

4th edition

Cleantech Survey Report

Middle East and North Africa



EY
Building a better
working world

In collaboration with:

Clean Energy Business Council
مجلس صناعات الطاقة النظيفة



MESIA جمعية الشرق الأوسط لصناعات الطاقة الشمسية
Middle East Solar Industry Association
Empowering Solar across the Middle East



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About the survey

The *2014 MENA Cleantech Survey* gauges the sentiment of senior industry executives regarding the cleantech industry and renewable energy implementation in the Middle East and North Africa Region.

The survey identifies the most important market drivers, prospects for growth and key issues, provides an additional voice of the market and articulates the attractiveness of technologies among different countries in the region.

Foreword



Nimer AbuAli
Cleantech Director – EY
Middle East and North Africa



Thomas Christiansen
Associate Director – EY
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We are pleased to present our fourth Middle East and North Africa *Cleantech Survey Report* in collaboration with the Clean Energy Business Council (CEBC) and the Middle East Solar Industry Association (MESIA). Based on the key findings from our 2014 cleantech survey, the report provides a comprehensive assessment of the cleantech market in the Middle East and North Africa (MENA) Region.

The report builds on our *Renewable Energy Country Attractiveness Index* (RECAI), published quarterly since 2003, which ranks 40 countries across the globe on cleantech developments. RECAI takes into account the vast potential and strong commitment of regional governments to tap cleantech opportunities and has confirmed the year-on-year rise of the cleantech sector in Morocco and Saudi Arabia.

According to the International Energy Agency (IEA), global renewable energy capacity expanded at its fastest pace in 2013, with generation reaching almost 22% higher than the global newly installed generation capacity; it is now on par with that of natural gas. Investment in new renewable capacity topped US\$250 billion in 2013 and is very likely to grow further.

Cleantech makes up only a small share of the total power generation in the MENA Region, which is dominated by conventional energy sources. However, opportunities to provide

affordable and secure low-carbon energy are continuously expanding and, going forward, industry executives expect a rapid growth in the cleantech contribution.

Cleantech growth is essential if we are to serve the energy needs of the 321 million people in the Region, with an average population growth rate of 1.9% per annum over the last few years. Fuelled by the population boom, investments in infrastructure and growth of energy-intensive industries such as petrochemicals, energy consumption in the MENA Region is expected to increase by 81% from 2010 to 2050. The energy subsidy bill for MENA governments is also expected to grow accordingly if no further steps are taken to reduce subsidies. The IEA estimates that energy subsidies in the MENA Region stood at about US\$178 billion in 2013, which is 34% of global energy subsidies. International economic and energy agencies have called for a reduction in government subsidies, a key factor standing in the way of cleantech's rapid growth.

The MENA Region is favorably positioned as an enabler of cleantech with excellent solar, wind and ocean resources and abundant space for large renewable projects. As government commitments to renewable energy grow and new financing sources and innovative financing structures emerge, the MENA Region can become one of the fastest cleantech growth markets in the years ahead.

Industry perspectives

Clean Energy Business Council



“The CEBC will continue to push for better policy, data, research and communication, which are necessary if we are to see renewables take a greater foothold in the MENA Region.”

Alice Cowman
CEO, Clean Energy Business Council

The CEBC is delighted to collaborate with EY and the MESIA to produce the 2014 Middle East and North Africa *Cleantech Survey Report*.

Since the foundation of the CEBC in 2010, there has been great optimism about the potential for renewable technologies in the MENA Region. Unfortunately, this optimism has not been matched by actual projects completed on the ground. In spite of high-level targets being set by most countries in the region for renewable generation as part of the energy mix, there has been little serious commitment in terms of long-term policy support. This has been highlighted in the results of the cleantech survey for four years running.

However, there have been some very positive highlights in the last year. Jordan has led the way with its independent power producer renewables program and Egypt's GW renewables program has attracted huge investor interest. The year ended with a world record when Saudi bid 5.98 US cents per kilowatt hour (kWh) for the 100 megawatt (MW) second phase at the Mohammed bin Rashid Al Maktoum Solar

park in Dubai. With rooftop solar programs being announced throughout the region, it is hard not to remain excited about the future.

Governments are also showing signs of increasing tariffs and reducing fossil fuel subsidies. Abu Dhabi's recent tariff hikes have made the case for energy efficiency and potential renewables that are more commercially viable than ever before. Interestingly, this survey also demonstrates the excitement we are seeing about water technologies in the region and, in particular, renewable desalination.

In spite of these small strides, the fact remains that approximately 98% of the region's energy mix still comes from fossil fuels. Much greater momentum is required. The CEBC will continue to push for better policy, data, research and communication, which are necessary if we are to see renewables take a greater foothold in the MENA Region.

Alice Cowman
CEO, Clean Energy Business Council

Middle East Solar Industry Association

The MESIA is thrilled to have collaborated with EY and the CEBC in producing the 2014 MENA *Cleantech Survey Report*. The report reflects the excitement and optimism developing in the MENA cleantech sector, especially for solar power. We see significant cleantech growth happening in Egypt, Jordan, Saudi Arabia and the United Arab Emirates (UAE). This will no doubt help in making solar more robust and commercially attractive. We expect the solar market to exceed the cumulative level of 1,000MW in terms of projects awarded, which is a major milestone for the industry.

Of course, despite the vast potential for solar technology in the Middle East, major hurdles still remain. One of the fundamental and most pressing hurdles is the lack of a policy framework. This is something that MESIA has been working very hard on for the past five years.

By shedding light on this issue, the survey reminds us that the problem has not been solved as yet and that it still requires a lot of attention, both from the public and the private sectors.

As the largest solar trade organization in the Middle East, MESIA will continue to support and collaborate with the policymakers in those markets by helping them with the regulatory, technological, commercial and operational steps involved in this linkage. We are confident that our collaborative efforts will reap rewards and that in the next five years, the Middle East solar industry will become one of the biggest success stories in the global cleantech sector.

Vahid Fotuhi

President | Middle East Solar Industry Association



“The report reflects the excitement and optimism developing in the MENA cleantech sector, especially for solar power. We see significant cleantech growth happening in Egypt, Jordan, Saudi Arabia and the United Arab Emirates (UAE).”

Vahid Fotuhi

President, Middle East Solar Industry Association

The MENA cleantech market

Q1

Top three technologies in terms of market potential over the next five years for each MENA Area

A significant shift in the expectations of industry executives has occurred during the last 12 months with regard to the growth of clean technologies in the MENA Region over the next five years.

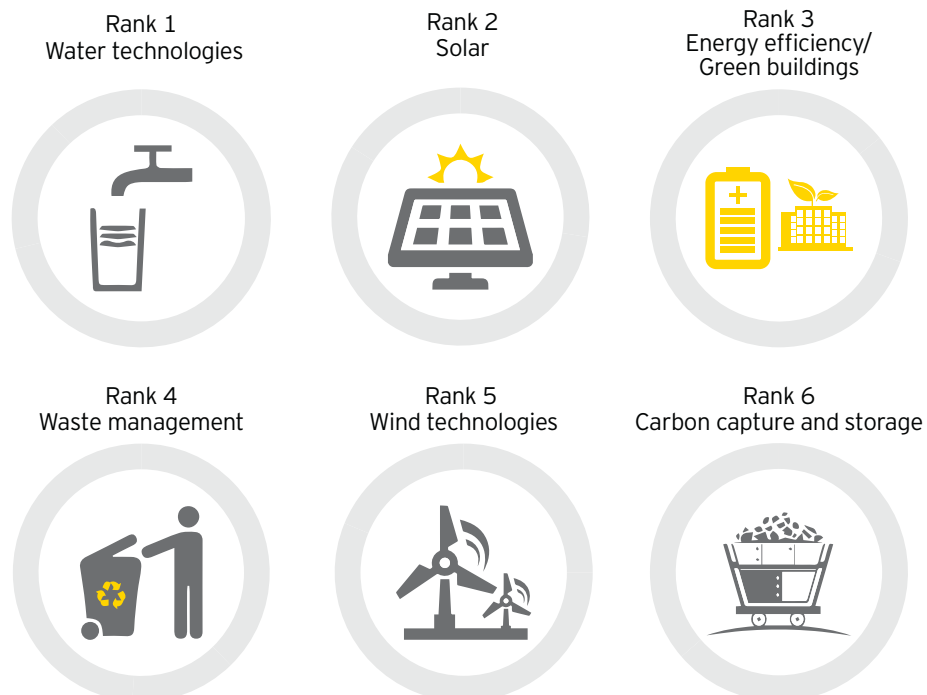
We have seen a sudden growth in confidence for water technologies among the industry executives surveyed. Surprisingly, water was mentioned less frequently as a growth area over the last three years, but it has swiftly broken through to being the leader in market potential in the next five years. In addition, prospects for investment in water infrastructure have improved markedly over previous years.

Solar has been ranked second this year, although it had been placed as the technology with the highest market potential for the past three years. Confidence

in solar had been growing based on the announcements of new projects and policies in the region, owing to its low pricing and interest rates, and abundant solar resources.

Following water and solar in the survey results are green buildings and energy efficiency. These technologies may rise in importance over the coming years, given their highest return on investment and fastest payoff as well as the high levels of energy consumption in several MENA countries.

Top technologies by rank across the GCC, the Levant and North Africa



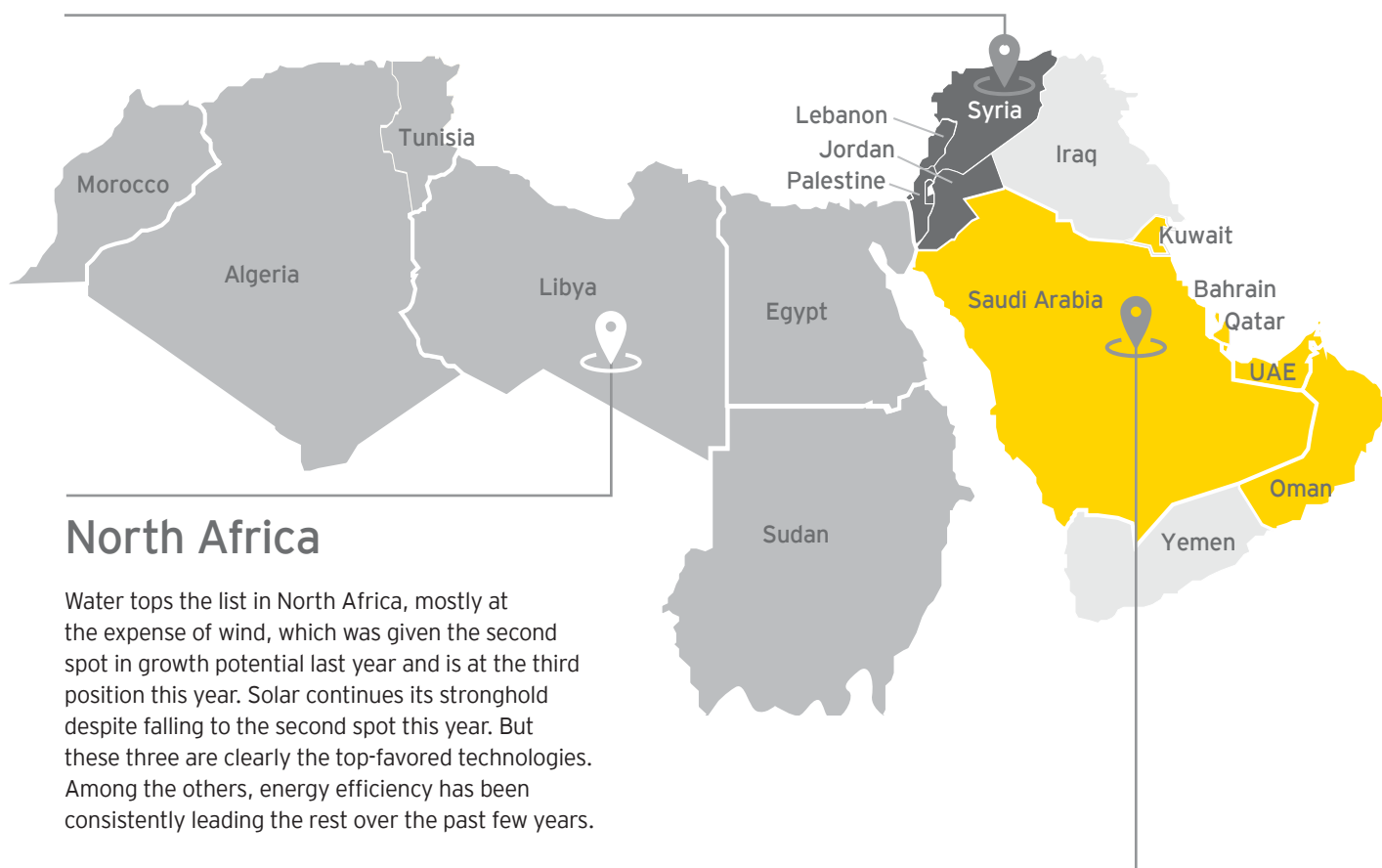


Fastest-growing technologies in the GCC, the Levant and North Africa

Levant

The shift to water as the top technology for the future is also seen in the Levant region (Lebanon, Syria, Jordan and Palestine). Last year, wind was rated the third most important technology, but it has now dropped to the fourth position, alongside energy efficiency and green buildings, as awareness of water's potential grows.

The Levant differs from the GCC in that it rates wind and carbon capture and storage higher, while the GCC rates energy efficiency, green buildings and waste management higher.



North Africa

Water tops the list in North Africa, mostly at the expense of wind, which was given the second spot in growth potential last year and is at the third position this year. Solar continues its stronghold despite falling to the second spot this year. But these three are clearly the top-favored technologies. Among the others, energy efficiency has been consistently leading the rest over the past few years.

GCC

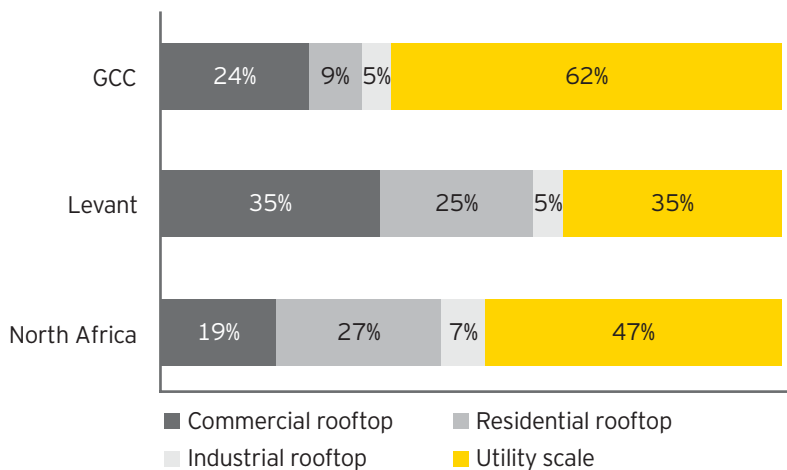
Water technologies, which rank at the top in the GCC, have edged ahead of solar. Energy efficiency and green buildings are third in the GCC, followed by waste management and wind. Carbon capture and storage is still under the radar of industry executives and may afford a pioneering opportunity for new technologies.

Energy efficiency and green buildings continue to remain a priority for the GCC, due to climatic conditions, high energy usage, increasing commitment of governments and new private entrants as solution providers.

Which category of solar photovoltaic technology will experience the highest new installation volume (MW) in each area under MENA over the next three years?

This year's survey has taken a more in-depth view of the potential technologies market and expectations. Within the solar sector, we explored industry preferences for the technology that will gain traction in the coming years. Four broad categories of solar photovoltaic technology came out as key contenders. These were commercial rooftop, residential rooftop, industrial rooftop and utility scale. Of these, utility scale is the top technology that is expected to be deployed across the markets of the GCC, the Levant and North Africa. This is not surprising as regional power utilities are expected to take the lead in the spread of photovoltaic technology.

Solar photovoltaic category growth expectations



The demand in the GCC and the Levant is driven by utility scale, which is followed by commercial rooftop. But in North Africa, residential rooftop is placed second. The survey results indicate that areas with high government subsidy will see utility scale as being dominant in solar deployments.

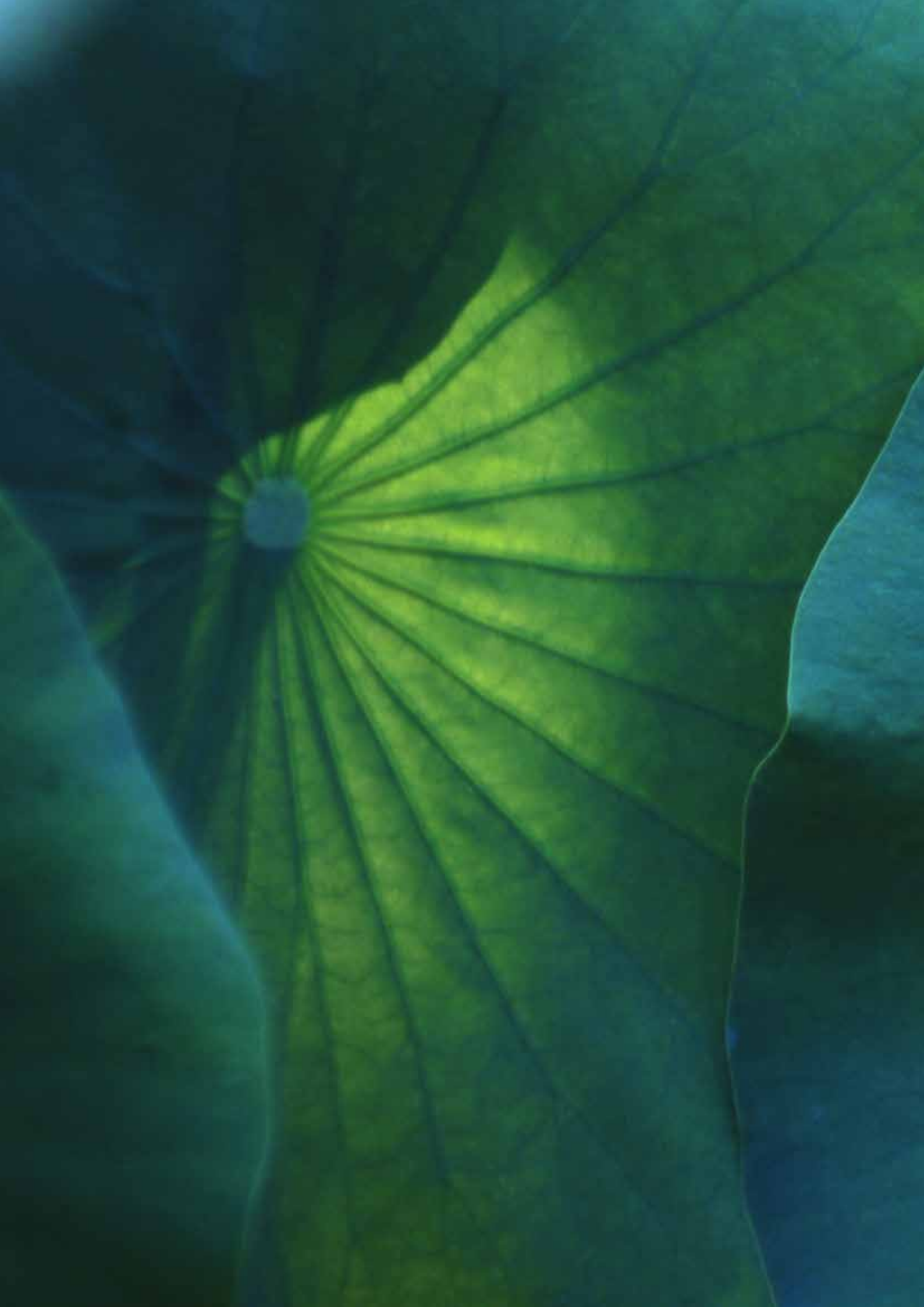
In the GCC, residential and industrial rooftop demands have the least potential for takeoff as there are relatively few power disruptions, and customers await government subsidies to increase rooftop deployment. Commercial rooftop deployments are expected to make up 25% as companies seek to cut down on their energy consumption bills, which are among the highest in the MENA Region.

The scenario in the Levant is different from the GCC and North Africa, as cash-strapped utilities are not

expected to drive solar deployment outside of their own stated plans. Commercial and residential rooftop deployments are likely to increase in the Levant as the private sector and households will fend for themselves and attempt to reduce their dependence on generators.

Similar to the GCC and the Levant, utility scale is expected to shoulder almost half the solar burden in North Africa while residential rooftop will be its second biggest market.

The underlying assumption for solar deployment in the entire MENA Region is that wherever there is a high government subsidy, utility scale will dominate, and in areas with low subsidies, residential and commercial rooftop arrangements will grow.



Market forces and policy

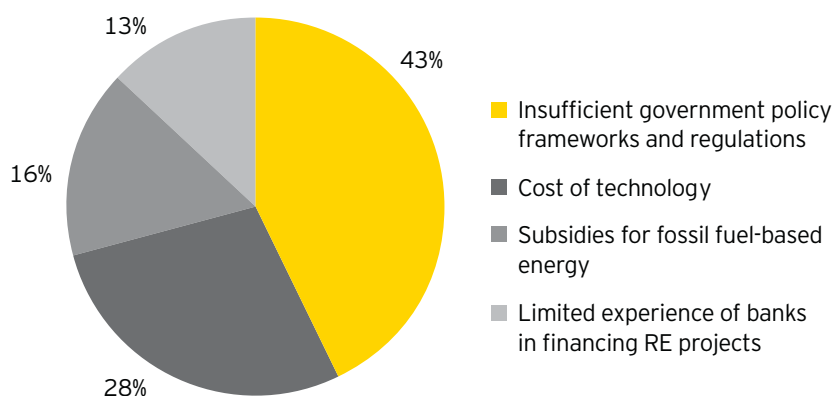
Q3

Within MENA, what is the single most important barrier or challenge to the development of renewable energy?

Instead of looking separately at the drivers of cleantech development and at its barriers or challenges in the MENA Region, industry observers are of the view that these two are interlinked and are part of the overall market forces and policy environment in the region. As cleantech deployment is still in an initial phase, the policies of the governments, their project commitments and subsidies are playing a big role in market development.

Our 2013 cleantech survey ranked the following as the most significant barriers or challenges to the development of cleantech in the region:

Most important barriers or challenges to the development of cleantech – 2013



This year, we have expanded on the above themes and have also made the survey more specific to the three areas within the MENA Region. Across the GCC, the Levant and North Africa, insufficient government policy frameworks and regulations continue to be the largest barrier. This barrier has continued to grow in importance over the past few years.

Price competitiveness remains the second most important barrier in the GCC at 25%, the Levant at 19% and in North Africa at 15%. The sharp decline in cleantech prices over the past few years is not considered significant in the MENA Region as cleantech is still considered to be too costly to deploy. However, there are clear changes in the priority and weightage given to the other barriers to cleantech development.

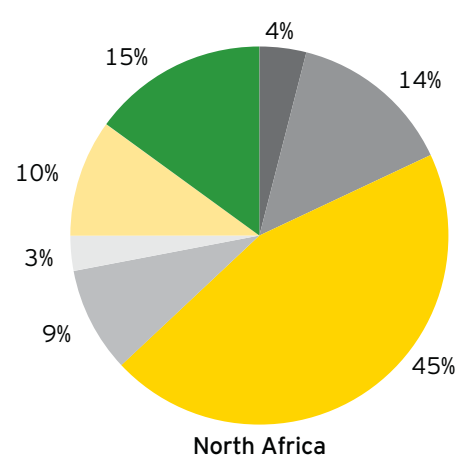
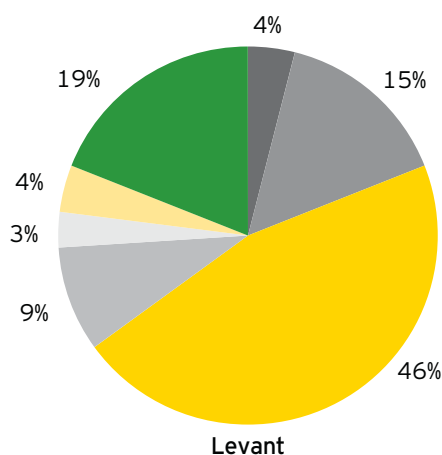
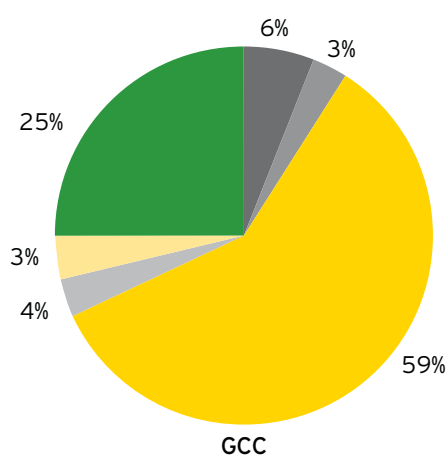


Poor grid infrastructure is an insignificant barrier in the GCC, while it is the third most important in the Levant and North Africa. Similarly, insufficient private financing and limited financing experience among banks for cleantech projects is the fourth most important barrier in the Levant and North Africa

while it is insignificant in the GCC. Lack of financing is considered a key barrier to cleantech development in the Levant.

North Africa also suffers from the lack of local capacity (workforce training, domestic contractors etc.), which was rated at 10% and was much higher than that for the GCC and the Levant.

Most important barriers/challenges to the development of cleantech 2014



- Environmental/technology issues (such as dust and humidity)
- Grid infrastructure
- Insufficient government policy frameworks and regulations

- Insufficient private financing and limited financing experience among banks for RE projects
- Lack of global carbon reduction mechanism

- Lack of local capacity (workforce training, domestic contractors etc.)
- Price competitiveness compared to traditional energy sources

In your opinion, what will be the main drivers of cleantech growth in each geographic Area within MENA?

(Pick the three most important drivers for each area.)

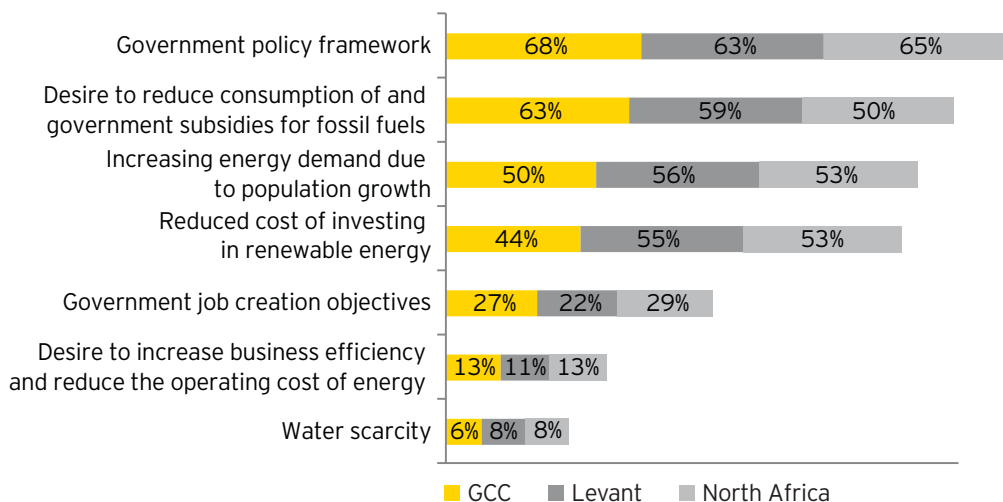
In our 2013 survey, government policy, access to finance and cost of competitive technology collectively represented 85% of the responses as drivers for cleantech growth in the MENA Region. We see key changes from these drivers of development this year. In particular, increasing energy demand due to population growth has moved to second in North Africa and third in the GCC and the Levant from its fourth and below ranking of last year. In addition, North Africa has different priorities and drivers of demand from the GCC and the Levant, which show noteworthy similarities. Government policy remains the top driver across the GCC, the Levant and North Africa.

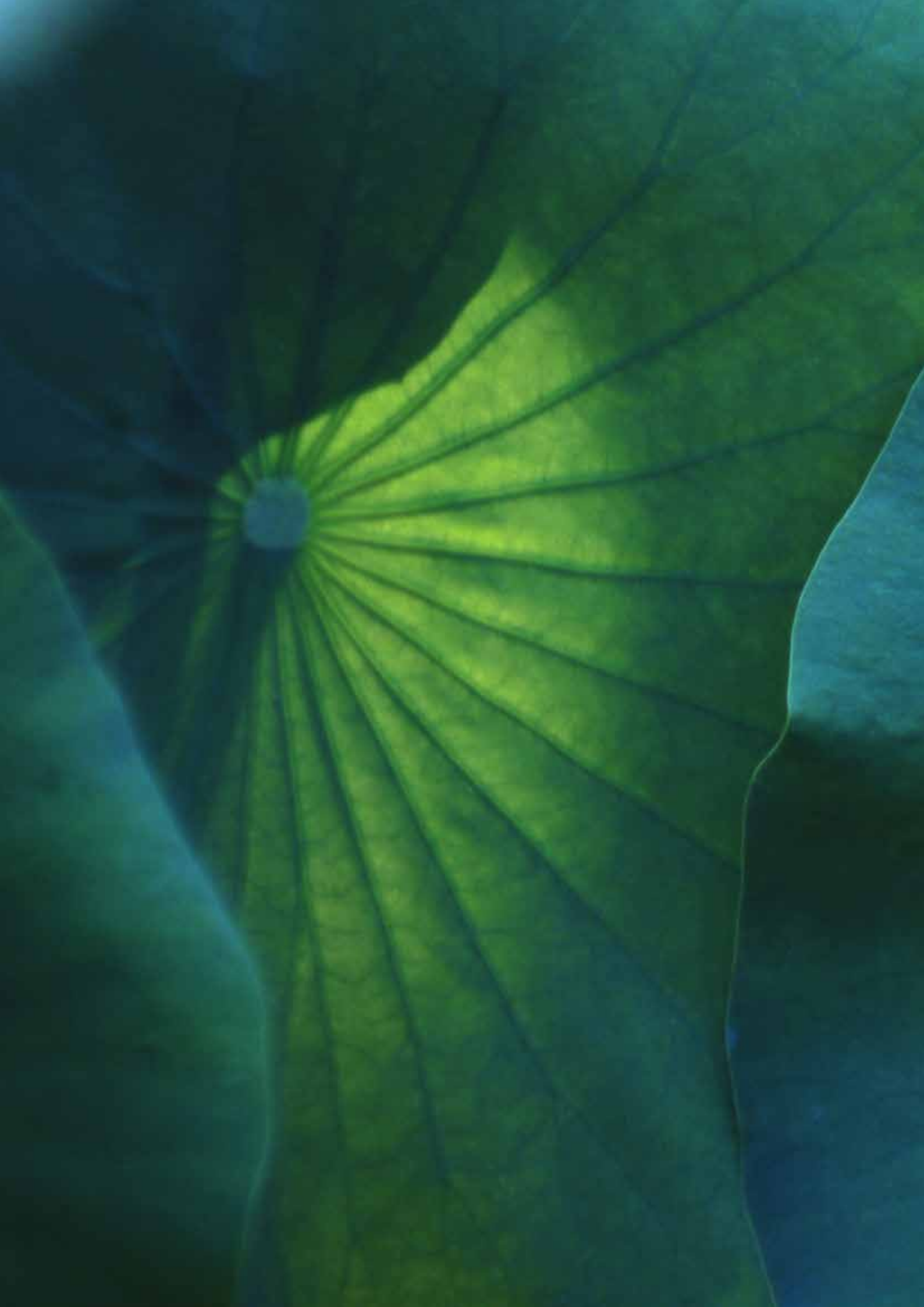
The second most important driver for the GCC and the Levant is the desire to reduce consumption as well as government subsidies for fossil fuels. This is a change from previous years, when financing and reduced cost of cleantech in the GCC were the second most important drivers. The reason for this change could be that GCC governments would like to increase their revenues from the fuel they use in local consumption and, at the same time, want to meet the cleantech targets defined earlier.

For North Africa, the second most important driver is the increasing energy demand due to population growth. This driver is ranked third in the GCC and the Levant.

Reduced cost of investing in renewable energy is ranked fourth in the GCC and the Levant, while North Africa ranks it third. Water scarcity, though not seen as having a significant impact on the drivers of demand for cleantech, has begun to be mentioned as a driver.

Main drivers of cleantech growth





Geographic overview

MENA countries with the highest potential for cleantech

Q5

Select three MENA countries with the highest potential for renewable energy investments in the next five years

Similar to our 2013 survey results, the Kingdom of Saudi Arabia (KSA) and the UAE still dominate the first and second spots in MENA country attractiveness rankings. They continue to be seen as having the highest potential for renewable energy investments over the next five years. KSA is seen as a large potential market but, so far, not much has happened on the ground because of delays in the implementation of solar and wind programs, and regulatory issues.

Despite the requisite financing, space, resources and demand being in place, cleantech growth in the UAE is slow. In our rankings this year, there have been substantial changes from the third spot onward as compared with last year.

Jordan and Morocco have moved up two places each and are ranked third and fourth respectively. It is interesting that these two are not at the top of the rankings, given that they have the largest markets in terms of projects in the pipeline and also have their policy framework in place. Jordan, Morocco

and Egypt continue to remain attractive markets although their minimal financial resources limit their potential.

The other upwardly mobile countries include Kuwait (from 10th in 2013 to 7th in 2014), Tunisia (from 15th to 10th) and Libya (16th to 11th). Qatar has dropped from third to sixth, Oman from seventh to ninth and Egypt moved from fourth to fifth, while Syria replaced Palestine at the bottom of the rankings.

MENA countries with the highest potential for renewable energy investments

Rank 1



KSA

Rank 2



UAE

Rank 3



Jordan

Rank 4



Morocco

Rank 5



Egypt

Rank 6



Qatar

Rank 7



Kuwait

Rank 8



Algeria

Rank 9



Oman

Rank 10



Tunisia

Rank 11



Libya

Rank 12



Lebanon

Rank 13



Iraq

Rank 14



Bahrain

Rank 15



Yemen

Rank 16



Syria

MENA country highlights of project developments and outlook

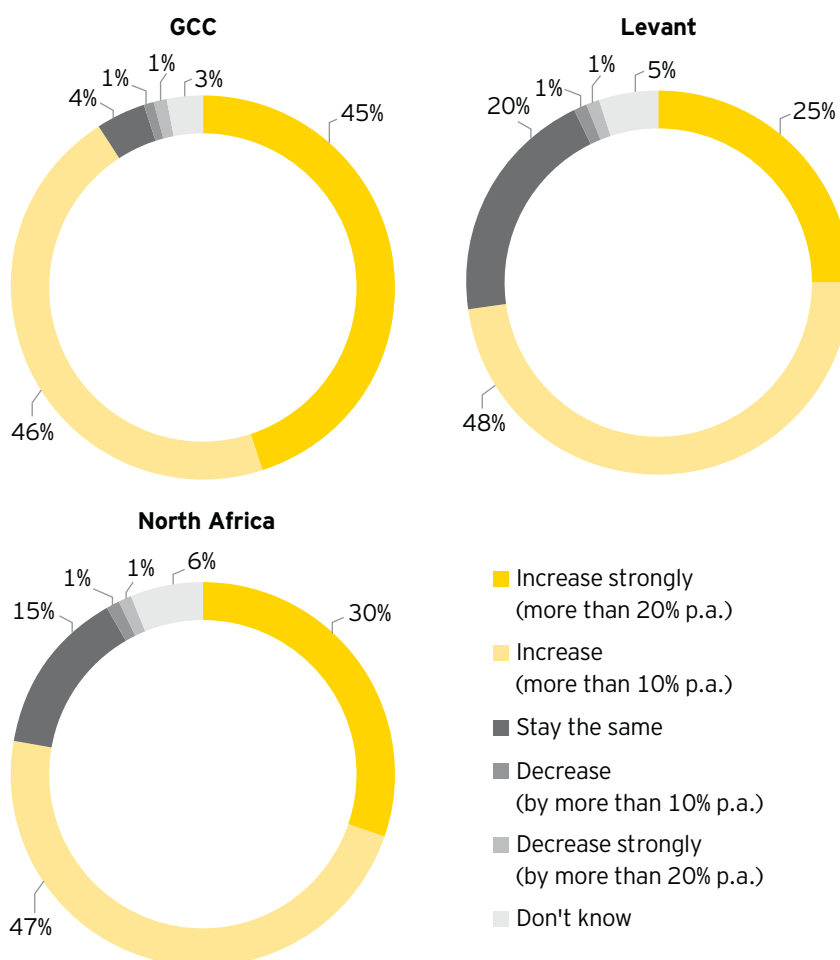
- ▶ In early August 2013, Morocco shortlisted seven bidders for two concentrated solar power (CSP) projects with a total capacity of 300MW. It is also planning to issue tenders for two solar photovoltaic (PV) projects: the Tafilalt complex and the Atlas complex. The 100MW Tafilalt and 200MW Atlas complexes comprise four and eight solar parks respectively.
- ▶ Algeria has introduced a 20-year guaranteed premium for wind projects, just months after the creation of its solar feed-in tariff (FIT – a scheme that pays people for creating their own green electricity). Separate rates will apply to projects above and below 5MW and the rates will reduce after the first five years of establishment.
- ▶ Egypt has selected local cable maker Elsewedy Electric in a bid to build, own and operate six 100MW wind farms in the Al-Zayt Gulf.
- ▶ Jordan's Ministry of Energy and Mineral Resources has canceled the third round of its procurement program mainly because of grid-related challenges. Otherwise, the program would have seen 400MW of wind and solar capacity up for tender.
- ▶ Kuwait is awaiting expressions of interest from developers to build the 280MW Al-Abdaliyah combined-cycle CSP project, valued at about US\$3.3 billion with a solar component of at least 60MW.
- ▶ Qatar has unveiled a mega-scale solar factory in Doha with a 300MW capacity, which is to be expanded to 2.5GW.

Financial and investment overview

Q6

How will the level of investment in cleantech in the different areas of MENA change over the next five years?

This year, we extended the finance and investment section and included additional questions to gauge market sentiment and to understand the sources of funds that can be deployed in the region. It also aims to provide investors and financiers with an understanding of the opportunities in the MENA cleantech sector.



The GCC is the most optimistic of the three as 91% of respondents expect that investment in cleantech in this area will increase or increase strongly over the next five years. This is due to the large-scale plans and cleantech programs that have been announced and due to budget allocations.

The Levant, with the exception of Jordan, is least optimistic about investment, with a third saying that investment will either stay the same or decline.

Financing for cleantech is not available in most cases because of country risk. Jordan is the only country here to have progressed in the areas of policy framework and financing. It has strong projects on the ground as well as in the pipeline.

While 77% expect investment to increase in North Africa and there is strong optimism, financing and country risk remain high for this area.



Q7

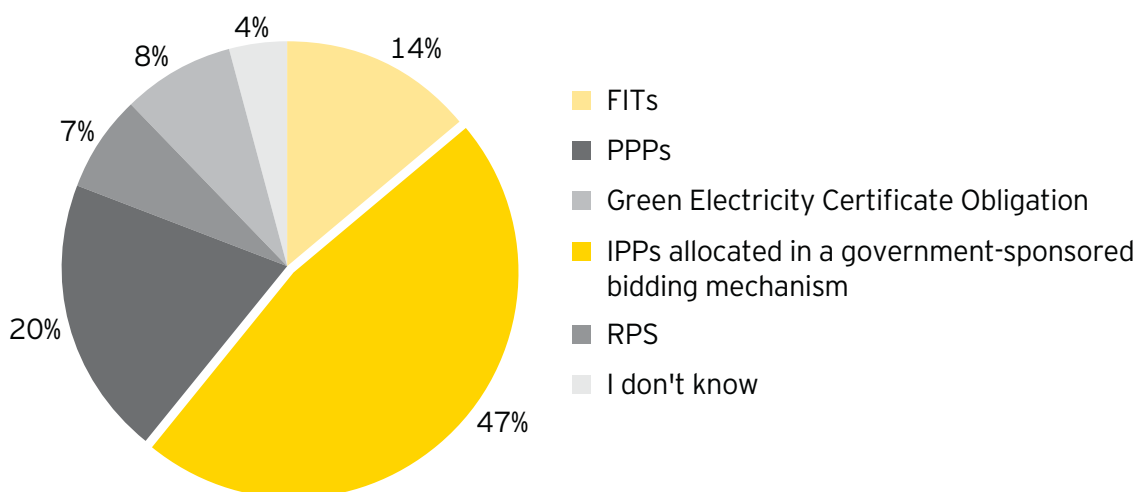
What is the most effective mechanism to attract private sector investment to renewables in MENA?

Almost half of the 2013 survey respondents said that FITs were the best way to attract investment into the region's cleantech sector. This year, FITs are not in fashion as only 14% of the respondents consider them as the best way to attract private investment. Though FITs remain the method of choice for countries such as Jordan, public-private partnerships (PPPs) or independent power producers (IPPs) set the pace in the GCC. For example, Dubai has recently announced IPP financing of its new 100MW solar project.

This year, the preferred route of attracting private investment into cleantech is allocating projects to IPPs through a government-sponsored bidding mechanism. Though a more complex route, it provides investors with better hedging ability against risk. The straightforward method of PPP creation has moved into the second spot vacated by FITs and is followed by two interesting ideas that are new to the region. Renewable portfolio standards (RPS) is a regulation that requires electric utilities and other retail electric providers to supply a specified minimum amount of customer load with

electricity from eligible renewable energy sources. And with the Green Electricity Certificate Obligation scheme, electricity suppliers are legally obliged to purchase a proportion of their electricity from renewable sources. In addition to selling green electricity to the consumer, they can sell these renewables obligation certificates to another supplier who has failed to meet their quota. Whether these regulations come into force remains to be seen, but our respondents have begun to demand them.

Mechanism to attract private sector investment



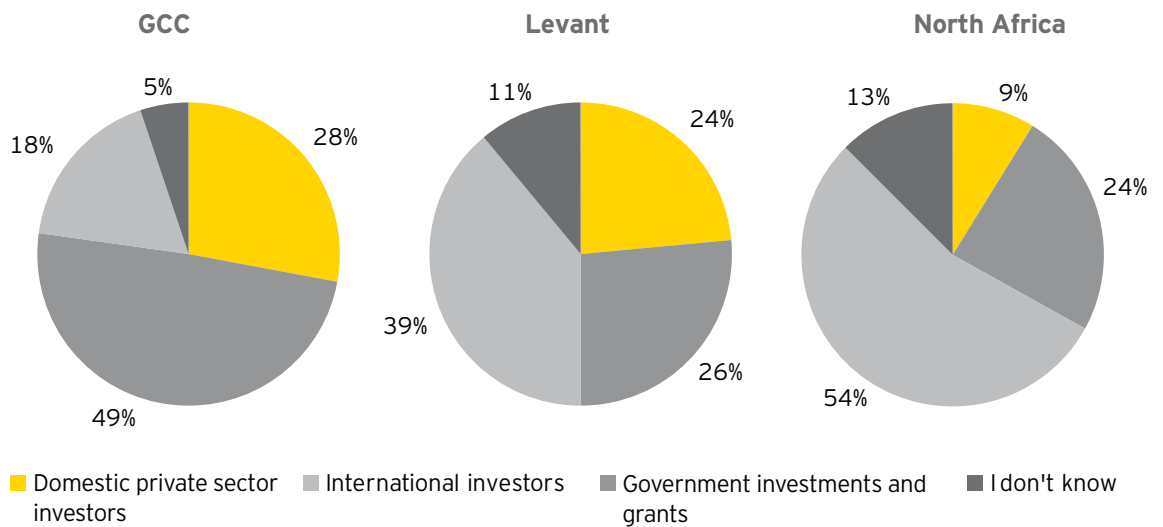
Q8

What will be the most important source of equity investment for cleantech in the three MENA Areas over the next three years?

It comes as no surprise that two-thirds of the respondents expect the GCC to raise equity financing via their governments and domestic private investors, as the area does not have a sizeable private ownership of utilities and power-generating companies. GCC governments have an excellent opportunity to bring in private investors into the cleantech sector. However, regulation will take time, though there are several examples of PPP companies operating in the conventional energy sector.

In contrast, only a third of the respondents said that North African governments and domestic investors will be the source of equity investment into the cleantech sector, while half of them said the same about equity investment in the Levant. These two areas are more open for equity investments by international investors. More than half the respondents said that international

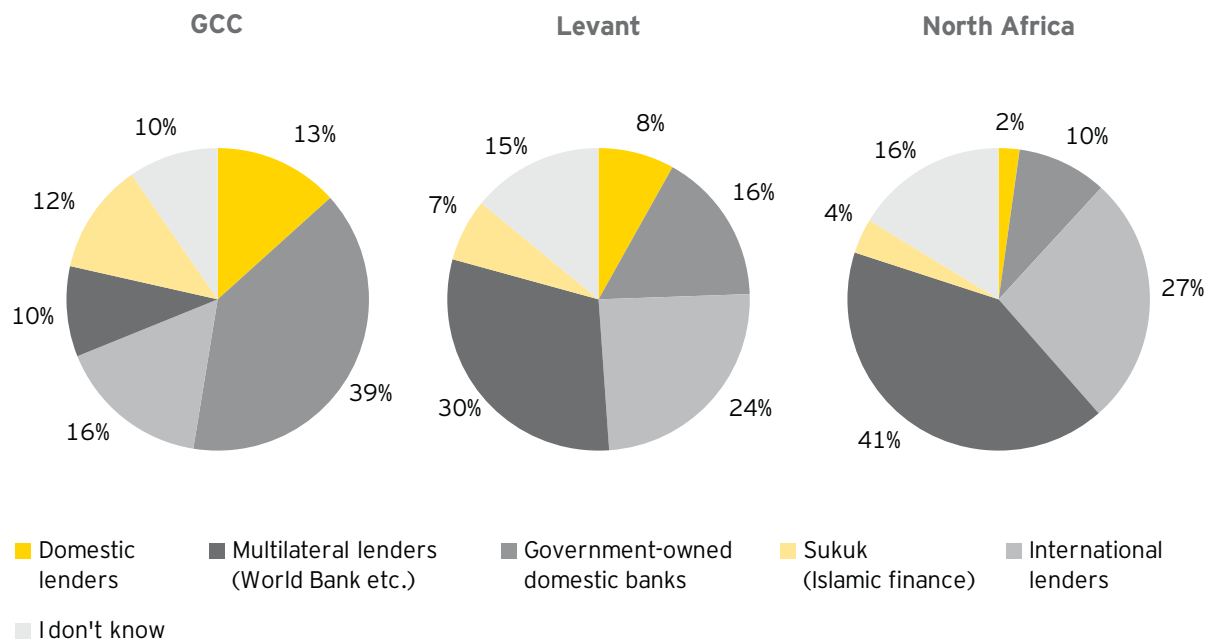
investors will be the source of equity investment in North Africa and almost 40% said the same for the Levant. It may be challenging to assume that investment in the Levant will come from international sources because of country risk, but it is most likely to happen for Jordan, which is the most politically stable country there.



Q9

What will be the most important source of debt financing for cleantech in the MENA Region over the next three years?

Continuing with the sentiment expressed for equity financing, respondents expect the GCC to raise cleantech debt internally while North Africa is expected to pursue international lenders aggressively. The Levant will rely the most on multilateral lending agencies such as the World Bank. Contrary to expectations, respondents do not believe that the GCC, the largest sukuk market in the world, will choose this route aggressively for cleantech. This might be because they underestimate the sukuk market or because the ticket sizes for most projects in the GCC are too big for standard issuances.



Key developments

MENA cleantech developments

Q10

What is the most important development in cleantech in the last 12 months in MENA?

This open-ended question was designed to get a feel of the top-of-mind recall and sentiment of our respondents, and it has provided us with valuable feedback. In addition to what they thought were the top developments in MENA cleantech, we are pleased to note that respondents displayed their feelings in the three broad areas of technology, cost and market. We have encapsulated the range of responses mentioning specific countries and their projects.

Jordan leads the top-of-mind recall as it recently began construction on the Tafila wind farm project. Its new law for FITs and new tender frameworks are leading cleantech innovation in the region.

The UAE follows with its announcement of the 100MW solar power projects in Dubai and Abu Dhabi and continuing developments at Masdar City. Further, its announcements regarding the development of a rooftop solar scheme by Dubai Electricity and Water Authority (DEWA) is a first in the region.

Saudi Arabia ranks third and respondents consider it the largest market, with work being done to develop solar and wind projects. Its

polysilicon plant construction is also mentioned along with the publication of its solar atlas. A minor negative for Saudi Arabia is seen as the delay in the implementation of its solar mega project due to investment and regulatory issues.

Morocco, at fourth in our survey, has announced a US\$9-billion solar project and is going ahead with the wind farms. It is also seen as a leader as it pursues both solar and wind technologies aggressively.

Egypt, Kuwait, Oman, Libya and Qatar are the other countries mentioned as potential cleantech markets.

Technology

Cleantech as a win-win approach to generation is finding widespread acceptance in the MENA Region. Technological breakthroughs in solar, wind and water are driving the increased importance of cleantech among regional leadership, legislators and government entities. Decreasing cost of solar and wind farms, coupled with the development of rooftop generation technology, are providing more options to countries to lower their dependency on fossil fuels. Future developments will see the region adopt technologies such as electric cars, smart metering and a host of other clean technologies.

Cost

MENA countries are increasingly realizing the opportunity cost being incurred by not adopting cleantech. They now seek to reduce the amount of fossil fuel they use domestically, which can be sold for more profit in the open market. There is also recognition of the benefits in reducing subsidies and offsetting the cost of renewables. 2013 was seen as a milestone year for cleantech developments in the region with the rise of IPPs and competitive procurement in reverse auctions. Forming strong relationships between the private and public sectors and encouraging local investors backed by governments to create an efficient cleantech infrastructure are seen as important. As the cost of cleantech closes the gap with traditional sources, investors are more likely to step in.



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