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ENERGY POLICY: REDESIGN THE DECISION MAKING ARCHITECTURE

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INTRODUCTION

This paper has one message. India must redesign its energy policy architecture. The current structure of institutions and the process of decision making do not facilitate the development of an integrated energy policy. It is too fragmented and diffused and the result is burgeoning avoidable costs and inefficiencies. The paper delivers this message in three parts.

The first part outlines the nature and extent of the present energy problem. This is a qualitative exposition. It does draw on hard data but the objective is to define trends and direction and no more. It establishes that there are many reasons for the problem. Some are beyond the control of the decision makers; others have been triggered and exacerbated by the institutions and policy and could have been avoided.

The second part describes the existing structures and processes of decision making. It highlights the fact that whilst there are well defined positions on oil and gas, coal, nuclear, power and renewables there is no executive authority responsible and accountable for weaving these into one seamless and integrated policy. There is in effect an energy problem but there is no energy strategy. The consequential costs – current and future is potentially a major block to sustainable growth.

The final part offers suggestions on how best the government can do better what it is already doing. In contemplating the options for change the paper accepts as an overriding constraint the political infeasibility and impracticality of radical proposals – viz., to knockdown and rebuild the existing policy architecture. It looks therefore at options that shift the needle a few degrees only.

Energy is a complex subject that straddles the public and private domain and sits at the nub of decision maker's deepest dilemmas. The dilemma of how to attract investment into the energy sector and at the same time meet the public's demand for

affordable, accessible and reliable energy; the dilemma of accelerating industrialization and economic growth without degrading the environment and the dilemma of securing energy independence and energy security within the framework of a globalised, liberal and competitive world. These are not easy dilemmas to resolve at the best of times but they are even more difficult to tackle in India because of its fractious polity. This paper has been driven by the hope that a first step in the right direction will lay the basis for larger subsequent strides towards a destination that resolves these dilemmas.

PART I

THE ENERGY BACKDROP

India's energy problem can be succinctly stated. Demand is surging; supplies are not keeping pace with demand, and the environment is under stress.

Surging Demand

The following numbers highlight the dimensions of this issue. The demand for energy in India has increased at a compound rate of 5.9% per annum over the period 2000 to 2010 as compared to an average global growth rate of 2.5%. The country consumed 742 million tons of energy in 2010 of which Coal accounted for 315 million tons; oil and gas 245 million tons and non-commercials like wood, dung and bio 177 million tons. The rest was hydro, nuclear and renewables.

Looking ahead the Planning Commission has estimated that India will consume approximately 1 billion tons of energy in 2020. The IEA has projected that it will need to invest $ 2.3 trillion (2009 dollars) in energy infrastructure over the next two decades to meet this demand and economists have estimated that the energy import bill could be $ 3.5 trillion (2009 dollars) aggregate over the period 2013 to 2030.

There are three reasons for this problem of surging demand -- population, prosperity and policy.

The pressure of population needs no elaboration. India has a population of 1.2 billion and this fact alone explains why it is amongst the largest consumers of energy in the world today. This pressure will not abate as the population is continuing to grow at between 1% and 1.5%.

Prosperity has reinforced this pressure. The Indian economy has been transformed over the past two decades. Its GDP has quintupled from $320 million (2009 dollars) in 1990 to near $ 2 trillion today but more pertinent it has moved onto a more energy intensive growth path. The relatively less energy intensive agricultural sector accounts for only 18% of GDP whilst industry consumes a third of all the electricity generated and more than 90% of the coal produced. This economic change has been accompanied by a demographic and social transformation. The median age of the country is 23. This youthful bulge is aspirational, individualistic and entrepreneurial. They are not bound by the traditional norms of hierarchy, tradition, age and community. They are looking to own shares, open bank accounts and metaphorically speaking trade up from a cycle to a two wheeler and eventually a "TATA NANO". They are also on the move forsaking their rural roots for an urban existence in the search for a better future. The combined impact of relative prosperity and shifting aspirations has been a powerful driver of energy demand.

Superimposed on population and prosperity has been the impact of policy. Two decisions have contributed most to pushing demand. One, the decision to subsidise petroleum products and electricity and two the 'default' decision to neglect demand management and energy efficiency.

Petrol, Diesel, LPG, Kerosene and electricity have been subsidised for decades. This has led to excessive and wasteful consumption and the "dieselisation" of the economy. To compound this damage, the Bureau of Energy Efficiency which was set up under the

Ministry of Power in March 2002 has not had a material impact on demand conservation and energy efficiency. India remains today amongst more energy inefficient countries in the world. It is estimated for instance that for every $1000 increase in GDP India consumes approximately 1.5 barrels of oil equivalent compared to 0.75 to 1 barrel in the U.S. / Europe for an equivalent hike in GDP.

Sputtering Supplies

The domestic production of commercial energy has not kept pace with the surge in demand. This has sharply widened the demand – supply gap. In the early 1980's for instance India imported 25% of its crude oil requirements and a small quantum of specialised grade coal. Today, it imports nearly 80% of its crude oil requirements and 100 million tons of coal. It is further projected that at current trends India's oil import dependence will exceed 90% and the imports of coal will reach 300 million tons by 2020.

There are several reasons why domestic supplies of oil and gas production have faltered.

The first is Geology. India is not a "Saudi Arabia" or a "Kuwait". It is not sitting on vast accumulations of hydrocarbons but on the other hand it is not totally bereft. The Directorate General of Hydrocarbons (DGH), the government regulator for exploration and production (EP) and Oil and Natural Gas Corporation (ONGC) the state owned and largest EP Company have together identified 26 sedimentary basins in the country. They have estimated that these basins contain 'prognosticated' reserves of 30 billion tons of oil and oil equivalent of gas: The bulk of these reserves are however in difficult geology and inhospitable terrain. As such they are difficult to locate and even when located they are difficult to produce on a commercially sustainable basis. Notwithstanding the prognosticated numbers are material and a well-planned and

intensive exploration strategy in warranted. In this regard however the government has been laggard.

ONGC's data show that only 22% of India's sedimentary basins have been substantively explored; 46% have been partially explored and the balance 32% have not even been surveyed. The exploration density of 20 wells per 1000 sq. km is amongst the lowest in the world. It is therefore not surprising that only 6.8 billion tons of the "prognosticated" 30 million tons have been upgraded to "probable" reserves and that the production profile has been relatively flat. In 2000 for instance domestic production was 33 mtpa of oil and 32 bcm of gas. Today it is 37.9 mtpa of oil and 40.7 bcm of gas and this modest increment has happened only because of two significant discoveries – one by Cairn in the Barmer region of Rajasthan and the other by Reliance in the Eastern Offshore basin of Krishna Godavari.

Exploration has been slow because the government has been ambivalent about the role of the private sector. Initially and for three decades after independence the government was clear. Oil / gas was a strategic industry and exploration would be handled almost entirely by ONGC/Oil. The private companies would not be encouraged. Later in the early 1980's the government shifted its stance. They hesitantly "invited" the international private companies to explore. A handful of companies like Shell, Chevron and Occidental commenced exploration but none were successful and they relinquished their license. It was only in the 90's that the government become actively solicitous. They announced what is still today called the "New Exploration Licence Policy" (NELP) and invited bids from petroleum companies to invest in exploration. They offered a production sharing contract that on one hand obligated the companies to bear 100% of the exploration risk but on the other gave them a share of the production in the event of commercial success. They held road shows in all the major oil / gas hubs around the

world to explain the details of NELP and with every round they improved the terms to ensure they were competitive.

To date, there have been 9 rounds of bidding under this policy. The results have been mixed. The Government has signed 254 production sharing contracts including with several well-known companies like British Petroleum, Cairn, British Gas, ENI and Petrobras. Together these companies have invested approximately $ 32 billion in exploration and production. On the flip side there is disappointment that other than BP who bought a 30% share in Reliance's exploration business, none of the super majors like Exxon, Shell, Chevron and Total have responded to NELP. The bulk of the investment has in fact come from ONGC and Reliance. This is disappointing because the super majors have the technology, capital and the operational expertise to harness India's "difficult" hydrocarbons. These companies have been deterred by three factors. First they do not perceive Indian geology to be comparatively prospective. They see better opportunities elsewhere. Second they are discouraged by the cumbersome licensing and approval procedures. And third they have been shaken by the post facto changes in the terms and conditions. NELP assured the companies of a tax holiday irrespective of whether the discovery was oil or gas. The Finance Ministry redefined the meaning of gas and this concession was removed. Similarly NELP gave companies the right to "price" and "market" gas. Later this right was abridged when Reliance applied to bring its KG D6 gas discovery to the market.

The government's ambivalence towards the private sector has its roots in the left leaning legacy of the Nehruvian Era. It was during this era that the "commanding heights" of the economy were brought under the control of the State. Since then there has been a change in economic policy but not a comparable shift in regulatory attitude. The bureaucrats have been reluctant to allow the private sector a free hand. They are

still somewhat suspicious of the companies and they have therefore retained their right to be the "controller" of last resort. Their consequential "involvement" in the details of operations and management has been a blocker.

There are four other reasons why exploration and production has been laggard.

One ONGC has an imbalanced and aging portfolio of producing fields. It has 105 fields but the bulk are marginal producers. Mumbai High is the jewel in its portfolio but this field has been producing for over four decades and it is in decline. The recovery rate of oil and gas from its fields is 28% compared to a global average of 40% for fields of comparable geology. ONGC has expended a great deal of effort to stem this production decline and improve the recovery rates but it has not been overly successful. This is in part because they have failed to access state of the art 'enhanced' oil recovery technology. This technology is proprietary and the international companies will only offer it if they can share in the production upside. ONGC has refused to contemplate such a quid pro quo.

Two ONGC has been compelled to "finance" part of the losses of the oil marketing companies. This has eroded their investible surplus. As noted IOC, BPCL and HPCL are required to sell petrol, diesel, kerosene, and LPG below cost. The consequential "under-recovery" has been huge. In 2012 for instance the three companies "under-recovered" nearly Rs.150, 000 crore. The government has kept these companies whole by giving them I.O. U's; cash subventions and "discounted" crude. ONGC has borne the brunt of the latter. It is estimated that ONGC has realised on average only $ 40 / barrel from the sale of crude to these companies when they should have received in excess of $ 100 / barrel. Given that the finding cost of marginal barrels could be as high as $ 50 / bbl this discount policy has no doubt adversely impacted ONGC's exploration program.

Three the activities of the Controller and Auditor General (CAG), the Central Bureau of Intelligence (CBI) and the Central Vigilance Commission (CVC) have checked and balanced government decision making into a standstill. Bureaucrats will not put their signature on files that involve companies that are or have been the subject of public controversy. The result has been delayed approvals of exploration licenses and development plans. The winners of the ninth round of NELP bids received their license to commence operations two years after the announcement of the award.

Finally the Reliance KG D6 field has failed to produce as expected. At the time of discovery this field was projected to produce 60 mmscmd of gas and the hope was this would eventually increase to around 80 mmscmd and possibly even 120 mmscmd. The development and production facilities were designed accordingly. It became clear soon after production commenced that these projections were wildly off the mark. The field developed down-hole problems and production is currently around 15 mmscmd and falling.

The production story for coal has also been disappointing. Unlike oil however the declining trend has been entirely avoidable. India has the fifth largest deposits of coal in the world and yet today it is dependent on imports for nearly 18% of its requirements – a dependence that is expected to increase to 23% by 2017.

The reasons for this inversion are corruption, poor infrastructure, unionised labour and dated technology.

"Coalgate" is the proximate cause. This is a scandal that got triggered by the CAG's report that the Ministry of Coal had allocated "Coal Blocks" to companies that did not have the competence or the finances to develop them. The CAG reported that these 'allocations' had caused a financial loss to the exchequer. The Supreme Court took note of this report and in a blunderbuss response cancelled all the 206 licenses that had been

handed out since 2004. Production dropped sharply and the major consumers like Power and Steel were compelled to import. Beyond "Colgate" the problem is size, location, bureaucracy, and infrastructure. Coal India is a huge organisation with around 300,000 highly unionised staff. It operates in regions where crime and politics go hand in hand; It faces a labyrinth of procedural hurdles especially regards the acquisition of land and environmental approvals. And it has to contend with the 'cost' of long distance transportation. The major coal deposits are in the North and Eastern states of Bihar, Jharkhand and West Bengal, whereas the main markets are in the Western and Southern states of Maharashtra, Gujarat, Andhra Pradesh and Tamil Nadu. The road and rail infrastructure connecting the mines to the markets are poor and this leads to delays, accidents and leakages.

Oil, gas and coal account for around 90% of India's commercial energy supplies. The balance is made up of nuclear, hydro and renewables viz., (solar, wind and bio). Each of these non-fossil energy sources has significant long term potential and the government has set up national missions to foster their development. The results have been solid albeit from a low base but it will be decades before these sources account for a material share of the energy basket. This is not just because of commercial and technical reasons. It is also because of logistic and infrastructural constraints.

India's energy system is built around fossil fuels and it will not be easy or cheap to move it to a different base. To illustrate, Edison illuminated the lower half of Manhattan sometime in the mid 1880's. It was not until the mid-1930's that all of the factories in the mid-West of the U.S. had converted from steam power to electric power. This was because they had to be redesigned if not rebuilt. Else they could not use this revolutionary new technology. A similar transformation of India's energy infrastructure

will be required before non-fossil fuels can be materially scaled up. That will take decades and a lot of money.

Environmental Stress

The third aspect of India's energy problem is the nexus between economic growth, energy demand and environmental degradation. This nexus is physically manifest. Forest cover has been depleted; the ground water aquifers have receded; and air pollution has deepened. Moreover India is now amongst the largest emitters of Green House Gases (GHG) in the world. The energy sector accounts for 58% of these emissions.

There are many reasons for this environmental problem. First there is the fact of our energy system. It is based on fossil fuels and non-commercial sources like firewood, dung and bio. More than 50% of the population still rely on the latter for meeting their fuel requirements for lighting, cooking and heating. Second there is the fallout of the policy regards petroleum product and electricity subsidies. The price differentials created by this subsidy regime especially between diesel and kerosene has led to widespread fuel adulteration. The subsidies on power have also encouraged inefficient and excessive irrigation and this has contributed to the decline in the water tables. Third there is the consequence of using inappropriate and outdated technology. Most of the thermal power plants are still run on subcritical technology. Performance and emission standards have not been rigorously applied and despite the warning from the intergovernmental panel on climate change (IGPCC) that India does not have the luxury to develop first and clean up later there has been little progress towards a "greener" consumption pattern.

The energy problem of India – surging demand, sputtering supplies, and environmental stress - outlined above is no doubt because of the country's size, its stage

of economic development and geology. These are structural realities beyond the control of the government. There have however been policy shortcomings. The question that the next part addresses is the extent to which these policy shortcomings have been due to the institutions and processes of decision making.

PART II

INSTITUTIONS AND PROCESSES OR DECISION-MAKING

The Existing Institutional Structure

Energy related issues are handled by a multiple of segregated government departments, public sector organizations and semi-autonomous regulators in the Central and State governments. Each entity has an input into the decision making process but there is no institutional or executive mechanism for weaving these separate inputs into one seamless, cohesive statement. There are separate policies on oil and gas, coal, nuclear, power and renewables but there is no integrated energy policy. There are strategies on energy but there is no energy strategy.

At the level of the Central government there are five line Ministries involved with energy. These are the Ministries of Petroleum and Natural gas; Coal; Power Atomic and Non-Conventional and Renewable energy. In addition there is the Planning Commission and the Prime Minister's office. These latter two have no executive authority but they are influential. There is also the Ministry of Environment and Forests. This is the omnibus authority for all environment related issues. All energy related projects have to get the approval of the Environment Ministry and so to that extent it is integral to the decision making process. Each of these Ministries is headed by a Cabinet ranked politician; each is supported by a phalanx of bureaucrats and each has a constituency of state owned enterprises. Thus ONGC, OIL India, BPCL, IOC, HPCL and Gas Authority of India (GAIL) fall under the ambit of the Ministry of Petroleum; Coal

India Ltd. and its numerous subsidiaries under the Ministry of Coal and the National Thermal Power Corporation (NTPC) and the National Hydro Corporation (NHC) under the Ministry of Power.

Of all of these entities the Planning Commission is the only one with a mandate to look at energy through an integrated prism. One of its members is designated "Member Energy" and this member has the authority to develop an integrated energy policy. The problem is that the Planning Commission does not have the executive power to implement such a policy. That power vests with the Line Ministries. Consequently the policy pronouncements made by the commission can influence but it cannot bind. A few years back the Commission published the "Integrated Energy Policy" of India. The policy was approved by the Cabinet and then submitted to the Line Ministries for implementation. Today it is gathering dust. Most of its recommendations have been forgotten or set aside. This is because the Commission did not and does not have the authority to compel implementation.

The Prime Minister's office also endeavoured at one time to bring energy strategy under its umbrella. It set up an Energy Coordination Committee under the Chairmanship of the PM's Principal Secretary. The objective of the committee was to create a forum to discuss and develop an Energy Strategy. Several meetings were held but it soon became clear that unless and until the PM was ready to delegate overriding executive authority to this committee it could do no more than act as a sounding board. The PM did not delegate such authority and the committee soon became a clearing house for stalled energy projects.

The Central Government has not always had such a diffused, fragmented and siloe'd approach to energy policy. There was in fact a Ministry of Energy until 1992. This Ministry was responsible for all energy related issues other than nuclear (which was

under the charge of the PM) and Petroleum (which had been hived off as a separate ministry after the discovery of the super-giant oil field Mumbai High) Coal, Power and Renewables fell within its jurisdiction. In 1992 this Ministry was split into three Ministries. The official reason was organizational clarity, focus and accountability but the underlying driver was it allowed the Congress party to accommodate the demands of its coalition partners for Cabinet positions of economic significance.

At the level of the State Government level the structure is comparatively straightforward. All states have a 'Ministry of Energy' (M.O.E). The principal responsibility is to oversee the transmission and distribution of electricity but in those states where oil, gas and coal have been found separate departments under the M.O.E. have been set up for managing these commodities. Some states like Gujarat have also incorporated state owned companies to carry out exploration and create distribution infrastructure. These companies are autonomous but also operate under the MOE.

The relationship between the Centre and the State has got complicated in recent years by the State's effort to reclaim their economic autonomy. Energy has been a peg on which this claim has often been hung. One example is illustrative of this tension.

Some years back the Gujarat government "interpreted" that the constitutional right of the State's to distribute electricity gave them the "right" also to create the distributional infrastructure for distributing fuels like gas. It decided that it would build an inter-state gas pipeline network for this purpose. The issue for them was not the availability of gas – it had indigenous gas production; two LNG import regasification terminals were located on its coastline and the inter-state HBJ gas pipeline traversed its territory - but the response of the Central Government. They knew this decision would ruffle the feathers of GAIL but they pushed ahead nevertheless. They passed an act authorising the Gujarat State Petroleum Ltd to build the pipeline. The Central

Government and GAIL did protest and they filed a plaint in the Supreme Court. The Supreme Court upheld the plaint but in the meantime GSPL had added 2000 kms of pipeline and boosted residential gas consumption from 10 mmscd in 2000 to 65 mmscd in 2010 and gas based power generation from 2000 mw to 5000 mw. Today the dispute is moot because pipeline construction is open to all parties but it did and does provide an indication of emergent tensions.

The current debate over whether to include Petroleum products under the umbrella of the General Service Tax (GST) is a further indication of this tension. The GST is a tax rationalisation proposal to ease tax administration and improve tax compliance. The state governments have refused to allow petroleum products to fall under its ambit on the grounds it will erode their tax base. The debate is on-going despite the fact that the Central Government has assured the states that it will compensate them for any loss in revenue.

A final layer to the existing institutional structure is the regulatory apparatus. There are a plethora of semi-autonomous energy regulators – some set up by Acts of Parliament like the Petroleum and Natural Gas Regulatory Board (PNGRB) and the Central Electricity Regulatory Commission (CERC); others by the line Ministries like the Directorate General of Hydrocarbons (DGH) and many by the state governments (the State Electricity Commissions). The purpose of these regulators is to protect the interests of the consumers (viz., fair and non-discriminatory electricity and pipeline tariffs; a forum for redressal of grievances etc.,); to control the transmission and distribution of electricity; to meet the demands of the producers for a fair return and a level playing field and to safeguard the interests of the government regards safety, technical and environmental standards. The regulators have however found it difficult to meet these multiple objectives. This is because they are not independent of the

government and they have multiple masters. The State Electricity Regulatory Commissions for instance are supposed to take their directive from the CERC but they defer to the politicians. This lack of clarity over responsibility and accountability does at times have serious unintended ramifications. The collapse the transmission grid that plunged much of North India into darkness a few years back was partly due to the failure of the regional dispatch centers to resist the "overdrawing" of power by certain states. Had their lines of authority been clear and had they been allowed to function freely the crisis could have been substantially mitigated if not averted.

In summary, the institutions and processes for decision making regards energy are flawed. The structures are too siloed; the approach is unidimensional; there is lack of clarity over the division of roles and responsibilities; and there is competing and clashing accountabilities. The consequence is policy sub-optimality and burgeoning avoidable and potential costs.

Avoidable Costs

There is no numerical estimate of the costs being incurred because of the flawed structure and process. It is not easy to quantify the consequences of the counterfactual "what if". However by studying decisions that were driven more by institutional factors than market reality or the logic of interdependence it is possible to get a sense of their costs.

The first has to do with the National Thermal Power Corporation (NTPC)'s efforts some years back to secure gas for one of its power plants in Gujarat. The Ministry of Power and NTPC invited petroleum companies to bid to supply gas to these plants. At the same time they made known that any bid above USD $ 3 / mmbtu would not be accepted. Their argument was that this would make it uncompetitive against coal. The international spot price of imported LNG at the time was approximately $ 4/mmbtu.

The companies consequently made clear that if the Ministry of Power / NTPC insisted on this condition there would be no response from the LNG suppliers. The Ministry was unrelenting and eventually the supply contract was awarded to the one company that bid. The Ministry of Power went ahead with the bid because their singular interest was to get cheap fuel for their power plant. They were unconcerned about the broader ramifications of demanding a condition that was patently uneconomical. As it happened the tender sent out a negative signal to the industry about the government understanding of the international gas market, it suggested that the Ministry of Power / NTPC had not consulted the Ministry of Petroleum and indeed the Ministry of Coal and it brought back memories of "License Raj" viz., the tactic to first get the license and then "negotiate" the terms.

Ultimately the bid foundered; as was predicted the Indian company found it uneconomic to supply at the bid price; the NTPC plants were idled and then commissioned on the back of LNG purchased at around $ 7 / mmbtu. The consequential and avoidable costs were huge and it was clear that the reason it occurred was because there was no authority above the Ministry of Power to compel a more holistic approach.

The second example illustrates the point that in the absence of a supervening single point of authority the weakest link in the chain of sequential approvals can throw the system out of gear. As already noted the Ministry of Petroleum has run nine rounds of bids under NELP. These rounds have been held regularly every 18 months or so and the licenses to explore have been generally awarded within months if not weeks of the closure of the bids. The exception has been the ninth round. In this case the winning bidders received their license after a two year delay. There are many reasons for this delay – not least the "risk averse" mood of the bureaucrats. But the one that is relevant is the post facto 'veto' authority exercised by the Defence Ministry. The Defence

Ministry objected to the license on the grounds that the exploration blocks lay below the flight path of their test Rocket Missiles. They argued that the oil companies would face the risk of falling debris and that as the drillers were mostly non-nationals there was a national security risk.

The Defence Ministry had no doubt a point. But the question that has to be asked is why was this point not settled before the NELP round was announced? Why was the objection not discussed and resolved during negotiations with the companies? Why did it become an issue only after the bids had been submitted, scrutinised, negotiated, approved and awarded. There may be many good answers to these questions but there is no denying the fact that the timing of the Defence Ministry's objections hurt India's efforts to enhance its exploration efforts. In fact it has positively deterred some companies form continuing with their exploration program.

The third example is niche. It highlights the consequence of lack of clarity regards responsibility and accountability. The hybrid electric car project has been officially supported. The government has set aside public funds to support it and the Finance Minister has underlined this support in his budget speech. The project is however, progressing in fits and starts. This is because the funds have not been fully disbursed. The reason for this disjunct between rhetoric and action is because there are three Central Ministries involved but none of them have full ownership of the project. The Ministry of Power is the supplier of electric power for the batteries; the Ministry of Heavy Industry has the capability to develop and build the chassis and the Ministry of non-conventional and renewable energy is the focal point for clean energy. Whilst each of these Ministries has supported the project and each has probably earmarked funds to move it forward none are prepared to take the lead unless and until they are given total

control. The result is that the project has fallen into the cracks separating these Ministries.

Potential Costs

The above examples highlight the fact that costs have been incurred because of lack of policy coordination. The costs are deemed "avoidable" in that they were incurred because of the nature of the institutions and structures. The next few examples focus on the costs that will be incurred if there is no change in these structures and processes.

The unlocking of 'unconventional' Shale gas and tight oil has transformed the U.S. energy situation. The country is now self-sufficient in gas and it has seen the fastest increase in oil production of any country in the world over the past 5 years. All the companies that had established LNG import regasification facilities along the U.S. coast line have applied to convert their facilities into liquefaction terminals for LNG exports and the price of U.S. domestic gas has dropped from an average of around $ 6 / mmbtu five years back to $ 3.50 / mmbtu today. This transformation has been brought about by the application of two technologies which separately have been in use for years but which have been applied in combination only recently. Hydraulic fracturing involves the bombarding of a rock face with a combination of water, salt and chemicals under extreme pressure. Horizontal drilling is as the term implies the horizontal splaying long distances upto of the drill pipes. These two technologies have together enabled companies to fracture (frakk) the rock face and collect the released oil / gas molecules.

The U.S. success has triggered worldwide interest in the potential of "unconventionals". Many countries are looking to 'frakk' their Shale rock. India has also moved in that direction. The Ministry of Petroleum has received the result of two studies – one carried out by the U.S. geological survey and the other by the International Energy Agency – that confirm that India has not insignificant reserves. The USGS study

looked at 7 sedimentary basins and concluded that at least 4 of these basins contained Shale rock. They estimated the 'risked reserves' in these 4 basins to be around 290 tcf of gas of which 63 tcf was technically recoverable. The IEA were more bullish. They placed the 'risked' reserves at around 600 tcf of which at around 100 tcf deemed technically recoverable. The Ministry has clearly been encouraged by these initial studies. They have published a draft terms and conditions for exploration for comment and they have also authorised to ONGC / OIL commence exploration in their nomination blocks. These are positive steps but it does not address the central concern. Where is the mechanism for aligning the multiple stakeholders involved with Shale gas and tight oil.

The exploration and production of Shale gas and tight oil poses several challenges. First it requires intensive drilling. A conventional reservoir might require 12 wells to delineate but a similar reservoir if conventional could require upto 700 wells. The operations have to therefore be carefully planned and the supply chain has to be seamlessly efficient. The slightest breach in this chain can sunder the operations. Second the companies must have access to large tracts of contiguous land and huge quantities of water. Third the environmental risks have to be carefully managed. France has banned hydraulic fracturing because of concern that the chemicals might leach into the soil and contaminate the ground water and Methane which is significantly more polluting than carbon dioxide as a Green House Gas might escape into the atmosphere. There are other countries that have also held back from endorsing hydraulic fracturing because of similar concerns.

These challenges will be difficult to overcome in all circumstances but in India it could be a deal breaker. For a start there will be a problem accessing land. This is because the landholdings are fragmented and small and the companies will have to negotiate with dozens of farmers to secure unfettered and contiguous rights to drill.

Second there will be the constraint of water. India is fast running into a water crisis and so this will undoubtedly be an issue. Most problematic however will be the institutional straitjacket. How will the Ministry of Petroleum, the Ministry of Environment, the Ministry of Water Resources; the State Governments, the EP companies, the service providers, the farmers etc., etc., be persuaded to look at this issue through a common eyeglass. In the absence of an institutional structure that facilities such coordination the country will have difficulty monetising these reserves. The potential opportunity loss will be enormous.

An important plank of India's Energy Security strategy has been to build up a portfolio of international energy assets. The government has acknowledged that hydrocarbons are tradable commodities and that they can be purchased on the open market. But given the volatility of the market they have also concluded that it is better to acquire equity ownership than rely entirely on arms-length supply deals. Towards that end they created ONGC Videsh a 100% subsidiary of ONGC and more recently "International Coal Ventures" a subsidiary of Coal India. Both were given the mandate to create an international footprint.

OVL has had commendable success. In 2001 it had one producing asset in Sudan with equity access to 250,000 tons of crude oil. Today it has a presence in 16 countries and investments in 32 assets. Its share of equity crude has risen to 7.26 million tons. This success has been achieved despite constraints of bureaucracy and competition from China.

OVL is a public sector entity. It does not have unfettered operational and financial autonomy. It has to secure the approval of its shareholder ONGC, the Ministry of Petroleum and the Committee of Secretaries prior to submitting a bid. At times it has to also pass the muster of the Empowered Group of Ministers. The consequence of this

layered and time consuming approval process is that the commercial terms are often leaked and OVL has difficulty meeting the bid deadlines. The "China Factor" further compounds the problem. For a start the Chinese Government strongly backs the international forays of their national companies. Recently for instance the Chinese President undertook a whirlwind tour of Central Asia. He attended the ceremony to mark the commencement of production from the giant Kashagan field in which CNOOC had just acquired a stake and he also announced financial support for the country's fourth refinery. CNOOC and SINOPEC can draw therefore on the weight of not only their balance sheet but also that of their sovereign when they bid. Moreover in countries where the bidding process is not transparent, the Chinese exploit the opacity by sweetening their bid for an upstream asset with a "behind the scenes" commitment to invest in downstream infrastructure like refining, power generation, fertiliser plants, roads and railways. These "two for one" offers have paid off handsomely in countries like Nigeria and Kazakhstan.

The challenge for OVL and indeed ICV in the future will be to counter this deepening competition. Clearly they will not be able to do so if they remain shackled by bureaucracy, delayed decision making, and episodic and ad hoc government support. The government will need to establish a more cohesive and collaborative institutional structure and to go beyond simply providing advisory and diplomatic support of the kind that the Ministry of External Affairs currently provides. It will need to see how best the resources of "India Energy Inc" can be pulled together to support all international initiatives whether they be to secure oil/gas/coal supply deals; LNG supply contracts, acquisition opportunities and / or construction contracts. The potential loss of not measuring up to this competitive pressure in terms of failed international initiatives and missed opportunities will also be large.

A third source of potential loss will arise from the institutional clamps placed on the development of an integrated policy for R & D and innovation. Technology is the critical prerequisite for enhancing domestic production, managing demand and weakening the nexus between economic growth, energy demand and environmental degradation. The Cassandra's of "Peak Oil" - the theorists that forecast the plateauing and then decline of oil and gas production - have for instance been time and time again humbled by geophysical, geological and production technological breakthroughs. Equally it is technology that might help the global community counter the dangers of global warming. India has the technological talent but it has not been in the forefront of these technological developments. This is because it has looked at energy technology and innovation through a siloe'd prison. Each Ministry and energy company have their separate R & D budgets and programs and there is limited if any effort to collaborate and coordinate research activities.

At times in fact the institutional straitjacket can be positively counterproductive. The management of the 'clean energy' fund is a case in point. This is a fund that was set up to support R & D in clean energy. It was financed by imposing a Rs.50 / per ton cess on imported and domestic coal. As the demand for coal increased its resources grew from Rs.1066 crore in 2001 to Rs.3250 crores in 2012 to Rs.8648 in 2013. There was in short no problem of money. The problem was instead the rule book. As the money was raised through the levy of an indirect tax the rules prescribed that the fund be managed by the Central Board of Excise and Indirect Taxes. One is not sure whether the Board sought to "delegate" this responsibility to more knowledgeable people or not but what is clear is that it is managed by people who do not have the domain expertise and perhaps not even the interest. Also that the fund has not delivered to expectations. The disbursement of money has been slow because of lack of technical capability to identify

and select projects and the bulk of the money has been given to on-going projects or those that have run out of cash, rather than to fund 'cutting edge' research on issues like carbon capture and sequestration, energy storage, concentrated solar and tidal wave.

Finally there is the looming threat of global warming. The current structure does not formally recognise the interdependence between "energy" and "environment". Both subjects are on the government agenda but there is no framework for managing them conjointly. In fact there is tension and turf battle. The progress of the PM's clean energy mission is a case in point. There was a lot of activity when it was first announced but now it appears that the various Line Ministers are ploughing their own furrow. A few years back it was reported that the PM's special envoy resigned because of difference of view with the Minister of Environment on India's position on climate change in multilateral discussions.

The fact is that India cannot afford to continue to delink energy issues from the environment. The IGPCC has already stressed that the world is fast reaching the tipping point of 450 ppm of GHG's in the atmosphere and that the impact of global warming will be particularly severe on countries in Africa, Middle East and Asia. India is dependent on its energy imports from these countries and any upheaval will have a direct impact on its security. Domestic energy policy can also no longer afford to ignore environmental consequences. The Ministry of Power cannot for instance look at ultra-mega thermal power plant simply through the lens of economics and ignore the environmental and social consequences. The potential loss of continuing with a structure that does not conjoin energy and environment will clearly be huge for India clearly does not have the luxury to develop first and clean up later.

'Success'

One should enter a caveat at this stage. This is to say that the impact of the existing siloed institutional and decision making structure has not been wholly negative. There are many situations where because of Ministerial and departmental focus the government was able to overcome seemingly intractable problems. The reason for entering this caveat is to make the point that when officials have had a free hand to operate and manage without constraint they have often achieved success. Two examples of leadership and entrepreneurialism will embed this point.

The power sector has been the bane of the energy industry. There are recurring power shortages; 25000 mw of power generation capacity has not been commissioned because of lack of fuel; the State Electricity Boards are effectively bankrupt – in 2011 they had ratcheted up Rs.60,000 crore of losses and over the ten year period 2000 to 2010 they haemorrhaged Rs.50,000 crore of cash; all because of the government fiat that had they sell electricity below cost – and the regulatory bodies have overlapping and conflicting accountabilities. The problems of this sector have been considered intractable because of the view "good politics" and "good economics" make for uneasy bedfellows and that when push comes to shove there in no space for "economics" on the mattress. Madhya Pradesh and Gujarat are two states that have upended this conventional wisdom. They have succeeded in revitalising their state electricity boards in part by taking the political bit between their teeth and in part through purposeful and innovative leadership.

In Madhya Pradesh the government brought in an outside consultant to help it draw up an investment and financing plan. It gave the consultant a free hand and it empowered the officials. Based on the recommendations of the consultants (suitably modified to reflect nuanced realities) the government has invested nearly Rs.10,000 crore in upgrading the transmission and distribution lines including creating feeder

lines to rural households; it has restructured the debt of the SEB's and authorised them to hike tariffs periodically, it has improved the payment collection system and streamlined the process for new connections and it has reorganized the finance, technical and service delivery department. The CERC has publically affirmed that MSEB will achieve cash breakeven by 2016 and that it will be amongst the most efficient SEBs in the country. Transmission and distribution losses are projected to come down to 3.5% of revenues.

In Gujarat the progress has been comparably impressive. GSEB had posted losses of Rs.2246 crore on earnings of Rs.6280 crore in 2001. In 2005 it posted a profit of Rs.203 crore and in 2010 profits of Rs.533 crore. There is no doubt that these numbers reflect creative accounting but the turnaround is nonetheless impressive. There are two reasons for this success.

First is differential pricing. GSEB offered farmers subsidised power to irrigate their farms but in return demanded that they pay market price for power into their households. The farmers accepted this offer because of the government's commitment to provide regular and secure supplies and because they had control over their household consumption: Second the government restructured GSEB into three separate entities – one to augment generation capacity; the second to invest and maintain the transmission facilities and the third to oversee distribution. Each entity was separately capitalised and their management empowered with delegated authority.

The success of the MP and Gujarat SEB's is important because it establishes that politics and economics can share the same bed space if on one hand there is purposeful and holistic leadership and on the other there is a balanced incentive structure. Both governments have won public and electoral accolades for their initiative.

The second example of success reflects the ability of the government and the public sector to respond to competitive challenges creatively and in a spirit of entrepreneurship.

The natural gas business is different from the oil business in several respects but two are important. One, it is not easy to store natural gas and / or transport it. There are technical hurdles and it is expensive. As a result the conventional business practice has been to develop all segments of the gas value chain from production to transportation to consumption simultaneously and to create an umbilical contractual link between these segments. Were there not such simultaneity of development and the contractual link and were for instance the gas market not developed at the time production commenced the gas would most likely have to be flared. Two the gas business has operated on the basis of long term contracts between the producer countries and the developed markets like Japan, Taiwan, South Korea, Europe and America. This is because these countries needed the gas; they had the import facilities and most important their customers were credit worthy. The emerging markets did not figure in the gas market because their anchor customers like power generation, fertilisers, and steel plants had been built largely on the back of subsidies and preferential treatment and were therefore not bankable.

Both of these conditions have eased in recent years. Long term “take or pay” contracts are still the norm but the spot market for tradable LNG has increased from a few percentage points in 2000 to around 20% now. And economic growth and liberalisation have created a raft of creditworthy customers in market like China and India.

The issue for India was to create the import facilities to access LNG. The government was keen this to do but they faced a conundrum. The consumers would not

sign long-term supply contracts and the gas producer countries would not sell because they were not yet confident of the market. To break this conundrum the Ministry decided to invest in an LNG regasification terminal suo moto and take the supply risk. They set up a company in the private sector Petronet LNG and announced their intent to build a 5 million ton regasification terminal in Dahej, Gujarat. They made this announcement before securing the supplies and locking in the customers.

The Ministry's decision was bold for several reasons. One it upended the conventional wisdom that the market should be first secured and then only the assets created for the importation of gas. Second it created a corporate structure that on one hand gave Petronet LNG the financial and operational autonomy to operate freely and on the other kept the Ministry in the driving seat. Petronet LNG shareholding was spread between four public sector companies (viz., ONGC, IOC, BPCL and GAIL) each of whom had 12.5% equity and portfolio investors. By limiting the public sector shareholding to 50% Petronet LNG was deemed to be a private company. But by virtue of being the dominant shareholder the Ministry of Petroleum could nominate the Chairman and the Chief Executive. The Secretary, Petroleum decided in fact to take the chair.

Petronet LNG has been an unqualified success. On the basis of a government guarantee it locked in supplies from Qatar on attractive terms; it then offloaded to customers only to keen to switch from expensive oil to gas and it did an IPO at a substantial premium. The plant was fully loaded up within months. The capacity has been doubled to 10 million tons and a second terminal has been built in Cochi. Petronet has today 70% of the Indian LNG market.

The above two examples convey a message and a forewarning. The message is that the problems of the energy sector have not arisen because of lack of competence, ideas

or entrepreneurialism. They have arisen because of structure that has institutionalised governance by committee and decision making that is based on the lowest common denominator of consensus. It has arisen because of the lack of integrated thinking and a leadership that has not fully appreciated the opportunity loss of neglecting the cross cutting and interdependent linkages within the energy sector and between energy, environment and development. The forewarning is that if 'business continues as usual' the avoidable accrued and potential opportunity loss could be enormous.

PART III

WHAT IS TO BE DONE?

The answer to this question must start with an acknowledgement of a fundamental gap. The word "energy" is missing from the legislative and executive lexicon. It is of course liberally used but it has not been officially defined. There is no national energy statement endorsed and supported by Parliament.

So as a first step the government should fill this gap. It should introduce a bill in parliament called perhaps "the Energy Responsibility and Security Act" a la the "Fiscal Responsibility Act" and the "Food Security Act". This bill should define the inter-linkages between energy, food, water, environment, technology, infrastructure, conservation and efficiency and lay out the road map for achieving energy independence, energy security and energy sustainability. It should define measurable metrics for measuring progress towards these objectives and make explicit India's global obligations and commitments.

Beyond this first step the government should focus on plugging the institutional weaknesses that this paper has identified. It has three options.

One to "do nothing" other than endeavour to do better what it is already doing. The argument could be that the current system does not suffer from any systemic weakness. The challenge of inter-ministerial and center-state coordination and collaboration needs of course to be overcome but it can be done without tweaking the existing institutional structure. This argument misses one essential point. It is that poor coordination and collaboration is but a symptom. It is not the cause of the problem. The cause is the fact that there is no executive authority responsible and accountable for the formulation and implementation of energy policy. It is this lacuna that has to be filled.

Two to revert to the status quo ante 1992. That is to recreate the Ministry of Energy as it once was and / or even in a stronger form by bringing the Ministry of Petroleum into its fold. This would formally establish the significance of energy and given its economic weight the Minister of Energy would rank alongside the Ministers of Defence, Finance, Home and External Affairs as amongst the senior most members of the Cabinet. Most countries have such a structure. The problem with this option is that it would require the government to upset the political applecart. Change is not easy in India's fractious and noisy democracy but it becomes even harder when it challenges vested interests and circumscribes the scope for political horse trading. Thus whilst this may be best option on paper it would be infeasible in reality.

Three to create a new department – say the "Department of Energy Resource and Security – in the Prime Minister's office with a mandate to develop and articulate an energy policy; to flush out all the issues that have fallen into the cracks between the Ministries and to deal with them comprehensively and to act as with "Energy ombudsman" of the energy policy.

The department should be in the PMO rather than say the Planning Commission because that would give it clout and an executive mandate. It should be headed by a

politician of Cabinet Rank and staffed by a multidisciplinary cadre of specialists in Finance, technology, energy, and environment. Specifically this department should focus on five issues.

One, the formulation and implementation of an integrated energy policy. Towards this objective it should develop clear, transparent and measurable monitoring and evaluation systems.

Two, the development of an international energy strategy. This does not mean that the entities currently involved with international matters – viz OVL for upstream petroleum assets, IOC for downstream oil supply deals; GAIL for LNG contracts, ICV for coal supplies etc., would take its order from this department. They would not and their roles and responsibilities would not change in any way. It would simply mean that this department would become the focal point for ensuring that all cross cutting issues had been considered and that the resources of "India Energy Inc" had been deployed to maximise competitiveness.

Three, the reinvigoration of R & D and innovation: As already noted, Indian Energy companies do not spend enough on technology and R & D and that what is spent is often misdirected. This department should become the single point driver of energy technology. It should identify areas of research, develop relevant partnerships and incubate new ideas. It should act as the fount of government support for universities, research labs and companies. In this regard it is worth pointing out that had the U.S. government not subsidised the efforts of George Mitchell – the Chairman of Mitchell Energy a small independent oil company – and the universities and laboratories with whom he was collaborating for almost a decade the Shale gas revolution might not have happened when it did. Mitchell drilled the first horizontal well in the Texas Barnett

Shale basin in 1992 but it was not until 1998 that he was able to declare commerciality. During this period the government stood behind him continuously.

Four, to streamline the Energy Regulatory Bodies and Energy Regulation: Currently as indicated there are a plethora of regulatory bodies. Some like CERC and the PNGRB have been established by Acts of Parliament and fall under the umbrella of the Central Government; others like the state regulatory commissions report to the state governments; and others like the Indian Energy Exchange (IEX), the Power Exchange of India (PEI), the National Power Exchange (NEP) have an indirect dotted line linkage to central and state governments. All of these entities have well defined roles and responsibilities. But there is overlap and on occasion contention over matters like the setting of prices and tariffs. There is a need to streamline and simplify. The department as "Energy Ombudsman" should locate under its umbrella it should locate an "Energy Regulator". The role of the latter would be to surface the cross cutting and common issues that underly energy regulation and to strike the right balance between the centrally appointed regulators and their state counterparts. The reporting relationships could be akin to the matrix structure that exists in global corporates wherein the executive has a dual reporting line – one to the CEO (Eg. The country head) and the other to the Line Managers (vis., the functional head). The latter is bold line, the former dotted. In similar vein the various energy regulators could report bold line to their appointing authority and dotted line to this "Energy Regulator". It could be argued that this would do nothing more than add another reporting layer. That might be the case in the short term but longer term the existence of a centralised regulatory authority could provide the basis for streamlining the existing processes; tightening energy regulation, creating a data base on energy regulation worldwide, providing a forum for information

exchange and best practice and building a cadre of specialised energy regulators. The latter could be useful as energy regulation becomes more complex and demanding.

Five, to be the communication nodal point on the subject. Energy is a politically sensitive subject. Yet there has been little if any effort to "educate" the public about its cross cutting technical, economic, social, environmental and political ramifications. The department should redress this and become the vehicle for explaining the logic of government energy policy; its political, economic and social rationale, their consequences etc. Its objective should be to enlist public support in managing the triangular problems of demand, supply and the environment.

The above ideas are not intended to be comprehensive. The department could do more or less. Its precise mandate will in any case evolve with time. At this stage what is more important than what it does is that it be there. The fact of an executive body with responsibility over energy will change the nature of the discussions on the subject and it will represent a step forward. That step might hopefully lay the basis for larger strides towards the development of more integrated and cohesive policy architecture.

CONCLUSION

Queen Elizabeth asked an assemblage of economists at the official opening of an extension to the London School of Economics on November 5, 2008 just weeks after the U.S. investment bank Lehman Brothers had collapsed why none of them had anticipated the economic and financial crisis. The academics promised a comprehensive response. They convened a conference to discuss this question and in July 2009 they sent a letter to the Queen. The letter contained a catalogue of well-known reasons for the crisis – the macroeconomic imbalance, lack of regulatory rigour, excessive risk taking, greed – but it also wrote "everyone seemed to be doing their own job properly" and "on its own merit" but there was "no one who understood the risks to the system as a whole". There was

no one it argued that saw the whole picture and who appreciated that “whilst individual risks may rightly have been small” the collective impact of these risks could well trigger a systemic collapse. These comments (taken out of context) distil the essence of India’s energy challenge. Everyone knows what is wrong; they know what should be done; they are doing what they can and in the main they are doing their job responsibility. But no one has the mandate and therefore the time and possibly the inclination to look at the whole picture? No one is asking the question: What are the small risks of looking at energy through a narrow prism? What might be the collective impact of these risks? This paper has taken a crack at bringing into sharper relief the collective impact of the “small risks” of looking at “energy” as the sum of a set of disaggregated commodities and through a policy framework that is compartmentalised and vertically structured. The thrust of this paper is not to knock down this structure in one fell swoop and to rebuild to a new design. It is to simply perforate the walls dividing the compartments and then depending on the outcome contemplate the next steps. The proposal might seem simple and unambitious but it is premised on the Burkean comment “no man made a greater mistake than he who did nothing because he could do so little”.

About the Author

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