NEED FOR A NEW ENERGY POLICY

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Based on prolonged deliberations by an expert committee, the Government of India approved and published an Integrated Energy Policy (IEP) in August 2006. It was a welcome step because, for the first time, an attempt was made to comprehensively assess the future energy security of the country by developing a long-term vision upto 2032 i.e. upto the end of the 15th five-year plan. The IEP put forth some very welcome objectives. The single overarching objective was to 'realise a cost-effective energy system' for which the following pre-requisites were identified:

- Competitive energy markets.
- Effective regulatory framework enabling market-determined pricing and resource allocations.
- Transparent and targeted subsidies.
- Across-the-board efficiency improvements.
- A combination of incentives and disincentives for regulating market and consumer behaviour.
- Implementable policies.
- Incentives to promote personnel efficiency in the power sector.
- Policies that reflect externalities of energy consumption.

NOBLE OBJECTIVES

In a business-as-usual scenario, 'cost-effective energy system' would mean cost becoming the singular overriding consideration. But here, at least for being politically correct in an eco-conscious era, the document talks about externalities of 'energy consumption'. Actually it should have been externalities of 'energy generation' considering the fact that generation of conventional energy has severe environmental and social externalities. The policy continues: "Environmental externalities should be treated uniformly and internalised. A consistent application of 'polluter pays' principle may be made to attain environmental objectives at least cost..." But it is not clear as to where the externalities should be 'internalised'. The document fails to directly tackle the issue by saying that the environmental and social externalities of conventional power generation should be costed and the same internalised in the pricing of that power. Such politically correct statements have been made without clarity and smacks of lack of sincerity, going by the overall tenor of the document. Such insincerity is evident from the fact that after three years of publishing the document, no project has been launched for costing of externalities. In the European Union, such a detailed country-wise exercise was undertaken involving thousands of technical and expert personnel and millions of Euros. The project was called 'Extern-E'. Such an effort is also essential in India to facilitate the green transition in the energy sector.

The other positive development in the IEP is the prima-facie recognition given to renewable energy development. The document states: "From a long-term perspective and keeping in mind the need to maximally develop domestic supply options as well as the need to diversify energy sources, renewables remain important to India's energy sector..." The IEP further states: "Subsidies for renewables may be justified on several grounds. A renewable energy source may be environment-friendly. It may be locally available thereby making it possible to supply energy earlier than in a centralised system. Grid connected renewables could improve the quality of supply and provide system benefits by generating energy at the ends of the grid... Further, renewables may provide employment and livelihood to the poor..." The following specific measures were also indicated:

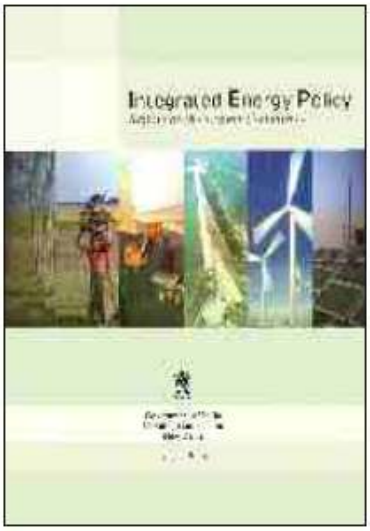
- Incentives linked to power generated and not on capacity installed (Generation Based Incentive - GBI).
- Introduction of a Tradable Tax Rebate Certificate.
- Mandated feed-in tariffs by regulators.
- IREDA to be converted into a national refinancing institution, to leverage larger volumes of lending to renewables.
- Publication of an annual renewable energy report giving all details of R.E. development in the country.
- Technology missions to be mounted for solar energy and bioenergy.
- Active policy on renewable energy.
- Focused R&D on climate-friendly technologies.

THE DOWNSIDE

All this sounds great. But the problem is in the details. The biggest bottlenecks are the two main assumptions made by the policy. The first is that "renewables may account for only 5% to 6% of India's energy mix by 2031–32." The second problem lies in the sweeping assumption that renewables would be critical for India's energy independence beyond 2050 only! These predictions are based on an unscientific and unvalidated presumption that "coal shall remain India's most important energy source till 2031–32 and possibly beyond." The contradictions in this belief will be analysed little later. The other unvalidated presumption is that India's economy should grow at a certain percentage and hence by 2031–32 power generation capacity must increase to nearly 8,00,000 MW. 95% of this is expected to come from conventional sources!

This undue optimism about availability of fossil fuels is in complete contradiction to the refusal to see latest technology developments, near-

future technology leapfrogging and cost-reduction projections for renewables. For example, the policy states that "solar thermal generation has not found acceptance globally" (pg.39, IEP). Such a statement was made at a time when globally, concentrated solar power (CSP) generation was seeing a big revival with many new projects planned in several countries. In India, there is a desert area of over 2 lakh square kilometers, where direct solar insolation suitable for CSP is available. Even if we utilise 15% of this desert land, we will be able to produce over 2,00,000 MW of power.



The numerous internal contradictions in the IEP stems from an attempt to be politically correct in a document which otherwise has an implicit methodological bias in favour of fossil fuels. Due to this systematic bias, the policy is skewed in favour of resources we do not have: oil, gas and coal. This bias was also the reason for the lack of follow-up action on the benevolent objectives listed in the IEP relating to renewables. The only significant action which came after two years of the publication of the IEP is the decision made by the central cabinet in June 2008 to launch a National Solar Mission as part of the National Action Plan on Climate Change (NAPCC). However, this decision has also not been implemented even after one year. This laggardness and inaction has been separately addressed in the 'Spotlight' section of this issue, in a detailed essay by V Subramanian, former Secretary, MNRE. He was responsible for initiating the generation-based incentive scheme (with a capacity cap of 50 MW) for grid connected solar power generation. However, the implementation of the scheme was not carried out in the true spirit in which it was conceived.

So many other very desirable and essential actions like establishment of technology missions for other renewables, development of methodologies for internalising the cost of externalities of conventional power generation (pg.79, IEP), assessment of off-shore wind power potential (pg.51, IEP) etc., were forgotten. The most glaring departure from the stated objectives is in respect of incentives to mega power projects. The policy states as one of the urgently required measures: "Removal of misplaced incentives such as those available to mega power projects is needed. While the rest of the world is recognising the higher efficiency of distributed generation facilities, India is providing incentives to mega projects. Consequently, state governments opt for mega projects that claim the incentives and then swap power among themselves to meet the guidelines of the 'mega power policy; thereby creating unnecessary transmission capacity and movement of power back and forth. There should be no discrimination in available incentives based on size or type of technology or fuel used." (pg.79, IEP). But the ground reality is that ultra mega power projects continue to be favoured and incentivised all around the country. And the Planning Commission who authored the IEP has not done anything to move India away from such mega disasters to a distributed generation system. The IEP document is full of such internal contradictions.

BUNDLE OF CONTRADICTIONS

In attempting to give only 5% share of power generation to renewables by 2031–32 and a marginal role even upto 2050, the committee mandarins were probably influenced by the predilections of the International Energy Agency (IEA) who have always attempted to belittle the role of renewables. This 'IEA style' bias is most evident in the projection that by 2031–32, the additional capacity from wind will be 14,000 MW (pg. 22, IEP). This is also in complete contradiction to the projections made by the 'Working Group on New and Renewable Energy' appointed by the Planning Commission for the 11th Plan, which has indicated a capacity addition of 33,000 MW from wind by 2020. By 2009, India has already crossed 10,000 MW of wind power installed capacity! But such 'looking westward' policy very often boomerangs on the believers themselves. In 2008, the IEA did a somersault and partly disowned their earlier stand of marginalising renewables. In a study titled 'Deploying Renewables: Principles for Effective Policies', IEA stated that by 2050, 50% of global electricity supply must come from renewable energy sources. The rationale, however, was not depletion of fossil fuels but the need to cut emissions in half by 2050. In the 'World Energy Outlook 2008' also, IEA changed track to give more prominence to renewables. It states that modern renewables will overtake gas to become the second-largest source of electricity soon after 2010. In order to keep climate change in check, the IEA now says that low-carbon energy should account for 36% of global primary energy mix by 2030.

Now, it is important to analyse the internal contradictions in the IEP in respect of some conventional sources of energy. First, about coal. The IEP document says Indian coal would be fully depleted in 45 years. Taking 2005 as the base year, this would mean than Indian coal would be available upto 2050. In all the eleven different modelled scenarios, coal remains the pre-eminent source upto 2032. The requirement of coal for power generation will increase from 406 Mt in 2004–05 to 2555 Mt in 2031–32. (pg.46, IEP). Upto 45% of this requirement would need to be imported. But no attempt has been made to correlate India's import requirements with the globally

available exportable surplus of coal and the competing demands for the same. The IEP just makes a statement that "currently less than a billion tonnes of high quality coal equivalent is traded internationally out of a production of about 4.8 billion tonnes of equivalent high quality coal." No attempt has been made to find out whether we are capable of ensuring the required supply of imported coal. I will separately analyse the veracity of this coal delusion.

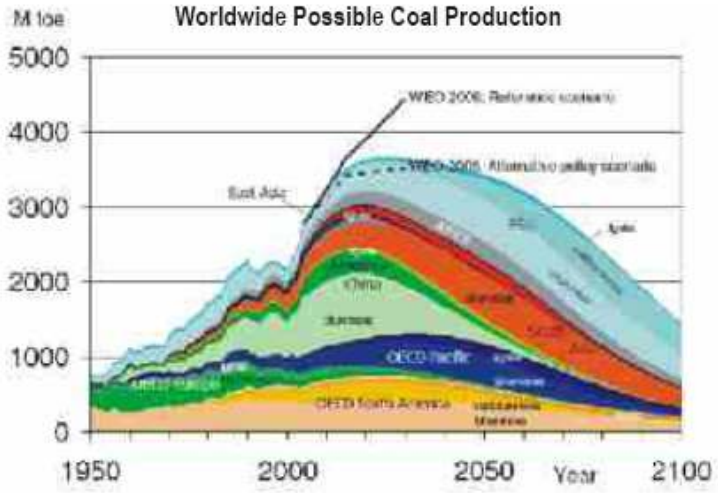
Contradictions abound about other conventional fuels also. In the chapter on 'supply options', it is mentioned that "nuclear energy can make only a modest contribution over the next 25 years... the installed nuclear capacity by 2031–32 will be 4,80,000 MW..." However, elsewhere, the policy says that "nuclear energy theoretically offers India the most potent means to long-term energy security" (pg. xxii, IEP). This long-term optimism results in a prediction that we may have upto 2,75,000 MW by 2050. These estimates are based on obtaining additional Uranium resources and faith in Fast Breeder Reactor technology, our success in assimilating Light Water Reactor technology through imports and the hope of developing Advanced Heavy Water Reactor for utilising Thorium by 2020. True, India has large thorium reserves; but belief in this as yet unproven technology is unrealistic. This biased optimism is more glaring when compared to the lack of trust in technology leapfrogging in the renewable sector. However, in the case of natural gas, there is a frank admission of our lack of resources and a decision that "no new gas capacity be built without firm and bankable gas supply agreements." Considering the fact that all hope upto 2032 has been pinned on coal, it is necessary to analyse in detail the coal story vis-à-vis India.

THE GREAT COAL DELUSION

The IEP says that "extractable coal reserves will run out in 45 years" (pg. 34, IEP). However, the crucial factor has been missed out: what is more important is not when coal will run out, but when production of coal will peak and decline. The peak in production and the subsequent reducing availability should have been assessed vis-à-vis established and planned coal-based generating capacity. Also, the large scale diversion of coal for new uses like coal-to-liquid fuel (CTL) projects—many of which require billions of tonnes of coal—have been ignored while assessing coal availability for power generation. There is tremendous confusion about the statistics relating to extractable coal. A reliable figure is 52 billion tonnes as mentioned in Coal Vision 2025 prepared by GoI. But critics point out that 10 billion tonnes mined from the beginning till 2002 has to be deducted from this figure. However, the Planning Commission having confessed to only a 45 year availability, we will accept that figure.

Blind faith has been placed in the availability of imported coal. Six countries who have 85% of the world's coal reserves dominate the global coal sector. They are in descending order of reserves: U.S.A., Russia, India, China, Australia and South Africa. The U.S.A. alone holds 30% of all reserves. However, in terms of annual production, USA is the second largest only. China with half of USA's reserves is the largest producer of coal. Largest coal producers in descending order are: China, USA, Australia, India, South Africa and Russia. The only other countries with significant production are Indonesia and Colombia. Largest net coal exporters in descending order are: Australia, Indonesia, South Africa, Colombia, China and Russia. These countries account for 85% of all exports with Australia contributing almost 40% of all exports. In other countries, the production is consumed within the country; China will soon cease to be an exporter and will become an importer of coal. Coal production in the USA peaked around 2002 and the country is also likely to enter the import market soon.

Worldwide Possible Coal Production



(Source: Energy Watch Group)

A recent study by the Energy Watch Group of Germany predicts that global coal production will peak around 2025 and then decline. The figure above provides a summary of past and future world coal production in energy terms based on a detailed country-by-country analysis. This analysis reveals that global coal production may still increase over the next 10 to 15 years by about 30 percent, mainly driven by Australia, China, the former Soviet Union countries (Russia, Ukraine, Kazakhstan) and South Africa. Production will then reach a plateau and will eventually decline thereafter. The possible production growth until about 2020 according to this analysis is in line with the two demand scenarios of the International Energy Agency (IEA) in the 2006 edition of the World Energy Outlook. However, the projected development beyond 2020 is only compatible with the IEA alternative policy scenario in which coal production is constrained by climate policy measures while the IEA reference scenario assumes further increasing coal consumption (and production) until at least 2030. According to the Energy Watch Group's analysis, this will not be possible

due to limited reserves. Hence it would be unwise to base future energy security on a resource which we do not have and the global availability of which in adequate quantities beyond 2030 is suspect. For a long-time we gloated about our national reserves. Now having conceded its limits, we are blindly pinning our faith on imports. This is nothing short of delusion.

THE WAY OF THE WORLD

Against the IEP's 5% renewable scenario upto 2032, the world is moving in an entirely different direction. As already mentioned, the IEA themselves have changed track and are now talking about 50% renewable electricity by 2050. A study by the Energy Watch Group shows that in the 'high variant' scenario, 29 percent of the world's electricity and heat requirements upto 2030 will come from renewables. As of 2008, the world already has an installed power production capacity of 2,80,000 MW from renewables. Out of this, wind alone contributes 1,21,000 MW. Installed capacity of wind power is predicted to grow to 3,32,000 MW by 2013, according to the Global Wind Energy Council's 'Global Wind 2008 Report'. Another reliable report by BTM Consults predicts 3,43,000 MW wind power by 2013. Wind power now contributes 1.3% of the global electricity supply which is projected to increase to 3.35% in 2013 and 8% by 2018.

The European Photovoltaic Industry Association's 'Solar Generation V-2008' report states that by 2030 cumulative global installed capacity of solar PV systems would be 18,64,000 MW, generating 2646 TWh of electricity and contributing to 14 percent of global electricity demand. Europe is planning to develop solar thermal energy to provide 50 percent of Europe's space and water heating requirements by 2050. A Strategic Research Agenda and Implementation Plan has been launched under the aegis of the European Solar Thermal Technology Platform (ESTTP). A comprehensive study by 'Emerging Energy Research' projects cumulative global installed capacity of concentrated solar thermal power (CSP) at 26,465 MW by 2020. An October 2008 report by 'CSP Today' predicts that 2025–2050 will be the huge commercial growth phase for CSP projects worldwide when the installed capacity will grow to 4,50,000 MW in Europe, North Africa and Middle East only. Recent reports from United States say that 55,000 MW CSP projects are already in the pipeline in that country alone.

While solar power will be the biggest contributor to the growth of renewable power, other sectors like biomass, biodiesel, wave and tidal power, geothermal energy, small hydropower, etc., will also contribute significantly to provide a minimum of 50% of the world's electricity by 2050, if not more. There are also possibilities of major technological breakthroughs in various renewable energy technologies. Considering all these, it is time we quickly develop a new energy policy, in tune with the times. After the publication of the National Action Plan on Climate Change, this need has become more urgent.

THE NAPCC AND IEP IN CONFLICT

The NAPCC stipulates that a dynamic minimum renewable purchase target of 5 percent of total grid purchase in 2009–10 may be prescribed and this should increase by 1 percent each year for 10 years. That means by 2020, we should be producing 15 percent of our electricity consumption from renewable sources (other than large hydro). This provision comes into direct conflict with the IEP which visualises only 5 percent renewable penetration by 2032. Since both documents have been approved by the cabinet, it is necessary to overhaul the IEP to bring it in tune with the latest policy of the government, as enunciated in the NAPCC.

Table 1: IEP–Generation Capacities by 2031–32

Source	Capacity (MW)	PLF (%)
Coal	26,9997	67
Natural Gas	69,815	27
Coal Bed Methane	27,778	36
In-situ Coal Gas	22,222	36
Nuclear	63,060	68
Hydro	1,50,153	30
IGCC Pet coke	3137	68
Conventional Sub-Total	**6,06,162 MW**	
Wind – Onshore	32,141	20
Wind – Off-shore	1200	25
Biomass Gasification	1200	75
Biomass Combustion	50,000	70
Solar	10,000	17.5
Renewables Sub-Total	**94,541 MW**	
TOTAL	**7,00,703 MW**	

The best-case scenario in IEP (scenario 11) is given in Table 1 with cumulative generation capacities of different sources and the load factors for each technology by the year 2031–32. Even though the installed capacity of renewables will be 94,541 MW, due to low plant load factor, their contribution to energy generation would be only around 5%.

While preparing the NAPCC, proper number crunching was not done. It was necessary to work out the source-wise additional capacity of renewables to be established if the 15% target by 2020 was to be achieved. Calculations by WISE (Table 2) shows that achievement of 15% would require a total capacity addition of renewables to the tune of 1,24,830 MW by 2020, based on demand projections made by the Central Electricity Authority. These calculations are based on technology-wise assessment, with wind power remaining a major component upto 2020. Other R.E. sources considered are small hydro, solar, and bioenergy. Capacity factors assumed are: wind-20%, SHP-30%, solar-20% and bioenergy-60%. Most of the 75,000 MW additional capacity (over and above the already planned 49,343 MW) that