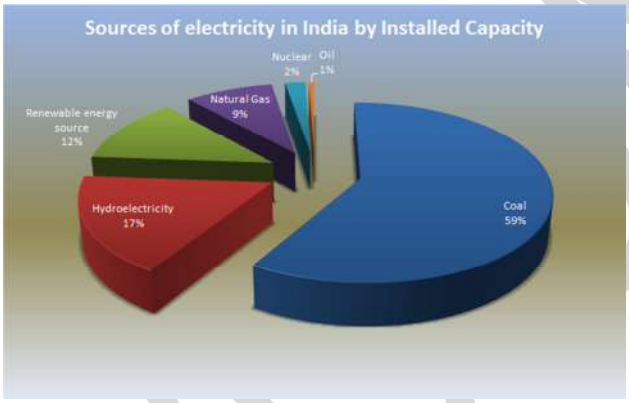
Energy Scenario in India

1 Introduction

India is ***4th largest consumer of energy after USA, China, and Russia,*** but it is not endowed with abundant energy resources. It must, therefore, meet its development needs by using all available domestic resources of coal, uranium, oil, hydro, and other renewable resources.

Meeting energy needs of achieving 8% economic growth, while also meeting energy requirements of the population at affordable prices, therefore, presents a major challenge. It calls for a sustained effort at increasing ***energy efficiency,*** while increasing ***domestic production*** as much as possible.



For Renewable Energy Source

- Wind=67%
- Small Hydro= 13%
- Biomass= 13%
- Others= 7%

2 Energy Security: Concerns and Reforms

The energy and the electricity sector arguably presents the most critical infrastructure bottleneck, indeed supply-side constraint, facing the Indian economy. *Standard solutions to the problem have revolved around deregulation and private participation in fuel exploration, power generation and distribution, coupled with efficiency improvements in public utilities.* But such technocratic assessments simplify the issue and do little to meaningfully address the problem.

Any serious attempt to reform the energy sector has to revolve around ***four objectives*** — *increasing fuel availability by* ***narrowing demand-supply gap****; addressing* ***energy pricing*** *through periodic tariff revision, reforming free and unmetered agriculture supply etc.; bringing* ***policy reforms****; and ensuring* ***power sector reforms*** *such as reducing distribution losses etc.* However, if we are to make progress with any of them, we need to go beyond policy reforms and efficiency improvements and resolve the ***political "collective action problem***". Let's now take the concerns and the reforms needed for each of these objectives separately in the table below:

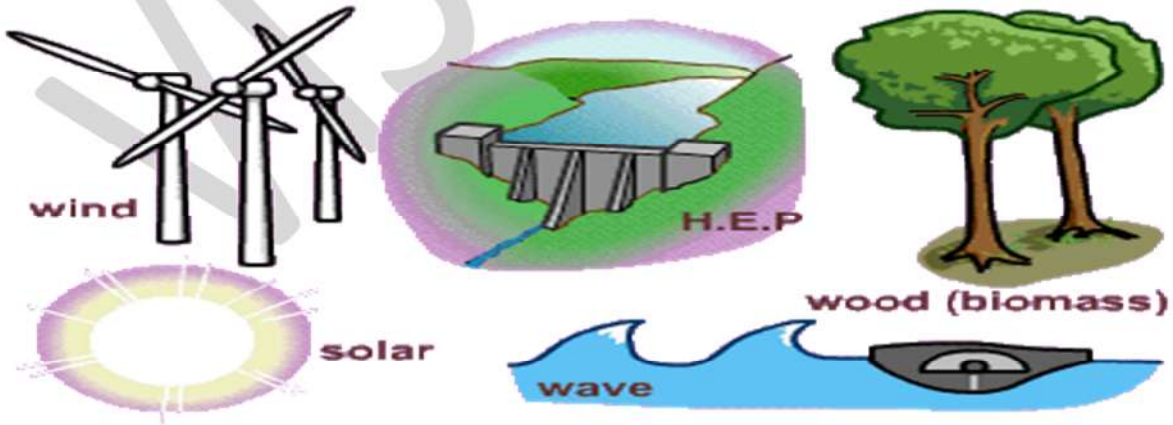
	Concerns	Reforms
1	**Energy Demand and Supply Gap** • Even though domestic production of energy resources is projected to increase, import dependence will continue. By the end of 12th plan, import dependence on crude oil and coal is estimated to be 78% and 22% of the demand respectively. • It is estimated that up to ***a third of India's power generation capacity***, both thermal and gas generators, is lying idle due to fuel scarcity. While the state-owned coal mining monopoly, CIL should shoulder its share of the blame for the current crisis, the major problems lie beyond mining per se. Land acquisition and environmental clearances are essential for both new mining projects and capacity-expansion in old mines, as well as for laying rail transport lines. We therefore have a situation where even the mined coal is stuck at the pithead for lack of adequate transportation facilities and capacity-addition projects are delayed inordinately. It is no wonder that the coal blocks allocated for captive power generation remained mostly unexploited.	• Bring reform in NELP and amend Coal Mines Act 1973 to allow private parties take up the mining. • A coal bank can be created that will manage the demand-supply gap. • ***Agriculture power reforms*** assume great urgency. Free farm supply adversely affects the quality of rural electricity supply and indiscriminate use of motors depletes groundwater levels. The Gujarat model of laying dedicated agriculture feeders incurs massive capital investments. A more cost-effective and efficient approach would be to assure farmers ***equivalent (or higher) units of free supply instead of restricting supply timings***. Farm connections would be metered and agriculture tariffs fixed. Each farmer would pay his monthly electricity bill, whereupon he would be reimbursed the previous month's bill to the extent of the free units consumable.
2	**Energy Pricing Issues** • An economically important but also politically sensitive issue. It was precisely to depoliticize the ***tariff increase*** that regulatory authorities were established. Unfortunately, they have become handmaidens of governments. • Misalignment of energy prices poses both ***microeconomic*** (underpricing energy to consumers reduces the incentive to be energy efficient and promotes leakage of subsidized products for sale in open market) and ***macroeconomic*** (hits either producers or leads to excessive import dependence with implications for Balance of Payment) challenges.	• Tariff policy needs to be depoliticised. • There are currently a plethora of regulatory bodies. Some, like CERC and PNGRB, fall under the umbrella of the Central government; some like the state regulatory commissions report to the state governments, and others like the Indian Energy Exchange (IEX), and the National Power Exchange (NEP) fall between several stools and have an indirect dotted-line linkage with Central and state governments. There is overlap, and on occasion, contention over matters like the setting of prices and tariffs. A ***department of energy resources and security*** in PMO should be created to act as energy regulators ombudsman in striking the right balance between the Centrally appointed regulators and their state and local counterparts.

3	**Policy neglect of Energy** There is no ***National Policy On Energy*** endorsed or supported by Parliament. Nor is there an official body authorised and accountable for overseeing the country's energy policy.	• A bill should be introduced in Parliament defining the inter linkages between energy, food, water, environment, technology, infrastructure, conservation and efficiency, and lay out the roadmap to energy independence, energy security and energy sustainability. It should define measurable metrics for progress towards these objectives, and make explicit India's global obligations and commitments.
4	**Transmission and Distribution Problems** • Transmission and Distribution losses account for 27% of electricity generated. • At least ***two-thirds of the national average distribution losses***(which is 23 %) are commercial losses, mostly in the form of billing deficiencies or pilferage.	• Discom reforms as suggested by Shunglu Committee should be done. • Restructuring of APDRP • Underground cabling to improve safety and theft. • Smart grid. • Integration of renewable into the grid. • Strengthening of NLDC/RLDC/SLDC is vital for grid management. • Prepaid metres for those consumers with chronic defaults.

3 Renewable Energy

3.1 Introduction

Gone are the days when renewable energy meant dim solar lanterns. *Small-scale renewable energy power plants are now cheaper, more reliable and more efficient*. In ***Durbuk***, in Ladakh, a solar power plant is powering 347 households, a clinic, a school and some government offices. In ***Tamil Nadu***, a *panchayat* purchased a windmill that is not only providing electricity to the entire village but is also selling the surplus to State utilities and earning profit. In ***Bihar***, a company named Husk Power Systems is using rice husk to generate electricity and supplying it to 250 villages.



3.2 Essentiality of Renewable Energy

- India is currently the world's third largest carbon emitter. According to the *Copenhagen Accord*, which India signed along with 167 other countries in 2009, *80 % of the world's proven coal, oil and natural gas*

reserves must remain in the ground in order to avoid warming the planet beyond the internationally agreed limit of 2°C rise in average temperature. So, from an ***ecological point of view,*** renewable energy must come up on a large scale and not as isolated stories of miracles.

- ***From an economic point of view*** also, no one needs proof that India is facing a power crisis. Coal reserves are depleting and getting expensive. Many major plants in the country are facing severe coal shortages. In the last fiscal, India imported over 150 million tonnes of the fossil fuel, widening the country's *fiscal deficit* to further dangerous levels. Renewable energy will address power shortage challenges, which cost Rs 4.2 lakh crore a year.
- ***From a social point of view***, the government had promised to *deliver electricity to the entire population*. But considering that providing electricity to all means providing it for 24 hours of 365 days and not four hours in a day, the government has missed the target by a long shot. Renewable energy is the need of the hour and it is capable of delivering what India needs. But the question is will we realise it in time?

3.3 Key Issues With Renewable Power Generation

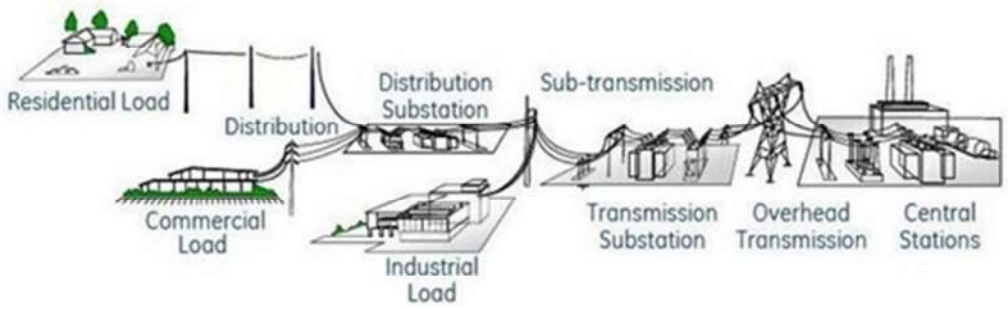
1. **Regional Concentration of Renewable Energy Potential**
   Because Renewable Energy is location-specific and not evenly distributed, there are problems on scaling up grid connected renewable power.
2. **Insufficiency and High cost of Evacuation Infrastructure**
   Utilisation of variable Renewable Energy requires a robust transmission infrastructure from remotely located generating plants to the load centers. This requires infrastructure such as roads etc as well as land for installation.
3. **Financial Barriers**
   Renewable Energy technologies require large initial capital investment. These technologies need to be supported until technology breakthroughs and market volumes generated are able to bring the tariff down at the grid parity level.
4. **Low Penetration of Renewables for Urban and Industrial Applications**
5. **Policy Interventions to Incentivize Creation of Financeable Business Models for Off-grid Renewable Sector**
   - Off-grid renewable sector is much more competitive with conventional power as it avoids investment in transmission to remote location.
   - E.g. Rice Husk gasifiers based electricity generation is one such model.

3.4 12th Plan Strategy for Renewable Energy

1. **Off-grid Renewable Energy for rural applications**
2. **Grid interaction and grid parity** to be achieved.
3. **National Bioenergy Mission(NBM)**
   - Successful model in Bihar: Off grid renewable models based on biomass.
   - Attract investment to make the mission sustainable.
4. **National Biomass Cook Stove programme(NBCSP)**
   Leveraging PPP in exploring a range of technology deployments, biomass processing, and delivery models.
5. **National Bioenergy Corp of India**
   It should be established to implement NBM and NBCSP.
6. **Renewable Energy Development Fund**
   To address financing constraints for grid connected as well as the off-grid applications of renewable, REDF should be set aside.

After looking at the general issues and strategies associated with renewable energy as a whole, let's delve into two important sources of renewable energy, viz. hydel and solar power.

3.5 Hydel Power



India is blessed with immense amount of hydroelectric potential and ranks ***5th*** in terms of exploitable hydro-potential on global scenario. As per assessment made by CEA, India is endowed with economically exploitable hydropower potential to the tune of ***148 GW*** of installed capacity.

Hydropower projects are generally categorized in two segments i.e. ***small and large hydro***. In India, hydro projects up to 25 MW station capacities have been categorized as Small Hydro Power (SHP) projects. While Ministry of Power, Government of India is responsible for large hydro projects, the mandate for small hydro power projects (up to 25 MW) is given to Ministry of New and Renewable Energy. Small hydropower projects are further classified as:

Class	Station Capacity in kW
Micro Hydro	Up to 100
Mini Hydro	101 to 2000
Small Hydro	2001 to 25000

3.5.1 Barriers To Hydropower Development

1. **Hydropower Planning**:
   - Planning for hydropower development in India has generally been oriented toward *individual projects*. However, this approach has several limitations for sustainable development of an entire river basin.
   - *Inter-state disputes* are another aspect, which hinder integrated river basin development for hydropower projects. A large number of hydropower projects with common river systems between adjoining states are held up due to a lack of inter-state agreements and disputes on water-sharing.
2. **Land Acquisition and Safeguard Issues**: Land availability and acquisition are among the core structural issues that impact almost all infrastructure sectors. Problems arising in the acquisition of land for hydropower projects are causing suspension and delay in construction activities.
   - The problem areas include *compensation amount* for acquisition, the Social Impact Assessment *(SIA) processes, Legal defiitions* which increase complexity and cost for developers without adequately benefiting the affected population etc.
   - Construction and operation of hydropower dams can significantly *affect natural river systems as well as fish and wildlife populations*.
   - Furthermore, hydropower projects involve submergence causing the *displacement of project area people*. The rehabilitation of project-affected people is also a major issue, which is more pronounced in the case of storage-based hydropower projects, as was evident during the development of the Tehri dam. The project met with mass protests on the issue of safety, environment and rehabilitation, resulting in unusual delays and cost over-runs.

3. **Finance**: Hydropower projects are *capital-intensive* and financing them, by finding an optimum balance between bankability and affordability, is often a challenge. Although the operating cost of hydro projects are minimal and the project life longer than thermal, there are multiple other factors that make hydropower difficult to finance.
    - Hydro projects require *higher upfront costs* to address greater complexities in design, engineering, environmental and social impact mitigation, etc.
    - Most hydro projects takes at least five to six years to construct which *increases the interest* during construction.
    - Delay in cash inflows increase uncertainty and risks, resulting in higher *risk premium on financing* charges.
4. **Technical Challenges**: Techno-economic viability of hydropower projects depends on the *geology, topography, hydrology and accessibility of the project site*. Even if extensive investigations using state of the-art investigation and construction techniques are adopted, an *element of uncertainty* remains in the sub-surface geology. Geological surprises during actual construction cannot be ruled out. This unpredictable geology is more pronounced in the young fold Himalayas where most of the Indian hydropower potential resides. Such technical challenges add to construction risks.
5. **Lack of Enabling Infrastructure**:
    - A number of hydropower projects are *located in remote sites* in states, which do not have adequate demand for electricity. This creates the requirement for developing enabling infrastructure for *power evacuation*. The *'chicken neck'* presents geographical constraints in developing requisite transmission infrastructure for hydropower evacuation from the northeast.
    - Furthermore, the Plant Load Factor (PLF) for hydropower projects is typically less than 50%, as a result of which *significant transmission capacity is under-utilized*. All these result in higher transmission costs.
    - Hydropower projects also require the presence of *associated infrastructure* such as roads, bridges, schools, hospitals etc. in the area. Lack of these infrastructural assets and difficult terrain of the sites often creates major road blocks in moving skilled manpower to project sites.

3.5.2 Suggestions

1. **Governance Framework:** Strengthening of governance in the natural resource sector is a key determinant for sustainable and inclusive growth. Thus, a nation needs to have an overarching policy framework, specific sector strategies, and clear and transparent processes for accelerating hydropower development. Standardised processes and efficient inter agency governmental coordination reduces unpredictability and creates a better climate for potential investors.
2. **Benefit-Sharing Framework:** Mitigation of social and environmental risks also plays a critical role in the development of hydropower projects. Since the benefits and negative effects of natural resource development are often unevenly distributed, benefit-sharing mechanisms and mitigation measures are crucial for sustainability and stability in development. Benefit-sharing is a commitment by the government and the developer to share the monetary and nonmonetary returns with stakeholders. An appropriate benefit-sharing mechanism ensures social stability and also aligns a country's national strategy with the local needs.
3. **Facilitating Investments And Finance:** In order to attract investments for capital-intensive hydro power projects, it is necessary to address the concerns of developers as well as consumers. To broaden investment avenues, the government needs to facilitate optimum risk allocation and often, on a case specific basis, better upside to developers. Furthermore, the PPP framework needs to be designed considering key factors needed to develop commercial hydropower projects such as capital, capability and credibility. All modalities related to clearance processes, land acquisition, building evacuation infrastructure, fiscal incentives and innovations etc should be streamlined.
4. **Facilitate Market Development:** Policies targeted at market development play a crucial role in channelizing investments and private sector participation in hydropower development like any other sector. The private sector recognises the enormous potential of the hydropower sector in India. Yet, more substantive and enabling changes by the government in the policy and regulatory framework are needed to expedite the initiative. Steps like hydropower purchase obligations, differential tariff structure

for peak and off load season, developing market for ancillary services, support across the national grid etc could be taken.

5. **Technical Capacity Development:** Hydropower development involves significant challenges on account of terrain and geology. The solution to such challenges requires capacity-building of the agencies involved as well as the introduction of modern techniques and technologies. The capacity building initiative will need to appreciate the technical challenges specific to hydropower and equip the concerned institutions with tools, training and systems to help address them.

3.6 Solar Power

In India, the solar power industry is a *5-year-old baby*. On the ***solar power generation side***, the total installed solar power capacity in India in 2010 was 18 MW. In Sept' 2014, it was *2.76 GW*. *India receives sunlight for 300 days in a year at 5KW/Cm^2. It is 7% more effective than coal and 10% more effective than nuclear plants*. On the ***solar power equipment side***, Indian manufacturers have capacity to produce about 1,900 MW of modules that will generate electricity when the sun's rays fall on them. Both these segments need to be nurtured. Solar power has the potential to meet 7% of our power needs by 2022, mitigate 2.6% of carbon emission, and reduce coal imports by 71 million tones per annum saving Rs 33,000 crore.

3.6.1 Initiatives

- **JN National Solar Mission:** A part of NAPCC, it aims to generate 20 GW solar electricity by 2022 in 3 phases. The new government at the centre has revised the target to 100 GW from 20 GW.
- **Ultra Mega Green Solar Power Project**: Plan to install world's largest solar plant with 4 GW capacity near Sambhar lake, Rajasthan by 2010.
- **Clean Energy Fund***:* To encourage private solar companies by reducing custom duty on solar panels by 5% and exempting excise duty on SPV.
- **Renewable Energy Certificate**
- **70% Subsidy on installation of SPV power plant in NE States and 30% in other regions.**
- **100% FDI** allowed for renewable energy generation, distribution, and manufacturing projects.
- **Desert Power India**

Some Examples

- Durbuk, ladakh
- Salijeepali in Andhra: 1st village where entire electrification was done with solar power.
- Solar Pond at Bhuj in Kutchh.

3.6.2 Challenges Ahead

1. **Domestic Content Requirement Issues:** The *National Solar Mission (NSM)* is being rolled out in phases, and for the *first batch* of the first phase, the government said that those project developers who opt for the crystalline silicon modules, shall buy only those made in India. For the *second batch*, it went a step down in the value chain and said that even the cells will have to be made in India. However, this rule did not apply to thin film, simply because there is no thin film module manufacturer in India to buy from. As a consequence of this, most of the project developers went in for imported thin film modules. Also, this ***Domestic Content Requirement*** was only for projects awarded under the NSM and *not for those set up under the various states' programmes*. Notably, of the 1,200 MW of capacity in India today, about 850 MW has come under Gujarat's programme. Most of those putting up projects under the states' programmes are therefore importing their modules.

   Thus, the NSM projects are importing thin films (mainly from the U.S.), those under states' programmes are importing crystalline silicon modules (mainly from China) and nobody is buying from Indian manufacturers. Indian manufacturers want protection against the much cheaper products from abroad, especially from the Chinese crystalline silicon manufacturers and the American 'thin film' manufacturers, both of whom often bring in cheap funding for their buyers.

Against this backdrop, India initiated anti-dumping investigations in Nov 2012 against manufacturers in China, USA, Taiwan and Malaysia, deferring to the pleas of the domestic manufacturing industry. The solar power generators were promptly up in arms, pleading that the duty would make their upcoming projects unviable, given that most of them were won under thin-margin tariffs determined through competitive bidding processes. The project developers stress that it is only smart to let them buy their equipment from the cheapest sources in the world, so that a culture of setting up solar plants develops first. Force them to buy locally, the costs will stunt the growth of the fledgling industry and neither the power producers nor the module makers will be in business.

In trying to tread the fine line between these two positions, the government of India has triggered off what some people are calling '***solar wars'***. Now, the U.S. has taken India to WTO over the '*domestic content requirement*' (DCR) under the NSM. India is likely to argue that the NSM is in the nature of government procurement — because the power is bought by a government-owned company. India is not a signatory to the ***Agreement on Government Procurement***, hence, no violation. Secondly, India will argue that the DCR rules have truly caused no damage to any overseas manufacturers, because it is applied on a very small portion of the country's goals, the rules do not cover states' programmes. Regardless of which way these moves go, the fundamental question remains — how to balance the conflicting interests of manufacturers and project developers?

2. **Land scarcity**
   Per capita land availability is a scarce resource in India. Dedication of land area for exclusive installation of solar cells might have to compete with other necessities that require land. The amount of land required for utility-scale solar power plants — currently approximately *1 km² for every 20–60 MW* generated could pose a strain on India's available land resource. The architecture more suitable for most of India would be a highly distributed, individual rooftop power generation systems, all connected via a local grid.
   However, erecting such an infrastructure, which doesn't enjoy the economies of scale possible in mass utility-scale solar panel deployment, needs the market price of solar technology deployment to substantially decline so that it attracts the individual and average family size household consumer. That might be possible in the future, since Photovoltaic (PV) is projected to continue its current cost reductions for the next decades and be able to compete with fossil fuel.
3. **Slow Progress**
   While the world has progressed substantially in production of basic *silicon mono-crystalline photovoltaic cells*, India has fallen short to achieve the worldwide momentum. India is now in 7th place worldwide in Solar Photovoltaic (PV) Cell production and 9th place in Solar Thermal Systems with nations like Japan, China, and the US currently ranked far ahead. Globally, solar is the fastest growing source of energy (though from a very small base) with an annual average growth of 35%, as seen during the past few years.
4. **High Maintenance Cost of Solar panels, equipments etc.**

4 The Civil Liability for Nuclear Damage Act

4.1 International Conventions on Liability

After World War II, European governments were keen to adopt nuclear power but lacked the necessary technical expertise. On the other hand, American companies were keen to sell their nuclear plants but were unwilling to accept responsibility for accidents. So, the U.S. companies recommended legislative intervention to make it *impossible* for anyone to file a liability claim against atomic suppliers. These suggestions were made in a report called the "*Harvard report*". In a few years, this annex went on to become the ***Paris Convention*** insulating nuclear suppliers internationally.

Ironically, the U.S. under its own ***Price-Anderson Act*** does allow victims to sue suppliers. In fact, this is the reason that it did not accede either to the Paris convention or even to later agreements like the ***Vienna Convention***. When it finally engineered the ***Convention on Supplementary Compensation*** in 1997, it included a "grandfather clause" that would allow it to keep this aspect of its tort law unchanged while forcing ***newer***

signatories like India to renounce their right to take action against suppliers. India signed the *Convention on Supplementary Compensation* thereby delivering on the last of its commitments stemming from the landmark 2005 nuclear agreement with the United States.

The *Convention on Supplementary Compensation* will enter into force only when *at least five countries* with a minimum of 4,00,000 units of installed nuclear capacity ratify the treaty. The *Convention on Supplementary Compensation* is a treaty that requires signatories to pass a domestic liability law in conformity with a model text. It *provides no forum for signatories to challenge each other's national laws.* Article XVI of the Convention allows for arbitration as well as adjudication by the ***International Court of Justice****,* in the event of a dispute. But the U.S. entered a reservation while ratifying the Convention in 2008 declaring, "that it does not consider itself bound by these dispute settlement procedures." When it eventually ratifies the treaty, India is likely to make a similar declaration. *That would leave the Supreme Court of India as the only forum competent to rule on the compatibility of the Civil Liability for Nuclear Damages Act, 2010 with India's international obligations stemming from its accession to the CSC.*

India's decision to join the CSC is not only a surrender to a manifestly unfair international regime but will also have an impact on the safety of nuclear installations in India.

4.2 India and the Liability Act

The flaws of international convention are also being reflected in our domestic Liability Act. Let's look at some of the issues:

1. **Compensation Amount (Clause 6 &7):** Clause 7 states the "Central Government shall be liable for nuclear damage in respect of a nuclear incident" when such liability exceeds the Rs. 1000-crore liability limit of the operator (i.e. NPCIL). However, NPCIL can make the foreign builder legally responsible to pay for compensation for an accident through a construction contract. But again amount payable can't exceed operator's liability (i.e. Rs 1000 crore).

   Under Clause 6, the maximum liability of the operator and the government combined has been set at "the rupee equivalent of $300 million of SDRs, or Rs. 2,610 crore — 23 times lower than what is provided under the equivalent U.S. law, the controversial Price-Anderson Act.

2. **Rights of Recourse (Clause 17)**: The law blocks the victims from suing foreign suppliers in an Indian court or in a court in its home country. Only the "operator shall have a right of recourse," according to Clause 17. But such a right of recourse can only be to meet the operators' own liability of Rs 1000 crore. The state operator can sue the foreign supplier if

   a) "such right is expressly provided for in a contract in writing."
   b) "the nuclear incident has resulted as a consequence of latent and patent defect supply of sub-standard material, defective equipment or services , or from the wilful act or gross negligence on the part of the supplier." ……. (not under the international law)
   c) "accident has resulted from the act of commission or omission of a person done with the intent to cause nuclear damage.

   Of these three provisions, only (a) and (c) are mentioned in model law specified by CSC.

3. **Timeframe for Claim (Clause 18)**: The law also limits liability in time, with Clause 18 stating: "The right to claim compensation for any nuclear damage caused by a nuclear incident shall extinguish if such claim is not made within a period of 20 years from the date of incident…" The 20-year time limit was untenable because damage to human health from a serious radioactive release "involves changes in DNAs, resulting in mutagenic and teratogenic changes, which take a long time to manifest."

4.3 Criticism of Liability Act

1. **Amount Of Liability Will Be Capped and Paid for from Insurance Pool**

   The MEA speaks of the liability in case there is a nuclear incident, which will be capped at $300 million SDRs or Rs. 2610 crores. In addition, the operator NPCIL is only liable up to Rs.1500 crores, and the Union government would pay the balance RS 1110 crores. Any damages above this would come from an international fund, once India ratifies the international Convention on Supplementary Compensation for Nuclear Liability or Convention on Supplementary Compensation. This effectively means that the supplier will not be liable, and even the operator will be liable only for a small fraction of what victims will need, given the recent example of $200 billion for the Fukushima disaster. The insurance pool in this regard will in any case be paid by the government and government-owned insurers from public taxes in a 50:50 ratio.

2. **Supplier's Liability Is Not Necessary**

   On section 17(b) which gives the operator a "right to recourse" i.e. suing the supplier, the MEA says this will be possible only if under section 6a, it is written in the contract between NPCIL and the supplier. The explanation goes on to say that while the "right to recourse" is permitted, it is not required or necessary. *Section 17 states that the operator shall have a right of recourse. While it provides a substantive right to the operator, it is not a mandatory but an enabling provision.*

3. **The Tort Law Or Civil Damages Suit Clause For Victims Does Not Apply To Suppliers**

   About section 46, which refers to the right of victims to sue in case of a nuclear accident according to 'tort' law, the MEA says that the supplier cannot be liable under this kind of "class-action suit".

5 Coal Related Issues

5.1 Coal Demand-Supply Gap

Despite such large reserves of coal, we have to import nearly 170 million tonnes of coal. Also, there are questions over the unfair allocation of coal and the bidding processes.

5.2 The Coal Block Allocation

- The ***Coal Mines (Nationalisation) Act 1973*** does not allow private companies to mine coal for sale to third parties, though captive mining is allowed for specified end use sectors. There are political sensitivities in opening up coal sector to private investment, but it is simply not logical to keep private investment out of coal when it is allowed in petroleum and Natural gas.
- The apex court has also questioned the government on how coal block allocation was decided by ***screening committee*** as alleged in the affidavit filed by coal secretary. The allocation of coal blocks is done through mechanism of an inter-ministerial inter-governmental body called screening committee which is chaired by Coal Secretary. It includes secretary of nine ministries having interests in coal, besides heads of various PSUs, and Chief Secretaries of coal supplying states are also part of it.
- In the above light of many identified flaws, there is a demand to amend Coal Mines Act 1973. Recently, many flaws were found in captive coal allocation leading to ***cancellation of all but four of 218 allocated coal blocks.*** The CAG remarked that coal blocks were given free and company with political links got multiple blocks, leading to notional loss of about Rs 1,86,000 crore.
- After cancellation of coal blocks by SC, the GoI brought Coal ordinance for ***e-auctioning*** of coal blocks that opened the gates of coal mining to private parties even for third party sale through *reverse auctioning process*. The government has so far added around 1.43 lakh crore to its kitty after the end of second tranche of coal block auctions.

5.3 Underground Mining

- Only 15% of India's coal production is from underground mines. The industry aims to reach a total coal production of 30% from underground mines by 2030.
- There is a clear trend towards underground mines as this has positive implications for the environment.
- Considering emerging hurdles in forest clearance and land acquisition in future, serious efforts need to be made to increase the share of underground production by focussing on long wall technology and productivity in underground mines.

5.4 Coal Regulation and Pricing

India has *fifth-largest coal reserves* in the world. There are huge power expansions plans, which need to be fuelled by coal. However, there has been no coal regulator. The idea of a **Coal Regulatory Authority** was mooted in 2008, but it could not be established for unknown reasons. Setting up a regulator for monitoring coal resource development was first recommended by the Integrated Energy Policy (IEP) framed by former Planning Commission member ***Kirit Parikh*** and the ***T L Shankar Committee*** on coal sector reforms. The Energy Coordination Committee, headed by ex-PM Manmohan Singh, had then asked the Planning Commission to prepare a paper on the issue. However, so far, the Coal Regulatory Authority could not see the light of the day.

5.4.1 Independent Coal Regulatory Authority Bill, 2013

After the recent CAG observations on the coal sector and the Coalgate controversy, the previous Government had come up with a draft *Independent Coal Regulatory Authority Bill, 2013* to establish an independent regulator for the coal sector. The Government said that the independent regulator was needed considering the *near-monopoly the producers* in the coal industry enjoy and the fact that regulation was currently done by agencies closely associated with the government as well as the same producers. Its **salient features** were:

1. Coal Regulatory Authority would comprise a chairperson and four members, one each for the *legal, technical, finance and administration wings*. The chairperson and the members would be appointed by a *selection committee headed by the* ***cabinet secretary***.
2. The bill seeks to empower the proposed regulator to ***decide the fuel's prices and to suspend or cancel authorisations*** of errant coal producers. Coal pricing was administered by govt under Collaries Control Order(CCO) 1945 till that order was amended in 2000, and the PSUs were given freedom to fix prices on a normative basis. This brought no change in PSU monopoly over coal pricing.
3. Centre's role would be restricted to policy-making while the regulator would ensure implementation of the policy.
4. The regulator's functions would include specifying the quality and performance parameters, ensuring adherence to the mining plan, recovering penalties, monitoring the utilisation of funds for coal conservation and promoting clean coal technologies.
5. To ensure independent functioning of the regulator, a ***Coal Regulatory Authority Fund*** has also been proposed.

However, critics pointed out many **limitations of CRAI Bill** as mentioned below:

1. The CRAI bill is a ***half-hearted measure***, as it would not empower the regulator to determine the grade-wise price of coal or enable it to enforce that contracts for captive coal blocks be auctioned — two crucial areas of major concern for consumers.
2. The CRAI's role would be ***limited*** to coal conservation, enforcement of mine development plans, coal sampling and testing, suggesting principles of pricing, norms of operational efficiency and resolution of disputes between producers and consumers.
3. Its ***composition and the method of selecting*** its members are similar to the provisions in the case of other regulatory authorities, leaving scope for the government to use the CRAI as a parking place for retiring civil servants, thereby eroding its autonomy.

Not quite confident of piloting the bill through the usual legislative process, the *government has now set up a toothless regulator through an executive order.* This implies a total dilution of the concept of independent statutory regulation — a long overdue reform — and would simply create yet another layer of red tapism and infructuous public expenditure arising from it! *We need independent, umbrella regulation for pricing not only electricity but also the two fuels, coal and natural gas, as well as nuclear power, with a single authority to hear appeals against its orders.*

5.4.2 Pricing Power of Coal Regulator

In India, the prices of coal currently being realised at e-auctions, the majority of which is supplied by CIL, are about 80 % higher than the notified price. It is said that there is no commercial mining in India by companies other than (state-run) CIL. Coal India decides price of the fuel without any formal directive from the coal ministry, but the government has a say because it holds majority equity. Some Ministries have said that the bill would take the country back to the pre-1991 era of licence raj and there must be a difference between regulation and licensing.

6 Smart Grid

For a century, utility companies have had to send workers out to gather much of the data needed to provide electricity. The workers read meters, look for broken equipment and measure voltage, for example. Most of the devices utilities use to deliver electricity have yet to be automated and computerized. Now, many options and products are being made available to the electricity industry to modernize it.

The "grid" amounts to the networks that carry electricity from the plants where it is generated to consumers. The grid includes wires, substations, transformers, switches and much more. Much in the way that a "smart" phone these days means a phone with a computer in it, ***smart grid means "computerizing" the electric utility grid***. It includes adding ***two-way digital communication technology*** to devices associated with the grid. Each device on the network can be given *sensors* to gather data (power meters, voltage sensors, fault detectors, etc.), plus two-way digital communication between the device in the field and the utility's network operations center. A key feature of the smart grid is ***automation technology*** that *lets the utility adjust and control each individual device or millions of devices from a central location*.

6.1 Benefits

- Efficient, reliable, end-to-end intelligent two way delivery system leading to smart demand side management, more efficient transmission of electricity, reduction in AT&C losses etc.
- Real time monitoring and control of power system, saving up to 15-20% of energy.
- Quicker restoration of electricity after power disturbances.
- Reduced operations and management costs for utilities, and ultimately lower power costs for consumers.
- Reduced peak demand, which will also help lower electricity rates.
- Increased integration of large-scale renewable energy systems
- Better integration of customer-owner power generation systems, including renewable energy systems
- Improved security

6.2 Identified Challenges and Strategies for Smart Grid Operations

1. **Smart Grid Demonstration and Deployment Activities** : These activities leverage efforts under way in the research and development activity area and will help develop critical performance and proof-of-concept data. This activity area will help in developing a framework for analyzing smart grid metrics and benefits, which is necessary to help build the business case for cost-effective smart grid technologies.
2. **Research and Development Activities** advance smart grid functionality by developing innovative, next-generation technologies and tools in the areas of transmission, distribution, energy storage, power

electronics, cybersecurity and the advancement of precise time-synchronized measures of certain parameters of the electric grid.

3. **Interoperability and Standards Activities** ensure that new devices will interoperate in a secure environment as innovative digital technologies are implemented throughout the electricity delivery system, advancing the economic and energy security of the country. The smart grid interoperability process promises to lead to flexible, uniform, and technology-neutral standards that enable innovation, improve consumer choice, and yield economies of scale.
4. **Workforce Development** intends to address the impending workforce shortage by developing a greater number of well-trained, highly skilled electric power sector personnel knowledgeable in smart grid operations.
5. **Monitoring National Progress Activities** establish metrics to show progress with respect to overcoming challenges and achieving smart grid characteristics.