WANA INSTITUTE

FACTSHEET

Renewable energy in the WANA region

Prepared by Sean D. Thomas, Research Associate

The WANA region is typically associated with non-renewable energy in the form of oil and gas. Arab countries alone are estimated to hold 713.6 billion barrels of oil (or 43% of the world's proven reserves)[1] and Iran supplements this with a vast additional share of approximately 157 billion barrels.[2] Despite this, the WANA region is home to cutting-edge renewable energy projects, particularly in the countries of the Gulf sub-region. What factors best explain this? What are the different types of renewable energy in question? And what is their potential?

Renewable energy as economic etrategy?

The economies of Gulf States are (in)famous for relying on the export of fossil fuels; known as 'rentier states', these countries are sustained primarily by external revenues for their non-renewable natural resources. Rentier states do not need to impose taxes on their citizens, which removes, or at least undermines, the impetus for political representation. Instead, rentier states provide significant benefits to citizens to ensure their acquiescence to the political order. To this end, the domestic cost of oil and gas has been kept very low in the Gulf states, via government subsidies and domestic price controls. This is now posing a significant problem because domestic demand, driven by population growth, has increased sharply in recent years [3]. The more oil is consumed domestically, the less is sold on the more lucrative international markets. This 'opportunity cost' can be huge in terms of lost revenues. For example, in 2012 it cost Saudi Arabia $3-5 per barrel to pump oil from the reservoir to the surface, where it can be exploited for domestic use with minimal additional costs; by comparison, the price per barrel on the international markets at the time was $125[4]. Without greater economic diversification, particularly in the energy sector, these countries risk complete economic and political breakdown when their natural resources begin to run out. These reasons have driven the Gulf states, particularly the United Arab Emirates (UAE), Qatar and Saudi Arabia, to become major players in the renewable energy sector.

> The most important feature of the rentier stateis that – being financially independent of society and indeed having, in a sense, society on its payroll – it is autonomous […] and does not need to seek legitimacy through democratic representation.[5]

Hydropower

Ironically, although some of the world's most water-poor countries are located in the WANA region, notably Yemen and Jordan, hydropower is currently the region's main source of renewable energy, making significant contributions to energy supply in Egypt, Turkey, Syria, Iraq and Iran.[6]

Solar

Solar power is the most attractive form of renewable energy for the WANA region (see figure 1). Its potential cannot be overstated: Desertec Foundation estimates that 'within six hours, deserts [globally] receive more energy from the sun than humankind consumes within a year'.[7]

There are two main methods for exploiting solar energy: photovoltaic (PV) cells and 'concentrated solar power' (CSP). In the first case, energy from the sun is used by the photovoltaic cells to charge electrons, generating a direct flow of electricity. In the second case, the energy from the sun is concentrated to produce heat, which is then used to power a generator or turbine to produce electricity. Abu Dhabi's 'Shams 1' plant is the largest CSP plant in the world, while the Mohammed bin Rashid al-Maktoum solar park in Dubai is the largest PV solar power facility in the region.

The potential for solar energy to be used for desalination is also being investigated. Countries like Saudi Arabia use vast amounts of oil to power the conversion of seawater into fresh water, an example of the 'opportunity cost' explained above. Saudi Arabia uses approximately 1.5 million

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1 I A Gelil, M El-Ashry and N Saab (eds.), Sustainable Energy; Prospects, Challenges, Opportunities (2013) Arab Forum for Environment and Development <http://www.afedonline.org/report2013/ENGLISH/Sustainable%20Energy-English.pdf> at 23 October 2014.

2 OPEC, Iran Facts and Figures <http://www.opec.org/opec_web/en/about_us/163.htm> at 26 October 2014.

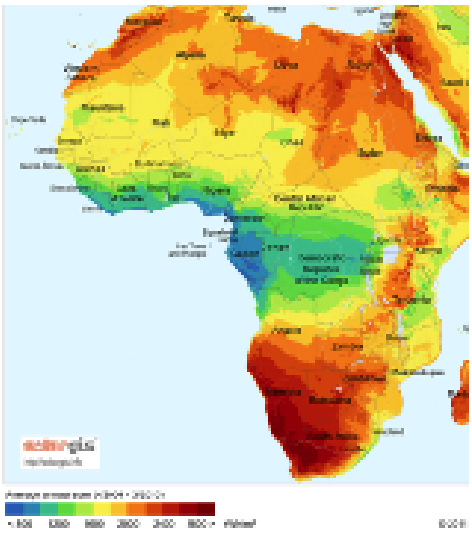
3 L El-Katiri, *A Roadmap for Renewable Energy in the Middle East and North Africa*, The Oxford Institute for Energy Studies (2014) <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2014/01/MEP-6.pdf> at 26 October 2014.

4 The Economist, *Keeping it to themselves* < http://www.economist.com/node/21551484> at 3 November 2014.

5 G Luciani, 'Oil and Political Economy in the International Relations of the Middle East' in L Fawcett (ed), International Relations of the Middle East (2013) 103, 115.

6 Stockholm International Water Institute, *Water and Energy Linkages in the Middle East* (2010) <http://www.siwi.org/documents/Resources/Papers/Paper16_Water_and_Energy.pdf> at 26 October 2014.

7 DESERTEC, *The Desertec Concept* <http://www.desertec.org/concept/> at 30 October 2014.



Direct normal irradiation (Source: Solargis).

barrels of oil per day to produce electricity and desalinated water.[8]

On a smaller scale, solar power also represents a viable alternative to non-renewables for individual households via the use of PV cells, given that electricity is created directly with this method. However, a common hurdle is that the technology is still relatively expensive compared with the cheap cost of fossil fuels and the better ratio of energy to cost associated with the latter.

Wind power

Wind power is increasingly playing a role in the production of energy in the WANA region. Morocco's Tarfaya wind farm is the largest on the African continent and Egypt aims to generate 12% of its energy via wind technology by 2020.[9]Jordan is currently developing a 117MW wind farm (enough to power roughly 150,000 homes) in the province of Tafila. Iran has also vastly expanded its output of electricity generated by wind power, spurred in part by the weight of sanctions against its oil and gas sector.[10]

Waste-to-Engery

As well as ranking among the highest per capita consumers of oil in the world, per capita rates of Municipal Solid Waste (MSW) generated in the Gulf states are some of the highest globally.[11] Across the WANA region the most common method for dealing with MSW is to dispose of it via landfill. However, to the old adage 'reduce, re-use, recycle', it is possible to add a fourth 'r'—'recover'. This denotes the fact that significant amounts of energy are stored in MSW—energy that can be recovered and utilised. This is typically done by way of incineration, but other, cleaner, waste-to-energy techniques are also being tested in the WANA region, including gasification and anaerobic digestion. In this way, MSW, alongside sewage, industrial waste and agricultural waste, can potentially be used to produce biogas, thereby mitigating some of the environmental impacts of current waste-generation and disposal.

Challenges

Political risks are the principal hindrance to the development of renewable energy projects in the WANA region. For example, the large Desertec project recently saw a major withdrawal of investors due to reservations about instability in the region and the high costs of the project. Similarly, Iran is subject to sanctions against its renewable energy projects (solar, wind and biogas) by the US, making it more difficult to implement renewable energy initiatives. The danger, and indeed the irony, is that underinvestment in alternative energy sources due to security concerns will precipitate further conflict in the future, given the mutually dependent nature of energy, water and food. The cost-benefit ratio is an additional challenge. It is often cheaper and more efficient (in the short-term) to maintain the status quo of using oil and gas, rather than invest in expensive technology for renewables which will not send as much energy to the power grid as more conventional power stations. However, these challenges are equally met with optimism in the region; for example, Masdar city in the UAE is a zero carbon, zero waste smart city that represents a beacon for the potential of sustainable urban planning. Masdar city utilises a variety of the forms of renewable energy described above and is an example of the adaptability required to meet the challenges of transitioning to a green(er) economy.

8 I A Gelil, M El-Ashry and N Saab (eds.), *Sustainable Energy; Prospects, Challenges, Opportunities* (2013) Arab Forum for Environment and Development <http://www.afedonline.org/report2013/ENGLISH/Sustainable%20Energy-English.pdf> at 23 October 2014.

9 Clean Technica, *Egypt Plans 2GW Auction Each For Wind & Solar Power Capacity* <http://cleantechnica.com/2014/09/25/egypt-plans-2gw-auction-wind-solar-power-capacity/> at 30 October 2014

10 The Wind Power, *Iran* <http://www.thewindpower.net/country_en_38_iran.php> at 28 October 2014.

11 M S Al-Ansari, 'Improving Solid Waste Management in Gulf Co-operation Council States: Developing Integrated Plans to Achieve Reduction in Greenhouse Gases' (2012) *Modern Applied Science*, vol. 6 (2), pp. 60-68.

Sean D. Thomas

Sean joins the WANA Institute as a Research Associate charged with examining the continuing Syrian refugee crisis and its impact on surrounding states, as well as performing analyses of ongoing developments in Iraq and Syria concerning the so-called "Islamic State" organisation. His research interests include the politics of refugees in Arab states, and International Relations Theory. Sean holds a First Class BA (hons) in International Relations and Politics. He also holds an M.Litt in Middle East, Caucasus and Central Asian Security Studies.