Thus far, even with the aforementioned actions toward sustainability, Kuwait's energy intensity performance has not improved. Indeed, the latest IEA statistics show that its energy intensity increased from 0.49 kWh/US$ in 2005 to 0.56 kWh/US$ in 2012. There are numerous factors underlying the deficient behaviour of Kuwait's energy system; these are discussed in the following section.

Barriers toward sustainability

The main barriers to energy sustainability in Kuwait involve, but are not limited to:

Undefined goals with respect to energy efficiency and conservation in terms of:

- Quantity and quality, for example, an energy saving target that is based on total consumption, per capita, or GDP. In other words, how much do we want to save? Is the indicator based on per capita savings, energy intensity improvement, or some other measure?
- Time duration needed to achieve the energy saving goals.

Lack of an implementation roadmap strategy that has clear and achievable milestones. In 2012, KISR developed such a roadmap for the deployment of renewable energy systems to meet 10 per cent of the demand. However, it has not been utilized due to the absence of a mandated authority to implement it.

Lack of an authority that is empowered with legal framework to follow up and enforce energy sustainability in the country. So far, a number of fragmented efforts have been carried out by a range of public and private organizations. Such efforts need to be concentrated in order to reach the intended goals more effectively. A national authority is needed to coordinate the efforts of the energy stakeholders and to be responsible for the development and implementation of the energy roadmap strategy.

Political pressure. The continual political pressure to provide substantial energy subsidies has been the key barrier toward sustainability in Kuwait. In 2011, the total energy subsidy in Kuwait was US$11.1 billion, which represented 7 per cent of GDP (see Jim Krane's article in this issue). The government has advised in favour of, and has attempted to pass, a number of propositions to increase the energy tariff. However, all of these attempts have been vetoed by the parliament.

Necessary actions

These barriers can be addressed through short/medium and long-term actions. Within the short and medium terms (five to ten years), an energy consumption labelling system for appliances could be developed and applied, to encourage the use of energy-efficient systems. Moreover, the present building code may be revised to reduce energy consumption per building area unit further, and put

'… LEGISLATION FOR ENERGY EFFICIENCY AND RENEWABLE ENERGY MUST BE DEVELOPED AND APPLIED …'

restrictions on the building areas. In addition to appliance and building code development and improvement, legislation for energy efficiency and renewable energy must be developed and applied, in order to regulate related applications, deployments, pricing policies, and financial incentives, etc., to stimulate sustainability practices. Furthermore, there must be promotion of energy service companies, to advance energy efficiency practices and renewable energy deployment. A national entity – such as a National Energy Council – must be established to manage energy resources, impose energy efficiency measures, and sustain the deployment of renewable energy systems. Such a body would have a mandate to secure the energy supply and to enforce efficient energy use, in order to assure socio-economic development and environmental sustainability.

For a long-term strategy for action, the education system should be developed to embed a culture of responsibility toward sustainability. Additionally, such a strategy ought to embrace a communication plan to disseminate to the public the importance of, and need for, sustainability. Such a strategy would support investment in long-term R&D programmes that are adapted to the nature of Kuwait's energy challenges.

Renewable energy can drive job creation in the GCC

Rabia Ferroukhi and Arslan Khalid*

As global economies continue to struggle with remnants of the persistent economic crisis, unemployment and its associated social and economic impacts remains a key concern and an instrumental driver of public policy. Renewable energy offers considerable potential for gross job creation. In fact, according to estimates in the

document 'Renewable Energy and Jobs: Annual Review 2015' published by IRENA, the sector (excluding large hydro) supports around 7.7 million direct and indirect jobs globally. Project level data indicates that, on average, renewable energy technologies create more jobs than fossil fuel technologies. For instance, solar photovoltaic (PV) creates at least twice as many jobs per unit of electricity generation as either coal or natural gas. According to the UK Energy Research Centre document 'Low carbon jobs: The evidence for net job creation from policy support for energy efficiency and renewable energy' published on 5 November 2014, renewable energy deployment is also associated with net job creation throughout the economy, although the magnitude varies by country and with the mix of technologies and policies deployed. Therefore, countries in the GCC can expect significant job creation through renewable energy deployment in addition to other benefits such as emission reductions and fuel and water savings.

Growth driving jobs

Over the past 20 years, rapid economic growth has been the primary driver of job creation in the region, with the public sector as the leading employer. The career opportunities offered by the public sector, and the comparison with private sector wages, made these jobs more attractive to nationals. Public sector employment, however, has been growing at a slower pace than private sector. In addition, while governments have traditionally relied on the public sector to absorb the growing national workforce, budgetary concerns are driving efforts to implement employment strategies that can increase national participation in the private sector. According to the document 'Labor Market Reforms to Boost Employment and Productivity in the GCC: an Update' prepared by IMF staff for the annual meeting of ministers of finance and central bank governors (on 25 October 2014 in Kuwait City), factors such as the saturation of the public sector, the unattractiveness of private sector opportunities, and the relative lack of required skills coupled with a rising population have resulted in a significant employment problem for the region's young people. (The document 'Rethinking Arab Employment: a Systemic Approach for Resource-Endowed Economies', part of the New Vision for Arab Employment Initiative of the World Economic Forum World Economic Forum, published in October 2014, indicates that youth unemployment rates are high: 28 per cent in Saudi Arabia and Bahrain, 21 per cent in Oman, 9.2 per cent in Kuwait, 11 per cent in the UAE, and 1.7 per cent in Qatar. In contrast, it notes that overall unemployment rates are lower than the global average: 5.6 per cent in Saudi Arabia, 7.4 per cent in Bahrain, 8.1 per cent in Oman, 1.5 per cent in Kuwait, 3.8 per cent in the UAE, and 0.6 per cent in Qatar.) The creation of employment opportunities in all sectors of the economy will be essential in addressing this issue in the future. It is in this context that renewable energy can contribute to the solution.

'… ON AVERAGE, RENEWABLE ENERGY TECHNOLOGIES CREATE MORE JOBS THAN FOSSIL FUEL TECHNOLOGIES.'

All the GCC countries have announced renewable energy targets and plans to define the long-term vision for energy sector diversification. Despite relatively slow progress over the past few years, decreasing technology costs (especially in solar PV) show promising signs. This is best illustrated by the recent 200 MW PV plant in Dubai, where the record-breaking bid of US¢5.84/kWh has set a new benchmark for solar PV projects. Several initiatives followed suit, reviving hopes that GCC aspirations for renewable energy can be met. These include the tripling of Dubai's target, the revival of plans for the 100 MW PV plant Nour 1 in Abu Dhabi, the announcement of a 50 MW solar PV plant in Saudi Arabia by Taqnia, and the announcement of a 1 GW solar thermal facility in Oman for enhanced oil recovery.

The completion of renewable energy plans in the GCC could result in the deployment of more than 70 GW by 2030 (in the absence of any national technology-specific targets we assume that the shares of the technologies are as follows: 60 per cent PV, 30 per cent concentrated solar power (CSP), 5 per cent wind, and 5 per cent waste-to-energy). Such a deployment would potentially create a significant number of jobs along the value chain (results are derived from IRENA estimates that use an employment-factor approach). This could generate an average of 137,000 direct jobs every year between now and 2030 (direct employment is generated by core activities, without taking into account the intermediate inputs necessary to manufacture equipment or to construct and operate facilities), with Saudi Arabia in the lead at 70 per cent.

Solar technology will lead job creation

Given the abundance of solar resources in the region, employment in the renewables sector will be led by solar technologies, with CSP and PV accounting for around 75 per cent of the jobs in 2030. Massive deployment of CSP in Saudi Arabia, and to some extent in the UAE, could result in around 71,000 jobs, making it the largest technology by numbers employed, followed by PV at 32 per cent of the jobs in 2030. According to the forthcoming IRENA paper 'Gulf Cooperation Council Regional Energy

Market Analysis', waste-to-energy and wind energy – important elements in the plans of some GCC countries – could support about 15 per cent and 12 per cent of the jobs in 2030.

Looking at the different segments of the value chain, *construction and installation* will undoubtedly create the largest number of jobs in the sector in the early stages of deployment. However, as markets mature and local manufacturing increases, the share of jobs in the *manufacturing* segment is likely to rise. Moreover, as greater capacity is installed, a larger workforce for the *operation and maintenance* (O&M) of existing plants will be required, resulting in an increase in its share.

'REGIONAL TRENDS INDICATE THAT THE CONSTRUCTION AND INSTALLATION SEGMENT IS INDEED LEADING JOB CREATION.'

Regional trends indicate that the construction and installation segment is indeed leading job creation. Developers have been involved in projects in the GCC and in the broader MENA region (in countries such as Jordan, Morocco, and Egypt). ACWA power, for instance, has been developing/running renewable energy projects in South Africa, Morocco, and Bulgaria since 2012, and is now developing the 200 MW PV plant in Dubai which is expected to create 1,000 jobs.

Although not comparable to mass manufacturing and low-wage markets such as China and south-east Asia, the GCC region has the potential to create jobs in the manufacturing segment of PV and CSP, given its relative advantage in lower energy prices. The case for equipment manufacturing for local use is further strengthened by the presence of synergistic domestic industries such as: glass and petrochemical industries for PV; and cement and metal industries for foundations and fixtures for PV, CSP, and wind farms.

Though solar equipment manufacturing in the region remains small, interest in localizing different segments of PV manufacturing is rising. According to Robert Kennedy's *Aljazeera* article 'Qatar Sheds Light on Its Solar-Power Future' from 8 June 2014, module production has been taken up by Qatar Solar Energy, which established a 300 MW facility in Doha, with a goal of producing 2.5 GW in the long run. The competitive advantages, together with the future market potential of the region, is attracting foreign investors such as SunEdison which, according to a statement released by the company on 4 February 2014 ('SunEdison, PIF, Sanabil Investments Take Steps To Advance Solar Energy Industry In The Kingdom Of Saudi Arabia') is conducting feasibility studies for a 3 GW panel production facility. Saudi Arabia has also announced plans (reported in a Gulf Research Center paper 'EU–GCC Renewable Energy Policy Cooperation: Exploring Opportunities' published in December 2013) for a 10,000 tons per annum polysilicon production facility in Yanbu Industrial City, which is expected to create 1,000 local jobs.

While the opportunity for renewable energy job creation across the segments of the value chain is clear, maximizing its potential will require appropriate policy and regulatory frameworks that encourage deployment, stimulate investment in local industries, strengthen firm-level capabilities, and promote education and training.

Stable and predictable policies will be key

It is important to highlight the fact that stable and predictable deployment policies and regulations will play a central role in creating a thriving renewable energy market; this is essential for attracting sizeable investment into the local value chain and creating jobs. In addition, capacity-building activities that develop the necessary skills, coupled with constructive labour policies, can facilitate the integration of labour resources into the renewable energy sector. However, in order to maximize job creation throughout the renewable energy value chain, GCC countries may need to adopt a range of industrial policies that encourage the development of the domestic industry from both the demand and the supply side.

On the demand side, incentives such as local content requirement (at least in the early stages of deployment) can be introduced to support a young domestic industry and generate demand for local equipment and services. On the supply side, governments can support the establishment of a domestic industry by providing guarantees and low-cost financing, promoting research and development, arranging technology transfer, and training human capital. Finally, governments can further promote the establishment of the renewable energy value chain through direct public investment in flagship projects and/or in public private partnerships.

Renewable energy education and training are of particular relevance in creating an enabling policy framework that can maximize job creation for the growing number of nationals entering the labour force. Opportunities for renewable energy employment will include a broad range of occupations and skill requirements. Skilled technical jobs (for those such as scientists, engineers, and designers) will continue to be filled by experienced international professionals, with increasing participation from nationals

supported by education and training. As the industry develops over time, the share of low-skilled technical jobs (such as PV panel cleaners and factory workers) is expected to decrease through process improvement and mechanization. Such low-skilled jobs should be replaced by opportunities for a smaller number of high-skilled workers, providing further chances for trained nationals. Finally, the sector could create other types of employment, including commercial, financial, legal, and policy-related opportunities.

Resilience through renewables

According to the paper 'Impact of the Global Financial Crisis on GCC–UAE's Banking Sector' by Hoda Jaber, published by the British University in Dubai on 1 February 2012, the economies of the GCC have been relatively more resilient in the aftermath of the global economic crisis. However, the recent collapse in oil and gas prices is prompting a rethinking of the region's development strategies. With an uncertain economic outlook and rising populations, any failure to address appropriately the needs of a large domestic population entering the labour market could pose certain challenges. Therefore, job creation is a central priority for the GCC governments.

Renewable energy offers considerable potential for job creation in the energy sector and in the broader economy. Successful implementation of renewable energy plans in the GCC could generate an average of 137,000 direct jobs every year along the value chain. While most of these jobs would initially be created by project developers in the construction and installation segment, employment in the other segments is likely to increase as the domestic industry matures. However, maximizing the job creation potential of renewable energy will require policies that encourage deployment, strengthen firm-level capabilities, enable investment and technology transfer, and promote education and training. The GCC countries have been blessed with hydrocarbon resources that have fuelled development over the past decades. Going forward, the abundant solar resources of the region can stimulate economic growth and provide employment for future generations.

**The opinions expressed in this article are those of the authors and do not necessarily represent the views of International Renewable Energy Agency's Secretariat or member countries.*

Energy productivity, the new frontier for GCC countries

Waleed Alsuraih

The recent decline in oil price – the largest in terms of annual average when compared to those of 1986 and 2009 – turned the 2014 budget surplus for Gulf Cooperation Council (GCC) countries into a deficit of about 8 per cent of combined GDP in 2015, according to the International Monetary Fund (IMF). Since 2014, natural gas prices have also shown a declining trend, although not as pronounced as oil. In response, governments have dug into their reserves and are tapping new sources of financing, particularly government bonds. Global estimates show the oil price may remain depressed for the foreseeable future, implying slow recovery in the short to medium term.

'THE DEMAND FOR DOMESTIC ENERGY IN GCC COUNTRIES HAS BEEN GROWING FASTER THAN THEIR GDP …'

The demand for domestic energy in GCC countries has been growing faster than their GDP (an average of 5 to 9 per cent a year from 1980 to 2014). This rate of growth is unsustainable, however, as GCC governments face significant difficulties in balancing their budgets, mostly due to the rising costs of fossil fuel subsidies relative to their GDP. For the GCC economies, the challenge of diversification remains, as their growth is still not of a type designed to reduce their reliance on oil revenues, let alone to increase private sector jobs for citizens, strengthen human capital, and promote more sustainable development.

Under the old social contract, oil revenues (which represented about 80 per cent of total revenues in the GCC in 2013) delivered economic development and substantive societal benefits for three and a half decades. This was done through the provision of highly subsidized fuels and other services on the domestic market, and the sale of oil at overseas international prices. This level of government spending is unlikely to be maintained, however, because a return to high oil revenues is uncertain in the short term. In GCC countries, the growth in total factor productivity – a measure of an economy's efficiency and technological sophistication – has