

March on toward power self sufficiency



SEC wanted to add 12,043 MW power capacity by 2015, equivalent to between 4 and 8 power plants of the size commonly built in the Gulf. (AN photo)

By **K.S. RAMKUMAR** | ARAB NEWS

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Saudi Electricity Co. (SEC), which is majority state-owned, says its power generation capacity rose to almost 45,400 megawatts (MW) in the first quarter of 2010, up 76 percent from 25,800 MW in April 2000.

The size of the utility's electricity transmission networks increased 45 percent to nearly 42,800 km from 29,600 km in 2000, while the distribution grid grew 63 percent to nearly 368,400 km from almost 226,700 km over the period. The number of subscribers increased over the same period to 5.77 million from 3.5 million.

However, according to analysts, fuel shortages and other hurdles will put new electricity generation targets in

alone, according to the report. The country's current capacity is just under 40,000 MW.

The plan faces a number of constraints, including shortages of fuel and manpower, and a lengthy contracting process, says Douglas Caskie, an expert in Gulf power at the international consultancy IPA Energy and Water Economics. "That sounds very ambitious given the capacity developments so far. If you imagine 2,000 MW as a really significant sized power plant, to replicate that, to run the procurement process for that in five years, four times over, is significant."

Saudi Arabia is in dire need of more electricity capacity. Power cuts are an annual occurrence at periods of peak demand in summer, and consumption is increasing at one of the fastest rates in the world. There has been double-digit, compound growth in demand. And that is a combination of a number of factors including low tariffs plus the ongoing planned development of projects, the industrial cities, and the new economic cities.

A shortage of natural gas remains a significant constraint, with Saudi Aramco, the state oil company, being pulled in different directions to supply gas to industrial plants and its own operations, JP Morgan Chase, the investment bank, said in a recent report.

"With gas growth uncertain over the next few years and a stated policy that petrochemicals get first priority for gas supplies, it appears that the Kingdom's power generation will require an increasing amount of oil," says Lawrence Eagles, the author of the report. The burning of oil to generate electricity emits more pollution, requires additional capital investment in power plant technology and reduces the country's exports.

By 2012, Saudi Arabia could be burning 900,000 to 1.2 million barrels per day (bpd) of oil to generate electricity in summer months, JP Morgan says. The country used as much as 470,000 bpd of crude oil last summer, according to a global energy consultancy.

Saudi Arabia has few alternatives. Solar energy is considered an unrealistic option in certain quarters because of its high cost. Nuclear energy is not being pursued as much as the UAE is doing. Natural gas, the default option that fuels slightly less than half of Saudi power capacity, remains in short supply. Despite its vast oil reserves, the country has few reservoirs of natural gas found separately from oil deposits, so gas supplies decrease with OPEC quotas and other limits to oil production, according to analysts.

Saudi Aramco hopes to find significant new reserves in the Empty Quarter in the south, but its efforts after almost six years of drilling with foreign partners have not borne desired fruit. "They would need a significant find. I think they would need a game-changing find in the Empty Quarter if these things are going to be gas-fired," Caskie said of the planned new power plants. "They'll burn fuel or oil.

Meanwhile, Saudi Arabia's effort to unbundle, deregulate and privatize its electricity generation, transmission and distribution industry is taking a leap forward, with new thinking formulated after a lengthy break. A plan has been aired by Saudi Arabia's Electricity and Cogeneration Authority to split the state-controlled SEC's power generation assets into four competing companies and divide the remaining distribution and transmission assets into another two outfits.

The Kingdom has been considering possible reforms for a long time, but has had to overcome opposition to privatization, as well as finding a working blueprint for the reforms. A shortage of gas feedstock might, however, continue to constrain swift generation growth even after the reform, says an analyst.

The plan is hoped to finally bring more private investment into the Kingdom's power sector, which keeps growing at a pace with which the state is finding it hard to keep up, although for the full benefits of privatization and competition to filter through, a scrapping of the generous subsidies would be necessary.

According to analysts, Saudi Arabia has been mulling the idea of radically reforming the electricity generation, transmission, and distribution sector for many years, ever since the potential of allowing private power-generation investments through independent power projects (IPPs). Indeed, a more or less detailed plan to break up the SEC into at least four competing power-generation companies was originally floated a year ago. The plan is now set to move forward with implementation now scheduled for mid-2010.

Abdullah Al-Shehri, vice governor for regulatory affairs at Saudi Arabia's Electricity and Cogeneration Authority, said: "SEC currently owns generation, distribution and transmission and we would like to see this unbundled. Our requirement is by mid-2010 to create competition and encourage privatization." Outlining the plan further, Al-Shehri said SEC would be transformed into a holding company only, owning the four new power generation companies, as well as a transmission and a distribution company.

The plan is understood to call for an equal division of SEC's current generation capacity, which he put at about 36,000 MW, giving each of the four new power producers around 9,000 MW of capacity. With that base, the companies would be able both to divest generation assets in order to finance other projects, or to build strategic alliances. It still remains unclear whether the companies will have as equal a generation capacity spread over the vast country as possible, or whether they will be region-based.

Saudi Arabia's electricity demand has been spiraling for many years, on the back not only of the last few years' high oil export revenues, but also because of the population growth. While the latter is likely to remain robust, economic growth in Saudi Arabia is likely to take a significant hit from the fall in oil export revenue since mid-2008, and from the lower industrial growth and electricity demand that are also a by-product of the deep ongoing global recession. Nevertheless, high electricity demand growth by international measures is still expected, with Al-Shehri confirming that the Kingdom was anticipating a six percent demand growth this year as new generation capacity is brought online, relieving supply constraints suffered on and off over the past decade.

Saudi Arabia's main problem with bringing sufficient new generation capacity online has been the lack of sufficient gas feedstock for new plants, while it has been reluctant to launch projects for new plants that are run on petroleum-based-fuel. This has eased somewhat over the past two years, and the government seems to have accepted

that there will be a place for oil-based fuels in its electricity generation for quite some time, though it is also continuing a drive to develop as much associated and non-associated gas for power supplies as swiftly as possible.

SEC is partly privatized, with 20 percent of the company's shares floated on the Saudi stock market, somewhat complicating the forced break-up of the company. While it is likely that the four competing power generation companies will be offered to investors, attracting those with a presence in a high-growth market, the country's regulated and highly subsidized retail electricity price will still ensure that only the state might actually experience any benefit from the break-up and the resulting domestic competition. For the competing power generators, the measure is likely to bring their own margins under some pressure, lowering some of the Saudi Arabian generation market's attractiveness resulting from its growth.

According to the latest forecasts from Report Linker, the country is expected to see an increase in generating capacity of 38.2 percent over the 2009-2014 period, on the back of expectations of real GDP growth averaging 3.36 percent per annum over the 2010-14 period. According to a recent estimate by Banque Saudi Fransi, investment in the Kingdom's power and water sectors will need to rise by around a third to \$266.7 billion through to 2025, compared to the total investment of \$400 billion planned for total infrastructure. So far, \$80 billion has been budgeted for new generating capacity.

SEC expects generating capacity to be increased from the current 45GW to 70 GW by 2020 or around 3GW every year. The driving force behind this rapid increase is a combination of the country's reliance on desalination plants for its drinking water, rising demand for air conditioning and expectations that GDP per capita will rise by 42 percent over the same period.

Efforts needed to use and conserve water wisely

By **ROGER HARRISON | ARAB NEWS**

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It is time for a paradigm shift. With only three quarters of one percent of the water on this planet accessible as fresh not saline liquid, humanity is in no position to waste any of it.

Water is a small and dwindling resource and it behooves us to make great efforts to use it wisely and conserve it wherever possible. Growing population numbers that increase the need for the greatest water user agriculture, variations in climatic conditions and industrialization of developing countries all put increasing pressure on a decreasing finite resource.

The simplicity of having water out of a tap for almost no charge in Saudi Arabia seduces the user into thinking it is freely available. Sixty percent plus of domestic water that arrives in homes and business for human consumption has been manufactured in energy intensive resource-guzzling desalination plants. Built at huge cost, run and maintained at further expense, the water manufacture infrastructure has obvious costs. Less obvious are the hidden expenses of the gap between water produced and water received by end consumers through loss and tanker delivery charges.

Apart from financial cost, environmental cost in terms of carbon, nitrous oxide and sulphur emissions from desalination plants add to the mix. Soon these will be real financial costs that can be built into the price of water production as unclaimable carbon-credits.

As Carbon Emission Reduction (CER) trading reaches the Kingdom, which it did on May 31, the failure to reduce emissions will result in the inability to claim carbon credits for trading on to polluting industries. The loss of potential savings on the production side of the equation equates to an actual cost that could be retrieved and goes into the production price.

Little if any of this worries the general consumer who washes his car daily, uses several gallons of water by leaving the tap running as he brushes his teeth or waters grass and flowers never designed by nature to prosper in the desert. At the end-consumer level, he simply turns the tap on and water — most of the time — emerges.

Conservation of the most precious of liquids is essential; awareness of this among the Saudi public seems, to judge by the use of water in private and public spaces and in domestic situations, appears to be low.

Raising awareness involves action in three areas: Price, public education and pressure.

In reverse order, the pressure on the public has and will come again when water stops flowing. The traditional, and thankfully largely historical, agitated queues of consumers outside water distribution centers in Jeddah were an annual demonstration of needs over supply.

Worse was a break in the 300km Jubail-Riyadh water pipeline some years ago that brought scenes of panic to the streets and saw the price of tanked water rise by a factor of 10 in a matter of hours. Add that situation to the fact revealed at the Water Electricity and Power Conference (WEPC) in Dammam last year that Riyadh had just 36 hours of reserve water and the pressure to conserve takes on a new dimension.

Pressure to keep water flowing and potable applies to the authorities too. Extension, maintenance and repair of the system are priorities that need constantly to be addressed if the specter of urban drought is to be avoided.

The National Water Company (NWC), the executive arm of the Ministry of Water, aims to reduce the volume of water and revenues that are lost to leakage to a more reasonable 20 percent in Riyadh. It needs to; leakage is at very high levels. Riyadh sprawls over 536 square km, an area more than five times the size of Paris. About 60 percent (in some areas 75 percent according to the NWC at the WEPC last year), of Riyadh's valuable water supply according to the Swiss based ABB company on March 4, 2010, is lost through leakage in the 10,000 km of pipes that transport water to the city's 4.5 million population. Their water metering system is part of the modernization of the city's ageing water network.

Public education, the second prong of the attack on wasteful use, has been tried before but is currently under way again in the Kingdom. The Saudi Ministry of Water and Electricity (MOWE) started the latest iteration on May 12 when it teamed up with Ariel washing powder and LG to announce the launch of its 'Saudi Water Savers' campaign. It is a commendable Kingdomwide campaign to address the water challenge in the country and make the Saudi population aware of how it consumes its daily water.

According to MOWE, research showed that "on average each person in Saudi Arabia consumes 286 liters of water per day, the third highest consumption in the world after the US (No. 1) and Canada (No. 2)."

The campaign is aimed at the adult Saudi consumer and focuses in particular on 'intelligent' front-loading washing machines and the Saudi housewife. It claims that, "if only 10 percent of Saudi housewives switched from a top loading washing machine to a front loading automatic washing machine, it would save the kingdom 4 billion liters of water every month."

However, while the campaign is laudable, awareness through education really has to be integrated into the public education system at the earliest opportunity and from primary stage upwards. Targeting adults only addresses those who have developed bad water habits; better to target those whose habits have yet to develop with good water-use habits through science education that produces an understanding of the issue.

The third prong, price, is probably the most effective in changing public behavior and attitude to water. There is little evidence that the general public in the Kingdom regards water as a scarce diminishing resource except when it stops flowing. Panic buying begins and the flower of understanding begins to grow, rooted solidly in the wallet and blossoming with the realization that as a member of the public you have no right to water; it is a good and has economic value that has to be paid for. But how much should it cost?

In effect, the Saudi water producers are making a product for a dollar and selling it for a cent to consumers who use more per than anyone bar the US and Canada. Selling water for one percent of what it really costs is a consumer's dream because they can use as much water as they wish, and still receive a low monthly bill.

Desalination plants supply 60 percent of this urban water use. According to a multiple government sources, the basic cost to desalinate one cubic meter of water ranges from four to six riyals. Plus, most of this desalination occurs along the coast line, hundreds of km from Riyadh and other major cities.

The National Water Company estimates it costs another two to three riyals to transport and distribute the water to the consumer's house. Water is relatively dense — one ton a cubic meter — and needs a great deal of pumping. Hidden in this equation is the real cost of transporting water. Government subsidized oil is used in the desalination process, but if factored in at commercial rates, the price jumps another few riyals per cubic meter.

All things considered, the government is paying anywhere from SR9-12 per cubic meter of water that comes out of your tap, but they only charge the consumer 10 halalas per cubic meter. It is evident that this consumer dream is a governmental nightmare.

When crunched, the numbers indicate that the government spends about SR650 per person, per year, on desalinated water use alone. With a national population of 27 million, the government water bill is currently SR17.5 billion per year.

Subsidy is a double edged sword; one side a blessing to the consumer from a state that has a generous approach to its citizens in providing the necessities of life. The other edge is that this self-same generosity engenders a culture of waste. If water is so inexpensive to the consumer, it has no perceived value.

Until it runs out, that is.

The answer to the Kingdom's use of water lies in the three Ps: Public education, Pressure, and most of all Pricing. There are five more Ps, used by military and logistical organizations across the world, that might be worth noting when it comes to addressing the inevitable water issues that lie somewhere in the Kingdom's future: Proper Preparation Prevents Poor Performance

Desalination only solution to avert crisis



Adil Bushnak

By SHAHEEN NAZAR | ARAB NEWS

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Saudi entrepreneur suggests the Kingdom should invest in R&D to solve problem of water shortage

WITH 24 million cubic meters per day (m³/day) of production capacity, the desalination plants in the Arab world represent nearly 50 percent of the world's total desalination capacity. Saudi Arabia is the biggest producer of desalinated water in the Arab World. Jeddah, the commercial hub of the Kingdom, has been relying on seawater desalination for decades. Adil Bushnak, the Saudi entrepreneur who heads several companies active in water, environment and energy services, says the role of desalination as a major source of domestic water supply will greatly increase in Arab countries because of population growth, increasing urbanization, industrialization and depletion of non-renewable sources of water.

He agrees that desalination of seawater is a costly affair but asserts that it is the "only solution," especially on the coast, to meet the drinking water requirements. Even in places where ground water is available, it cannot be consumed directly because it is generally salty and contaminated. Brackish water desalination is required to treat it to be made consumable.

Speaking to Arab News, Bushnak made a case for smaller desalination units instead of massive plants that the governments in Saudi Arabia and other Arab countries have installed. He talked of new technologies being developed which are cheaper, compact and household-friendly. According to him, Massachusetts Institute of Technology (MIT) is working on chips to produce water. "You can put chips, maybe thousands, in a container. Put salty water from the top and take sweet water from the bottom," he said.

Arid countries such as Saudi Arabia, other Arab nations as well as Pakistan and India should invest on a priority basis in research and development to find a solution to the problem of water shortages, he said. Noting that people in remote areas do not have access to good, reliable sources of water, Bushnak said they should be given low-cost and simple solutions using solar energy because electricity is also scarce.

"We need something like television or mobile phones. There are so many technologies involved in these machines, but they work with the press of a button. The same can be done with desalination. It's a matter of time. The question is who will do it. I say this is our need; let's do it ourselves instead of waiting for others to take the lead," he said.

Bushnak was of the opinion that countries facing water shortages should invest in new technologies not only to solve their problems but also to make money out of it by exporting their products.

Bushnak, who heads major water-related companies such as Moya Bushnak, Water and Environment Services Co. (WESCO), Kindasa Water Services, and Al-Alamiah Water Works and Services (AWWS), called for local production of spare parts and components required in the water industry. He said as a Saudi supplier of desalinated water he still relies on foreign companies for pumps and pipes and other components.

He welcomed the launch in February this year of a SR1.3 billion Saudi-Japanese joint venture company to manufacture reverse osmosis membrane elements for seawater desalination. He said a similar attempt by his company in the past failed because the collaborating US company Du Pont decided to withdraw after two years of work, just before the factory was about to be built. He also welcomed the government's move to encourage investment in the manufacture of spare parts and components required in the water industry. Government departments such as the Ministries of Finance and Industry, King Abdul Aziz City for Science and Technology (KACST) and Industrial Fund have developed strategies in this regard. They are more generous in offering incentives than before, he said, adding it needs to be faster and more integrated.

KACST recently announced plans to set up solar desalination plant which, after three years, will produce 30,000 mega watt using photovoltaic. "That to me is a big dream. I will be happy if it happens even in six years. But the best part is that a government department has set a dream. Earlier it was lacking," he said.

He advocated greater use of solar power for generating energy as well as producing water. "The abundance of sun is another gift of God Almighty to Saudi Arabia. This must be exploited for the maximum benefit of our people," he said.

On April 17 this year Saudi Arabia announced the establishment of the King Abdullah Nuclear and Renewable Energy City in Riyadh that will produce nuclear and renewable energies to generate electricity, produce desalinated water and reduce reliance on depleting hydrocarbon resources. Bushnak said this was a remarkable development. "Until recently, no government department was responsible for developing renewable energy. Twenty years ago, we set up our first solar plant, but only as research not as application. Now we are talking of application. It makes a big difference," he added. He said such developments were reflective of changes of perception on the part of the government "where the thinking was emerging that we could not continue as business as usual and that something more needed to be done."

Bushnak said while the budget allocation for research at universities was very good and generous, what was lacking was venture capital support. "Just developing something in the lab is not enough. It cannot become commercial automatically. You need someone, a company, a businessman, to take it and commercialize and sell it everywhere," he said, adding research without support for entrepreneurship is useless, other countries will benefit from it.

According to him, there is a gap between university research and market. The government has started bridging this gap by establishing techno-valleys in Jeddah, Riyadh and Dammam that are linked with the respective universities in these cities and have a budget of SR100 million each. Bushnak was of the view that these valleys should integrate the research done in their respective universities and "find investors like me to invest money in the project and commercialize it."

He said, "I am not interested in an exhibition like Ibtikar (which was organized in late May in Jeddah for Saudi innovators). There are so many ideas. You need to use a prototype, test it, prove it to the market and let the market invest in it. The United States is very strong in this. Countries like India have also started doing it. Learn from them. Give incentives to the entrepreneurs who are willing to take the risk."

Commenting on the growing concern over depleting sources of water, Bushnak said that in places like Riyadh, Qassim and several border areas there was enough ground water. "It is sufficient for hundreds of years if we stop wasting it on agriculture." He said stopping subsidies for wheat farming to save water was not enough. Farmers are still growing water-intensive fodder for animals. Practically, animals in Saudi Arabia are consuming more water than humans.

Saudi Arabia is known for some of the region's big dairy farms, exporting milk and other dairy products to neighboring countries. Bushnak saw no reason for these farms to operate in the Kingdom.

"Why should we have to feed 20 million animals? Why can't we import their feed from outside, or use seawater to produce fodder for them? Milk can also be imported. Every liter of milk takes 1,000 liters of water to produce. So, with every 1,000 liters of water, we are exporting just one liter of milk," he pointed out.

He said more than 40 percent of oil and gas production is being used just to produce water, electricity and fuels for cars and industries in Saudi Arabia. These utilities are heavily subsidized, which is benefiting only a handful of people, not the majority of Saudis who need them.

Bushnak was of the opinion that the government should reexamine the policy of subsidies. He said with the current pricing and subsidies on water and electricity, the poor pay much more while people in developed urban areas get water for 10 halalas, the poor pay up to SR6. The reason? Water is not delivered to them. He has to buy it. "Less than 50 percent of the population in Jeddah is connected to the network. Others buy it from truckers to survive," he added.

He said in villages ground water was not available everywhere. Where it is available, it is either floated or salty and thus not usable. They depend on treated water or trucked water which is very expensive. "Villagers survive with minimum water or no water if the truck fails to arrive. Safety and reliability of water is another issue. Besides that, it depends on a villager's luck how much he is made to pay as the price depends on the distance of his village from the place the water originates from."

Treating sea as open sewer hits ecology beyond repair

By ROGER HARRISON | ARAB NEWS

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Realization that we are an integral part of the environment, rather than simply users of it, has come to bear fruit at last

The tendency to use the ocean as a dumping ground is not new. However, with increased industrialization both the quantity and quality of what is dumped has altered for the worse.

Half the world's population lives in cities and 40 percent of humans live within 100km of the sea shoreline. From this location many economic benefits accrue: Ocean navigation and trade, coastal fisheries, tourism and recreation. And of course a useful access to a waste dump, the sea itself.

According to Don Hinrichsen, writing a report for the American Association for the Advancement of Science, underlining the crisis of our coasts is the threat of increasing population and its ever-increasing needs.

"If coastal demographics are alarming now, they are downright scary by 2025," he wrote. "Already nearly two-thirds of humanity — some 3.6 billion people — crowd along a coastline, or live with 150 km of one. Within three decades, if trends continue, 75 percent of humanity, or 6.4 billion, will reside in coastal areas, nearly a billion more people than the current global population."

As population density has increased, so have the pressures on the coastal ecosystems and the marine environment. Habitat conversion, land cover change, increase in pollutants both domestic and industrial lead to loss of biodiversity, coral reef bleaching, new diseases among littoral and reef dwelling organisms, hypoxia, harmful algal blooms, silting, reduced water quality and threats to human health through accumulated toxins in fish and shellfish and pathogens such as cholera and hepatitis 'A' living in polluted water.

With a concentration of fertilizers in run-off water from farming activity comes eutrophication, an increase in the concentration of chemical nutrients in the ecosystem of coastal waters to such an extent that, when the phytoplankton and zooplankton die, they cause a drop of oxygen level in the water and subsequent death of many species of marine dweller. The algal bloom commonly known as the 'red tide' is one example. The green bloom and accumulation of seaweed strands on the shore of Jeddah's Al Hamra Beach is another.

Sewage from urban areas is a major source of the pollution that is discharged into the sea. In the case of urban Jeddah, despite the efforts of local authorities, it still reaches the seashore. Even if the effluent is treated to remove solids, the liquid discharged contains high levels of nitrogen and phosphorus that act as nutrients for microscopic algae and zooplankton.

Less obvious but as significant are the exhaust fumes from vehicles and industrial chimneys which are significant sources of nitrogen compounds that are transported in the atmosphere and deposited in coastal waters.

Globally, the run-off from agriculture is the main source of eutrophication but atmospheric deposition is the fastest growing source. In the case of the coastal cities of the Kingdom, agricultural run-off is minimal, and the two main sources are incompletely treated sewage and atmospheric deposition from industrial areas.

Apart from eutrophication is the physical settling of sewage on the seabed and coral reefs that border the Red Sea near Jeddah. Near large sewage outfall pipes in south Jeddah the polyps that are the living part of the coral have been wiped out leaving only calcareous skeletons behind. Layers of silt have literally suffocated them.

Importantly, their death removes a base element of the marine food chain. With the polyps gone, polyp-feeding fish leave too, removing the next link in the food chain and the knock on effect along that chain results in a reduction, and finally elimination, of a local fishing industry.

There are 600,000 square km of coral reefs throughout the world's tropical seas. These species-rich ecosystems are also suffering widespread decline.

Clive Wilkinson, a coral reef specialist working at the Australian Institute of Marine Science and quoted by Hinrichsen, has estimated that 10 percent of the world's reefs have already been degraded "beyond recognition". Thirty percent are in critical condition and will be lost completely in 10-20 years, while another 30 percent are threatened and will disappear within 20-40 years. Only 30 percent of the world's reefs are thought to be in stable condition, those removed from inhabited areas or otherwise too remote to be exploited.

The pressures of population, urban and industrial development have been increasing in the world's coastal areas for decades. They have triggered widespread degradation of marine resources in Asia, Africa, Europe, North America and parts of Latin America particularly in the over-exploitation of inshore fishing.

"Nearly all Asian waters within 15 km of land are considered over-fished," observes Ed Gomez, Director of the Marine Science Institute at the University of the Philippines in Manila.

With its relatively small size, limited oceanographic circulation and high number of endemic species, the Red Sea is particularly vulnerable to pollution, loss of species, and reduction in the productivity ecosystem. The key environmental threats, according to a US-based university backed research organization EOE, are unregulated fishing, uncontrolled development and oil pollution.

"The World Bank/GEF/PERGSA Strategic Action Programme (SAP) for the Red Sea aims to improve coastal and marine environments by reducing navigation risks, and preventing and controlling maritime pollution. The LME's (Large Marine Ecosystem) extensive coral reefs, seagrass beds, and mangroves suffer from the excesses of tourism, pollution discharges and industrial development. There is a need to establish more marine protected areas, to serve as havens for fish and for repopulation purposes."

Dumping waste into the sea, damaging the marine environment in any way will have, in the fullness of time, an effect on populations that live near the coast. Stopping the use of the sea as an open sewer will involve several approaches from public education. It will certainly require the policy and legislative structure but above all it will need enforcement. In the area of policy, Saudi Arabia has long had the framework in place.

In 1992 Saudi Arabia adopted the Basic Law — commonly referred to as the Kingdom's constitution — which sets out the system of government for the country, and the obligations of the government to the people. Article 32 of the Basic Law states: "The state works for the preservation, protection, and improvement of the environment, and for the prevention of pollution."

Clearly the basis of the law has been established and the legal basis for implementation is there. Saudi Arabia is also a signatory to the UN Convention of the Law of the Sea, which provides for a universal legal framework for the rational management of marine resources, and their conservation for future generations.

Following on that, an environmental regulation was enacted by Royal Decree No. M/34 on Oct. 16, 2001, and was published in the Official Gazette number 3868 November 9 2001.

It aimed to create a general regulatory framework for the development and enforcement of environmental rules and regulations. The regulation assigned to the Meteorology and Environmental Protection Administration (MEPA), the general responsibility for creating a regulatory framework for the development and enforcement of environmental rules and regulations.

The new regulation "anticipates that MEPA will coordinate with other government agencies regarding the development and enforcement of environmental standards, and that MEPA, together with any other relevant government agency, will have the power to impose penalties for violations of any applicable environmental standards, where there are no such penalties already in place."

It seems that, triggered by the disastrous floods in Jeddah in late 2009, enforcement of the ample regulations has been initiated. However, this is not the conclusion of a process of protection. It is the beginning of a new stage in the realization that the culture of "out of sight out of mind" has come to an end. Perhaps a realization that humans are an integral part of the environment, rather than simply users of it, has come to bear fruit.

Renewables could save oil for export



Keep oil under ground or maybe use it for better purposes, such as for producing medicines or chemicals. (AN photo)

By SIRAJ WAHAB | ARAB NEWS

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Although Saudi Arabia is blessed with an abundance of oil and gas, important moves are under way within the Kingdom to advance alternative energy streams from solar and wind to nuclear power generation.

It is more than a futuristic vision; it is a reality that is right around the corner.

"The Kingdom burns 1.2 million barrels of oil every day to generate electricity and produce water," said Ali Sayigh, director general of the UK-based World Renewable Energy Network, earlier this year during a visit to Saudi Arabia. "Some of this could be stopped through renewable energy. This would lead to a cleaner environment in the Kingdom."

There is a twofold benefit for the Kingdom. First, sunlight is readily available across the country, with areas such as the Rub Al-Khali ideal for solar power generation both in days of clear skies and unused area for photovoltaic panels or large arrays of mirrors that concentrate sunlight on a shaft that heats up to generate steam, which in turn is used to power turbines for the generation of electricity. Turbines turning water into steam also are used for desalination plants to provide potable water.

The second benefit is preserving the country's valuable hydrocarbon energy stream for refining into transportation fuels or petrochemical feedstock, both of which can be exported to contribute to the Kingdom's revenue stream.

"The availability of alternative energy sources will help preserve non-renewable oil and gas resources and free up more of the production stream that can go into feedstock. These hydrocarbon feedstocks will, in turn, create ever more value-added products," Mohamed H. Al-Mady, SABIC vice chairman and CEO, said during a keynote speech at the recent Petrotech 2010 Conference in Bahrain.

"The major consumption of fossil fuel is for energy generation, leaving non-energy uses, such as feedstock, with only a small portion. Alternative energy would preserve the non-renewable oil and gas resources in higher proportions for use as feedstock to produce value-added products."

"The demand on utilities in the Kingdom has significantly increased," said Mohammed Ali Trabelsi, Saudi Aramco's executive director of pipelines, during a lecture at King Fahd University of Petroleum and Minerals in Dhahran.

"Underlying this growth are two drivers — residential end-use energy requirements and industrialization. On the residential side, the combination of high population growth, a young population, and a rising standard of living, has led to a substantial increase in the demand for housing and subsequently an increasing need for more electricity and water."

"There is plenty of money to be made because Saudi Arabia is rich in silicon which is a key ingredient in the production of solar cells and electronic stuff," said Sayigh during an interview earlier this year.

The Kingdom is rich in silicates, but last year Showa Shell of Japan and Saudi Aramco signed a memorandum of understanding to conduct tests and build a 10-megawatt pilot solar power plant as a first step to developing a Kingdom-wide solar energy strategy.

Ironically, Saudi Aramco noted conventional, silicone-based solar panels are less reliable in high temperatures, making them unsuitable for the Kingdom's average 28 degrees C temperature.

Showa Shell's proprietary silicone-free, copper-indium-selenium (CIS) panels are more durable in high temperatures. If successful, such power plants might be used for remote areas not connected to the nation's power grid.

Trabelsi said the Kingdom should take a three-step approach to develop alternatives.

"The first is new technology in renewable energy. We need to pursue new energy technologies and develop the industries that are most economic for Saudi Arabia's climatic and geographical locations," he said.

"The second is to collectively engage research institutions, industries and government entities to streamline and establish the needed policies for the development of renewable energy sources on a national scale. Third, and most importantly, a major effort is needed in order to develop our own human resources and build the knowledge, skills and experience of our professionals to help in creating a new energy era for the Kingdom."

Sayigh agreed that the Kingdom is making the right moves.

"A solar-powered desalination plant that is to be established in Al-Khafji will be the biggest of its kind. It will have a great impact and will eventually prove itself as a landmark project," he said.

"Saudi Arabia has the resources to allocate substantial funds for research in this particular field. Keep oil under ground or maybe use it for better purposes, such as for producing medicines or chemicals. There is no point in burning it all up. Just as you have a basket of currencies, have a basket of energies: Oil, gas and renewables. There is no harm in that."

SABIC's Al-Mady said the strategy is applicable across the Gulf Cooperation Council member states.

"The countries of our region can and should be in the forefront of the alternative energy revolution and become key players. We have abundant sunlight and seawater, as well as landscape. We also have the financial resources to support research programs for indigenous technology development," Al-Mady said.

"By doing so, we shall secure additional sources of energy for our nations and contribute to the world's efforts to protect the environment. Additionally, growth of alternative energy will create thousands of good jobs in energy production, distribution and installation."

Investment in renewable energy need of the hour

By KHALIL HANWARE | ARAB NEWS

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Remarkable diversification in terms of energy sources and the intensification of deploying renewable energy options are evident around the world. Such endeavors are, on the whole, fueled by a range of environmental, energy security and/or economic considerations.

Indeed, it is no exaggeration to suggest that the world is progressively undergoing transition from a hydrocarbon-based economy to one based on sustainable forms of energy. It is notable, however, that there has been comparatively limited interest in examining the prospect of renewable energy in major oil-producing countries, especially in those characterized by heavily oil-dependent economies.

Consequently, there has been a corresponding dearth of research. These countries need to consider such sustainable energy means to further secure their energy and economic futures. The key role that these countries could play in achieving a healthier future for generations to come should not be overlooked.

Saudi Arabia, a major oil producer, with at least a quarter of the world's proven oil reserves, is also an increasingly urbanized and industrialized nation that is blessed with abundant solar energy and a reasonable wind resource.

Developing technologies that contribute to sustainable economic development is at the heart of collaborative research work in progress at King Abdullah University of Science and Technology (KAUST) in Thuwal, north of Jeddah. KAUST is one such marvel that will serve as a growing symbol of a country exploring new horizons and reinventing itself for the future.

KAUST sprang from an idea Custodian of the Two Holy Mosques King Abdullah had to establish a world-class university. In King Abdullah's words: "It will support industries and the private sector and help set up new knowledge-based industries. It will also help in converting innovative ideas and inventions into economic projects benefiting the country and citizens."

Saudi Arabia hopes to approve a regulatory framework for investment in renewable energy in 2011, according to a Reuters report published recently.

The framework should set out the conditions of government funding and incentives for the sector, said Adullah Al-Shehri, governor of the Saudi Electricity and Co-generation Authority (ECRA). Without them, the renewables sector would not progress in the Kingdom, he said.

"We developed the policy and we were ready as regulators to submit to our board for approval and then take it to the council of ministers," Al-Shehri said.

ECRA is regulator of the water and desalination sector.

"If they (the government) don't provide the funds nothing will move forward, this is our proposal...to get the government committed and (its) support," he said.

The government also needed to clarify which body would be regulating renewables contracts going forward, he said. "Anybody who wants to invest (renewables) in Saudi Arabia will find it difficult to know who to talk to," Al-Shehri said.

The Kingdom announced in April it would set up a scientific center called King Abdullah City for Atomic and Renewable Energy. The center would be in charge of promoting research and sealing future deals.

The future role of ECRA will be to issue project licenses, he said.

Al-Shehri said peak power demand in Saudi reached 41,000 megawatts in 2009 while power generation capacity is 46,000 MW.

The Solar Energy Coordination and Communication Workshop, held at KAUST recently, has resulted in a committee being formed to focus on the acceptance and use of the renewable energy source.

Khaled Al-Sulaiman, vice-president for Renewable Energy at the King Abdullah City of Atomic and Renewable Energy (KACARE), told the gathering about recent mandates received from the government declaring that nuclear and renewables would be among the energy options adopted by the Kingdom.

"KACARE has been given responsibility to guide renewable energy efforts," he said. "We are charged with technology development and investigating nuclear and renewable energy resources. We can do it -- I mean all of us, all stakeholders in Saudi Arabia, in cooperation with others globally. There will be no turf fighting or the marking of territories."

Amin Al-Shibani, KAUST's vice-president of economic development, said: "The introduction of a new industry, any industry in any nation, is faced with a lot of obstacles and challenges. With determination and leadership the key stakeholders will overcome these obstacles."

Professor Ghassan Jabbour, director of KAUST's Solar and Alternative Energy Engineering Research Center, said his center's mission was to make solar energy low-cost and therefore commercially viable. "Our main wealth is knowledge," he added. "We must encourage the process or we won't move an inch forward. Our center is investing in the human mind."

Unfortunately, not everyone was equally supportive of transitioning to a renewable energy economy. In a speech to the Cambridge Energy Research Associates (CERA) annual conference in Houston, Texas, last year, Minister of Petroleum and Mineral Resources Ali Al-Naimi warned that promoting the rapid growth of renewable energy without continuing to invest in oil would create a "nightmare scenario." "We must be mindful that efforts to rapidly promote alternatives could have a 'chilling effect' on investment in the oil sector," he said. "A nightmare scenario would be created if alternative energy supplies fail to meet overly optimistic expectations, while traditional energy suppliers scale back investment."

Although Al-Naimi, an influential voice in the Organization of Petroleum Exporting Countries (OPEC), acknowledged that the world is moving away from fossil fuels, he indicated renewable energy technologies may be unable to grow to the same scale as crude oil.

He called the current energy infrastructure "highly efficient and economical," and said the costs of replacing it with alternatives would be "prohibitive" in the short term. "A prudent approach demands we recognize that the massive scale of the global energy system makes rapid change costly and impractical," he said.

Alternatives to nuclear energy under focus

By SARAH ABDULLAH | ARAB NEWS

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As a solution to the overwhelming call to meet the growing demand for electricity and energy to fuel water desalinization projects, Saudi Arabia is moving closer to relying on nuclear energy to meet these vital requirements.

Despite the Kingdom's \$80 billion investment to expand its electric generation capacity and construction of several electrical power plants, Saudi Arabia still needs more reliable energy sources to supply electricity to a growing population.

In 2009, power demand grew by more than 8 percent, increasing annually by at least 7% with an additional 60,000 megawatts expected to be needed by 2020. Previous plans for harnessing the extra energy was simple, namely to merely increase the use of crude oil to generate the extra power.

However, the Kingdom has come under tough scrutiny due to environmental issues and the pollution being caused globally by fossil fuels. The American Energy Information Administration (EIA) has predicted that the only way to mitigate global warming is if the world energy consumption of fossil fuels drastically is reduced over the next 10-15 years. They also found that the use of nuclear power is only effective in reducing the causes of global warming by only 10 percent

Nonetheless, despite the recent media reports announcing the Kingdom's progress toward nuclear energy, the decision to utilize it isn't exactly a greenfield idea. Saudi scholars have carried out feasibility studies examining the most suitable locations in the Kingdom for construction of nuclear power stations since the early eighties. The results have found repeatedly that the most suitable places to construct such stations in Saudi Arabia, would be firstly Jeddah area and secondly the coast of Dhahran.

As a means of continuing research and gaining of further technological know-how in preparation for the building of such power plants, Nuclear Energy Research Center's have been established in King Abdul Aziz University (KAAU) in Jeddah and in the new King Abdullah University of Science and Technology (KAUST), 80 km north of Jeddah.

Arab News contacted several experts in the nuclear research center of the Engineering Department at KAAU, but received no solid information. Only that the research being done currently is, "highly sensitive and needs further study and planning before any decisions can be made or information released."

In April, however, there were announcements that the Kingdom is planning to open the King Abdullah City for Nuclear Energy and Renewable Energy in Riyadh. Former Minister of Commerce and Industry, Hashim Yamani, is expected to head of the new research city. "This is a massive step toward securing additional sources of energy and preserving oil for many decades. Turning to renewable energy will safeguard energy supplies for the ever-growing population and its increasing demand for desalinated seawater and electricity," said Khaled Al-Sultan, rector of King Fahd University Petroleum and Minerals.

Al-Sultan also said that Saudi Arabia has a scientific and research talent for advancement in renewable energy at a time of "unprecedented and intense competition for alternative, diverse, sustainable, and reliable sources of energy to generate electricity and reduce the dependence on oil and gas."

The objective for the new city is to fund university research labs and assist in private sector rollout of nuclear applications for agriculture, health care, water desalination and power generation industries.

Internationally the use of nuclear energy gained popularity in the 1990s with currently 439 nuclear power plants in operation worldwide and another 28 others under construction. The reason for the popularity despite, the drawbacks is that electricity generation from nuclear energy is considered to be economical and very cost effective compared to generation from renewable energy sources worldwide such as sun, water, wind, or geothermal energy. However, one must also ask at what cost?

Official studies from the German government has shown that the risk of getting cancer significantly increased in children growing up in the neighborhood of a nuclear power station, particularly leukemia. Other disadvantages have to do with nuclear waste. The EIA has shown that a typical nuclear reactor produces 20-30 tons of waste per year that can't be disposed of with Plutonium 239 remaining dangerous for as much as 10,000 years and radioactive for 240,000 years. Most countries reuse nuclear waste to create energy but this just creates more waste while others utilize the waste through their national defense departments.

Even though, there are major drawbacks some success stories do exist. The European countries of France and Luthuania get three quarters of their energy from nuclear means and countries such as Belgium, Bulgaria, Slovakia, South Korea, and Switzerland get one third of their power by having incorporated nuclear as an alternative to their energy policies. Nonetheless no one can deny that Saudi Arabia does have other alternatives that many Asian and European countries can not consider — the pollution-free power of the sun which would make the need for nuclear energy and the headaches that go with it completely avoidable.

According to Christian Comes, Solar Sales Division, SANYO Component Europe GmbH, Saudi Arabia is missing out on a great opportunity to not only use solar energy as a primary energy source but to profit worldwide from the renewable energy, as well.

"Saudi Arabia has enough sun and space to produce solar electricity to sell. However, due to the previously thought high investment, it has been ignored," he said, adding that currently this factor is beginning to change. The fact is Saudi Arabia can generate enough power from the sun to take care of its and others' energy needs. Some of Europe's biggest corporations such as ABB of Switzerland, Munich Re, Deutsche Bank and Siemens, as well as others have launched a \$570 billion solar development program or Desertec, with initial installations to be in Egypt, and North Africa followed by Saudi Arabia and Turkey.

Another power project headed by France's President Nicolas Sarkozy, the Mediterranean Solar Plan, will produce 20GW of power by 2020. These plans are based on the idea that the Middle East and Saudi Arabia can export solar power to Europe. The power is expected to be transported via 20 cables lying beneath the Mediterranean Sea at a cost of \$1 billion each.

Last year, Minister of Petroleum, Ali Al-Naimi, said: "Saudi Arabia aspires to export as much solar energy in the future as it exports oil now."

Speaking to Arab News regarding the realistic possibilities of using solar energy, a representative of Siemens, said: "We expect that the market for solar thermal power plants is growing in many regions of the world. Key regional markets for solar thermal power are within the Sun Belt. There is currently significant demand in Spain, we are anticipating high growth rates in the US, north Africa, and the Middle East. Solar power will be profitable first of all in North Africa and the Middle East."

With wind and solar and power being disregarded in the past due to their high costs, Siemens says that the costs are falling and expected to decrease further in the future. "The question of cost efficiency depends on various factors, including geographical conditions. For example, the cost for one megawatt of wind power onshore has dropped from 3 million euros to one million euros during the last 20 years with this development not having ended yet. We are currently working on the wind power business and expect the same effects for solar power, too," he said.

With so many countries realizing the energy possibilities the Kingdom has to offer, shouldn't Saudi Arabia also realize them and utilize them as prime alternatives to nuclear energy.