grid	Priority access guaranteed by law Priority access guaranteed in practice Priority dispatch guaranteed by law Priority dispatch guaranteed in practice
		Grid Code for RE	Technical guidelines to connect small scale PV systems to low voltage grid adopted. Technical guidelines to connect medium to large scale PV systems to medium and high voltage grid adopted. Technical guidelines to connect medium to large scale wind systems to medium and high voltage grid

2.1 Power Sector Structure

Power sectors in the Arab region have traditionally seen a high degree of state ownership, monopoly, and vertical integration. High vertical integration describes a situation in which all stages in the electricity value chain (generation, transmission, distribution, and retail) are owned and operated by the same actor. A separation of the different segments in the value chain is referred to as 'unbundling' and is seen as one of the key pre-conditions to removing conflicts of interest between the operating actors and increasing overall competition in the power market.

Unbundling the electricity sector can take different shapes depending on the degree of vertical separation. It is possible to distinguish between ownership, legal, functional, and accounting separation. The highest degree of unbundling is achieved through ownership separation, a situation in which the transmission and distribution infrastructures been fully separated from the generation stage. For other types of unbundling, the power sector will mostly operate under the same ownership, with separations occurring at lower levels.

2.1.1 Unbundling in the Arab Region

During the last decade, most countries in the Arab region have introduced power sector reforms in order to open up their electricity markets and facilitate private sector integration. As an important part of these reforms, six out of the 20 examined countries have already undertaken some first steps towards a formal unbundling of generation and transmission and distribution activities. Those countries are currently in the process of implementing transparent and functional organizations, to prepare for a transitioning period that should last about 10 years.

Independent regulators will play a crucial role in enforcing the legal provisions which are the basis for an open and unbundled market. Since regulators are crucial in this process, all the countries which have started to legally unbundle their power sector have established regulatory agencies. Refer to Chapter 4 on institutional capacity for more information on the regulators.

Jordan is the only country in the region which implemented a full ownership separation of its power sector. Since the adoption of the Jordanian General Electricity Law in 2003, the country has initiated a fully unbundled power sector that separates the ownership of generation, transmission, and distribution. NEPCO, the National Power Electric Company managed by the government and the electricity regulator, owns and operates the transmission lines, while three private companies own and operate the distribution networks. Both private and public companies are active in the power generation, and privately owned companies produce about 75% of the electricity (NEPCO, 2014).

Most countries with the ambition to unbundle and privatize their power sectors have taken steps towards a legal or functional separation. The most common way to accomplish a legal separation is to create a state-owned holding company with a number of subsidiaries which manage and operate separately the different activities within the power sector value chain. This type of unbundling can be found in Algeria, Egypt, UAE (Abu Dhabi), and, to some extent, Bahrain and Saudi Arabia.

2.2 Independent Power Producers

Private sector participation in RE power generation activities exists in various distinguishable forms depending on the party the electricity is sold to: utility supply, third-party sales, direct export, partial self-consumption and exclusive self-consumption. Apart from exclusive self-consumption, all types of private power generation fall under the concept of Independent Power Producer (IPP) analyzed below.

IPPs typically build, own, and operate power plants to sell electricity either to the utility or directly to a third-party through a PPA. While the first option is a common and sound means for private actors to operate, third-party sales offer additional incentives for investors.

Table 3: Status of Power Sector Unbundling, Incorporation and Privatization in the Arab countries

	Reference to the policy	Status of unbundling
Algeria	Law 02-01 on Electricity and Gas Distribution	Functional or legal separation
Egypt	Law 87 2015, Article 13	Functional or legal separation
Jordan	General Electricity Law No. 64.	Ownership separation
Palestine*	General Electricity Law No. 13.	Ownership separation*
Saudi Arabia	Electricity Law of 2005	Functional or legal separation
Sudan	Electricity Law of 2001 and Cabinet Decree 169 of 2010	Functional or legal separation
UAE (Abu Dhabi)	Law 2-98 of 2008	Functional or legal separation

* Palestine's current status of separation is naturally high since almost no generation or transmission takes place in the country. Distribution companies are private or owned by a municipality.

A third-party supply option can be particularly appealing for larger industrial and commercial actors unwilling to become electricity auto-producers despite their particular electricity needs.

Most Arab countries allow for some sort of private participation in power generation activities, and all but one of the investigated countries have adopted legislation authorizing IPPs. Libya, the only country with a fully closed electricity sector, is now preparing to open up its market through a new electricity law and recently the Renewable Energy Authority of Libya (REAOL) started working on a plan to create a national fund to finance small projects that would cover up to 70% of the cost by the government.

While many countries have IPPs producing conventional electricity, private participation in RE power generation remains limited. By the end of 2015, Algeria, Egypt, Morocco and UAE were the only countries in which private actors owned and operated utility scale renewable energy power plants. In Algeria and Egypt several small and medium sized PV plants came on line in 2015 under the feed-in tariff schemes adopted in the two countries. In Morocco, the 300-MW Tarfaya wind farm and Noor 1 CSP project have been in operation since 2014 and 2016 respectively. The 100-MW Shams-1 CSP plant in Abu Dhabi has been in operation since 2013. Nevertheless, a number of RE IPP projects are now in the pipelines of Egypt, Jordan, Abu-Dhabi, Palestine and Morocco. Palestine renewable energy and energy efficiency law, number 14, October 2015, allowed the country to announce in March 2016 its plan to bring on 30 megawatts of solar power, which will include the launch of solar power tenders including 10 megawatt solar projects for each of its 11 governorates totaling 110 megawatts, to be added to the grid over the next four years. Another two 50MW PV projects are envisaged[1] . Another important development occurred in Tunisia, where the Assembly of the Representatives of the People (ARP) adopted in April 2015, the law No. 74/2013 on electricity production from renewable sources, aiming to promote private sector integration and to open RE market and promote the export of electricity generated from renewables.

Table 4: Status of IPPs Producing RE in the Arab region (2015)

	RE Utility Supply		RE Third Party Supply		RE Direct Export	
	Legal basis to operate as IPP and sell power to utility	MW	Legal basis to operate as IPP and engage in third-party supply	MW	Legal basis to operate as IPP and engage in direct export	MW
Algeria	Law No 02-01 (2002) on Electricity and Distribution of Gas, Article 26;Decree No 13-218 (2013) on Feed-in tariffs for Renewable Energy.	270	Law No 02-01 (2002) on Electricity and Distribution of Gas.[2]	-	Law No 02-01 (2002) on Electricity and Distribution of Gas.[2]	-
Bahrain	Legislative Decree No. 1 of 1996 with respect to Electricity and Water.	-	No	-	No	-
Djibouti	Law No 88 (2015) on Regulation of the Activities of the Independent Electricity Producers	-	-	-	-	-
Egypt	Law No 100 (1996); Law No 89 (1998) on Competitive Bidding; Renewable Energy Law No 203 (2014).	70	Decree No. 326 (1997) establishing "The Electric Utility and Consumer Protection Regulatory Agency."	-	No	-
Iraq	Economic Affairs Commission Decree No S.L. 614, August (2008).	-	-	-	No	-
Jordan	Law No 13 (2012) on Renewable Energy and Energy Efficiency Law, Article 5 (competitive bidding), Article 6 (Direct Proposal Submission)	-	No	-	General Electricity Law 64.[3]	-
Kuwait	IPP Law No 39-10 (2010).[4]	-	No	-	No	-
Lebanon	Law 463 and its amendments	-	No	-	No	-
Libya	No legal basis in place yet.	-	No	-	No	-
Morocco	Law No 13-09 (2009) on Renewable Energies.	700	Article 26 of the Law 58-15 (2015) revision Law No 13-09 (2009) on Renewable Energies.	200	Law 13-09 (2009) on Renewable Energies.	-
Palestine	General Electricity Law No 13 (2009) Renewable Energy Efficiency Law No 14 (2015)	-	Renewable Energy Efficiency Law No 14 (2015)	4	No	-
Qatar	Law No 10 (2000) on the Establishment of KAHRAMAA.[5]	-	No	-	No	-
Saudi Arabia	Royal Order A/35 of H.M. King Abdullah bin Abdulaziz Al Saud on 17th April 2010 on establishment of KACARE.[6]	-	No	-	No	-
Sudan	Electricity Act (2001) Chapter II Article 3.2.	-	No	-	No	-
Syria	Law No 32 (2010), Article 30.	-	Article 30 of the Law 32 (2010).	-	No	-
Tunisia[7]	Law No 1996-27 (1996); Decree 1996-1125 (1996).	-	Law No 74/2013, (adopted in April 2015)	-	Under preparation: overall exporting conditions specified in the new Renewalbe Energy Law.	-
UAE	Article (3) of the Decree No. (1) (1992), amended by Article (1) of Decree No. (9) (2011).[8]	100	No	-	No	-
Yemen	Electricity Law No 1 (2009).	-	No	-	No	-

[2] The Law 02-01 (2002) does not differentiate between export of power produced from conventional sources and renewables.
[3] The General Electricity Law No 64 regulates issues of export and import, but does not specify the situation for renewables.
[4] The IPP Law No 39-10 (2010) does not specify situation for renewables
[5] The law authorizes KAHRAMAA to formulate and enter into power and water purchase agreements and provide necessary technical and corporate support for establishment of generation and desalination ventures.
[6] The Royal Order authorizes KACARE to develop, lead and implement clean energy projects in the kindgom.
[7] Law 74-2013: in April 2015, the law on electricity production from RE was adopted by the Tunisian Parliament. The law aims to promote private sector integration and to open RE market and promote the export of electricity generated from renewable. and at the end of 2015 this law was amended but still not announced yet.
[8] Authorizes Dubai Water and Electricity Authority to purchase electricity from any entity at the prices and under conditions it deems appropriate.

2.2.1 Utility Supply

A large majority of the Arab countries allow private power generation for utility supply, and many large-scale RE projects in the region have been made possible through competitive bidding processes and long-term PPAs with a single-buyer. While direct proposal submission for utility supply is only authorized in Jordan, Egypt and Palestine, as many as 14 out of 20 countries allow for public competitive bidding either under IPP or EPC tendering procedures. In addition to that, Algeria, Egypt, Palestine, and Syria have introduced FIT schemes.

What characterizes the Arab region regarding the possibility for private actors to produce electricity for utility supply is the lack of clear signals from the governments. In most countries, private actors fully depend on government announcements of tenders, and as a general rule, competitive bidding processes are only planned for a few occasional projects. Egypt, Morocco, and Saudi Arabia are the only three countries that have set targets for the total installed capacity of RE to be developed through a competitive bidding approach. However, these targets have been realized to various degrees. More about the development in each country can be found in Chapter 3 under competitive bidding.

2.2.2 Third-Party Supply

In countries that allow third-party sales, new innovative business models have emerged to overcome some major barriers for both small and large scale RE deployment (Kollins, Speer, & Cory, 2010). Despite a more liberal approach towards private participation in general, third-party sales seems to be a sensitive political topic in many of the countries in the region.

Six countries authorize IPPs to produce electricity for third-party sales: Algeria, Egypt, Morocco, Saudi Arabia, Syria and UAE. In Morocco, Law 13-09 allows RE IPPs to sell electricity directly to large consumers and bypass the single-buyer ONE. This option was applied in January 2013 when NAREVA Holding Company commissioned three wind projects, with a total capacity of 200 MW, to supply power directly to large industrial customers (P. Rouaud, 2013). However, on a regular basis, the third-party supply option is to some extent being hindered by the fact that the medium voltage grid has not yet been fully opened for third-party access.

Tunis, source: PTB , photovoltaic (PV) development in Tunisia

Egypt is close to applying the third-party option in practice. Egyptian law allows for third-party sales from IPPs and NREA has, announced and awarded concessions for land in the Gulf of Suez dedicated to 600 MW of wind power. The contract was awarded to a private actor that intends to sell electricity to third parties. A similar process is being adopted for PV land concessions in Upper Egypt. The third-party option in Egypt seems to have been developed as a parallel track to the competitive bidding scheme.

In Algeria, despite Law 02-01 allowing third-party sales, RE projects under this option have not been developed. Third-party sales would theoretically be possible in Saudi Arabia, however this option is not clear in the recently announced plans.

2.2.3 Direct export of RE

Electricity exports, and particularly RE electricity exports to Europe has sparked intense controversy over the last 5 years. Until now, the possibility for private actors to produce RE for export to other countries is very limited, and all ongoing electricity-exporting activities in the Arab region are orchestrated by the national utilities. For the near and medium term, RE expansion will mostly be for satisfying growing domestic needs.

Of the few countries which have made RE electricity exports an option in their legislations, most have taken a rather restrictive approach, and have not implemented these legislations or made such exports possible in practice. Law 13-09 in Morocco allows for export of RE-produced electricity by using the national grid and interconnections. Any IPP that aims to export will be subject to a technical approval by the state-owned utility ONE. In Jordan, the General Electricity Law specifies that import and export will be handled on a case-by-case basis and that it depends on an authorization by the Council of Ministers. In Algeria, Law 02-01 allows for export, but the authorization procedure and other details are not fully fleshed out. Tunisia has specified the conditions for exporting RE sourced electricity to a certain extent in its new electricity law, which is still waiting to be adopted. The remaining Arab countries do not seem to foresee private export of RE as a cost effective option for the near future.

Jordan has come furthest in the establishment of grid codes, having technical specifications for RE procedures of all sizes.

2.3 Grid Access

2.3.1 Priority Access and Dispatch

Private participants in RE power generation need a guaranteed access to the transmission grid under clear, transparent, and non-discriminatory conditions. Since wind and solar PV technologies are characterized by generation fluctuations and limited storage options, it is crucial for developers to know that their electricity can be fed into the grid once generated.

In addition to guaranteed grid access, priority access and priority dispatch are important to increase the competitiveness of RE technologies. Priority access ensures that RE projects are granted priority when competing with other actors also requesting access to the grid in a certain location. Since RE projects are more dependent on the geographical location than conventional generation, a priority access makes sure to minimize the constraints related to the selection of the site. Priority dispatch ensures that RE generators are allowed to send off and sell all their electricity in preference to conventional power generators. In practice, the implication of a priority dispatch of RE is that conventional generators will have to reduce their generation levels in cases of transmission congestion.

To encourage investment in RE power generation activities, governments should establish clear and consistent conditions for grid access. An effective approach is to specify grid access details in national-level regulations and grid codes referenced in the PPA, and to avoid case-by-case negotiations. Moreover, it is important that all producers are treated in a non-discriminatory way. A guaranteed non-discriminatory access can be assured through regulated grid-transporting tariffs combined with an unbundled power sector.

Only a few countries in the region have specified grid-access details in their regulations. So far, Algeria and Jordan are the ones that currently include the most preferential grid-access conditions for RE projects. Algeria guarantees access to the grid without any priority for RE projects. However, distribution companies operate as single-buyers on the market and once a RE project has been connected to the grid, priority dispatch is guaranteed (Décret exécutif no 06-429 du 2006). In Jordan, the General Electricity Law grants non-discriminatory access to the transmission lines, and the Renewable Energy Law from 2012 further obliges NEPCO, as the single-buyer on the market, to purchase all electricity produced, although without any priority dispatch for RE projects (Law 13 of 2012). The electricity regulators set the transmission tariffs and, in the case of Jordan, such tariffs have been specified and regulated.

Table 5: RE Grid Access Conditions

	RE Guaranteed Access to the Grid	RE Priority Access	RE Priority Dispatch
Algeria	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.	No priority access.	Priority dispatch once a RE system is connected.
Bahrain	No.	No.	No.
Egypt	Article 6, Renewable Energy Law No 203 (2014) "EETC and distribution companies are committed to connect RE to the grid."	No.	No.
Iraq	No.	No.	No.
Jordan	Non-discriminatory guaranteed access foreseen by the Law No 13 (2012) on Renewable Energy and Energy Efficiency, Article 8C.	No priority access	No priority access
Kuwait	No.	No.	No.
Lebanon	No.	No.	No.
Libya	No.	No.	No.
Morocco	No.	No.	No.
Oman	No.	No.	No.
Palestine	No, but Palestinian electricity distribution companies are committed to purchase all produced electricity.	No.	No.
Qatar	No.	No.	No.
Saudi Arabia	No.	No.	No.
Sudan	No.	No.	No.
Syria	No.	No.	No.
Tunisia	No.	No.	No.
UAE	No.	No.	No.
Yemen	No.	No.	No.

Interestingly, none of the countries provide a statuary guarantee of priority access. Distribution companies worldwide and in the Arab region, have proved to be one of the major obstacles in relation to grid connection of RE systems. Knowing that they are obliged to purchase RE electricity once a system is connected could lead to a situation where grid connection approvals for RE projects are delayed. Therefore it is crucial for RE investors to see that both priority access and priority dispatch are being stipulated in law.

Other countries in the region lack comprehensive national regulations that guarantee grid access for RE projects. In Morocco, Law 13-09 was amended to specify the grid access conditions for the low, medium, high, and extra high voltage grids, which can be accessed within the limits of the technical capacity of the networks. Despite the lack of detailed grid access regulations, grid operators in both Egypt and Palestine are de facto committed to purchasing all generated RE electricity. The Egyptian Electricity Transmission Company (EETC) has taken this further, and specifies priority dispatch for RE in its network access contracts with power producers. Tunisia recently adopted a new RE Law, and it remains to be seen whether this law executive regulations will include priority access and dispatch for RE projects. Lastly, Saudi Arabia and UAE (Abu Dhabi) have detailed grid codes but do not specify any special conditions for RE projects. Nevertheless, the regulatory agency in Abu Dhabi has recommended an amendment of the transmission code to give priority access to RE projects.

2.3.2 Grid Code

Grid codes, or network codes, are technical specifications regulating the management and functioning of the electricity grid. In addition to technical specifications, the grid codes sometimes include cost sharing specifications and priority conditions as mentioned in the previous section. Since the technical capacity of the grid can be particularly problematic for RE developers, grid codes must clarify which technical rules govern access to the grid for all types of RE projects.

In the Arab region, technology-specific RE grid codes have been developed in the few countries that have introduced regular support schemes for RE, as opposed to ad-hoc projects. Jordan is the most accomplished in the establishment of grid codes, having technical specifications for RE producers of all sizes. Egypt is following this example and has now published two out of three grid codes detailed below. Tunisia has for several years managed its successful support schemes for distributed solar PV with a "grid code light" that specifies the overall technical conditions. Nevertheless, Tunisia is now in the process of preparing legally adopted grid codes for all sizes of RE projects. Saudi Arabia and Sudan have also initiated the process to prepare grid codes for RE integration with the grid.

Table 6: RE Grid Codes

	Technical Guidelines Adopted to Connect		
	Small Scale PV Systems to Low Voltage Grid	Medium- to Large-Scale PV Systems to Medium and High Voltage Grid	Medium- to Large-Scale Wind Systems to Medium and High Voltage Grid
Algeria	No	Under preparation	Under preparation
Bahrain	No	No	No
Egypt	Yes	Under preparation	Yes
Iraq	No	No	No
Jordan	Yes	Yes	Yes
Kuwait	No	No	No
Lebanon	No	Under preparation	Under preparation
Libya	No	No	No
Morocco	No	No	Under preparation
Palestine	Yes	n/a	n/a
Qatar	Under preparation	Under preparation	No
Saudi Arabia	No	Under preparation	Under preparation
Sudan	Under preparation	Under preparation	Under preparation
Syria	No	No	No
Tunisia	Under preparation	Under preparation	Under preparation
UAE	No	No	No
Yemen	No	No	No

DJIBOUTI PRIORITIZES OFF GRID, DECENTRALIZED SYSTEMS TO IMPROVE ELECTRICITY ACCESS

In Djibouti, where only 55% of the population has access to electricity, the government prioritizes access to electricity for citizens in line with its 2035 Vision. The governmental policies focus on remote communities that won't benefit from grid-extension in the near future to develop electrification through a mix of RE and non-renewables. Outside of the main cities, Djibouti's rural/remote communities and pockets of economic activities are quite dispersed, and off-grid decentralized systems appear to be the most viable option to conduct a successful and inclusive electrification campaign. In the village of Ali Adeh, the government completed a diesel (100kVA) and solar (62.1kWp) hybrid system, and in the village of Assa Ella site, a similar hybrid system to electrify 20 households has been funded by the KSA Fund. The government of Djibouti is conducting research on the country's five districts (Ali-Sabieh, Tadjourah, Dikhil, Obock and Arta) to assess the potential of connecting the towns with the railway network that connects Ethiopia and Djibouti in order to tap into the electricity network to power villages like Assa Ella, Hol-Hol, Goubetto in the different districts. The bigger cities like Ali Sabieh, Dikhil, Arta and others own their own electricity grid, and Al-Sabieh's energy needs are fully covered by a local power plant.

2.4 Market Structure Final Scores and Ranking

The final scores and ranks of the Market Structure category are presented in figure below. The overall performance of the countries under this category is relatively weak, and this is mostly due to grid-related issues. The leading country in this category is Morocco, followed by Egypt, Jordan and UAE. The Market Structure category assesses the openness of power generation markets to private sector participation, including grid access. The openness criterion is measured by looking at two aspects: the legal framework allowing IPPs to produce electricity from renewables, and the actual deployment of RE projects by IPPs. The four leading countries opened the market for private investments in renewable energy. Morocco ranks first in this category because it is leading the region in utility-scale RE projects in operation developed by IPPs. Also, it is the leading country that has RE IPPs producing power under a third-party supply model. Under the "Grid Access" factor, although the number of countries adopting and having grid codes under preparation increased compared to previous edition of AFEX, no country received the full scores since no country clearly stipulates priority access and priority dispatch conditions for renewables in legislation.

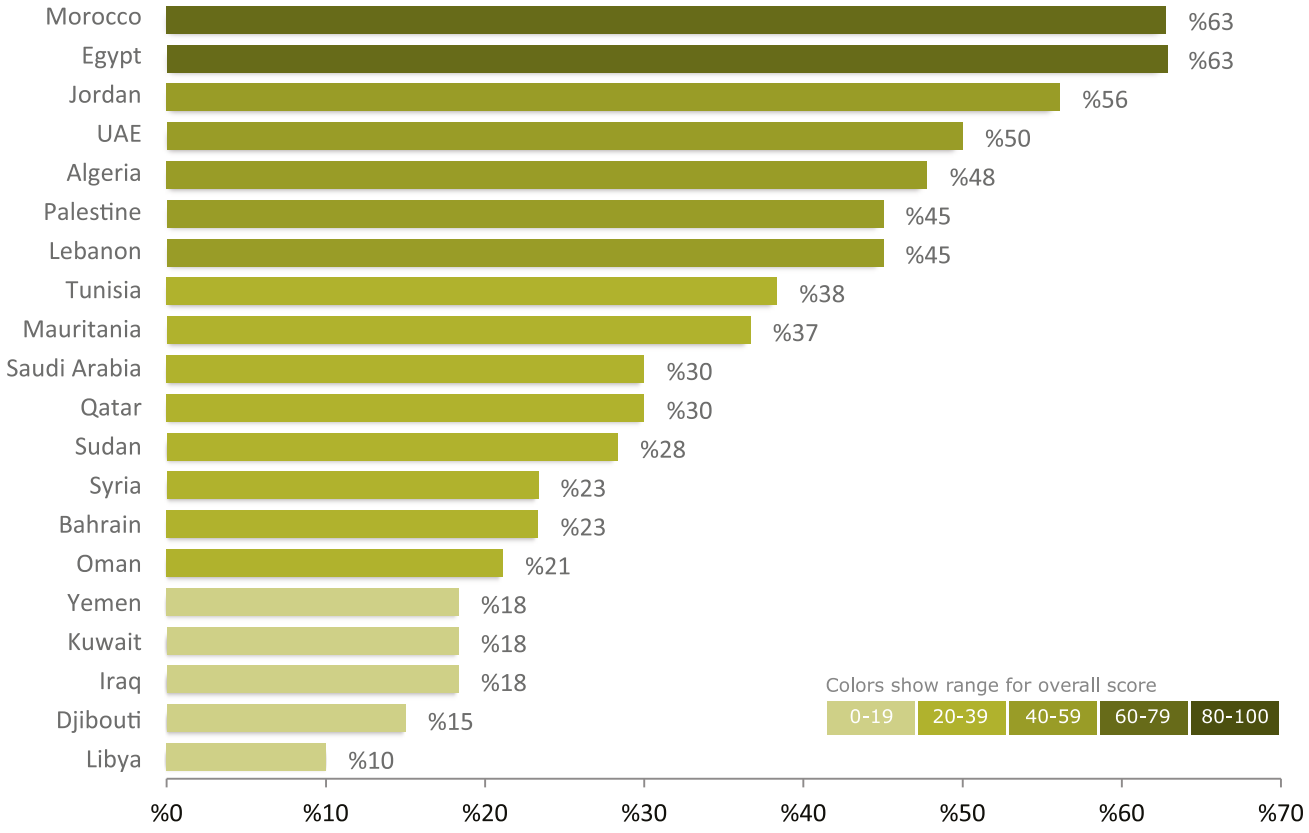
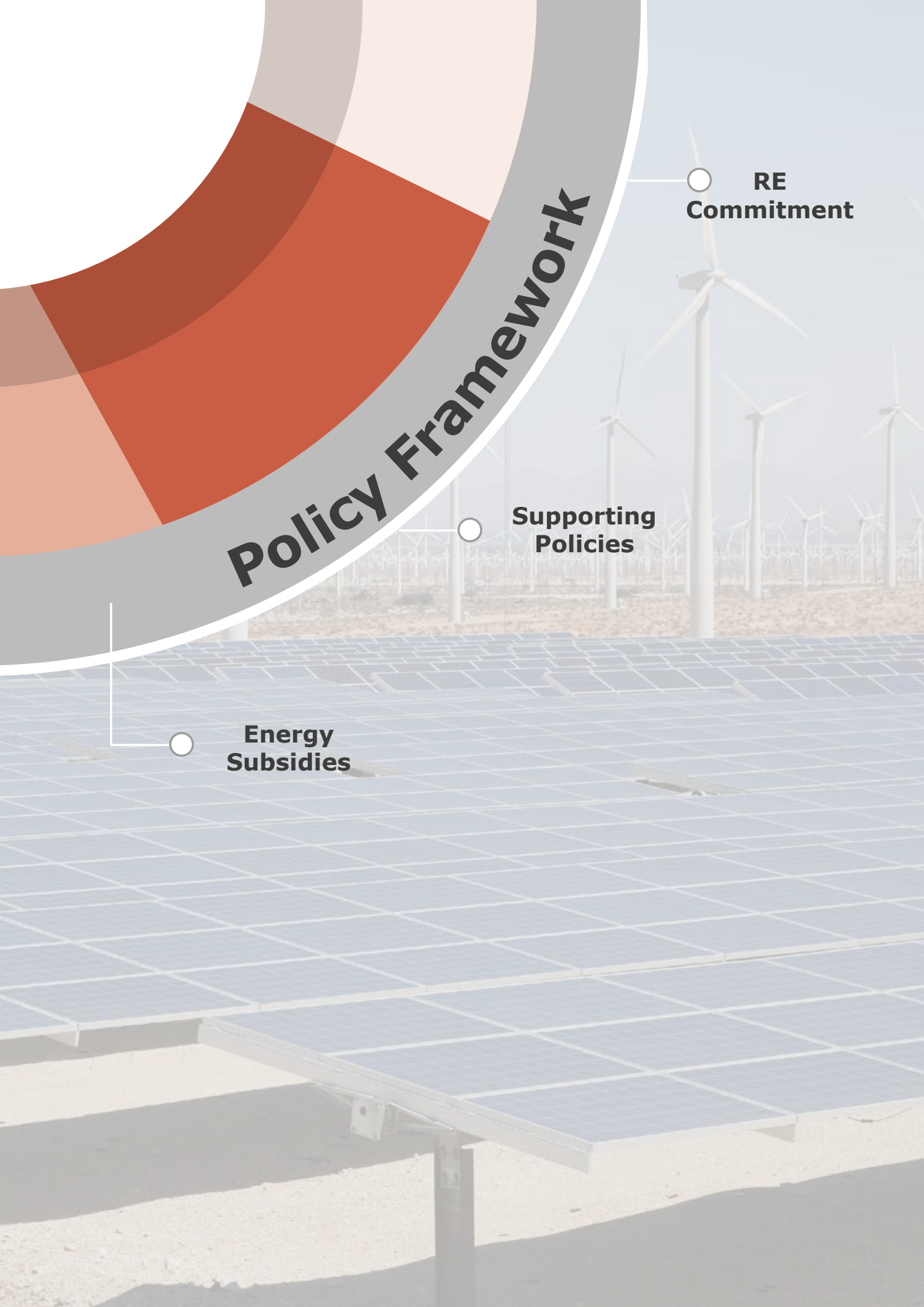


Figure 1: Market Structure Final Scores and Ranking


Policy Framework
RE Commitment
Supporting Policies
Energy Subsidies

3 Policy Framework

The policy framework category assesses the investment environment for RE by looking at the overall political commitment to enable RE development. Those commitments derive from official and credible targets, the establishment of a predictable and transparent regulatory framework, the streamlining of administrative procedures, the integration of fragmented RE strategies into the overall energy strategy, and the mobilization of funds for the deployment of demonstration projects. In order to efficiently attract both national and foreign RE investments, it is crucial to establish RE policies in official and legally binding documents.

To better understand investment conditions in the region, the policy framework category focuses on three factors: (1) RE commitment; (2) supporting policies; and (3) energy subsidies. The factors are measured by a number of qualitative and quantitative indicators as shown in Table 7.

Table 7: Policy Framework Evaluation Factors and Indicators

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	Percentage of total installed capacity (MW)
		RE Projects under Construction	Percentage of total installed capacity (MW)
		RE Projects under Tendering	Percentage of total installed capacity (MW)
	Supporting Policies	PPA Bidding or Public Competitive Bidding	Resources identified for private development; tenders announced; PPA signed (MW)
		Direct Proposal Submission	Policy adopted by law; proposals selected for private development; PPA signed (MW)
		Feed-in Tariffs	Officially adopted; RE projects implemented through feed-in Tariffs (MW installed)
		Net Metering	Officially adopted; RE projects implemented through net metering scheme (MW)
	Energy Subsidies	Electricity Subsidies Residential	Percentage of Palestinian residential retail prices (benchmark)
		Electricity Subsidies Commercial	Percentage of Palestinian commercial retail prices (benchmark)
		Electricity Subsidies Industrial	Percentage of Palestinian industrial retail prices (benchmark)

3.1 RE Commitment

3.1.1 RE Targets

Demonstrating political will and commitment to pursue RE are critical to foster favorable RE investment. Clearly formulated and officially adopted targets represent an important first step to any RE development plan, and can provide a basis for generating investors' trust.

While most Arab states have announced targets for RE deployment, only a handful of them have been officially adopted by a higher political authority. In 2015, Djibouti communicated its target to go 100% renewable by 2020. This target, while the most ambitious, does not exceed 1000 MW in terms of installed capacity. The 2016 edition of the AFEX report documents several target changes in various countries. Morocco's previously announced target to produce 42% of its energy needs through RE by 2020 has been ratcheted up during the COP21 negotiations in Paris to 52% of installed electricity production capacity from renewable sources by 2030. This target highlights the country's strong commitment as host of COP22. Egypt leads the Arab countries in terms of installed capacity for the 2020 timeframe with its plan to develop 10 GW of wind and solar projects by 2022. Egypt had originally decided upon a 2020 target, which was revised in 2015. Lately, as part of the "Saudi Arabia Vision 2030" policy paper a target of 9.5 gigawatts of renewable energy by 2023 was set. This represents an average of about 1,600 MW of new renewable energy capacity annually. Lately, King Abdullah City for Atomic & Renewable Energy (KA-Care) has issued a tender for technical, financial, and legal consultants to advise on 3.5GW of renewable projects targeted for 2020. Regionally, the 2030 time period target is dominated by Algeria, which announced an ambitious official target of 12000 MW of RE. Algeria's target was revised in 2015 to 27% of electricity generated by 2030 instead of 6%. Other officially adopted targets can be found in Jordan, Palestine, Tunisia, Iraq and Yemen. An interesting shift can be noted for Jordan compared to AFEX 2015, where the PV target for 2020 has been increased from 800MW to 1000MW, while CSP is no longer part of the 2020 target.

Table 8: RE Targets (2014)

	RE Strategy/Action Plan/Program	RE Targets							Target Date
		Wind MW	PV MW	CSP MW	Biomass MW	Geothermal MW	Total MW	Total %	
Algeria	National Program for Renewable Energy and Energy Efficiency 2030 adopted in 2011	1,010	3000	-	360	5	4,375	15	2020
		5,010	13,575	2,000	1,000	15	21,600	27[a]	2030
Bahrain	Unofficial target (NERAP under preparation)	-	-	-	-	-	250	5	2030
Djibouti	National Program for Development of Renewable Energy and Energy Efficiency, 2015	300	200		0	500	1,000	100	2025
Egypt	National RE Strategy 2020 adopted in 2008, updated in 2012; Feed-in Tariff Program; target year amended in 2015	7,200	At least 2,300	0	0	0	9,500	20[a]	2022
Iraq	Renewable Energy Plan 2013-2017, adopted in 2012. Master Plan of Energy 2030 adopted in June 2013.	0	300	0	0	0	300	1	2020
Jordan	Master Strategy of Energy Sector in Jordan for the period (2007-2020) adopted in 2007, and updated in 2015.	800	1000	0	50	0	1,850	10[b]	2020
Kuwait	Kuwait Energy Security Vision	700	4,600	5,700	0	0	11,000	15	2030
Lebanon	Policy Paper for Electricity Sector (2010); NEEAP (2011-2015) INDC 2015	400	100-150			0	900-950[c]	12 15	2020 2030
Libya	National Plan for developing RE in Libya (2013-2025).	600	344	125	0	0	1,069	7	2020
		1,000	844	375	0	0	2,219	10[a]	2025
Mauritania	The Poverty Reduction Strategy Paper (PRSP), 2013	30	30	0	0	0	60	20	2020
Morocco	New National Energy Strategy Assessment Report, 2013. Morocco INDC submission to CoP 21.	2,000	2,000				6,000[d]	42	2020
		4,200	4,560		0	0	10,090	52	2030
Oman	Sultan Qaboos bin Said's "Vision 2020"	-	-	-				10[a]	2020
Palestine	National Energy Strategy (2012-2020); Palestinian Solar Initiative.	44	45	20	21	0	130	10[a]	2020
Qatar	-	-	-	-	-	-	1800	20	2030
Saudi Arabia	Saudi Arabia's 2030 Vision	-	-	-	-	-	9,500	10	2023
	Saudi Arabia's Renewable Energy Strategy	9,000	16,000	25,000	3,000[f]	1,000	54,000	30	2040
Sudan	RE master plan is under development	680	667	50	68	54	1,582[e]	11	2031
Syria	The 11th Five-Year Plan for 2011-2015	1,000	2,000	1,300	250	0	4,550	30	2030
Tunisia	The study for energy mix in 2030 is currently under development.	1,755	1,510	460	0	0	3,725	30	2030
UAE - Abu Dhabi	-	-	-	-	-	-	-	7	2020
UAE – Dubai	Dubai Integrated Energy Strategy 2030	-	-	-	-	-	5,000	25	2030
Yemen	National RE and EE Strategy adopted in 2009	400	8.25	100	6	200	714.25	15	2025

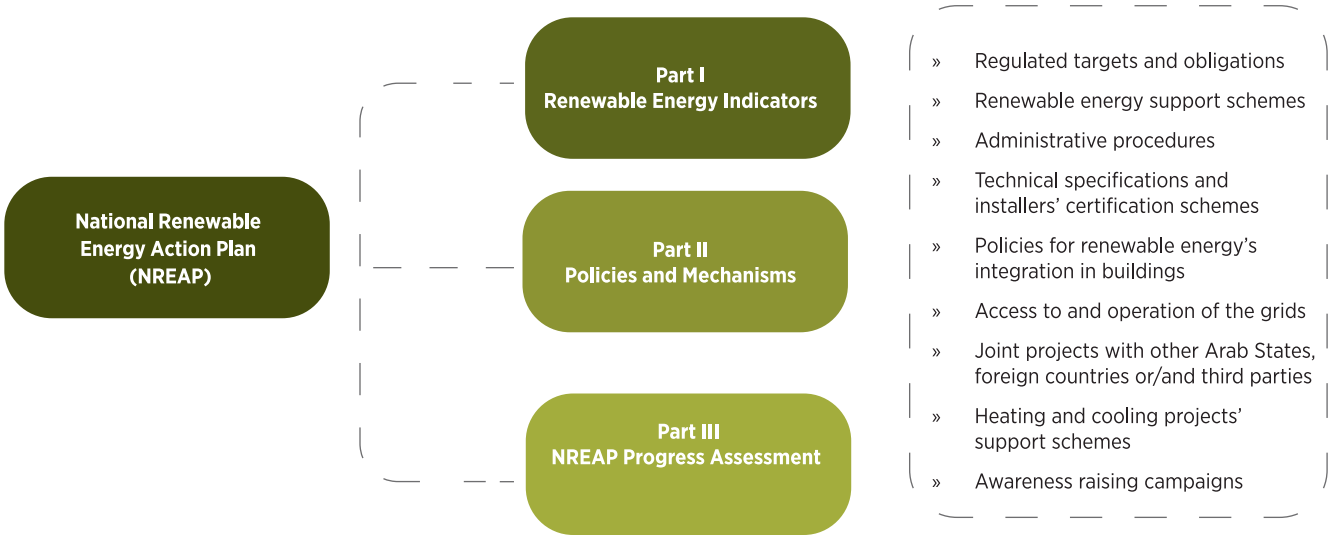
[a] Electricity generation
[b] Primary energy
[c] Including 400 MW hydro
[d] Including 2,000 MW hydro
[e] Including additional 63 MW hydro
[f] Waste to energy

Sources: RCREEE Focal Points

To support the implementation of the Pan-Arab RE strategy, the Energy Department of the LAS in collaboration with RCREEE and GIZ introduced the Arab Renewable Energy Framework (AREF). AREF is a guideline for Arab states to develop their national renewable energy action plans (NREAPs) until 2030, based on a customized template and reports on the progress accomplished. The Arab Ministerial council of Electricity in its 11th session of June 2015, requested the LAS energy department and RCREEE to provide technical support to Arab countries to prepare and implement their renewable energy plans based on the AREF and NREAP's template. Two countries (Lebanon and Sudan), have taken the lead and drafted/ consolidated a national plan based on those documents. The Lebanese NREAP draft has been under public consultation and is expected to be officially endorsed late 2016 or early 2017. The preparations of Sudan's draft NREAP revealed the absolute necessity of elaborating concrete policies, regulations and measures that help deploying renewables through private investment. Accordingly, a set of policy measures and regulations has been designed and is under discussion for adoption. Moreover, Bahrain is currently developing its NREAP with support of UNDP.

Providing a comparative analysis between the countries' official targets is rendered complex by the fact that each country expresses its target differently: either as a share of generation mix, as share of installed capacity or as a share of its total primary energy consumption. In addition, countries which express targets as a percentage of installed capacity in MW do not automatically provide the corresponding percentage output in MW, which is in every case considerably less impressive. Despite these shortcomings, it is safe to say that most of the expressed targets are relatively ambitious, especially in relation to the high regional reliance on fossil fuels. Interestingly, the targets confirm an overall preference for solar rather than wind in the region. Another particularity of the region is that, with the exception of Djibouti, it can be broken in two between the Mashreq and the Maghreb in terms of targets. The Eastern Arab countries that constitute the Mashreq generally have less ambitious targets (in the range of 5-10 percent) than the Maghreb countries whose targets range between 27 to 50%.

Outline of some key provisions covered by the regional NREAP template



BEIRUT RIVER SOLAR SNAKE - Image source http://www.brsslebanon.com/

3.1.2 SDGs and COP21 Pave the Way for Achieving RE Targets Arab Countries

2015 was a landmark year for global sustainable development action, as it saw the adoption of the 2030 Agenda for Sustainable Development in September, followed by the COP21 Paris Agreement in December. Given that the energy sector is the dominant contributor to climate change and is responsible for 60% of all GHG emissions worldwide, RE can play a critical role in combatting climate change and meeting sustainable development goals. In one of its latest report, IRENA showed that the scaling up of RE deployment to a 36% share in the global energy mix could halve CO2 emissions and maintain the rise of temperature below 2°C compared to pre-industrial times. The sustainable energy goal of the SDG focuses on access to affordable, reliable, sustainable and modern energy for all by 2030. In order to become a reality, the global economy's reliance on fossil fuels must operate a swift shift to increasingly depend on clean energy sources like wind, solar and thermal. Renewables accounted for nearly half of all new power generation capacity in 2014 (IEA), and investments were sustained by plummeting prices of RETs, which make the global energy transition not only possible but also more economically viable.

In the run up to the Paris Climate conference, Arab countries have produced INDCs with vastly different levels of ambition regarding GHG emission reduction and deployment of RE technologies. Regionally, Morocco is taking the lead in terms of deployment of RE and CO2 abatement, with a pledge to produce more than 52% of its electricity and to reduce emissions by 13% below BAU by 2030. Djibouti's Intended Nationally Determined Contributions "INDCs" contains an unconditional pledge to reduce emissions by 40% by 2030 (compared to BAU), and a conditional pledge to reduce emissions by a further 20%.

Jordan, in its INDC, has committed to cutting its GHG emissions by 1.5% from BAU levels by 2030, a percentage that could rise to 14% provided international finance comes in. The Kingdom plans to boost its local RE deployment with a target of 11% of its energy demand sourced from solar, wind and hydropower by 2025, and to improve its EE by 20% by 2020.

Lebanon in its INDC, following the preparation of the National Energy Efficiency Action Plan 2011-2015, has updated the National Energy Efficiency Action Plan for 2016-2020 and is prepareding the National Renewable Energy Action Plan 2016-2020, to meet the target of 12% renewable energy by 2020 that has already been committed through the 2010 Policy Paper for the Electricity Sector. Lebanon is also preparing for the exploration of potential for the production of natural gas offshore. This would allow for considerable reduction in emissions in the power sector by replacing dependence on heavy fuel oil and diesel in power generation, and, in the long term, throughout the economy. In addition, the government of Lebanon is currently preparing a Sustainable Development Strategy that covers all sectors of the economy where climate change mitigation and adaptation issues are mainstreamed throughout .

In its INDC, Sudan indicated its plan to reach 20% RE share in the power mix by 2030, and aims to expand its forest area by 25% by 2030. Yemen's emission cut by 2030 could be at 1% compared to BAU, or climb up to 14% provided international support is granted, with a conditional pledge to produce 15% of power from RE by 2025.

For the GCC countries (Saudi Arabia, Kuwait, UAE, Qatar, Bahrain and Oman), a new IRENA report entitled "Renewable Energy Market: The GCC Region" highlights the multiple benefits a scale up of RE installations would have for these countries. The report found that if the GCC countries' plans and targets were achieved, it could save 11 trillion liters of water withdrawal and 400 million barrels of oil in the power sector, and create over 200,000 direct jobs, while reducing by 8% the per capita carbon footprint by 2030. Since desalination activities are extremely power hungry, the report advises to switch to solar desalination technology which could be reliable, cost-effective and environmentally-sustainable in addressing future water demands.

UAE seeks to increase its share of clean energy to 24% of the total energy mix by 2021, up from 0.2% in 2014. By 2030, Mauritania pledged to reduce its emissions by 22.3% from BAU levels. The INDC specifies that 88% of this pledge is conditional upon international support (such as climate finance flows, technology transfer), and that 12% will be achieved unconditionally. Algeria is following the same path in its INDC, by announcing emission reduction targets in the 7-22% bracket from BAU, with the lower end being unconditional and the top end of ambition provisional to climate finance and access to technology.

In its INDC, Saudi Arabia put forward a target goal to reduce 130 MtCO2e annually by 2030, provided the Paris agreement does not impact its oil-exporting capacity. The UAE seeks to increase its share of clean energy to 24% of the total energy mix by 2021, up from 0.2% in 2014. Oman's INDC pledged unconditional 2% emissions cut in 2030, relative to BAU, achieved through an increase in renewables and reduction in gas flaring, although no targets were given for either. Bahrain's Economic Vision 2030 aims to diversify the country's economy and reduce its dependence on oil and gas products, but the contours of its low GHG development remain vague. Qatar took the same approach as Bahrain: it plans to bring down emissions by diversifying its economy, but has not communicated any reduction target.

3.1.3 RE Share

The most common way to evaluate the overall effectiveness of a country's efforts to promote RE is by looking at the share of RE in the installed power capacity mix. The changing volume of installed capacity or generation, usually expressed as share of the total power mix, is often a very reliable indicator as to how committed a country is to its national target. Table 9 provides an overview of each country's renewable mix (excluding hydro) in terms of installed capacity. Although hydro is considered a renewable source of energy, it is excluded from further evaluation in AFEX due to the maturity of the industry and its limited potential for further development.

Observing the data by country, wind generation is currently dominated by Egypt and Morocco, while solar PV and CSP have been most developed in Algeria, Morocco, Egypt and the UAE. In terms of renewable energy share in the overall installed capacity, Sudan is leading with around 51 percent share attributed to its large hydro capacity. If hydro is excluded, Mauritania stands first with a 12.4 percent share, slightly ahead of Morocco. Mauritania successfully commissioned two wind plants Nouakchott and Nouadhibou wind parks, 30 and 4.4 MW successively.

Morocco has increased its share of solar from 35 MW in 2014 to 198 MW in 2016, and wind from 290 MW in 2012 to 787 MW in 2015, as a result of long-term efforts and successes in achieving its RE action plan. During the past year, Egypt reestablished itself as the leading country in wind energy after a new 200 MW project was commissioned and inaugurated in Gulf al Zayt. Egypt's other wind projects currently in the pipeline will likely make it retain its dominating position in the coming years. Jordan also showed an impressive growth with the commissioning of 212 MW wind and PV projects. Similarly, in Algeria, the photovoltaic grid connected capacity increased to 270 MW through adding more than 24 distributed plants, each ranging between 1 to 30 MW, in addition to other small scale roof top systems increasing the renewable energy share in the total generation capacity to 2.2% excluding hydro and 4.1% if hydro is considered. The PV total installed capacity in Egypt reached around 90 MW, due mostly to the PV rural electrification program supported by the UAE and the feed-in tariff small scale program. UAE maintains a prominent position in solar installations with a combined 123 MW of operational CSP and PV capacities. Almost all the other Arab countries have distributed and utility scale PV installations.

Table 9: Renewable energy installed capacity in the Arab countries – Mid, 2016

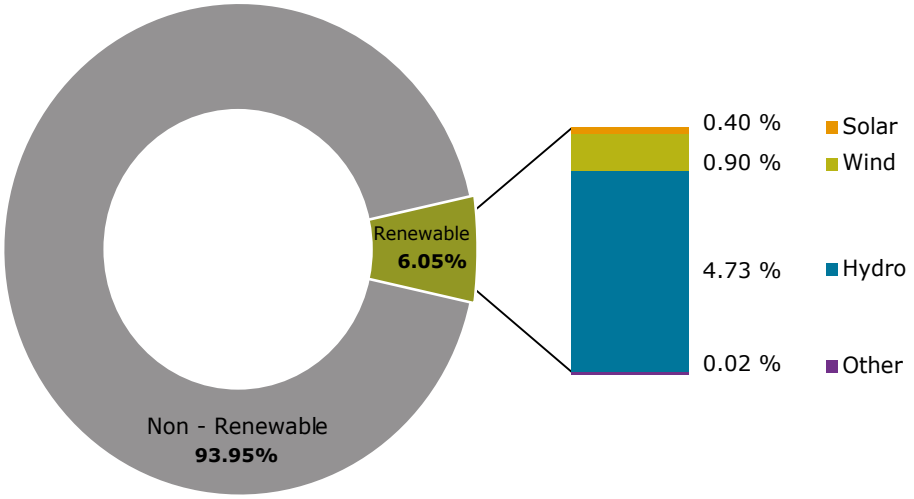
	Wind MW	PV MW	CSP MW	Other MW	Total RE in 2016		Total RE in 2014	
					MW	% of total installed capacity	MW	% of total installed capacity
Algeria	10	270	25	0	305	1.89	42.1	0.37
Bahrain	0.675	5	0	0	5.675	0.14	5.5	0.14
Egypt	810	90	20	0	920	2.63	645	2
Iraq	0	3.5	0	0	3.5	0.01	0	0
Jordan	197	50	0	3.5	250.5	5.65	18.55	0.59
Kuwait	0	14.7	0	0	14.7	0.09	1.8	0.01
Lebanon	0.5	20	0	0	20.5	0.76	2.1	0.09
Libya	0	5	0	0	5	0.05	5	0.05
Mauritania	34.4	18	0	0	52.4	12.38	-	-
Morocco	787	15	183	0	988.5	12.05	785	10.9
Oman	0	0	7	0	7	0.08	-	-
Palestine	0.7	4	0	0.2	4.9	3.38	4.9	3.38
Qatar	0	1.2	0	40	41.2	0.47	41.2	0.46
Saudi Arabia	0	23.2	0	0	23.2	0.05	19	0.03
Sudan	0	12	0	0	12	0.38	0	0
Syria	0.15	2	0	0	2.15	0.02	2.15	0.02
Tunisia	245	20	0	0	265	6.21	265	6.63
UAE	0	33	100	1	134	0.49	134	0.49
Yemen	0	3	0	0	3	0.20	3	0.20
Arab Region	**2085**	**590**	**335**	**45**	**3055**	**1**	**1974**	

Sources: RCREEE (2016), IRENA (2016), Arab Union of Electricity (2015), Global Wind Energy Council (2015)

For the first time, the aggregate share of installed RE in the Arab region exceeded 6% of the total installed capacity.

This 6% consists of hydro (4.73%), followed by wind (0.90%), solar (0.40%), and others (0.02%).

Figure 2: Regional Share of Installed Capacity of Renewable Energy (Mid, 2016)



Source: Source: RCREEE Focal Points, 2016

Oman, source: by Timon , Solar-Farm- Singh

Oman: Construction Starts for World´s Largest Solar Steam Power Plant Miraah
Source: solarthermalworld.org

OMAN BETS ON SOLAR FOR ITS OIL EXTRACTING ACTIVITIES

The largest producer of oil and gas in Oman, Petroleum Development Oman (PDO), announced in 2015 plans to build one of the world's largest solar plants for enhanced oil recovery (EOR) to extract heavy and viscous oil at the Amal oilfield. Miraah (Arabic word for mirror) will be a 1,021 megawatt solar thermal facility producing 6,000 tons of solar steam daily for oil production in South Oman. This groundbreaking project features the huge market for solar in the oil and gas industry. Miraah will save 5.6 trillion British Thermal Units (BTUs) of natural gas each year, the amount of gas that could be used to provide residential electricity to 209,000 people in Oman. It is worthy to note that PDO has been pioneering solar EOR since 2010 when successfully piloted a seven Megawatt project at Amal to test the commercial viability of solar steam which produced 50 tons of steam a day. The full-scale project will comprise 36 of GlassPoint Solar modules, over a total project area of three-square kilometers including less than two-square kilometers for the solar field. GlassPoint uses concentrating solar power (CSP) through an enclosed self-cleaning glasshouse trough technology boiling the water to produce high-quality steam, which is fed to the oilfield's existing steam distribution network. The enclosed self-cleaning solar collectors are protected from wind, sand and dust storms typical in Oman and the Gulf region.

RE COMMITMENT: In total there are more than 3000MW of RE projects underconstruction, which is surly a positive development

3.1.4 RE Projects under Construction

RE projects under construction is an important addition to the previous indicator, which only reviewed completed projects. In young RE markets, projects under construction provide important indications as to how likely a country is to achieve its announced target. A regular follow-up of the concrete outcomes of RE efforts is also crucial for governments to adjust their RE strategies continuously. Table 10 provides an overview of the RE projects under construction late 2015 and early 2016. The table provides information on both public and privately-developed projects.

Table 10 shows that have RE projects under construction. Interestingly, those five countries no RE projects under construction. Regionally, RE projects under construction should, if completed, would add around 3,000 MW of RE or roughly the same as the current regional RE installed capacity.

Table 10: Examples of RE Projects under Construction, Mid, 2016

	RE Technology	MW	Project	Total
Algeria	Wind	20	Khenchela	**98**
	PV	73	Distributed projects in different sites	
	Geothermal	5	Guelma	
Bahrain	Wind	2	Addur Wind Pilot Plant	**5**
	PV	3	Addur PV Pilot Plant	
Djibouti	PV	50	Grand Bara Phase I	**50**
Egypt	Wind	220	Gabal Al-Zayt	**340**
	Wind	120	Gulf of Al-Zayt	
Jordan	PV	200	10 projects in Maan area, 1 in Aqaba and 1 in Mafraq	**200**
Kuwait	Wind	10	Shagaya RE Complex I	**70**
	PV	10	Shagaya RE Complex I	
	CSP	50	Shagaya RE Complex I	
Lebanon	Wind	60-100	Under contracting	**90-130**
	PV	15	Systems under the National Energy Efficiency and Renewable Energy Action (NEEREA)	
Libya	Wind	60	Darnah	**328**
	Wind	80	Al-Magron I	
	Wind	120	Al-Magron II	
	PV	14	Al-Jofra	
	PV	14	Houn	
	PV	40	Sebha	
Mauritania	PV	30	Nouakchott	**30**
Morocco	Wind	150	Taza	**720**
	Wind	100	Tanger II	
	Wind	120	Jbel Khalladi	
	CSP	200	Noor II	
	CSP	150	Noor III	
Oman	CSP	50	Amal Oil Field Phase I out of 1021 MW plan	**100**
	Wind	50	Dhofar Wind farm	
Palestine	PV	470 kW	Tubas	**1.17**
	PV	700 kW	Jericho	
Qatar	PV desalination	10	Duhail	**10**
Saudi Arabia	PV desalination	15	Al Khafji	**165**
	PV	100	Mecca	
	CSP	50	Green Duba ISCC (Integrated Solar Combined Cycle)	
UAE	PV	200	Dubai MBR Solar Park Phase 2	**550**
	PV	350	Abu Dhabi Solar Park (including Noor 1 project)	

Source: RCREEE focal points (2016), Arab Sustainable Energy Portal TaqaWay (2016)

3.1.5 Off-grid decentralized RE Projects in the Arab world

Since previous sections looked in depth at centralized grid connected systems. This subchapter focuses on off-grid decentralized energy generation in the Arab region, at the systems which exist and how they can be scaled up.

While the energy sector in the Arab region produces 49% of the oil reserves and 41% of gas reserves worldwide, millions of households and economic actors throughout the Arab world suffer from either a complete lack of access to energy, or from unreliable energy services. This problem is particularly acute in remote, rural areas oftentimes not covered by electricity grids. While electrification reaches an average of 98% of the population in the region, the percentage drops to 78% when only rural populations are concerned.

Countries like Bahrain, Jordan, Kuwait and the UAE have managed to cover most of the electricity needs of their urban and rural populations, but Yemen, Mauritania and Sudan still have a long way to go to achieve full access to electricity for their people. Only 29% of the Yemeni rural population has access to electricity, and Mauritania only provides 35% of its population, rural and urban combined, with electricity. In Egypt, 99.6% of the population is grid-connected, but given the country's large population, the remaining 0.4% is not negligible since it concerns 344,000 persons, or roughly 68,800 households.

Figure 4: Percentage of the population served with electricity

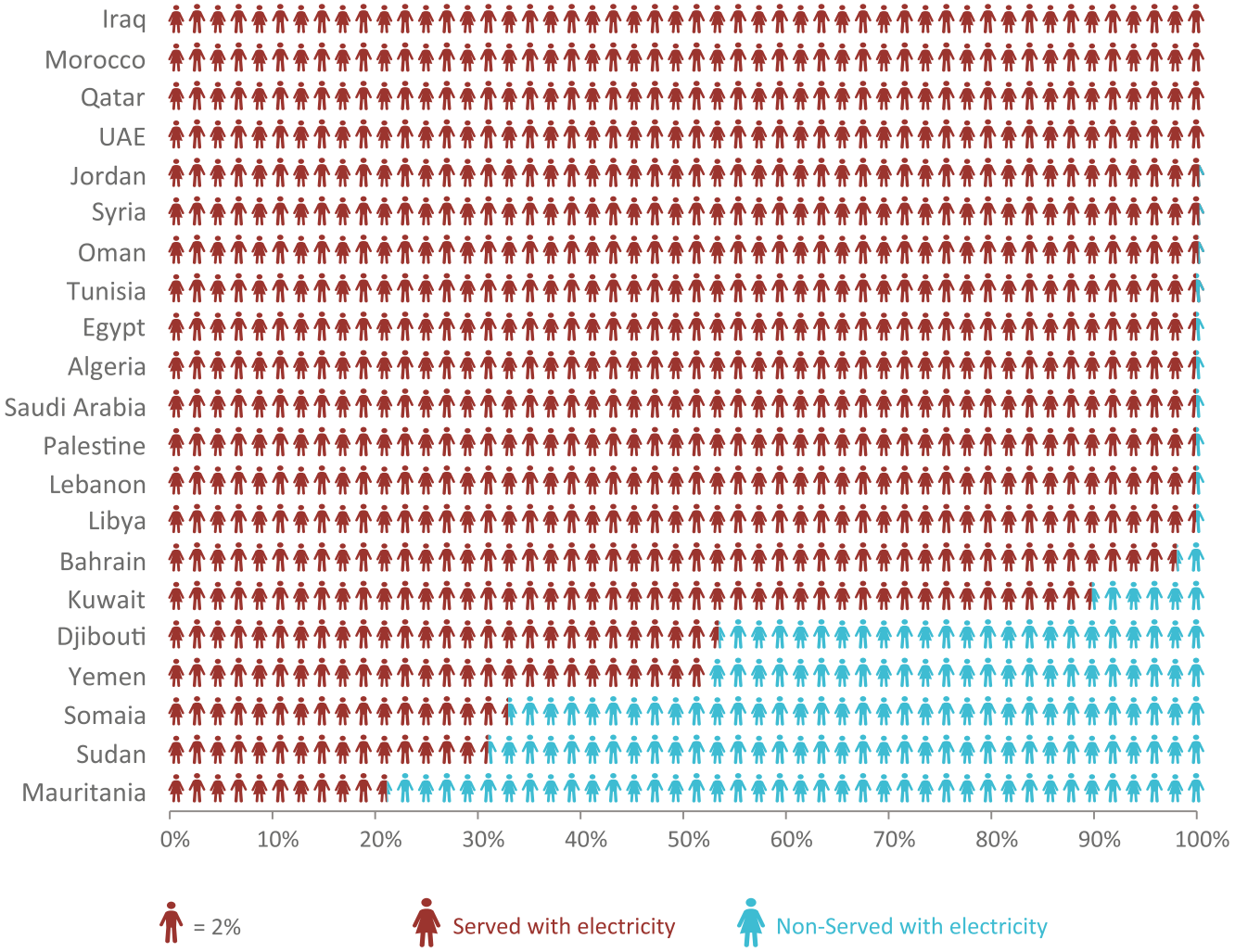
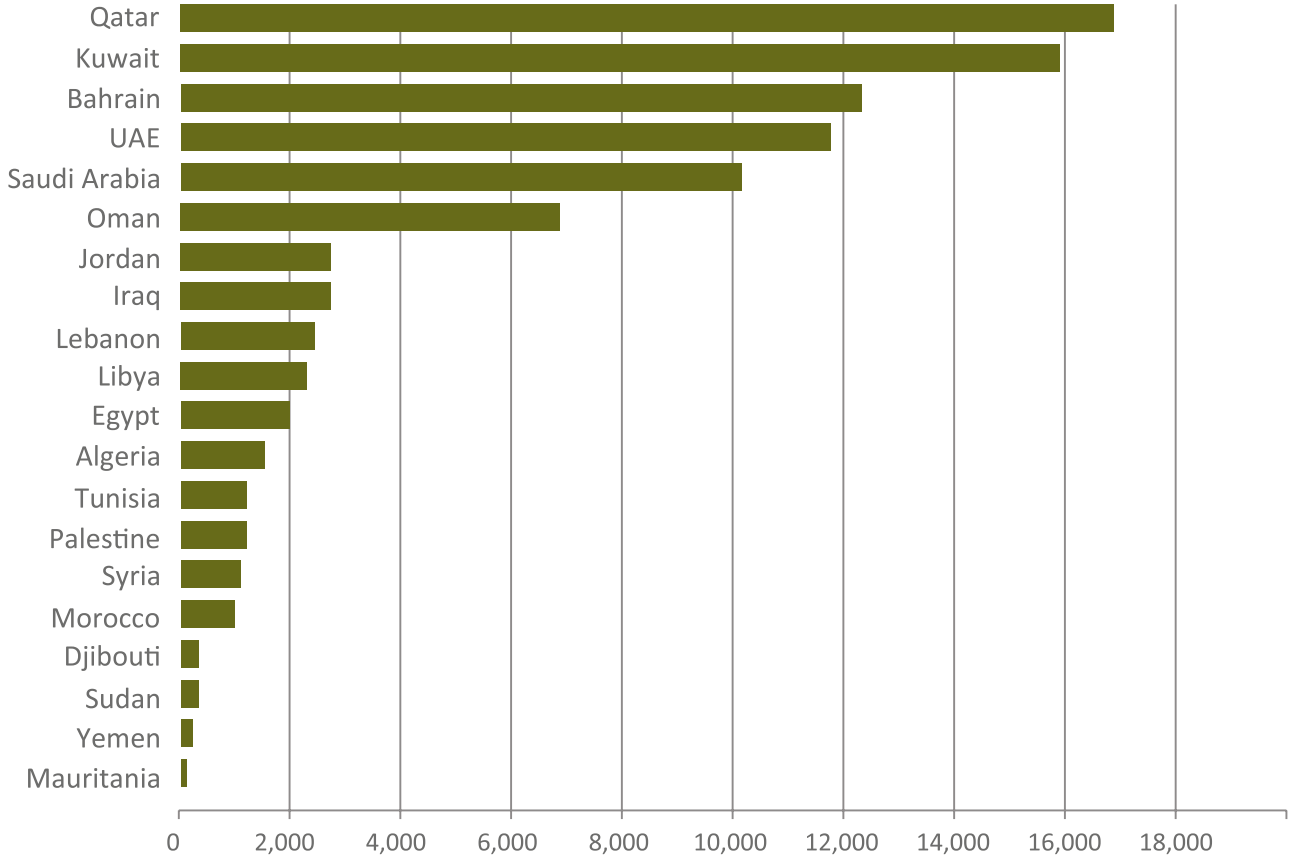


Figure 5: Per capita share of electricity (in KWh)



Since energy generation has historically been centralized, many remote and rural areas made of scattered households are not connected to the main grid, as building tens of kilometers of medium and low voltage extensions are often perceived too costly especially for a population that consumes on average less than 30kWh per month. So for many countries in the region and elsewhere, the investment needed to bridge the rural electricity gap often exceeds their capacity to mobilize sufficient sources of financing domestically.

Off-grid energy systems are smaller in size than centralized ones and have a semi-autonomous capability to satisfy electricity demand through local power generation. The term 'off-grid covers both mini-grids, for multiple customers, and stand-alone systems which typically are used for individual appliances and users. Diesel generators, biomass, hydro, solar photovoltaic and wind are off-grid systems that can be used to power stand-alone systems and mini-grids. In the region, stand-alone system electricity is usually generated by PV solar panels, micro hydro and diesel generators. Currently, the preferred decentralized, off-grid energy generation systems in the region are diesel generators which are used for lighting, irrigation, pumping, heating, cooling, agro-processing and powering domestic and industrial electrical appliances. Isolated electricity generation has a variety of applications that include agro-processing facilities, mining and other types of mineral excavation, oil and gas extraction sites and telecommunication and television towers.

In Egypt and Yemen, approximately 90% of the diesel generators in rural areas are used for the agricultural sector, to draw groundwater for irrigation. The success of this technology can be explained by various factors: the initial cost, while not cheap, is affordable, the technology is known and can be operated easily and installed fast. But this reliance on diesel has become increasingly problematic. Aside from its large emission account, diesel generators do not provide sufficient energy security for its users. Diesel prices are particularly volatile, and the fuel cannot be accessed constantly on the market. Prices of diesel may also hike in the next years as many countries in the region have implemented gradual phase out of fuel subsidies or are in the process of doing so. This is the case for Egypt which announced recently its plan to completely phase out fuel subsidies over the next 5 years. This implies that diesel will soon be paid at its international price and no longer be kept artificially low by subsidies. But currently, diesel remains cheap in many countries. Section 3.4 provides more insights on this issue.

There should also be an intensification of mini-grids systems for rural and remote electrification in the near future, since stand-alone solutions, while being a crucial component of energy access, do not produce enough power to be the end-point of rural electrification strategies. Mini-grids, on the other end, could be scaled up to cater to the growing electricity needs of rural areas and effectively stimulate socio-economic development. Given the steep decline of many renewable energy technologies' prices and installation costs, fluctuating fossil fuel cost and progress in off-grid technology, renewable or hybrid off-grid systems have slowly started becoming a cost-effective solution for mini-grids. A mini-grid is an integrated energy system consisting of interconnected loads and distributed energy resources, including generators and energy storage devices. As an integrated system, a mini-grid can operate in parallel with the utility grid, or in an island mode. A modern mini-grid can combine renewable and fossil fuel and is scalable in order for additional generation capacity to be added without disturbing the mini-grid's stability.

Mini-grids can rely on single generation technologies (diesel, solar PV, hydropower, biomass power generation or wind) or combine two or more technologies into a hybrid system, the latter being seen as more attractive since it mixes dispatchable power sources with non-dispatchable power sources and thus increases reliability. Local renewable resources are often included in the design of the mini-grid. However, while it is a fact that renewable energy deployment in off-grid systems is growing steadily in most regions, the scope and the extent of this growth is difficult to quantify due to limited available data.

The four main mini-grid operated models are the utility, privately owned, water pumping and isolated single activity, and they differ depending on who the power generation and distribution assets are, who operates and maintains the system and what these models relationships to the customers are. Utility grids are usually funded by the government of the national treasury. In the utility operator model, the utility is responsible for all mini-grid operations, and operates in the same way as the national grid: the power it generates is fed into the distribution grid and supplied to the customers. In privately owned models, a private entity plans, builds, manages and operates the mini-grid system. The funding depends on private equity and commercial loans as well as some government support in the shape of grants, subsidies, results-based financing or public sector loan guarantees. References to community owned, or community operated diesel generators are seldom in the literature.

According to a recent study on diesel to solar transformation (D2S) by UNDP and RCREEE, Egypt has 30 decentralized power plants powered by diesel fuel. These power plants are diesel hungry since each 2MW of generating capacity consumes about 2,500 tons of diesel per year. The total annual consumption of these 30 power plants amounts to 75,000 tons of diesel. The study showed also that in the countries surveyed by the D2S study, namely Egypt, Sudan, Yemen and Djibouti, irrigation and agribusiness are the largest consumers of diesel, and most of the fuel is used to activate water pumps to draw water from canals or the aquifers to irrigate the fields. The majority of Egypt's water pump is used to draw water from relatively shallow depths and is portable, in 80% of the cases. Those pumps are all diesel-fired, so there is a high potential for retrofitting existing pumps with a solar PV component to reduce the farmers' vulnerability to diesel shortages and irregular access. A rough estimate indicates that agribusiness could benefit from up to 2 GWp of PV irrigation in Egypt.

Another RCREEE study which assessed the feasibility of PV hybridization in the Egyptian Red Sea town of Marsa Allam, showed that hybridization of gensets would be feasible at a diesel price of EGP 4 per liter. In Marsa Allam, 65 hotels are supplied exclusively with diesel gensets with an average of 2 MW installed capacity. This diesel consumption amounts to 1,056 million liters per year per hotel, or a combined 68.64 million liters on an annual basis. Shortages in diesel have disrupted the business of these hotels, and the announced phase out of fuel subsidies will create an extra financial burden to hotel owner in this area. According to the study, solar PV could achieve 60% penetration in diesel-based mini-grids.

Telecom companies in Egypt operate multiple off-grid base stations which mainly depend on diesel for power generation. The D2S study estimates that 800 off-grid telecom base stations could benefit from a stronger reliance on solar PV rather than diesel, and could potentially save 1.87 ktoe if diesel gensets were replaced with 90 kWp of PV.

Morocco, as part of its large rural electrification plan which kick-started in 1996, provided over 38,000 villages across the country with access to electricity, among which 3663 villages (50,000 households) have been powered with solar PV kits. In parallel, many micro-hydro power stations have been built and are in operation throughout the kingdom, for potable water, electrification and agricultural purposes. To this date, rural electrification has reached 98.95%

On December 7th, during the Paris COP21 negotiations, two loan agreements and a loan guarantee were granted by the OPEC Fund for International Development to finance the second phase of the Moroccan rural electrification programme. This $70 million loan will enable 723 additional villages to have access to electricity. Recently, the UAE's Company Masdar announced installing 9,000 out of 17,670 the solar home systems across 940 villages representing 50% of a project to electrify rural Morocco with Morocco's Office National de l'Electricité et de l'Eau Potable (ONEE). Each of the installed systems consists of 290-watt solar panels and batteries with storage capacity for three days as well as energy-efficient appliances such as LED lamps and a 165 liter refrigerator. The project is expected to be completed by the second half of 2016.

Algeria's grid system is well developed on the coastal regions, which are home to the main centers of demand and population, but fails to provide coverage to the rest of the country. Low population density, low economic performance and adverse conditions in the Sahara desert have led the country to focus its off-grid RE efforts into rural electrification programmes in the country's Grand Sud, mostly through off-grid PV, and less frequently with CSP. Twenty plateau and steppe villages have been electrified with PV. Those villages, located in the South and away from any communication networks, have sparse and isolated populations. They are spread out on 4 Wilayat: Tamanrasset, Tindouf, Illizi and Adrar. Since diesel prices are high and fuel is difficult to transport in such remote areas, the state decided to use decentralized solar energy to satisfy the population's basic needs for lighting, cooling, pumping, TV and Radio access. Tunisia has installed 11,000 decentralized PV systems throughout the country. In Libya, GIZ has initiated a 1,000 Roofs Program, which seeks to have a total capacity of 3 MW, both on-grid and off-grid. Egypt has 30 decentralized power plants, mostly diesel and gas turbine units which are not connected to the national grid. The agribusiness sector is increasingly realizing the potential of having hybrid systems, whereby water pumps are activated alternatively by diesel and solar PV panels, given the difficulties accessing the fuel and its fluctuating price.

OFF-GRID RENEWABLE ENERGY IN ARAB INDCS

Off-grid has not been reflected in Arab countries' INDCs, with the exception of Sudan and Somalia which mention the state of decentralized energy systems in their respective countries and stress off-grid's future prospects. In its 2030 target to produce 20% of its energy through renewable energy, Sudan mentions the development of 1000 MW of solar PV (both on-grid and off-grid) and its intention to supply 1,1 M Solar Home Systems to provide electricity to remote areas not included in the national grid-extension plan. Somalia has already developed small-scale off-grid generation using solar energy, to produce electricity in rural areas and for water heating in cities. According to the Somali INDC, solar cooking has started to pick up in the country, the Norwegian Nordic International Support Foundation (NIS) donated 700 solar powered lights to Mogadishu City, and an estimated 3,300 solar powered lights were also donated to Mogadishu Council by the Turkish government and other donor agencies. The Benadir Electric Company (BECO), the dominant private agency that provides electricity for Mogadishu, has announced its plan to install 5 MW of solar equipment, while 10 extra MW of solar energy should equip two sites in the near future.

Saudi Arabia is looking into offsetting diesel usage with PV-generated electricity for remote, off-grid sites such as border posts, highway rest stops, mosques and small villages. The daily energy needs of these spots have traditionally been met using diesel generators, but this solution is expensive and generators struggle to function properly during the hottest months. All those remote sites could be instead powered by micro-generation through hybrid designs, including solar-powered desalination and cooling. An equestrian resort located 85km west of the capital is powered by a hybrid 1 MW CPV plant, which offsets the resort's 14 MW diesel generator. Aramco and Saudi Electricity Company are discussing plans to replace 300 MW.

In Sudan, which rate of electrification is low compared to other Arab countries, many large farms are forced to rely on diesel generators to pump water and irrigate their fields, and the fuel price can make up to 40% of the overhead. Many water pumps in Sudan rely on hydro-electricity to operate and have been integrated into the design requirements of dams, to control the water flow. The Roseires Dam, built in the mid-sixties, provides sufficient electric power to operate pumps which deliver water from the Nile to 63,000ha of farmland. Sudan's oldest cultivated areas are located on a large plain, which terrain naturally slopes south to north which allows the river water to irrigate by the force of gravity. For all agricultural projects located further away from the Nile, reliance on diesel-fuel pumps is the norm, this is why the Global Environmental Fund (GEF) launched a project in 2014 to replace diesel-based water pumps by promoting PV pumps. This will be enabled through targeted subsidies and the design and implementation of-micro-finance lending. GEF plans to implement at least 1,468 off-grid PV pumps in the northern state of Sudan, with a capacity ranging from 3,12 KWp to 29,6 KWp.

Djibouti used to rely heavily on diesel-fired power plants to supply its main grid, but over the past few years diesel is being phased out and replaced by hydro-electricity imported from Ethiopia. The country has two smaller diesel-fired power plants (Tadjoura and Obock) that have their own local distribution networks and consume a combined 4,250 tonnes of diesel annually. Since Djibouti relies almost entirely on aquifers for its drinking water needs, reducing energy consumption in this sector is critical, and while few diesel generators, PV systems and wind pumps are currently in use, the government announced its intention to equip some rural boreholes and wells with solar pumps and it is building smaller solar power plants to supply 25 villages in the next five years, with three of them already up and running, but none of these projects are connected to the grid. In terms of off-grid wind options, Djibouti is a prime location for the scaling up of wind farms since it boasts one of the windiest sites on the continent. While the potential is huge, Djibouti has very limited experience with wind so far, with a handful of wind pumps having been installed.

In Mauritania, a large country with a small population that does not require an extensive electricity network, load centers are spread throughout the country, therefore there is a strong need for decentralized services. Numerous programmes and electrification projects in Mauritania focus on poor rural areas not connected to the grid. The government has developed a unique system to finance a portion of the cost of extending services to rural areas through the Fund for Universal Access to Services (FAUS), which is supplied by telecommunications revenues. The Master Plan for the Production and Transport of Electricity offers a scenario for connecting off-grid consumption centers. Because of the off-grid nature of these local networks, they depend on diesel generation, and the idea is to include a greater share of RE. Hybridization of generation is already being used in several isolated consumption centers to reduce the cost of electricity. One of the first projects, built in Kiffa, includes a 4.8 MW thermal unit and a 1.3 MWp solar field.

In Yemen, the government introduced an incentive program for solar pumping shortly before the outbreak of civil conflict. The Agriculture and Fisheries Production Promotion Fund, in collaboration with CAC Bank, introduced an interest-free loan program for farmers. This program enables them to purchase solar, powered pumps, for which demand is increasing noticeably, to replace diesel-powered ones. The bank offers the interest-free loans to farmers to purchase solar-powered pumps, while the government covers loan service fees. The government also provides grants depending on the loan's repayment period. The program has been implemented and 170 pumps were financed through this program. Through the Small Enterprises Development Fund, the Ministry of Industry and Trade has also started financing solar energy projects in late 2014. The loan has a repayment period of three years and an annual interest rate of 12.5%. This is not very different from the 13.5% interest rate and the two-year disbursement period for other projects.

OFID GRANT FOR IMPROVED ENERGY ACCESS TO 427 PALESTINIAN FAMILIES THROUGH RE

The OPEC Fund for International Development's $500,000 grant approved in October 2015, will enable 427 Palestinian families from the West Bank and the Gaza strip to have access to energy through a combination of technological solutions that include PV solar panels, biogas generation, solar cookers and the establishment of a local value chain for producing those technologies.

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3.2 Supporting Policies

Even though RE systems have exponentially gained in cost effectiveness and competitive advantages over the past few years, many of these technologies remain in an early stage of commercialization in the region, and their development hindered by a general lack of mainstreaming strategies. For these reasons, RE targets can only succeed when supported by policies that mitigate commercial risks of investors and lenders associated with financing and deployment of RE projects.

3.2.1 IPP Public Competitive Bidding

With IPP Public competitive bidding, government hopes to yield the lowest price for the services and minimize the risks, as prescribed by a request for proposal (RfP). The developer is chosen through a tendering process and a PPA is signed with the successful bidder at the bidding price.

IPP public competitive bidding is the preferred policy option enabling private development of large-scale RE projects in the region. A handful of countries have launched official tenders for some sort of RE project. Among these, Morocco has proved to be effective in carrying out IPP public competitive bidding processes for RE projects and in realizing its announced plans. Egypt and the UAE have also had successes by following the competitive bidding scheme. In other countries, where tenders have been announced for private development of RE projects through public competitive bidding schemes, the tendering processes have often been delayed or interrupted for various reasons.

The energy prices reached under the IPP bidding in the Arab region illustrate the competitiveness of wind and PV power, with developers running a cost race for both. The auction of the 800MW third phase of UAE's Mohammed bin Rashid Al Maktoum Solar Park broke the world record when awarded to a Masdar-led consortium at a levelised cost of electricity (LCOE) of 2.99 US cents/kWh. This came after an earlier ground breaking second phase of 200MW which was awarded to Saudi Arabia's Acwa Power- led consortium with 5.84 US cents/kWh. Similarly, the 50 MW solar PV plant considered by Taqnia for Saudi Electric Company in Saudi Arabia received offers at 4.9 US cents/kWh. For wind, Egypt's 250MW Gulf of Al Zayt wind project currently under negotiation received a price of about 4 US cents/kWh and Morocco secured an

average bids of just 3 US cents/kWh from its tender for 850MW tender of large-scale wind energy projects, with the lowest tariff at around 2.5 US cents/kWh. It is important to note that those prices are only possible because of the region's remarkable solar and wind energy resources, backed by some concessional finance and measures to reduce the various risks and encourage investment.

Through Saudi Arabia Vision 2030 plan and its target to add 9.5GW of new renewable energy capacity by 2030, the Saudi Electricity Company "SEC" invited expressions of interests to develop two solar photovoltaic Independent Power Plants ("IPPs"), to be located in Al-Jouf and Rafha north of the Kingdom of Saudi Arabia. The selection of developers will be through a competitive process. Each site will involve the development of up to 50MW of PV capacity. The IPPs will support already existing conventional plants in their respective locations. The entire energy output will be sold to SEC under a long term Power Purchase Agreement.

In UAE, Abu Dhabi Water and Electricity Authority (ADWEA) has pre-qualified 34 companies for its 350MW solar PV park in Sweihan, where the bid submission deadline was set in September 2016. The Dubai Electricity and Water Authority initiated the first 200MW CSP project by receiving formal bids in July 2016 from four international financial services firms to provide advisory services on the project.

The Moroccan Agency for Solar Energy's (MASEN) is working on the Ouarzazate solar program, in which Acwa Power accomplished the 160MW Noor 1 CSP project in March 2016, and is leading a consortium to develop the 200MW Noor 2 and 150MW Noor 3 CSP projects. Furthermore, bids have been received for Noor PV1, including three PV projects, where financial close is expected late 2016 or early 2017. In addition, MASEN launched expressions of interest for the 400MW Noor Midelt solar project, which comprises both CSP and PV technologies, developed over a two-phase RFP process.

MASEN is expected to launch expressions of interest later this year for the development of the 400MW CSP and PV Tata solar project plant. Moreover, the pre-qualification process for the 200MW Noor Atlas solar complex is expected in the second half of 2016, where the complex will comprise eight solar PV plants of 10MW to 30MW each in the southern region of Morocco. Another pre-qualification process is expected for the 200MW Noor Argana solar PV plant by the Moroccan electricity and water utility company ONEE.

Conversely, with the adoption of the feed-in tariffs schemes and the direct proposal submission, some countries also pursue this alternative option for development of large-scale RE projects. In Jordan, for example, some previously planned projects for private development through public competitive bidding process for IPPs have moved to a direct proposal submission scheme. Nevertheless, the 103 MW EPC project in Al Quweira, funded by Jordan's Ministry of Energy and Mineral Resources through a grant from Abu Dhabi Fund for Development, recently was awarded through a bidding scheme for 15 qualified bidders with a very competitive price of $128 million to a consortium of companies from UAE and Spain.

Table 11: IPP Public Competitive Bidding – Status of Projects

	PPA Bidding/Public Competitive bidding					
	Identified RE Sites for Private Development (MW)		Announced Tenders (MW)		PPA Signed (MW)	
	Wind	Solar	Wind	Solar	Wind	Solar
Algeria	0	0	0	0	0	0
Bahrain	0	0	0	0	0	0
Egypt	2500	120	250	120	0	0
Iraq	5	15	5	15	0	0
Kuwait	10	60	10	60	0	0
Lebanon	200	10	50-200	?	0	0
Libya	120	50	0	0	0	0
Morocco	1,200[1]	1,000	1,200	510	150	510
Palestine	0	0	0	0	0	0
Qatar	0	0	0	0	0	0
Saudi Arabia	500-800		0	100	0	0
Sudan	0	0	0	0	0	0
Syria	50	0	50	0	0	0
Tunisia	0	0	0	0	0	0
UAE	0	1000	0	800	0	300
Yemen	0	**0**	**0**	0	0	0
Yemen	0	0	0	0	0	0

[1] 1000 MW through Integrated Wind Programme and 200 MW extension of existing wind project (Koudia Al Baida)

3.2.2 Direct Proposal Submission

Direct proposals allow developers to submit unsolicited applications to the government. This process allows for a power purchase agreement (PPA) to be signed on the initiative of the developer. Since it naturally requires less preparatory work from government, this process is usually faster and more direct.

Egypt, Jordan and Palestine are the only countries that allow direct proposal submission. While Jordan provides some guidance when it comes to identifying appropriate land sites, direct proposals usually put greater responsibility upon the developer to find a suitable site for deployment. This is particularly difficult in Palestine where most rural land, suitable for larger scale RE systems, remains under Israeli control.

In Jordan, two rounds of direct proposals have been launched. The first round was initiated in 2011 and involves 12 projects with a total capacity of 200 MW. Round two has not yet been completed. The table below summarizes the status of projects within both rounds.

Table 12: Direct Proposal Submission – Status of Projects in Jordan

#	Type	Capacity	Location	Project(s) Information & Current Status
Operational Projects (Round 1), Dec. 2015				
1	Wind	117 MW	Tafila	BOO Project for Jordan Wind Company (JWPC). VESTAS machines. Project Agreements along with the successful financial closure have been completed by the end of 2013. Commissioned on 16 September 2015.
2	PV	10 MW	Mafraq	BOO for the local PV manufacturing company "Philadelphia-Solar". Connected to distribution company. Commissioned on 22 October 2015.
Projects Under Construction (Round 1)				
1	PV	200 MW total	10 projects in Maan Area , 1 in Aqaba, 1 in Mafraq	(12) PV solar proposals were received in March 2013 with total capacity of (200) MW. PPAs signed in March 2014. Reached Financial Close in May 2015.
Projects Under Development (Round 1)				
1	Wind	230 MW	3 projects in the South, and 1 in the North	Proposals have been submitted by 30/09/2014 PPA signed for one project, the other 3 under PPA signing. Operational in 2018
2	Wind	89 MW	Fujeij / Shobak	On 30 November 2014, KEPCO submitted a direct proposal for this project. Currently under PPA signing. Operational in 2018.
Projects Under Development (Round 2)				
1	PV	200 MW total (50 MW each)	North, East and Middle Jordan	(45) MOUs were signed with short listed PV bidders. (34) Proposals were submitted by 10 February 2015. Encouraging prices were proposed. PPAs signed for 2 projects, the other 2 under PPA signing. To be operational by end of 2017.

The Jordanian direct proposals have seen a major shift from the first round to the second round. The first round involved a standard flat rate feed-in tariff, which is the common direct proposal model in many countries. The second round saw a shift to a tender scheme under which the project that is technically viable and offers the lowest feed-in rate will be chosen, in other words more similar to a traditional competitive bidding process. This shift has been a smart move from the government. By offering a very attractive rate in the first round of projects, the country was able to grab the attention of many of the world's premium solar PV developers as well as local developers relatively new to the market. Through a 'learning by doing' approach, Jordan has been able to improve the capacity of its governmental organizations, as well as local developers, to enable the industry to thrive over the coming years, with a second round currently being contracted and a third round to be undertaken as soon as the capacity of the grid has been increased to accommodate more projects. Each round has a nominated priority area that the Ministry of Energy and Mineral Resources (MEMR) has identified and would like to develop. Developers with deployment plans in these areas will be prioritized.

In Egypt, a deal was sealed in 2015 with Siemens for deploying large wind projects for up to 2000 MW in the Gulf of Suez and West Nile. The deal includes setting up a blade factory in Egypt to serve both domestic and regional markets.

In Palestine, authorities received an offer for the development of a large-scale wind project with a capacity of 100 MW, and four offers for the development of large-scale solar projects: one for constructing five solar stations (28 MW), the second to build a 20-MW PV plant in Hebron, and the last two offers for the development of two projects with 10 MW and 5 MW capacities.

3.2.3 Feed-in Tariffs

Feed-in-tariffs (FITs) are a market-based instrument designed to increase investment security for RE technologies. When the supply price has not reached grid parity and the incremental costs need to be covered either by the treasury or a foreign grant/loan, the FIT scheme enables RE prices to be competitive on the market. Worldwide, FITs are commonly used and countless studies vouch for this mechanism, which they argue is the most efficient policy option to stimulate the deployment of grid-connected RE technologies in introductory phases.

Algeria, Egypt and Palestine have all opted to apply a fixed tariff rate for their FITs. Depending on the type of scheme and technology, some of these fixed rates are revised during the programs, but always according to pre-defined price levels and not according to market fluctuations (except with the FOREX rate fluctuations). This factor creates certainty for investors who know from the beginning how much support they can expect. FIT schemes in the region vary greatly in duration, scope, tariff structure and tariff levels; specifically in the way those levels have been determined.

The Egyptian FIT scheme was introduced in October 2014 then revised in Septembber 2016 and applies to both solar PV and wind projects. Tariff rates per kWh are technology-specific. For solar PV, tariffs are linked to the amount of installed capacity, while for wind projects, tariffs are determined by location and operating hours. For solar PV, the FIT is granted for a period of 25 years and operates at a fixed rate. Wind projects reats are granted for 20 years. The tariff level for wind is considered moderate, with a flat tariff ranging between of (US cent 4-7.98) per kWh while for PV betwen (US cent 7.88-8.40). In 2015, Egypt broadened the scope of its FiT to cover waste to energy and biofuel options, where the associate executive regulations are still in the design phase.

In order to further support investments in RE, all FIT projects in Egypt have a guaranteed access to the grid coupled with a priority dispatch. If, for any reason, priority dispatch is not granted to the RE power producer, the Egyptian transmission company EETC is required to compensate him. Land access will be provided on the basis of a usufruct, which means that the investor pays a fee for land which amounts to 2% of the project's overall income.

The FiT has proved to be an investment puller scheme in Egypt, as over 130 applicants have been qualifies for the first round of the FiT in Egypt in utility scale projects and over 150 for PV rooftop installations. Nevertheless, till June 2016, only ten of the utility scale projects are expacted to reach the financial closure due to a host of reasons, including the readiness of associated documents such as the power purchase agreement, as well as the clarity of the administrative process and the large number of entities involved. Also, securing foreign currency lending and arbitration have been reported as subject of long discussions. It is expected that the second round will move much faster as a result of the learning curve.

Algeria's new FIT scheme is eligible for both solar PV and wind energy projects and applies fixed tariff rates, whereas the previous scheme used was premium price tariffs. The design of the scheme is similar, yet slightly more complicated than the Egyptian FITs.In Algeria, renewable power projects will be subjected to a specific regime based on a 20-year power purchase agreement ("PPA") with one of the four distribution grid operators, which all are subsidiaries of the State-owned Sonelgaz Group. These projects will receive preferential regulatory FIT applicable to the electricity produced. Projects with an installed capacity superior to 1 MW are eligible on an "open-door" basis. In order to benefit from FIT, producers need to apply to the Algerian energy regulator, the "Commission de Régulation de l'Electricité et du Gaz" ("CREG"), for authorization. To qualify, producers must satisfy a number of criteria, including holding an operation authorization and a certificate that guarantees the origin for key materials, both delivered by the CREG. Finally, additional authorizations such as building permits and environmental impact assessments will be required. The preferential feed-in tariffs will be guaranteed for the 20-year duration of the PPA. Base tariffs range from 12.75 Algerian dinars per kWh to 15.94 DZD/kWh for solar photovoltaic projects. For wind power projects, the base tariff range from 10.48 DZD/kWh to 13.10 DZD/kWh depending on whether the installed capacity of the production facility is over 5 MW or comprise between 1 MW and 5 MW.

Following an initial five-year phase during which the base tariffs will apply according to the potential operating hours of the power plant, the applicable feed-in tariff will be revised and adjusted based on its effective operating hours during the initial five-year phase. The feed-in tariff applicable to facilities with a low production time will be increased up to 15 %, while the FIT applicable to facilities with a high production time will be reduced up to 15 %, in accordance with regulatory reevaluation rates. The subsidized feed-in tariffs will be financed through a National Fund for Renewable Energies and Cogeneration (Fonds National pour les Energies Renouvelables et la Cogénération), established by a 1 % tax levy on the state's oil revenues, and through other resources or contributions, including a premium paid by end-users.

To qualify for Algerian FIT, 51% of local ownership is required and financing must be structured through local banks. In addition, foreign investment projects must be submitted to the National Investment Council (CNI) for its approval.

Palestine has adopted FITs for several different RE technologies. But so far, the key established program which has used the FIT mechanism is the Palestinian Solar Initiative, introduced in 2013. This program offered small-scale (<5kW) solar PV installers a fixed feed-in tariff, that would decrease by 7% every year under a 20-year power purchase agreement. The program was planned to be launched in three steps, but was interrupted halfway through

the second step because of the high associated costs. The new Tunisian RE law allows for FiT, still it is not clear if the scheme would be adopted. In 2015, Sudan started drafting RE laws and policies for private investments promotion that include the possibility for FiT, with a focus on small scale distributed generation to improve the energy accessibility .

FIT levels should be determined by taking into account the actual generating cost of each technology. While country-specific levelized costs of energy generator (LCOE) calculations are missing, it is clear that introduced tariff levels vary a lot between the countries. Due to a strongly different risk sharing and financial models, the recent prices under competitive bidding scheme in UAE, Morocco and Egypt, are by far below the announced FITs for solar PV and wind in Egypt and Algeria. Algeria offers a higher initial support to RE systems; however this FIT will be revised after the first five years of operation, for adjusting the tariffs depending on the actual energy yield of solar projects and the full load hours for wind projects. Palestine, on the other hand, started with tariff levels that overcompensated the investors. This, in combination with an undefined plan for financing, led to the termination of the program.

3.2.4 Net Metering

Net metering is a widespread billing mechanism essentially used to encourage residential or small-scale businesses to install RE (particularly solar PV), for self-consumption primarily. It allows for prosumers (actors who both produce and consume electricity) to feed their excess electricity generated by RE into the grid to offset the utility electricity consumption. The net metering mechanism is often perceived as a more flexible and easier, alternative to feed-in tariffs. Net metering usually places the economic burden on the utility and is of little cost to the State. It provides the prosumer with a long-term guarantee of low electricity bills, a particularly attractive feature in countries with high electricity tariffs. The bill-saving value is highest if the electricity tariff structure is divided in tariff-brackets, since it allows prosumers to cut down their peak consumption and stay away from the highest tariff brackets.

The way the net metering mechanism is designed is of crucial importance for its attractiveness, particularly when the net excess of energy generation is handled by the end of a settlement period. Some systems allow for customers to credit the excess kWh to the next billing period; others have been regulated so that any excess kWh in the end of the period is granted to the utility, or alternatively that any surplus has to be purchased by the utility. Another design detail that varies between different net metering schemes is the eligible installed capacity. The best result of a net metering scheme can be obtained if the mechanism does not limit system size or capacity and allows for excess generation to be credited to the next settlement period (Michell et al., 2011).

In the region, six countries, (Egypt, Jordan, Lebanon, Tunisia, UAE and to some extent Morocco) have adopted net metering policies. However, only few of them have implemented it in practice. The implemented schemes are all very different and are targeting various categories of prosumers. While Jordan and Tunisia have relatively simple schemes that have attracted smaller system investors, (Jordan managed to attracted both smaller and big prosumers), Egypt has designed a complicated scheme more suitable for the electricity consumers in the highest tariff slot under the low-voltage grid. Common for all schemes is that they limit the allowed capacity, by either stating it in the policy (in the case of Jordan and Tunisia), or through the design of the billing mechanism, which does not make it profitable to install a system that covers more than part of your own consumption (in the case of Egypt).

Jordan

Under the Jordanian net-metering scheme, the excess electricity fed into the grid is credited for later consumption. This credited excess electricity can be used to offset electricity used at other times, when there is little or no PV electricity production (e.g. at night). The legal basis for net-metering is the 2012 Renewable Energy and Energy Efficiency Law No. 13 (REEL). The REEL and its bylaws enables Independent Power Producers (IPP) to provide electricity from renewable sources to NEPCO as part of a long-term Power Purchase Agreements (PPA). Private investors can also invest in their own PV system of up to 5 MWp to directly consume the electricity produced and offset it within a net-metering scheme. The REEL also allows for the electricity to be generated on a different location than the one where the consumer is located, which is referred to 'energy wheeling'.

In case of any excess electricity at the end of the month, this surplus is transferred to the next month. At the end of the year, potential surplus can either be sold at a price of JOD 0.12 (USD 0.15) per kWh or be transferred to the next year. Even though the scheme can be used by relatively large systems, the policy does not provide enough details on how it will take into account the day/night/peak capacity tariff structure that applies for most commercial and industrial consumers. By December 2015, more than 2000 applications were received by the distribution companies and about 35 MW of rooftop systems were installed and another 30 MW were approved for later installations.

Tunisia

Tunisia offers other net metering conditions depending on the grid level the prosumer is connected to. For actors connected to a low-voltage grid, the policy has been designed in such a way that no monetary transfer is ever needed. Any net excess electricity at the end of the billing period is rolled over to the next period. To prevent electricity excess levels from becoming too high, the policy forbids prosumers from installing a higher capacity of solar PV than the capacity they subscribed to the previous year' (Decree n° 2009-2773). For actors connected to the medium- or high-voltage grid, it is allowed to produce and sell surplus electricity as long as it is limited to 30% of the annual production. Since the retail tariff for electricity within this sector is time-based, the net metering scheme employs a time of use design. While the scheme targeting large-scale prosumers has not been widely used, the scheme targeting small-scale actors has been popular. This scheme has been successfully combined with a grant and a bank loan allowing net metering subscribers to pay off their loan directly via the electricity bill.

Egypt

Egypt adopted a net metering policy in the beginning of 2013 and is now in the process of implementing it. Although the policy de facto stopped operating due to introduction of FIT program, by law it is still operational and is still open for applications. The policy applies to solar PV projects connected to the low voltage grid. The scheme has a very complicated design where the prosumers can only offset electricity consumed in the highest tariff bracket for each month. Since no installation limit has been specified, customers can connect a system that produces more electricity than they consume. This is, however, unlikely because of a number of reasons. The fact that surplus electricity can only be credited in the highest tariff bracket encourages customers to install PV systems that only meet a small portion of their overall need. This behavior is reinforced through the policy design, which cancels the potential for excess electricity at the end of the year.

Morocco

Morocco is the only country with a functioning, large-scale, grid-connected RE auto-producer. Auto-producers were established as a result of a specific investment program designed by the utility operator ONE in 2006. It guaranteed the purchase of excess electricity at a preferential rate. until 2012, when the program ended and auto-producers became no longer eligible to benefit from these incentives.

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 had very little influence due to the wide gap between investment costs and electricity savings' potential.

UAE, Dubai

On December 15, 2014, the UAE's Executive Council allowed for rooftop PV systems to operate under a net metering system. The net metering scheme was officially launched by Dubai Electricity and Water Authority (DEWA) on March 15, 2015 and is expected to encourage commercial and residential building owners to fit solar PV panels through the Shams Dubai framework. This would, enable them to submit planning applications directly to DEWA through a free online portal. DEWA wants solar power capacity to rise to 7% of total power output by 2020, compared with the current level of around 1%. The Authority wants solar power to represent 15% of generation by 2030. It has said solar growth will be driven by 5 GW of new capacity planned at the giant Mohammed bin Rashid Al Maktoum Solar Park, as well as from small and medium-sized plants installed under the Sham Dubai initiative. Companies already signed up to the Shams Dubai scheme include engineering groups expanding into the solar sector, as well as international PV contractors and developers. By June 2016, more than 30 photovoltaic systems have been installed, six of them have been connected to Dubai's electricity network. DEWA is working to connect the other projects. It was announced also that DEWA has collaborated with 18 government organisations in Dubai to connect projects under the Shams Dubai initiative.

Palestine

About 35MW of solar capacity are planned to be added to the Palestinian grid under a net metering system. The power utility will provide credits rather than cash for electricity generated based on a net metering agreement allowing the consumer to generate power in line with applicable regulations. Palestinian utilities would provide credits for any excess electricity generated without a cap. The 35MW will include 25MW for businesses and 10MW residential and public sectors. The systems to be installed under the net-metering scheme will be eligible for soft loans provided from the US$50 million Palestine Solar Fund.

Table 13: Net Metering Policy

	Net Metering Policy	Projects Implemented through Net Metering Scheme, 2014 (MW)
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.	0
Iraq	No net metering policy in place yet, but Ministry of Electricity is considering revising electricity tariffs and introducing a net metering scheme to support the development of distributed renewable energy systems.	-
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).	35
Lebanon	Decision of Board of Directors of Electricité du Liban (EDL).	2
Palestine	Decree approved by the cabinet in March 2012 decision No 13/127/16 on the use of Renewable Energy.	4
Syria	Electricity Law No 32 (2010).	0
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.	23
UAE	"Shams Dubai" net metering scheme.	12

3.3 Energy Subsidies

Energy subsidies worldwide continue to have a significant impact on the overall progress and deployment of RE technologies. In the Arab region, the energy produced by 'traditional sources' (fossil fuels) is subsidized by over 50% (IEA, 2014), while the RE industry receives little support from governments. To ensure a smooth transition towards RE, and for Arab countries to tread on an increasingly sustainable path, actions should be taken at all levels with the 'system approach' in mind. Maintaining the ongoing fossil fuel subsidies will prolong the existence of fossil-dependent energy systems, causing tremendous damages to the environment and society as a whole. Regulatory policy changes, as mentioned earlier in this chapter, are not enough to speed up the deployment of RE technologies. Any country with the serious ambition to increase the share of RE technology must, in parallel, take the necessary steps to reform, phase out, or reduce fossil fuel subsidies. Such efforts include estimating the amount of subsidies, assessing social and economic impacts of a subsidy phase out, designing a strategy that minimizes the negative effects during the phase out, and last but not least, make sure to create public acceptance for undertaking these necessary measure (IRENA, 2014).

This section starts by providing a general outlook on the magnitude of electricity subsidies in each country before providing an overview of the recently implemented subsidy reforms. Estimating the exact amount of subsidies in each Arab country is a challenging task due to the different forms they may take, modes of implementation, poor data quality and availability, secrecy of information, and lack of transparency.

Based on the price-gap approach, the previous editions of AFEX Renewable Energy introduced a method to provide an estimate of the implied subsidies. As a reference price, Palestine's retail electricity tariffs were selected. Electricity in Palestine is almost unsubsidized and, therefore, represents the approximate true retail cost for a specific energy mix used for power generation. In all other Arab countries, prices are currently set by the national governments. The goal of this method is not to calculate the exact amount of subsidies, but to provide a general idea of the magnitude of subsidies in the electricity sector.

The Figures below illustrate an implied subsidy in the residential, commercial, and industrial sectors. These figures are based on estimated average monthly electricity consumption by different segments of consumers in 20 Arab countries. For residential customers, the average consumption is 500 kWh per month, for commercial customers 1,500 kWh per month, and for industrial customers 30,000 kWh per month. Most of the countries represented in this report subsidize electricity tariffs and fossil fuels. Over the past few years, several countries have recognized that subsidizing fossil fuels is problematic and have started to adopt subsidy reform programs and to adjust energy prices. Despite these efforts, the overall subsidy rate remains high for both oil exporting and oil importing nations in the region.

Djibouti, as can be observed from figures 6, 7 and 8, has very high electricity tariffs for the residential and commercial sectors (US$0.30/kWh), since the country relies entirely on oil products for power generation (IRENA, 2015). In Mauritania, a country that generates 75% of its electricity from heavy fuel oil, electricity tariffs for the industrial sector are very high, and the monthly residential rate (above US$0.20) is also relatively high (IRENA, 2015). On the other end of the spectrum, Syria, Kuwait and Iraq have the lowest electricity tariffs in the region since energy subsidies tower above 95%. To give an example of those prices distorted by subsidies, a residential costumer in Syria only pays 3% of the real electricity price.

Across the region, the commercial and industrial sectors are generally less subsidized than the residential sector, and electricity tariffs for commercial and industrial customers are higher than for residential customers. Exceptions are Tunisia, the UAE and Qatar, where residential tariffs are higher than the two other segments. Kuwait is the only country which set up a fixed tariff of 2 Fils per kWh (US$0.66/kWh) for all sectors.

It is important to note, though, that these figures only show the difference in price between countries at a certain level of consumption. They do not represent the actual price paid by different consumers, as the electricity tariff rates are often pegged to the voltage and level of consumption and can thus vary greatly. In addition, the different fossil fuel energy mixes used for power generation and fuel supply costs for power plants has not been factored in.

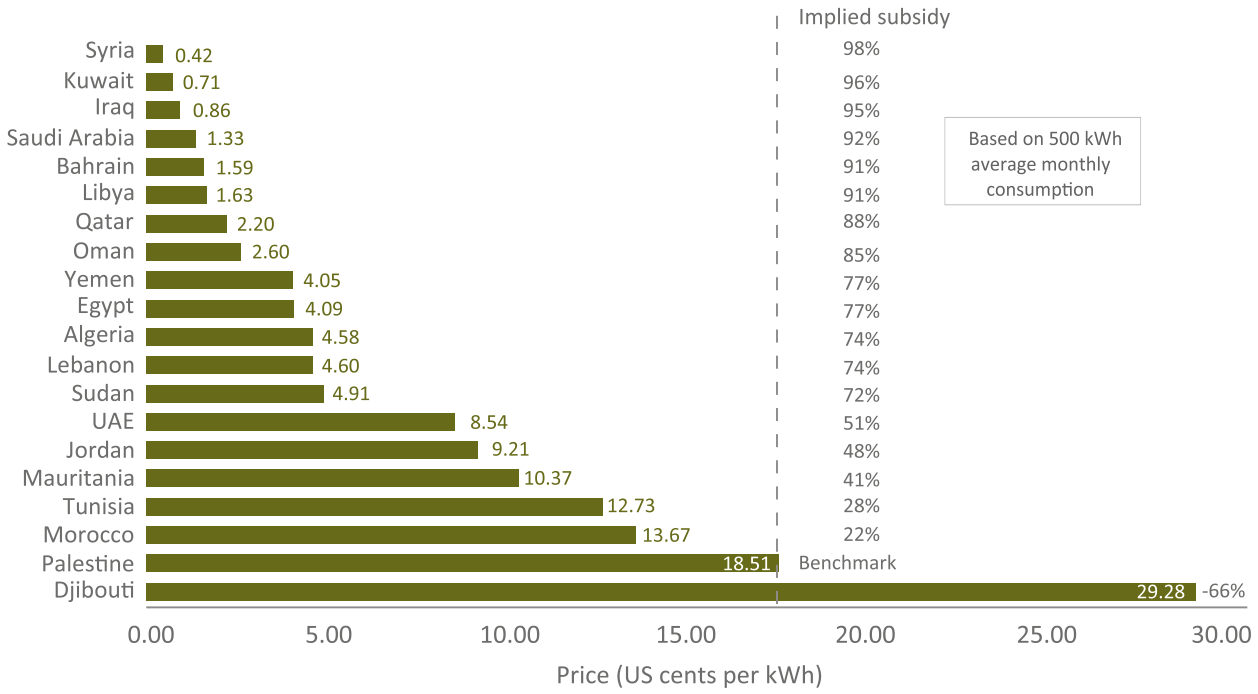


Figure 6: Residential Electricity Prices and Subsidies Benchmarked to Palestine (2015)

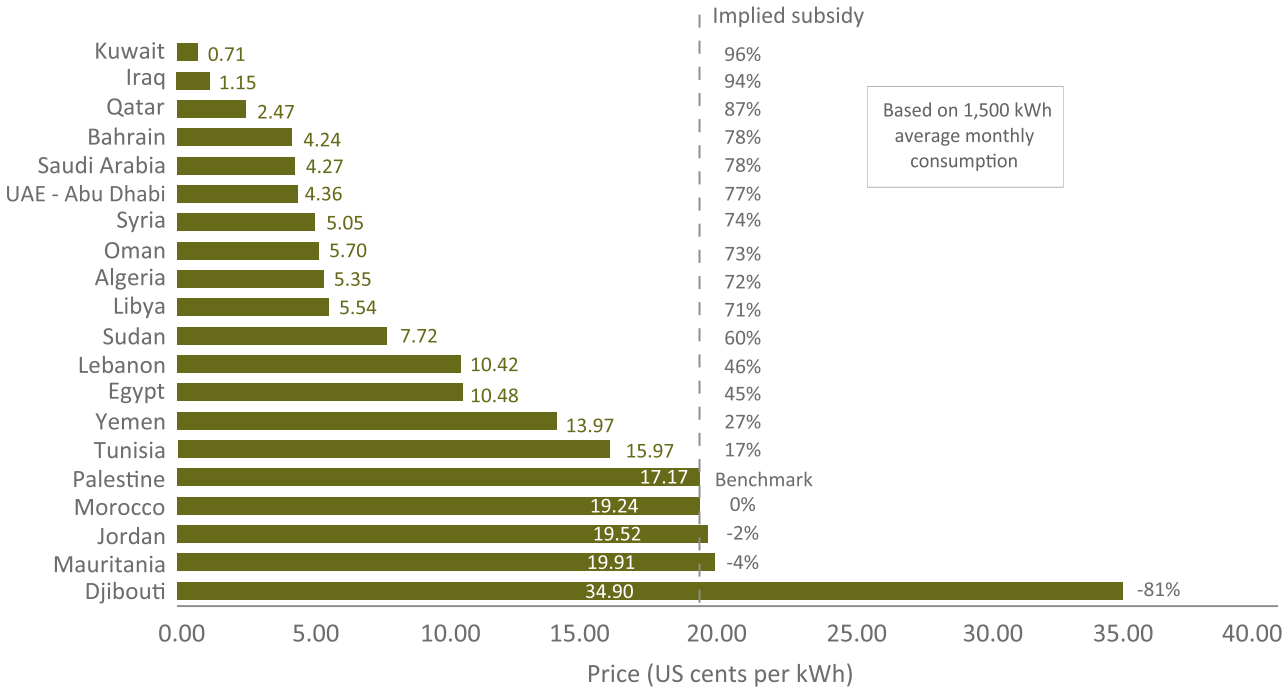
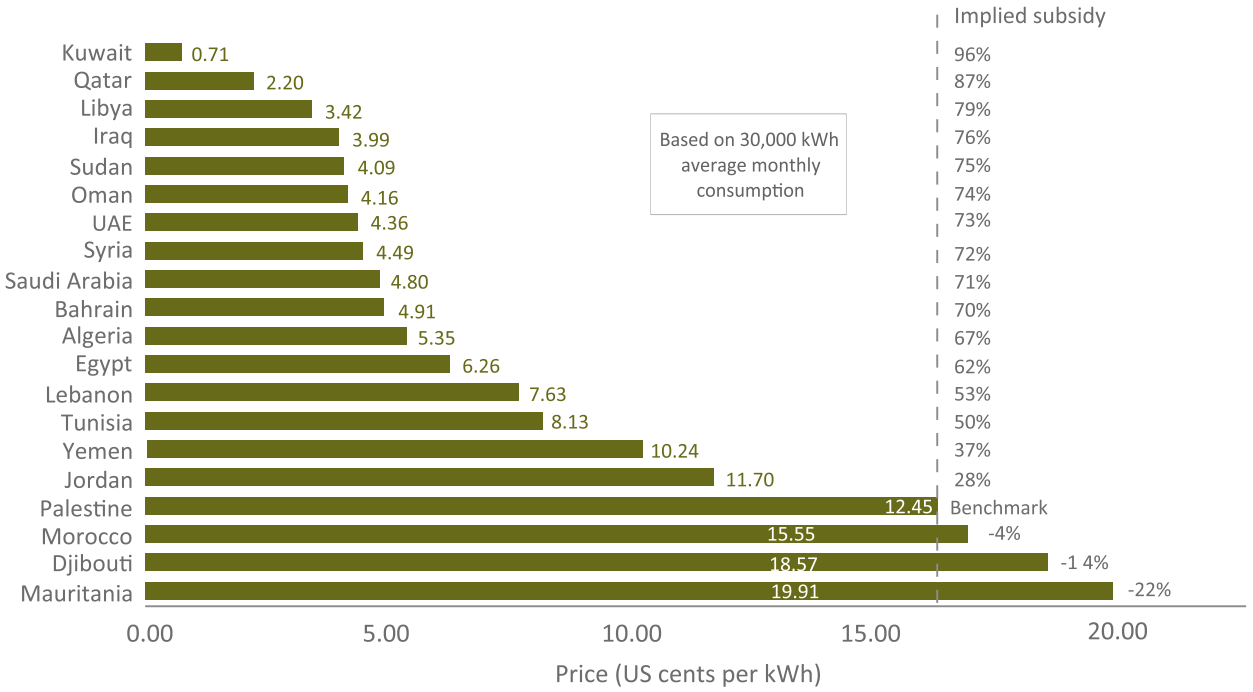


Figure 7: Commercial Electricity Prices and Subsidies Benchmarked to Palestine (2015)



Sources: RCREEE based on data from national energy utilities

Figure 8: Industrial Electricity Prices and Subsidies Benchmarked to Palestine (2015)

Since AFEX's previous edition, many net-importing countries have undertaken some ambitious subsidy reform programs. As oil prices started plummeting in June 2014, many oil exporting countries have also started to implement subsidy phase-outs in the electricity sector.

Looking at the economic consequences of the subsidy situation, it is not surprising that many Arab countries adopted subsidy reform programs. Between 2013 and 2016, Bahrain, Egypt, Jordan, Saudi Arabia, Tunisia, Oman and UAE have all shown diligence in implementing subsidy reform efforts in the electricity sector.

Bahrain started phasing out its subsidies on electricity starting February 2016 in the residential sector for non-Bahrainis, and the phase out will continue until 2019. Starting February 2016, the new electricity price for foreigners are set at 6 fils for a consumption that does not exceed 3000 kWh, 13 fils for the 3001-5000 kWh segment of consumption, and 19 fils for more. The hope is to gradually increase the electricity price of the latest segment by 29 fils in 2019. This price hike won't affect Bahraini citizens who will continue paying 3 fils, 9 fils and 16 fils per kWh for the three segments of consumption (under 3000 kWh, 3001-5000 kWh and above). As for the commercial and industrial sectors, the tariff of electricity is fixed at 16 fils per kilowatt hour. According to the Bahraini government, the largest chunk of the subsidies (250 million dinars/year in 2013-2014) is directed towards the supply of electrical power to Bahrainis and non-Bahrainis domestic users. The real price of a unit of electricity is 29 fils per kilowatt hour, a heavy financial burden covered at 85% by the government. The continuous decline in oil prices since 2014 negatively impacted the total revenues of the government, which took the decision to raise the prices of electricity, which average consumption increases by 5-6% annually.

Jordan plans to substantially decrease the total amount of electricity subsidies by 2017. This subsidy phase-out process started in 2014, and stepwise increases in electricity prices for the coming years were announced. While a large majority of households will not be directly affected by the upcoming electricity price hike, the industrial and commercial sectors need to plan for considerable higher electricity tariffs. Indeed, the highest electricity tariffs in the whole region will soon be applied to Jordanian banks and hotels, which will see an annual increase of 15%. By 2017, banks will pay 322 Fils (US$0.45) per kWh and hotels will pay 255 Fils per kWh (US$0.36). As a result of this dramatic tariff increase, a large number of RE projects are expected to be deployed in these two sectors in the near future.

In Egypt, the power sector subsidy reform is ongoing since July 2014, when the Egyptian government announced a five-year transitional plan to phase out subsidies in the electricity sector. This plan was officially endorsed and a Prime Minister Decision was issued on July 17th, 2014. This Decision approved annual tariff increases for most user segments on July first each year until 2018. The highest tariff increases will be experienced by some of the extra-high voltage industrial users – more than 20% annually. The latest tariff increase, as of July 2016 ranged from 25 to 40% depending on consumption levels.

The Saudi government initiated a package of reforms meant to alleviate the pressure on the state budget while enhancing energy efficiency by increasing domestic prices of fuel, water and electricity. The Saudi government announced it will subsidize energy prices up to US$ 61billion in 2015, which is equivalent to 9.3% of its GDP. While Saudi Arabia has not changed electricity prices for the residential segment under 4000 kWh, the 4000-6000 kWh bracket has increased by 66.7% (20 halalas), and the bracket above by 30 halalas. For the commercial sector, Saudi Arabia amended the tariff of electricity for each segment of consumption by 4 halalas. For the governmental sector, electricity tariffs have increased by 23% to 32 halalas per kilowatt-hour. Only the industrial sector benefits from a unified tariff across sectors, which costs 18 halalas per kWh. Those new increases, which came into effect in January 2016, are expected to reduce the pressure on the state budget.

Since it costs the UAE the whopping sum of US$29 billion a year (IMF Data, 2015) to subsidize its electricity sector, the Emirate of Abu Dhabi announced earlier this year new tariffs on electricity. For expatriates, electricity prices will rise by 40%, from 15 fils/kWh to 21 fils/kWh for usage of up to 20 kWh/day in apartments and 200 kWh/day in villas. The current 5 fils/kWh rate stays the same for Emirati residents who consume up to 30 kWh/day in an apartment and up to 400 kWh/d in a villa.

3.4 Policy Framework Final Scores and Ranking

The final scores and ranks for the Policy Framework category are presented in Figure 8. The Policy Framework category measures three major aspects: commitment of government authorities to pursing RE, supporting policies in place, and phase-out of fossil fuel subsidies. Jordan scores high in this category due to improvements in several areas. Jordan followed by Palestine has shown great commitment for RE by focusing on successful implementation of its supporting policies: the direct proposal submission scheme for the development of utility-scale RE projects and the net metering scheme for the development of distributed RE projects. Similarly, Djibouti and Mauritania with their high energy prices and excellent political commitment represented by high target and percentage of RE projects under construction in relation to its low base of installed capacity, as well as its flexibility to receive direct proposals, positioned them high in this category. Morocco and Egypt are also advanced in this category due to the adoption of different policy schemes and ambitious targets with several projects under installation.

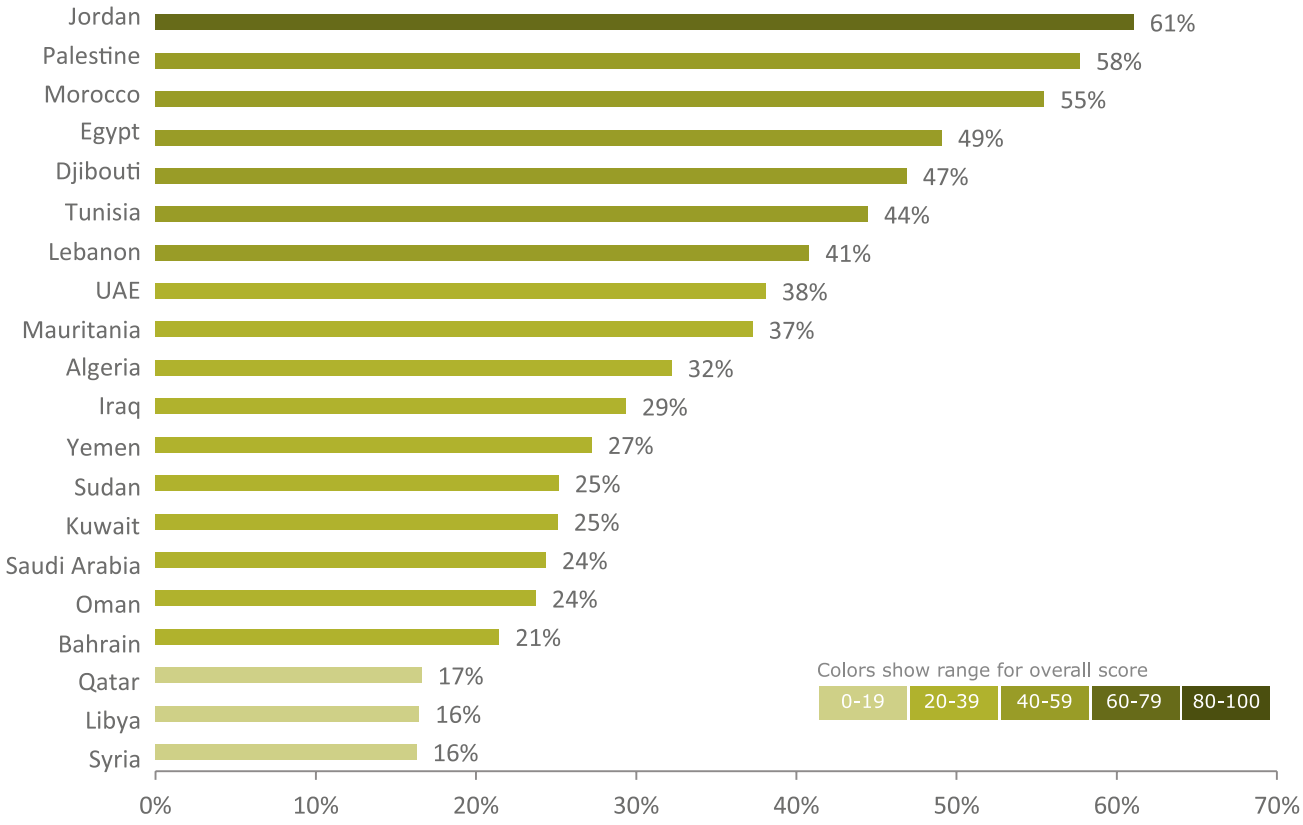


Figure 9: Policy Framework Final Scores and Ranking


Institutional Capacity
RE Institutions
Project Support
Governance Quality

4 Institutional Capacity

The Institutional Capacity category assesses each state's ability to design RE policies and to institutionally support to the deployment of RE projects. Indeed, a strong institutional capacity is critical to ensure RE targets are met. The Institutional Capacity category looks into the following three segments: (1) RE institutions; (2) project support; and (3) governance quality, explained in Table 13 along with their 8 associated indicators.

Table 14: Institutional Capacity Evaluation Factors and Indicators

Category	Factors	Indicator	Score/Measuring Unit
Institutional Capacity	RE Institutions	Independent Regulator	Established by law; under establishment; non existent
		RE Agency	Established by law; under establishment; non existent
		Capacity of RE institutions	Expert assessment from 1 to 10
	Project Support	Resource Quality Assessment	Detailed wind atlas published and available to public; detailed solar atlas published and available to public
		Land Access	Land allocated for private development of large-scale wind projects; land allocated for private development of large-scale solar projects
	Governance Quality	World Bank Ease of Doing Business Index	Rank under World Bank Ease of Doing Business Index
		Global Competitiveness Index	GCI scores
		Bertelsmann Stiftung's BTI Status Index	BTI Status Index scores

4.1 RE Institutions

4.1.1 Independent Regulator

To have a functioning, open and trustworthy power market for investors, it is a must to set independent and transparent power sector regulations. An independent regulator needs to guarantee fair competition between the various stakeholders on the market and ensure consumers protection. The regulatory agency sets tariffs, issues licenses, evaluates the power sector's performance and enforces legal provisions, which are the basis for an open market (Bjork et al, 2011). The 3rd EU Energy Market Directive offers guidelines on best practices for well-functioning, independent regulators. These guidelines specify that electricity regulators must be legally distinct and functionally independent from any private or public entity. Regulators need to have the legal power to fix and approve price tariffs and other binding regulations without interference of the government. Moreover, all regulatory activities should follow a common, clear, and transparent methodology. The mentioned provisions require a high level of in-house expertise as well as sufficient funds to hire consultants.

In the region, countries committed to unbundling their power market have established regulatory agencies, see Table 15. However, it is common for these regulators to lack resources, to be subjected to political interference and to have their regulatory decisions overruled by the government. Only one regulatory agency is considered fully independent in the entire region: the Jordanian Energy and Minerals Regulatory Commission (EMRC). It is the only agency taking decisions without state interference (Cambini & Franzi, 2013). EMRC can set tariffs and issue licenses without informing the government and receiving prior approval from either the government or the parliament. In contrast, the level of political independence of the regulatory bodies in Algeria, Egypt, Palestine, Sudan, and Saudi Arabia is considered low since those agencies mainly operate as advisory bodies to the government which is the one taking the final decision.

The regulatory body in Abu Dhabi has government representatives on its board and, for this reason, is not administratively independent. Nonetheless, it is said to have far-reaching regulatory powers in licensing and monitoring activities . In most countries, transferring the responsibility from government-controlled bodies to independent regulators has proven to be challenging. The current period is one of transition, and it appears it will take some more time until regulatory agencies are fully independent. In countries with no independent regulatory body, national utility operators or transmission systems operators usually perform associated functions. An important development occurred in Egypt, where a new electricity law has been issued in July 2015. The law separates the Egyptian Electric Utility and Consumer Protection Regulatory Agency from the Electricity Ministry, making it an independent body tasked with regulating the market. This step will help creating a more liberalized electricity market and encouraging the private sector to invest.

Table 15: Electricity Regulatory Agencies

	Electricity Regulatory Agency	Power Off-taker for Large-scale RE Projects
Algeria	Commission de Régulation de l'Electricité et du Gaz (CREG)	Société Algérienne de Gestion du Réseau de Transport de l'Electricité (GRTE)
Bahrain	Nonexistent	Electricity and Water Authority (EWA)
Djibouti	Service des Réglementations de la Direction de l'Energie	Eléctricité de Djibouti
Egypt	Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA)	Egyptian Electricity Transmission Company (EETC)
Iraq	Nonexistent	Directorate of Transmission Directorate of Transmission Project
Jordan	Energy and Minerals Regulatory Commission (EMRC)	National Electric Power Company (NEPCO)
Kuwait	Non existent	Ministry of Electricity and Water
Lebanon	Non existent	Electricité du Liban (EDL)
Libya	Renewable energy Authority of Libya (REAOL)	Renewable energy Authority of Libya (REAOL)
Mauritania	Autorité de Régulation Multisectorielle	Société Mauritanienne d'Electricité (SOMELEC)
Morocco	Under establishment	Office National d'Electricité (ONE)
Oman	Authority for Electricity Regulation	Oman Power and Water Procurement Company
Palestine	Palestinian Electricity Regulatory Council (PERC)	(OPWP)
Qatar	Nonexistent	Qatar General Water and Electricity Corporation "KAHRAMAA"
Saudi Arabia	The Electricity and Co-Generation Regulatory Authority (ECRA)	Saudi Electricity Company (SEC)
Sudan	Electricity Regulatory Authority (ERA)	Sudan Electric Transmission Company (SETCO)
Syria	Non existent	Public Establishment for Electricity Generation and Transmission (PEEGT)
Tunisia	Nonexistent	Société Tunisienne d'Electricité et du Gaz (STEG)
UAE	Abu Dhabi Regulation and Supervision Bureau (RSB)	Dubai Electricity and Water Authority (DEWA); Abu Dhabi Water and Electricity Authority (ADWEA)
Yemen	Non existent	Public Electricity Corporation (PEC)

4.1.2 RE Agency

Institutional and administrative barriers are major obstacles to RE development. This includes complicated, lengthy, and non-transparent procedures to obtain permits, involvement of too many public authorities, and lack of clarity of institutional framework. Many countries around the world have established dedicated RE agencies to overcome some of these barriers and accelerate the development of RE.

An RE agency should be a dedicated body with an ability to design RE policies, streamline administrative procedures, assist in the deployment of private RE projects, and lead the 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 and feasibility studies, and in promoting research and development. This requires sufficient resources, competent and specialized staff, and committed leadership.

Table 16: RE Institutional Stakeholders

	RE Policy Maker (Dedicated RE Department or Dedicated Agency)	Other Key RE Institutional Stakeholders
Algeria	Renewable Energy and Energy Conservation Directorate at the Ministry of Energy and Mines	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	No dedicated RE department or agency in place yet	Electricity and water Authority (EWA); Sustainable Energy Unit (SEU);
Djibouti	Direction of Energy at the Ministry of Energy in charge of Natural Resources	Agence Djiboutienne de Maîtrise de l'Energie (ADME)
Egypt	New and Renewable Energy Authority (NREA)	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) Energy and Environment Research Center under Ministry of Industry
Iraq	Renewable Energy Department at the Ministry of Energy and Mineral Resources	National Energy Research Center (NERC)
Jordan	No dedicated RE department or agency in place yet	National Energy Research Center (NERC)
Kuwait	No dedicated RE department or agency in place yet	Kuwait Institute for Scientific Research (KISR)
Lebanon	Lebanese Center for Energy Conservation (LCEC)	UNDP – CEDRO and UNIDO – DREG Projects; The Lebanese Solar Energy Society (LSES) Industrial Research Institute (IRI) National Council for Scientific Research (CNRS)
Libya	Renewable Energy Authority of Libya (REAOL)	General electricity company of Libya(GECOL) under the ministry of electricity and renewable energy Center for Solar Energy Research and Studies (CSERS)
Mauritania	Department of Electricity and Energy Management (DEME) at the Ministry of Petroleum, Energy and Mines (MPEM)	Agency for the Development of Rural Electrification (ADER); Multisectoral regulation Authority (ARM); Agency for the Promotion of Universal Access to Basic Services (APAUS);
Morocco	Direction of Electricity and Renewable Energies at the 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)	Energy Research Centre (ERC) at An-Najah National University
Qatar	Qatar General Water and Electricity Corporation "KAHRAMAA"	Qatar Science and Technology Park (QSTP) Energy and Environment Research Institute (QEERI) Qatar Solar Technologies (QST)
Saudi Arabia	King Abdallah City for Atomic and Renewable Energy (KACARE)	Saudi Aramco
Sudan	Directorate for Renewable and Alternative Energy within Ministry of Water and Electricity	National Center for Energy Research (NCR)
Syria	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	Agence Nationale pour la Maîtrise de l'Energie (ANME)	Centre de Recherche et des Technologies de l'Energie (CRTEN)
UAE	Ministry of Climate Change and Environment	MASDAR
Yemen	Renewable Energy Department within the Ministry of Electricity and Energy	Renewable Energy and electronic design Centre, University of Science and Technology Technical Centre for Training and registration – Dhahban, Public Electricity Corporation (PEC)

4.2 Project Support

4.2.1 Detailed Resource Mapping

Identifying and assessing the technically feasible, commercialized and economically competitive power generation potential of renewable resources are essential for establishing a business case. Detailed data on wind speed and solar irradiation can reduce perceived risks for developers, and potentially allow for lower costs during development. The accuracy of the data is important since the quality of renewable resources differs depending on the location, time, season and climatic zone. Hence, providing reliable, transparent, detailed, and accurate mapping of resource intensity and quality is the first indication that guides site qualification, technology selection, and optimum design of RE power plants.

Although the 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).

Table 17 indicates the status of various national detailed resource mapping initiatives. It shows that several countries in the region have issued detailed solar and wind atlases. However, the data are not often easily accessible to project developers, and 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. It is worthy to note that Egypt put together its first wind atlas in 1987 followed by several detailed site specific wind Atlases. Similarly Jordan designed a comprehensive and detailed solar atlas which is available to developers via the ministry. Lebanon's national wind atlas is also widely available in the electronic format on the websites of the UNDP CEDRO Project.

Table 17: Detailed Resource Mapping

	Wind Atlas Published	Solar Atlas Published
Algeria	Yes	Yes
Bahrain	Assessment of resources completed in 2012	Assessment of resources completed in 2012
Egypt	Yes	Yes
Iraq	Ministry of Science and Technology installed 9 towers to measure the wind potential	No
Jordan	Yes	Yes
Kuwait	Yes	Yes
Lebanon	Yes	No
Libya	Yes	Yes
Mauritania	Yes	Yes
Morocco	Yes	Yes
Oman	Yes	No
Palestine	Yes	Yes
Qatar	Mapping of resources is ongoing	Mapping of resources is ongoing
Saudi Arabia	Yes	Yes
Sudan	Wind measurements were completed in 2011, but detailed wind atlas is not published	No
Syria		Mapping of resources is ongoing
Tunisia	Yes	Yes
UAE	Yes	No
Yemen	Yes	Yes
	Yes	No

Mauritania Solar PV
source: Clement Tariff

4.2.2 Land Access

Access to land is one of the central elements in unlocking investments in RE, and should be facilitated without entailing excessive administrative burdens for developers. When allocating land for RE development, it is crucial to consider others value than the natural solar or wind conditions. Any type of spatial planning must take into account and evaluate social, economic, mining rights, military importance and environmental consequences of land use changes. Land access policies need to evaluate socio-cultural impacts, water availability, food security, trade concerns, existing infrastructure, local content, and employment possibilities as well as other sector-specific issues.

Currently, the regime for land ownership in the region is complex, particularly in the regions where tribal communities have their livelihoods. Even in cases when several socioeconomic impact studies have been undertaken and vast desert land seems uninhabited, the land has shown to be of great cultural and economic importance to local tribes and pastoralists.

An additional challenge involves identifying the current owner of property when considering an allocation of land for RE deployment. Although most countries in the region have a registry 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 nonurban areas that are most attractive for RE projects. Complex land access conditions cannot be discussed without mentioning the challenging situation in Palestine.

In many cases, when land owners are identified, negotiations can take significant amounts of time, especially considering the large areas needed for RE project development and the multiple owners of land that will be required to be consulted. Developers in Jordan specifically encountered this problem during the development of PV projects under the first round of direct proposal scheme. Often, developers had to deal with multiple landowners due to the size of the projects and different land plots that were needed. Organizing meetings with all landowners at the same time was found to be difficult. Reaching final agreement and signing a land lease contract between multiple (sometimes up to six) landowners delayed the process extensively, and meant extensions were required on final project submissions. The process of land acquisition from either private or state-owned entities should start very early and should be facilitated by a central office in the future.

The large majority of Arab states must increase their efforts in identifying appropriate land for further RE deployment. In addition, all countries have to pass clear regulations that facilitate access to public and private land while taking into account the consequences of land use change. In the region, only a few countries have undertaken initiatives to facilitate land access for private developers.

Morocco:

In Morocco, the government has identified a number of priority development zones for RE projects. Any project larger than 2 MW must be located in one of those development zones. MASEN is the agency responsible for the allocation of land for solar projects. This agency has been given far-reaching authority, including the possibility to expropriate private land for the purpose of developing solar projects. There are no restrictions for foreign investors except for the use of agricultural land, which is only possible to lease for 99 years.

Egypt:

In Egypt, the National Renewable Energy Agency (NREA) is responsible for the allocation of government-owned plots of land to developers wishing to establish solar or wind FIT projects. Wind projects can make use of the land for 20 years, and solar projects for 25. In both cases, land is leased to developers on a usufruct basis established at 2% of the energy sold. The Egyptian law does not allow for foreign investors to acquire agricultural land, and at least 51% of allocated desert land must be under local ownership With the launch of the FIT scheme in 2014, all qualified developers with no access to private land were entitled to apply to NREA for the allocation of land. The land is allocated on a first-come first-served basis based on the investors' preferences and the plots' availability. The developers are granted access to the land for a period not exceeding fifteen months to undertake the necessary technical measurements and studies, upon the signing of a memorandum of understanding for land access with NREA.

Jordan:

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 delineated specific areas for development of solar projects. In addition, project developers can freely select sites for projects under the direct proposal scheme. This, however, places a lot of responsibility on the investor to identify an appropriate site. Land access for foreign investors is subject to priority authorization. While ownership of solar generation projects for foreign project developers is unlimited, engineering and construction services are limited to 50% foreign ownership, and the retail and sale of any product is limited to 50% foreign ownership. If a foreign entity wishes to do business in Jordan, it has three main options: setting up the operating branch of a foreign company, establishing a limited liability company or a shareholder company.

UAE:

In Dubai, the authorities have identified a vast area of 48 km2 for the private development of large-scale solar projects, the Sheikh Mohammed bin Rashid Al Maktoum Solar Park. In 2013, the Emirates already commissioned the first phase of the Solar Park, a 13-MW PV power plant (Dubai Energy Report). In early 2015 UAE and the Dubai Electricity and Water Authority (DEWA) awarded PPA for the development of the second phase, a 200-MW PV power plant.

Kuwait:

Kuwait recently started the construction of the Shagaya Renewable Energy Park, a 100km2 site in the desert that will have wind, solar thermal and photovoltaic facilities, to achieve its target of 5% RE by 2020 and 15% RE by 2030. The site PV plant, which is under construction since December 2015, will have a 10MW capacity and should be connected to the grid in 2016. The construction of the PV farm belongs to the park's first phase of development, just like the 50MW solar thermal plant and 10MW wind energy that will be built next. According to the Kuwait Institute for Scientific Research (KISR) in charge the Energy Park master plan, the development of the park will occur in three phases: the first phase will be developed by the government and the second and third phases by private investors on a BOT basis for a duration of 25 years. The development of the first phase consists in building a 70-MW Renewable Energy Park (10 MW wind energy, 10 MW PV, and 50 MW CSP) to test different technologies, identify the most suitable ones for the climatic conditions of Kuwait, and build capacity of local engineers and professionals. In the second phase, the authorities plan to expand the capacity of the Renewable Energy Park to 1000 MW, and in the third phase to 2000 MW (1100MW of solar-thermal generation capacity, 750MW of solar PV and 150MW of wind power). Outside of the Shagaya site, the Ministry of Electricity and Water (MEW) in partnership with the Kuwait Authority for Partnership Projects (KAPP) are developing the 280MW Al Abdaliyah hybrid power plant project, which will combine 60MW of solar capacity and gas fired units. Seven groups of developers have been prequalified and bids were expected on October 10, 2016.

KSA:

the Saudi Electricity Company "SEC" invited expressions of interests to develop two solar photovoltaic Independent Power Plants, 50MW each to be located in Al-Jouf and Rafha north of the Kingdom of Saudi Arabia. The selection of developers will be through a competitive process. The entire energy output will be sold to SEC under a long term Power Purchase Agreement. The projects' land are procured by SEC.

4.3 Governance Quality

Aside from natural resource and technical aspects of RE, other elements can be perceived as a serious risk to investors and ultimately influence their decisions on whether or not to invest in RE projects. These fundamental factors are the overall political stability or instability caused by war or civil disturbances, the security of investment/ risk of expropriation, the regulatory environment, the competitive landscape and the currency rate fluctuations. Three renowned indexes provide analyses on these specific factors: the World Bank's Ease of Doing Business Index, BTI Status Score and the Global Competitiveness Index.

Table 18: Countries Performance under International Indices

World Bank Ease of Doing Business		BTI Status scores		Global Competitiveness Index	
UAE	31	**Tunisia**	6.15	**Qatar**	14
Bahrain	65	**UAE**	6.05	**UAE**	17
Qatar	68	**Qatar**	6.01	**Saudi Arabia**	25
Oman	70	**Kuwait**	5.85	**Kuwait**	35
Tunisia	74	**Lebanon**	5.74	**Bahrain**	39
Morocco	75	**Algeria**	5.11	**Oman**	62
Saudi Arabia	82	**Jordan**	5.09	**Jordan**	64
Kuwait	101	**Djibouti**	5	**Morocco**	72
Jordan	113	**Palestine**	5	**Algeria**	87
Lebanon	123	**Bahrain**	4.96	**Tunisia**	92
Palestine	129	**Oman**	4.75	**Lebanon**	101
Egypt	131	**Morocco**	4.6	**Egypt**	116
Sudan	159	**Egypt**	4.4	**Mauritania**	138
Iraq	161	**Mauritania**	4.35	**Yemen**	-
Algeria	163	**Saudi Arabia**	4.26	**Iraq**	-
Mauritania	168	**Iraq**	3.53	**Palestine**	-
Yemen	170	**Yemen**	2.91	**Sudan**	-
Djibouti	171	**Libya**	2.64	**Syria**	-
Syria	175	**Sudan**	2.44	**Libya**	-
Libya	188	**Syria**	1.8	**Djibouti**	-

4.3.1 Ease of Doing Business

The World Bank Ease of Doing Business Index aggregates basic data related to establishing and operating of a commercial enterprise. While this index is not specifically tailored for the region and does not have a special focus on RE, it provides a clear overview on the general conditions that prevail in a country compared to another. The Ease of Doing Business Index ranks economies from 1 to 189 by focusing on the regulatory environment and determining how conducive it is to business operations. What is particularly striking is how wide the range is between Arab countries: while some countries fare pretty well when assessed by those ranking systems, others appear at the very bottom of the list.

Among Arab States, the UAE is way ahead of the pack by ranking 31 out of 189 economies, followed by Bahrain (65), Qatar (68), Oman (70) and Tunisia (74), the only non-Gulf country to make it in the top 5. Morocco follows right after (75), ahead of Saudi Arabia (82) and Kuwait. Since AFEX 2015, Jordan experienced a slight downgrade in the ranking and is now 113 (compared to 107), along with Egypt (131) and Yemen (170). Palestine is faring much better than last year in this ranking, and climbed to 129 (compared to 143 the previous year), a positive curve also experienced by Mauritania which is now ranked 168 compared to 176. War torn Syria and Libya unsurprisingly appear at the very bottom of the list, 175 and 188 respectively-a similar ranking at last year.

4.3.2 Bertelsmann Stiftung Transformation

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 (Bertelsmann Stiftung, 2016).

The BTI scores show that the political and economic situation is precarious in some countries of the region. The overall regional average shows a slight downturn since the last edition of the AFEX, with a BTI score averaging 4.53 for the 20 countries listed, as opposed to 4.74 the previous year. Among Arab countries, Tunisia moved up four ranks since last year and is now the leader of this index, with a BTI of 6.15, a score a little under last year's top of the list Qatar. Tunisia's stabilizing political landscape and healthier economic state account for the country's good performance in this year's ranking. Tunisia is closely followed the UAE, Qatar and Kuwait, which also continue attracting investors. Egypt's ranking dropped from 9 in 2015 to 13 in this edition. Ongoing and unabated war in Syria and Libya has pushed those two countries at the bottom of the list, which a BTI of 1.8 and 2.64 respectively.

4.3.3 Global Competitiveness Index

The Global Competitiveness Index, developed by World Economic Forum, assesses the competitiveness landscape of 144 countries. This index defines competitiveness as a set of institutions, policies and factors determining a country's level of productivity. To establish this index, a large number of competitiveness factors have been inputted and analyzed. This index bases itself on 12 essential pillars, including, among others, institutions, infrastructure, macroeconomic environment, labor market efficiency, which are all given a score between 1 and 7. While the UAE was spearheading the GCI in 2015, this position is now held by Qatar, which ranking progressed from 16 in AFEX 2015 to 14 today. Qatar fares well in the ranking due to its stable macroeconomic environment driven by public budget surpluses and low government debt. However, the recent decline in oil and gas prices, which haven't been captured in the latest GCI, may undermine the country's performance in the coming years. To maintain its strong position, Qatar will have to invest in innovation, technology transfer and know-how to ensure its future economic growth (World Economic Forum, 2015). UAE drops to 17 this year as a result of the newly available indicator on tertiary education which led to a significant drop in the assessment of higher education and training. However, the UAE have an excellent macroeconomic environment, highly developed infrastructure, strong institution, and an economy that is more diversified than other GGC countries. Still in the Gulf, Kuwait and Bahrain have done better this year, by ranking 35 and 39 respectively, in comparison to Oman, which lost 16 places in the ranking and was downgraded to 62. Lebanon, which ranks 101 has experienced a positive trend, and Mauritania, while being placed at the bottom of the GCI is doing slightly better by ranking 138, compared to 141 last year.

4.4 Institutional Capacity Final Scores and Ranking

The final scores and ranks for the Institutional Capacity are presented in Figure 10. Three major aspects were measured under this category: RE institutions, project support, and general investment climate conditions in the country. Morocco leads this category followed by UAE, Jordan and Egypt. Morocco scored the highest in the RE institutions factor, particularly under the "RE Agency" indicator. UAE performs well under the factor assessing the general business conditions. It scored the highest under the "Ease of Doing Business" indicator and under the "Global Competitiveness Index." The top-ranking countries under this category are also countries that have made some efforts in improving the land access situation for the deployment of utility-scale RE projects. Overall, all countries need to improve their efforts in providing better institutional support for the deployment of private RE projects. This includes streamlining administrative procedures, improving the coordination amongst various stakeholders, and establishing institutions or entities to facilitate land access and permitting processes.

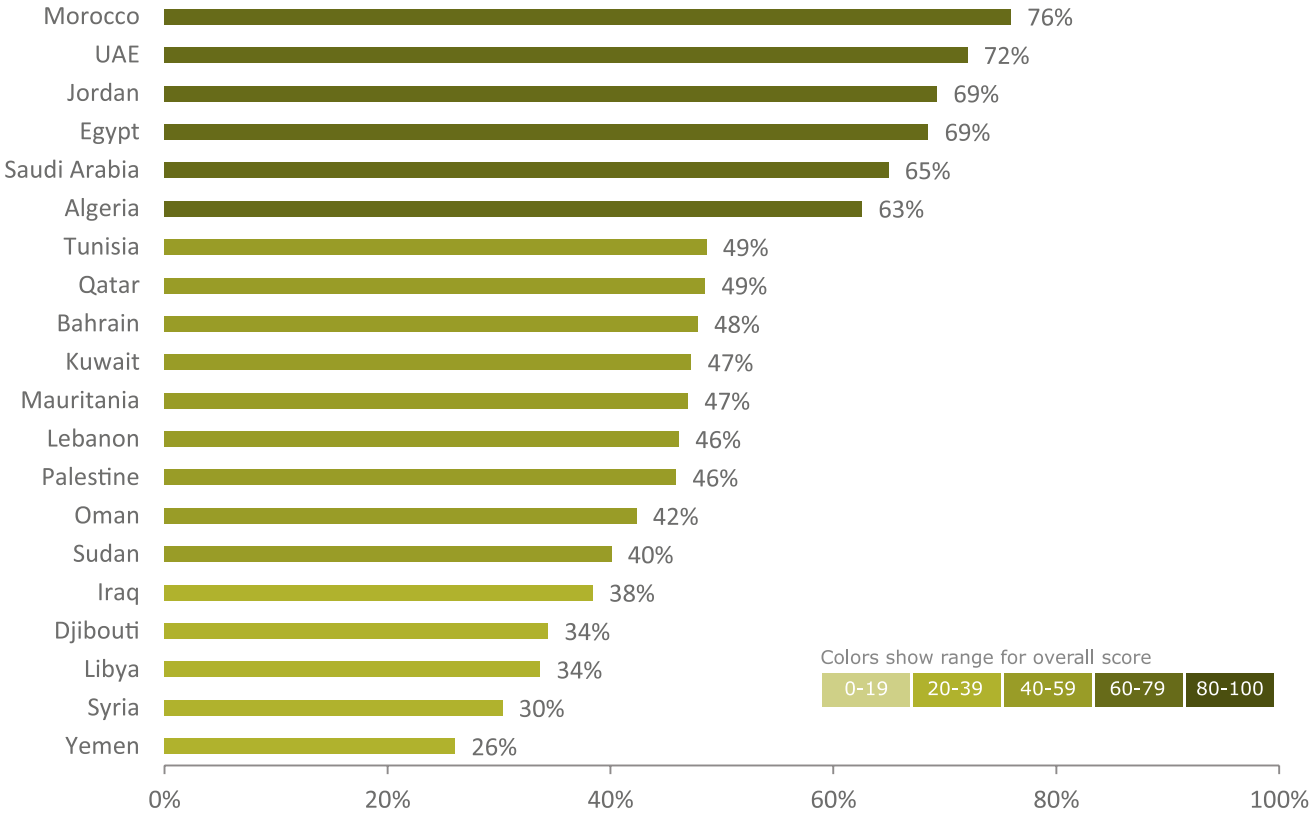
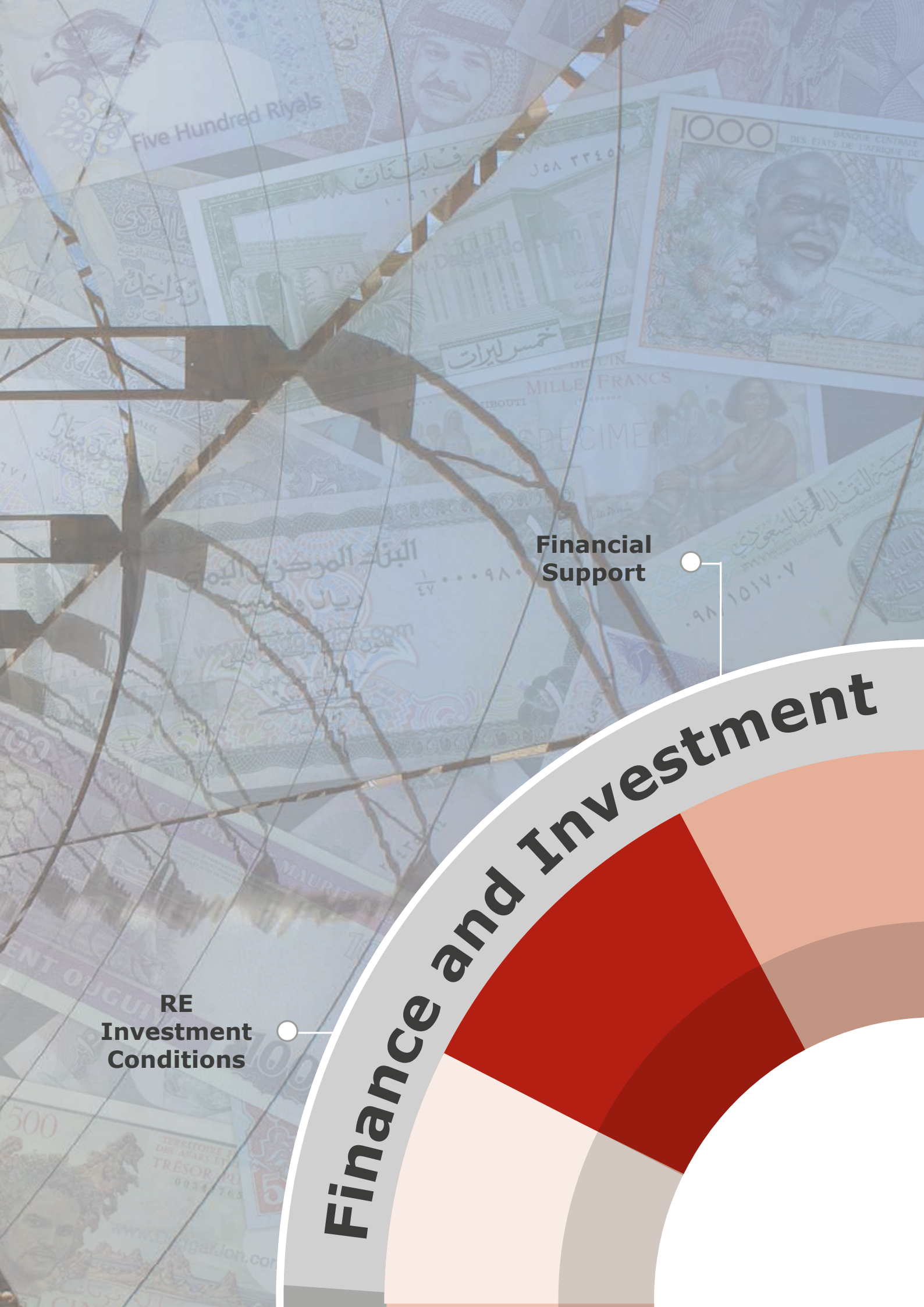


Figure 10: Institutional Capacity Final Scores


Financial Support
Finance and Investment
RE Investment Conditions

5 Finance and Investment

Just like for 2015, renewable energy analysts believe that 2016 and 2017 will exceed expectations. 2015 witnessed the blossoming of many large-scale, cost-effective renewable energy opportunities and an acute interest of policymakers and finance institutions in those developments. In addition, and for the first time in history, emerging economies surpassed the OECD countries in terms of annual investments in clean energy. If we zoom in on the Arab region, IRENA predicts annual RE investments of US$35B by 2020, on the year the Paris Agreement and its ambitious CO2 abatement efforts will kick-start. According to the NBAD Financing the Future of Energy report (2016), in order to achieve COP21 scale of ambition, private and institutional capital will be required to catalyze the clean energy sector in a way not previously seen. The enthusiasm of policymakers in the Arab region for renewable energy is on an ascending curve, especially given the ongoing price volatility of conventional energy sources. They are now attracted to long-term projections and the stability renewables can provide, and have understood the importance of diversifying their energy mix to cope with declining fossil resources and hiking energy demands. In the Arab region, energy markets and procurement structures are being liberalized at a faster pace to attract foreign investments and decouple competition. Most Arab countries are currently discussing the structure of their optimal energy mix, and are increasingly realizing the importance of making a transition towards a better energy distribution system powered by clean sources.

The Finance and Investment category assesses two major factors: (1) the level of financial support provided by the state to RE projects; and (2) RE investment growth. Factors and indicators are summarized in Table 19.

Table 19: Finance and Investment Evaluation Factors and Indicators

Category	Factors	Indicator	Score/Measuring Unit
Finance and Investment	Financial Support	Fiscal and financial Incentives	Number of fiscal and financial incentives for RE projects
		Mechanism to cover incremental costs of RE	Mechanism established by law; sources of financing are clear; disbursement procedure is clear; Operational
	RE Investment Growth	Share of Private RE Investment	Percentage of total RE installed capacity

5.1 Financial Support

5.1.1 Fiscal Incentives

Fiscal incentives, in the form of tax-related measures, include among others: tax reduction or exemptions, tax credits, tax holidays, accelerated depreciation, and import duty exemptions. These incentives are best used as complementary means to support a larger RE policy and financing portfolio. While tax reductions, exemptions and accelerated depreciation act directly on the total payable tax amount, tax credits can be used to offset income tax payments by the end of the year. The effectiveness, in terms of allowed saving, depends on the applicable tax rate - the higher the tax rate, the higher the potential savings from a tax incentive. To give an idea about the potential effectiveness of tax incentives, Table 20 provides an overview of various tax rates throughout the region.

Various taxes affect RE projects at different stages of investment. While customs duties and sales tax have the largest impact on the initial investment and construction stages, the withholding tax is applied once sponsors or lenders receive dividends or interest from their investment. Reaching the commercial operation stage, the profit of the RE investment is mainly subject to corporate tax. The latter varies substantially between countries in the region - from 0% in UAE to 30 in Tunisia. Among Arab states, a handful has introduced fiscal incentives targeting renewable energy projects. The most common tax-related initiative in the region is exemptions from customs duty, and can be found in Jordan, Egypt, Libya, Palestine, Sudan, Tunisia, and Morocco. A common feature is that procedures to qualify for an exemption are complicated. Investors in Egypt, for example, have to acquire a certificate from NREA verifying that imported equipment is to be used for RE projects. In Palestine, investors need prior authorization from the Israeli authorities, something that has shown to be complicated to obtain. Tunisia has restricted its duty exemption initiative in order to protect local manufacturers, and the country only allows duty exemptions for renewable energy components that do not have locally manufactured substitutes.

In addition to the countries offering duty exemptions, Jordan, Palestine, Tunisia, and Morocco are also offering several other tax exemptions. Jordan has established clear rules specifying that all RE and EE systems qualify for full exemption from sales tax. In Morocco, large-scale investment projects over MAD 200 million can, in addition to duty exemptions, qualify for a value-added tax exemption on all imported equipment, materials, and tools. Standard related tax rates in these two countries imply that substantial savings can be made if projects qualify for these exemptions.

Table 20: Tax Rates in the Arab Region

	Corporate Tax Rate (%)	Withholding Tax on Interest (%)	Withholding Tax on Dividends (%)
Algeria	23[1]	10	15
Bahrain	No corporate tax for most companies in Bahrain[2]	0	0
Egypt	22.5[3]	20	5-10
Iraq	15[4]	15	0
Jordan	20[5]	5	0
Kuwait	15	0	0-15
Lebanon	15	5-10	10
Libya	20	5	0
Morocco	10-31	10	15
Oman	12[6]	0	0
Palestine	15-20	0	10
Qatar	10[7]	7	0
Saudi Arabia	20	5	5
Sudan	10-20	-	-
Syria	10-28	7.5	0
Tunisia	30	20	0
UAE	0[8]	0	0
Yemen	20[9]	10	10

Sources: "Tax Guides and Country Highlights | Deloitte International Tax Source," n.d.

1 Special tax rules for hydrocarbon sector
2 46% for oil companies
3 40-55% oil and gas companies
4 35% for hydrocarbon sector*
5 24% for electricity generation
6 55% sale of petroleum
7 35% oil and gas operations
8 85% hydrocarbon
9 50-55% oil and gas companies, 20% foreign banks

While none of the countries in the region have introduced tax credits or exemptions on withholding, Sudan is the only country stipulating that all strategic projects, including electricity generation, are subject to an exemption from the corporate profit tax for a period of ten years. As opposed to Sudan, Jordan, with a standard corporate tax rate of 20%, applies a higher tax rate for electricity generation. It is, however, unclear if RE projects are also subject to this tax rate. Moreover, it should be noted that all oil- and gas-producing countries, except Sudan, apply a higher corporate tax regime for the hydrocarbon sector. The corporate tax rate for the oil and gas sector varies from 35% in Qatar and Iraq to 55% in UAE.

Among the countries offering fiscal incentives, very few have clear regulations and guidelines determining how these incentives can be obtained. All countries need to facilitate the use of these tax measures and further guarantee their existence throughout a fixed period of time.

5.1.2 RE Funds

In order to finance incentives initiated or supported by the government, many countries are establishing RE funds. A fund can be helpful in mobilizing financing from various sources, and facilitating the establishment and implementation of the various financing mechanisms such as soft loans, subsidies, grants, equity investments, and others.

Nine out of 20 countries have formally established, or are discussing the possibilities of establishing, RE funds. One of the most successful RE funds can be found in Tunisia, and has recently changed name from the National Fund for Energy Management (FNME) to the Fund for Energy Transition (FTE). This indicates a focus not only on energy efficiency measures, but also on RE measures. The fund has been particularly successful in easing the access to commercial financing for small private investors.

Lebanon's biggest accomplishment has been the leveraging of private funds for financing small-scale projects through its innovative financing mechanism "National energy efficiency and renewable energy action"NEEREA". NEEREA is initiated by the Central Bank of Lebanon (Banque du Liban-BDL) in collaboration with the European Union (EU). The loan is offered at an interest rate of 0.6% for period that should not exceed 14 years including a grace period of 6 months to 4 years. The green loans are provided through all the Lebanese commercial banks to directly reach the end user. NEEREA also includes a grant scheme based on an agreement signed between the BDL and the EU. In addition, the technical support and capacity building activities are done by the Lebanese Center for Energy Conservation (LCEC) to develop the know-how among all players.

Table 21: Public RE Funds

Algeria	RE Fund	National Fund for Renewable Energy and Cogeneration (FNER) established by executive decree No. 11-423 in December 2011
	Sources of financing	1% of oil royalties Other sources and donations
	Disbursement procedure	Financing newly introduced feed-in tariffs scheme
Bahrain	RE Fund	Not in place yet
Egypt	RE Fund	Renewable Energy Fund established by Cabinet in 2012
	Sources of financing	Not identified yet
	Disbursement procedure	Not identified yet
Iraq	RE Fund	Not in place yet
Jordan	RE Fund	Jordanian Renewable Energy and Energy Efficiency Fund (JREEEF)
	Sources of financing	Annual budget allocations
	Disbursement procedure	Foreign donations
Kuwait	RE Fund	Not identified yet
Lebanon	RE Fund	National Energy Efficiency and Renewable Energy Action (NEEREA) established by Central Bank of Lebanon in 2010
	Sources of financing	EUR 12 million from EU grant for RE projects Central Bank of Lebanon (low interest soft loans)
	Disbursement procedure	Low interest loans for RE and EE projects for a period of 14 years with grace period of 4 years and 10 years for repayment
Libya	RE Fund	Under consideration
Morocco	RE Fund 1	Energy Development Fund (EDF) with a total capital of USD 1 billion
	Sources of financing	USD 200 million from Hassan II fund USD 300 million from UAE USD 500 million from Saudi Arabia
	RE Fund 2	Renewable energy fund (FER) established by SEI
	Sources of financing	SIE forecasts to avail a contribution of 2 Billion Dirhams in equity
	Disbursement procedure	Equity investments in new and established companies focusing on wind projects
Palestine	RE Fund	Not in place yet
Saudi Arabia	RE Fund	Under consideration
Sudan*	RE Fund	Not in place yet
Syria	RE Fund	Not in place yet
Tunisia	RE Fund	National Fund for Energy Management (FNME) established by Law 2005-82 (2005) and Law 2005- 106 (2005)
	Sources of financing	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 Approximately EUR 17.5 million per year is contributed to the fund as a result of these revenue streams
UAE	RE Fund 1	Masdar Clean Tech Fund is a privately structured, government-backed entity that channel government funds and venture capital into RE projects worldwide and within the country USD 250 million venture capital vehicle
	RE Fund 2	Abu Dhabi Fund for Development also sets aside USD 350 million in soft loans for RE projects in developing countries
Yemen	RE Fund	Under consideration
Oman	RE Fund	Not in place yet
Mauritania	RE Fund	Not in place yet

5.1.3 Other Financial Support

The low access to finance has been identified as a key barrier to promote sustainable energy in the Arab region. Particularly distributed generation activities are somehow different from traditional credit registries, and in many cases there is a clear need to expand access to finance, particularly for SMEs, to enable entrepreneurial activity and spur sustainable energy growth. Strengthening the financial infrastructure through improving credit information systems and collateral regimes, as well as reforming insolvency regimes and strengthening competition among banks are all of vital importance.

Financial systems in the Arab Countries have been under different levels of maturity and reforms to foster financial stability and development. Across the Arab region, banks dominate the financial system. According to IMF (2016), less than 5 percent of the region's firms use banks to finance investment, whereas the world average is around 25%. Nevertheless, private sector has the leading share in the Arab region banks' domestic credit (save Qatar, Algeria, Yemen, and Lebanon, having a high percentage in the public sector). Private sector credit distribution also varies among the oil exporting and importing countries. For example, a high percentage of private credit is for trade, industry, and finance sectors is observed in Bahrain, Egypt, Morocco, and Tunisia. The personal consumption loans and the real estate sectors also have substantial shares. In particular, the real estate reaches around 20% of the total credit portfolio in many GCC and some other Arab countries. The Arab region's equity market values to GDP ratios are generally below 100 percent. GCC, Jordan and Morocco, have a market cap to GDP ratio of above 50 percent, while the ratios of Lebanon and Egypt are well below 50 percent.

Several Arab countries have attempted to promote sustainable energy lending with support from national and international financial institutions and donors. It was clear that such lending requires a stable banking system, which is the case for many Arab countries, nevertheless, the engagement of these banking systems in sustainable energy lending is mostly limited. In Egypt, the banking system rating has recently moved from negative to stable, reflecting that the bank's funding and liquidity positions will remain strong within improving operating conditions till the end of 2016. With around 40 commercial banks, the banking system can handle financial mechanism to support sustainable energy projects. Another example is Tunisia. The country banking system rating has also recently moved from negative to stable due to political stability. It has also reduced external funding challenges following the resumption of official financing and access to international capital markets, and finally, it has gradually reduced its fiscal and external imbalances. Morocco had a stable rating in 2015 coping with the economic slowdown. The banking sector in Morocco balances resilient profitability against modest capital ratios given substantial risk appetite and modest asset quality. The banking system comprises 19 banks, of which five are majority public-owned and seven majority foreign-owned. The sector is dominated by the five largest banks, which hold a market share of deposits and credit of about 80%. The three largest banks, Attijariwafa, Banque Marocaine du Commerce Extérieur (BMCE) and Banque Centrale Populaire (BCP), hold about two-thirds of total bank assets. As for Jordan, according to Moody's rating system, Jordanian banks benefit from gradually improving operating conditions. Jordanian rating jumped to stable as most Arab countries since 2013 after the government pursued fiscal consolidation that stabilized the high debt numbers in the medium term. The sector consists of 25 banks, 15 of which are listed on the Amman Stock Exchange (ASE) and is regulated by the Central Bank of Jordan (CBJ) As oil exporters, GCC countries always had a strong banking system with fixed exchange rate regimes, which exposes them to the vagaries of international oil prices. According to Moody's, Saudi Arabia, Kuwait, Qatar and UAE have maintained a stable rating since 2010 reflecting the expectation of sustained government spending, low problem loan levels and the banks' strong loss-absorption capacity.

Jordan, Morocco, and UAE are examples of the Arab countries that have established entities that offer equity products to new and established companies focusing on RE projects. Societe d'Invetissements Énergétiques, (SIE), in Morocco, is a government-funded organization that takes ownership stakes directly in RE project companies. Because SIE is well trusted by banks and other financing institutions, it lowers the risk profile of the projects company and enables beneficiaries to attain lower cost debt. SIE's recently established renewable energy fund (FER), dedicated to wind energy projects, which is expected to increase SIE's equity investments during the coming year. In Jordan, JEDCO Governorates Development Fund supports startup companies by allowing up to 80% of equity in their RE projects. Since JEDCO only requires 10% return on any profits, this significantly reduces the cost of equity. The Jordanian fund has not been heavily used. However, with the increasing electricity prices, JEDCO expects a higher demand for RE systems and their offered services.

Since 2004, Tunisia has initiated a funding mechanism to support the spread of solar water heaters (SWH), by providing loans to those who wish to install such equipment, which are collected later through electricity bills. The objective of the mechanism, is to spur the use of solar heaters in the residential sector by subsidizing the acquisition of the solar heater to the value of 100 Tunisian Dinars per square meter, and the rest is paid back over five years, without interest through the electricity bill. Around 30,000 square meters of solar collectors were installed, and it is expected to install approximately 100,000 square meters by the end of the 2016. It is worthy to indicate that the success of the mechanism encouraged expansion towards PV systems. In this mechanism, the national agency ANME had played different roles, first it had an advisory role for the banks then it worked simultaneously with the banks and the clients to gain interest and then it took the role of the regulatory agency to control the interest when the payback period is more than 5 years and at the end it managed the segmentation of the market and finding the first movers. Based on this remarkable role, the Tunisian banks are currently asking the new SMEs to go to the ANME to benefit from the loans, hence banks are actually educating clients and became promoters agents.

Egypt also had witnessed some initiatives such as Egypt Sustainable Energy Financing Facility (EgyptSEFF) was launched in 2015. EgyptSEFF is a credit line dedicated to

energy efficiency and renewable energy investments in Egypt. The credit line has been developed by the European Bank for Reconstruction and Development (EBRD) and is available to clients in Egypt through the National Bank of Egypt (NBE). The credit line offers an attractive financing package, consisting of commercial loans with a repayment period of up to five years, free technical assistance and investment incentive grants (depending on the loan and project conditions). Similarly, The Egyptian Environmental Compliance Office, affiliated to the Federation of Egyptian Industries (ECO) is also sponsoring a green fund offering 2.5% interest/administration fee, aiming at financing renewable energy projects and new industrial equipment. This ECO fund can finance up to EGP 3 million per customer over 5 years with a total capital of EGP 50 million. These type of loans can be obtained through the National Bank of Egypt or other participating banks. Additional support is provided through the Ministry of Environment (Environment Development Fund) where EGP 80,000 can be paid upfront for an environmental audit resulting in an effective rate of about 5.3%. The fund might be renewed at 3%. Early 2016, a planned GEF fund for Solar Heating in industrial Processes has been announced in Egypt. The planned fund is structured of U$ 2 million from GEF at zero interest and U$ 2 million from the National Bank of Egypt (NBE) at commercial rate (14-15%) resulting in an effective rate of about 6.5%. The loan needs to be paid up to 5 years with one year grace period. The loans range from EGP 30,000 to 4,000,000 based on calculations using the solar system to replace gas, diesel or electricity. In a very positive step, the National Bank of Egypt discusses to leverage the below new soft loans for the fund, once recalculated, this will bring the overall interest to 3.5 and 5%.

Palestine in 2012 have initiated the revolving Fund which is considered as one of the newly established funds in the region. The current mandate of the Revolving Fund covers investment in sustainable energy projects within the public sector only. Start-up capital for the first 2 phases has been provided by the French Development Agency (AFD): USD 250,000 for the first phase and USD 1.5 million for the second phase, which started in June 2014. The ceiling coverage of interest is up to 5% and up to 5 years loans. The Revolving Fund operates as a public investment vehicle, where money saved from sustainable energy projects reverts back to the fund. EE projects implemented through the Revolving Fund include installing solar water heaters in three hospitals in Ramallah, Hebron and Nablus with a total investment amount of USD 55,000, and implementing EE measures in various public buildings. The OPEC Fund for International Development's $500,000 grant approved in October 2015, will enable 427 Palestinian families from the West Bank and the Gaza strip to have access to energy through a combination of technological solutions that include PV solar panels, biogas generation, solar cookers and the establishment of a local value chain for producing those technologies.

In Jordan, there are two initiatives providing capital subsidies. The Jordan Chamber of Industry Factories Support Program offers a non-refundable capital subsidy for small industrial enterprises to install either solar PV or solar water heaters. The objective is to install small projects in order to familiarize industry with the technology. The subsidy covers up to 35% of the product costs, if imported, and up to 50% if the product is Jordanian made. The Higher Council for Science and Technology Industrial Research and Development Fund (IRDF) provides industrial organizations with grants of up to EUR 32,792 for implementing a solar PV project in partnership with an academic institution. Out of the two initiatives, the Jordan Chamber of Industry Factories Support Program has been the most successful one in attracting beneficiaries.

In UAE, Masdar Capital provides private equity transactions to promising and pioneering companies in clean tech and renewable energy. The main difference from the equity investment entities established in Jordan and Morocco is that Masdar has a global coverage, and is focusing on company investments predominantly in Europe and North America.

In Mauritania, the solar platforms project, implemented by the French NGO GRET in conjunction with APAUS, cost USD 4.8 million. ACP-EU Energy Facility funded USD 3.4 million and the remaining USD 1.37 million were funded by the Mauritanian government. It aims to install 100 multifunctional solar platforms in Brakna, Gorgol, Assaba and Hodh El Gharbi, with the goals of contributing to economic development and employment, improving socio-economic conditions and integrating the rural population into the national community.

In Qatar, early 2016, Qatar Petroleum and Qatar Electricity and Water Company (QEWC) formed joint venture (JV) to explore solar opportunities to develop 1 GW of solar PV. A start-up capital fund is to be created to pursue the solar venture, with QEWC controlling 60% of the fund, and Qatar Petroleum to operate a 40% stake. The JV will invite international companies to back 40% of each solar project via a competitive tender process. The setting up of the JV should be completed by the end of 2016 or in early 2017. Earlier, in 2014, a 300 MW module production facility was inaugurated in Doha by Qatar Solar Energy (QSE).

EBRD'S SUSTAINABLE ENERGY FINANCE FACILITIES IN THE ARAB REGION

The European Bank for Reconstruction and Development (EBRD), together with its partners, is launching a US$ 250 million financing framework for private sector renewable energy generation in Morocco, Egypt, Tunisia and Jordan – representing a region where energy remains overwhelmingly supplied through imports of hydrocarbons.

Announced ahead of the high-level business forum in Morocco organized by the EBRD, the framework is considering up to US$ 250 million in debt and equity funding for private companies in the Southern and Eastern Mediterranean (SEMED) region to build new renewable energy generation capacity. Most of the produced energy will be sold directly to private sector consumers such as cement companies and hotel groups.

5.2 RE Investment Growth

5.2.1 Share of RE Private Investment

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.

In the Arab region, it is government agencies and publicly owned or controlled electricity generation companies that have taken the lead in RE investment or RE output procurement, often with the support of development banks. Since the first edition of AFEX in 2013, the situation with regards to private investments has improved, but overall still remains poor.

In 2016, the countries that made advancements in attracting private investment for large-scale RE projects are Morocco, Jordan and UAE. Jordan and Tunisia made advancement in creating better investment conditions for small-scale RE projects. The following tables provide details of large-scale private RE projects in the region that have been awarded power purchase agreements or different phases of development.

Table 22: Status of Large-scale Private RE Projects, Egypt (March, 2016)

	Technology	Project	Capacity (MW)	Status	Lead Developer	Approximate Total Investment Costs
Egypt	Wind	Gulf of Suez Feed In Tariff	700	Developers qualified	Multiple	USD 4050 million
	PV	Benban Feed In Tariff	2000	Developers qualified		
	Wind	Gulf of Suez	250	PPA under negotiation	Toyota	USD 1500 million
	Wind	BOO	250	Under development	-	
	PV	West Nile BOO	200	Under development	-	
	PV	Kom Ombo BOO	200	Under development	-	
	CSP	West Nile –BOO	50-100	Under development	-	
TOTAL			**3650**			**USD 5.550 Billion**

Egypt managed to efficiently attract the private sector in renewable energy projects through both feed-in tariff and completive bidding schemes. According to the International Finance Corporation, an arm of the World Bank, Egypt's renewable energy projects could require $8 billion in capital investment over the next four years, representing a significant opportunity for investors and lenders. By the end of the 2015, the total pool private RE projects amounted to 3650MW, of which around 1200MW were wind projects and another 2400MW of PV and from 50-100MW of CSP projects. Yet, many projects have stalled as developers who prequalified for solar and wind projects under the attractive feed-in-tariff faced some delays and currency risks while discussing with the government over contract terms such as arbitration to overcome complications in securing financing. Many developers are now looking to phase two of the FiT where, because of the lessons learnt, a faster round is expected. On a parallel track, Egypt has also commissioned megaprojects through direct proposal submission from firms like Siemens.

Table 23: Status of Large-scale Private RE Projects, Jordan (Mid, 2016)

	Technology	Project	Capacity (MW)	Status	Developer	Approximate Total Investment Costs
Jordan	Wind	Tafila	117	In operation since 2014	Jordan Wind Project Company	USD 292 million
	Wind	Maan	80	PPA signed, under construction	Spanish Engineering Firm	USD 112 million
	PV	Ma'an Development Area	52.5	PPA signed, under construction	Kawar Investment Company	USD 165 million
	PV		20.5	PPA signed, under construction	SunEdison Italia Construction	USD 56 million
	PV		10	PPA signed, under construction	Ennera Energy and Mobility	USD 25 million
	PV		10	PPA signed, under construction	Martifier Solar Investment	USD 25 million
	PV		10	PPA signed, under construction	Bright Group Investments	USD 31 million
	PV		10	PPA signed, under construction	Clean Energy Concepts	USD 24 million
	PV		21	PPA signed, under construction	Catalyst Private Equity	USD 45 million
	PV		20	PPA signed, under construction	European Jordanian Renewable Energy (EJRE)	USD 47 million
	PV		10	PPA signed, under construction	Greenland Alternative Energy	USD 27 million
	PV	Hosha/ Mafraq	20	PPA signed, under construction	Evolution Solar Inc	USD 73.5 million
	PV	Mafraq	10	In operation since 2015	Philadelphia Solar	USD 23 million
	PV	Aqaba	10	PPA signed, under construction	Shamsuna Power Company	USD 20 million
	PV	South Maan	10	PPA signed, under construction	Scatec Solar	USD 28 million
TOTAL			**411**			**USD 993.5 Million**

Jordan is one of the few countries in the region that saw large increase of private investments in RE, both of large-scale projects and small-scale as a result of its policy framework. The pool of investors is quite diversified and includes both local and foreign investors. Over 400MW of large scale wind and PV projects are in different phases of development, amounting to around a billion USD investements. On average the size of PV projects is rather medium, mostly under 50 MW and a large portion of these projects is concentrated in the southern part of the country in Ma'an Development Area. In the second round of direct proposal submission process the preference is be given to RE projects in the northern and eastern parts of the country.

Morocco made advancements in attracting private investment in RE projects mostly due to its IPP public competitive process. By the early 2015, the total pool of private RE projects amounted to 2267 MW, of which around 1757 MW were wind projects in operation and another 510 MW of CSP projects that have been awarded PPAs. Unlike Jordan's investors' market, Morocco's pool of developers is dominated by few big players. Many wind projects so far have been developed by NAREVA Holding Company, an energy subsidiary of the Moroccan National Investment Company. The latest wind power bid including five projects and totaling 850MW, has been awarded to a consortium of Enel Green Power (EGP), Nareva and Siemens. All CSP projects have been awarded to a consortium led by ACWA Power. It is important to note that MASEN has 25% stake in all CSP projects. The total investment cost of the large-scale projects is estimated at USD 5.707 billion.

Table 24: Status of Large-scale Private RE Projects, Morocco (Mid, 2016)

	Technology	Project	Capacity (MW)	Status	Developer	Approximate Total Investment Costs
Morocco	Wind	Tétouan (Lafarge Cement Plant)	32	In operation since 2006, 2011	Lafarge	USD 50 million
	Wind	Ciments du Maroc	5	In operation since 2000	Ciments du Maroc	USD 10 million
	Wind	Tarfaya	300	In operation since 2014	NAREVA Holding and ONEE	USD 610 million
	Wind	Akhfenir	100	In operation since 2014	NAREVA Holding	USD 415 million
	Wind	Haouma in the Tangier region	50	In operation since 2014	NAREVA Holding	
	Wind	Foum El Oued in Laayoune	50	In operation since 2014	NAREVA Holding	
	Wind	Akhfenir II	100	PPA signed	NAREVA Holding	USD 180 million
	Wind	Jbel Sendouq Khalladi	120	PPA signed, under construction	UPC Renewables	USD 180 million
	Wind	Taza	150	PPA signed	EDF EN Maroc and Mitsui	USD 200 million
	Wind	Midelt	150	PPA signed	NAREVA Holding, Enel Green Power SpA and Siemens	USD 1.1 billion
	Wind	Jbel Lahdid	200			
	Wind	Tiskrad	300			
	Wind	Boujdour	100			
	Wind	Tangier II	100			
	CSP	Noor I	160	In operation since 2016	ACWA Power	USD 1 billion
	CSP	Noor II	200	PPA signed, under construction	ACWA Power	USD 1.1 billion
	CSP	Noor III	150	PPA signed, under construction	ACWA Power	USD 862 million
TOTAL			**2267**			**USD 5.707 Billion**

Similar to Morocco, UAE attracted private investments mostly in large-scale RE projects through IPP public competitive scheme. UAE's total pool of private RE projects is 1100 MW, of which 100 MW of CSP is already in operation and 200 MW of PV have been awarded a PPA. A Masdar-led consortium won the contract for the 800 MW third phase for the Mohammed bin Rashid Al Maktoum solar park. The electricity cost for the third phase at a record breaking bid of USD cents 2.99 per kWh. This is follows the second phase, which totaled 200MW - and similarly witnessed a at that time world record broken at USD cents 5.84 per kWh from the Saudi Arabia's Acwa Power led consortium.

Table 25: Status of Large-scale Private RE Projects, UAE (Mid, 2016)

	Technology	Project	Capacity (MW)	Status	Developer	Approximate Total Investment Costs
UAE	CSP	Shams 1	100	In operation since 2013	Masdar, Total and Abengoa	USD 600 million
	PV	Mohammad Bin Rashid Al Maktoum Solar Park Phase 2	200	PPA signed	ACWA Power	USD 250 million
	PV	Mohammed bin Rashid Al Maktoum Solar Park Phase 3	800	Awarded	Masdar, Fotowatio Renewable Ventures (FRV) - an Abdul Latif Jameel company, and Gransolar Group	USD 900 million
TOTAL			**300**			**USD 850 million**

5.2.2 Increase of RE Private Investment

Since the previous edition of the AFEX report Arab countries made considerable progress in attracting private investment in RE projects. In 2014, only Morocco had private RE projects in operation, while by the end of 2015 this number increased to five countries, Egypt, Jordan, Morocco, UAE and Tunisia. The increases in share of private investment include large-scale RE projects that have been awarded PPAs and for small-scale projects that have been installed through net metering schemes (Tunisia, Jordan and Palestine). Although there is no formal process for private RE projects in Lebanon, there are de facto small scale RE projects in Lebanon operating under net metering scheme.

Table 26: RE Private Investment Increase (Mid, 2016)

	Total in 2013 (% of installed capacity)	Total in 2016 (% of total installed capacity)*	Investment Increase
Algeria	0.0%	2.3%	2.3%
Bahrain	0.0%	0.0%	0.0%
Djibouti	0.0%	17.0%	17%
Egypt	0.0%	1.0%	1.0%
Iraq	0.0%	0.0%	0.0%
Jordan	0.0%	10.5%	10.5%
Kuwait	0.0%	0.0%	0.0%
Lebanon	0.0%	0.7%	0.7%
Libya	0.0%	0.0%	0.0%
Mauritania	0.0%	0.0%	0.0%
Morocco	1.3%	18.9%	17.6%
Oman	0.0%	0.0%	0.0%
Palestine	0.0%	3.5%	3.5%
Qatar	0.0%	0.0%	0.0%
Saudi Arabia	0.0%	0.2%	0.2%
Sudan	0.0%	0.0%	0.0%
Syria	0.0%	0.0%	0.0%
Tunisia	0.0%	0.4%	0.4%
UAE	0.0%	4.1%	4.1%
Yemen	0.0%	2.0%	2.0%

* Includes large-scale RE projects that have been awarded PPAs and for small-scale projects that have been installed through net metering schemes

5.3 Finance and Investment Final Scores and Ranking

The final scores and ranks for the Finance and Investment category are presented in Figure 11. This category measures the level of financial support provided to RE projects, including support through fiscal policies and RE investment growth. Although several countries made improvements in this category, the overall performance of the region still remains poor. Only a few countries were able to attract investments in RE projects. The leading country in this category is Morocco, followed by Jordan, Egypt, Algeria and UAE. These are the main countries that were able to attract private investments in utility-scale RE projects.

Although Arab countries can pursue success in achieving 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 in the future.

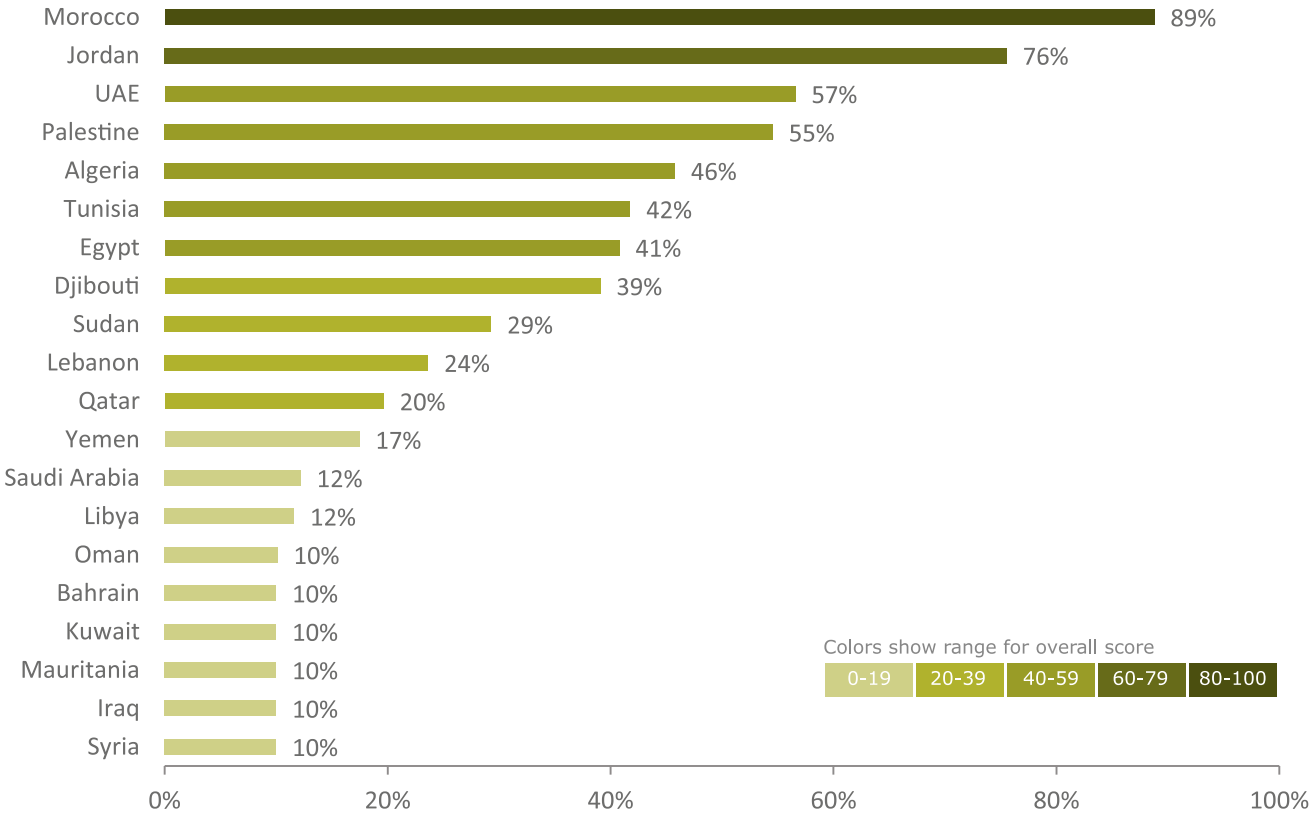


Figure 11: Finance and Investment Final Scores and Ranking

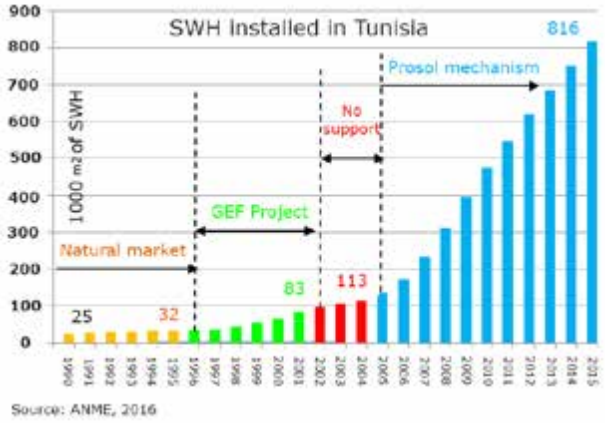
SPECIAL FOCUS SECTION

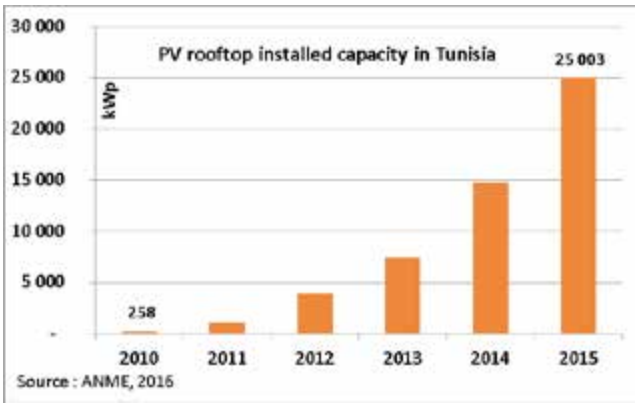
SOCIO-ECONOMIC IMPACT OF RE IN THE ARAB REGION: JOB CREATION TUNISIA CASE STUDY

From the initial project development phase, to the manufacturing of components, the licensing process, the infrastructure readiness, and the installation, renewable energy projects engage a vast array of economic activities and spur job creation, either direct or associated characterized by their sustainability. The following sections summarizes a study focusing on the Tunisian experience, developed on behalf of the Project RE-ACTIVATE ("Promoting Employment through Renewable Energy and Energy Efficiency in the Middle East and North Africa") which the German Society for International Cooperation (GIZ) is implementing for the German Ministry of Economic Cooperation and Development (BMZ).

Background on the situation of renewable energy in Tunisia

The use of renewable energy (RE) in Tunisia is still low with a share in the total primary energy mix of less than 2%. During the last decade, the main developments were in solar water heater (SWH) and photovoltaic (PV) rooftop markets thanks to the two public support programs of Prosol SWH and Prosol Elec.





The Prosol mechanism, aiming at boosting the SWH market, started in 2005. It is based on a combination of incentives, which create a win-win situation for market stakeholders. It includes mainly the following:

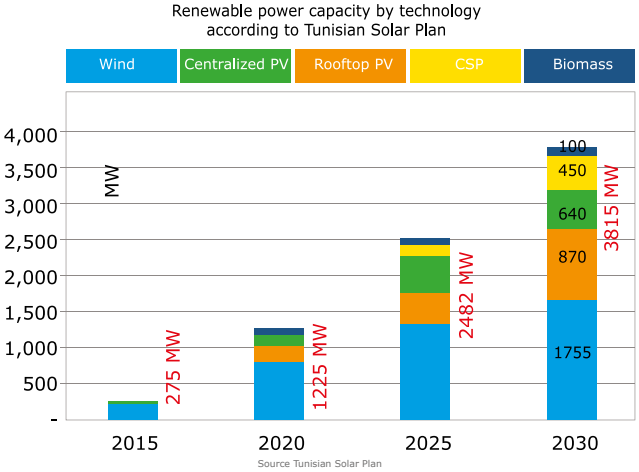
- Low-interest bank loans for domestic customers, paid back through the electricity bill. The loans come from private banks, but STEG, the state utility for electricity and gas directs them to end users.
- Capital cost subsidies provided by the Tunisian Energy Transition Fund, of up to 100 Dinars per square m2 distributed to the suppliers by the Tunisian Agency for Energy Conservation (ANME).
- Tax incentives consisting of VAT and customs duty exemptions.

Beside the financial component, a set of accompanying measures have been developed, including awareness raising campaigns, capacity building measures, as well as public certification of suppliers, installers and products.

Prosol has allowed a real market transformation in Tunisia, by multiplying the annual installed capacity by 10, from 7,500 m² per year in 2004 to currently around 70,000 m² per year. The total installed capacity has reached 816,000 m² by the end of 2015 compared to less than 120,000 m² in 2004. Based on this experience, the government launched in 2010 a similar financing mechanism to develop the PV rooftop market, based on a partial capital cost subsidy, a bank loan repayable over 7 years via the electricity bill and a state-sponsored quality management system for the program. Up to 2015, around 10,000 households have installed rooftop PV systems reaching a total cumulated installed capacity of about 25 MW.

As for wind power, the Tunisian experience started in 2000 with the launch of a first pilot project of 20 MW. Currently, the total installed capacity is 245 MW and is exclusively owned and operated by STEG. In stark contrast to other countries of the region, till 2015 Tunisia refrained from using large-scale solar plants, even though a tender for a 10 MW PV plant in the south is in the pipeline. Likewise, biomass still plays no role for power or heat production, and hydropower capacities are equally very small.

In the Intended Nationally Determined Contribution (INDC) submitted to the United Nation Framework Convention on Climate Change (UNFCCC) before the CoP21, Tunisia has committed itself to the ambitious target of reducing its carbon intensity by 41% in 2030 compared to 2010. Around 13% of the target will be reached on an unconditional basis whereas the remaining 28% requires international support to be reached. Energy efficiency and renewable energy represent the major part of the expected reduction, accounting for almost 75% of the total mitigation objective. To reach this objective and to meet the economic and strategic challenges related to its increasing energy deficit, Tunisia has decided to engage in an energy transition process based on a combined and large-scale development of both EE and RE measures.



For renewable energy, the target adopted by Tunisia is to increase the share of renewable energy in electricity generation from currently 5% to 30% by 2030. The Tunisian Solar Plan is the implementing mechanism to reach this objective and aims at reaching a total installed capacity of about 3800 MW by 2030, 1750 MW of which come from wind and 1500 MW come from PV (both rooftop and centralized power plants). In addition to power generation, the Tunisian Solar Plan expects to reach an installed SWH capacity of about 2.850 million m² by 2030. Thus, the SWH market penetration would evolve from 66 m²/1000 inhabitants in 2015 to 200 m²/1000 inhabitants in 2030, one of the highest figures in the entire region.

Current Employment in RE sector

Based on a survey carried out in 2016 by Alcor and GWS on behalf of GIZ, the number of direct jobs created in Tunisia through RE until 2015 is estimated to be more than 3,000. Jobs created in the planning phase are accounted for as direct if the activities are carried out by companies exclusively working on RE. In the case of PV, the installers themselves mostly also plan. Currently, Tunisia is manufacturing or assembling a substantial share of its SWH (90%) and PV hardware itself (30%). Compared to the middle of the last decade, direct employment from renewables has increased by a factor of 5.

Jobs in	Testing	Development	Production	Supply and installation	Operation and maintenance	Total Jobs 2010 - 2015
Renewable Energy	15	12	311	1552	316	2206
PROSOL Residential	15	-	282	1013	192	1502
PROSOL Tertiary	-	4	0	16	6	26
PROSOL Elec	-	-	29	501	6	536
Wind	-	8	0	22	18	48
Horizontal activities						979
Promotion			200			200
Vocational and education			200			200
R&D			25			25
Energy managers in companies			500			500
Consulting			50			50
Total						3185

Paralleling international experience, most RE jobs in Tunisia result from the installation of small-scale home applications. Actually, looking at direct jobs alone, 2-3 times as many jobs are created through the installation of PV modules than through the production thereof. Importantly, the regional distribution of small-scale applications has an important impact on local labor markets, which become more diverse compared to large installations. The development of SHW and PV rooftop markets has helped to increase the local integration in these industries, with 7 SWH manufacturers and 4 PV panel assembling companies currently operating in Tunisia. Increasingly, there will be indirect jobs from the higher local (and possibly also regional) integration of RE hardware production. These projections are included in the following simulations.

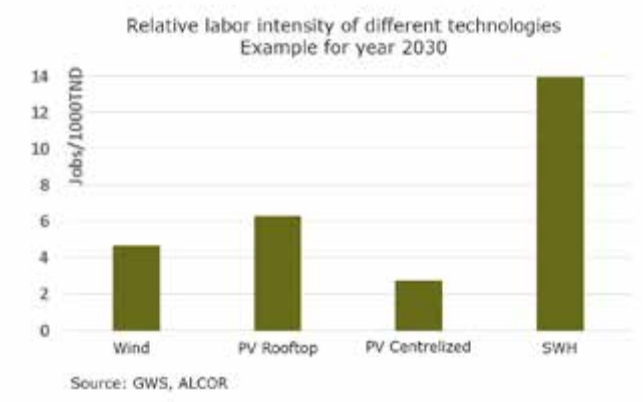
Job creation from renewable energy and energy efficiency in the future

The current situation in Tunisia in terms of jobs, energy generation and energy efficiency calls for an improvement of all three. The Tunisian Solar Plan shows a path towards a greener future with additional decent jobs resulting from it. To measure the economic impacts of consistently following this path, a small economic model has been developed which allows for the calculation of both direct and indirect employment effects of additional investment in RE and EE in Tunisia. The model is based on the Tunisian Input-Output-Tables (IOT), provided by the Tunisian Statistical Bureau. The IOT are matrices, which connect the activity of any economic sector with the activities of all other sectors. For instance, investment in wind farms leads to more jobs in the construction sector, in machinery production, in planning services etc.

This additional activity in several economic sectors need more inputs in terms of material, such as, concrete, scaffolding, steel etc. provided by the respective economic sectors. Employment coming from the provision of these inputs is called indirect employment. The larger the domestic part of production and the larger the degree of integration in the respective economy, the larger the impacts on indirect employment and on the job market as a whole. The model is driven by a GDP and population growth forecast and yields a baseline projection until 2030. The Tunisian Solar Plan then is translated into a scenario with investment in wind energy, solar PV (roof top and centralized), biogas, and solar water heaters as renewable energy carriers and investment in buildings and industry as energy efficiency measures. A comparison of the simulation results under either scenario for GDP, total employment and employment by sector yields the net economic effects of the Tunisian Solar Plan. Since this contribution focuses on RE, the following will show results for an RE simulation only.

The main results

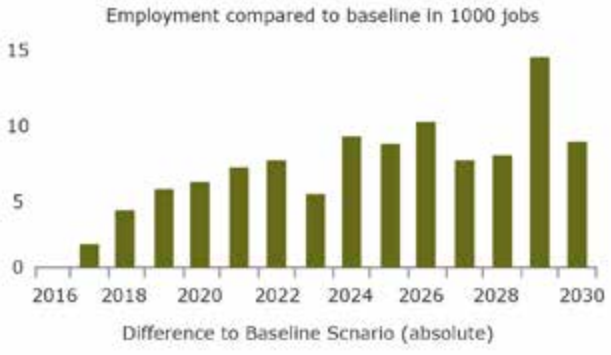
The first driver of the results from the scenario is the investment RE technologies which leads to the increase in domestic production (if any), in the production of inputs, in installation (in the model mainly visible in the construction sector) and in O&M. The second driver is the export of RE systems coming from the Tunisian manufactures. The model does not include induced effects from money saved on energy and spent on other purposes.



PV is modeled explicitly for rooftop and centralized large installations for the future, although the latter up to now does not exist in Tunisia. Overall, the effects on the Tunisian economy are positive. GDP growth is up to 0.7% higher than in the business-as-usual scenario and about 16,000 (full time equivalents) additional jobs are created add up to.

The different RE technologies compared with respect to their labor intensity in Tunisia show that the SWH industry is the most labor-intensive by creating around 14 jobs/1000 TND. The lowest labor-intensity is related to centralized PV systems with less than 3 jobs/1000 TND. Labor intensity is always expressed in terms of direct jobs.

The future import quota is still assumed to be high for most RE technologies except for SWH. However, the production of PV cells and modules globally does not yield large additional employment, since it is largely automated. Moreover, the domestically produced modules or cells would not be competitive in terms of prices due to economies of scale. Production on a larger scale leads to lower prices of the respective products. In the case of wind energy, regional production of components, which are either difficult to transport, such as towers, or labor intensive, such as blades can act cost saving.



Learned lessons

Contrary to other countries in the region, Tunisia, till now, has chosen to focus on developing small-scale RE projects such as SWH and rooftops PV. In addition to their energy impacts, these projects have higher local content employment. They generate proximity jobs (installation, maintenance) whose social value is greater than centralized ones created by large projects.

In addition to SHW and rooftops PV demand development through incentives and innovative financing mechanisms, Tunisia has also made a major effort to support supply side. This was through setting up large training programs for installers and facilitating procedures for local manufacturers (land acquisition, obtaining necessary authorization, financing, international certification of their products, etc.).

List of Figures

List of Abbreviations

ADEREE	Agency for the Development of Renewable Energy and Energy Efficiency
ADWEA	Abu Dhabi Water and Electricity Company
AFD	French Development Agency
ANME	Tunisian Agency for Energy Conservation
ARP	Representatives of the People
AUE	Arab Union of Electricity
AREF	Arab Renewable Energy Framework
ASE	Amman Stock Exchange
BECO	Benadir Electric Company
BUTs	British Thermal Units
BOT	build-operate-transfer
BECO	Benadir Electric Company
BTI	Bertelsmann Transformation Index
CBJ	Central Bank of Jordan
CDER	Algerian Center for Development of Renewable Energy
CNI	National Investment Council
CSP	concentrated solar power
DEWA	Dubai Electricity and Water Authority
DANIDA	Danish International Development Agency
D2S	Diesel to Solar Transformation
DLR	German Aerospace Center
DNI	direct normal irradiation
EDL	Electricité du Liban
EETC	Egyptian Electricity Transmission Company
EgyptERA	Egyptian Electric Utility and Consumer Protection Agency
EMRC	Energy and Minerals Regulatory Commission
EPC	engineering, procurement and construction
ESMAP	Energy Sector Management Assistance Program
EU	European Union
EUR	Eurozone Euro
EBRD	European Bank for Reconstruction and Development
EOR	Enhanced Oil Recovery
EWA	Electricity and Water Authority
FDI	foreign direct investment
FAUS	Fund for Universal Access to Services
FNME	National Fund for Energy Management
FTE	Fund for Energy Transition
FIT	Feed-In Tariff
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GECOL	General Electricity Company of Libya
GHI	Global Horizontal Irradiation
GRTE	Société Algérienne de Gestion du Réseau de Transport de l'Electricité
GW	Gigawatt
GIZ	German Development Cooperation
GCC	Gulf Cooperation Council
GWh	Gigawatt hour
IEA	International Energy Agency
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
ILS	Israeli New Shekel
IMF	International Monetary Fund
IPP	independent power producer
IRENA	International Renewable Energy Agency
ISCC	integrated solar combined cycle
KISR	Kuwait Institute for Scientific Research
Km	Kilometer
kW	Kilowatt
kWh	Kilowatt hour
kWp	Kilowatt peak
LCOE	Levelised Cost of Electricity
LAS	League of Arab States
LCEC	Lebanese Center for Energy Conservation
m	Meter
MAD	Moroccan Dirham
MASEN	Moroccan Agency for Solar Energy
MEMR	Ministry of Energy and Mineral Resources
MW	Megawatt
MWh	Megawatt hour
NEPCO	National Power Electric Company
NERC	National Energy Research Center
NREA	New and Renewable Energy Authority
NBE	National Bank of Egypt
NREAP	National Renewable Energy Action Plan
NEPCO	National Power Electric Company
NEEREA	National Energy Efficiency and Renewable Energy Action
OECD	Organization for Economic Co-operation and Development
ONE	Office National d'Electricité
PEC	Public Electricity Cooperation
PEEGT	Public Establishment for Electricity Generation and Transmission
PETL	Palestinian Electricity Transmission Company Ltd
PDO	Petroleum Development Oman
PPA	power purchase agreement

PV	Photovoltaic
QEWC	Qatar Electricity and Water Company
RCREEE	Regional Center for Renewable Energy and Energy Efficiency
RE	Renewable Energy
RFC	Request for Proposal
SEC	Saudi Electricity Company
SETCO	Sudan Electric Transmission Company
SIE	Société d'Investissements Energetiques
SNI	Moroccan National Investment Company
STEG	Société Tunisienne d'Electricité et du Gaz
SWH	Solar Water Heater
SDGs	Sustainable Development Goals
SEC	Saudi Electricity Company
TND	Tunisian Dinar
SDGs	Sustainable Development Goals
SEC	Saudi Electricity Company
TND	Tunisian Dinar
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environmental Program
UNFCCC	United Nation Framework Convention on Climate Change
UNDP	United Nations Development Programme
USD	United States Dollar
WB	World Bank

List of Tables

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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.

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 20-country group for the indicator;

max is the maximum value observed in the 20-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.