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RURAL ELECTRIFICATION

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RURAL ELECTRIFICATION

- **Rural electrification** is the process of bringing **electrical power** to rural and remote areas. Rural communities are suffering from colossal market failures as the national grids fall short of their demand for electricity.
- **As of 2017, over 1 billion people worldwide lack household electric power – 14% of the global population.**
- Electrification typically begins in cities and towns and gradually extends to rural areas, however, this process often runs into obstacles in developing nations.
- Expanding the national grid is expensive and countries consistently lack the capital to grow their current infrastructure.
- Additionally, amortizing capital costs to reduce the unit cost of each hook-up is harder to do in lightly populated areas (yielding higher per capita share of the expense).
- If countries are able to overcome these obstacles and reach nationwide electrification, rural communities will be able to reap considerable amounts of economic and social development.

Social and economic benefits

Education

- Access to electricity facilitates sustainable economic and social growth.
- Through an increase in educational achievement. **Students who were previously forced to study when the sun was shining are now**



able to study by the light of LEDs early in the morning or late into the night.

- In Kenya for example, interviews with school teachers revealed that access to light has allowed for extra hours of teaching earlier and later in the day to cover material not adequately reviewed during normal hours.

Productivity and efficiency

- In addition to improved education, **rural electrification also allows for greater efficiency and productivity.**
- Businesses will be able to keep their doors open for longer and generate additional revenues.
- **Farmers will have access to streamlined modern techniques such as irrigation, crop processing, and food preservation.**
- In 2014, rural communities in India gained more than US\$21 million from increased economic activity driven by recent additions of electricity.

Job creation

- When expanding the electrical grid, there is a demand for thousands of jobs ranging from business development to construction.
- **Projects to spread electricity create a wealth of job opportunities and help to alleviate poverty.**
- For example, India set a target of 175GW of clean energy to be installed by 2022 to increase electrification throughout the country.

Healthcare improvements

- **The availability of electricity can drastically increase the quality of healthcare provided.**
- Improved lighting increases the time patients can come and get treatment.



- Refrigerators can be used to conserve incredibly valuable vaccines and blood.
- Sterilization measures will be improved and the implementation of high-tech machines such as **x-rays or ultrasound scanners can provide doctors and nurses the tools they need to perform.**
- In Diara Rhashalpool, a cluster of villages on the river Ganges, **140 households are without power.** The locals **are forced to travel 2–3 hours across the river for treatment or access to vaccines.**
- With access to electricity, treatment would be far more accessible to the local population.

Additional benefits

- Reduce isolation and marginalization through telephone lines and Television
- Improve safety with the implementation of street lighting, lit road signs.
- **Reduce expenses on expensive fossil fuel lamps i.e., kerosene**

Challenges

- Researchers pointed out that while many supportive policies have been put in place, **cost for providing electricity to remote villages remains high.**
- Furthermore, both energy resources and demand in these areas can be very volatile, **making it difficult to plan appropriately.**
- Another issue is that village location was determined historically based on **soil, water, storage**, etc., and **might not be optimal for renewable energy generation.**

To mitigate these issues, the Networked Rural Electrification Model has been proposed.

- In this model, villages in a selected area are linked up via an optimal network, which in turn connects to a few centralized generation facilities located at spots with better renewable energy resources.
- As such, **each village is partially supplied by small local facility, and partially by the centralized facilities.**
- This improves energy resources utilization as well as overall system flexibility and reliability.
- Viability of this model depends on the cost of building the optimal network.
- Based on multiplier-accelerated A* algorithm, the researchers have devised an effective method for evaluating all possible connections under complex geographical structure and hence practically optimize network design.

Government Yojana

- Government of India had launched **Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)** in December 2014 for the rural areas with the objectives of electrification of all un-electrified villages as per Census 2011; Strengthening and augmentation of sub-transmission & distribution infrastructure in rural areas, including construction of HT and LT lines, metering at distribution transformers, feeders and consumers; and feeder segregation.
- **Pradhan Mantri Sahaj Bijli Har Ghar Yojana – Saubhagya** was launched in October, 2017 for electrification of rural and urban poor households in the country.
- SAUBHAGYA was launched with the objective to achieve **universal household electrification by providing electricity connections to**

all un-electrified households in rural areas and all poor households in urban areas of the country.

- Under the aegis of SAUBHAGYA, as on 31.03.2019, all households were reported electrified by the States, except 18,734 households in Left Wing Extremists (LWE) affected areas of Chhattisgarh.
- Subsequently, seven States namely **Assam, Chhattisgarh, Jharkhand, Karnataka, Manipur, Rajasthan and Uttar Pradesh reported that 19.09 lakh un-electrified households in their State identified before 31.03.2019**, which were unwilling earlier but later expressed willingness to get electricity connections needed to be electrified.
- The electrification of these households was sanctioned under SAUBHAGYA. **All these seven States reported 100% households' electrification as on 31.03.2021.**
- **A total of 2.817 crore households were electrified since the launch of SAUBHAGYA, up to 31.03.2021.**
- Thereafter, some States again reported that 11.84 lakh households remain to be electrified. Electrification of these households was again sanctioned till date; **a total 2.86 crore households have been electrified.**