

Synopsis of important articles in Yojana magazine August, 2016 (Shankarias)

Rural electrification: a developmental challenge

Close to 68% of the country's population live in rural areas. Electrification of rural areas is one of the most essential factors to improve and strengthen the rural economy. In today's context, rural electrification has five major facets:

- Setting up of rural electricity infrastructure.
- Ensuring last mile connectivity by providing connectivity to households.
- Adequate supply of desired quality of power.
- Supply of electricity at affordable prices.
- Providing clean, environmentally benign and sustainable power in efficient way.

Major problem in rural electrification, is providing the last mile connectivity to households. While close to 98% of the inhabited villages have been connected with the grid, still large sections of these grid connected villages, suffer from lack of last mile connectivity.

Un-Electrified households

Broadly, there are three types of un-electrified households:

1. Those households in areas where grid connectivity has not reached.
2. Those households in unconnected hamlets of grid connected villages.
3. Un-electrified households in electrified hamlets of grid connected villages.

Close to 97% of the unconnected households belong to the second or third type and only 3% belong to the first type.

Rural Electric Corporation

- Established in 1969.
- Main objective was to finance and promote rural electrification all over the country.
- Provides loan assistance to State electricity boards and state power utilities, equipment manufacturers and so on.
- Managing rural electrification programmes of Ministry of Power.

Amendments in National Tariff policy

- The Amendments to National Tariff Policy have included Micro grids as an option to provide power supply to remote, unconnected villages with provision for purchase of power

into the grid as and when grid reaches there.

- Risk of villages getting connected to the main grid before completion of project life of micro grids and subsequent loss of commercial value of the Micro grid is a pertinent one, but it can be addressed by putting in place an appropriate regulatory framework to ensure compulsory purchase of power into grid from Micro grid at original tariff.

Rural electrification policy, 2005

- Providing electricity to all rural households by 2009.
- Quality and reliable power supply at reasonable rates and minimum lifeline consumption of 1 unit per household per day as merit good by 2012.
- Amended definition of electrified villages: Village will be considered electrified only based on a certificate issued by the gram panchayat, certifying that basic infrastructure has been provided in inhabited locality as well as a minimum of one Dalit Basti / Hamlet where it exists and electricity is provided to public places and atleast 10% of the households in villages are electrified.

Rajiv Gandhi Grameen Vidyutkaran Yojana

- Launched in April 2005.
- To provide electricity to all un-electrified villages.
- Implemented by Rural Electrification Corporation.

Deendayal Upadhyaya Gram Jyoti Yojana

- Launched in 2014.
- Aims to provide 24 x 7 powers for all by 2019.
- Separation of agriculture and non-agriculture feeders.
- Strengthening and augmentation of sub transmission and distribution infrastructure in rural areas, including metering at distribution transformers, feeders and consumers.
- Specifically, the major components of DDUGJY are feeder separation and power for all by 2019.

Ujwal Discom Assurance Yojana (UDAY)

- Scheme to restructure the way was State owned power distribution companies operate.
- To liberate State Discoms from debt and mounting operational losses.
- States shall take over 75% of DISCOM debt as on 30 September 2015 over two years – 50% of DISCOM debt shall be taken over in 2015-16 and 25% in 2016-17.
- This will reduce the debt burden of the State Discoms and will allow them to deploy profits for improving operational efficiency rather than servicing the accumulated debts.

Challenges and way forward

Various programmes so far implemented for the purpose of rural electrification have suffered from major hurdles, which include high cost of grid extension and low recovery due to highly subsidized tariff, low level of tariff collection resulting in negative return, supply rationing due to non-availability of power and high operation and

maintenance costs. For rural electrification to be achieved in a sustainable way, we need massive focus on creation of income generation activities to boost rural economy. This will bring in affordability for the rural masses, who will be willing to pay for services which bring wealth and sustainability.

Perception management: a big challenge TP growth of nuclear power

The current energy scenario in many developing countries across the globe calls for quantum jump in electricity generation and at the same time staying committed to Sustainable Development. Nuclear energy emerges as one of the promising options for such a development model.

Pros of Nuclear energy

- Safe and reliable source of energy.
- Minimum carbon foot print.
- Steady and uninterrupted energy supply.
- Nuclear fuel has very high energy density and is also compact, thereby making its transportation quite easy.
- Sustainable form of energy.

Common concerns about nuclear energy

- Radiation pollution in the surrounding areas leading to increased incidence of cancer and genetic disorders.
- High temperature in the surroundings of nuclear plant, adversely impacting agriculture and fishing.
- Nuclear energy has been commercially viable only through large government subsidies.
- Fissile material used in Nuclear reactors can be used for making nuclear weapons.
- Safety of nuclear reactors in the wake of disasters.
- Handling radioactive waste.

Addressing perceptions

Fear of radiation

- All of us are constantly exposed to **background radiation** emitted by the radio-nucleotide in the earth's crust (Radon gas emitted due to radioactive decay of radium) and cosmic radiation from the space. This is accentuated in the poorly ventilated environments.
- There are certain pockets in the country (Ex. Kollam, Kerala), where the background radiation level is much higher than the radiation level in the periphery of the exclusion zone which extends up to 1.6 kms around the reactor core (**Exclusion zone essentially defines a buffer zone where the public has no access**).
- Hence, it is established beyond doubt that, radiation levels beyond the periphery are insignificant to have any adverse impact on health.

Adverse impact of Thermal pollution on surroundings

- Entire heat from the fission reaction cannot be utilized for the purpose of electricity generation, a part of it is

released into the surroundings. Stringent guidelines have been laid down on, to what extent the discharge can bring about thermal changes in the surroundings.

- The size of *mixing zone (Zone where thermal discharge from power plants, merge with receiving water body)* should be within 500 diameters around the reactor and the temperature change should not be more than 7C.
- This ensures minimum damage to the surrounding areas.

Nuclear energy in Energy mix

- India currently generates 3.5% of its total electricity from Nuclear energy.
- Per capita energy consumption in India is 1/3 of the world average and 1/10 of that of United States.
- Given the positive correlation between per capita electricity consumption and human development, India needs to drastically increase its electricity generation.
- Large chunk of it would come from Coal based thermal power plants. The remaining has to be met through renewable energy sources.
- Solar and Wind energy, owing to their intermittent character cannot contribute as much as Nuclear energy. This is attested by the fact that, despite installed nuclear energy capacity being 1/7 of capacity of all other renewable energy sources put together, the energy produced from the latter is only 2 times that of energy generated from Nuclear energy.

Coal imports are rising owing to poor quality of Indian coal, uncertainty in supply and bottlenecks in large scale mining and transportation. Thus nuclear provides a clear advantage over other sources of conventional and non-conventional sources of energy.

Safety of Nuclear power

- Despite the fact that three major nuclear accidents have taken place till date, norms and standards that are maintained in nuclear installations are of the highest standards across the globe.
- Many countries like Switzerland and Germany, who have proclaimed to cut down dependency on nuclear energy and close down reactors, are placed in a sweet position with respect to energy demand and access. Their population has largely stabilized, per capita demand has reached levels consistent with high level of human development and also they have access to import electricity from adjacent nations.
- But this is not the case with developing countries like India and China. India has to assess the cost benefit ratio of nuclear energy and at the same time focus on maintaining the highest standards when it comes to Nuclear safety.
- This has been time and again demonstrated earlier, when the Kalpakkam reactor and the Kakrapar reactor withstood the might of the nature during 2004 Tsunami and 2001 Earthquake respectively.

Management of Radioactive waste

- Radioactive waste can be safely stored or the isotopes can

be separated from the spent fuel and incinerated in fast reactors or by irradiating them with high energy charged particles in accelerator driven systems.

- Closed fuel cycle combined with separation of minor actinides will lead to, only storage of very small fraction of the spent fuel for a few hundred years.
- India has been practicing utmost caution, taking into consideration public safety as the prime goal while managing nuclear waste.

Long term energy security

India is abundantly blessed with sunlight and vast reserves of Thorium.

- Utilizing thorium for electricity generation has been temporarily out of our reach, owing to the fact that thorium has to be converted to fissile material (U-233) for initiating and sustaining fission reaction.
- This has been the ultimate goal of India's 3 stage nuclear programme, aimed at increasing the inventory of fissile material in the first and second stages of the programme to facilitate electricity generation from Thorium in the third stage.

As elaborated, nuclear energy is essential in fulfilling India's energy demand and ensuring energy security. Adequate safety measures when taken in a timely manner, will address the concerns about nuclear energy.

Shale Gas in India : challenges and prospects

India is the world's third largest consumer of energy behind China and the United states. Vast portion this energy requirement is met through imports, especially in the petroleum sector where our import reliance is likely to rise from 73% in 2011-12 to 80% by 2016-17. Increasing the domestic energy efficiency and ramping up domestic production is the key to meet the energy demands in a fiscally sustainable manner.

Share of gas derived energy, in the global energy mix is poised to rise sharply, owing to increased availability and trade of gas and its environment friendly nature. The share of Gas is projected to reach 25% of the global energy mix by 2035 and around 32% this would be from unconventional sources of gas. In this context, emergence of Shale gas is pertinent for India.

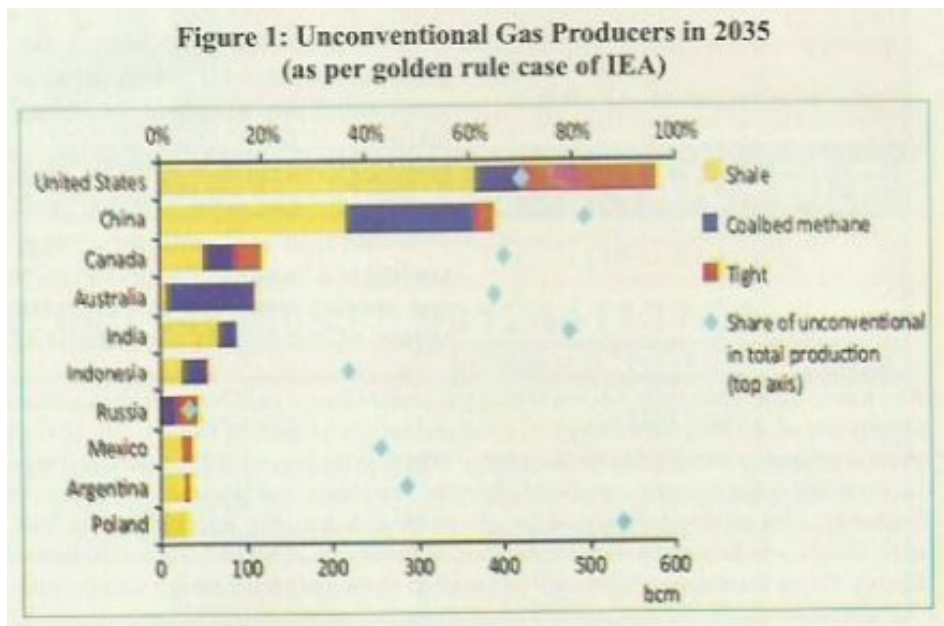
Global trends in unconventional gas sources

Traditionally, the following have been considered as unconventional sources of gas:

- Coal bed methane (CBM)
- Coal mine methane (CMM)
- Shale gas
- Tight gas

The global gas demand is expected to go up by 50% in 2035 and about 1/3 of this increase in demand will be met through unconventional sources. Shale oil and gas production has been picking momentum across the globe, especially in the United States, which has led to the U.S becoming a net

exporter of gas from being an importer.



Factors in the recent years that have made shale gas production economically viable:

- Technological advance in horizontal drilling
- Hydraulic fracturing
- Increase in natural gas price in the global market.

Major challenges in Shale gas exploitation

- **Groundwater contamination:** Use of sand/ceramic and high pressure water helps to fracture the shales and shale gas escapes out through these fractures. There is fear of, this injected mixture or the escaping gas contaminating the ground water.
- **Water requirement:** Large quantity of water is required for the process of hydraulic fracturing. This water requirement should be met without affecting the local community's ability to meet its water needs.
- **Requires vast land cover:** Many wells will have to be dug to sustain commercially viable production. Typically 100-500 sq.km land would be required.
- **Risk of earthquake:** The fracturing mixture is injected at high pressure. This has been speculated to have potential to cause earthquake.

Shale gas resources in India:

We do not have a single reliable source on the total estimated shale gas reserves in the country and how much it is technically recoverable.

- The **US Geological Survey (USGS)** has projected the reserves in 4 basins (Cambay onland, Cauvery onland, Damodar and Krishna Godavari Onland) to be around 584 trillion cubic feet, out of which 96 TCF has been estimated to be technically recoverable.
- **Directorate General of Hydrocarbons** has data, obtained from various onland wells.
- **EPINET**, the corporate data repository of ONGC also has large amount data.

The challenge still remains, on how to assess shale deposits especially for the purpose of carving out blocks for bidding programme.

Mitigating shale challenges

- **Resource assessment:** In the recently approved Hydrocarbon Exploration Policy (HELP), a unified exploration regime has been envisaged, which will ease the exploration process and also do away with separate licenses for different types of Hydrocarbons.
- **Availability of Land and Water:** India owing to its huge population, population density and dependence on agriculture, will face a challenge in this regard. Nevertheless, strong land acquisition laws protecting the interests of land owners and corporates will have to be put in place. Exhaustive and comprehensive discussions will have to be held with the local community to clear all apprehensions.
- **Environmental pollution:** Adequate measures will have to be taken to minimize adverse impact on the surroundings. Transparency in operations will help in addressing trust deficit, if at all they exist.

Shale gas offers a viable option to ensure energy security of the nation. Placing necessary safeguards, to minimize environmental pollution and securing the interests of the local community will ensure utilizing our shale gas prospects for the nation's developmental needs.

A renewable future for India

India at present faces both Developmental and Environmental crisis. Developmental crisis manifests itself in the form of poverty, growing inequality and poor human development indicators. On the other hand environmental pollution and damage to ecology has been increasing in alarming proportions.

Few facts on India's current energy status

- Officially, 300 million people do not have access to electricity.
- 3/4 of rural households connected to grid, face problem of erratic power supply in term of duration and voltage.
- About 700 million Indians use biomass such as dung, agriculture waste and firewood as their primary energy source for cooking. They are adversely affected by, indoor pollution impairing their health and also lost educational opportunities to the girl child.

Problems with Coal based thermal energy

- 60% of particulate matter emissions, 45-50% of SO₂ emissions, 30% of NO₂ emissions and 80% of mercury emissions come from coal based power plants.
- Coal based power plants account for half of the greenhouse gas emissions and 70% freshwater withdrawal for industrial purposes in our country.
- There is a fatal overlap of coal reserves, dense forests, tribal population, high poverty and backwardness. Hence, mining impacts the livelihood of tribal population and also

causes substantial destruction of dense forests.

These problems with coal based power plants, make it imperative for the nation to adopt a sustainable development model powered by environment friendly renewable energy.

Recent trends calling for convergence of environment and energy security

- India's dependence on coal imports for meeting domestic needs has been increasing over the years. This poses threat to energy security and fiscal stability of the nation.
- Cost of renewable energy has been coming down and even reached levels of grid parity, as in the case of wind power. In case of solar power, we are close to achieving grid parity, but certain impediments to making solar energy commercially viable still remain relevant, in the form of large and expensive storage systems required to supply 24x7 solar power.
- Electricity has become ubiquitous and its applications have been expanding rapidly.
- Need to reduce global greenhouse gas emissions to uphold our commitment to Paris climate deal, calls for ramping up our renewable energy contribution in the energy mix.
- There is an increasing global recognition to supply clean energy to all. This has been reiterated even in the Sustainable Development Goals.

Above mentioned trends call for ensuring a renewable electricity future that is affordable and accessible to all.

The future : Decentralized power supply

- Current electricity supply model in India relies on centralized generation and grid based distribution. This model requires huge capital investment for developing grid and also suffers from high transmission and distribution losses due to transmission over long distances and poor maintenance of supply lines.
- Renewable energy is best utilized when it is generated and distributed through decentralized networks. This model, very well complements the nature of electricity demand, which is also decentralized.
- Smart grids, with mini-distribution companies, capable of selling and buying power from the main grid can promote penetration of decentralized establishment of solar, wind and mini hydroelectricity power plants.

If operationalized, this model will revolutionize the way power is produced and consumed in India. Millions of households would produce and consume their own electricity. Thousands of renewable energy based grids would promote millions of small business and social entrepreneurs to create local jobs and build local economies. Living standards in villages will improve which inturn, will ensure women empowerment, better health and education. There cannot be a better development agenda for the nation.

Edited by Giri Sankar.R IRS

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Political Science Shubhra Ranjan (Vajiram and Ravi) Mains Test Series 2016

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Hi friends ,
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Its not what you know, but what you write and how you write .

7 TIPS TO IMPROVE YOUR ANSWER WRITING

Tip 1. Answer the question **completely**. Read the question twice to understand , what all is asked.

Foreign direct investment in the defence sector is now said to be liberalized. What influence this is expected to have on Indian defence and economy in the short and long run?

(GS Paper 3, 2014)

In this question , you have to answer two parts –

a) Impact of FDI in defence .

b) Impact on economy .

Also , in both the parts , you should write about “short run” and “long run” perspective.

Tip 2. Understand what is **exactly asked** . Do not write whatever you know in the topic without understanding what is asked.

While we flaunt India's demographic dividend, we ignore the dropping rates of employability. What are we missing while doing so? Where will the jobs that India desperately needs come from? Explain.

(GS Paper 3, 2014)

The moment you see “demographic dividend”, do not start writing about it . Read the question again. The question is referring to the unemployment of the demographic dividend. Thereby referring to skill development of the demographic dividend. Now connect the two and write your answer.

Also , don't miss the second part of the question on “where will the jobs come from”.

Tip 3. Use **key words and phrases**

Though the federal principle is dominant in our Constitution and that principle is one of its basic features, but it is equally true that federalism under the Indian Constitution leans in favour of a strong Centre, a feature that militates against the concept of strong federalism. Discuss.

(GS Paper 2, 2014)

Use key words related to the question like cooperative federalism, bargaining federalism, etc. This will add weight to your answer.

Tip 4. **Manage your time** for each answer properly.

Every paper of GS requires you to answer 20/25 questions. Hence , do not spend too much time on one particular answer because you know it too well / you are not able to generate points . And don't spend time too much time to write introduction / conclusion in the GS papers.

Tip 5. **Present** the answer well .

Keep this in mind .An examiner has to evaluate a lot of sheets along with yours,on a single day . How will you make the examiner feel your answer is better ? How will you make it easy for him to give you marks ?

Its possible when you write legibly,make use of charts/diagrams/subheadings/maps .

Donot write at a stretch.Break into paragraphs/ subheadings /bullet points .Follow according to the needs of the question.

Tip 6. Use relevant facts/data to substantiate your answer.

Instances of President's delay in commuting death sentences has come under public debate as denial of justice. Should there be a time limit specified for the President to accept/reject such petitions? Analyse.

(GS Paper 2,2014)

To substantiate your argument in the above answer, you should quote instances of Supreme Court ruling ,Bhullar case ,Constitutional provisions on death penalty,etc .This will give more validity to the answer.

Tip7. **Practise** Answer writing.

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xaam team was contacted by an English teacher working in a village , toiling hard to meet ends , he requested us to provide him some opportunities , so that he can fulfill his dream of Clearing UPSC one day. The problem is because of the dearth of employment in his village no parents want to spend money on tuition that too English tuition . We helped him and he appeared for this years prelims , although with sound basics he is getting Approx 79 marks [he belongs to the kind of candidate who has spent 2-3 months only preparing geography ,] This year prelims ditched the aspirants who did not prepared in a balanced manner , rural aspirants are the worst affected kind . Now he has a long year ahead of him , financial broke but full of confidence . We earlier asked him to prepare trick videos which we will share on our you tube Channel [<https://www.youtube.com/user/xamTricks>] , but video recording processing and sending over internet is a problem for him , mobile internet opens google in 10 minutes . As the video option was not possible which could have supported him we decided to ask him to prepare comprehensions [It came in our mind when we saw the CSAT Paper 2 , it was stuffed with comprehension and gave many a scare even when it was qualifying] . If you want to improve your English and let a helping hand to him buy the compilation and practice , more such compilations and English tests are in the pipeline .

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