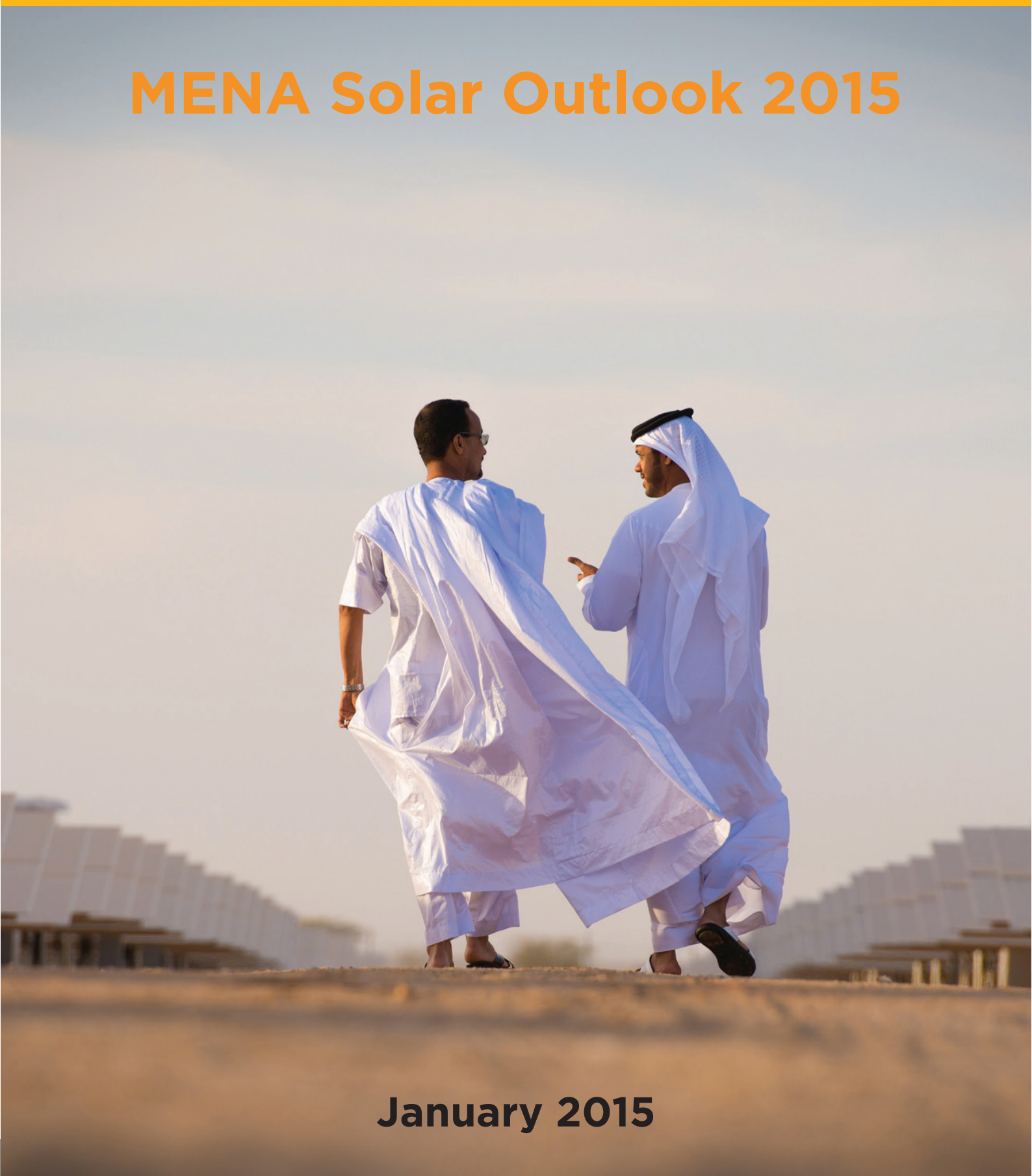
MESIA

جمعية الشرق الاوسط لصناعات الطاقة الشمسية

Middle East Solar Industry Association

Empowering Solar across the Middle East

MENA Solar Outlook 2015



January 2015

INSIDE

INTRODUCTION

Solar energy has always held great promise for the Middle East and North Africa (MENA). However, for the past 70 years, that potential has been overshadowed by another form of energy: hydrocarbons. Thanks to their superior capacity factor and 'dispatchability', oil and gas have held a duopoly in the power generation sector of the MENA region. Hitherto, it has been cheaper and more reliable for utility companies to draw on the region's abundant and easily accessible oil and/or gas reservoirs rather than have to have to determine how to unlock their vast solar energy resources.

As a result, despite some of the highest solar irradiance levels in the world, the Middle East has until recently produced very little by way of solar energy. As of 2013, there were more solar power plants built in the tiny central European state of Slovenia than all of the Middle East combined. From 2006 until 2013, only 70MW of solar PV projects were awarded across the region.

Luckily, the situation is changing – rapidly.

This study provides a look back at the previous two years to understand some of the key factors behind this change. It will also shed light on the specific market trends that will arise over these next 12 months. The aim of this study is to provide our MESIA members with insight on where the solar opportunities will be so that we can bridge the gap between the project sponsors and the solution providers.

I would like to thank Dr. Steve Griffiths, MESIA's Research Director and Executive Director of Institute Initiatives at Masdar Institute, for spearheading this study. I would also like to thank Mr. AyhamMkalalati, MESIA's Technical Director and Project Development ManagerEnviromena Power Systems for providing in-depth technical insight on all the solar projects in the MENA region.

As Mahatma Gandhi once said, "be the change you wish to see." That is exactly what MESIA is doing. We are bringing together all the stakeholders in the MENA solar industry so that we can work together to change the status quo and to bring this region's vast solar potential to life.

Onwards & Upwards!

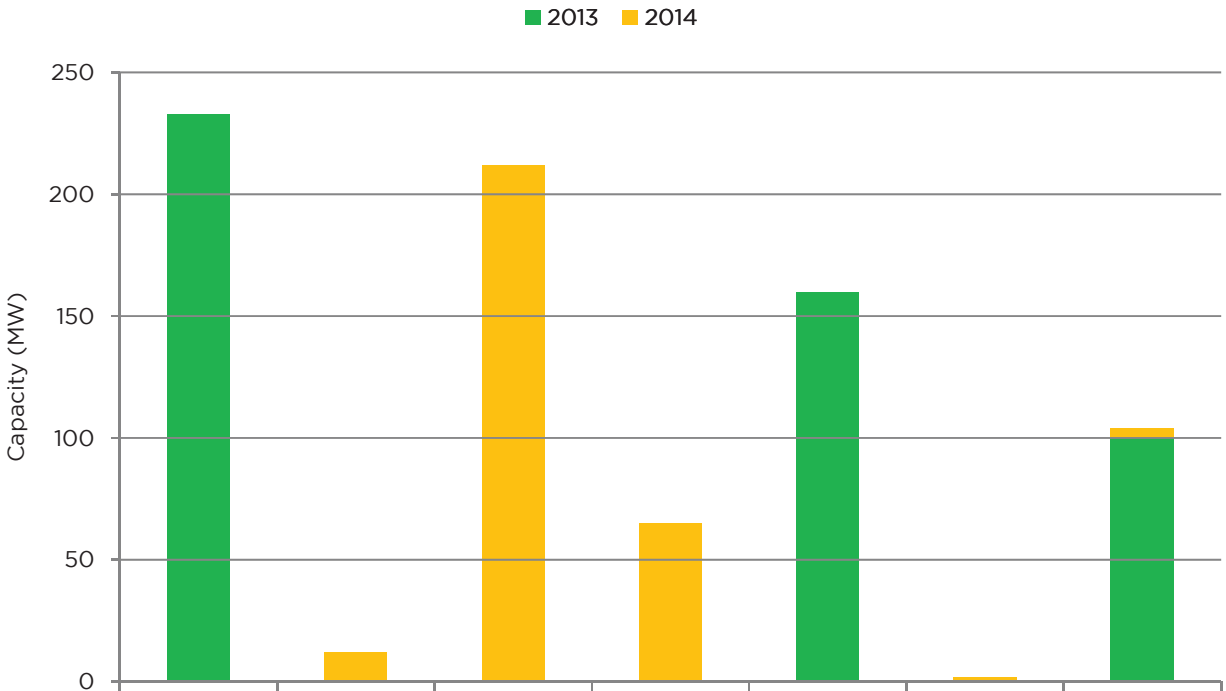
Vahid Fotuhi
President

SOLAR POWER EMERGES

In 2014, a record number of solar projects were awarded in the Middle East with a combined capacity of 294 MW, a four-fold increase over the previous seven years combined.

If we factor in North Africa, 2013 was an even bigger year. However, the 493MW of projects that were awarded in 2013 consisted of only **3 projects; in Morocco, Algeria, and the UAE, as illustrated in the chart below. By comparison, there** were over 30 solar projects awarded in 2014, a ten-fold year-on-year increase.

The lion's share of those projects were in Jordan where 12 ground-mounted projects were awarded as part of the Hashemite Kingdom's first round of solar IPP tenders along with a number of large-scale ground mounted projects. But we also saw Kuwait, Qatar, Egypt and Dubai enter the market with several projects of their own, thus underscoring the fact that solar has truly and finally taken off across the entire MENA region.



	Algeria	Egypt	Jordan	Kuwait	Morocco	Qatar	UAE
2014	0	12	212	65	02		4
2013	233	0	00		160	0	100

FACTORS FUELING SOLAR'S GROWTH

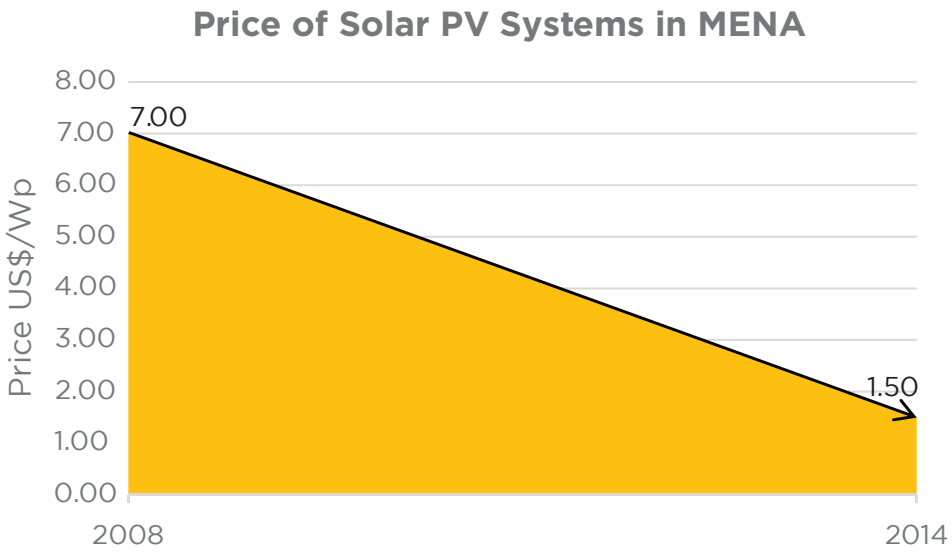
There are two factors fueling thesharp rise in solar projects in the MENA region.

First, the price of solar systems has dropped dramatically since 2009 when the first large-scale solar project in the Middle East was unveiled by Masdar in Abu Dhabi. The installation cost of utility-scale solar PV power plantshave fallen from roughly $7.00/watt in 2008 to less than $1.50/watt in 2014, as shown in the graph below.

This amounts tomore than a 75% cost reduction. It means that for the same budget as a 10 MW solar PVpower plant in 2008, aplant five times larger can be built today without having to spend a penny more.

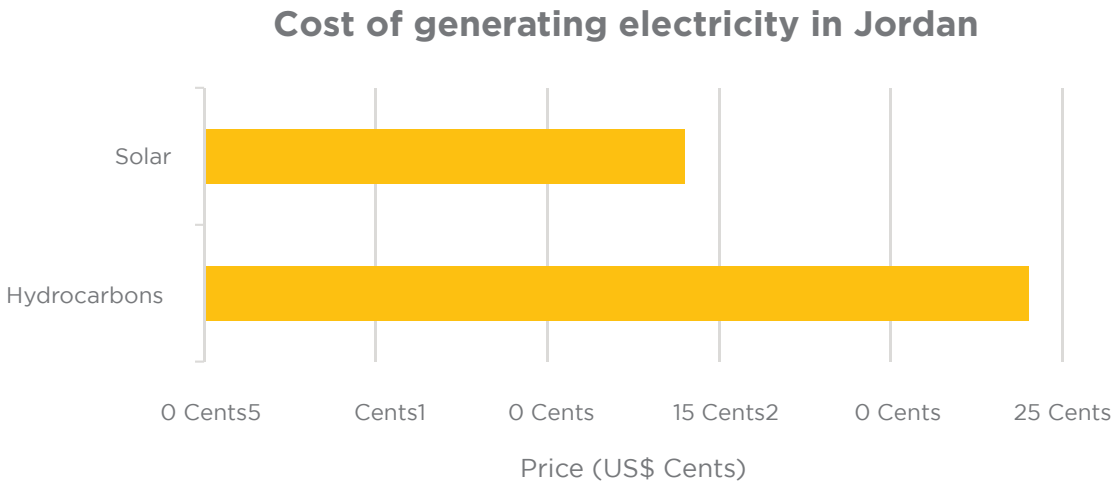
As a result of this cost reduction, solar energy is now competitive with the wholesale price of electricity in many jurisdictions in the Middle East. One example is the recent Dubai Electricity & Water Authority (DEWA) tender for a 100 MW solar PV power plant. DEWA was able to secure a 25-year electricity tariff of approximately $0.06/kWh. This tariff is broadly in line with the price of generating power from natural gas, the staple fuel for much of the region's power generation infrastructure.

At the same time as solar prices are coming down, the cost of generating electricity from natural gas is going up.



Here in the UAE, the government has historicallybeen able to produce or import natural gas for less than $2.00/MMBtu resulting in natural gas-based electricity generation at very low cost. Today, however, much of the new domestic natural gas production could cost up to $8.00/MMBtu to deliver to the market due to high concentrations of hydrogen sulphide (H2S) or carbon dioxide (CO2), which are toxic and corrosive. LNG imports – which started in 2010 in Dubai and may begin on a larger scale in Abu Dhabi as early as 2016 – cost more than $12.00/MMBtu.By comparison, the cost of solar today is equivalent to burning natural gas at approximately $4.00/MMBtu.

Meanwhile, in Jordan, the natural gas pipeline that provided the country with 95% of the fuel it needed to generate electricity was repeatedly blown up during the Arab Spring. This pushed up the average cost of electricity to $0.24/kWh. When solar developers approached the government and offered solar PV energy at a price that was 40% cheaper it's no surprise that Jordan jumped at the opportunity and awarded long-term utility-scale power projects to 12 international consortiums dotted across the countries. Together they will generate 300 GWh of clean electricity, enough to power nearly 1 million households.And as the graph below demonstrates, this is achieved based on zero subsidies; solar power is now less expensive than electricity generated using hydrocarbons.



SOLAR VS. DROPPING PRICE OF OIL

Even with the 45% drop in oil prices witnessed in 2014, solar power remains competitive. For one, oil accounts for only 5% of global electricity production, according to the International Energy Agency. In the Middle East, the majorityof the electricity generated comes from natural gas. But if we were to compare to oil, solar is able to compete on commercial grounds. For example, the price of the electricity from the second phase of the Sheikh Mohammed bin Rashid solar park in Dubai is equivalent to aconventional power plant burning oil priced at roughly $20 per barrel.

Solar power has 3 added benefits over fossil fuel power plants. First, solar power plants produce almost no CO2 emissions whereas oil-based power plants, particularly fuel-oil plants generate hydrogen sulphide (H2S) or carbon dioxide (CO2). This leads to smog and pollution which is bad for both the environment and the health of the communities.

Second, oil is very unpredictable. Over the past year we have seen oil prices shoot up to nearly $120/barrel and then come crashing down to below $60/barrel. Power plant operators do not like such vast swings in fuel prices since up to 50% of the cost of a fossil power plant is the expense of the fuel over the life of the plant. Solar power on the other hand is much more predictable; the fuel price is always the same: zero.

Finally, solar and oil operate based on opposite drivers. With fossil fuels such as oil and natural gas, as demand goes up, so do prices. With solar, as consumption goes up, prices come down thanks to economies of scale. And so as demand for solar continues to balloon in our region, we will see prices continue to drop regardless of the price fluctuations in oil prices.

SOLAR TRENDS IN 2015

In 2015, we will see the solar market in MENA reach a new level of growth, with over 1,500MW worth of solar projects expected to be tendered over the next 12 months, as outlined in the table below.
There are 3 general trends that will underscore the MENA solar market.

First, we will see projects become much bigger in size. The typical project will go from 1-10MW to 10-100MW. In 2013, there were only 3 projects awarded that were larger than 10MW. In 2015, we expect that number to reach 40, a titanic leap.

A good example of the regional move toward solar can be found in Egypt. As its natural gas infrastructure continues to age it is becoming more expensive for Egypt to generate power using natural gas. Egypt has therefore turned its attention to seeing how it can take advantage of its abundant potential for solar and wind energy. In November 2014, Egypt's Ministry of Electricity unveiled a landmark program which will see it introduce 2,000MW of large-scale solar PV power projects and 300MW of rooftop solar power projects. The fact that about176companies subsequently responded to the Ministry's invitation to submit proposal for this Feed-in-Tariff (FIT) program is a clear signal that solar has become a compelling source of energy in all corners of the Arab world.

SOLAR PROJECTS IN 2015

Project	Country	MWp	Status	Client
Al Wadi Al Jadid	Egypt	6	In bid stage	Masdar
Kom Ombo	Egypt	200	EOI phase	NREA
FIT Round 1 target	Egypt	500	bid stage	Ministry of Energy (first trench of 2,300MW)
RHC Grid Connected Solar Power Plant	Jordan	6	In bid stage	Royal Hashemite Court
Round 2 of Direct Proposals for Renewable Energy	Jordan	200	In bid stage	MEMR
Quweira PV Power Plant	Jordan	65	PQ stage	MEMR
Hashemite University Grid-Connected PV	Jordan	5	in bid stage	Hashemite University
Construction of Six Stores at Subhan	Kuwait	5	Bid preparation	MEW
1MW PV Farm in Zahrani	Lebanon	1	EOI phase	Lebanon Oil Installations
Hoon PV Power Plant	Libya	14	In bid stage	REAOL
Noor II CSP (parabolic trough) IPP at Ouarzazate	Morocco	200	Awarded	Masen
Noor III CSP (tower) IPP	Morocco	150	Awarded	Masen
Noor IV PV IPP	Morocco	80	Bid preparation	Masen
Royal Oman Police Hospital	Oman	1	Bid preparation	Royal Oman Police
Kahramaa - Water Reservoir project	Qatar	10	Bid preparation	Kahramaa
Al Aymadi solar project	Qatar	1	Bid preparation	Al Aymadi
Marina Mall	Qatar	0.4	In bid stage	Qatar Foundation
Duba Phase I Integrated Solar Combined Cycle	Saudi Arabia	50	PQ stage	SEC
Waad Al Shamal ISCC - CSP	Saudi Arabia	50	Bid preparation	SEC
10 MWp PV Power Plant Albagair	Sudan	10	In bid stage	Ministry of Water Resources and Electricity
Noor 1 100 MW Solar Power Plant	UAE	100	PQ stage	Masdar
Al Ain Hospital	UAE	1	Awarded	SEHA
MBRAM Solar Park Phase 2	UAE	100	RFP stage	DEWA
Utico FZ - Ras Al Khaimah PV	UAE	40	PQ stage	Utico
Dubai Roof-top program	UAE	20	Bid preparation	DEWA; net metering program

In 2015, MESIA expects that 500MW of the 2,000MW of large-scale solar PV projects will receive the preliminary generation license to proceed, representing 25% of the target capacity. We also expect the long-awaited KomOmbo program (10 x 20MW) to receive the green light in 2015. In total, there will be approximately 700MW of solar PV projects awarded in Egypt this year, as reflected in the graph below, making it the largest solar market in the MENA region in 2015.

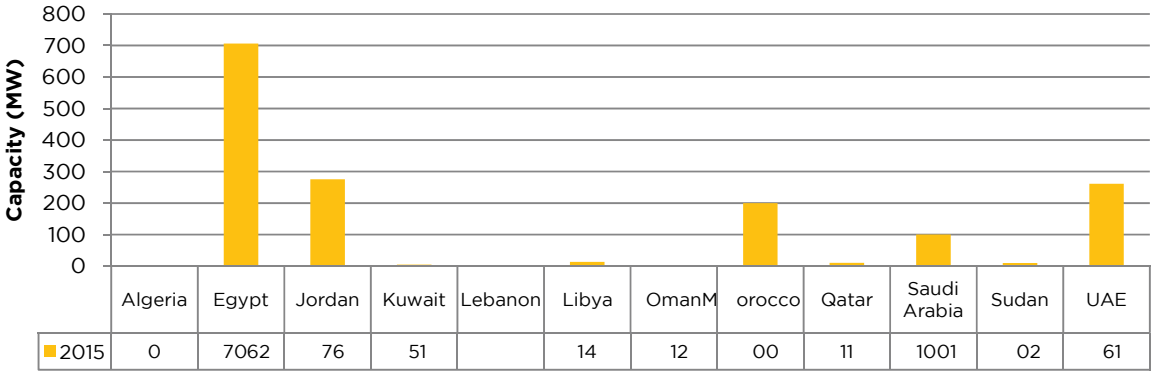
At the same time, the market is becoming more broad-based. In the past, most of the solar projects were focused on the UAE. In 2015, there will be large-scale solar tenders in at least ten different markets in the Middle East, a new record, with Jordan and Morocco expected to make a big splash. Even smallerregional countries like Qatar, Kuwait, and Lebanon are makingstrides with their solarprograms.

This diversity will become more exciting once Saudi Arabia enters the market. It has so far been held back from achieving its herculean solar potential due to the lack of political alignment. But in time they too will turn to solar in a big way, following the footsteps of Jordan and Egypt. This will no doubt herald a new wave of dramatic growth in our region's emerging solar market. In fact, Saudi Arabia's most recent plans for solar PV entail building a capacity of 6 GW over the next 10 years. 2015 is expected to be the year that Saudi finally starting moving ahead with its ambitious plans.

Finally, we will see niche segments within the solar industry emerging. In the past, the typical profile of the companies was small local installers. But as the market continues to grow we will see more specialized companies. Aside from the traditional installers we will see system operators like SAT Engineering and regional solar developers like Access Power MEA rise to the forefront.

Dubai's landmark unveiling of a grid-connected solar rooftop program will also foster the growth of specialized rooftop installers. Other rooftop markets will also emerge in Jordan and Egypt where there is significant demand for decentralized power. As a result, solar companies that had to endure razor thin margins in order to win projects in the past now have the luxury to pick and choose which projects they can chase.

Expected Solar Power Capacity in MENA in 2015



CONCLUSION

The year 2015 will be a breakthrough year for solar energy in the MENA region. The UAE will continue do its share leading the industry, with mega solar projects awarded in both Abu Dhabi and Dubai. But this year we will also see such mega projects mushrooming across the entire Middle East.

There is still much work to be done. Most notably, for solar to soar to new heights we will need to see government regulators do their part and adopt policies that promote solar energy. Although we are starting to see this happen in many countries there are still some notable exceptions. Above all: Saudi Arabia. Only once the Kingdom of Saudi Arabia adopts regulations governing the integration of renewable energy into the grid will we see that country take its rightful place among the biggest markets for solar energy. Luckily, whilst hydrocarbon reserves are finite, solar resources are not. Therefore we will see Saudi Arabia in time join the ranks of solar-embracing countries in MENA, thus ushering in a new phase of growth for our region's most abundant natural resource: solar power.

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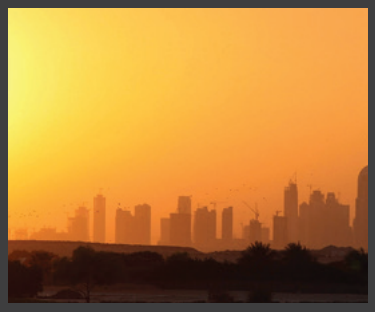


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