

# Financing the Future of Energy

## The opportunity for the Gulf's financial services sector

### Executive Summary

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# Foreword

## Financing the Future of Energy

**Alex Thursby**  
Chief Executive, NBAD



**Energy has been the cornerstone of the economies of this region. Even now, as we see an increasingly diverse range of economic activity, the future of the Middle East is inextricably bound up with the future of energy.**

The world's thirst for energy continues to grow and meeting the demand will be a real challenge. The rapid development of the GCC countries means we are part of that global picture. Energy demand, expected to increase threefold in the next fifteen years, will far outstrip today's supply. To close the gap will require huge levels of investment in projects that provide additional generation capacity and improve the efficiency of our energy use.

We should not underestimate the scale of the task facing us all. But, for the region, it gives us the opportunity to create solutions for highly efficient

energy systems that both supply our energy needs locally and connect to a growing world market in energy technology. Since this will require innovative approaches to financing energy, we believe it also presents real opportunities for the region's banking sector. That's why we commissioned this report: we want to understand better what the real drivers are so we can respond to them effectively.

Some of the report's findings may surprise you, as they did me. For example, renewable energy technologies are far further advanced than many may believe: solar photovoltaic (PV) and on-shore wind have a track record of successful deployment, and costs have fallen dramatically in the past few years. In many parts of the world, indeed, they are now competitive with hydrocarbon energy sources. Already, more than half of the investment in new electricity generation worldwide is in renewables. Potentially, the gains to be made from focusing on energy efficiency are as great as the benefits of increasing generation. Together, these help us to reframe how we think about the prospects for energy in the region.

At NBAD, our strategy is to expand our presence along the rapidly growing super-region that stretches from Africa through the Middle East to Asia, that we call the West-East Corridor. The vibrancy of these economies is driven by the rise of new megacities, rapid industrialisation and increasing middle class wealth and expectations. This report has also

highlighted for me the reality that the transformation under way right across the West-East Corridor brings with it an almost insatiable demand for new energy. These countries are looking for different kinds of solutions, to break out of traditional centralised approaches to generation and use new technologies to help them leapfrog developed economies.

As this report shows, when we look to the future, it is very clear that renewables will be an established part of the global energy mix. Governments around the world, including the Gulf region, are setting out their ambitions for decarbonising their economies, and the global debate about energy has never been more intense.

We are delighted to have had the collaboration of Masdar, Abu Dhabi's renewable energy company, in producing this report. Their expertise does an enormous amount to put the UAE at the forefront of the renewable energy debate and their international profile is a national asset.

So for NBAD, this report is the start of a journey: we want to learn more, collaborate more and make a real contribution to helping this region to meet its own energy challenge. We think this region has the potential to become a global centre of excellence in new energy solutions and we hope to work with others to better understand the role that the banking sector can play in financing the future of energy.

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# Executive Summary

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## Financing the future of sustainable energy offers excellent opportunities for the banking sector in the Gulf region.

This report provides the evidence base needed to convince financiers that those opportunities are real, large and happening now. It aims to give them the context they need to guide their choices and shape the financial products which will support the development of the energy industry.

The opportunities encompass projects that generate energy, that transmit and distribute energy to consumers, and that improve the efficiency of energy use. All of these – especially when combined – will help to address a fundamental requirement for the region: ensuring that supply can continue to meet the growing demand for energy. At the same time, it can enable the region to move towards greater prominence as a global home of sustainable energy.

The need for a strategic approach to energy finance is driven by the pressures of growth in the region, pressures that are creating the greater demand for energy. As this report will show, there is a large and

projected gap between supply and demand for energy in the Gulf, especially in the form of power (electricity). This is driven by growing populations and increasing per capita GDP with associated lifestyle benefits and challenges. More electricity generation is needed to serve a more energy intensive industrial base, greater use of air conditioning and an urgent scaling up of desalination capacity to meet future water demands. Energy demand in the region is expected to triple during the next 15 to 20 years. Rising to these challenges will require both substantial new generation capacity and wiser, more efficient, use of that energy.

While the economies of this region have been built on oil and gas production, and that will continue for the foreseeable future, the energy system of the past will not be the same as the energy system for the future. It is clear that renewables will be an established and significant part of the future energy mix, in the region and globally.

The argument of this report has four pillars, as follows:

# \$150bn

US\$150 billion was invested in solar generation globally in 2014.

## Pillar 1

### The scale of the opportunity is large.

The investment required for power generation, transmission and efficient use of energy is in the order of tens of billions of US dollars per year in the region – and hundreds of billions (possibly a trillion) US dollars per year worldwide. Continued rising demand will ensure a locked in energy demand, which underpins the attractiveness of this area as an investment proposition.

Of the increased generation capacity, a considerable percentage will come from renewables. In 2014 alone, US\$150 billion was invested in solar generation globally, and US\$100 billion in wind. For the last few years, more than half of the total investment in new electricity generation worldwide has been in renewable energy technologies. The trend has been enabled by continuing reductions in technology costs, rising demand for electricity in developing countries, and a significant drive by Governments to switch to less carbon intensive generation sources to respond to climate concerns.

Globally, the economic development of the Middle East, Africa and Asia – the fast emerging markets which have been termed the 'West-East Corridor' – have particular importance because this is where the largest amount of new demand will come from. This corridor will be characterised by the rise of new mega cities, rapid industrialisation, and growing middle class wealth and expectations. The nature of the energy demand in these countries will be different from the pattern which is now set in the developed world, requiring much more new-build generation (rather than adaptation or upgrading of established grids), rapid deployment and innovations which can reach large populations, often living in off-

grid situations. For the economies along this corridor, there is a huge opportunity to leapfrog traditional approaches to developing energy systems, moving immediately to cutting edge technologies, more cost-efficient and decentralised systems, and applying more innovative approaches to finance these developments.

## Pillar 2

**Renewable energy technologies that can realise these opportunities are proven, cost-effective and available today.** They also have the benefit of balancing economic, energy supply, sustainability and social ambitions for consumers, policymakers and investors.

For solar PV and on-shore wind technologies, there is already a track record of successful deployment. Prices have fallen dramatically in the past few years: solar PV falling by 80 per cent in six years, and on-shore wind by 40 per cent. The speed of this shift towards grid parity with fossil fuels means that, in many instances, perceptions of the role of renewables in the energy mix have not caught up with reality. At the end of 2014, the 200 MW Dubai Electricity and Water Authority (DEWA) bid in Dubai set a new world benchmark for utility scale solar PV costs, showing that photovoltaic technologies are competitive today with oil at US\$10/barrel and gas at US\$5/MMBtu. As Government and utilities are driven to bring new generation capacity on stream, this new reality presents a significant opportunity to make savings, reduce fuel cost risks, achieve climate ambitions and, at the same time, keep more oil and gas available for export.

Other technologies capable of transforming the wider energy system also represent medium



term investment opportunities, particularly storage technologies and concentrated solar power. They are currently running behind solar PV and on-shore wind in the maturity curve but are rapidly catching up. They can already be seen to be following a similar path towards proven deployment and operation, reliability and falling costs.

Efficiency and demand-side management is the other side of the equation in closing the energy gap of the future. There is particular emphasis on efficiency in developed economies, seen for example in more efficient industrial processes and even instances of innovative approaches by suppliers to incentivise reduced energy use in their customer base. Even in the Gulf region, where local energy prices have until recently provided comparatively little economic incentive for efficiency, there is now a growing awareness of the merits of reducing demand, particularly in construction and the built environment. Recent tariff rises in Abu Dhabi and Dubai, for instance, have looked to further support moves in this direction. Reducing local use also has the economic benefit of freeing up the oil and gas resources of these countries for future export.

## Pillar 3

**Investors and developers see a global stage for projects.** While the particular characteristics of demand and supply are local, the opportunity for proven technologies and finance packages is global. For example, government ambitions and targets have put solar and wind power at the heart of future energy developments in the Middle East. Ambitious targets and well-developed programmes create the opportunity for the development of significant local markets and experience. Building renewable energy technology supply chains and

capacity within the region will also open up the opportunity to export expertise and deliver solutions elsewhere, especially along the West- East Corridor where the requirement to meet new demand and to find non-traditional and innovative solutions is even more pressing.

## Pillar 4

### **Realising the opportunity will require collaboration between policymakers and financial institutions.**

Governments all over the world, including in the Gulf region, are setting ambitions and shaping strategies to respond to climate change and decarbonise their economies. Because of the sheer level of investment needed to deliver on those strategies, there is a major role for the private sector, especially the finance sector, to play in enabling Governments to make those policy ambitions a reality.

The traditional models of financing used for large infrastructure projects can be enhanced to support more frequent and fast deployment of renewable technologies. The banking sector has a major part to play, but so too do other financial services actors: insurance companies or global institutions such as the Clean Development Fund. Recent experience in delivering solar PV and on-shore wind projects on the global

stage has forged new approaches to financing renewable energy – such as securitisation, aggregation and green bonds – which can usefully be adapted for the Gulf region. Alongside the financial sector, though, Governments have a continued contribution to make, from establishing Power Purchase Agreements or procurement frameworks that enable new technologies to be deployed at scale and drive down costs. Plus the key contribution of Governments is to provide the longer term certainty that is a prerequisite for new project development.

This situation provides the cue for the financial sector to engage and work closely with Governments to establish mutually beneficial solutions: ensuring that the right policy frameworks are in place to facilitate the financing which will be needed and then helping to deliver the capital required.

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**Dubai set a new global benchmark in December 2014: at 5.84 US cents per kW hour, the bid for Dubai Electricity and Water Authority's 200 MW solar PV plant was cheaper than oil at US\$10/barrel and gas at US\$5/MMBtu.**

### Renewables in the context of a low oil price

The sharp fall in the oil price in 2014 has raised the question of whether the trend towards a more integrated energy mix and the growth of renewables will continue, or be stalled by more affordable oil and gas. There are strong reasons to believe it will continue.

- First, the huge rise in energy demand is for the most part electricity, yet only 5 per cent of global electricity comes from oil so, in that regard, oil is not a direct competitor with renewable electricity sources but rather a complement to it. Also solar is on track to achieve grid parity in 80 per cent of countries within the next two years, so cost is no longer a reason not to proceed with renewables.
- Second, there has been an historic concern that renewables are an unreliable option, because the wind blows only intermittently and the sun does not shine all the time, but that is proving to be less of an issue. For the Gulf region, the peak in electricity demand tends to occur during the middle of the day, and modern grids can now easily cope with at least 40 per cent of renewable input before requiring modifications. Even if there is intermittency, the increasing role of gas in the electricity market provides an ideal complement to the generation profile of renewable energy technologies. Furthermore, developments in storage technologies are progressing rapidly, and in the next few years utility scale solutions will be deployed that further minimise concern around what was until recently seen as a major inhibitor to the uptake of renewable generation.

- Finally, the underlying drivers towards renewable energy sources are long term: the looming gap in demand and supply that needs to be filled by significantly increased electricity generation; the challenge of managing finite or hard-to-reach resources; the desire of Governments to secure local supplies and where possible to disconnect from the volatility of the oil price; plus policy frameworks worldwide that seek to decarbonise their economy in response to climate change and pollution concerns. All of these are set to continue.

### The opportunity for the Gulf region

The landscape of energy production and use is changing both regionally and globally. The government of Abu Dhabi's twin reports, the Economic Vision 2030 and Environment Vision 2030, stand out in the region as plans for a future that will enhance economic performance, while also meeting the goals of a more sustainable economy that improves quality of life for citizens. Achieving this vision, however, will require innovations in energy supply and demand, including sustainable energy sources and high efficiency energy use. Recognising that there is significant existing infrastructure in place, the transition to this new energy future will be gradual – probably requiring several decades. But making the transition smoothly requires strategic decisions in the short term – over the next five to ten years – to avoid locking the energy system into further investments that will need to be rethought as unavailability of competitively priced conventional fuel sources mounts and environmental sustainability becomes an increasingly important performance criterion.

The introduction of more sustainable energy generation and improvements in the efficiency of energy use will reduce the energy intensity and carbon intensity of the Gulf region. The region currently has the highest energy intensity (energy use per unit of GDP) and carbon intensity (carbon dioxide emissions per unit of GDP) of any global region. It also has one of the world's highest per capita energy consumption and carbon emission rates, and lowest rates of deployment of renewables. If the region is to take a world-leading role in these areas, opening itself to a global marketplace and participating in the financing of energy projects in other nations that have set ambitious sustainability targets, it will be necessary to demonstrate the ambitions and the delivery capability at home. The central role of Government in the economies of many of the countries in the region can help to support a rapid transition if a decision is made to do so.

This transition to a more sustainable energy future will also involve the development of innovations that tie in well to the centres of scientific and technological expertise in the region, such as Masdar. By linking energy projects to innovation and the high tech economy that comes with it, the region has the potential to develop a workforce and the solutions for highly efficient energy systems that both supply the energy needs of the region and connect to a growing world market in energy technology and finance.

### **The opportunity for the finance sector**

The opportunity for the region is also an opportunity for the finance sector. What at first appear to be challenges as the region makes the transition to a new energy future can become the source of the opportunity, when it is recognised that the situation will demand innovative responses in technology, industry and infrastructure – all of which need to be financed. The intention of this report is therefore to lay out a vision for the opportunity that exists for the financial community by not only supporting these areas of growth but by also innovating itself.

If the transition is to be successful, however, careful thought – founded in a strong base of evidence – is needed to ensure that financial resources are directed towards the most fruitful projects that will lead the region to global leadership in the most effective manner while maintaining profitability and of course, meeting demand. Hence, the following chapters develop the evidence base, describing the current state of the energy system in the nations of the region, the state that must be reached if supply is to keep pace with demand, the potential drivers of change – such as economic growth, population growth, availability and prices of oil and gas, regional climate and sustainable energy policy, and the restructuring of local economies so they have a broader base in high value economic activities.

The intention of this report is to enable the finance sector to understand more fully the opportunities which exist and to provide the context for developing appropriate financial products and structures to enable the energy industry to deliver these opportunities. With greater amounts of capital available for these transformational projects, and through close working with key stakeholders in the policymaking arena, the banking sector can become one of the driving forces, accelerating the transition to a much needed new world of energy.

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**The region currently has the highest energy intensity and carbon intensity of any global region.**

# Future Energy Trends

## Rising demand

**US\$48 trillion of investment** in energy infrastructure is needed **in the next 20 years**: the bulk of it in non-OECD countries.

MENA energy demand is expected to **grow by 8.3 per cent per year** between 2013-2019: more than x3 the global average.

Over **170 GW of additional capacity** will be required **in the GCC region** alone by 2020.

## Rising investment levels

More than **50 per cent of investment in new generation capacity worldwide** is in renewables.

**US\$260 billion a year** has been invested in renewable energy technologies worldwide for the **past five years**.

**Green bond issues** to pay for low carbon energy projects reached **US\$36.6 billion in 2014**, more than triple the previous year.

## The falling cost of solar PV

**Prices for solar PV** modules have **fallen over 80 per cent** since 2008.

Solar PV will be at **grid parity in 80 per cent of countries** in the next 2 years.

Solar PV is already **cheaper than grid electricity** in 42 of the 50 **largest US cities**.

## Technologies with proven track record

Industrial applications of **energy efficiency can deliver 100 per cent payback** in five years.

**Modern wind turbines** produce **x15 more electricity** than the typical wind turbine in 1990.

The **cost of energy storage** is expected **to drop to US\$100 per kWh** in the next five years, against US\$250 now.



## DISCLAIMER

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To obtain more information on the report please contact [futureofenergy@nbad.com](mailto:futureofenergy@nbad.com)