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SPOTLIGHT ON: CHALLENGES TO GLOBAL AGRICULTURE

“Agriculture is at the nexus of three of the greatest challenges of the 21st century – achieving food security, adapting to climate change, and mitigating climate change while critical resources such as water, energy and land become increasingly scarce.”

– Commission on Sustainable Agriculture and Climate Change , March 2012

According to the latest report from the *Commission on Sustainable Agriculture and Climate Change*, the global agriculture industry faces serious threats from climate change, population growth and unsustainable resource use. Major risk factors are becoming apparent in many parts of the world – no country is immune.

AGRICULTURE AT RISK:

- With 6 percent average annual agricultural GDP growth, chemical fertilizer use in **China** (383.6 kg per hectare) is contributing to pollution and greenhouse gas emissions.
- Government subsidies of nearly \$20 billion went to **US** corn and soybean producers between 2003-2005. Climate change may substantially reduce corn exports in the coming decades.
- 18 percent of total **UK** greenhouse gas emissions are linked to food supply chains. Approximately 22 percent of household food and drink is wasted.
- Post-harvest losses of annual fruit and vegetable production in **India** are estimated at 20 percent due to sub-par packaging and refrigeration.
- Deforestation and land use changes associated with agriculture account for over 70 percent of greenhouse gas emissions in **Brazil**, a major global food producer.
- In **Australia**, changing climate and water over-allocation is threatening the Murray-Darling Basin, which supplies water to over 3 million people and to irrigated agriculture worth \$5 billion annually.
- One of the best-developed economies in eastern Africa, but one-third of **Kenyans** are undernourished. 4 out of 5 depend on agriculture for their livelihoods.

U.S. Intelligence warns of National Security Implications of Global Water Conflicts

Fresh water supplies are unlikely to keep up with global demand by 2040, increasing political instability, hobbling economic growth and endangering world food markets, according to a U.S. intelligence assessment by the office of the Director of National Intelligence.

The Bottom Line: During the next 10 years, many regions will experience water challenges – shortages, poor water quality, or floods – that will increase the risk of instability and state failure and increase regional tensions.

Between now and 2040, fresh water availability will not keep up with demand without more effective management of water resources. Water problems will hinder the ability of key countries to produce food and generate energy, posing a risk to global food markets and hobbling economic growth. As a result of demographic and economic development pressures, North Africa, the Middle East, and South Asia will face major challenges coping with water problems.

Although the report said that a “water war” was unlikely in the next 10 years, the risk of conflict would grow with global water demand likely to outstrip current sustainable supplies by 40 percent by 2030.

Chief drivers of increased water demand over the next 10 years would be population growth and economic development, although the impacts of climate change will play a growing role, particularly after 2040.

“Beyond 10 years we do see the risk increasing,” a senior U.S. intelligence official told reporters. “It depends upon what individual states do and what actions are taken right now to work water management issues between states.”

Over the coming decade, over-pumping of ground water supplies in some agricultural areas will pose a risk to food markets and cause social disruption if mitigating steps such as drip irrigation and improved agricultural technology are not implemented.

The report warned through 2040 water shortages and pollution would likely harm the economic performance of important U.S. trading partners by limiting the use and development of hydro power, an important source of electricity for developing countries.

While the intelligence community believes there is no technological “silver bullet” on the horizon to improve water management, the report said the most important step to address the problem would be more efficient use for agriculture, which accounts for 70 percent of global fresh water use.



Risk Factors & Mitigation Strategies

What can be done to address these water problems? Stratfor Research offers key takeaways from the U.S. Intelligence report.

- During the next 10 years, water problems will contribute to instability in states important to U.S. national security interests. Water shortages, poor water quality, and floods by themselves are unlikely to result in state failure. However, when combined with poverty, social tensions, environmental degradation, ineffectual leadership, and weak political institutions – water issues contribute to social disruptions that can result in state failure.
- Water-related state-on-state conflict is unlikely during the next 10 years. Historically, water tensions have led to more water-sharing agreements than violent conflicts. However, as shortages become more acute, water in shared basins will increasingly be used as leverage. The potential use of water as a weapon or to further terrorist objectives also will become more likely beyond 10 years.
- During the next 10 years, the depletion of groundwater supplies in some agricultural areas due to poor management will pose a risk to national and global food markets.
- Beginning now through 2040, water shortages and pollution are likely to harm the economic performance of important trading partners.
- Over the next three decades, improved water management, pricing, allocations, and “virtual water” trade as well as investments in water-related sectors such as agriculture, power, and water treatment will afford the best solutions for water problems.
- The greatest potential for relief from water scarcity will be through technology that reduces the amount of water needed for agriculture and irrigation processes.

Gulf Region Works to Minimize Adverse Effects of Desalination Technology

With 5 percent of the world's population and only 1 percent of global freshwater water resources, the Gulf region is heavily affected by water scarcity and heavily dependent on non-conventional water resources such as desalination and treated wastewater.

Did you know?

- **The Middle East contains:**
 - **Five percent of the world's population**
 - **One percent of global freshwater water resources**
 - **Sixty percent of global desalination capacity**
- **Ten Gulf countries are among the top 20 globally in forecasted desalination capacity**
- **A seventy percent waste water reuse rate exists in certain Gulf nations**

The Gulf region, which boasts 60 percent of global water desalination capacity, will soon announce targets to minimize the adverse effects of desalination on the environment in relation to greenhouse gas emissions and the discharge of brine and other contaminants.

The collective water shortage of 17 Arab countries is currently estimated at over 30 billion cubic meters and this deficit is expected to triple by 2030 and increase to over 150 billion cubic meters by 2050, the Arab Water Academy in Abu Dhabi said yesterday.

The current heavy reliance on fossil fuels for water desalination is not sustainable — Saudi Arabia alone uses 1.5 million barrels of oil per day at its plants.

Many of the problems related to desalination could be reduced by replacing fossil fuels with renewable energy sources. This will reduce the cost of energy consumption, which accounts for 30-50 percent of the overall water desalination costs.

A giga-watt (GW) of energy produced by oil and gas generates 700 and 460 tons of carbon dioxide respectively. In comparison, the same amount of energy produced by solar energy [concentrated solar power] releases just 17 tons of carbon dioxide, Dr Asma Al Kasmi, director of the Arab Water Academy, told Gulf News.

\$300 Billion Investment in GCC Water and Desalination Projects

Spurred by a buoyant economy and population growth, over \$300 billion will be invested in the GCC water and desalination projects over the ten year period between 2012 and 2022, according to a report from researchandmarkets.com.

Subsequent to its revolutionary discovery of hydrocarbons about three decades back, the GCC economies have come a long way into establishing themselves as a fast developing region boasting modern amenities and facilitating high standards of living.

It said the GCC have increased spending on job creation and infrastructure expansion and are opening up utilities to greater private sector involvement.

While privatization occupies centre stage in the overhauling process of the power and water sector, the initiatives toward alternative energy sources in the form of solar and nuclear power, as alternatives to the heavy dependence on the hydrocarbons sector, particularly to replace natural gas as a primary fuelin power generation, has been considered a highlight of the regional power reforms.

The emergence of alternative power sources will enable GCC nations to successfully diversify their economic growth from a predominantly oil based economy thus bracing themselves against future adversities arising from oil fluctuations, the report noted.

Renewable energies are poised to capture a considerable segment of the global energy mix. Given rising demand for energy, supply worries with regard to fossil fuels and environmental concerns, the renewable energy opportunity is substantial. Solar energy in particular offers huge potential for the sunny GCC countries.

Rising domestic energy needs for power generation and desalination, favorable conditions for solar energy production and interest in acquiring technological know-how make a perfect argument for renewable energy in the Gulf.

All six nations of the GCC have either embarked upon or committed to investments in solar projects, with projects split between solar photovoltaic and solar thermal applications.

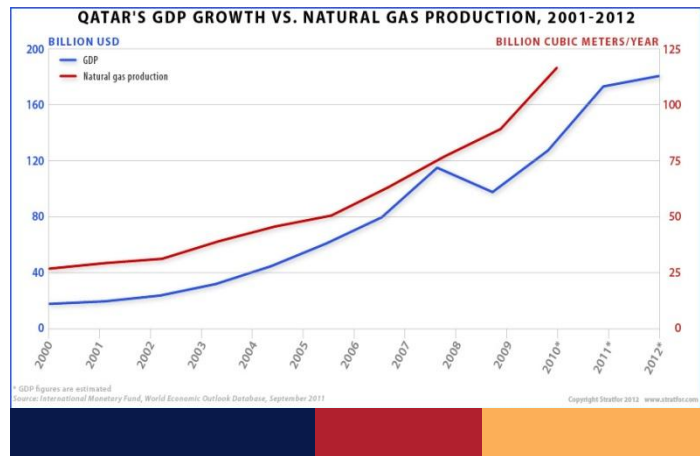
The GCC region also has considerable wind resources, even though these vary widely across the countries and wind installations are at a less developed stage than their solar counterparts.

Qatari Natural Gas Industry is Crucial to Nation's Economic Health

Qatar's current and future regional influence are strongly linked to its natural gas sector. The graph at right illustrates the strong correlation between natural gas production and GDP growth.

With dependence on oil viewed as a strategic liability, Qatar's forward-looking investments in liquefied natural gas (LNG) production and export technology give the country an advantage in an increasingly popular energy commodity. Also, because it cannot be undermined in price or supply guarantees by Saudi Arabia, Qatar's LNG exports have given it considerable independence compared to its oil-dependent neighbors who are more likely to fall in line with Saudi views on most foreign policy issues.

Due to its significant LNG infrastructure investments and sizable natural gas reserves, Qatar will continue to be a key supplier of LNG for roughly the next 20 years. Qatar topped the list of global LNG exporters in 2010 with 7.5 billion cubic feet (bcf) a day; more than double the exports of Indonesia and Malaysia, the second and third countries in the list, which exported 3.1 bcf and 3.0 bcf, respectively.



High Predictions for Japan Oil Consumption

Japan – a resource constrained, island economy that has long been challenged by its lack of natural resources. Japan is a major importer of food supplies, basic commodities, and especially energy resources including coal, oil and LNG.

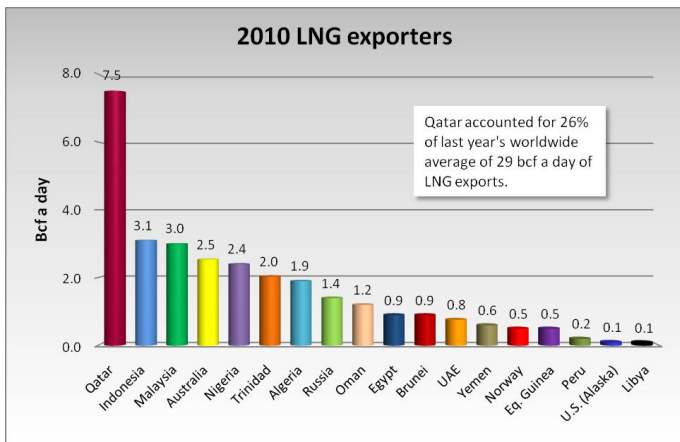
Following the Fukushima crisis, which essentially eliminated Japan's nuclear power production abilities, Japan's use of oil has dramatically increased. According to data from J.P. Morgan Global Commodity Research, February saw Japan's oil use (for power generation) spike by 520 kbd (thousand barrels per day) year over year; an amount roughly the equivalent to China's projected 2012 oil demand growth (500 kbd).

Japan is making a concerted effort to prevent power shortages and blackouts this summer. Will oil consumption rise as a result? Analysts agree that oil use for power is the single largest demand-side uncertainty during the peak demand period of July and August.

Even though selected nuclear reactors are scheduled to go back into operation come summer, it is unlikely to make a dent in Japan's summertime oil consumption levels. Only 6 of Japan's 54 closed reactors may be re-opened. Utilities could still burn up to 800kbd of oil for power generation, despite the inclusion of these new reactors.

Furthermore, the Fukushima crisis has altered the way Japan structures its power production, particularly as related to oil. Prior to the accident, oil supplies were largely allocated for peak demand periods, but now oil is often utilized for mid-range use as well. This results in a larger, more consistent demand profile.

Summertime demand for air-conditioning may amplify daily demand peaks. Oil will be relied upon to meet demand and avoid power outages. Of course, many uncertainties remain. Weather patterns, such as major heat waves, could complicate matters or ease the burden. Implementation (or lack thereof) of power conservation measures may also have an impact on usage.



Qatar accounted for 26% of last year's worldwide average of 29 bcf a day of LNG exports.

However, with natural gas prices expected to peak within the next three to five years, Qatar faces both a shrinking profit margin and a more competitive market as regions such as North America are poised to become exporters themselves.

Qatar will continue its attempts to mitigate some of these factors by encouraging its current customers to sign larger, longer-term deals — some up to 20 years — in an effort to lock in at current prices. Qatar has also been actively seeking to diversify its economy away from LNG and seek investments in alternative energy technology.



India Turns on World's Largest PV Plant; 600 MW of Solar Power Added to Grid

Just over a year ago, the Indian state of Gujarat announced it was building a \$2.3-billion solar park — the largest photovoltaic power station in the world. This major solar park has now come online, announced Narendra Modi, Chief Minister of Gujarat.

“Gujarat dedicates 600 MW of solar power to the nation today. This achievement is not merely a step in the direction of power conservation, but it provides the world with a vision of how the power needs of future generations can be solved in an environment-friendly manner,” remarked Modi.

The new plant represents a major addition to India’s electrical grid, and has tripled the nation’s current solar power capacity. The solar park is three times larger than the Chinese Golmud Solar Park, which previously held the world PV record. The Golmud park was completed in October 2011 with a total capacity of 200 MW, a size easily dwarfed by Gujarat’s 600MW plant capacity.

Many other projects must come online if India is to reach its “green goals” by 2020. At that time, India is targeting 15 percent of its total energy consumption to come from renewable sources of energy. Currently, that figure stands at 6 percent.

The Gujarat project has been a collaboration between 21 different companies, including several from the U.S. Another \$400 million is reserved for additional renewable energy in the same region. Modi says India will use this funding to encourage the development residential solar panels for homeowners. The solar project, Modi believes, is an important step forward for India and a great addition to the rest of the world’s renewable energy capacity .



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