Confederation of Indian Industry

POLICY watch

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Focus: Energy

The NDA Government has taken several major strides in the past few months that have defined change, boosting up investor confidence even as Prime Minister Narendra Modi carried the India story to new heights with every new foreign visit. One sector that has dominated every bilateral and multilateral dialogue is energy and India's initiatives in sustainable energy. A similar story has been playing out domestically too as the Government has unleashed some of the boldest reforms in this crucial sector- from opening up the coal sector to deregulating diesel prices, to phasing out subsidies in lpg and mainstreaming renewable energy.

The complexities in an energy starved country like India have always posed one of the biggest challenges for any Government. On the one hand is the growing demand of an economy raring to go, on the other is the irony that large pockets of the country still remain in darkness. The per capita consumption of electricity stands at a paltry 917.2 kWh, as against 3298 kWh in China and 12346 kWh in the US.

Add to that, the lack of abundant easy natural resources like crude oil and gas. Coal is available but large parts of the country remain unmined. The Government has begun well adopting access, availability and affordability as the three drivers to ensure sustainable energy for all in the next five years.

The biggest reform by this Government has come in the form of energy sector policies – the new bill for coal sector that seeks to liberalise the sector and allow private mining companies to take up coal mining for the first time- deregulation of diesel prices and now part withdrawal of subsidies for cooking gas.

These are bold reforms and require political conviction to take economic decisions that may not be palatable for voters in the short term. The political mandate at the general elections followed by the equally convincing poll results at the State have helped the Government to push through these crucial decisions that will help improve the fiscal health of the economy.

The sub-optimal condition of the coal sector has had a negative impact on the economy. India is importing large quantities of coal despite having the fourth largest reserves globally. Lack of transparent allocation policies coupled with laws that restricted the sector to only State run Coal India Ltd prevented large investments with much of the coal remaining untapped while demand grew over the years.

In the hydrocarbons sector, the Government did well to come out with a final decision on gas pricing although it was below industry expectations. The decision to deregulate diesel prices was overdue as it was a huge drain on the fiscal health of the economy, as large subsidies were being given for a fuel that had huge downsides on climate change considerations. The deceleration of the economy is a must as India takes centre stage globally as a responsible economic power.

The first signs of fresh thinking were evident when the new Government decided to integrate the responsibility of the energy sector by assigning the portfolios to one Minister in Mr Piyush Goyal who is in charge of coal, power and renewable energy. This has brought about a new thinking as there is now a holistic approach in policy framing. A case in point being the new thinking of getting conventional power generating companies like National Thermal Power Corporation to put up large scale solar power plants in their backyard to bring in the required amount of unconventional green power into the system.

Clearly, there is evidence that the new Government is committed to bringing in reforms and putting the Indian economy on a strong growth trajectory. Going forward, this buoyancy at the political level will be instrumental in overcoming the hurdles in the energy sector and propelling economic growth. ■

Chandrajit Banerjee
Director General
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Inside this Issue

India's Oil and Gas Sector at Crossroads – Time to Strike it Big and be the Game Changer

What, in your view, is making the global hydrocarbons sector more complex and challenging?

Thirty years ago, the world's population was 4.5 billion; today there are 7 billion of us.

Total world energy demand is projected to increase to 40 per cent by 2030. That would be the equivalent of adding another United States and another China to demand. Meeting this demand will require all forms of energy: fossil fuels and alternatives. The fastest growing of these will be natural gas.

There are two trends that underpin the challenge:

Changing geographies and geologies: China, India and Middle East have emerged as key demand centres, contributing more than 80 per cent of incremental consumption. Exploration and production of conventional hydrocarbons now happens in more remote, challenging and expensive to operate locations. The share of unconventional sources is increasing rapidly. Recently discovered ~32 BTOE of tight oil, ~160 BTOE of shale gas, and challenging geology of some of the remaining reserves are tangible examples of this increased complexity. Additionally, the crude slate is becoming heavier, sourer and with increased sulphur content, increasing the technological complexity and cost of refining.

Rising cost pressures: Operators in the Exploration and Production (E&P) sector are facing deteriorating economics with a sharp drop in oil prices and an increasing complexity of extracting hydrocarbons from frontier provinces. Refining margins have also dropped, more so in the developed countries. Enhancing operational efficiency is increasingly becoming critical to ensure sustained profitable operations.

Sashi Mukundan
Chairman, CII National Committee on Hydrocarbons and Regional President and Country Head, BP Group

What is the present status of the Indian hydrocarbons sector? What is the growth potential and the challenges for the industry?

India is at an important crossroad. The country recognizes that energy fuels growth. It has options around coal, oil, gas, renewables and nuclear. We will have to exploit all possible options for augmenting supply to meet our rapidly growing energy demand. This would include increasing domestic production, as also relying heavily on the rapidly growing international trade.

Security lies in the diversity of supplies: take Japan after Fukushima: if it did not have the option of replacing its nuclear energy with imports of LNG, coal and oil, the lights would have gone out for a long time.

Renewables are a great idea but will occupy just 7-8 per cent share in the energy mix by 2035. The basic problem for renewables is that as a sector they are still heavily dependent on financial and policy support.

The option of nuclear energy exists but is relatively small given the incubation time and cost to develop it.

In the foreseeable future, hence, conventional hydrocarbons will continue to play a pivotal

role for India. Energy we can produce domestically is of huge value and I see the Indian oil and gas sector as being rich with opportunity.

Gas especially has the potential of a large domestic resource play and is also less expensive to import than other fuels. It is a cleaner fuel. If promoted around a national gas grid, it can help India leapfrog across many years to becoming a developed economy as we set up smart cities, industrial corridors, expressways, high speed transportation - much like the telecom revolution that vaulted Indians from the landlines to mobile telephony in just a decade. The Government needs to attract massive investments in gas infrastructure to build India into an economic 'powerhouse'.

The key to doing this lies in liberalization and global integration. In case of domestic production, this means to recognize the importance of market prices in attracting the investment and technology that India desperately needs to unlock its domestic hydrocarbon potential. Producers will not invest and produce if they do not have a line of sight to profits.

I believe it is crunch time for the Indian Government to re-energize the flow of investments in oil and gas exploration. Maintaining status quo will lead to further imports and balance of payments woes. The Government needs to act as an enabler, maintain sanctity of contracts, and let public/private capital work for India. India needs to support and unshackle its E&P sector to step up and participate in this very risky business. This is a business where the track record in the Indian hydrocarbon basins is of 1 to 2 discoveries in every 8-10 wells drilled.

A business-as-usual approach will have to be shunned. Activities in the upstream sector should focus on 4 key areas to unlock large resources.

Enhanced oil recovery – bring in partners with advanced technologies to extract more from existing oil fields. The benefits can be huge – just a 5 per cent enhancement will mean 2-3 billion barrels of additional reserve extraction, about 40 per cent of current proved reserves of India.

Deepwater – in deepwater E&P, the bets are large; if done right the benefits can also be equally enormous. Policy framework for this sector therefore needs rejuvenation through flexibility. Explorers need space to take risks without retribution. There are c.10 TCF of discovered gas resources across India's deepwater basins that are awaiting right price signals to be economically viable for development and monetisation. These would require c.$40-50bn of upfront capital investment in the next four years and can realistically bring gas to starved Indian markets by 2018/19, replacing imported LNG worth $150bn.

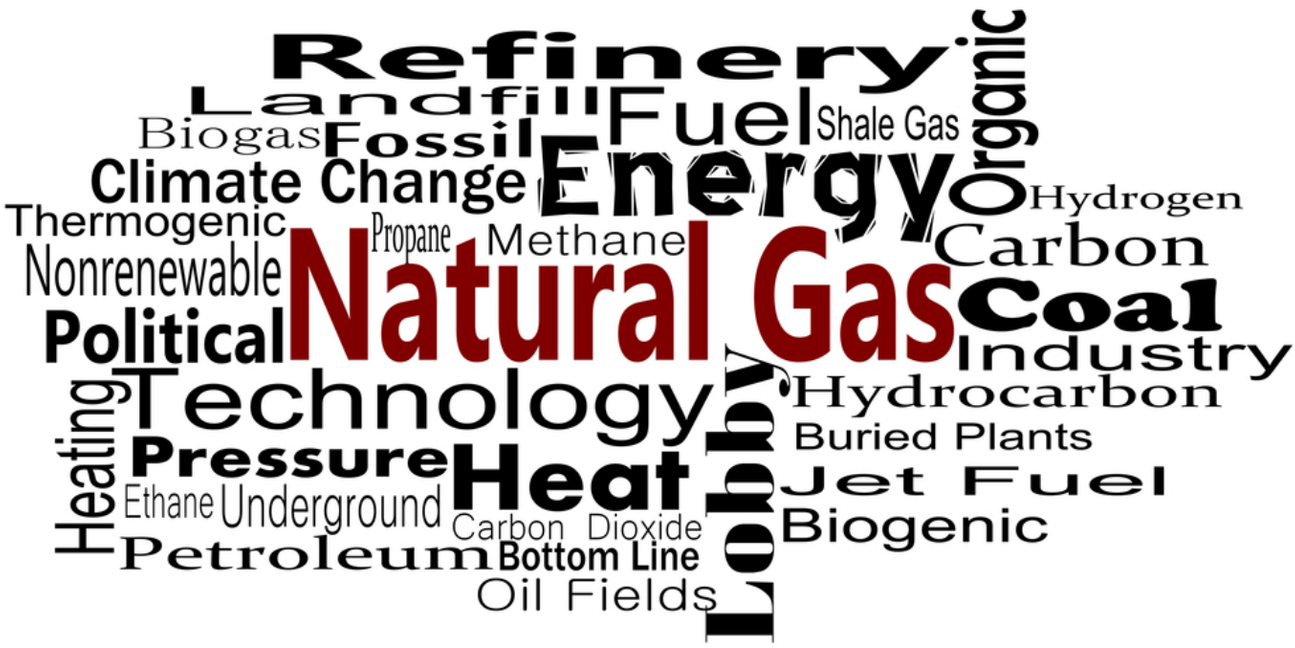
Unconventional resources – shale gas and tight oil are two other frontier areas for the Indian E&P sector. Technology is often the difference between resources discovered or lying undiscovered. Our industry globally has amazing technology and can energize India. We need the right conditions to encourage unconventional E&P. In the US, the shale gas revolution has been a classic case of markets at work – supported by favourable tax regimes, pipelines, infrastructure, and land ownership.

Strategic partnerships - strategic thinking and execution at the basin level is needed. The growth of several successful hydrocarbon provinces such as Angola, Azerbaijan and Iraq has been based on successful strategic partnerships. There is a large opportunity to create such partnerships in legacy NOC acreage and yet to license acreage. Some possibilities are:

- EOR in existing aging fields through globally applied technologies
- HPHT wells need innovative fit for purpose technology that can only come with global tie-ups
- Exploration and development of Ultra-deepwater acreages

Similarly for the rest of the energy value chain, here are some quick wins that hold a wealth of potential:

In coal: look for newer cleaner technologies that encourage coal and petroleum coke gasification and utilization.



In refining: develop world scale plants that can compete in all seasons – important to provide advantaged fuel and feedstock in terms of cost, quality and formulation to the Indian industries so that they can be the most competitive globally.

In petrochemicals: an urgent need exists for developing advantaged feedstock. This would be the backbone for development of smart cities and related industrial, residential, and infrastructure investments.

City gas distribution: more than 250 cities and 13-15 million households across the country could have city gas distribution. More than 5000 compressed natural gas stations could be set up to service more than 10 million vehicles.

Natural gas pipelines: over 32000 km of gas pipeline, a pipeline design capacity of more than 800MMSCMD, and LNG terminal capacity of 80 to 90 million tons per year will be needed by 2030.

What are the key imperatives for stakeholders in the Indian hydrocarbons sector?

There are different imperatives for players in each part of the value chain:

Exploration & Production

- Extract superior value from discovered resources and treat early monetisation of discovered but undeveloped domestic resources as a matter of national priority and remove regulatory bottlenecks to incentivise rapid progress.
- Create an enabling policy regime to attract global investments and cutting edge technologies to explore, develop and produce more. This includes maintaining sanctity of contracts, allowing market-determined pricing and a single minded focus on increasing activity.
- Given the capital intensive nature of the E&P sector with significant risk capital exposure, both Government and investors need to trust each other and recognise that objectives are fully aligned.

Natural Gas Pipelines/LNG

- Create a favourable environment: equal access to infrastructure, fair pricing; upgrade infrastructure for sourcing more gas, infrastructure status, tax breaks, etc.
- Build scale by setting up a pan India national gas grid to cater to future gas demand.

Refining & Petrochemicals

- Drive innovation to improve refinery configuration and complexity factor to cater to changing product mix.
- Invest in development of world scale state of art refineries and petrochemical complexes and drive excellence in refinery operations to sustain margins.

City Gas Distribution

- Co-create demand with customers; phase out subsidies on other fuels.
- Create demand, adopt innovative methods to promote usage of CNG.
- Partner with players in the gas value chain to reduce cost and time for network rollout; partner with service providers to outsource non-core business.

Action needs to be taken now and with urgency. The value at stake for India here is too big to fritter away. ■

A New Fuel Basket to Meet India's Energy Security

The power sector, for long, has been seeking much-needed reforms on the fuel supply scenario in the country. An analysis of the energy and demand trends in India indicates that the energy mix will remain heavily dependent on coal and imports of crude oil. On 31 December 1947, India's per capita electricity consumption was recorded to be 16.3 kWh[1]; this figure as of March 2013 was 917.2 kWh[2], indicating the mammoth increase in demand for electricity in India in the past six-plus decades. The demand for electricity continues to grow as the country aims to regain the 9 per cent growth rate – which can only be sustained by a 12-13 per cent rate of growth of the power sector.

Easing the regulatory framework and creating a smooth liquidity flow in the sector has significantly improved the condition of the power value chain. A developing country like India, with industrial growth at the crux of our development, has a long way to go before we can consider ourselves to be energy-sufficient. The biggest roadblock is the acute shortage of fuels for power generation. This continues to be the primary challenge despite the highest priority being given to the development of generation-based renewable energy sources under the low carbon growth strategy. The fuel mix of India's generation capacity is expected to remain roughly the same in the coming years.

Domestic Coal - Issues and Concerns

Indian coal has a comparatively poor natural fuel value. On an average, Indian power plants consume about 0.7 kg of coal

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to generate 1 kWh, as compared to the United States, where thermal power plants consume about 0.45 kg of coal per kWh. This is attributed to the variance in the quality of coal as measured by the Gross Calorific Value (GCV). Indian coal has a GCV of about 4500 Kcal/kg, less than the coals of other countries.

The stagnation of domestic coal production is also leading to India becoming increasingly dependent on coal imports, which have

recently experienced unprecedented rise in prices. To give a broad overview, in order to bridge the gap between power demand and coal availability, the power utilities' imports of all types of coal during the period (first half of 2014-15) stood at 110.15 million tonnes (MT) as against 92.98 MT imported during the corresponding period of 2013-14. This is an increase of about 18.47 per cent in the first half of FY'15[3].

Imported Coal – Issues and Concerns

Over the past four decades the international coal market has been range-bound and stable in terms of price and availability. Internationally, coal commitments are typically for short terms, less than 5 years for supply and less than 6 months for price. Suitable sources for Indian needs include countries like Indonesia, Australia, and South Africa. However, in September 2010, the Indonesian Government introduced a new regulation stipulating benchmarking of coal prices. Consequently the prices of coal from Indonesia have gone up on an average of 130-150 per cent between 2007 and now[4]. This change in the market environment has created a volatile situation. Similarly, other countries exporting coal to India have also amended domestic laws, impacting the price of coal for Indian developers. This unprecedented and unanticipated increase in imported coal prices has made most imported coal-based power projects unviable at their contracted tariffs. The projects awarded through competitive bidding have been severely affected.

1 http://www.cea.nic.in/reports/planning/dmlf/growth.pdf

2 http://www.cea.nic.in/reports/monthly/executive_rep/aug14.pdf

3 http://articles.economictimes.indiatimes.com/2014-10-08/news/54784764_1_coal-imports-coal-minister-piyush-goyal-less-than-four-days

4 http://www.financialexpress.com/story-print/1153460

The problem that the Indian imported coal-based projects are facing is primarily on account of the sudden shift in price levels of imported coal, coupled with the impact of unexpected changes in laws of the foreign countries from where coal is being imported. Since the changes in laws causing increase in the coal prices have been effected in some of these foreign countries, the provision for 'Change-in-Law' in the PPA does not protect the Indian power developers from this eventuality. This has exposed the vulnerability of the power projects dependent on imported coal due to legal / regulatory changes in coal exporting, which are beyond the control of coal producers. It is estimated that over 50,000 MW capacity power plants have been impacted in one way or the other by these volatilities in the coal market.

Recommended Way Forward

Fuel price pooling provides a possible solution which will enable the import of fuels for the interim period to boost this impacted capacity and allow the cost of import to be shared equally by all the generation capacity, by pooling it with our domestic fuels. However, it is critical that we consider pooling as a short-term solution only.

There is need for reforms in the coal mining sector to attract private investment that can support increased domestic coal production.

The need of the hour is to evolve a long-term national energy security policy. At this time all the different states / UTs of India plan for their power requirement independently as it is a state subject. It is crucial to have a central body to assess the need of each state and then plan for them, their fuel sourcing – from a basket of different fuels – alongside their power production.

Under the policy, the Central Government must also consider mediating to resolve issues related to the pending fuel supply agreements for long-term fuel linkages both in India and overseas. The policy must take into account that resources are a subject that many countries like to deal with on a Government-to-Government (G-to-G) basis. An example is the growing engagement between China and Latin America. These engagements were in the form of loans provided by the China Development Bank to Venezuela, Brazil, Argentina and Ecuador in return for oil[5]. Like other progressive nations, the Indian Government must also become more proactive in engaging with countries on a G-to-G basis to secure access to scarce resources.

There is also a need to establish an appropriate mechanism to offset, in tariffs, the adverse impact of the unforeseen, uncontrollable and unprecedented escalation in the imported fuel price due to market fluctuations. It is also imperative to make the domestic coal industry more competitive and introduce policy and regulatory reforms to enable increase in coal production in India. ■

5 Chinese Engagement in Latin America and the Caribbean: Implications for US Foreign Policy: American University, School of International Service

Make Hay as the Sun Shines in India

How has the solar power sector in India grown and how, in your view, is the solar landscape going to evolve over the next few years?

India today finds itself on the path of becoming one of the leading nations in solar energy by taking steps towards implementing large MW scale solar power projects and is poised to position itself as one of the world's major solar producers as well as a manufacturing hub for solar power plants.

With installed solar capacity at around 3000 MW, the policy framework put forth by the Ministry of New and Renewable Energy (MNRE) through the Jawaharlal Nehru National Solar Mission (JNNSM) has been a success as far as capacity addition is concerned. The JNNSM launched in 2010 targets setting up a generation capacity of 20,000 MW in three phases by 2022.

In addition, several states like Gujarat, Rajasthan and Karnataka are pursuing their own programmes, providing for preferential tariffs and other deployment support (which includes provisioning of infrastructure, wasteland for development, evacuation infrastructure, solar parks, etc). In particular, Gujarat and Rajasthan, blessed with the largest incidence of solar radiation, are poised to emerge as solar hubs in the country.

However, JNNSM was launched with two main objectives – to solarise India through an addition of 20,000 MW by 2022 under the JNNSM; and to have a thriving solar PV manufacturing industry by having 4000-5000 MW of annual capacity domestically by 2020. There is still a lot to be done to reach the second objective. In India, the size of the manufacturing companies is minuscule and most of them have closed down. Currently, only 18 per cent of the Indian market is catered to by the domestic players; rest 88 per cent of the market is serviced by foreign manufacturers led by First Solar (share of over 21 per cent). The Indian Solar Manufacturing industry has an installed capacity of close to 1GW of Cells & 2GW of Modules with an investment of Rs 10,000 crore.

Deepak Puri
Co-Chairman, CII National Committee on Renewable Energy and
CMD, Moser Baer India Ltd.

Presently, there is no company in India that makes ingots and wafers (these two, almost always, are made at the same place). The cell manufacturers are currently importing wafers from other countries.

In an attempt to give an impetus to domestic manufacturing, of the total capacity of 750 MW under Batch-I Phase-II of the Solar Mission, the Government had allocated 50 per cent of the capacity (375 MW) for bidding with Domestic Content Requirement. We expect that a number of projects will be allocated using domestically manufactured cells and modules, and this will be critical for the survival of manufacturing in India.

A strong focus on R&D is required if solar manufacturing capacity has to be developed in India. In addition, an enabling policy framework to incentivise and create a powerful solar ecosystem is necessary.

Going forward, the Government is now looking at accelerating the pace of solar development in the country and has set an ambitious target of 100 GW capacity addition in solar power by 2022.

Solar projects are clearly an attractive investment option and can provide equity returns in the 15 per cent - 20 per cent range. Technology solutions are also available to meet the Government's capacity addition target. However, there is a need for key policy interventions and viable solutions for this industry to continue on a strong growth trajectory.

What in your view are the key issues that face the renewable energy sector today?

Despite the strong growth witnessed in this segment, significant barriers to renewable energy development remain. Given the high upfront capital costs of renewable energy technologies, financial barriers are substantial. More importantly, the current policy of growing the market through the Renewable Purchase Obligation (RPO) route is facing serious challenges with many State Discoms not fulfilling their obligations and the market for Renewable Energy Certificates (RECs) being virtually inoperative. In addition, other key bottlenecks are equally important in limiting the growth of renewable energy.

For instance, the limited availability of evacuation infrastructure and grid interconnections is one of the biggest obstacles to harnessing renewable energy potential. Much economically attractive wind and small hydropower potential remains untapped because of the lack of adequate grid evacuation capacity and approach roads. The lack of good-quality data on renewable resources also remains a problem, despite heavy investment by the MNRE in collecting data on renewable energy. The lack of support infrastructure in the form of a strong indigenous supply chain is another key barrier. Currently, almost the entire RE generation capacity is absorbed in the state where it is generated. There is no coordination with central Government institutions, such as has occurred with conventional ultra-mega power plants (UMPPs). Most RE projects are not selling to buyers outside their states and hence, the role of central institutions such as Power Grid Corporation of India Limited (PGCIL)

and POSOCO is limited.

Another key bottleneck is the approval process. The multitude of approvals required and the issues with land acquisition lead to significant time and cost overruns. In fact, the existing mechanism—including single-window clearances, facilitation by state nodal agencies, and simplified regulation for smaller renewable energy projects—have proved to be of limited effectiveness. In some cases multiple bottlenecks have been replaced by single, larger, and more powerful roadblocks, and significant delays remain the norm. In addition, speculative blocking of land has become common, leading to unsustainable price increases.

Clearly, while the share of RE capacity (wind, solar, biomass, small hydro, municipal solid waste and biogas) has definitely increased, it still is a long way off before renewables play a significant part in the country's overall energy basket.

What measures can be taken to address the financing challenge in the renewables sector ?

Indian financing lags behind international benchmarks for solar project financing on the key parameter of loan tenor and interest rates. If these issues could be addressed, the impetus for setting up solar farms would be stronger.

For a market to grow to 10 GW annually there is a need to mobilise Rs 250 billion of low cost debt. This will lower the cost of renewables. This could be done through multilateral funding and channelized through agencies like Indian Renewable Energy Development Agency (IREDA). Back of the envelope calculations show that for each percentage drop in financing cost there is a drop of Re 0.20 in tariff. Funds that are part of the climate change negotiations (costs of mitigation which the developed countries need to pay to the developing countries) could be deployed to lower the debt cost.

Moreover, disparate finance streams could be channelled in a more targeted way. For example, IREDA might expand its role in funnelling all overseas aid and development assistance into RE and

transmission infrastructure projects at a reduced rate. Stakeholders were of the view that currently IREDA is providing debt at high interest rates. In this respect it might also expand its efforts in reducing interest rates to projects through the use of funds from National Clean Energy Fund (NCEF).

Also a long term tenor (the duration of lending, for instance spreading the loan over a 20-year period) will lead to improved cash flows. The tenor currently tends to be insufficient in India, typically up to 8 years. This mismatch means there is a shortage of appropriate debt as investors seek out alternative assets that fit better with their investment horizons. As an infrastructure investment, RE projects need longer-term debt, of 15 years or more.

What more can be done to put the sector on a strong growth trajectory?

The first key issue that needs to be addressed is RPO Compliance. Under section 122, it is suggested that the Appellate Tribunal gives directive to regulatory commissions to ensure RPO compliance on the lines of what was done by the Ministry of Power in the case of tariffs.

The REC mechanism is facing challenges in its implementation. It is critical to restore the viability of such an important mechanism by supporting existing RE capacity installed on REC market. NCEF fund may be utilized to purchase the unsold stock of wind and solar RECs (as a last resort buyer) and kept as inventory through IREDA and redeemed when the REC market improves once RPOs are enforced. In particular, support needs to be provided for projects based on the Average Power Purchase Cost (APPC)+ REC model.

For achieving higher RE market penetration, RE will have to be sold across state boundaries and hence, PGCIL and POSOCO are now planning to coordinate closely with their state-level counterparts and other state institutions.

The cost of integrating RE into the grid (i.e. reducing the variability/uncertainty and balancing) is reduced significantly if the geographic area of the grid is large. This can be achieved either through allowing greater control over grid operations at a national level or through creating enabling frameworks (e.g. imbalance markets). This requires high-level of coordination among system operators, transmission planners, buyers, and regulators. Central Government institutions such as PGCIL and POSOCO have a key role in operationalizing this coordination. Central and state regulators, however, need to create regulatory and market frameworks to make this co-ordination happen. ■

Incentivise Renewable Power to Make it Competitive

India's significant economic growth over the last decade has led to an inexorable rise in energy demand and led by Prime Minister Mr Narendra Modi's Government, the country is now getting ready to tap into solar and wind energy in a big way in the next five years. Growth in the clean energy sector is seen more as a necessity, primarily due to an energy deficit and the surging demand forecast.

The recent flurry of activity demonstrates the seriousness of India's intentions and inspires confidence about the best use of our energy resources. The new Government has charted a clear path to make India energy self-sufficient, via:

- **Solar and Solar Rooftop Energy:** The Government has announced a target up to 100,000 MW of solar generation by 2022, far more than an existing 20,000 MW target by 2020. The Government has also announced that it will work specifically towards grid parity, making solar bankable and the industry self-sufficient.

  Analyst firm Bridge To India states that the rooftop market presents a vast opportunity in India. According to the firm, the potential is easily in excess of 100 GW and the key market drivers are grid and diesel parity as well as the net metering policies being announced in several states. So far, only a tiny fraction of this opportunity has been tapped.

- **Wind Energy:** India has an installed wind energy capacity of 21,141.36 MW as on March 31, 2014 and ranks fifth in the world after the US, China, Germany and Spain. The potential is far from exhausted. According to the Indian Wind Energy Association, it is estimated that with the current level of technology, the onshore potential for electricity generation from wind is a massive 102 GW. It can sustain the growing needs of electricity of the Indian consumers in a sustainable way. The growth of the wind energy is projected to be the highest in the industry.

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Co-Chairman, CII National Committee on Renewable Energy and Founder-Chairman & CEO, ReNew Power Ventures Pvt. Ltd.

While India's Renewable Energy (RE) sector has begun to move from the margins to the mainstream, there are certain challenges that we need to combat and enable policies that support RE. Some of these challenges are:

- **Renewable Purchase Obligation (RPO):** Currently, different states have different thumb-rules to fix RPOs. Second, there is a need to enforce RPOs. A recent ICRA study noted 11 of the 28 states are yet to meet the long-term trajectory for RPO norms.

- **Land Acquisition:** Solar power is an extremely land-intensive electricity generation option, as 5 to 10 acres of land are needed to generate 1 MW of electricity (5-10 acres/MW). According to the Jawaharlal Nehru National Solar Mission, it is estimated that 40 million sq. m. are required for 20 GW of installed power. However, land acquisition in India continues to remain cumbersome. The lead time to acquire land can range from 6 to 12 months to over a year.

- **Infrastructure:** To support growing RE, the expansion of transmission infrastructure, for both intra and inter-state, is required. Transmission constraints have been a recurring challenge in India and scaling up RE goes hand in hand with the expansion of transmission infrastructure. Investment needs for transmission expansion are significant and there are challenging existing planning and cost-recovery practices.

- **Green Norms:** RE projects can have major ecological impacts if they are installed without proper environmental assessment and management. For example, solar panels are a potential threat to birds, mayflies and aquatic insects. At concentrated solar power plants, birds are fooled by the rays of focused sunlight produced, resembling water surfaces, particularly in 'power tower' plants. Planning of any large-scale desert power facility must include a conservation plan that will anticipate and mitigate damage done to any plant or animal species in the area, based on the technology employed and the plant's site. Environment impact assessments should be mandatory for all solar and wind power plants.

The new Government is deeply committed to India's transition towards cleaner and more sustainable forms of energy. India is well-positioned for this change and a comprehensive set of recommendations can help drive this robust growth in the coming years:

- **Introduce public and private education and training measures to develop and strengthen a skilled domestic workforce:** A potential barrier to local job and value creation from renewables is the lack of skilled labour. This may decrease the reliability of installations and reduce public support for renewables. We must utilise

international cooperation for knowledge and technology transfer as well as education and training.

- **Foster research and innovation through public and private funds to strengthen the competitiveness of domestic industries:** The Government and industry need to develop substantial R&D capabilities within India to suit the needs of the wind and solar power sectors. This will also help keep costs under control.
- **Encourage manufacturing:** The Government should encourage domestic manufacturing with an export-oriented mindset by attracting FDI, providing capital subsidies or other incentives to manufacturers.
- **Financing:** Renewables should be considered under priority sector lending by banks. RBI or IREDA should provide low cost foreign exchange hedges at 3.5 per cent from the present 7 per cent. There should be a reduction of Minimum Alternate Tax (MAT) from 0-10 per cent for renewables sector, similar to the IT sector in its initial days.
- **Grid management:** India should develop a robust interstate transmission network to evacuate power, which is currently nonexistent in India. In this regard, the Ministry of New and Renewable Energy and Power Grid Corporation of India Limited (PGCIL) have planned six dedicated green energy corridors to evacuate RE from regions rich in such energy and feed into other regions. These green energy corridors have also been envisaged to address intermittency and variability aspects as well as grid integration issues of large scale RE generation. The corridor needs to be rolled out on a priority basis, while Mega Park sites must be aligned with and in proximity of the green corridor for easy evacuation of RE.

  Integration of wind power requires better scheduling and forecasting of generation. State-of-the-art centralised forecasting centers should be set up and integrated with supervisory control and data acquisition systems. As wind power installation increases in India, grid management will become even more important.

- **Decentralised / Small-Scale Renewables:** While the development of large-scale RE has now become a desperate need to sustain and fulfil the energy requirements of the nation, the Government should also incentivise setting up of small RE plants. Given the remoteness of much of India's un-electrified population, decentralised RE offers the most viable solution to provide basic energy access to all. Off-grid or small scale renewables have the potential to support small communities of people and be more appropriate for the immediate surrounding environment.
- **Facilitating access to low-cost capital to scale up renewables:** We should develop international standards and aspirational timescales to expedite project approvals and facilitate bundling of projects and securitisation. Standardising contracts and other documents to reduce due diligence time, ensure consistency in cash flow, and secure lower-cost capital is also needed. Improve both system performance and credit performance data availability and transparency. This could include historical datasets of RE system performance and operating costs and customer credit performance. Share best practices for international clean energy finance to reduce policy risk and speed up project development and investment.
- **Enforcing RPOs:** The Government should give a legal standing to RPOs and also define it in the Electricity Act. This will give a big impetus to the growth of the sector and also lead to development of RE in all parts of the country, not just in a few regions.
- **Revise the legal framework** on the health and occupational safety of workers at RE plants.

The Way Forward

Governments have the power to create markets and policies that accelerate development and deployment of clean energy technology. Clear and predictable policy support that is now being provided by the Modi-led Government is vital in propelling investor interest in this sector. The Government's push through incentives for wind energy and solar programmes is propelling investor interest. However, a lot of the policymaking sits at the state level. Unless the states are willing to buy more RE, it will not be sufficient. Therefore, while the central level incentives have helped, we also need to take the next step to further increase the incentives and make RE more competitive and acceptable to the eventual buyers, which are the state discoms. ■

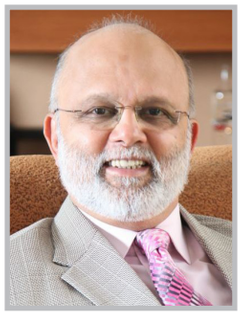
Biomass Should be Treated as National Wealth

While crude prices are showing a downward trend and the energy bill may appear to be reined in, India's growing energy demand continually puts it through a rollercoaster. This demand has also created another issue – emissions, leading to climate change. The development of the bio-energy sector is a key imperative for India as it battles the twin challenges of achieving energy security while staving off climate change. Comprehensive inclusion of bio-energy in the energy basket will also allow India to meet its ambitious 2020 renewable energy target. Of the 250 million tonnes coal equivalent renewable energy consumption worldwide, India has a mere 4 per cent share. A percentage increase in this share would have a significant impact on India's GDP.

Bio-energy, or biomass-based energy, is the only renewable source that can be used across all three energy-consuming applications – transport, heat and electricity. Also, it allows for distributed generation and utilisation, making it widely accessible. Among the various options available, biofuels (biodiesel, bioethanol), biomass combustion for heat and power, and biomass gasification for heat, power, fuel and chemicals, have the maximum potential for India with low cost of investments.

However, some issues must be addressed first. In order to reap the maximum benefit from bio-energy, an integrated policy approach has to be taken up across the value chain – from feedstock aggregation to technology development, deployment, distribution of the energy, and measurement of the impact.

The development of the bio-energy sector is contingent upon the availability of feedstock. Estimates peg the availability of biomass in the country in excess of 500 - 600 million metric tonnes per year, but the



Pramod Chaudhari
Chairman, CII National Committee on Bio-Energy and Executive Chairman, Praj Industries Limited

availability of feedstock at the right price is the key issue. Agricultural residues today are either burnt in the field or used as fuel, and do not fetch significant value for the farmers. There is also no organised sector to collect these residues. It is expected that on commercial deployment of biomass technologies such as second generation ethanol, gasification, pyrolysis, etc., collection and delivery of agricultural residues could become a valuable source of supplementary income to farmers, possibly to the extent of up to Rs 3000/dry ton of agricultural residue, if suitable mechanisms are put in place. Therefore, an integrated approach to biomass collection and delivery should be undertaken countrywide. Biomass should be treated as national wealth, at par with minerals and other natural resources.

In many cases, the technology is still evolving, as in the case of second generation biofuels, or waste-to-power. These need robust funding and policy intervention. In many developing countries, there are special grants and incentives available for such efforts to ensure energy security from alternate sources. Another challenge is the uniform and consistent implementation of the policy. Take the case of the Ethanol Blending Programme which has seen many implementation challenges, right from inconsistent mandates (there was a lapse of 10 years since it was first mandated) to its pricing and excise regulations.

One key advantage of bio-energy is the multiplier effect for rural India via employment generation. Feedstock, available in the rural belt, provides incentive for employment in the form of collection (it can be turned into an organised employment source); establishment of energy generation industries (such as ethanol or biogas, which can be transported thereafter); and development of distribution channels. It is also a great way to introduce specialised skills into rural India.

The CII National Committee on Bio-Energy has embarked on a strategic agenda to mainstream bio-energy and integrate it with the national energy infrastructure, with special emphasis on policy advocacy, technology intervention, and establishing market linkages. As a step in this direction, five Core Groups were constituted, focusing on Feedstock, Biofuels, Power and Decentralised Distributed Generation (DDG), Biogas, and Cook Stoves, to suggest policy interventions and an action plan for the development and promotion of bio-energy in India. A Bio-Energy Report has also been tabled.

We recognise that progress has been achieved in some areas. However, a lot still needs to be done in order to make India energy-secure. Some key areas are mentioned here.

Biogas is a critical renewable energy source. The Government of India's Ministry of New and Renewable Energy (MNRE) has implemented demonstration programmes in the past few five-year plans. To expand the scope of the existing biogas power generation programme to include cooking, heating and cooling applications, it has been

renamed the 'Biogas-based Decentralised Power / Energy Generation Programme' (BPEGP). Further, the demonstration programme on biogas purification and bottling is proposed to be converted into a dissemination programme and renamed as 'Biogas generation, Purification and Bottling Program' (BPBP) during the 12th Plan. Recognising the importance of biogas, the Central Electricity Regulatory Commission (CERC) has given a separate status to biogas for the first time.

Cook Stoves are an effective method for rural India that can ensure smokeless cooking, which will reduce the health hazard to women and children, and also combat the rapid depletion of forest cover. While the NPIC model of the MNRE enables faster propagation of improved cook stoves, there is a need for quality control. Financial assistance from the Government and the corporate sector will enhance propagation. On the design front, indigenous front-feed forced draft stoves with lighting by thermopiles should be developed. High efficiency fixed stoves with metallic liners should also be developed, and the BIS standard for fixed stoves should be prepared. Extensive propagation of cook stoves under corporate CSR programmes should be promoted, with users contributing a small part of the cost of the stove.

Transport fuels account for 22 per cent of the energy use and 14 per cent of emissions in India. The current production of transport biofuels largely entails ethanol production from non-food, byproducts of the sugar industry called molasses. In the case of biodiesel, Jatropha was promoted as a major feedstock of interest, but large-scale cultivation of Jatropha was unsuccessful due to lack of experience, infrastructure and supply-chain for cultivation and collection of the seeds.

Some areas that need to be addressed to ensure effective implementation of bio-energy in transport fuels is clarity on not just the blending level mandated, but also on the detailed implementation procedure to ensure that there is an effective mandate. For successful realisation of the mandate, it is important to create an operating environment that supports sustained indigenous manufacturing and domestic consumption of fuel ethanol. It would also involve rationalising the availability for competing uses and bringing automobile users on board to improve acceptance. While second-generation ethanol technology to convert agri-residue or biomass such as bagasse, corn cobs, corn stover, etc. to ethanol is ready to be commercialised and the cost of production is approaching parity with molasses-based fuel ethanol, there is also a need to enhance the effectiveness of the first generation ethanol programme.

While a few recommendations have been mentioned here, there are many others that can be readily implemented provided we have continuous dialogue and learning to create awareness and acceptance. It is important to have demonstration projects for each idea to enable rapid scaling-up. Financing schemes and fiscal incentives will create a positive environment for the development and adoption of these technologies.

India enjoys unique opportunities in the bio-energy sector due to its agrarian economy and industrial growth. There is huge potential for the sector to contribute to GDP growth while mitigating greenhouse gas emissions, making it a long-term, sustainable energy option for the nation. ■

CII Recommendations for Energy

ISSUES	RECOMMENDATIONS
POWER	
FUEL AND COAL BLOCK DEALLOCATION	
Restrictions on Prior Allottees: A Prior Allottee cannot participate in auction without paying the additional levy of Rs 295/ tonne within the specified period.	Remove the clause of paying the levy of Rs 295/tonne as a pre-qualification for participating in the auction process.
Framing of auction rules: Central Government to frame rules for auction, determination of floor price, manner of receiving compensation etc. Moreover, nominated agency to notify floor price or reserve price.	Reserve price and upfront payment should be based on actual mineable reserves (as assessed by CMPDIL) and not on the basis of Geological Reserves. To calculate reserve price, sale price of coal should be considered as CIL mine mouth price for similar grade of coal supply by CIL to power sector.
Valuation of compensation to Prior Allottee: The quantum of compensation estimated for the land in relation to Schedule I coal mines shall be as per the registered sale deed together with 12 per cent simple interest from the date of such purchase.	Care must be taken to ensure that the compensation offered to the Prior Allottees not only covers the hard cost but also the soft cost. Huge expenses are incurred to obtain statutory licenses, procure movable property and develop mines. It will only be fair that the compensation is comprehensive and Prior Allottees are reimbursed all costs incurred by them.
Certain arrangements allowed: The Coal Ordinance allows the successful bidder, with prior approval of the Central Government, to enter into certain agreements or arrangements with other successful bidders for optimum utilisation of coal mines for the same end uses in public interest and to achieve cost efficiencies.	Mines were allotted to the Prior Allottees based on their specified end-use sector, i.e. IPP, Captive Power, Steel and Sponge Iron. As per the present sector-wise segregation of Schedule II, it appears that only 5 blocks will be available for Independent Power Producers (IPP). This will lead to a significant supply-demand mismatch during the present coal shortage scenario, and may result in irrational price discovery in the auction process. In view of the wide gap between the coal availability and requirement for already completed IPP projects, Government may like to consider increasing the number of blocks to be available for IPP in the first phase of auction.
GENERATION	
Standard Bid Documents for Case I • Proposed framework ineffective for tie up of projects under advanced stages of construction / operational projects. • Elements of Build Own Operate Transfer (BOOT) model exist with reference to captive mines and FSAs which need to be transferred in case of termination. • Fuel Price recovery capped to arbitrary benchmarks. • In case of fuel shortage, the fixed cost recovery limited to 70 per cent. • Concept of Dedicated and Open capacity creates new complications and may lead to stranded capacity.	**Address issues in the proposed Standard Bidding Documents to attract private sector investments:** • States should be advised to go ahead with old documents after incorporating complete fuel price pass-through and let fixed cost be the biddable parameter. • Allow 100 per cent recovery of fixed cost in case of fuel shortage. • Do away with multiple tranches of capacities to avoid the risk of capacities getting stranded.

ISSUES	RECOMMENDATIONS
Standard Bid Documents for Case II • DBFOT model is suited more for natural monopoly businesses like road, transport, transmission and distribution of electricity etc. and not for de-licensed businesses like generation. • No provision of complete pass-through of fuel costs onto consumers. • Concept of Dedicated and Open capacity creates new complications and may lead to stranded capacity.	**Address infirmities in the proposed Standard Bidding Documents to attract private sector investments:** • Revert to Build Own Operate (BOO) bidding structure framework to ensure lower tariffs and better efficiency in plant operation. • Allow complete pass-through of fuel price cost and let fixed cost be the biddable parameter. • Do away with multiple tranches of capacities to avoid the risk of capacities getting stranded.
DISTRIBUTION	
Lack of distribution reforms is straining the growth of the power sector: • Poor financial health of DISCOMS due to lack of cost reflective tariffs. • Continued high AT&C losses. • Market development hampered leading to stranded / idle generation capacities and minimal invest in network up-gradation. • Low implementation of Open Access due to high cross subsidy surcharge.	**Implement distribution reforms to put the sector on high growth trajectory:** • Accelerate distribution reforms with efficiency improvements and introduction of cost-reflective tariff. • Facilitate structural reforms of separating 'wires' and 'supply'. • Enable legislation to attract private capital in retail supply. • Drive private sector participation in distribution. • Scale-up open access, through capping cross subsidy. • Separate base and peak load market.
FUNDING	
Balanced risk-return crucial to attract investment and drive innovation: • Need to mobilise huge investments (~USD 1 trillion). • Stranded assets of ~33 GW due to no coal linkage or no off-taker. • Many risks across the value chain, not being allocated to appropriate owners (fuel price/availability risk to IPP).	**Bail out stranded assets to unlock equity and debt capital:** • Protect developers from project execution risks beyond their control (single window clearance, implement new SBD, 100 GW+ sites for Case-II bidding). • Transfer fuel supply risk to CIL / gas suppliers through enhanced penalties. • Create disproportionate returns for innovation through IRR bump-ups, or through sovereign fund to invest in new and advanced technologies. • Fast-track clearances through institutional reforms. • Facilitate capacity market for medium-term and peaking power.

ISSUES	RECOMMENDATIONS
HYDROCARBONS	
Need to improve the investment climate	Government and related agencies need to build trust with the investment community, and ensure transparency and predictability in policies.
Lack of market pricing in natural gas	Natural gas, an environment-friendly fuel, needs market price to secure long-term investments that are both risky and have high gestation periods. Investors need payment safety mechanisms and regular rate of returns to make these investments. Tax policies should be stable and incentivised to attract investments.
Subsidies on petroleum products and delivery mechanisms	Targetted subsidies should be ensured to reduce fiscal burden. Also, subsidies should be given to the needy. Need to reduce LPG subsidies and target kerosene subsidies for the economically weaker section.
Model for production sharing contract	Production sharing contracts must be sacrosanct and should ensure operational and functional transparency while providing investors guarantees of returns on their investments. Contracts should be fair and provide the Government with a stable revenue share.
Lack of regulatory mechanism	An independent regulator with enough teeth to take strong decisions is the need of the hour particularly in a sector that is dominated by state players.
Lack of incentives to develop midstream infrastructure like pipelines	Pipelines have to be developed to move products and fuel from production to consumers. This will help in tapping demand and planning capacity accordingly.
RENEWABLE ENERGY	
Renewable Purchase Obligation (RPO) noncompliance	While Section 86 (1) (e) and Section 61 (h) of the Electricity Act 2003 obligate power distribution entities to purpose RE-based power, RPO compliance has been poor. This noncompliance has had a pernicious effect on the RE Certificate market as well. An effective compliance mechanism must be devised and adhered to wherein defaulting distribution utilities are penalised and overachievers incentivised.
Cost of financing, as interest rates of 12.5-13 per cent are too high	• Allot Priority Status and introduce separate caps vis-a-vis conventional power for SCBs to make available adequate funds for RE projects. • Introduce 10-12 year tax-free bonds to bring in funds from the market; these could be floated by PFC/IREDA. The corporate bond market could also be tapped. • Interest subvention can be done either by channelising the funds sourced from multilateral sources or through budgetary allocation via NCEF. • Increasing the tenor of funds to 12 to 15 years will help in reducing the cost of generation and approaching grid parity; funds from insurance and pension funds which have maturity profiles of 25-40 years could be mobilised.
Limited availability of evacuation infrastructure and grid interconnections have led to wind and small hydropower potential remaining untapped	• While planning for interstate and intra-state transmission systems, Central / State transmission utilities should account for likely generation capacities based on conventional energy as well as renewable energy sources. • Transparent and reliable data-backed scheduling and forecasting mechanisms need to be instituted at a consolidated State Load Dispatch Centre (SLDC) level instead of substation-level. Increasing data base will increase predictability. • Best practices and international models, like that of Germany which has data for a longer period, must be adopted.

The Journey From a 72 Hour Deadline to a 74 Block Obsession

It all started with a congratulatory message from a fellow batch-mate on October 16, 2014. What followed over the next three days is simply unimaginable as the Modi Government initiated one of its boldest reforms, unshackling the age-old Government-controlled coal sector. "It was a 72 hour deadline for us," coal secretary Anil Swarup said even as he recounted how he and his team of officials went about writing the new ordinance that was to change the country's coal sector forever. But if that was all about the 72 hour deadline to reframe laws governing the coal sector, its now "an obsession" to get 74 coal blocks off the ground. Secretary Swarup, an official known for his execution skills (he was earlier heading the PMGSY), said in a lighter vein that life for him is now all about eating, sleeping and breathing coal till February 11, a deadline they have set for themselves to begin the auction process.

"While most editorials said that the Government had not gone the whole hog, the ordinance which will be presented as a bill in the winter session of Parliament has for the first time allowed private mining companies to get into India's coal sector," he said in an informal discussion with industry representatives at CII's CEO's power round table held on November 20, 2014. The interaction was held barely hours after the rules had been put out.

Amongst key areas that dominated the discussions were concerns about the bidding process, how existing players would get their linkages or how they would be compensated. And the coal secretary did not disappoint them for he had answers for each one of them. For the rest, he was all ears for suggestions.

That's not all. The Secretary assured that the Government is willing to go that extra mile to ensure increase in coal production to meet the domestic requirement. The coal ministry has set an ambitious target of increasing coal production from 460 MT to 1000 MT by the end of 2019, a five-year plan of its own. This production is set to come from mines owned by Coal India Ltd, Mr Swarup said. The produce from mines owned by private sector is expected to be an additional 300-400 MT, augmenting the overall coal production to 1300-1400 MT. The ministry is also working on a strategy paper to ramp-up coal production. The paper will carry details of mine-wise production escalation, and the evacuation plan.

The Government is exploring rationalisation of coal linkages that will enable swapping of coal, a first for the sector

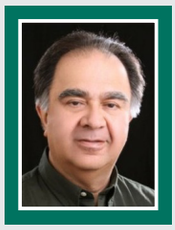
But industry leaders present at the session wanted much more and queries poured in. One of the first such issues was to understand the reason behind the "80-60 rule". The "80-60" criteria refers to the level of investments made by the company in the power, steel or cement plant that would use the coal. The Government is now using this as a basis in the auction process for coal blocks in schedule II and III to enable larger participation.

"If we were to allow only players with 100 per cent investments in the project to participate in the auction of blocks under schedule II, then only those players from whom coal blocks have been taken away would compete in the auction. This is something that the Government does not want, thereby justifying the magical figure of 80 per cent investment to participate in the auctioning of blocks under schedule II," Mr Swarup said. In addition, the Government also does not want to shrink the size of investment to nil to dissuade participation of player with no investments on the ground. This strategy will enable optimum utilization of blocks under consideration, he said.

Rationalisation of coal linkages to optimise evacuation infrastructure and to reduce the time taken to transport coal is also being considered seriously by the ministry officials. Rationalisation, if utilised effectively will not only minimise infrastructure bottlenecks but also will reduce high transportation cost for all stakeholders involved. "The Government is exploring rationalisation of coal linkages that will enable swapping of coal, a first for the sector," said secretary Swarup.

One of the biggest worries for the private sector revolves around the need for a level playing field. Expressing apprehensions, industry leaders asked if the private sector would not be disadvantaged as they would have to acquire blocks through auction while the public companies would get it on the basis of nomination. Mr Swarup dismissed such doubts and assured that the Government would adopt an approach that will ensure a level playing field for both the public and the private sectors.

The countdown to the auction had begun and it was time for the industry to get back to their boardrooms and prepare for the new coal regime set to roll out over the next few months. The CII session had made one thing clear - the coal sector is in safe hands. ■



On the domestic front, we have had a National Action Plan on Climate Change in place since 2008. We have made great strides on efficiency and on renewable energy contributing to a reduction in emissions intensity. Further, the new Government has announced very ambitious growth objectives for solar energy in recent days. Given our vulnerabilities as a country to climate change, a lot more will continue to be need done. What we now need to do is make the global community aware that climate change is and has been an important concern for the country for a number of years. With a fulltime dedicated Minister in place, the focus on this important subject will only increase. Our unwillingness to be complaisant at international discussions has created a false impression that this subject has not been getting the attention domestically that it needs.

The recent G-20 meetings have provided the opportunity for greater articulation on our part. PM Modi supported inclusion of climate change in the meeting agenda despite the Australian host's reluctance to do so. The recent announcement on emissions by the 2 largest emitters, US and China, provides some markers for us going forward.

Krishan Dhawan
Chairman, Core Group on National Clean Energy Fund and CEO, Shakti Foundation

Recent policy intent and legislative directions indicate the Government's keenness in resolving the coal supply constraints facing power projects, thereby helping provide a fresh lease of life to stranded or idle plants. The first steps to re-vitalise the power sector have been taken but a holistic transformation will depend upon distribution reforms and easing of regulatory approvals.

Prabir Neogi
Chairman, Core Group on Fuel Linkages and Infrastructure Development and Chief Executive – New Initiatives (Fuel And Distribution), CESC Ltd.

The Government has announced a few bold measures for the oil & gas sector, which would take the country on its path of energy self-reliance and also fiscal discipline. Complete deregulation of diesel prices would not only ease the subsidy burden of the Government, but also of upstream companies, leaving them with additional resources for their core activity, which is exploration & production. Similarly, the gas price hike, though lesser than what the industry anticipated, will also encourage exploration production activities. Diesel deregulation will also encourage competition in the retail sector, benefiting the end consumer.

As a nation, we continue to import about 80 per cent of our oil and gas requirement and hence a strong policy framework is needed to encourage the oil & gas sector. While paying for costly imports on one hand, denying domestic producers a price commensurate with the risk and capital cost is telling heavily on our domestic production.

India has the potential to become a global hub for refined products thereby creating additional jobs, generating foreign exchange, and also creating energy security for the nation. We look to the Government to come out with encouraging policy measures through simplification of procedures and fiscal incentives so that the sector can retain its true potential.

L K Gupta
Managing Director & CEO, Essar Oil Ltd.

Industry Voices

India's oil and gas sector is at an interesting juncture. Like other key sectors of the economy that play a critical role in India's energy security, the oil and gas sector too is heavily regulated and its destiny can therefore be shaped by the hand of the Government. Our new Government has the opportunity to provide much needed impetus to this sector and help it to assume dimensions where it not only makes material improvements to India's domestic hydrocarbon self-sufficiency but also contributes significantly more to India's economic growth than it has in the past. The key area where the focus needs to be increased is domestic exploration – with a view to ramping up drilling activities that ultimately lead to more oil and gas discoveries being made in India, which could ultimately lead to an improvement in our balance of payments and reduction of our trade deficit.

Shaleen Sharma
President & Managing Director, BG India Ltd.

Renewable energy, driven predominantly by wind and solar power, is expected to provide almost a quarter of the world's electricity supplies by 2050, according to a new report published by IEA. Solar power currently accounts for 0.5 per cent of total electricity supplies but this will need to increase if carbon emissions are to be abated in a significant manner. The future success of renewable energy will depend on several critical issues such as cost of generation, availability of intra-state and inter-country transmission corridors, grid and market integration of renewable power. Time of day tariffs and smart meters will be key enablers. LCOE of renewable energy gets prefixed for the entire lifecycle of such projects with no fuel required and, in my calculations, is already lower than conventional energy. Decentralised generation and distribution of renewable energy needs to be promoted through net metering of rooftop solar power and developing a regulatory framework for supporting off-grid generation and distribution of renewable power. The cost of off-grid generation needs to be socialised amongst all off-grid and grid connected consumers.

For renewable energy to emerge as a dominant player in the future, significant efforts will also be needed in development of energy storage solutions. Energy storage provides multiple benefits including time shifting, grid stabilisation, improved generation efficiency, and improved utilisation of transmission capacity.

Sunil Wadhwa
Co-Chairman, CII Climate Change Council and MD, IL&FS Energy Development Company Ltd.

India faces unique socioeconomic difficulties such as poor access to energy, large and mounting bills of fossil-fuel imports, and increasing international pressure to reduce carbon emissions despite its low per capita emissions. The Government is right in mixing large-scale renewables into our energy mix to provide 24X7 power for all, which is not possible via only conventional sources. However, the country has allowed renewable energy capacity addition to lose steam in the recent past.

The thrust the new Government has brought to this sector is unprecedented and very welcome. It probably is the only sector where the private sector would find it hard to match the Government's ambition of deploying 100 GW by 2020. This sector will see a huge spike in investments, to the tune of US$ 30-40 billion, over next 6-7 years, and will add at least 500,000 jobs, mostly in rural sector. The Government's vision should be to establish and propel India as a global leader in renewable energy through technology innovation, deployment, service delivery, and market creation.

The areas of concern which the new Government should address is to bring in a long-term and stable policy environment, simplify land acquisition processes, set up a stronger RPO enforcement mechanism, and upgrade transmission network for evacuation and grid integration.

Sunil Jain
CEO & ED, Hero Future Energies Ltd.

When I introspect on my 20 years' journey in bio-energy, I am reminded of Albert Einstein's quote, 'In theory, theory and practice are the same. In practice, they are not.' In theory, it is recognised that bio-energy constitutes 25 per cent of India's primary energy but, in practice, bio-energy did not get an infinitesimal share of the policymakers' attention. In theory, there is acknowledgement of enormous evolution that has been taking place in biotechnologies but, in practice, the focus was on technology evolutions in wind and solar energy.

However, I look at the future with far greater optimism. The Government as well as Industry, is beginning to evaluate RE impact in terms of GWh energy supplied, rather MW installed capacity. Automatically, this accords bio-energy the pre-eminent status it deserves. Bio-energy now provides efficient cooking/ heating and transport fuel solutions, apart from electricity (as DDG & CHP solutions). Furthermore, there are huge collateral benefits - jobs creation in the 'organised' biomass supply chain, and the valuable by-products of bioenergy plants (compost, bio-char, etc.)

K Krishan
Chairman, Malavalli Power Plant Pvt. Ltd.

India's high dependence on imported energy continues to be a major economic threat, especially when we are at an inflection point, given the ambition of the new Government of being catapulted into a higher growth trajectory. Bio-energy, given the agrarian character of our nation, offers a tremendous opportunity in terms of millions of rural jobs and billions of revenues and investments possible in the sector.

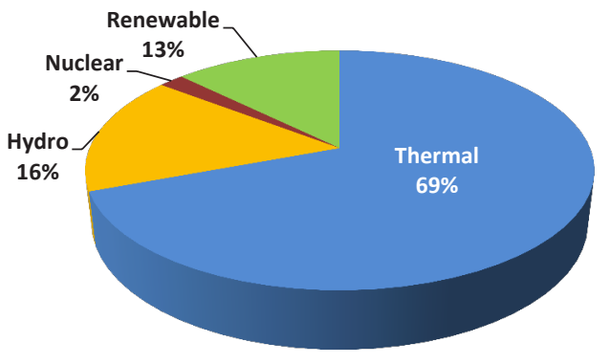
A focused push by setting up a Bio-Energy Mission that can further ensure establishing a comprehensive framework for feedstock collection; attracting more of clean energy fund towards bio-energy projects and setting support mechanisms for the first few years can jump start a vibrant industry. Supporting mandates for flexi-fuel vehicles would benefit the end-consumers both in terms of cleaner air and cost of fuel which in turn would keep inflation in check. A right thrust from the Government would ensure that bio-energy becomes one of the pillars of inclusive growth for years to come, besides setting up a base for a larger bio-based economy.

G S Krishnan
Regional President, Novozymes South Asia Pvt. Ltd.

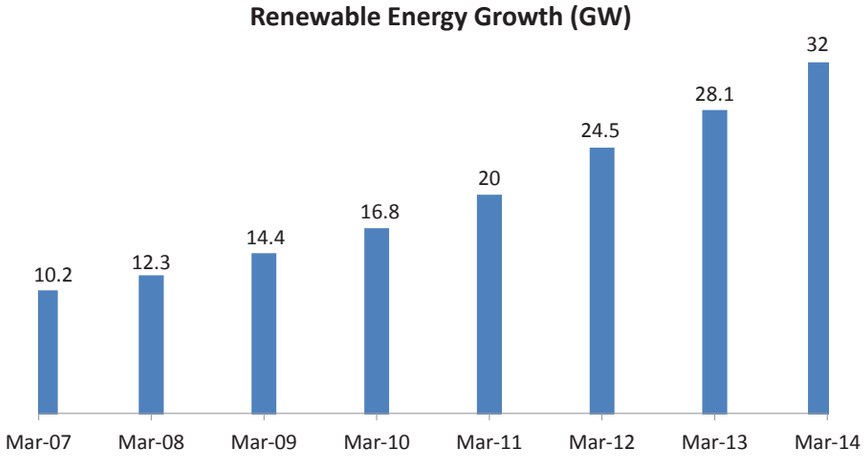
With global energy demands expected to double by 2040, energy security and energy access are high on the list of concerns for all nations, with India being no exception. Fuels from renewable sources have the potential to support growing energy needs of high growth economies while addressing concerns regarding climate change and greenhouse gas emissions. Although biofuels may be a good energy alternative option, many hurdles limit the Indian biofuel industry – especially on the diesel substitution side – from growing at the desired pace. With the Government of India promoting the consumption and production of biomass such as agri-residues and non-edible oils, stakeholders across the bio-energy space should initiate, if not already started, identification of untapped feedstock resources to support various biofuels projects in India. This would be a step in the right direction.

Dr Anjan Ray
Regional Commercial Director, Renewable Energy and Chemicals, UOP, A Honeywell Company

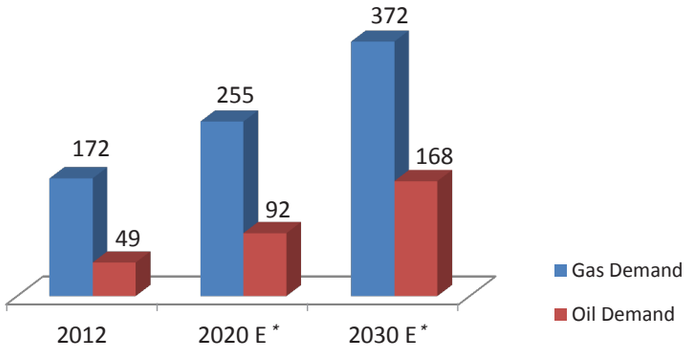
INSTALLED POWER CAPACITY : INDIA



Renewable Energy Growth (GW)



Demand of Oil and Gas in India



*Estimated

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