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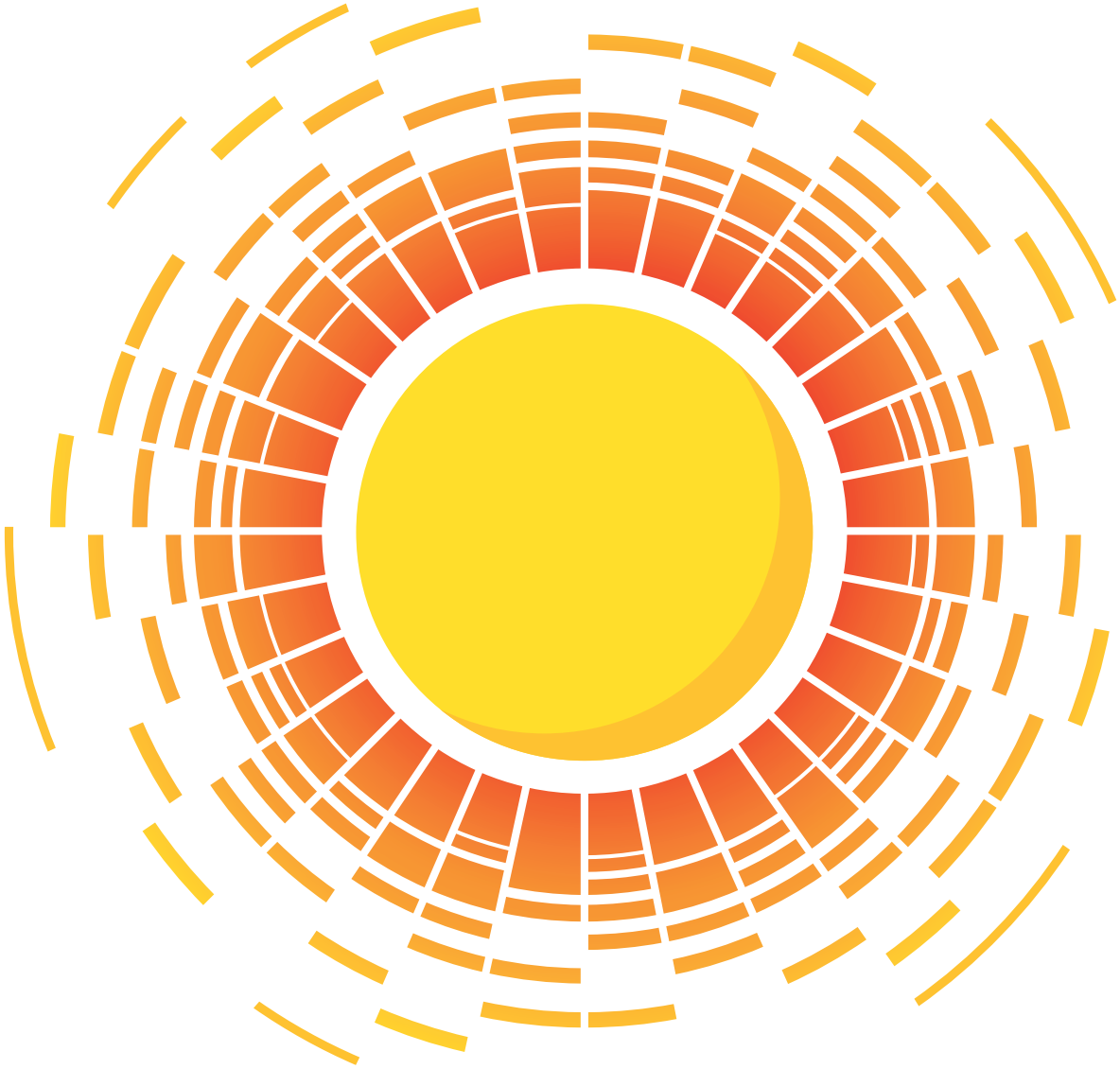
الأكاديمية العالمية للبحوث الشرعية في المالية الإسلامية



Sustainable finance

Can Sukuk become a driver of solar and green energy growth?

Deloitte Islamic finance Insights Series
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Contents

Foreword from Deloitte

Dr. Hatim El Tahir, FCISI
Director, Islamic finance Group Leader, Deloitte ME IFKC
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This is the second Deloitte renewable energy report that examines the industry investment trends, regulatory policy, industry stakeholders, financing strategies and success stories that help drive the value proposition for Islamic financing options.

While the demand for sustainable energy-efficient sources continue to increase in many countries around the world, security of sustainable finance and responsible investment in the sector represents a main challenge. Solar energy continues to enter mainstream utilization in several Organization of Islamic Cooperation (OIC) countries in the regions analyzed in this report (MENA, Asia and Europe).

Energy efficiency and green energy concepts have been embraced and deployed in the national visionary strategies. A clear trend is the growing importance of Islamic finance as an alternative funding choice for many countries and governments, supported by Multinational Development Banks (MDBs) and local industry supporting initiatives (technical and financial).

The methodology for developing this set of issues and trends emerged from data analytics from Deloitte's Energy and Resource thought leadership, senior managers that serve clients in the solar sector space in our region, Deloitte Middle East (ME) Islamic finance Knowledge Center (IFKC) survey conducted in 2017, interviews and industry group discussions as well as country cases built by associate research institutions.

I am most grateful to my fellow colleagues at Deloitte ME and Malaysia, and all associate research institutes acknowledged in this report.

As economic growth and population increase in the 10 countries and regions reviewed, solar and green energy will likely grow in scale and scope and will certainly require huge capital to fund. The issues and industry growth trends in this report may stimulate debate as to how Islamic finance can become central to these growing investment opportunities and help identify some of the key financing strategies/structures which can be further improved to respond to increasing needs for capital.

I hope you enjoy reading this report.

Foreword from ISRA

Professor Mohamad Akram Laldin
Executive Director
International Shariah Research Academy for Islamic finance

The Paris Agreement on Climate Change marks a key turning point in the global energy transition. More than 178 nations have ratified the United Nations Framework Convention on Climate Change (UNFCCC), which mainly aims to consolidate efforts to address the threat of climate change.

One of the most important provisions of the Paris Convention is to promote renewable and sustainable energy. This not only has a direct impact on economic and social development, it is also environmentally friendly. More importantly, the use of "green" energy has become an integral part of the UN's Sustainable Development Goals (SDGs), which have been incorporated into the economic growth plans of many nations. It also contributes to several policy objectives, such as developing new industries and products, creating new jobs, reducing emissions of polluting gases and providing affordable and reliable clean energy.

According to the Bloomberg NEF report, global investment is focusing strongly on investing in renewable and clean energy. For example, investments into global clean energy recorded an increase from US$ 200 billion in 2008 to US$ 332 billion in 2018. This is due to lower investment costs in green energy, especially solar.

Several countries have also recently witnessed a remarkable development in renewable energy investments. In the countries of the Gulf Cooperation Council (GCC), for example, the renewable energy target has become an integral part of national determined contributions and falls within the objectives of UNFCC.

It is worth noting that issuances of green bonds have become part of the current forms of financing for renewable energy projects. In the field of Islamic finance, green Sukuk has emerged as a Shariah-compliant instrument for the same purpose.

Malaysia and Indonesia are among the first countries to issue this type of Sukuk. In Malaysia, the first corporate green Sukuk worth RM 250 million, was issued by Tadau Energy Sdn Bhd to partly finance large-scale solar construction. Meanwhile, Indonesia issued US$ 1.25 billion of sovereign green Sukuk, whose revenues will be partly used to finance renewable energy projects. The increase in the adoption of green Sukuk to finance renewable energy projects is attributable to the following factors: the increase in renewable energy projects, particularly solar energy projects, the low capital costs, and the fact that it is a Shariah-compliant instrument.

This report, which is jointly produced by ISRA and Deloitte Middle East, highlights the importance of renewable and alternative energy by presenting the experiences of selected countries in this field. The report also emphasizes the role of Sukuk in sustainable development and renewable energy projects, particularly solar projects. The report is expected to raise stakeholders' awareness on investment in renewable energy projects through Shariah-compliant financing instruments particularly green Sukuk.

I would like to take this opportunity to express my gratitude to Deloitte Middle East for collaborating with us in producing this report. My profound thanks also go to all the contributors to this report. Congratulations to the production team from ISRA and Deloitte Middle East for this great achievement. This report would not have been possible without your earnest support.

Acknowledgments

We extend our gratitude and appreciation to the respondents of our online survey questionnaire and Deloitte professionals who contributed to this report. We are also grateful to fellow colleagues and practitioners who contributed in developing the country cases and stimulated our discussion themes which helped improve the depth of the research scope and industry analysis.

Solar energy continues to enter mainstream utilization in several Organization of Islamic Cooperation (OIC) countries in the regions analyzed in this report (MENA, Asia and Europe).

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Executive summary

The drive to promote green energy in many countries, together with reducing solar technology costs and maturing practices, have attracted strategic investors into the sector primarily driven by return and sustainable investment principles. Owing to such factors, almost all countries analyzed are either increasing their current solar capacities or installing new plants to achieve its clearly set energy efficiency strategies.

Countries such as Malaysia and Indonesia which are considered highly coal dependent economies have started to drastically decrease their government sponsored subsidies towards conventional energy sources to drive their focus towards non-conventional sources, with solar the being prime focus.

With such focused approach by various governments, the majority of the group countries researched have seen a rising trend in investments through both conventional and Islamic finance methods primarily driven by international developers and strategic national investors. This has also encouraged many other investors to engage in scale solar and green energy projects, thereby enjoying benefits offered by their respective governments.

Over the years, and in particular in the markets we considered, Islamic finance has emerged as a key player to fund social and infrastructure projects and offers various innovative Shariah-compliant structures to both large and small-scale enterprises in different sectors of the economies. Evidently, these structures are also used in financing several major solar projects in the Middle East and North Africa (MENA), Asia and Europe.

This report provides an in depth analysis of the key driving factors of going green in these selected groups of counties and discusses the value proposition of Islamic financing strategy, as well as present anchor transactions and structures used in these countries.

The analysis also covers the global energy landscape, and concludes with discussions on regulatory and investment policy support in these group countries. A summary of the industry outlook is presented addressing the various challenges and opportunities faced by solar developers and investors which could help improve business practices and investment strategies.

Over the years, and in particular in the markets we considered, Islamic finance has emerged as a key player to fund social and infrastructure projects and offers various innovative Shariah-compliant structures to both large and small-scale enterprises in different sectors of the economies.

Research methodology

The report includes 10 country cases in Asia (Malaysia, Indonesia, Pakistan), Middle East (Kingdom of Saudi Arabia, United Arab Emirates, Bahrain, Jordan and Morocco), and Europe (Turkey and Kazakhstan). We examined the size of global solar projects and finance gap, along with regulatory and policy development in the selected countries.

The 'Solar report' is a follow up issue of our 'renewable industry study' in which we examined the prospects of Islamic finance as a source of financing solar projects in several OIC markets based on three geographical regions: Asia, Middle East and Europe.

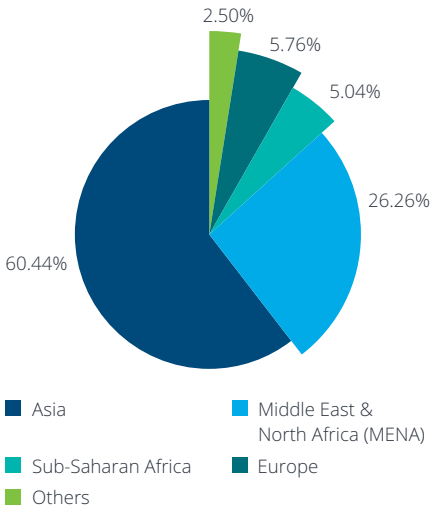
We have unearthed vital and interesting findings and provided industry analysis through our 'triangular study approach': regulatory environment, markets and practices, and business supporting institutions. This allowed us to form practical policy and practice recommendations as how to Islamic finance can lead by assuming a natural role in financing the 'real economy sector of energy.

We looked at the challenges and needs of key solar stakeholders, articulating a possible 'way forward plan' for connecting Islamic finance investors, solar energy operators, energy distributors and other stakeholders.

The report includes 10 country cases in Asia (Malaysia, Indonesia, Pakistan), Middle East (Kingdom of Saudi Arabia, United Arab Emirates, Bahrain, Jordan and Morocco), and Europe (Turkey and Kazakhstan). We examined the size of global solar projects and finance gap, along with regulatory and policy development in the selected countries. The report also features highlights on the role of the International Renewable Energy Agency (IRENA) and the Islamic Development Bank (IsDB) in the MENA region and other industry and multilateral organizations.

Present Islamic finance instruments such as 'Solar Sukuk' serve as a catalyst for funding solar projects in the OIC marketplace.

Figure 1: Percentage of participating respondents based on different geographical regions



Almost

60.44%

of respondents were from Asia

Followed by the MENA region with

26.62%

of total respondents

5.76%

of respondents were from Europe

Introduction

In the past decade, the world has witnessed a pressing need for a major transformation from conventional energy sources to renewables starting with planned efforts in limiting the global temperature rise to below 20°C for the present century. According to the International Energy Agency (IEA) World Energy Outlook 2018, rising disposable incomes and an additional 1.7 billion people – mostly added to urban areas in developing economies have pushed up global energy demand by more than a quarter to 2040.

While the prevalent approach followed by many countries is to decrease their energy-related carbon emissions, a key driver for climate change is arriving at a universal agreement on improving energy efficiency along with faster adoption levels for renewable energy as their primary source.

IRENA reported that the global renewable energy capacity more than doubled in the last decade from 1,060 MW in 2008 to 2,179 MW in 2017[1]. This provides an additional thrust to the overall appeal of renewable energy as one of the preferred areas for investing in the future.

Increasing renewable energy deployment by various countries contributes to numerous policy objectives, including boosting national energy security and economic growth, creating jobs, developing new industries, reducing emissions and local pollution, and providing affordable and reliable energy.[2]

Global new investment in clean energy almost increased by 66% from US$ 200 billion in 2008 to US$ 332 billion in 2018, with a maximum investment per MW in solar sector compared to the rest of renewable energy sources. This is largely due to a drastic decrease in required capital cost thereby reducing the total investment in solar to US$ 130 billion in 2018, as reported by Bloomberg NEF.

Looking at the Gulf Cooperation Council (GCC) region, the renewable energy market has seen an upward trend in recent years with all countries incorporating renewable energy targets in their National Determined Contributions (NDCs) under the United Nations Framework Convention on Climate Change (UNFCC).

Renewable energy financing in the GCC region generally has long tenures with high debt-equity-ratios (more than 70%). However the rise of the green bond market is seen as one of the innovative financing methods with the National bank of Abu Dhabi issuing the first green bond in the Middle East valued at US$ 587 million in 2017.[3]

Islamic finance is considered one of the new options for solar financing apart from conventional loans, bonds and equity schemes. One of the popular finance techniques, Green Sukuk, which are Shariah-compliant green bonds, have recently been used in five renewable energy projects in Malaysia (as at December 2018). Indonesia has also launched the world's first sovereign Green Sukuk bonds (for US$ 1.25 billion) in February 2018, whose proceeds will partially finance renewable energy projects.

Overall, the adoption of Green Sukuk as one of alternatives to several traditional financing techniques will rise due to factors such as increasing number of solar projects, lower capital cost, faster, favorable green energy policies, along with preference towards Shariah-compliant instruments.

Global solar energy landscape

Renewable energy is gaining impetus these days as part of focused approach in every country's economic growth policy. It is considered one of the many ways to achieve a country's development ambition and to meet the increased demand for power with emphasis on developing the infrastructure needed to meet the demands of the future.

Increasing global prosperity drives growth in energy demand. According to IRENA's report on global landscape of renewable energy finance 2018, global annual investment in renewable energy rose steadily in 2013-2015, peaking at US$ 330 billion in 2015 before falling to US$ 263 billion in 2016. While annual investment declined in 2016, capacity additions in the same year were up from 2015. This was partially due to declining costs, time lag between financial closure (i.e. the time of investment) and the completion of construction, after which an installation becomes operational.

Cost declines for key technologies have influenced finance flows in the renewable energy space. Lower solar and wind power costs were key contributors which reduced the total value of renewable energy investment in 2015 and 2016, as each dollar of investment financed more capacity than in previous years.[4]

However, global clean energy investment reached US$ 332.1 billion in 2018, according to Bloomberg NEF.

Global new solar energy investment

Investments in renewables have continued to increase each year and continue to make remarkable progress. According to the Frankfurt School-UNEP Centre Annual Global Trends in Renewable Energy Investment 2018 report, global investment in renewable energy went up by 2% in 2017 to US$ 279.8 billion, taking cumulative investment since 2010 to US$ 2.2 trillion. This rise in capital expenditure took place in a context of further decrease in the cost of wind and solar that made it possible to buy megawatts of equipment more cheaply than ever before.

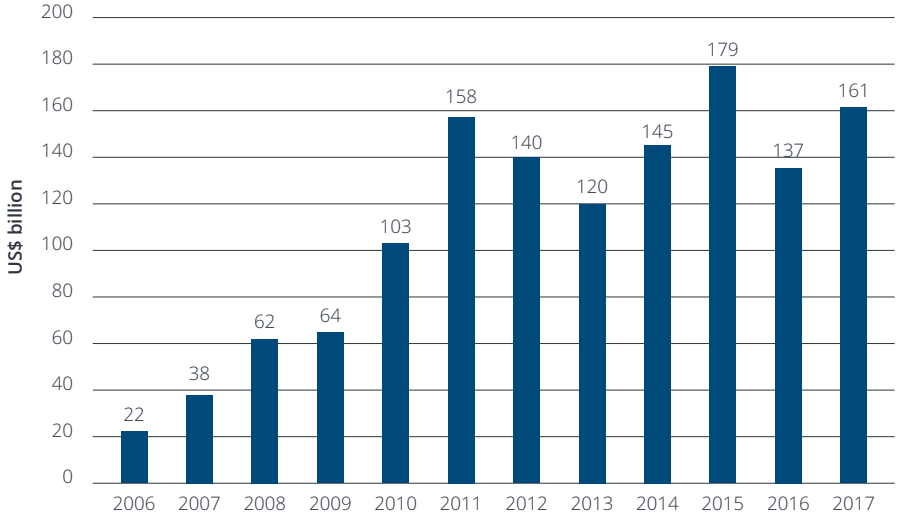
Solar power gained prominence in 2017 as total installed capacity from new solar power projects stood at 98 gigawatts, which was more than total of new coal, gas, and nuclear plants put together.[5]

Global investment in solar projects has increased dramatically to reach US$ 161 billion in 2017 as shown in Figures 2 and 3.

Global clean energy investment in 2018 **US$ 332.1 billion**

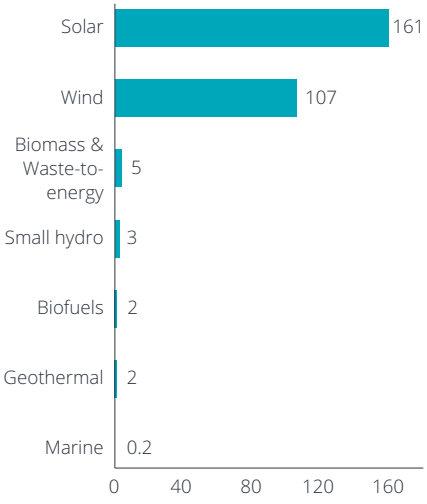
Global new investment in solar in 2018 **US$ 131 billion**

Figure 2: Global new investment in solar photovoltaic (PV) (US$ billion), 2017



Source: BloombergNEF

Figure 3: Global investment of renewable energy by sector by 2017 (US$ billion)



Market development and investment trends

Majority of the financial support has come through government-backed programs boosted by the willingness of development financial institutions (DFI's) to advise and fund these projects. As an example, the World Bank Group's lending arm the International Finance Corporation (IFC) has provided nearly US$ 6 billion in capital for 250 renewable energy projects in emerging markets (5 GW solar and 4 GW wind)[6].

Technology trends

Technology is accelerating the deployment of renewables: Automation and advanced manufacturing are improving the production and operation of renewables by reducing the costs and time of deploying renewable energy systems. Artificial Intelligence (AI) can improve weather forecasting, optimizing the use of renewable resources whereas Blockchain can enable energy attribute certificate (EAC) markets to help resolve trust and bureaucratic hurdles. Advanced materials have potential to transform the materials in solar panels and wind turbines (Deloitte analysis).

Emerging markets

In 2017, emerging markets accounted for 63% of global new investment in renewable energy, widening the investment gap with developed countries to a record high.

China recorded the highest growth for solar and wind segments along with capacities marking above 100 GW for both in 2017. China accounted for over half of new solar additions and two thirds of global PV production in 2017.

Developed countries have benefitted from market and product designs that initially took off in emerging countries. For example, renewable energy auctions are a trend that emerging markets embraced first and that have brought steep price declines in renewable prices across the globe.

A combination of enabling trends and demand trends are helping solar and wind compete on par with conventional sources and win (Deloitte analysis).

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Solar energy growth

Enabling trends	Demand trends
Lower solar cost	Focused approach by government to support growth of non-conventional energy sources
Expanding investor interest	Population growth, increasing economy and climate changes are fueling demand for power
Technology innovation	Persistent energy deficit

Investment trends by regions

A report published by IRENA: Unlocking Renewable Energy Investment: The Role of Risk Mitigation and Structured Finance (2016), identifies the main risks and barriers to renewable energy investment and provides policy makers and public finance institutions with a strong portfolio of measures, instruments and tools (see Figure 4) that can be used in combination to mobilize private investment at scale.

Investment in renewable energy projects – GCC

The renewable energy projects in GCC are concentrated in the UAE. According to

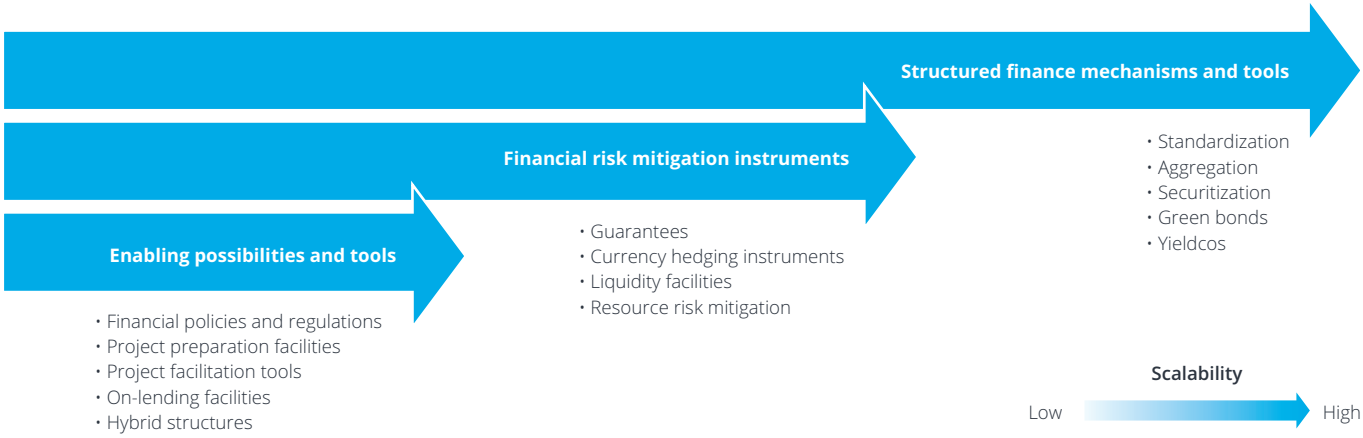
IRENA's renewable energy market analysis GCC 2019 report, investment trends in renewable energy projects in the GCC spiked in 2011 with US$ 765 million invested in the UAE's 100 MW Shams 1 CSP plant, which became operational in 2013. Investment activity dropped in 2012. Because of increasing government interest and falling technology costs, investment in new projects rose in 2015, and included US$ 326 million in the UAE's 200 MW Mohammed bin Rashid Al Maktoum Solar Park Phase II, US$ 400 million in the Shagaya project in Kuwait and US$ 600 million in Oman's 1 GWth Miraah Solar EOR project.

After a lean year in 2016, renewable energy investments again picked up in 2017, mainly in three large-scale solar projects in the UAE. In Dubai's Mohammed Bin Rashid Al Maktoum Solar Park, the 950 MW solar PV Phase III and the 700 MW CSP Phase IV received investments of US$ 940 million and US$ 3,870 million respectively as reported by IRENA.

In Abu Dhabi, about US$ 870 million was invested in the 1,177 MW Noor Abu Dhabi solar PV plant in Sweihan.

After a lean year in 2016, renewable energy investments again picked up in 2017, mainly in three large-scale solar projects in the UAE. In Dubai's Mohammed Bin Rashid Al Maktoum Solar Park, the 950 MW solar PV Phase III and the 700 MW CSP Phase IV received investments of US$ 940 million and US$ 3,870 million respectively as reported by IRENA.

Figure 4: Policies, tools and instruments that reduce renewable energy barriers and mitigate risks



Source: IRENA, 2018

I. MENA

The Middle East will require additional power capacity of 267 GW by 2030, an increase of 66%, as reported by Siemens. The following tables highlight the market growth trends and list some of the key solar projects and capacity.

Morocco, Jordan and Egypt are including large scale CSPs in their energy mix

Morocco planned to construct 800 MW project valued at US$ 2.4 billion

Industry investment trends

- Investment in renewable energy projects within the MENA region has seen an upward trend due to rise in clean energy-based electricity demand coupled with factors such as growing population, economic growth, decreased cost of solar energy, and increased industrial activity.
- Solar energy has continued to gain momentum both globally and in the MENA region. As of the first half of 2018, over 470 GW of solar photovoltaic (PV) was installed worldwide of which 100 GW was added in 2017.
- The 200 MW Kom Ombo solar PV project in Egypt and Jordan's Round 3 PV auction received bids below 3 US$ cent/kWh. In addition, the Egyptian government has requested bids no higher than 2.5 US$ cent/kWh for the ongoing 600 MW solar PV West of Nile tender.
- The biggest solar projects to be financed included the 800MW Noor Midelt PV and solar thermal portfolio in Morocco, at an estimated US$ 2.4 billion and, Dubai Electricity and Water Authority (Dewa) in UAE Phase IV is 950MW and has a total project cost of US$ 4.36 billion.
- Morocco's 580 MW Noor II and III projects at the Ouarzazate solar complex, one of the largest in the world to consist of PV and CSP.
- Concentrated solar power in MENA: Despite MENA region's contribution standing at a mere 7% of the global Concentrated Solar Power CSP's generation of 5 GW, countries such as Morocco, Oman and the UAE are early adopters of the large scale CSP, while other countries like Egypt, Jordan and Kuwait have or are looking to implement utility scale projects (Source: MESIA).

MENA solar projects

Project	Country	Capacity (MW)	Status
CREG PV IPP	Algeria	150	–
Solar PV EPC	Algeria	50	–
Algeria PV	Algeria	4000	Announced
West Nile PV IPP	Egypt	600	–
West Nile PV IPP 2	Egypt	200	–
Round 3 Solar PV	Jordan	150	–
RAI Solar PV	Jordan	50	Awarded
Noor Midelt PV	Morocco	800	–
ANME Solar Park	Tunisia	1700	Announced
Tunisia Authorization Scheme	Tunisia	64	Awarded
Tunisia PV - Round 1 Auction	Tunisia	500	–
Tunisia PV - Round 2 Auction	Tunisia	70	–
Solar IPP project	GCC country	900	–
Solar IPP	GCC country	2 GW	–
12 Solar PV projects	GCC country	–	–

Source: MESIA, Solar Outlook Report 2019 and other

GCC focus

GCC region is expected to add 7 GW of new renewable energy

KSA's 300 MW project began construction in November 2018

Industry investment trends

- The GCC region is expected to witness drastic rise in renewable energy deployment. Led by the UAE, Oman and KSA, nearly 7 GW of new renewable power generation capacity is expected to become operational by the early 2020s.
- According to IRENA, the Solar PV remains the dominant technology in the GCC's project pipeline, with a share of over 75%, followed by CSP at 10% (all of which accounted by a single project in the UAE) and 9% share for wind projects, primarily in Saudi Arabia and Oman. Solar-assisted enhanced oil recovery in Oman is also expected to contribute about 1 gigawatt-thermal (GWth) in 2019.
- GCC countries are investing in the renewable energy value chain including project developers, manufacturing companies, and research and development initiatives. Although the bulk of investments to date are concentrated in the UAE, as deployment picks up, investment flows will likely be distributed more evenly among the countries in the region.
- Saudi Arabia's 300 MW solar PV Sakaka project, the first utility scale project in the country, was awarded at 2.34 US$ cent/kWh and began construction in November 2018, (Source: MESIA, Solar Outlook Report 2019).

GCC: Installed renewable energy capacity at end of 2018

Country	Photovoltaic (PV)	Concentrated Solar Power (CSP)	Total renewable energy	Share of RE in total electricity capacity
Saudi Arabia	89	50	142	0.2%
United Arab Emirates	487	100	589	2.0%
Bahrain	5	0	6	0.1%
Kuwait	19	50	79	0.4%
Oman	8	0	8	0.1%
Qatar	5	0	43	0.4%

Source: IRENA, Renewable Energy Market Analysis: GCC 2019

Utility-scale renewable energy projects in the GCC as of January 2019

Country	Project/site	Technology	Size (MW)	Details
United Arab Emirates (Dubai)	Mohammed bin Rashid Al Maktoum Solar Park, Phase IV	CSP	700	• The project has been considered as the world's largest CSP plant, expected to cost US$ 3.87 billion (AED 14.2 billion) to build in stages starting in 2020
		Solar PV	250	• Assumed to start in 2020 with additional scope of CSP plant in November 2018
	Mohammed bin Rashid Al Maktoum Solar Park, Phase III	Solar PV	600 (of 800)	• Construction begun in 2017 • Shuaa Energy 2 developed the project which is a joint venture between DEWA (60% stake) and a Masdar-led consortium which also includes Electricité de France's subsidiary, EDF Energies Nouvelles
			200 (of 800)	
	Mohammed bin Rashid Al Maktoum Solar Park, Phase II	Solar PV	200	• The project has been developed by ACWA Power and TSK and operational since March 2017
	Mohammed bin Rashid Al Maktoum Solar Park, Phase I	Solar PV	13	• The first phase of the Solar Park was a 13 MW PV plant completed by First Solar in late 2013
United Arab Emirates (Abu Dhabi)	Noor Abu Dhabi, Sweihan	Solar PV	1,177	• Under construction in 2019 at an average price of 2.94 US$ cents/kWh
	Shams 1	CSP	100	• Completed in 2013
Oman	Miraah Solar Thermal	Solar thermal	1000 (GWth)	• Miraah is a 1 GW solar thermal plant that creates steam for enhanced oil recovery. The first four blocks (100 MW) were completed in February 2018. • Under construction: 100 MW complete, delivering 660 tonnes of steam/day as of February 2018
	Ibri PV Plant	Solar PV	500	• The Oman Power and Water Procurement company (OPWP) has shortlisted the three bidders in November 2018 for the US$ 500 million project
	PDO Amin PV Plant	Solar PV	100	• A joint Japanese-Omani consortium has been announced in Nov 2018 to build a landmark 100 megawatt solar photovoltaic Independent Power Producer (IPP)
Saudi Arabia	Sakaka	Solar PV	300	• The US$ 302 million facility will begin commercial operations in August 2019 which is backed by is a 25-year PPA with the Saudi power procurement company
Qatar	Al-Kharsaag	Solar PV	900	• To be completed by 2020 (first 350 MW) • The project is structured as a 25-year build, own, operate, and transfer (BOOT) public-private partnership with Kahramaa
Kuwait	Shagaya	CSP	50	• Completed
		Solar PV	10	• Completed
	Al Dibdibah/ Shagaya Phase II	Solar PV	1,200 - 1,500	• The US$ 1.2 billion project is owned by Kuwait National Petroleum Company (KNPC). Bidders expected to construct the project and perform O&M for 25 years
Bahrain	Askar Landfill	Solar PV	100	• Askar PV on a landfill: three bids were submitted in December 2018. EWA will be the sole offtaker of the project for a period of 20 years. The lowest tariff was submitted by ACWA Power: US$ 4.92 US$ cents/kWh with an alternative bid of US$ 3.89 US$ cents/kWh
	Al Dur	Solar-wind hybrid	5	–

Source: IRENA, Renewable Energy Market Analysis: GCC 2019

II. Asia

China leads with US$ 126 billion investment

Indonesia witnessed US$ 1 billion worth of investment for RE projects

Industry investment trends

- The East Asia-Pacific region was the dominant destination for renewable energy investment which witnessed rapid growth from US$ 64 billion in 2013 to US$ 114 billion in 2015, before a dip to US$ 88 billion in 2016.
- According to Frankfurt School-UNEP Centre Global Trends in Renewable Energy Investment 2018 report, China was the leading country for renewable energy investment in 2017 which accounted for US$ 126.6 billion, contributing to 45% of the global total. There was an extraordinary solar boom in that country in 2017, with some 53GW installed (more than the whole world market as recently as 2014), and solar investment of US$ 86.5 billion, up 58%.
- Indonesia was the prominent country in Asia within the geothermal energy space with total of US$ 1 billion worth of investment. Almost 60% is contributed by Supreme Energy Muara Laboh geothermal project of 80MW.
- Pakistan continued to attract investment in non-hydro renewables, particularly large-scale and small-scale solar, but its total of $695 million, while up 42% on 2016, was far below the average of $1.7 billion achieved in 2014 and 2015.[7]

III. Europe

Renewable energy sector employs about 1.2 million people

The European Investment Bank has supported solar photovoltaic projects

Industry investment trends

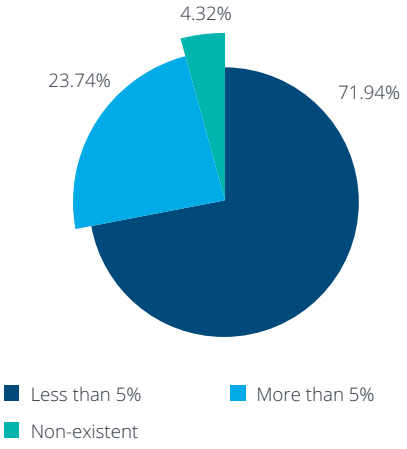
- Europe shows that renewable energy can reach very high penetration at low cost. By 2050, renewables will make up 87% of the electricity mix, with wind and solar playing dominant role, according to Bloomberg Nuclear Energy Finance.
- By 2050, Germany will be running on wind and solar, and 84% renewables, but it has the highest emissions in Europe.
- By 2025, UK will have added 158 GW of wind and solar
- According to IRENA, the renewable energy sector employs about 1.2 million people in Europe. This figure would increase substantially with a doubling of the renewable share by 2030.
- The European Union (EU) will require investment of around US$ 76.5 billion annually to achieve 34 per cent renewables in its power mix by 2030, according to IRENA.
- Turkey's renewable energy sector will attract nearly US$ 28 billion investments by 2020, according to a new report by the World Bank's IFC arm.
- Some US$ 16.4 billion of these investments will be made in wind power, US$ 7.4 billion in solar energy, and US$3.4 billion in geothermal energy and US$ 560 million in hydro power, according to data compiled by state-run Anadolu Agency.

Industry and business leaders' outlook

This section summarizes the feedback from our online survey questionnaire which aims at understanding how Islamic finance as an option could be considered to fund solar energy projects. The target audience consisted of executives from organizations whose primary industry was oil and gas production, solar generation, banking, asset management or professional services.

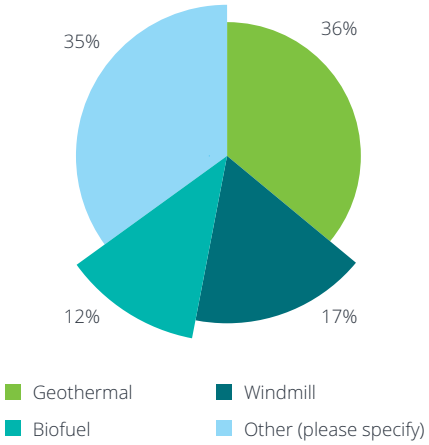
I. Industry information and factors involved

Figure 5: What is the estimate of solar energy contribution to energy generation in your country?



- Majority of respondents believe that share of solar energy in their country's total energy generation has been low despite having considerable amount of support from their governments.
- This is evident from the fact that non-hydro renewables comprise only 11% of the gross energy consumption compared to 29.7% for petroleum products.[8]

Figure 6: Aside from solar energy, what other renewable energy projects exist in your country/region?



- Apart from solar, geothermal is the primary renewable energy source followed by Windmill and Biofuel which substantiates strategies to invest and undertake renewable energy projects in future.
- As reported by IRENA, there is ample evidence that the Solar PV and wind power dominate global spending on new renewables projects, moving from 83% of total finance in 2013, to 93% of total renewable energy investment in 2016.
- Therefore, solar projects can be seen as an important asset, underpinning economic growth of the countries.

Apart from solar, geothermal is the primary renewable energy source followed by Windmill and Biofuel which substantiates strategies to invest and undertake renewable energy projects in future.

Figure 7: Which factors have most influenced the growth of solar energy projects in your country?

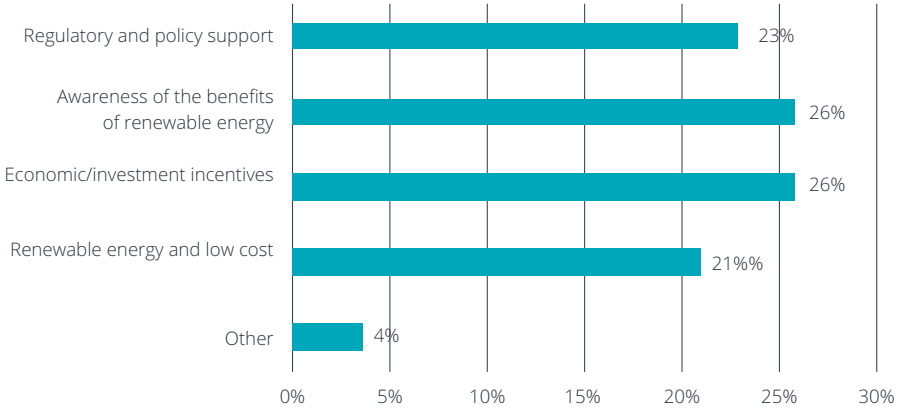
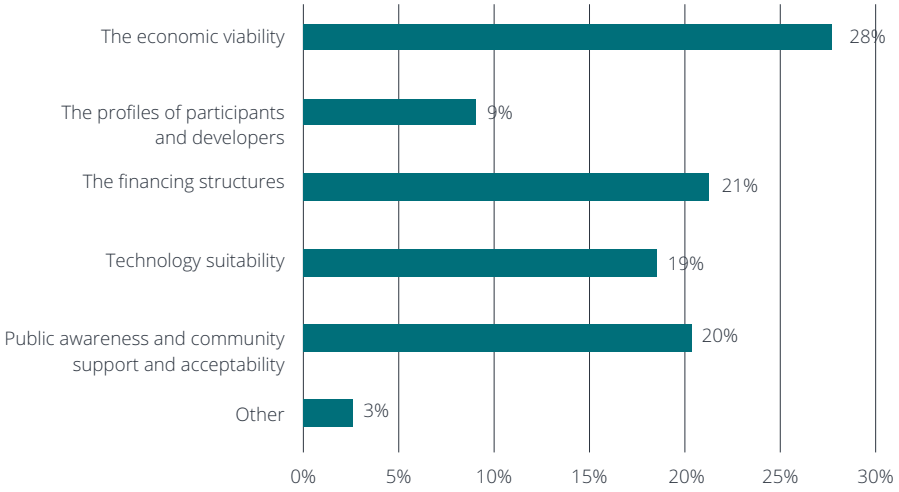


Figure 8: Which factors do you think will influence the growth of solar energy projects in your country?

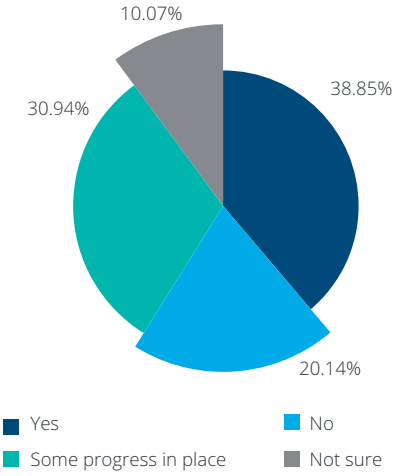


Awareness of the benefits of renewable energy and investment incentives are considered two key factors influencing solar energy growth with more than 50% of respondents indicating the same.

- Awareness of the benefits of renewable energy and investment incentives are considered two key factors influencing solar energy growth with more than 50% of respondents indicating the same.
- The economic viability is the major influencer to the growth of solar energy. While 60% attribute to the technological suitability, financing structures and public awareness and community support.

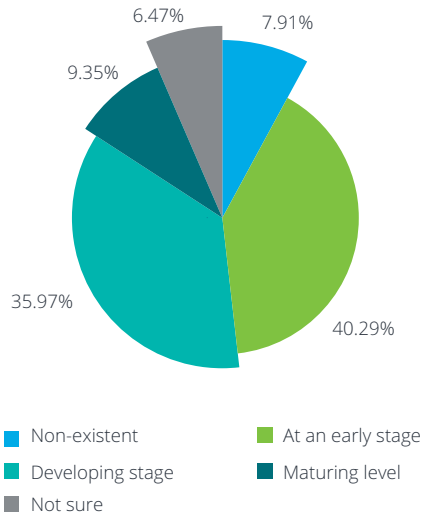
II. Policy development and regulation

Figure 9: Is there a defined solar energy strategy/initiative in your market/ jurisdiction?



- Majority (~70%) of industry experts comprehend about presence of solar energy strategy in their market.
- This indicates that the countries' governments are starting to make room for more solar projects in the coming future. This hopefully will result in significant change in the solar energy market.

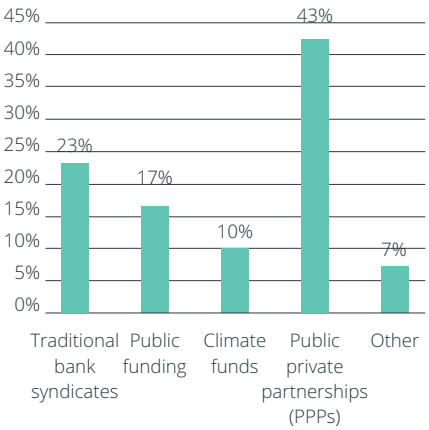
Figure 10: What is the level of regulation and government support/guidance relating to solar energy in your country/region?



- Large number of respondents have witnessed government support on regulation and guidance, with many other leaders considering it to be at the nascent stage with very little progress.
- Results indicate that governments are active in shaping solar energy strategies in several countries around the world.

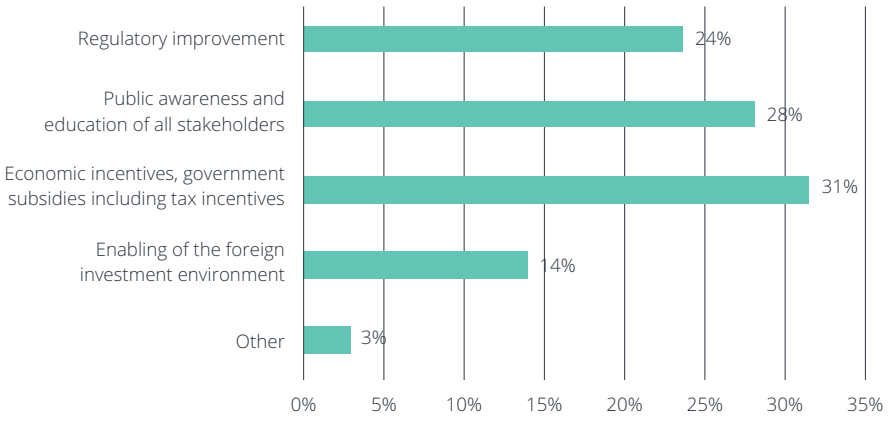
III. Islamic finance as an alternative option to Solar projects

Figure 12: Which of the following is more suitable to solar financing projects?



- Most of the respondents (43%) believe Public Private Partnerships (PPPs) are suitable for financing projects followed by traditional bank syndicates and public funding.
- Few respondents (7%) suggested that Islamic finance instruments like Mudarabah and Sukuk would be the ideal way to invest in solar projects.

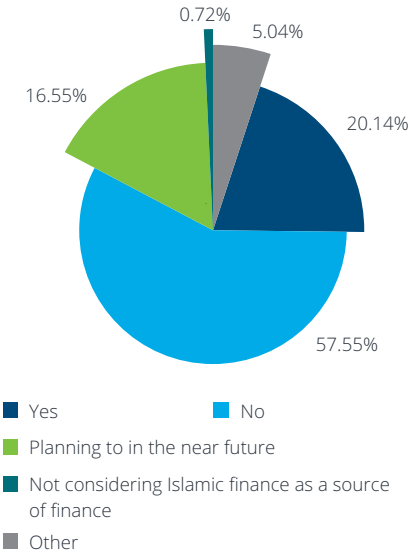
Figure 11: What types of support and policy would you be interested in seeing to consider solar energy in your business?



- Majority (83%) of respondents expect to see improvement in regulatory, economic incentives, government subsidies and awareness and education which will help them consider solar in their business.

Less than 20 % of respondents were engaged in Islamic financing of a solar project. Factors such as technological improvements, demand for innovative ways of financing will see an upward trend in the future.

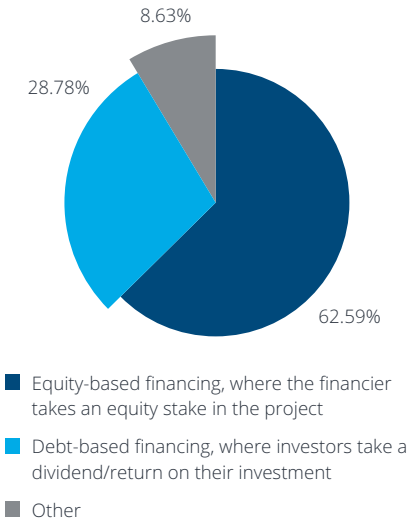
Figure 13: Have you or a member of your team, or any affiliate organization, engaged in Islamic financing of a solar project?



- Less than 20% of respondents were engaged in Islamic financing of a solar project. Factors such as technological improvements, demand for innovative ways of financing will see an upward trend in the future.

Many government agencies offer financial support in terms of tax exemptions, incentivizing SMEs engaged in RE project development, providing incentives for citizens to adopt RE based electrification programs in their localities and buildings.

Figure 14: If you are considering Islamic Finance for solar projects, which of these options suit you more?



- Investment in equity-based and debt-based investments (collectively ~90%) are considered best options for investing in solar.
- A small amount of respondents suggested that diversified option between debt and equity could be a good method rather than investing solely in one type of financial instrument.

Opportunities

- **Government policies**
  Many countries have formulated explicit solar focused regulatory policies along with ambitious RE targets
- **Declining capital cost**
  Large number of investors have shown interest to invest in solar sector owing to decline in cost of capital required with support from industry and government
- **Use of unproductive land areas**
  Many countries have started to utilize available unproductive lands in the countries to set up solar plants
- **Financial support**
  Many government agencies offer financial support in terms of tax exemptions, incentivizing SMEs engaged in RE project development, providing incentives for citizens to adopt RE based electrification programs in their localities and buildings

Challenges

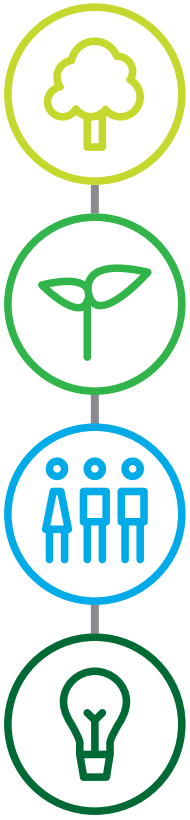
- **Lack of available government resources**
  State owned utilities in some countries want to keep a firm grasp over the power sector and are hesitant to liberalize their energy sectors
- **Unrealistic expectations**
  Countries need to set expectations for tender prices based on their own risk profiles, not on tender results achieved in other countries
- **Subsidy reform**
  In the long run, energy subsidies are unsustainable, hence, long term reform is a necessary measure that will help countries become energy independent. However, reform, if not implemented with an adequate safety net to protect the poorest segments, may cause public unrest

Islamic financing strategy

Solar and green energy financing decisions have been affected by the continuing global credit crush impact such as banking regulatory capital requirements, which triggered corporates to actively seek alternative financing sources such as green bonds and green Sukuk private equity investments and other methods.

This section discusses key Islamic finance structures, supported by regional and Multilateral Development Banks (MDBs) in the regions studied. It also proposes Sukuk as a practical asset class for funding solar projects and analyzes its merits and factors rendering it a driver of boosting green economy in MENA and Asia.

Going Green: Anchor solar projects



Green financing

Sustainable projects

Social cohesion and inclusion

Environmental

UiTM Solar Power Sdn Bhd

In April 2018, UiTM Solar Power Sdn Bhd, an indirect subsidiary of Universiti Teknologi Mara, issued Green SRI Sukuk of up to RM240 million to finance the development and operation of the 50MW utility solar power plant in Gambang, Pahang. It is the first institute of higher learning in the world to issue a Green SRI Sukuk.

Transaction details	Murabahah
Issuer	UiTM Solar Power Sdn Bhd
Country	Malaysia
Use of proceeds	The green SRI Sukuk will finance a 50MW utility solar power plant in Gambang, Pahang, Malaysia.
Rating	AA- by Malaysian Rating Corporation Berhad ("MARC")
Facility	Green SRI Sukuk
Issue size	MYR 222.3 million (US$ 56.8 million)
Tenor	18 years
Issue date	27 April 2018
Islamic structure	Murabahah (via Tawarruq arrangement)

Republic of Indonesia

In March 2018, the Republic of Indonesia issued a 5-year green Wakalah Sukuk which also marked as the Republic's first issuance under its recently established Green Bond and Green Sukuk framework.

Transaction details	Wakalah
Issuer	Perusahaan Penerbit SBSN Indonesia III ("PPSI-III")
Country	Indonesia
Use of proceeds	To finance or re-finance expenditure directly related to eligible green projects, including renewable energy, sustainable transport, waste management, climate-related projects and green buildings
Rating	Baa3 by Moody's, BBB- by S&P and BBB by Fitch
Facility	Green Sukuk
Issue size	US$ 3.0 billion Wakalah Sukuk Tranche 1: US$ 1,250 million Tranche 2: US$ 1,750 million
Tenor	Tranche 1: 5 years Tranche 2: 10 years
Profit rate	Tranche 1: 3.75% per annum Tranche 2: 4.40% per annum
Issue date	1 March 2018
Islamic structure	Wakalah

In October 2017, Quantum Solar Park (Semenanjung) Sdn Bhd issued one of the world's largest Green SRI Sukuk of up to RM1 billion for purposes of financing the construction of three large-scale solar photovoltaic plants in Kedah, Melaka and Terengganu.

Mudajaya Group Berhad (Sinar Kamiri Sdn Bhd)

In January 2018, Sinar Kamiri Sdn Bhd, an indirect subsidiary of Mudajaya Group Berhad, issued a Green SRI Sukuk of up to RM245 million for purposes of financing the construction/development of a 49MW solar photovoltaic facility in Sungai Siput, Perak.

Transaction details	Wakalah
Issuer	Mudajaya Group Berhad (Sinar Kamiri Sdn Bhd)
Country	Malaysia
Use of proceeds	To finance a largescale 49MW solar PV plant in Sungai Siput, Perak (Malaysia).
Rating	Tier-1 (RAM Holdings, AA-IS (Malaysian Rating Corporation Bhd)
Facility	Green SRI Sukuk
Issue size	MYR 245 million (US$ 62.8 million)
Tenor	18 years
Issue date	30 January 2018
Islamic structure	Wakalah Bi Al-Istithmar

Quantum Solar Park (Semenanjung) Sdn Bhd

In October 2017, Quantum Solar Park (Semenanjung) Sdn Bhd issued one of the world's largest Green SRI Sukuk of up to RM1 billion for purposes of financing the construction of three large-scale solar photovoltaic plants in Kedah, Melaka and Terengganu. This is the largest solar power project of its kind in South-East Asia and will generate about 282,000MWh of electricity to Tenaga Nasional Bhd yearly for a period of 21 years.

Transaction details	Murabahah
Issuer	Quantum Solar Park (Semenanjung) Sdn Bhd ("QSP Semenanjung")
Country	Malaysia
Use of proceeds	To finance the construction of three large-scale solar photovoltaic plants in Kedah, Melaka and Terengganu.
Rating	AA- by Malaysian Rating Corporation Berhad ("MARC")
Facility	Green SRI Sukuk
Issue size	RM1.0 billion (US$ 236.5 million)
Tenor	1.5 years – 17.5 years
Issue date	6 October 2017
Islamic structure	Murabahah

PNB Merdeka Ventures Sdn Bhd

In December 2017, the Malaysian government linked investment institution Permodalan Nasional Berhad (PNB) launched its MYR 2 billion green Sukuk programme to fund its 83-storey office space which forms part of the Merdeka PNB118 tower project within the Warisan Merdeka.

Transaction details	Murabahah & Wakalah
Issuer	PNB Merdeka Ventures Sdn Bhd
Country	Malaysia
Use of proceeds	To fund the construction of 83-storey green building, Merdeka PNB118 Tower.
Rating	–
Facility	Green SRI Sukuk
Issue size	RM2 billion (US$ 480 million)
Tenor	15 year
Issue date	29 December 2017
Islamic structure	Murabahah (via Tawarruq arrangement) and Wakalah

Tadau Energy Sdn Bhd

In July 2017, Tadau Energy Sdn Bhd, a Malaysian-based renewable energy and sustainable technology investment firm, issued the world's first Green SRI Sukuk of up to RM250 million to finance the construction of large scale solar ("LSS") photovoltaic power plants in Kudat, Sabah.

Transaction details	Istisna' and Ijarah
Issuer	Tadau Energy Sdn Bhd
Country	Malaysia
Use of proceeds	To finance the construction of a 50MW Solar Photovoltaic power plant in Sabah, Malaysia.
Rating	AA3 by RAM Rating Services Berhad
Facility	Green SRI Sukuk
Issue size	RM250 million (US$ 59.2 million)
Tenor	2 to 16 years
Profit rate	5.20-6.55% per annum
Issue date	July 2017
Islamic structure	Istisna' (manufacturing sale) and Ijarah (leasing)

Jordan Islamic Bank invests in solar power as part of social responsibility

Jordan Islamic Bank (JIB) has inaugurated the largest rooftop PV project in Jordan a 2.7MW rooftop solar project in Sahab, King Abdullah II Industrial City.

The project took nine months to complete. The cost of constructing the plant was approximately JOD 1.4 million (US$ 1.97 million) and the cost recovery period of the plant is estimated to be approximately one and a half years.

Solar energy project financed by IFC

IFC International Finance Corporation WORLD BANK GROUP

The IFC committed a record of US$ 2 billion to support the Middle East and North Africa private sector, boost innovation, drive economic growth, and create jobs.

It focused on supporting power and renewable energy projects, and helping entrepreneurs. Among key projects in FY18 were a US$ 653 million financing package for a landmark solar array in Egypt, the first green-bonds program in Lebanon and the Levant, and a solar project in Gaza, the first privately financed energy project in more than a decade, as reported by IFC.

The IFC has also invested more than US$ 300 million to support clean energy options in Jordan, enabling well over US$ 1 billion in private sector investments in Jordan's power distribution and generation sectors, including solar power.

Between 2012 and 2015, The IsDB provided financing for the energy sector, supporting four renewable energy development projects and six energy-efficiency projects.

Islamic Development Bank (IsDB) solar energy initiatives

The IsDB is an ardent supporter of green energy projects, having invested billions into the sector as a group. It has approved financing of various development projects in different countries. Among the projects approved for financing, are several solar energy projects (see table on page 25).[9]

Between 2012 and 2015, the IsDB provided financing for the energy sector, supporting four renewable-energy development projects and six energy-efficiency projects. The IsDB extended a Financing Facility approach which worked through an implementing partner: The Turkiye Sinai Kalkinma (TSKB, known in English as the Industrial Development Bank of Turkey).

The combined costs of the projects amounted to US$ 641.2 million of which IsDB provided US$ 100 million. All ten projects are already proving to be successful with the energy efficient projects having already decreased greenhouse emissions by 1,006,000 tonnes, surpassing their target of decreasing emissions by 300,000 tonnes.

A new approach in Islamic Financing

This was the first time IsDB used Restrictive Mudarabah financing. Under this mode of financing, the IsDB provides capital to Mudarib (in this case, TSKB) to invest in business enterprises, as per the agreed criteria. This approach eliminated the need for IsDB to enter into individual financing agreements for each sub-project being financed and gave a lot of freedom to TSKB as the local executing agency.

Solar panel projects

The facility has also supported smaller projects that allow companies to generate their own electricity. One beneficiary was Prokon, an engineering manufacturing company located just outside Ankara. In March 2013, Prokon installed 2,040 solar panels on the roof of its workshop. Solar power has huge potential in Turkey especially as the panels generate around 75-95 MW during the peak months of July and August. Between April 2013 and February 2016, Prokon generated around 1,835 MWh from the panels in total. The process has been so successful that Prokon now sells energy back to the National Grid. Prokon have also pursued development of other solar powered equipment such as solar-tracking systems that enable panels to rotate and 'follow' the sun thereby generating more power.

Several solar energy projects approved for financing by IsDB

Project	Country	Size of support	Year	Details
Solar Energy for rural development project under reverse linkage	Mali	US$ 4 million	January 2018	The objective of the project is to enhance the capacity of Mali in rural electrification by establishing a sustainable model for rural electrification, which provides affordable and reliable electricity to rural communities in the country. The project will Increase the installed capacity of solar energy by 14%; from 15 MW in 2015 to 17.42 MW in 2021.
Mohammed bin Rashid Al Maktoum Solar Park	Dubai	US$ 170 million	June 2017	Non-sovereign project financing participation in the Dewa 800 MW Photo-voltaic Solar Power Plant – Phase III"
Scatec solar projects	Egypt	US$ 24 million	June 2017	Scatec Solar is developing six projects in the Egyptian FiT program, in partnership with prominent international investors including Norfund and Africa 50. The projects will have a total installed generation capacity 300MW and will all be based in Benban Solar Park. The total cost of the projects will be funded by sponsor equity and senior financing provided by the EBRD, IsDB, FMO and the ICD.
Alfanar project	Egypt	US$ 28.5 million	June 2017	To build a 50MW solar PV power plant in the Benban Solar Park in southern Egypt. The total project will be funded with equity and debt. Equity funding will be provided by Alfanar Company, while the senior financing will be provided by the EBRD and the ICD.
Solar Power Plant – King Hussein Cancer Center Expansion Project	Jordan	US$ 5 million	December 2016	Support for construction of a solar power plant which is expected to contribute to the sustainability and financial resource optimization of the "King Hussein Cancer Center (KHCC) Expansion Project" in Jordan.

Source: Islamic Development Bank (IsDB)

European Investment Bank (EIB)

Mediterranean Solar Plan – Project Preparation Initiative (MSP-PPI)
Initiative of the European Investment Bank (EIB), together with the European Commission, KfW, and the Union for the Mediterranean.

The Mediterranean Solar Plan Project Preparation Initiative (MSP-PPI) aims to accelerate the implementation of renewable energy and energy efficiency projects in several Mediterranean partner countries (Algeria, Egypt, Palestine, Jordan, Lebanon, Morocco and Tunisia).

Supported Ouarzazate solar complex in Morocco
The EIB has supported solar photovoltaic projects. The bank is behind development of first large solar project in North Africa, the massive concentrated solar power project at Ouarzazate, Morocco. A financial commitment of € 300 million was signed by the European Investment Bank (EIB), the Development Agency for France (AFD), KfW Entwicklungsbank (KfW) and MASEN, promoter of the Ouarzazate solar complex in Morocco.

Asian Development Bank (ADB)

The Asia Solar Energy Initiative (ASEI)
This initiative of the Asian Development Bank helps enable solar-generated electricity to compete with the retail rate from mainstream networks currently dominated by fossil fuel sources. Consequently, developing countries benefit economically from local solar manufacturing and associated industries while strengthening their energy security.

Innovative Finance: Asia Accelerated Solar Energy Development Fund (AASEDF)
The AASEDF boosts solar energy growth in the region through private sector participation by keeping transaction and opportunity costs low while solar technology remains at the pre-commercial stage. Ultimately, such support helps unburden end-consumers of the initial high cost of solar power.

African Development Bank (AFDB)

The Sustainable Energy Fund for Africa (SEFA)
Multi-donor trust fund administered by the African Development Bank to support small- and medium-scale Renewable Energy (RE) and Energy Efficiency (EE) projects in Africa.

A pan-African Private Equity Fund (PEF) solely focused on small/medium (5-50 MW) independent power projects from solar, wind, biomass, hydro as well as some geothermal and stranded gas technologies.

The AFDB has supported the development of two solar power plants Ouarzazate solar complex (Noor I and Noor II) by US$ 265 million at a total cost of € 2.048 billion with a cumulative capacity of 800 MW, under a public-private partnership (PPP). The investment is part of the Bank's continued support to Morocco's US$ 3 billion Noor solar energy program.

Considering solar Sukuk asset

The increasing use of Independent Power Producer (IPP) and Power Purchase Agreements (PPAs) in many countries including those analyzed is welcome news for the Islamic financing strategy as this helps identify and quantity both business and financial risks to design structures that balance with risk sharing and, asset-backed and ownership transfer elements designed in the structure. This is important to ensure that all stakeholders' interests are safeguarded.

Sale-based, lease-based, and equity-based Shariah-compliant financing structures such as Murabaha, Ijarah, Mudarabah respectively can be designed to reflect the solar project risks and timeline requirements, in the different phases of the project life-time.

Evidently, solar asset Sukuk financing brings benefits and skills along the entire value chain. Its transactional structure, as seen in the below proposed structure, is divided in different phases to reflect the level of the project implementation and capital expenditure.

The proposed solar Sukuk structure in Figure 15 illustrates the suitability of Sukuk in addressing developers and investors' interest alike.

Improving Grid Network through solar Sukuk structure[10]

Project overview

1. Gulf Municipality (GM) - project originator is seeking finance to build a 100 MW solar plant (Gulf Solar Farm).
2. GM aims to procure an Independent Power Project (IPP) to build the project asset in one of its suitable sites.
3. GM will purchase the Renewable Energy Certificates (RECs), through its affiliate; Gulf Electricity & Water Authority (GEWA).
4. GEWA will enter with Gulf Solar (service manager) into a Power Purchase Agreement (PPA).

Transaction highlights

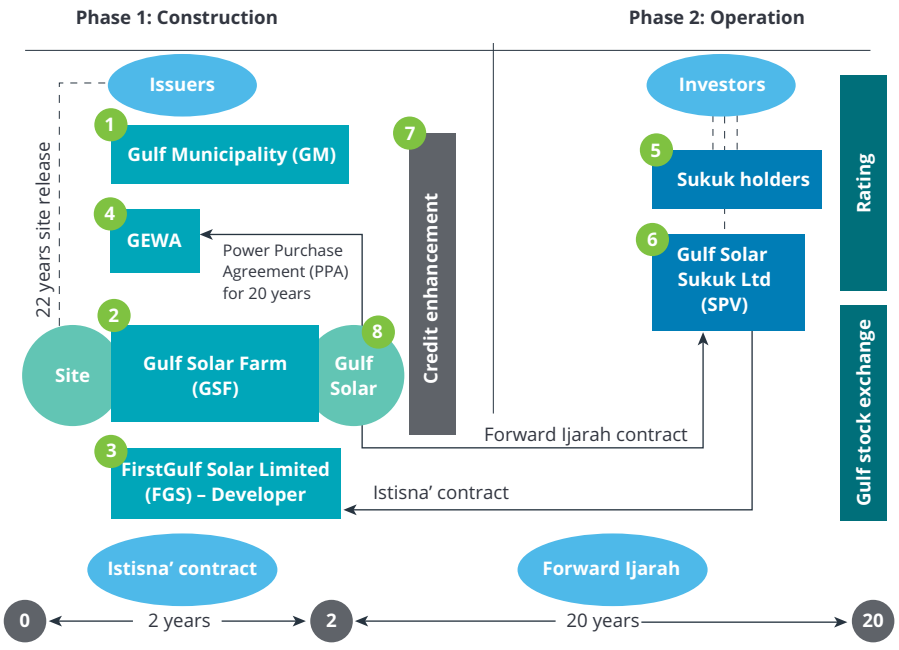
Construction phase

- A special purpose vehicle (SPV) will be set up to act as trustee of Sukuk holders (also known as investors).
- Gulf Solar Sukuk (SPV) signs an Istisna' contract with the project originator (GM), to construct the project asset (Gulf Solar Farm).
- A tech know-how developer (First Gulf Solar LTD) will deliver the project asset.
- Upon completion (two years), title and asset ownership pass to the Gulf Solar Sukuk (SPV).

Operation phase

- GM (the project originator) will also sign a Forward Ijarah with Gulf Solar Sukuk to lease the Solar Farm.
- The completion of the solar plant, Gulf Solar Sukuk (SPV) leases the solar farm to project originator (GM).
- Both parties are subject to a purchase undertaking where the project originator (GM) will repurchase the solar farm from the Gulf Solar Sukuk (SPV).

Figure 15: A proposed project structure of Gulf Solar Sukuk of US$ 100 million



1. Asset originator (GM)
2. The project asset (GSF)
3. Developer (FGS LTD)
4. Electricity distributor–off taker (GEWA)
5. Financers (Sukuk holders)
6. Special Purpose Vehicle (SPV)
7. Credit enhancement institution
8. Service manager (Gulf Solar)

Business practice and support initiatives

The following table highlights key government and financial institutions providing business, technical and financial support to MENA, Asia and Europe:

MENA	Asia	Europe
Business practice		
Saudi Arabia • King Abdullah Center for Atomic and Renewable Energy (KACARE) • Renewable Energy Project Development Office (REPDO) • Saudi Arabia Solar Industry Association (SASIA) • Saudi Standards, Quality and Metrology Organization (SASO) **UAE** • International Renewable Energy Agency (IRENA) • Abu Dhabi Future Energy Company (Masdar) • Dubai Supreme Council of Energy • Middle East Solar Industry Association (MESIA) • Clean Energy Business Council MENA (CEBC) • Ras Al Khaimah Research and Innovation Centre (RAK-RIC) **Bahrain** • Sustainable Energy Unit (SEU) • National action plans for renewable energy (NREAP) **Jordan** • Jordan Enterprise Development Corporation (JEDCO) **Morocco** • Moroccan Agency of Sustainable Energy (MASEN). • National Agency for the Development of Renewable Energy and Energy Efficiency (AMEE) • Moroccan Association of Solar Industries and Windmills (Amisola). • Research Agency for Solar Energy and Renewable Energies (IRESEN)	**Malaysia** • Malaysian Photovoltaic Industry Association (MPIA) • Centre for Education and Training in Renewable Energy and Energy Efficiency (CETREE), University Science Malaysia, Penang. **Indonesia** • USAID's Indonesia Clean Energy Development (ICED) • Indonesia Renewable Energy Society (METI) • Energizing Development (EnDev) **Pakistan** • Pakistan Solar Association (PSA). • Econoler, IRG & USAID – Pakistan • Alternative Energy Development Board (AEDB) • Renewable & Alternative Energy Association of Pakistan (REAP)	**Europe** • ESTELA: European Solar Thermal Electricity Association • European Renewable Energy Council • IEA - International Energy Agency • European Photovoltaic Industry Association • European Solar Thermal Industry Federation • International Solar Energy Society (ISES) • European PPP Expertise Centre (EPEC) **Turkey** • Renewable Energy Development and Information Centre (YEGEM) • Turkish Energy Foundation • Ege University- Solar Energy Institute • Istanbul Technical University – Energy Institute – Solar Car Team • Scientific and Technological Research Council of Turkey – Energy Institute
Financial initiatives and policies		
Saudi Arabia • Taqnia Energy- KSA • Saudi Arabia's Public Investment Fund (PIF) **UAE** • Abu Dhabi Fund for Development (ADFD) • Dubai Green Fund (DGF) • Mubadala Investment Company **Bahrain** • First Energy Bank – Bahrain **Jordan** • Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) • Higher Council for Science and Technology Industrial Research and Development Fund	**Malaysia** • Green Technology Financing Scheme (GTFS) • GreenTech Catalyst Sdn Bhd **Indonesia** • Indonesian Infrastructure Guarantee Fund • PT Indonesia Infrastructure Finance • Indonesian Independent Power Producers Association • Indonesia Solar Energy Lending Program (ISL) • Asia Development Bank (ADB) **Pakistan** • Meezan Bank	**Europe** • European Investment Bank **Turkey** • The European Bank for Reconstruction and Development (EBRD) **Kazakhstan** • Kazakhstan Renewable Energy Financing Facility (KazREFF)

Conclusion

Key messages

Balanced commercial and social financing strategy

Financing solar and renewable energy projects in countries studied are challenged with environmental and climate set of rules such as responsible investment guidelines, green energy principles, sustainable finance, social impact attributes and investment governance, more than ever. Success in achieving a balanced commercial and social financing strategy will require inclusive industry stakeholders partnerships that embrace sustainable finance and responsible investment.

New innovative project financing strategies

Governments and private sector enterprises are under increasing pressure to provide sustainable and competitive energy prices to meet growing economies and energy demands. This will require new innovative project financing strategies to access a diversity of international investors and perhaps tap into Islamic financial Institutional investors.

Disruptive innovation and sustainable finance

Energy and solar companies need to be mindful of the disruptive technological and regulatory and policy reforms which are shaping the industry investment space, and hence develop commercially viable and sustainable financing structures.

As this report illustrates, solar energy developers and investors alike now have enviable structures of Islamic finance to boost growth of green energy in the countries we studied. The drive for more Sukuk and other Islamic financing structures such as Murabah, Ijarah and Mudaraba in greenfield projects will continue to play a key role in the solar industry investment landscape.

UAE and KSA collectively will be leading the GCC region with maximum number of solar projects currently active or announced by their key industry players, followed by Bahrain and other nations.

Jordan and Morocco have started reversing their energy mix toward Renewable Energy (RE) after realizing its potential in coming years. A similar approach is observed by Indonesia and Malaysia as well to continue with their sustainable energy development plan.

The increasing acceptance and the adoption of Islamic finance across the countries studied, indicated that both energy operators and investors are taking advantage of the equity-based financing model. Different Shariah-compliant financing structures have been used for different phases of solar projects. In particular, Sukuk stands out as a popular asset class amongst international investors.

Due to such available offerings, both developers and investors have implemented Islamic financing strategies in their project financing and plant investments, thereby boosting their acceptance levels across the world. Many international agencies have started to reap the benefits offered by Shariah compliant financing options which lowers their debt to equity ratios for capital intensive projects.

Hence, in the coming few years, Islamic finance will be considered as one of the primary financing strategies and in particular, in the GCC, Jordan, Egypt, Malaysia, Indonesia and Pakistan. Other countries will follow suit as the market matures and become a driver of green economy in these regions.

In the coming few years, Islamic finance will be considered as one of the primary financing strategies.

Appendix A: Growth drivers and market dynamics

To increase traction for sustainable investment in renewables, IRENA, being a global renewable agency, anticipated strong foreseeable growth for RE projects in the Middle East and as a result, collaborated with the Abu Dhabi Fund for Development (ADFD) to support replicable, scalable and transformative projects in developing countries. ADFD committed US$ 350 million in concessional loans, over seven annual funding cycle, to renewable energy projects recommended by IRENA.

Some of the projects supported by IRENA are listed below:

Country	Name of project	Capacity (MW)	Loan Value (US$ million)	Project description
Guyana	Hinterland Electrification Programme	5.2 MW	US$ 8 million	Project by Ministry of Public infrastructure to install grid-connected solar PV systems; Benefit targeted at 34,700 people
Togo	Dapaong 30 MW Solar Project	30 MW	US$ 15 million	Project by Togolese Rural Electrification and Renewable Energies Agency to construct 30 MW project; benefit targeted at 700,00 people
Mauritius	Solar power kit	10 MW	US$ 10 million	Project by Central Electricity Board to install grid-tied solar PV systems on rooftops of low-income households; Benefit targeted at 30,000 people
Rwanda	Ignite Rwanda	7.5 MW	US$ 15 million	Project by joint venture between Ignite Power and Government of Rwanda to distribute and install 500,000 solar home systems through an affordable payment scheme; Benefit targeted at 2.5 million people
Niger	Rural electrification of 100 villages	2.1 MW	US$ 10 million	Project by Government of Niger to install solar PV mini-grids and individual solar home systems in 100 isolated villages
Republic of the Marshall Islands	Renewable/Hybrid Microgrid Portfolio	4.6 MW	US$ 11 million	Project by Government to install Solar PV mini-grids on four islands; Benefit targeted at 15,000 people
Seychelles	Ile de Romainville Solar Park	5 MW	US$ 8.5 million	Project by Government of Seychelles to install solar PV plant integrated with an existing wind farm
Antigua and Barbuda	Transformation and Resilience Building of the Water Sector	4 MW	US$ 15 million	Project by Government to install hybrid solar PV and wind project
Burkina Faso	Rural Electrification Project	3.6 MW	US$ 10 million	Project by Government to install solar plant; Benefit targeted at 12,400 households
Cabo Verde, Island of Brava	100% Renewable Energy Island Solution	2 MW	US$ 8 million	Project by Government to install hybrid wind and solar PV project
Senegal	Renewable Energy for Rural Electrification	2 MW	US$ 13 million	Project by Government to install solar mini-grid project; Benefit targeted at 100 remote villages
Cuba	Grid connected Solar PV Project	10 MW	US$ 15 million	Project by Government to install solar PV mini-plants; Benefit targeted at 5,300 people
Mali	Hybrid Renewable Energy Systems for Rural Electrification	4 MW	US$ 9 million	Project by Government to install solar power mini grids; Benefit targeted at 120,000 people
Sierra Leone	Freetown Solar Park	6 MW	US$ 9 million	Project by Government to install solar power plant; Benefit targeted at 15,000 people

Source: IRENA

Country case 1: United Arab Emirates

UAE

Solar energy sector in UAE

Overview

The key drivers for the growth of the UAE solar sector are large scale government sponsored solar energy projects and a strong sovereign credit rating offering low risk for Independent Power Producers (IPPs) with Power Purchase Agreements (PPA).

IPPs generate significant majority of Abu Dhabi's electricity wherein government utility companies tend to be significant equity-holders in these IPPs.

The UAE's solar-power plants are mostly built on an IPP model, typically having 25-year power purchase agreements.

The UAE has incorporated Shariah-compliant finance as co-investment to large projects mostly financed through conventional project finance.

Economic indicators

Country GDP

US$ 382.575 billion

GDP (World Bank, 2017)

Population

9,400,145 million

Total population (World Bank, 2017)

Industry statistics

- Installed renewables-based capacity (IRENA, 2018): 589 MW
- Share of renewables in total installed power generation capacity (IRENA, 2018): 2%
- Project pipeline as of November 2018: 3.14 GW solar power (PV and CSP) by 2020
- Renewable energy investment in 2017: US$ 2.2 billion

Key industry players

- Dubai Electricity & Water Authority (DEWA)
- Emirates Water and Electricity Company (EWEC)
- Abu Dhabi Future Energy Company (Masdar)
- Dubai Supreme Council of Energy

Key solar projects

Dubai

- Mohammed Bin Rashid Al Maktoum Solar Park

Abu Dhabi

- Noor Abu Dhabi, Sweihan (solar PV).
- Shams (CSP)

Key industry growth drivers

- Large scale government sponsored solar energy projects
- Favorable government policies
- Introduction of the new concepts of PPAs and IPPs and international solar operating firms
- Growing industrial base in the country
- Favorable and conducive investment guidelines

Industry highlights

- The UAE solar sector is expected to enjoy rapid growth, strengthened by ambitious government targets and a regulatory environment attractive to project financiers.
- The UAE's solar production has tripled since 2015, and now approaches 1 GW.
- Emirates Water and Electricity Company (EWEC) has replaced Abu Dhabi Water and Electricity Company (ADWEC) and will be under the umbrella of Abu Dhabi Power Corporation.
- Each of EWEC, DEWA and Sharjah Electricity and Water Authority (SEWA) are mostly free to adopt their own policies for solar power, Abu Dhabi and Dubai, have become regional leaders for the solar energy sector.
- Abu Dhabi and Dubai have attracted the world's lowest bids for solar energy generation. Private players are eager to take advantage of the huge size of the country's planned solar farms, and the country's reliable IPP model.

Regulatory development and policies

- Dubai has established one of the world's most effective regulatory environments to cultivate the growth of the solar-energy sector.
- All the solar IPPs in the UAE are backed by a government guarantee from the relevant Department of Finance (DOF). Without this guarantee, the projects will be a lot less bankable.
- Dubai has issued regulation targeted to achieve this goal including a mandate that all new buildings must heat 75% of water by solar energy. The Emirate's Shams Dubai initiative is promoting small-scale urban solar generation and has already developed 18.7 MW of rooftop solar generation. Through the Shams Dubai initiative, the city is hoping to increase rooftop and small-scale solar generation.

Financiers and investors

Name of project	Investment value	Capacity	Project period	Project description
Mohammed bin Rashid Al Maktoum Solar Park	–	Total capacity 5GW, Phase 3 of 800 MW	2012-2030	Project was awarded to a consortium between Masdar, and EDF partnering with DEWA with bid value at US$ 0.0299/kWh
Noor Abu Dhabi plant	US$ 3.2 billion	1,117 MW	Up to 2019	Project was awarded to DEWA and a consortium of Japan's Marubeni Corp and China's JinkoSolar Holding

Industry initiatives

- In January 2019, the Khalifa University of Science and Technology, the Abu Dhabi Transmission and Dispatch company (TRANSCO) and the Manitoba Hydro International (MHI) of Canada, signed a collaboration agreement for building an industrial-level software to monitor, predict, and interact with network operators in real time and enable renewable energy integration with the UAE power system.

Opportunities

- The country's clean-energy targets rank among the world's most ambitious, aiming to achieve 24% clean-energy generation by 2021, with solar-power as the second-largest source of clean-energy power after nuclear.
- The UAE has already made significant progress towards these goals, tripling solar-energy generation since 2015.

Islamic finance potential in the solar energy sector

Type of Islamic Finance	Name of project	Size of investment	Islamic lenders	Acceptance level of Islamic finance	Investment type	Description
Istisna Ijarah	800 MW - Mohammed bin Rashid Al Maktoum project	A US$ 242 million Islamic loan A US$ 2.84 million Islamic standby facility	Apicorp and IsDB were the sole lenders in the Islamic tranche	High	Co-investment	• The US$ 940 million financing will be used for the development of the third phase of the Mohammed bin Rashid Al Maktoum solar photovoltaic power plant in Seih Al-Dilal, around 50 km south of Dubai. • The deal includes : - A US$ 242 million Islamic loan - A US$ 2.84 million Islamic standby facility

Main hurdle is lack of liquidity among Islamic banks, However, UAE government's support for Shariah-compliant project finance will increase its investment appeal among investors

Source: IJ Global, Mohammed bin Rashid Al Maktoum Solar PV Phase III (800MW), February 2019

Country case 2: Kingdom of Saudi Arabia (KSA)

KSA

Solar energy sector in KSA

Overview

The Kingdom of Saudi Arabia (KSA) represents an attractive market for renewables due to its market size, resource potential, land availability and high-energy demand.

Power demand in the Kingdom is growing 8% annually, forcing state-run Saudi Electricity, the Gulf's largest utility company, to spend billions of dollars on projects to add capacity. The solar power market in Saudi Arabia is in the growth stage driven by rapid growth in electricity demand.

The development of Saudi Arabia's solar energy sector is one of the primary objectives of Vision 2030. In February 2017, the Kingdom launched the National Renewable Energy Programme (NREP), administered by the newly created Renewable Energy Project Development Office (REPDO).

Economic indicators

Country GDP

US$ 683.738 billion

GDP (World Bank, 2017)

Population

32,938,213 million

Total population (World Bank, 2017)

Industry statistics

- Installed renewables-based capacity (IRENA, 2018): 142 MW
- Share of renewables in total installed power generation capacity (IRENA, 2018): 0.2%
- Project pipeline as of November 2018: 700 MW wind and solar PV power by 2019/2020

Key industry players

- Saudi Electricity Company (SEC)
- King Abdullah City for Atomic and Renewable Energy
- Renewable Energy Project Development Office (REPDO)
- ACWA Power

Key solar projects

- Sakaka (Solar PV)
- Waad Al-Shamal (CSP)
- Solar energy plan - 3 GW consisting of 30 solar and wind projects
- New Taif energy project
- NREP Round 2 projects (12 projects over 7 sites)

Key industry growth drivers

- Rising domestic oil consumption
- Young citizens' entry into job market
- Reduced solar panel production costs
- Increasing demand for energy sources to deliver strategic infrastructure projects
- Government and policy support
- Strong industrial base such as oil and gas and petrochemicals
- Access to governments specialized funds

Industry highlights

- The solar power market in Saudi Arabia is in the growth stage driven by rapid growth in electricity demand.
- KSA has a pipeline of 12 projects for 2019 with the biggest one having a 600MW capacity. (Announced by REPDO in Jan 19).
- The NREP will target 700 MW, 1.02GW and 1.73GW respectively across the three rounds starting 2017. The NREP will target a further 6.05GW by 2023.
- It has targeted to develop 3.45 GW of renewable energy by 2020 under its National Transformation Program as well as developing 9.5 GW which is ~10% of total capacity of renewable energy capacity by 2023. This will be done through 60 projects, investing between US$ 30 billion and US$ 50 billion, with solar power as primary segment.

Regulatory development and policies

Saudi Arabia's Vision 2030 and the National Transformation Program (NTP) clearly outline ambitious renewable energy goals under the King Salman Renewable Energy Initiative.

- The Renewable Energy Project Development Office (REPDO): established to oversee the country's renewables program, chose the bids submitted by the local developer and Japanese engineering firm over the world's cheapest bids for a solar project submitted by a consortium led by Abu Dhabi clean energy firm Masdar and its French partner EDF.
- The Electricity and Cogeneration Regulatory Authority in Saudi Arabia (ECRA) has prepared a Small Photovoltaic Solar System Regulation, setting out the framework for the connection of Small Scale Solar PV Systems to the Distribution System.
- SASO adopts new IEC standards: Saudi Standards, Quality and Metrology Organization (SASO) signed technical cooperation agreements with Saudi Aramco and SEC in 2016 to collaborate on energy efficiency and consumption rationalization programs, and to exchange experiences in the development and management of engineering standards.
- Saudi Arabia issues rules for small-scale solar energy generation: In 2017, Saudi Arabia has issued a regulatory framework for electricity consumers to operate their own, small-scale solar power generating systems and export unused power to the national grid. The rules will cover small photovoltaic facilities with generating capacity of no more than 2 MW. Consumers will have their excess electricity offset against their future consumption and after a year, they will receive cash payments at a tariff approved by the authority.

Financiers and investors

- A memorandum of understanding (MOU) has been signed between the Crown Prince of Saudi Arabia and Japan-based SoftBank founder Masayoshi Son to establish the world's largest solar PV energy project by 2030.

Industry support

- In January 2019, King Abdullah City for Atomic and Renewable Energy (KACARE) signed a MoU and partnership with the Saudi Technical Institute for Electricity Services in Riyadh. The agreement entails cooperation for training and development in the field of renewable energy and benefiting from the existing capabilities and expertise of both parties.
- In January 2019, Saudi Arabia announced plans to develop a US$ 2 billion solar and carbon black integrated complex in the heart of the Kingdom. The deal was struck between Saudi Arabia's National Industrial Clusters Development Program (NICDP) and the Kingdom's diversified manufacturing company SABIC, in partnership with China's Longi and South Korea's OCI.

In January 2019, Saudi Arabia announced plans to develop a US$ 2 billion solar and carbon black integrated complex in the heart of the Kingdom.

Challenges and opportunities

Opportunities	Challenges
1. Easy availability of finance	1. Uncertainty of large projects
2. Significant investment in value chain	2. Solar prices competiveness
3. Presence of key players	3. High capital expenditure
4. Feed-in-tariff	4. Large installation area

Country case 3: Kingdom of Bahrain

Kingdom of Bahrain

Solar energy sector in Bahrain

Overview

The Kingdom of Bahrain is a small-scale producer of crude oil, refined oil products and natural gas with its energy sector largely dependent on fossil fuels.

However, the government foresees the need to diversify its energy supply in the near future. As a result, Bahrain has an installed electricity generating capacity of nearly 4 GW, of which just 6 MW stems from renewable sources (5 MW of solar PV and 1 MW of wind).

Rapid population growth and industrial development are the main drivers of the increase in power demand, which is addressed by expanding existing conventional power plants to supply residential and industrial end users, such as Aluminum Bahrain (Alba).

Economic indicators

Country GDP

US$ 35.307 billion

GDP (World Bank, 2017)

Population

1,503,091 million

Total population (CBB, 2018)

Industry statistics

- Installed renewables-based capacity (IRENA, 2017): 6 MW
- Share of renewables in total installed power generation capacity (IRENA, 2017): 0.1%.
- Project pipeline as of November 2018: 100 MW solar PV power by 2019
- Solar energy target 2025 (MESIA): 255 MW (PV) and 700 MW (2030) (Renewables)

Key industry players

- Bahrain petroleum company (Bapco)
- Electricity and water authority (EWA)
- Tatweer petroleum
- National oil & Gas authority
- KP smart solar energy Bahrain
- Solar One Bahrain

Key solar projects

- Bahrain PV Park
- Al Dur PV Plant and Al Dur Wind Farm
- Askar solar PV on a landfill

Key industry growth drivers

- Population growth and rapid industrial development
- Focused government approach for solar projects
- Conducive regulatory and investment environment
- Increasing demand for energy and power supply projects

Industry highlights

- The Kingdom's economic growth has been reinforced by a secure energy system, which has seen a corresponding growth in energy demand.
- As per the National energy efficiency plan, over the past twenty years, Bahrain's total primary energy supply grew by 4.2%, total final energy consumption grew by 5.3%, and non-industrial electricity consumption grew by 6.6% per year. The difference in demand and supply growth has placed increasing strain on the energy system. Currently the country's power generation system relies explicitly on natural gas, which is a scarce and diminishing resource.
- Integrating renewable energy in the energy mix can help Bahrain optimize the use of indigenous gas resources, reduce greenhouse gas emissions, make the economy more competitive, decrease electricity peak demand, and improve energy security in the long-term.

Regulatory development and policies

- Oil and gas accounts for majority of country's current consumption and exports, but several initiatives are undertaken to reach 255 MW of PV by 2025, as per National Renewable Energy Action Plan (NREAP), namely Net Metering – enacted in January 2018.
- The country has provided renewable energy-based mandates for buildings through tender based FiT schemes which will have rooftops of government buildings tendered in batches to harness solar energy.
- The government is working with local banks to encourage them to provide financial support to individuals willing to install solar plants and trying to increase public awareness about solar energy.
- To diversify the Kingdom's energy supply, the cabinet adopted the National Renewable Energy Action Plan (NREAP) and the National Energy Efficiency Action Plan (NEEAP) in early 2017. The NREAP highlights feasible renewable energy options for the country, and proposes targets, policies and initiatives for implementation. It sets a national renewable energy target of 5% by 2025 and 10% by 2035. The envisioned renewable energy mix comprises of solar, wind and waste-to-energy technologies. The NEEAP sets a national energy efficiency target of 6% by 2025. It aims for efficiency improvements in both energy supply and demand through 22 initiatives across all economic sectors (SEU, 2017).
- Bahrain economic vision 2030: Protecting our natural environment will include implementing energy-efficiency regulations (e.g., for buildings and electrical appliances); and directing investments to technologies that reduce carbon emissions, minimize pollution and promote the sourcing of more sustainable energy".

Financiers and investors

Name of project	Investment value	Capacity	Project period	Project description
Bahrain PV Park	US$ 360 million	100 MW	2019	Project is developed Bahrain Petroleum Company (BAPCO)
	US$ 720 million	200 MW	Not disclosed	Not disclosed
Al Dur PV Plant and Al Dur Wind Farm	US$ 17.18 million	Total 5 MW (Solar 3 MW)	Not disclosed	Not disclosed
BAPCO township of Awali	US$ 25 million	5 MW	Not disclosed	BAPCO plan to fund distributed power plant

Key initiatives

- Bahrain has identified seven key initiatives that can be implemented along with setting a target of 5% renewables in the energy mix by 2025 and to 10% by 2035
- In January 2017, the Bahrain cabinet approved the development of a 100 MW solar plant project in Bahrain
- A consortium comprising Saudi-based ACWA, Japanese contractor Mitsui & Company and Bahrain industrial conglomerate AlMoayyed has won the contract for the construction and operation of a 100 MW independent solar power plant in the Kingdom

Challenges and opportunities

- Bahrain faces several challenges in ensuring sustainability and security of its energy needs. These include its limited resources of fossil fuel compared with its neighbors; a very high per capita consumption of electricity & water and its international, regional and local commitments towards clean environment, energy efficiency and renewable energy.
  In addition, the size of the country represents a challenge as solar energy projects are space consuming.
- Therefore, there is a need to diversify its energy mix by resorting to renewable energy and energy conservation by improving efficiency measures.
- Abu Dhabi Future Energy emerged as one of the potential bidders for Bahrain's 100 MW solar project thereby, progressing on its efforts to reach the target of 5% renewables in the energy mix by 2025.

Country case 4: Jordan

Jordan

Solar energy sector in Jordan

Overview

Jordan relies heavily on imports for its energy resources to meet its domestic demand for fossil fuels. These imports account for more than 40% of the country's budget.

Jordan is one of many countries located in the Solar Belt region, creating great potential for harnessing solar energy. The average solar radiation ranges between 5 and 7 kWh per square metre (m2), which potentially equates to at least 1,000 GWh per year.

The country has developed a master strategy of energy sector for the period 2007-2020 in which the country targets 10% electricity generation from renewables by 2020, amounting to 1,850 MW, of which 800 MW is wind, 1,000 MW PV and 50 MW is waste-to-energy.

Economic indicators

Country GDP

US$ 40.068 billion

GDP (World Bank, 2017)

Population

9,702,353 million

Total population (World Bank, 2017)

Industry statistics

- The total capacity of installed renewable power generation in Jordan, excluding hydropower, is approximately 550 MW divided between solar PV (347 MW), wind (197 MW) and biogas (3.5 MW).(IRENA)
- Clean energy target (2020):10% of total energy mix, MESIA

Key industry players

- Jordanian Renewable Energy and Energy Efficiency Fund (JREEEF)
- Ministry of Energy and Mineral Resources
- The Jordan Chamber of Industry's Factories Support Program

Key solar projects

- 200 MW by direct proposal submission-stage I (12 projects, nine of which are at Ma'an, first quarter (Q1) 2016
  - 100 MW at Qweira/GCC Grant (2017)
  - 100 MW small-scale PV rooftops in pipeline

Key industry growth drivers

- Key country in solar-belt region
- Government subsidies
- Tax exemption
- Conducive regulatory and investment environment

Industry highlights

- As Jordan is highly dependent on fossil fuels, its government plans to boost electricity generation capacity from renewable sources up from the current 18 MW to 1.8GW by 2020, setting a target of 10% of primary energy demand from renewable energy by 2020. Jordan is in the process of adopting NEEAP and plans to achieve a 20% reduction of primary energy consumption by 2020.

- **Status of renewable energy in Jordan**

National renewable energy plans	Market potential	Industrial assets
• 10% renewables in power generation by 2020 (1,850 MW) • Renewable Energy and Energy Efficiency Law passed in 2012	• Implemented renewable energy projects (1,132 MW) by 2018 leading to O&M value creation • Net-metering • Feed-in tariff • Wheeling application and direct proposal submission	• Well established industrial sector • Expertise in numerous basic components

Source: IRENA, 2018

- In the short-to-medium term, the Government expects to construct the first concentrated solar power (CSP) demonstration project and is considering Aqaba and the south east of Jordan for this purpose.

Regulatory development and policies

Government support mechanisms

- The Government of Jordan (GoJ) is continuously improving the policy framework and has introduced different instruments to attract and increase private investments in the energy sector to operate various utility scale projects (AFEX, 2016). To meet its respective targets, the following instruments and mechanisms were implemented:

Mechanism	Description
Feed-in tariff	FiT especially for solar PV and CSP projects not exceeding 500 MW. The prices were described as a "ceiling tariff" without indicating any tranches in size.
Independent regulator	Fully unbundled power sector with separate ownership of generation, transmission, and distribution. In addition, private investors can partially own and operate utility scale RE power plants.
Subsidies reform	Jordan decreased subsidy reforms in electricity sector. Most effected businesses were Jordanian banks and hotels which an annual increase of 15% every year. Due to this dramatic tariff increase, many RE projects are expected to be deployed in these two sectors soon (AFEX, 2016).
Other supporting measures	Jordan has established rules specifying RE and EE systems will be able to qualify for full exemption from sales tax. Jordan also introduced scheme for submission of direct proposals for the development of utility scale RE projects to the GoJ, which provides guidance to identify appropriate sites for implementation (AFEX, 2016).

Financiers and investors

Previous and ongoing solar energy projects in Jordan

Technology	Previous and ongoing projects
Solar PV	• 35 MW of small-scale systems (2015) • 20 MW at Al Mafraq (2015) • 10 MW at Aqaba (2015) • 10 MW at Al Mafraq (2015) • 5 MW at Azraq (2015) • 200 MW by direct proposal submission-stage I (12 projects, nine of which are at Ma'an, first quarter (Q1) 2016, PPA signed between NEPCO and Masdar) - 200 MW by direct proposal submission-stage II north and east Jordan (2016-2017) - 100 MW at Qweira/GCC Grant (2017) • 100 MW small-scale PV rooftops in pipeline

Financial support

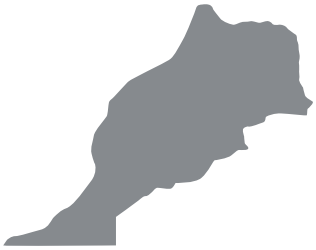
Name of institution	Description
JREEEF	• Designed to boost RE efficiency initiatives • Targets SMEs RE enterprises • Source fund from general budget, foreign investment and grants from GCC & EU • Covers interest rates and guarantees to loans for enterprises in partnership with the Jordan Guarantee Loans company
Jordan Enterprise Development Corporation (JEDCO)	• Support start-up and SMEs companies by allowing up to 80% of equity in their RE projects with a focus on industrial, service and agribusiness sectors • Require 10% return on profits
Jordan Chamber of Industry Factories Support Program	• Non-refundable capital subsidy for SMEs to install either solar PV or solar water heaters • Subsidy covers up to 35% of the product costs, if imported, and up to 50% if the product is Jordanian made
Higher Council for Science and Technology Industrial Research and Development Fund (IRDF)	• Provide grants up to EUR 32,792 for solar PV project

Challenges and opportunities

- Concentrated solar power (CSP): Potential investments in the installation of a CSP project, which would generate more than 250 MW of electric power in the Ma'an development zone.
- Solar PV - Opportunities for local manufacturing: Grid capacity and land access are two major challenges hindering the renewable energy deployment sector in Jordan. However, the National Electric Power Company (NEPCO) is planning to add a further 1 GW through the US$ 160 million Green Corridor project by the end 2019. The Ministry of Energy and Mineral Resources decided to delay the announcement of the successful bidder in Jordan's Round 3 PV and wind auction.

Country case 5: Morocco

Morocco



Solar energy sector in Morocco

Overview

Morocco imports around 91% of its energy demand which includes conventional resources such as crude oil and oil products, coal, natural gas and electricity.

The country has pledged to increase its RE capacity to 42% of total installed capacity by 2020 for a total of 6,000 MW and to 52% by 2030.

Morocco has an abundant source of solar energy, with an average solar potential of 5.5KWh/m2/day. To tap into this potential, the country launched the Moroccan Solar Plan in 2009, which foresees an increase in installed capacity of both concentrated solar power (CSP) and photovoltaics (PV) to 14% of total installed capacity, representing at least 2,000 MW by 2020.

Economic indicators

Country GDP

US$ 109,709 billion

GDP (World Bank, 2017)

Population

35,739,580 million

Total population (World Bank, 2017)

Industry statistics

- **Solar energy targets**
  (2020): 2 GW (Solar), MESIA
  (2030): 5 GW (Solar), MESIA

Key industry players

- ONEE (Office National de l'Electricité et de l'Eau Potable)
- Moroccan Agency for Solar Energy (MASEN)
- L'Association Marocaine des Industries Solaires et Eoliennes (AMISOLE)
- Ministry of Energy, Mining, Water and Environment (MEMEE)

Key solar projects

- Quarazate - 580 MW
- MIDELT – 600 MW
- TATA – 600 MW
- AIN BENI MAHTAR – 420 MW
- SEBKHATE TAH – 500 MW
- FOUM AL QUAD – 500 MW
- Boujdour – 100 MW

Key industry growth drivers

- Favorable and conducive investment guidelines.
- Focused approach by government
- Attractive investment destination

Industry highlights

- As of 2015, renewable energy in Morocco represented 32% of its capacity mix driven mainly by hydroelectricity and solar power. The country has pledged to increase its RE capacity to 42% of total installed capacity by 2020 for a total of 6,000 MW and to 52% by 2030.
- It has formulated a facilitative RE legal framework, through the declaration of RE law 13-09, which has opened the market for the production and commercialization of RE sources by public and private entities.

Noor Ouarzazate Solar Power Plant Project with power generating capacity of 580 MW uses both CSP and PV technologies wherein two of the power plants use parabolic trough power plants; one is a solar tower power plant and the other is a photovoltaic power plant.

Regulatory development and policies

- The Moroccan Government has been praised for the substantial efforts it has made to strengthen the legal and regulatory framework for developing renewables.
- Law No. 13-09 on Renewable Energy was promulgated in 2010, the aim of which is to deregulate the renewable energy sector in Morocco by providing a framework for private producers to produce and export green electricity. Depending on the capacity of IPPs, this law sets the subjugation of IPPs to a prior notification for generating capacity ranging between 20 kW and 2 MW, and a prior authorization for a capacity equal to or higher than 2 MW.
- The Moroccan Agency for Solar Energy MASEN (established in 2010) is responsible to ensure the implementation of the Moroccan Solar Plan which includes, managing the solar projects of the country, building a national expertise in the field of solar energy and playing a major role in developing energy policies on an international scale.
- The National Agency for the Development of Renewable Energy and Energy Efficiency aims to contribute to the implementation of government policy on renewable energy and energy efficiency.
- The Moroccan Association of Solar Industries and Windmills (Amisola) was created to promote the interests of industrialists and Moroccan professionals working in the renewable energy sector.
- A Research Agency for Solar Energy and Renewable Energies (IRESEN) was established in 2011 for carrying out R&D in the area of solar energy and renewables. The missions of IRESEN include:
  - Supporting R&D in renewable energy
  - Developing pilot installations and demonstration platforms
  - Transforming research activities into industrial outcomes

Financiers and investors

- To achieve its target, an investment of approximately US$ 9 billion was planned, involving several projects totaling to more than 3,00 MW.
- Noor Ouarzazate Solar Power Plant Project with power generating capacity of 580 MW uses both CSP and PV technologies wherein two of the power plants use parabolic trough power plants; one is a solar tower power plant and the other is a photovoltaic power plant.
- The Noor project was budgeted at a total cost of US$ 2.2 billion. The country's drive to develop a renewable energy industry and its stable government and economy helped in securing the necessary funding for the project.
- Key financiers included MASEN which issued green bonds for an amount of 1.15 billion dirhams (US$ 114.4 million), the German government-owned development bank Kreditanstalt für Wiederaufbau (KfW), World Bank, Clean Technology Fund, African Development Bank (AfDB), European Union, European Investment Bank (EIB), and Agence Française de Développement (AFD).

Country case 6: Malaysia

Malaysia

Solar energy sector in Malaysia

Overview

- Malaysia's location within the Sunbelt is one of the driving factors responsible for intensified awareness with average solar energy received is between 1400 to 1900 kWh/m2 annually with the highest solar radiation estimated at 6.8 kWh/m2.

As a result, Government of Malaysia provides immense boost for projects with either tax exemption of 100% on statutory income for ten years for a project or an investment tax allowance on qualified capital expenditure incurred to be set against 100% of statutory income for five years.

In 2016, 111 projects in renewable energy with total investments of RM 1.9 billion were approved. Out of the total, RM 1.7 billion (88%) were from domestic sources and RM 233.8 million (12%) were from foreign sources. These projects were expected to create 615 employment opportunities in this sub-sector.

Economic indicators

Country GDP

US$ 314,710 billion

GDP (World Bank, 2017)

Population

31,624,264 million

Total population (World Bank, 2017)

Industry statistics

- Malaysia has installed capacity of solar power at 15 MW in 2017

Key solar projects

- 81 projects - RM 588 million

Key industry players

- Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC)
- Energy Commission (EC)
- Sustainable Energy Development Authority of Malaysia (SEDA)
- Tenaga Nasional Berhad (TNB)
- SIRIM Berhad
- Yayasan Hijau Malaysia (YaHijau)
- Malaysian Green Technology Corporation (GreenTech Malaysia)

Key industry growth drivers

- Favorable Islamic finance structure
- Tax exemption offered by government for solar projects
- Great demand for solar power cells due to local economical production cost

Industry highlights

- Malaysian government introduced the National Green Technology Policy in April 2009 which provides guidance and create new opportunities for businesses and industries to bring a positive impact to the economic growth.
- Malaysian government has enacted the Renewable Energy Act in 2011 to implement the Feed-in-Tariff (FiT) system which enables individuals and companies to apply and become eligible producers and those who qualify are granted feed-in approvals by SEDA. The feed-in approval holder enters into a renewable energy power purchase agreement with the utility and all electricity produced thereafter enjoys guaranteed offtake by the utility.

Regulatory development and policies

The fundamental guide in the Energy Sector's development is based on the three principal energy objectives of the National Energy Policy of 1979, namely:

- **The supply objective:** to ensure adequate, secure and cost-effective energy supply through developing and utilizing alternative sources of energy (both non-renewable and renewable) from within and outside the country. The focus of policy initiatives, particularly with respect to crude oil and gas, were aimed at both extending the life of domestic depletable energy resources, as well as diversifying away from oil dependence to include other forms of fuel resources.
- **The utilization objective:** to promote efficient utilization of energy and discourage uneconomical and non-productive patterns of energy consumption.
- **The environmental objective:** to minimize the negative environmental impacts on the energy supply chain i.e. energy production, conservation, transportation and utilization.

Challenges

The use of renewable energy resources faces numerous challenges.

- Generation of energy from renewable resources is economically unattractive due to the availability of cheaper alternative energy and high cost of energy generation.
- Lack of reliable information on potential supply of renewable energy at the national level.
- Little traction for energy from the renewable resources due to weak public awareness on the positive attributes of renewable energy.

Financiers and investors

- The approved renewable energy investments include 81 projects (RM 588.8 million) that will generate energy from solar power, 12 projects (RM 145.7 million) from biogas, 10 projects (RM 806.6 million) from mini-hydro and six projects (RM 343.6 million) from biomass as the sources of energy generation.
- As of December 2017, 15.13 MW of Solar PV capacity has been installed in Malaysia, and there is a total of 354.21 MW installed capacity of Solar PV in Malaysia from 2012 to 2017, as shown in the below table.

	Investment installed capacity (MW) of commissioned installation value		Installed capacity (MW) of plants in progress	
	Other RE	Solar PV	Other RE	Solar PV
2012	62.66	31.54	0	0
2013	6.58	106.99	0	0.01
2014	13.6	64.87	0	0.04
2015	31	60.28	0	0.58
2016	46.96	75.4	2.4	3.57
2017	22.54	15.13	59.9	36.22
2018	0	0	180.36	2.23
2019	0	0	131.9	0
2020	0	0	183.69	0
Total	183.34	354.21	558.24	42.65

Key solar projects

Name of project/Company	Capacity	Project period	Project description
UMILE Ltd Liability Partnership Company	49 MW	Not disclosed	Planned to setup solar plant in Pasir Mas, Kelantan
Scatec Solar, ItraMAS, Maltech and Cam Lite	3 PV solar parks – 200 MW	Not disclosed	Along with Tenaga Nasional Berhad (TNB), planned to construct 3 PV plants in north, east and south region of Malaysia
Northwest Electric Power Design Institute (NWEPDI)	61 MW	2018	Signed EPC agreement with Malaysian PV developer UiTM Solar Power to construct Solar project in Rembau, Negeri Sembilan
Hanwha Energy Corp	48 MW	Not disclosed	Secured contract to build solar park in Perlis, Malaysia
BGMC International Ltd and Bina Puri Holdings Bhd	30 MW and 5 MW	Not disclosed	Secured contract to build solar PV in Kedah and Sabah region

Country case 7: Indonesia

Indonesia

Solar energy sector in Indonesia

Overview

The overall use of renewable energy constitutes about 12% of Indonesia's current energy mix with solar energy potential largely untapped contributing at less than 1% of the total energy mix.

Potential investors were deterred from entering the market in the past due to fuel subsidies, low electricity tariffs, logistical challenges, complex regulations, legal uncertainties, and the abundant supply of cheap coal & other natural resources.

The ambitious undertaking by the government to raise renewable energy sources to at least 23% of Indonesia's energy needs by 2025 (7% geothermal, 10% bioenergy, 3% water, and 3% other NREs) and 31% by 2050 certainly calls for significant investments from different stakeholders.

Economic indicators

Country GDP

US$ 1.016 trillion

GDP (World Bank, 2017)

Population

263,991,379 million

Total population (World Bank, 2017)

Industry statistics

US$ 1 billion

Total renewable energy investment

Key industry players

- Perusahaan Listrik Negara (PLN)
- The Ministry of Energy and Mineral Resources of the Republic of Indonesia (MOEMR)
- House of Representatives (Dewan Perwakilan Rakyat – DPR)

Key solar projects

- Plan to develop 5,000 MW of solar plants

Key industry growth drivers

- Favorable Islamic finance structure
- Abundant renewable resources
- Depletion of fossil energy resources
- High cost of oil-based energy generation
- National emission targets

Industry highlights

- Indonesia is the largest energy user in the ASEAN, accounting for nearly 40% of the market's total energy consumption. In a business-as-usual outlook, the country's energy consumption is expected to grow by another 80% by 2030.
- Indonesia's renewable energy sources are also considerable. The country is endowed with significant potential for hydropower (75,000 MW) while only 0.07% is being currently utilized; geothermal energy (29,544 MW) with only 5% being currently utilized; solar (207.8 GWp) with only a small amount of 16 MW being utilized; bioenergy (32,654 MW) with only 86.23 MW being utilized; wind (60.6 GW) and ocean (17.9 GW).
- In PLN's Electricity Business Plan 2017–2026 (known as the RUPTL), Indonesia plans to implement a program of "solar power plants for 1,000 islands/ locations". This program aims to develop solar photovoltaic (PV) power plants in remote islands and other locations facing transmission line expansion or transportation access issues. Under the RUPTL, the plan is to develop up to 5,000MW of solar power plants by 2025.

The ambitious undertaking by the government to raise renewable energy sources to at least 23% of Indonesia's energy needs by 2025 (7% geothermal, 10% bioenergy, 3% water, and 3% other NREs) and 31% by 2050 certainly calls for significant investments from different stakeholders.

Regulatory development and policies

- Several regulations have been issued on renewable energy for power plants, including solar energy, to help accelerate private sector development of solar power plants.
- One of these regulations includes Minister of Energy and Mineral Resources (MEMR) , who improved the incentives introduced in the 2013 policy, including the quota capacities and purchase tariffs, and revises the required level of local content in the development of solar photovoltaic plants.
- The MoEMR issued three new regulations in 2017 related to investment in the Indonesian power and New Renewable Energy (NRE) sector to further improve and accelerate investment flow in the industry. The regulations specifically tackle certain key areas of regulatory uncertainty relevant to the power sector.
  - Improves the risk allocation between PLN and independent power producers (IPPs) in power purchase agreements (PPAs)
  - Amends the maximum price payable by IPPs for natural gas
  - Utilization of New and RE for Electricity Supply relating to the purchase of electricity from renewable sources.

Financiers and investors

- The ambitious undertaking by the government to raise renewable energy sources to at least 23% of Indonesia's energy needs by 2025 (7% geothermal, 10% bioenergy, 3% water, and 3% other NREs) and 31% by 2050 certainly calls for significant investments from different stakeholders.
- The MoEMR in its Roadmap for Accelerated Development of New and Renewable Energy 2015-2025 expects that investment in the order of 1,600 trillion rupiah will be required by 2025 (475 trillion rupiah for geothermal, 645 trillion-rupiah bioenergy, 320 trillion rupiah for hydro, and 160 trillion rupiah for new energy).

Challenges and opportunities

The renewable energy sector still faces several challenges, including:

- Complex pricing mechanism
- Lack of research funding
- Insufficient finance especially lack of longer term lending from the banking sector
- Land procurement difficulties for developing large-scale power plant facilities
- Uncoordinated planning between ministries/agencies involved that impinges on the viability of specific projects
- Procedural delays in land acquisition and licensing that impede project implementation and raise the perception of risk for potential investors

In the recent years, there have been several incentives which aim at attracting more investment into the NRE sector such as:

- Feed-in tariffs that require PLN to purchase electricity from renewable energy producers at predictable prices (which vary from one area to the other).
- Government guarantees by the Indonesia Infrastructure Guarantee Fund (IIGF) that provide guarantees for the construction and operation of power plants in public-private partnerships (PPPs).
- Tax holidays and income tax reductions made available for renewable energy projects.

Islamic finance potential in the solar energy sector

Type of Islamic finance	Name of project	Investment value	Description
Sukuk	One Solar Watt Per Person Program	–	In 2012, two Brisbane-based solar companies, i.e. the Solar Guys International and Mitabu Australia proposed to fund its 250 MW of clean and renewable solar power project in Indonesia called 'One Solar Watt Per Person program' using Sukuk after securing a Memorandum of Understanding (MoU) with Indonesia's Ministry of Energy and Mineral Resources. The program was planned to deliver one watt of solar power for every man, woman and child in Indonesia.
Green Sukuk	Green projects ranging from renewable energy to waste management	US$ 1.25 billion	In February 2018, the Government of Indonesia, through its SPV Perusahaan Penerbit Surat Berharga Syariah Negara Indonesia, issued a 5-year Sukuk based on Wakalah Bil-Istithmar structure, the first global sovereign green Sukuk issuance.
Green Sukuk	More than half of the Sukuk's value was backed with state assets in the form of land and buildings as underlying assets, while 49% of the Sukuk's value was backed with ongoing or future infrastructure projects.	US$ 2.27 billion	In February 2019, Indonesia issues US$ 2.27 billion global green Sukuk. It marked the second time that the government banked on the global Sukuk market after it became the first sovereign green Sukuk issuer last year, which raised US$ 1.25 billion.

In the recent years, there have been several incentives which aim at attracting more investment into the NRE sector.

Country case 8: Pakistan

Pakistan

Solar energy sector in Pakistan

Overview

Pakistan's geography and location promises a huge natural potential for power production through Solar Energy generation.

NEPRA (National Electric Power Regulatory Authority) is the main federal regulator established in 1992 that issues licenses for every power project.

In Pakistan, there have been Islamic project financing structures for long term financing for the Energy Sector since 2011 (though mostly not for Renewable Energy).

For example, in 2015, Meezan Bank provided a rated listed Retail Sukuk for long term financing of PKR 22 billion (US$ 210 million) to Karachi Electric Ltd.

Economic indicators

Country GDP

US$ 304.952 billion

GDP (World Bank, 2017)

Population

197,015,955 million

Total population (World Bank, 2017)

Industry statistics

US$ 695 million

Total renewable investment

Key solar projects

- 24 solar projects – 556 MW

Key industry players

- The Alternative Energy Development Board (AEDB)
- National Electric Power Regulatory Authority (NEPRA)
- Private Power Infrastructure Board (PPIB)
- National Transportation and Dispatch Company (NTDC)
- Central Power Purchasing Agency (CCPA)

Key industry growth drivers

- High mean sunshine per day
- Large number of favorable government policies for energy sector
- Growing Islamic finance sector

Industry highlights

- Pakistan's tremendous natural solar potential is best described by the high Global Horizontal Irradiation (GHI) figures observed in its different provinces, with the highest being in Sindh, Balochistan and Punjab.
- Pakistan is a developing Muslim country with a growing Islamic finance industry, and has tremendous resource potential for solar, wind, hydro and biogas projects. Frequent power shortages (of up to 6000 MW) are listed as one of the primary hindrances for its industrial productivity, and yet less than 1% of its electrical power is generated by renewable means (other than hydro). The government of Pakistan has announced Islamic financing as their priority for financing infrastructure projects and has set a target of producing 5% of the country's energy needs using renewables by 2030.

Regulatory development and policies

Name of authority	Functions
NEPRA (National Electric Power Regulatory Authority)	• Main federal regulator • Issues licenses for power project • Regulatory framework for competitive environment • Formulate tariff for electric power
PPIB (Private Power Infrastructure Board)	• Window Facilitator to promote private sector participation • Facilitates investors in launching power sector projects • Executes Implementation Agreements (IAs) with project sponsors and issues sovereign guarantees on behalf of the Government of Pakistan
Alternative Energy Development Board (AEDB)	• Representing agency of the Pakistan Federal government, offers Federal Government guarantees to projects initiated under provincial Letter of Intent (LOI)
Energy Department of the Government of Sindh (referred to as GOSED)	• Generate, supply and distribute renewable, hydro and thermal energy. GOSED is also responsible for prospective planning, policy formulation and conservation strategies
Central Power Purchasing Agency (CCPA)	• Responsible for implementing and administering the 'Single Buyer Plus' market mechanism in Power agreements, to lead to competitive market operations
NTDC (National Transportation and Dispatch Company)	• Main Grid Supplier in Pakistan

Pakistan is a developing Muslim country with a growing Islamic finance industry, and has tremendous resource potential for solar, wind, hydro and biogas projects.

Financiers and investors

- It is proposed that Sukuk structures for Renewable Energy (including solar energy) financing need to be developed.
- Note that, in Pakistan, there have been Islamic project financing structures for long term financing for the Energy Sector since 2011 (though mostly not for Renewable Energy).
- With the efforts of Econoler and its Client, IRG (International Resource Group), and funding from USAID, the 3-year Energy Efficiency and Capacity (EEC) project was launched in Pakistan.
- The EEC project will identify potential firms, which can become ESCOs (Energy sector contracting services for RE/energy efficiency) in Pakistan. Post that, the objective is to competitively select best suited entities to provide energy efficiency to private and state-owned industries and aid them with managerial and technical staff trainings.

Challenges

- Some of the key challenges to Solar financing via Islamic finance structures, in Pakistan, are explained below:

The relative cost of Solar energy production in Pakistan:

- Although Pakistan's Alternative Energy Development Board (AEDB) does offer facilitation to IPPs to obtain NEPRA licenses for solar and wind power projects, and offers several incentives to private producers (such as tax cuts, duty waver on imported machinery, guaranteed government purchase etc.), a key challenge in Pakistan is that without government subsidies, the cost of Solar or Wind generated electricity is significantly higher than that of other sources.
- The fact is that investors in Renewable Energy demand high ROI to compensate for high risk of solar projects. RE solar projects typically have huge Capex costs (are capital intensive), and much of the parts and infrastructure need to be imported.

Islamic finance potential

- In April 2016, Pakistani banks arranged a ten-year Islamic Sukuk worth US$ 955 million for a hydropower plant, the largest-ever energy deal using Islamic financing in the country so far.
- This landmark energy Sukuk could be a door opener for more to come and Sukuk will be seen as a catalyst project financing method for green economy in the country and elsewhere in the World.

This landmark energy Sukuk could be a door opener for more to come and Sukuk will be seen as a catalyst project financing method for green economy in the country and elsewhere in the World.

Islamic finance potential in the solar energy sector

Type of Islamic finance	Name of project	Investment value	Description
Retail Sukuk	Not disclosed	PKR 22 billion	Meezan bank provided fund to Karachi Electric Ltd in 2015
Sukuk	Not disclosed	• PKR 5.5 billion • PKR 6 billion • PKR 13.73 billion	MBP provided series of funds to • Lalpir Power Ltd (2013 & 2014) • KAPCO Ltd (2011, 2012 & 2013) • Hub Power Co Ltd (2011, 2012 & 2013)
Not disclosed	Not disclosed	PKR 9.83 billion	Meezan bank provide syndicated finance to Hartfod Alternative Energy Ltd for Wind power-based production
Sukuk	Not disclosed	PKR 2 billion	MBL offered sukuk based finance to Lalpir Pvt Ltd
Not disclosed	Not disclosed	• PKR 39.8 billion • PKR 54.67 billion	MBL offered syndicated project finance to below companies • Sui Southern Gas Company • Sui Northern Gas Pipeline

Country case 9: Turkey

Turkey

Solar energy sector in Turkey

Overview

According to the Solar Energy Potential Map for Turkey published in 2008, the total potential is above 500 GWh.

The total number of solar energy plants as of July 2017 was 1773. As of September 2017, the total installed capacity was 2,246 MW. The biggest plant is the one that is operated by Kayseri Organized Industrial Center with an installed capacity of 50 MW.

Turkey already has an Islamic banking sector, which provides financing solar energy projects through Islamic finance. For instance, Turkiye Finance Participation Banks provides funds for the procurement of the equipment to be used in construction of solar plants with concessional terms as well as with maturities up to five years.

Economic indicators

Country GDP

US$ 851.549 billion

GDP (World Bank, 2017)

Population

80,810,525 million

Total population (Turkstat, 2017)

Industry statistics

US$ 2.2 billion

Renewable energy investment 2017

Key industry players

- Ministry of Energy
- EMRA (EPDK)
- EUAS (Electricity Generation Company – EGC)

Key solar projects

- More than 1,773 solar plants

Key industry growth drivers

- Established Islamic finance structure
- Enabling regulatory environment
- Growing industry infrastructure and institutions
- Government and policy support
- Strong manufacturing industries
- Increasing demand for alternative energy supplies
- Access to MDB's capital such as European Bank for Reconstruction and Development (EBRD)

Industry highlights

- Demand for energy and natural resources increases due to a growing economy and the population growth in Turkey. Over recent years, Turkey has seen the fastest growth in energy demand in the OECD, and according to IEA forecasts, is set to double its energy use over the next decade.
- Turkey is a net energy importer country, depending on such imports for 73% of its energy needs. This high rate of energy dependence has been the main driving force behind the formulation and implementation of new policies to commission local and renewable energy resources.
- Most of the plants are unlicensed ones with capacity equal and below one MW. Recently, the Minister of Energy has announced that the 10-year target is to install 10 GW solar energy capacity.

Regulatory development and policies

- The regulatory infrastructure for energy as well as solar energy market in Turkey consists of legal arrangements with institutions. There are laws on electricity natural gas, petroleum, LPG, renewable energy, nuclear power plants and geothermal energy markets which are applied via the support of few bylaws and communiques that are guided by the decisions of the Council of Ministers and/or High Planning Council and Ministry of Energy. In addition, the Energy Market Regulatory Authority (EMRA) has the mandate to make secondary regulations for and to supervise energy markets.

Challenges

- Macro-risks
- High installation and operation costs
- Technological over-dependence on foreign resources
- Limited knowhow
- Need for increased government support

Financiers and investors

Name of project/ Company	Investment value	Capacity	Project period	Project description
Solar plant in Konya – Kayapınar	US$ 1.3 billion	1,000 MWh	Not disclosed	In 2017, Kalyon-Hanwha Group consortium won tender to build solar project in Konya Kanyapnar
Four solar plants	Not disclosed	950 KWh	Not disclosed	Metropolitan Municipality of Antalya launched SP plant to be used for irrigation
Six solar plants	Not disclosed	1.44 MWh	Not disclosed	Metropolitan Municipality of Izmir announced to install sic SP plants
Buyukcekmece plant	Not disclosed	250 KWh	Not disclosed	Metropolitan Municipality of Istanbul will install SP plant

Islamic finance potentials

- Islamic finance with its asset-based structure, which promotes risk sharing, might be a viable alternative for financing Solar energy projects.
- The Mudharabah and Musharakah financing structures seem to be an appropriate for solar energy projects.
- In addition, Istisna' as well as Ijarah structures may also be used for solar energy production purposes.
- For instance, Turkiye Finance Participation Banks provides funds for the procurement of the equipment to be used in construction of solar plants with concessional terms as well as with maturities up to five years.
- Solar energy projects can be regarded as infrastructure projects for the financing of which Sukuk may be an appropriate tool.

Proposed Islamic finance transactional features

Issuance	Issue price	US$ 1 billion
Transaction terms	Tenor	Proposed a 10-year tenor
	Coupon rate	Proposed periodic payment: Change in Energy Price Index + 4% Payable semiannually
	Payments	Settlement options
	Currency	US$
	Underlying asset	Solar Energy Plants with capacity of 1GW to be produced in Konya, Karman and Antalya Regions of Turkey
Regulatory and legal	Governing law	British Law and Turkish Law
	Listing	Borsa Istanbul
	Regulatory approval	Listing Requirements as suggested by Capital Markets Board of Turkey, Borsa Istanbul
	Regulations	Subject to the regulations of the locations where the Sukuk is listed

Country case 10: Kazakhstan

Kazakhstan

Solar energy sector in Kazakhstan

Overview

The current total cumulative installed capacity of solar energy in country is approximately 0.5 MW with 28 solar power stations with total capacity of 713.5 MW planned by 2020.

The country's electric power potential is represented by 76 power plants with an installed capacity of 20.5 GW as of 2013, including thermal power plants, hydroelectric power, wind power, and solar power plants at 0.5 MW.

There is clear evidence of government's awareness and explicit strong commitment to support renewable energy. Favorable policies and regulation for renewable energy generation, including feed-in tariffs and tax reductions present favorable conditions for external investors.

Economic indicators

Country GDP

US$ 162.887 billion

GDP (World Bank, 2017)

Population

18,037,646 million

Total population (World Bank, 2017)

Industry statistics

- Total solar energy– 0.5 MW power plant

Key industry players

- The Ministry of Industry and New Technology
- Kazatomprom JSC

Key solar projects

- 0.5 MW power plant
- 28 solar power plants planned by 2020 with total capacity of 713 MW

Key industry growth drivers

- Established Islamic finance
- High solar radiance range

Industry highlights

- Renewable sources such as wind, solar, small hydro and bioenergy currently contribute less than 1% of Kazakhstan's energy mix.
- There is considerable potential in renewable power generation and the government expects the total share of renewable power generation to rise to 11% by 2030 with 1,040 MW of renewable energy capacity by 2020.
- The recent economic growth increased demand for additional energy in order to ensure economic growth. In this context, the use of renewable resources to cover the gap between supply and demand becomes attractive.
- Kazakhstan has areas with high insolation that could be suitable for solar power, particularly in the south of the country, receiving between 2200 and 3000 hours of sunlight per year, which equals 1300-1800 kW/m² annually.
- Both concentrated solar thermal and solar photovoltaic (PV) have potential. There is a 2 MW solar PV plant near.

Regulatory development and policies

- The Law "On Support of Usage of Renewable Energy Resources", July 2009, provides state support for green energy producers. It provides state incentives for producers of renewable energy.

Islamic finance potentials

- There is clear evidence of government's awareness and explicit strong commitment to support renewable energy. Favorable policies and regulation for renewable energy generation, including feed-in tariffs and tax reductions present favorable conditions for external investors.
- The involvement of Islamic investment in the solar projects financing is largely focused on developing natural ecosystem related to Shariah compliant investment strategy in clean energy.

Financiers and investors

- Even though being an attractive potential for solar, volume of proprietary funds in investments has decreased by KZT 34 billion in 2017.
- However, despite unfavorable conditions, Solar DAO is planning to expand in both Europe and Asia, with Kazakhstan being envisioned as one of the largest potential target markets. Solar DAO founders, UNISOLEX LLC, are already participating in construction of two PV solar plants, 1.06 MW in Kyzylorda and 10 MW in Almaty.
- The EBRD has been active in financing the construction of solar parks in Kazakhstan by having established Burnoye Solar 1 in Zhambyl region in April 2014; it is planning to start construction of Burnoye Solar 2, to be in the same region, both with a capacity of 50 MW. The bank will grant a US$ 44.5 million loan in partnership with the CTF.
- The EBRD is financing the 50 MW Burnoye Solar-2 project in Kazakhstan in partnership with the multilateral Clean Technology Fund (CTF), coming as part of a comprehensive US$ 200 million EBRD renewable energy-financing framework for Kazakhstan.
- To date, the EBRD has invested € 1.7 billion in sustainable energy and resources.
- Solar energy's share in the emerging field of renewable energy has been just slightly above 57 MW (as of September 2016). In 2017, there were six operating and 15 projected solar power stations across the country.
- The Kazakh investment company KB Enterprises (an investment firm specializing in the development of solar, wind, hydro and biomass projects) is planning the construction of a 100 MW solar power plant near Kabanbay, Tselinograd District, at a cost of US$ 165 million.

The involvement of Islamic investment in the solar projects financing is largely focused on developing natural ecosystem related to Shariah compliant investment strategy in clean energy.

Challenges

Main barriers to renewable energy penetration are:

Factors	Description	
Market failure	• Highly controlled energy sector • Restricted access to technology • Lack of competition • High transaction costs	• Missing market infrastructure • High investment requirements • Fossil fuel subsidies • Trade barriers
Economic and Financial	• High payback period • Lack of access to capital • Small market size • Lack of access to credit to consumers • Low electricity tariffs • High discount rates	• High up-front capital costs for investors • Lack of investor interest from the private sector • Lack of investor interest from the public sector • Lack of financial resources • Lack of instruments
Institutional	• Lack of involvement of stakeholders in decision making • Lack of private sector participation • Lack of a legal and regulatory framework • Problems in realizing financial incentives	• Long and complicated bureaucratic procedures regarding the issuance of building permits • Lack of expertise and awareness within authorities, especially at the local level • Lack of a stable institutional framework
Technical	• Lack of infrastructure • Lack of specialized technology for the needs of Kazakhstani market • Lack of domestic manufacturing industry PVs/Wind turbines	• Lack of skilled personnel/training facilities • Lack of entrepreneurs • Lack of R&D culture • Product not reliable • Inefficient technologies • Lack of experience
Social	• Lack of consumer acceptance of the product	• Lack of social acceptance for some Renewable Energy Technologies (RETs) • Low consumer awareness

The EBRD has been active in financing the construction of solar parks in Kazakhstan by having established Burnoye Solar 1 in Zhambyl region in April 2014.

Appendix B: Abbreviations

Abbreviations	Expansion	Abbreviations	Expansion
AED	United Arab Emirates Dirham	**KZT**	Kazakhstani Tenge
AUD	Australian Dollar	**MASEN**	Moroccan Agency for Solar Energy
CSP	Concentrated Solar Power	**MENA**	Middle East and North Africa
ESCA	Electric System Cascade Analysis	**MESIA**	Middle East Solar Industry Association
EWEC	Emirates Water and Electricity Company	**MW**	Mega Watt
EU	European Union	**NEF**	New Energy Finance Limited
GCC	Gulf Cooperation Council	**OIC**	The Organization of the Islamic Cooperation
GDP	Gross Domestic Product	**PPA**	Power Purchase Agreements
GW	Giga Watt	**PKR**	Pakistani Rupee
GWh	Gigawatt hour	**PLN**	Perusahaan Listrik Negara
ICMA	International Capital Market Association	**PV**	Photovoltaic
IEA	International Energy Agency	**UAE**	United Arab Emirates
IPP	Independent Power Producers	**UK**	United Kingdom
IRENA	International Renewable Energy Agency	**UNEP**	United Nations Environment Program
IsDB	Islamic Development Bank	**US**	United States
KSA	Kingdom of Saudi Arabia	**USAID**	U.S. Agency for International Development
KWh	Kilowatt hour		

Endnotes

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8. Economist Intelligence Unit (EIU)
9. Islamic Development Bank (IsDB)
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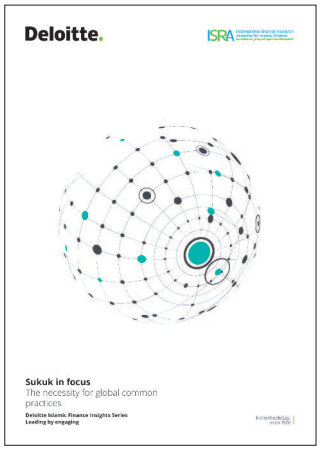
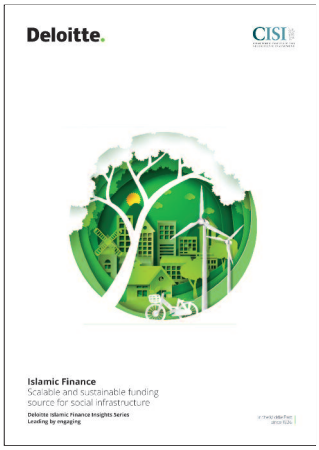
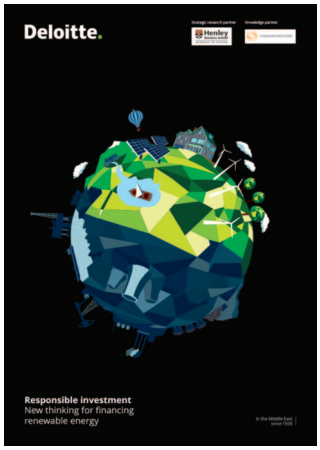
Appendix C: Thought leadership reports



Sukuk in focus: the necessity for global common practices".
The report discusses the drive to promote efforts to enhance the functionality of Islamic capital markets amidst the increasingly fragmented Islamic financial marketplace



Islamic finance: Scalable and sustainable funding source for social infrastructure
The whitepaper examines the key enablers of building an effective Islamic finance investment structure as a source of social infrastructure financing.



Responsible Investment: New thinking for financing renewable energy
The Renewable Energy report presents an analysis of the main drivers and factors for building the business case of a new thinking to finance sustainable development in the energy and renewable energy sectors.

Corporate Sukuk: Building the ecosystem to finance sustainable infrastructure
The whitepaper attempts to address some of the key regulatory and practice issues that Corporate Sukuk the new asset class may encounter.

About the Deloitte Middle East Islamic Finance Knowledge Center (IFKC):
Deloitte ME Islamic Finance Knowledge Center (IFKC) is a global knowledge management center of excellence and Islamic finance thought leadership think tank that provide market knowledge and practice insights to the Islamic financial service industry.

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