



Energy Review

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Adviser's Note

Drawing of New Fault lines on Gulf Energy Map

The contour of the Gulf Energy Map cartographed well, so far, by Gulf exporters lead by Saudi Arabia, seems to be changing with the surfacing of new strategic lines. The recent developments in OPEC proceedings, exposing divergence of interest between Saudi Arabia and the UAE and the assertion by the latter suggest that the strength of member in decision making is determined not as much by its oil power as by its construct of post oil society. Surely UAE is much smaller a player than Saudi Arabia but it enjoys higher degree of resilience. Its diversified economy allows it to take calculated risk in charting course not necessarily in line with the big brother. Its judgement and initiatives to redefine the terms of engagement of its citizens with the state, might not be as glamorous but more ensuring of the move to post rentier society. The announcement by ANDOC to expand its capacity to promote its national interest is a nuance message of its strategic weight in shaping of hydrocarbon regime, its energy vision to increase the contribution of clean energy sources in the total capacity mix to 50% by 2050 places it in the of company global transformers. The point is that the geoeconomics of transition to post rentier society is unleashing more divergence than convergence of interest among the oil exporters becoming visible in drawing of new fault lines.

- Prof. Girijesh Pant
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Climate Change and Coastal Development: A Case of Sunderbans, India

Mayilvaganan M

Urbanisation, coupled with climate change, is leading to growing concerns about land use change and the loss of beneficial green ecosystem systems in the coastal zones globally. Human and environmental wellbeing is supported by resources such as the coastal forest ecosystem, water filtration, and flood mitigation. Nonetheless, maintaining these features in fragile eco-sensitive coastal zones requires the conservation and equitable distribution of mangrove near the coast where local inhabitants live.

Studies show that [climate change is further expected to impact mangroves](#) in small deltaic islands due to sea level rise and a foreseen increase in the frequency and severity of frequent cyclones, among other causes. Regardless of this, augmenting religious tourism to the Gangasagar Island in Sunderbans in the state of West Bengal in India is also very likely to pose a burden to the ecologically sensitive island. This analysis examines the impacts of climate change and coastal urban development changes on the patterns of land use, population surge, and loss of green space.

The Sunderbans delta that is about 360 km² wide in the Bay of Bengal, created by the sediment deposits of three major rivers in the region—the Ganges, Brahmaputra and Meghna—is one of the world's largest rich ecosystems with an area of dominant sundari species of mangroves and other species such as the Royal Bengal tiger, and Gangetic dolphins, etc.

About 40 percent of nearly 10,000 km² of the Sunderbans mangrove forest, lies within West Bengal of India, while the rest 60 percent is in Bangladesh. It is entwined with numerous tidal rivers, estuaries and creeks. The extended freshwater swamps and their intertwined mangrove forests act as a natural buffer, protecting the mainland from cyclones, rising sea tides and other extreme natural events.

Gangasagar or Sagar Island, as it is called locally in Sunderbans, is just off the Bengal coast in the Hooghly estuary, on the point where River Ganga meets the Bay of Bengal. The physiographic features of Sagar Island consist of [mud flats, salt marshes, sandy beaches and dunes](#) and mangroves. With an area of 224.3 kms, Sagar Island has about 68 km broad shoreline. It is a fully inhabited island and as per the [2011 national census estimates, the island population at 212037](#). The island houses local population along with those migrated from nearby islands like Ghoramara, Lohachahara and Suparibhanga.

Shrinking Land Space and Green Cover

Mangrove forest cover in the Sunderbans is decreasing due to both anthropogenic and non-anthropogenic changes. The rising mean sea-level of about [2.6-4mm/yr](#) has hastened the rate of coastal erosion, flooding and tidal creeks around the Sagar Island. Besides, an increased intensity of cyclonic storms has a cumulative effect on the loss of mangrove that traditionally gives green cover in the Sunderbans.

The Sagar Island that is built primarily in silt and clay has witnessed higher storm surges, shoreline change, and embankment breaching with high tidal erosion in the last few decades from both the sea as well as from the Muri Ganga and Hoogly

River system. As a consequence of coastal erosion, the landforms in the coastal area of the Sagar Island are eroded considerably. Furthermore, the rising sea level and the intensity of cyclonic storms affects land loss, shrinking of the land and green space of the Island, along with the intrusion of salinity and contamination of fresh groundwater.

Reportedly, [Sagar Island has shrunk by about 20 square miles since the mid-20th century](#) while the annual rising sea level has not only caused livelihood stress on the island's local population but also on the green cover. The green cover in the deltaic islands that are provided by the Mangroves are lost noticeably due to the rise in sea level as they flourish largely in the intertidal zone due to terrestrial space constraints with existing human structures and change in land uses pattern in the coastal zone.

Also, barrage stress, sediment erosion and increased salinity in mangrove habitat are other reasons for the above phenomena. Evidently, the ecologically fragile Sundarbans region in India and Bangladesh has [lost 24.55 percent of the mangroves \(136.77 square km\) due to erosion](#), over the past three decades. The loss of the mangrove green cover has also impacted commercially sought-after fish species that are traditionally found with the ones that do not have as much market value.

Religious Tourism and the Coastal Development

Gangasagar Mela, an annual Hindu festival, attracts thousands of pilgrims from all over the country, who come to take a holy dip at the confluence of river Ganga and Bay of Bengal apart

from offering their homage to the Kapil Muni temple (holy Sage), built about 200 years ago, on Makar Sankranti. While the tourist flow throughout the year is negligible, the influx of pilgrims between the months of January and early March every year has gone up considerably. This overshoot has led to many infrastructural development facilities to be built on the susceptible island. Dense swamp tree forest and mangroves have been destroyed to accommodate the growing needs of the infrastructural developments.

Even though the tourist inflow has generated the temporal benefit by generating jobs and income to the local community, it has intensified the destruction of Sagar ecology. The accumulation of organic and inorganic wastes, environment degradation apparently looks inevitable.

The Way Forward

The battle to preserve the green cover mangroves in the fragile deltaic island ecosystem is getting increasingly complicated. The increasingly polluting mega construction projects with climate that keep changing, bringing erratic and severe storms and erosions are relentlessly jeopardising the mangroves. A better understanding of climate change and policy intervention strategies relating to it, safeguarding the vulnerable the estuarine ecosystem are the needs of the hour.

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City Gas Distribution: An Overview of Activities in India

Atul Rawat

Natural gas is the third largest contributor in the global energy mix after coal and crude oil and [accounts for 24.2% share](#). Its demand has been growing in India and it is expected to play a crucial role in [curbing environment pollution](#). Given Indian government has ratified the Paris climate agreement, [natural gas is likely to play a strategic role](#) in the country's energy mix. Although its share in the country's energy mix stands at 6.3%, the country seeks to increase the [natural gas share in the energy mix to 15% by 2030](#). The power, fertiliser and the city gas distribution (CGD) are the major natural gas-consuming sectors in the country. [Natural gas is also used as a feedstock in steel manufacturing and petrochemical plants](#).

India has an inadequate natural gas pipeline network leading to a regional imbalance in gas consumption. The country needs a pan-India natural gas distribution network to ensure last-mile connectivity for the consumers and establish natural gas as the preferred fuel. The Indian downstream regulator, Petroleum and Natural Gas Regulatory Board (PNGRB), has awarded 229 licenses for expanding the CGD network, covering [nearly 70% of India's population and 53% of the area](#). Additionally, the government has announced the addition of 100 new CGD networks to cover more areas. The sector demand is expected to reach [27 BCM by 2030 due to surge in CNG sales and switch to PNG from LPG](#). However, achieving the set target would be a challenge if CGD projects face commencement delays. Many CGD projects are not able to keep up with the timelines committed to the PNGRB. [The major causes behind the delay](#)

are lack of policy and judiciary support, inadequate or absence of gas sources, lack of anchor customers, project financing, local or state-level clearances, and administrative challenges.

Developing a CGD network is a capital-intensive process with a long gestation period. The delay in project commencement or slow growth in natural gas sales volume can impact the financial performance of the company. Given the CGD industry in a nascent stage in India, the companies face a high cost of capital as they have to rely on short-term borrowings at a high-interest rate to fund long-term investments. The government should ensure interest rate guarantees, conduct audits, introduce and implement single-window clearances and create funding agencies to enhance the project financial viability.

The declining domestic natural gas production has forced the CGD companies to rely on imported gas. The natural gas supply contracts are traded in the US dollar but domestic companies pay in local currency that exposes them to currency exchange risks. It becomes important for companies to mitigate this risk by using derivatives or seeking a guarantee for currency mismatch from the government.

The CGD project economics also need to factor in the volatility of the important commodity prices such as steel given the long construction and project execution period. The CGD companies with good liquidity can mitigate the impact of any issues that might adversely impact cash flows in the short term. The company could forecast the cash flows by simulating the influence of inflation, exchange rate, project effectiveness to develop a contingency plan.

The other critical issues causing delay are project management, customer relationship management and health, safety and environment issues. Developing a CGD network is a complex construction as it has multiple branches and exposed to third-party risks. Third-party work by other state and central agencies dismantles the pipeline network and causes supply disruption. This could be addressed creating a body to engage with state and central government agencies to ensure hassle-free construction and improve operational efficiency. CGD companies too can proactively liaison with the government agencies, develop a comprehensive network development plan, and implement effective vendor management to avoid construction delay and mitigate contractor risks.

The low penetration of gas-based equipment and the ancillary industry affects the project schedules and increases import dependence for equipment. Only a few cities have well-developed CGD networks such as Mumbai and the National Capital Region. Therefore, the high switching cost is a major hindrance for CGD companies in switching customers to natural gas across India. The availability of affordable appliances and equipment along with the pricing benefit over substitute fuels is a must for gaining ground in an already competitive market. The filling time for CNG vehicles is high that leads to long queues and waiting time at CNG stations which may impact the consumer conversion rate. The companies

could address this issue by increasing the CNG filling station density. However, developing a CNG station involves huge investment and regulatory clearances. The permission to operate mobile CNG stations could be a game-changer for the companies and the government in the long-run. The introduction of value-added services at filling stations such as grocery stores, calling to pick-up vehicles for filling during non-peak hours, etc. could help in increasing customer satisfaction and boost CNG sales.

Moreover, finding skilled labour is a challenge for the CGD industry as the CGD network construction requires welders, plumbers, engineers etc. throughout the project life. Given this CGD industry is not yet completely established, the experienced engineers and technicians do not find it attractive and remunerative. Therefore, the companies and government should collaborate to set up educational centres to develop a workforce with required skill sets.

CGD network development is imperative for the growing Indian economy. The natural gas preferred fuel would enable the government to achieve its target of reducing crude oil imports by 10% and meet greenhouse emission reduction targets.

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The Energy Dilemma for Pakistan in CPEC

Monika Kumari

Energy Resource development has been a key factor in Pakistan's economic growth and development. The national Power policy of 2013, by the Government of Pakistan highlighted its vision of developing an efficient, consumer-centric power generation and distribution system which would meet the needs of its people and the state in a sustainable as well as in an affordable manner. However, over the years, the gap between the energy demand and supply has only grown due to impediments in institutions and policy implementation by the state. The crisis in the energy sector of Pakistan is neither new nor novel. While domestic oil reserves are few and meet only 20% of the national requirement, the rest of the 80% required is imported from other countries. Similar is the fate of natural gas which has depleted due to increasing demands. Pakistan's shift from being hydroelectric to fuel-based led to a massive increase in imports of fossil fuels. On one hand, there was a growth in energy demands due to rising population, income, and urbanisation, the supply on the other hand suffered due to financial inefficiency, mismanagement, and corruption in the energy sector. The lack of a permanent solution has made Pakistan to welcome its all-weather friend China which made substantial investments in the country's energy sector under the flagship project of the China-Pakistan Economic Corridor (CPEC).

Of all the OBOR projects, CPEC gains more prominence for being the only project of strict bilateral significance. More than 35% of the overall investments worth \$62 billion has been for the

energy sector that includes solar, coal, natural gas, and hydroelectric power projects and the remaining on infrastructural development. Official estimates claim that 21 new power projects will generate nearly 17000 MW of energy. Five years after China and Pakistan signed the “game-changing” multi-billion initiative, a big question remains. Has CPEC been able to fulfill what it had promised to deliver?

With the perpetual financial crisis plaguing the national economy of Pakistan, China has begun reevaluating the feasibility of continuing its investments in the region. The former's inability to repay the project loans has pushed it yet again to renegotiate the terms of energy deals of CPEC. Bailed out by the IMF on the pre-condition to not use the money for commercial purposes, it has no option but to expect a concessional grant from China. A [report by DAWN](#) warned about the failure of the early harvest projects worth \$19 billion to usher in the level of development and prosperity that was claimed. The little hope that progress of coal-fired power plants gave through an increase in the supply of energy is marred when one looks at the worsened pollution in the country where toxic air pollution results in 128,000 premature deaths annually. Assistant Programme director of a Beijing based NGO ‘Greenovation-Hub’, Guo Hongyo who analyzed Chinese investments in Pakistan said that if Coal continues to be built as planned under CPEC, [Pakistan will be locked into a high-carbon emissions pathway](#), which is against the ‘Green policy’ adopted by it in 2019 committing to 30% usage of renewable sources by 2030.

Looking at Pakistan's renewable resources potential, it is an attractive investing ground for both private as well as public investors. CPEC is,

however, a state-led agreement and private renewable energy companies of China will find it hard to engage as easily as with the state-owned companies. Here, Pakistan should take a lesson from China which has witnessed massive economic growth at the cost of its environmental front making it the largest carbon-emitting country in the world. Despite its net-zero assurances by 2060, achieving such a target is certainly next to impossible without serious efforts. Currently, the production of renewable energy in Pakistan amounts up to one-third of the total energy production confined mostly to the northern hydroelectric plants, while solar energy shares only 4% of the whole. Only 14% of the total estimated 60000 MW hydropower potential is currently exploited. Several wind energy resources remain untapped. Nuclear power generation contributes a little over 7.5% to the electricity generation in Pakistan. Prime Minister Imran Khan's regime has taken a few notable steps in this direction by proposing the elimination of taxes for solar power and wind power manufacturing. Although it would be unrealistic for Pakistan to give up on its coal resources entirely, a wiser call would be to revamp its policies in favour of renewable energy resources.

While Pakistan should welcome the Chinese presence in its developmental projects, it should watch out against China monopolising its energy sector. The State of Industry Report by NEPRA brought focus to the corruption in power purchase agreements, where Chinese IPPs are being

favoured to Pakistani companies as well as the excess payments made, furthering the consumer expenses as well as the massive circular debt burden on the state. From raw materials to equipment and even labor is being imported from China, even as domestic companies and millions of unemployed youths lie idle.

Global pandemic and the pressures of economic slowdown saw a reduction in demands of energy. Pakistan observed a 15% drop in electricity demand due to the shutting down of factories, institutions and lowered industry and commercial energy demand. The oil sector had already been witnessing a collapse even before COVID-19. The World Bank has projected a negative 1% GDP growth in the upcoming fiscal year 2020-2021 and Energy finance analyst at IEEFA, Simon Nicholas has argued that [Pakistan will face an overcapacity in energy supply by 2022](#) and a huge financial burden of power capacity payments. The change in circumstances has made both countries more cautious and CPEC will witness a modest trajectory in the coming years. Despite that, the significance of CPEC will not fade away anytime soon, looking at its status as the BRI flagship and the wider geopolitical and geo-economics of Sino-US rivalry in the region.

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Prof. Maria Cândida Mousinho joins the editorial team of *Energy Review*. She is a Professor at the Post-Graduation Program on Energy and Environment, at the Multi-Institutional and Multidisciplinary Doctorate in Diffusion of Knowledge and at the Federal Institute of Bahia, Brazil.

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