India Energy Stack – Transforming the Power Sector

Mains: *GS III – Infrastructure-Energy*

Why in News?

The power ministry is working with discoms, regulators, and technology companies to roll out the IES blueprint, which will ultimately be implemented nationwide.

What is the IES blueprint?

- **India Energy Stack (IES)** – It is a digital infrastructure blueprint for India's power sector, envisioned as a Digital Public Infrastructure (DPI).
- The ambitious initiative aims to integrate producers, distributors, and consumers into a connected data ecosystem for smarter energy management and consumer participation.
- **Goals** – It include integrating renewable energy, improving utility efficiency, and empowering consumers with better access to energy services.
- **Technologies used** – The IES will use features like unique digital IDs, *open APIs, and a Utility Intelligence Platform* to connect the entire electricity value chain and enable data-driven innovation.
- This is similar to Unified Payments Interface (UPI).

> ***An API, or Application Programming Interface****, is a set of rules and protocols that allows different software applications to communicate with each other.*

> ***A utility intelligence platform*** *is a data-driven application that collects, synthesizes, and analyzes data from a utility's various systems to provide real-time insights for smarter management.*

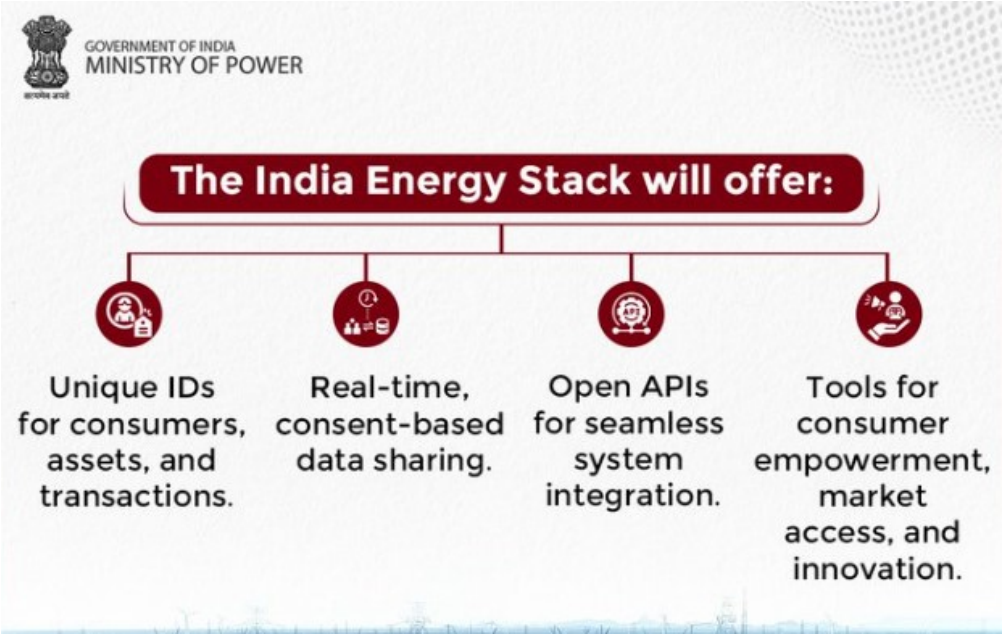
- **Developed by** – The IES initiative is being driven by a high-level task force mentored by Infosys co-founder Nandan Nilekani.

> ***Nandan Nilekani*** *helped to create foundational digital platforms like India Stack, which includes Aadhaar and UPI, and the Open Network for Digital Commerce (ONDC).*

- **Chaired by** – RS Sharma, former Mission Director of Unique Identification Authority of India (UIDAI).
- The, Utility Intelligence Platform (UIP), which is currently in the works, will cover the technology platforms of power utilities across states and is likely to be completed by 2026.

What are the benefits of this ambitious programme?

- **For Consumers** – It will also offer consumers unprecedented *access to a much wider market.*
- It also allows consumers at the retail level to get access to the market in new ways like
  - Ease of selling power through solar rooftops to other users in the grid
  - Trading excess power in the open market through aggregators
  - Using real-time intelligence from their smart meters to manage time-of-day usage
  - Access to modern billing applications.



- **Benefits for DISCOMS** – The national Utility Intelligence Platform (UIP) which is set to be commissioned within a year as a pilot under IES will offer following benefits
  - Allow development of data analytics tools for critical interventions
  - Revenue protection in high loss areas
  - Peer-to-peer energy trading
  - Outage management, among others.
  - Digital reform for a complex sector
- **Increases participants** – Given the overhaul of fundamental operations, the numbers are also set to increase exponentially.
  - **For instance**, the total number of participants at power exchanges, which is currently between 7,000 and 8,000, is projected to rise to millions once consumers start buying and selling power actively.
- **Market creation** – Creation of a larger market for generated electricity will be among the key application areas for IES.
- Whether through P2P trading or allowing consumers to bid on exchanges.

What is the need for India energy stack?

- **Changes in power system** – The Indian power system is going through a fundamental and drastic shift in terms of the flow of data and information.
    - **Conventional systems** - Power used to flow from power plants to consumers through transmission lines and distribution transformers.
    - **Current scenario** – Consumers are also producing their own solar power on rooftops.
- **Decentralization of production** – Power generation has been decentralised through schemes like PM-KUSUM, and smart devices like smart meters, SCADA systems, and electric vehicles have also been plugged into the system.
- **Management of changing landscape** – Managing this new and complex power system efficiently will necessitate efficient use of huge amounts of data that will come from multiple devices belonging to legacy systems.
- The IES, once it is ready, will add a data layer connecting these systems.

What are preconditions for the success of the IES?

- **Data requirements** – IES will require authentic and real-time data on location of devices and the direction of electricity flow, among other parameters, to ensure transactions are not disputed.
- **Addressing the demand patterns** – Major area of change is how the system reacts to demand patterns.
- Under IES, the intelligent grid will decode consumer behaviour to detect load changes.
- **Communication** – This will also require communicating electricity prices to the consumers in real-time.
- So that they can change their load patterns and benefit from low tariffs, while discoms get the information they need for load monitoring.
- **Responsibility on discoms** – Similarly, given the increasing complexity of power generation and supply sources, discoms will need to focus on demand forecasting, power procurement, and network expansion planning well in advance.
- **Grid operations** – They are another key area for IES, since transmission utilities and system operators will require modern systems to manage energy storage and battery devices on the grid, which will impact dispatch and scheduling.

What lies ahead?

- We need to prepare the Indian power system for the modern and complex applications that are currently already happening in the global power markets.
- For the power sector, this technological revamp under IES follows a spate of regulatory reforms implemented over the past few years which have already unclogged many of its traditional bottlenecks.
- The implementation of the Late Payment Surcharge (LPSC) Rules since 2022 has helped bring down discoms' losses, while the Electricity (Right of Consumers) Rules, 2020, provides for consumers to demand quality service from discoms.
- If successful, the IES pilot, the Utility Intelligence Platform, will pave the way for a major overhaul of the power sector, with the possibility of replicating key interventions across the entire energy spectrum.

Reference

Business Standard| India’s Stack and Power Sector

