

# Best Practices in Implementation of Planned Transmission Systems

By : Deepak Tulsi

Sr. General Manager

(Proj Mgmt: 12+ yrs; Business Development:6+ yrs;  
Corporate Planning : 3+ yrs; O&M(765 kV) : 2+ yrs.)

**Power Grid Corporation of India Ltd**

(A Maharatna PSU)

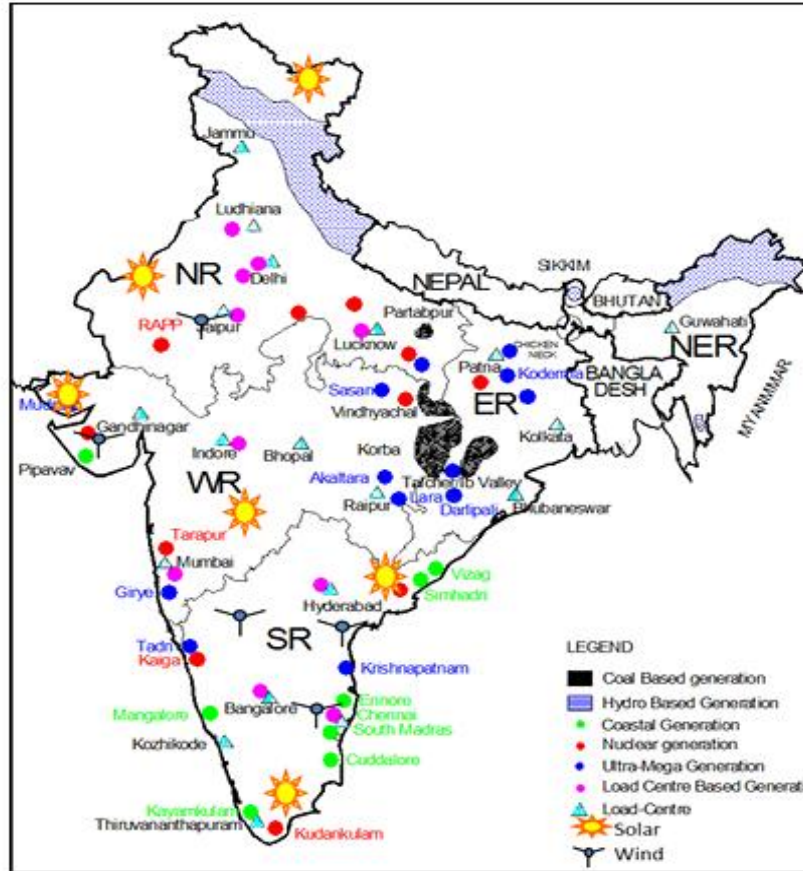
# “Vikshit Bharat@2047”: Macro Indicators

2026

Total Installed Capacity:  
**532.74 GW**

Non-Fossil Fuel Based:  
**283.47 GW**

**1,460 Units in FY25**



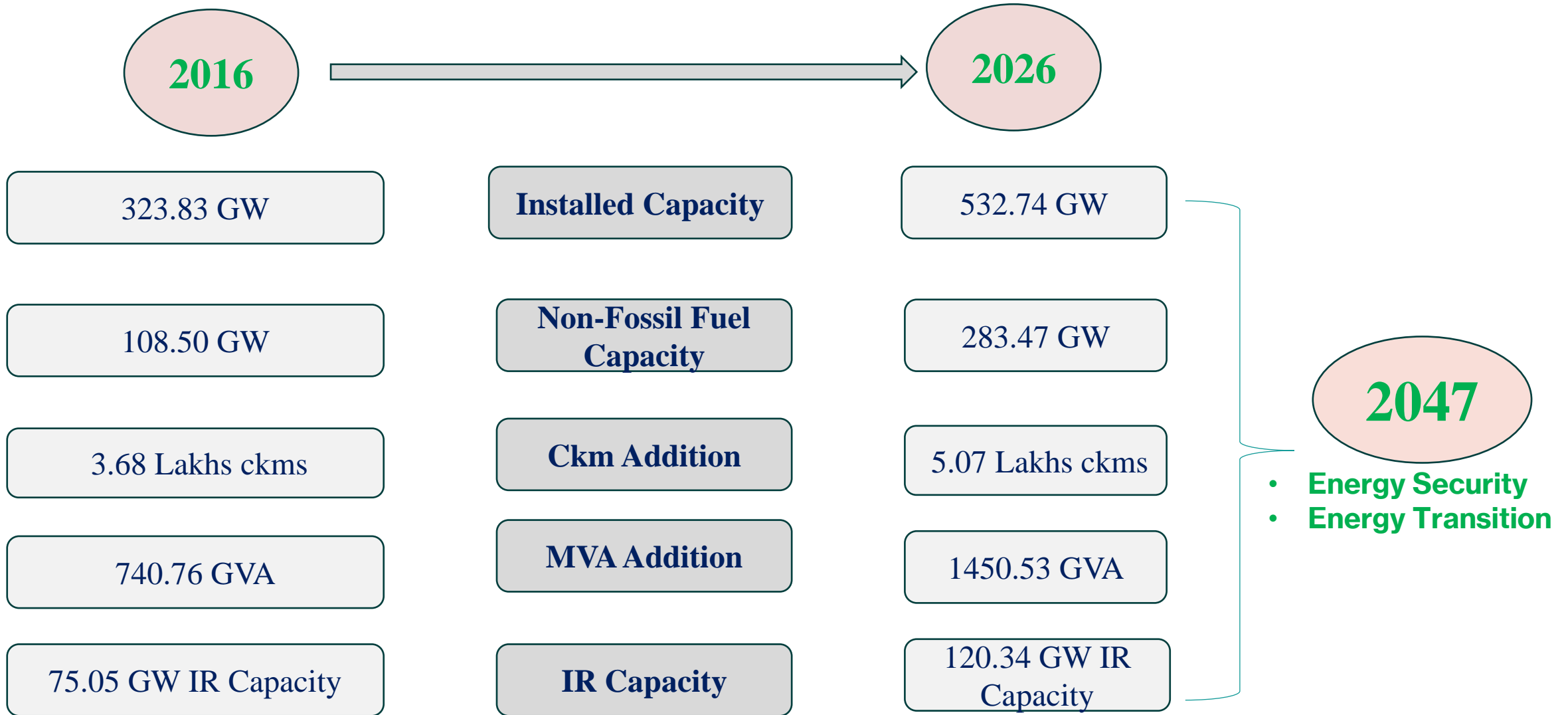
2047

Total Installed Capacity:  
**2100+ GW**

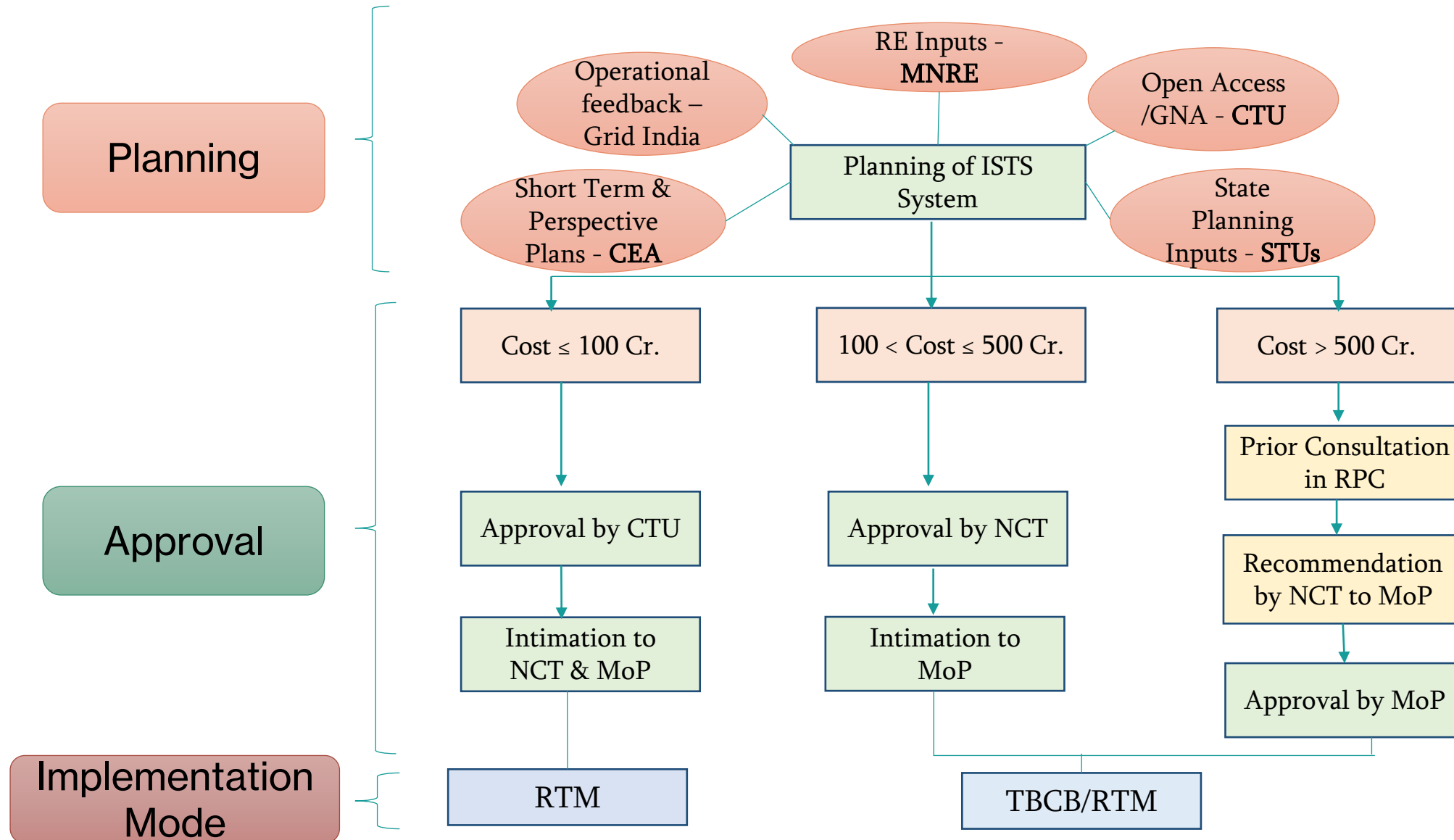
Non-Fossil Fuel Based:  
**1500+ GW**

**Approx 4,000 Units by 2047**

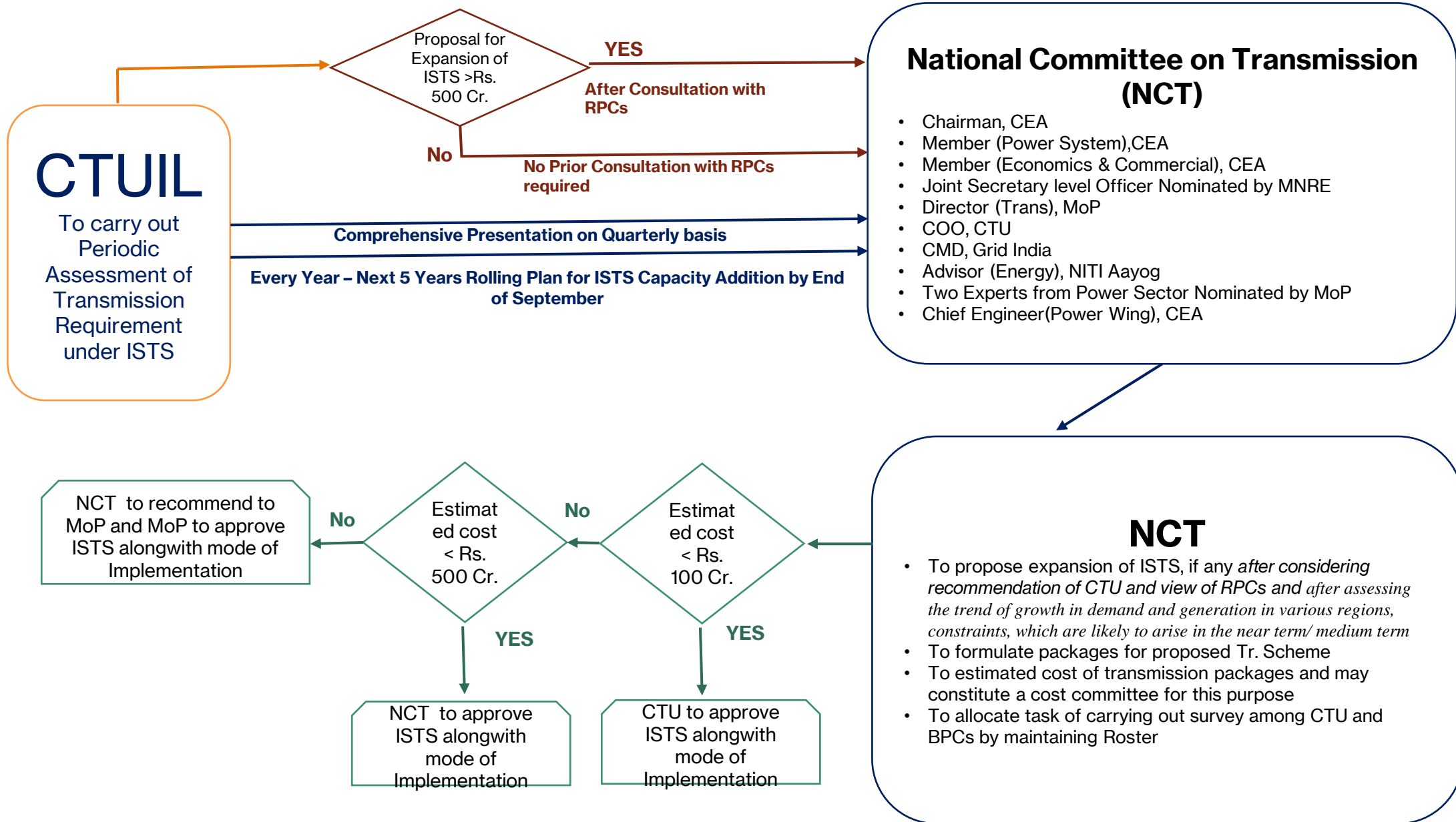
# Indian Power System : “Decadal Performances”



# Transmission System Planning, Approval & Implementation



# Planning of ISTS Network & Origin of Projects



# POWERGRID-India's flagship power transmission utility

**India's largest**  
Transmission utility

*By assets, network length & revenue*

**₹3 lakh crore+**  
Gross Fixed Assets

*On consolidated basis*

**1,84,960 ckm**  
Transmission lines

*1,584 nos. lines*

**6,24,016 MVA**  
Transformation capacity

*291 nos. substations*

**11**  
HVDC Projects

*Pioneer of ±800 kV in India*

**1,01,180 MW**  
Inter-regional (IR) Capacity

*~84% of total IR of the country*

**99.84%**  
System Availability

*Consistently 99%+ availability*

**64 Subsidiaries**

*Post merger\**

**51.34%**  
Govt. of India shareholding

**25.03% | 20.13%**  
FII/ DII Shareholding

\*17 TBCB SPVs merged into 2 existing SPVs.

# “Sustainability” Commitment

## Towards a Greener Future

- On a firm path to become Net Zero organization by 2047
- 50% of electricity consumption from renewable sources by 2025
- Becoming a Net Water Positive organization by 2030
- Achieving the status of "Zero Waste to Landfill" by 2030

### ESG Rating

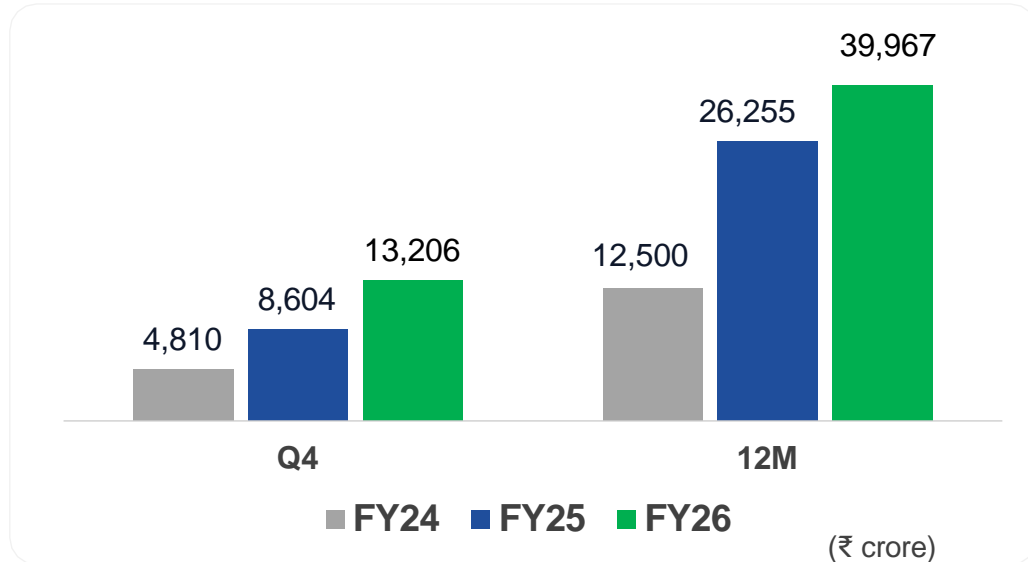
Rating Agency	Rating	Last Updated
Sustainalytics	23.7(Medium Risk)	May, 2025
MSCI	A	December, 2025
S&P Global	41	January, 2026
LSEG	3.5/5	December, 2025
NSE	70	December, 2025
CRISIL	58	September, 2025



# Performance For FY 26:

## CAPEX

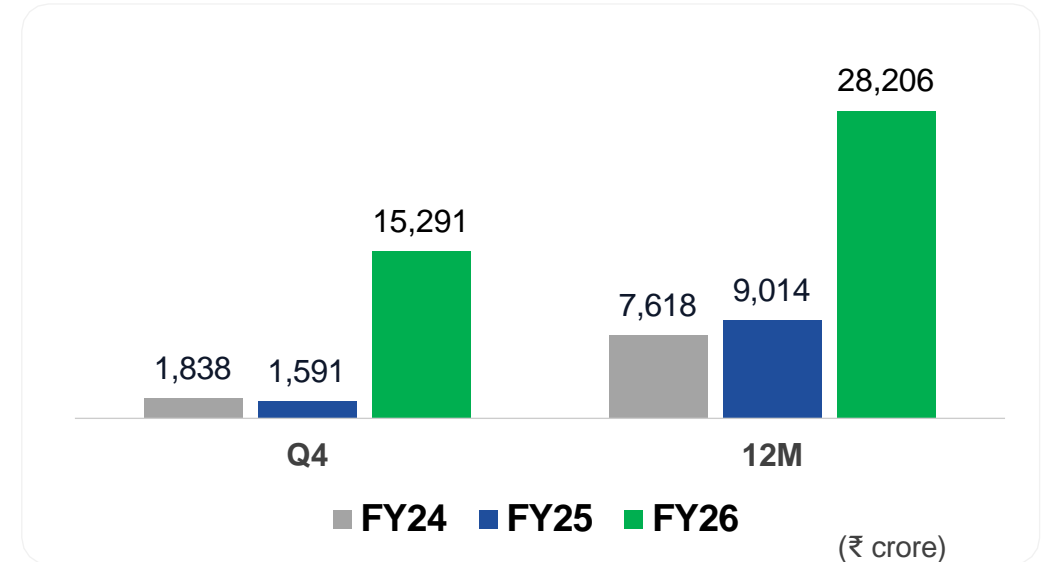
Committed	Delivered
<b>₹35,000 crore</b>	<b>₹39,967 crore</b>



**FY 27 Guidance** ➔ **₹37,000 crore**

## CAPITALIZATION\*

Committed	Delivered
<b>₹25,000 crore</b>	<b>₹28,206 crore</b>



**FY 27 Guidance** ➔ **₹30,000 crore**

# Strategic drivers powering transmission investment cycle

## DOMESTIC

## GLOBAL

01

### ANCHOR PROGRAM

900+ GW Non-Fossil Plan

**~₹7.9 lakh crore**

Till FY36

- CEA transmission plan
- 1,37,500 ckm lines
- 8,27,600 MVA capacity
- ISTS + InSTS + Green H<sub>2</sub>

02

### HYDRO POTENTIAL

Brahmaputra Basin Hydro

**~₹6.4 lakh crore**

~₹1.9 lakh crore till 2035 +

~₹4.5 lakh crore beyond 2035

- ~76 GW across 12 sub-basins
- 42 GW HVDC corridors
- ~31,000 ckm HVDC + AC lines

03

### NEW DEMAND CENTRES

Data Centres & GH2

**~71 GW**

GH2 uplift by 2032

- AI / DC clusters drive 1 GW+ point loads
- GH2 projects already at NCT (Kakinada, Vizag, Tuticorin, ~₹13,103 Cr.)

04

### GLOBAL INTEGRATION

OSOWOG (Long Term)

### Intercontinental & Cross-Border Links

- India ↔ Sri Lanka / Maldives / Myanmar
- India ↔ UAE / Saudi Arabia
- India ↔ Singapore

# MODE:

## RTM

Projects on Nomination Basis

For POWERGRID - No need to Grant of License to (deemed Licensee)

No Requirement of Acquiring New Company

Execution First, Tariff Determination Later (u/s 62 of EA)

Market, Interest Rate, Route Change Risk etc. passed through

Non Completion of project may lead deduction of IDC & IEDC beyond SCoD

Authorization u/s 164 is not required

LD provisions are not applicable

Tariff is fixed by CERC for 5- year block

No requirement of Signing TSA, RSA and Connection Agreement with CTU

## TBCB

Projects on Competitive Bidding Route

License is required from Regulator

Requirement of Acquiring Special Purchase Vehicle

Tariff Determination First, Execution Later (u/s 63 of EA)

No protection against **MOST** of the risks

Non-Completion of project by SCoD leads to levy of LD

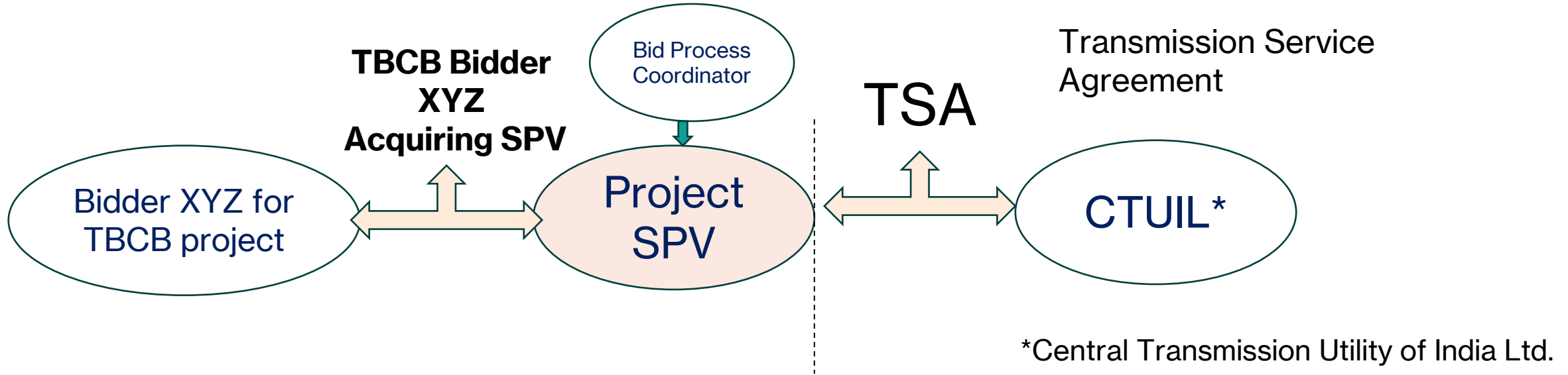
Authorization u/s 164 is required

Quantum of LD and Penalty – More Stringent

Tariff is fixed for full operational file of project ( 35 years)

Agreements are required to signed as per Sharing Regulations

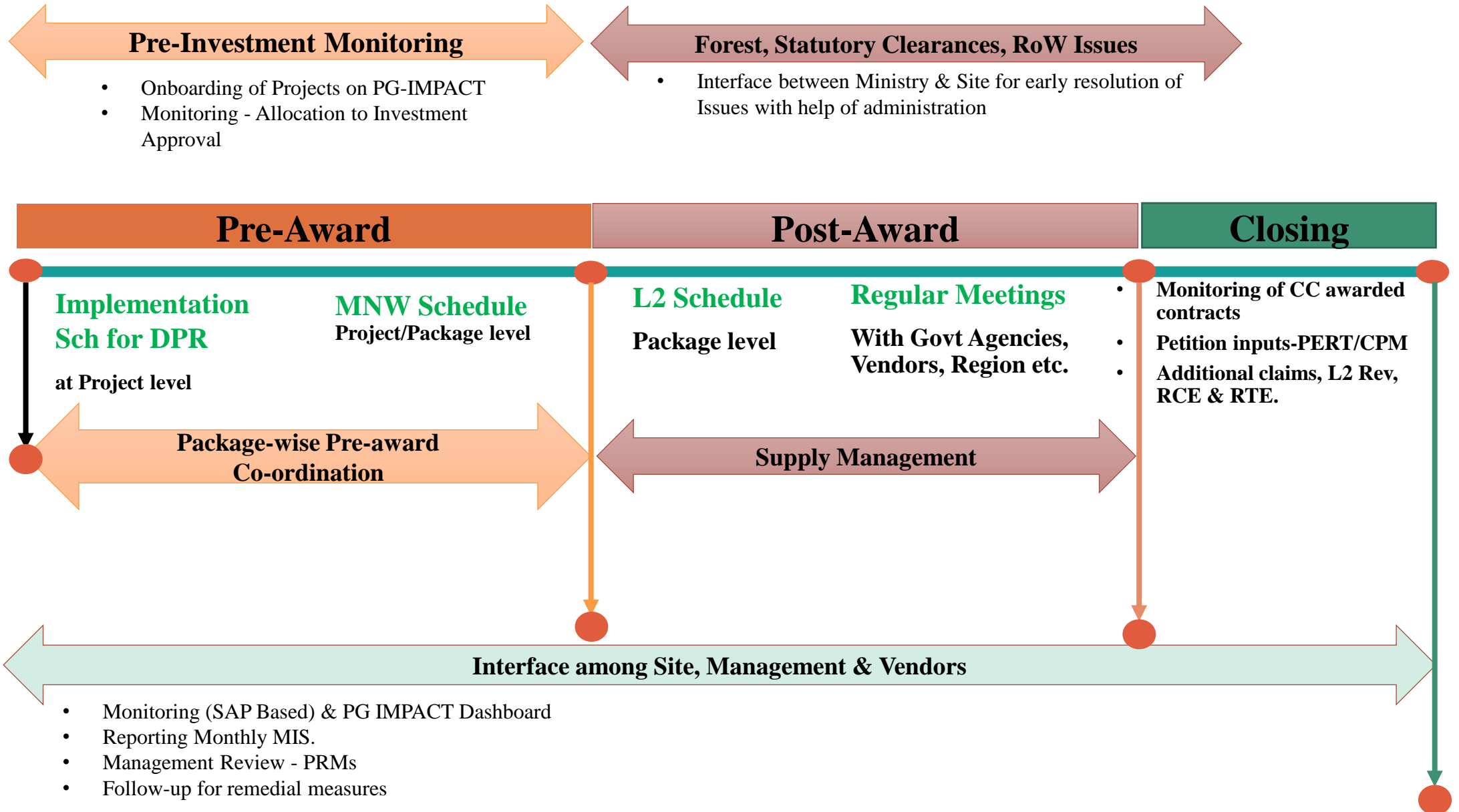
## (A) Tariff Based Competitive Bidding :



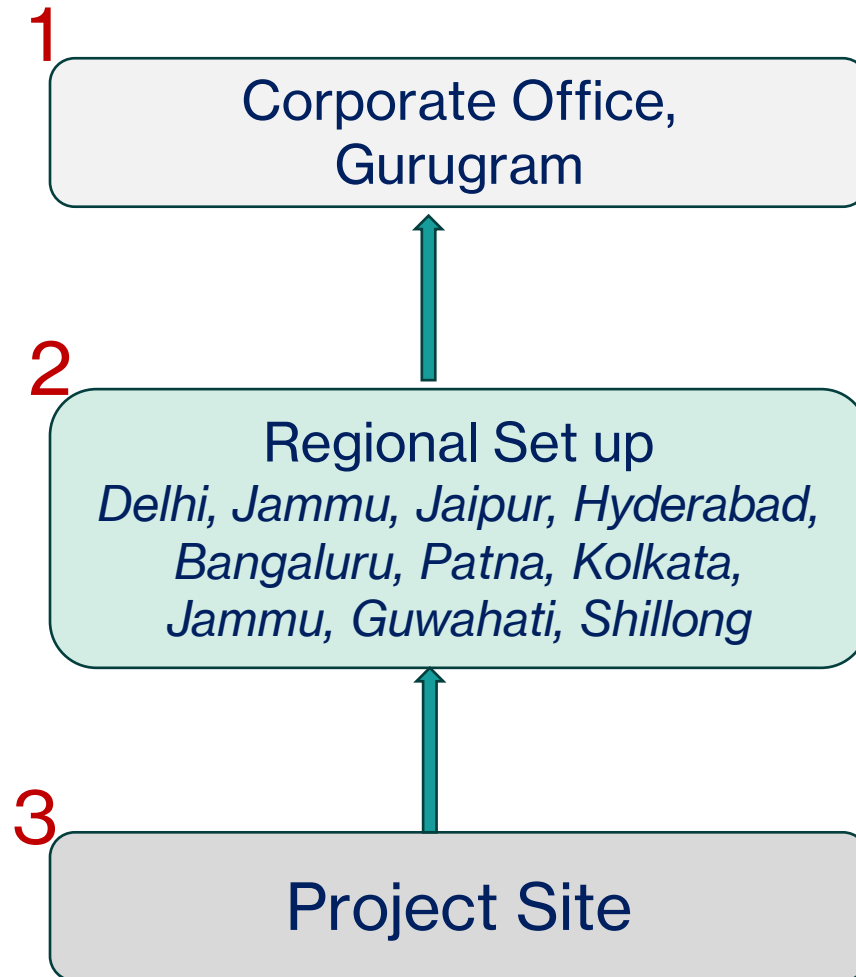
## ( B ) Regulated Tariff Mechanism :

- The projects are assigned to TSP wherein discovery of tariff is carried out after development of project;
- Tariff is determined based on the Tariff Regulation notified by Central Electricity Regulator Commission.

# Project Management Approach:



# Project Management Structure- A 3-tier structure



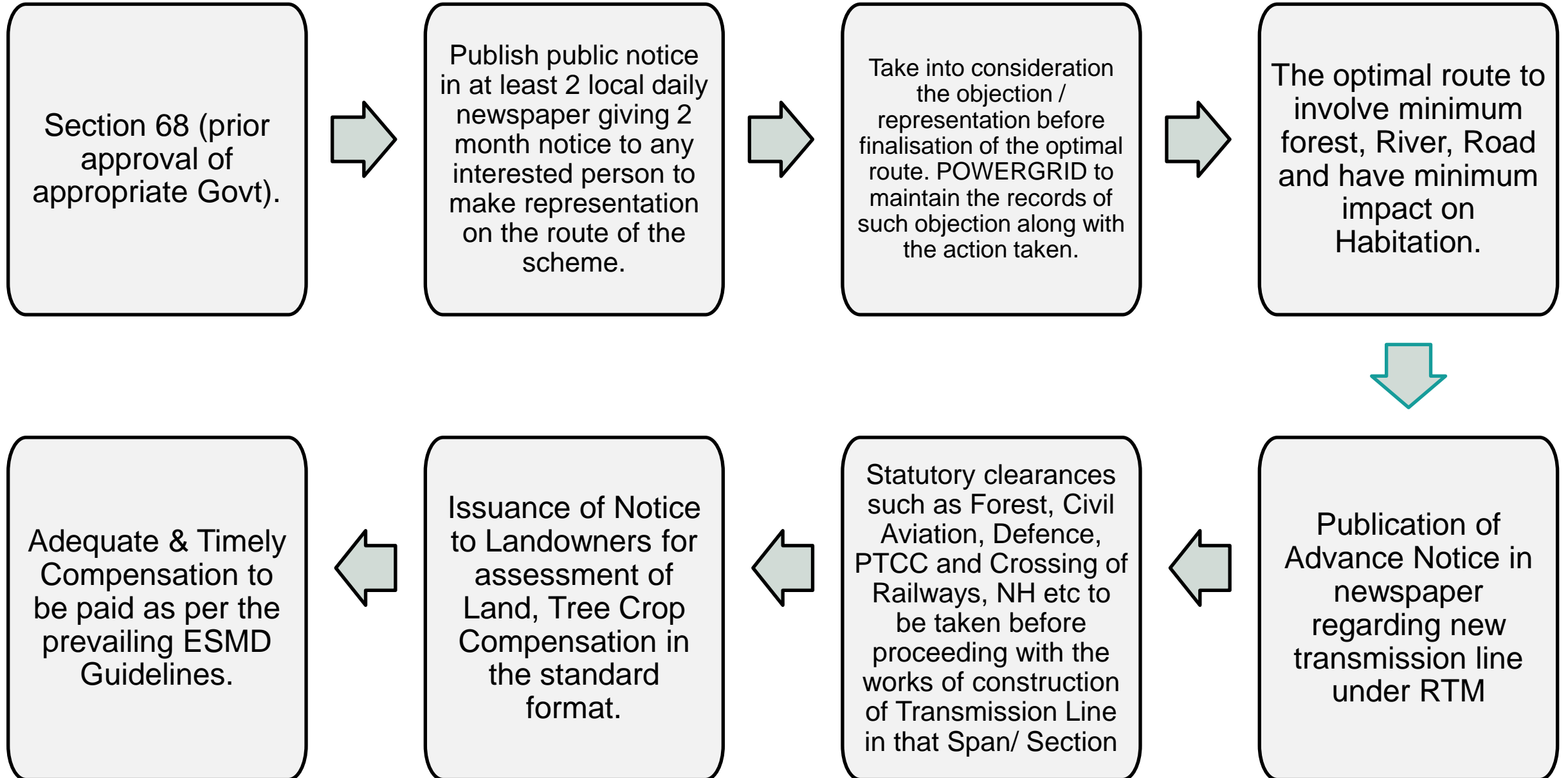
- Pre Tendering & Award of the EPC packages
- Engineering Management
- MNW & L-2 Finalisation.
- Fund tie up ; Stakeholder Management at apex level

- 
- Project Management at macro level.
  - Contract Management with fair degree of delegation ; Tendering for low value project.
  - Stakeholder coordination towards ROW  
Coordination support

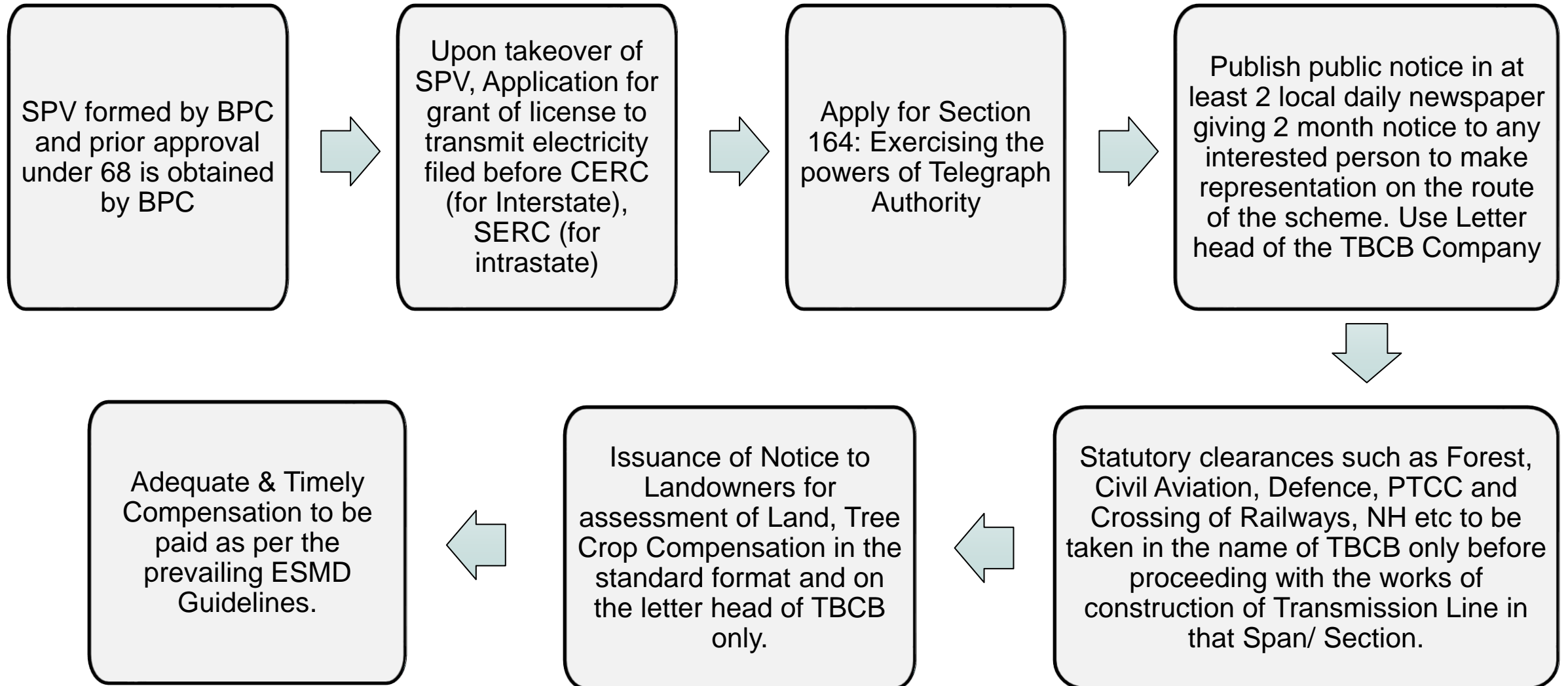
- 
- Site Management/ Project Management
  - Vendor Management; L-3 schedules
  - Contract Management.
  - First response towards ROW Matter.
  - Vendor Bill verification.

# **“Legal FRAMEWORK” for construction of Transmission Lines**

# Stakeholder Management : ROW: RTM Works



# Stakeholder Management : ROW: TBCB Works



# SECTION-164 of EA-2003

## Exercise of powers of Telegraph Authority in certain cases.

- The **Appropriate Government** may, by order in writing, for the placing of **electric lines** or **electrical plant** for the transmission of electricity or for the purpose of telephonic or telegraphic communications necessary for the proper co-ordination of works, confer upon any public officer, **licensee** or any other person engaged in the business of supplying electricity under this Act, **subject to such conditions and restrictions**, if any, as the Appropriate Government may think fit to impose and to the provisions of the Indian Telegraph Act, 1885 (13 of 1885), **any of the powers which the telegraph authority possesses under that Act with respect to the placing of telegraph lines and posts** for the purposes of a telegraph established or maintained, by the Government or to be so established or maintained.

# Indian Telegraph Act' 1885

PART III :Section 10 to Section 19.

- **Section 10:** Power for telegraph authority to place and maintain telegraph lines and posts
- **Section 11:** Power to enter on property in order to repair or remove telegraph lines or posts.
- **Section 12:** Power for local authority to give permission under section 10, clause (c),
- **Section 13:** Power for local authority to require removal or alteration of telegraph line or post.
- **Section 16:** Exercise of powers conferred by section 10, and disputes as to compensation, in case of property other than that of a local authority

**Request being given by POWERGRID to District Collector for Issuance of Order u/s 16(1) for uninterrupted work**

## **RoW : Transmission Line COMPENSATION payments regarding.**

*Section 10 (d) of the Indian Telegraph Act 1885: (d) in the exercise of the powers conferred by this section, the telegraph authority shall do as little damage as possible, and, when it has exercised those powers in respect of any property other than that referred to in clause (c), shall pay full compensation to all persons interested for any damage sustained by them by reason of the exercise of those powers*

*Section 16 (3) : (3) If any dispute arises concerning the sufficiency of the compensation to be paid under section 10, clause (d), it shall, on application for that purpose by either of the disputing parties to the District Judge within whose jurisdiction the property is situate, be determined by him.*

# Facilitating seamless execution of TL:

SC Recognised  
diminution of law on  
Installation of  
Transmission Line

Tower Area: 85%  
Corridor Area 15%.

Tower Area: 200%  
Corridor Area: 30% for entire RoW  
Corridor.

Livisha v. State of  
Kerala (2007)

POWERGRID v.  
Kamlesh Kumar  
Chimanbhai Patel (SC)  
(2013)

Guidelines dated  
15 Oct. 2015

Guidelines dated  
16 July 2020

Guidelines dated  
14 June 2024

Guidelines dated  
23 March 2025

Case which lead to  
Issuance of Guidelines

Only meant for urban areas issued  
in addition to the the Guidelines  
dated 15.10.2015.

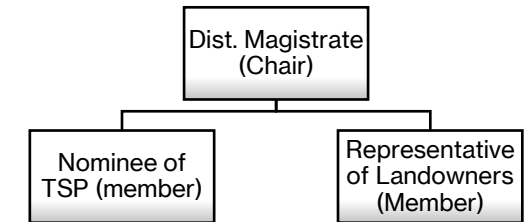
Tower Area: 85%  
Corridor Area: 15%

Non usability Allowance: 15% for  
urban areas (Additional).

Tower Area: 200%  
Corridor Area  
Rural Area: 30%  
Municipal Corporations and  
Metropolitan Areas: 60%.  
Municipalities, Nagar  
panchayats and all other  
urban planning areas : 45%

## Applicability :

- Only on Inter-State Transmission System lines.
- Where landowners have objected that the Circle Rates are below the Market Rates.
- State Government yet to specify the manner for determining the Market Rate



## Formation of Market Rate Committee (MRC):

The market rate of land shall be determined by a Market Rate Committee (MRC) consisting of:

- ▶ District Magistrate/District Collector/Deputy Commissioner or his/her nominee (not below Sub-Divisional Magistrate) - **Chair**
- ▶ Representative of Landowners - **Member**
- ▶ Nominee of ISTS Transmission Service Provider (TSP) – **Member**

*\*\*The District Magistrate/District Collector/Deputy Commissioner may co-opt up to 2 additional members as may be required.*

- Developed in 1998 and further updated in 2005 & 2009.
- Evolved through broader consultation process at National, Regional and Site level involving all major stakeholders
- The primary objective is to integrate sustainable development, environmental protection, and social responsibility into all phases of its power transmission projects. It ensures the company's activities minimize adverse impacts on surrounding communities and the environment.
- Three Pillers of ESPP framework:
  - **Avoidance,**
  - **Minimization, and**
  - **Mitigation.**

## **Environmental and Social Policy & Procedures (ESPP)**

**First company in Asia to come up with well-defined and written E & S safeguard policy**

**First organization in the world, whose safeguard policy (ESPP) has been accepted by two major multilateral agencies like The World Bank & ADB.**



**A dedicated set up at Central Office “ Survey Cell “is ensuring due diligence for optimum & most economical line route.**

## Transmission Line - Route Selection

- Utilization of all available technological resources (GIS & GPS etc.) to optimize route alignment with emphasis on avoidance of forest, National Parks, Wildlife Sanctuary and other ecological sensitive areas even to the extent of adopting more circuitous routes and setting up of state of the art substations en-route.
- While finalizing the route of transmission line, POWERGRID follows the policy of **Avoidance, Minimization and Mitigation** with following parameters:
  - ✓ As a rule, alignments are generally cited 10-15 km away from major towns, whenever possible, to account for future urban expansion.
  - ✓ Similarly, forests are avoided to the extent possible, and when it is not possible, a route is selected in consultation with the local Divisional Forest Officer, that causes minimum damage to existing forest resources.
  - ✓ Alignments are selected to avoid wetlands and unstable areas for both financial and environmental reasons.
  - ✓ In addition, care is also taken to avoid National parks and sanctuaries and any other forest area rich in wild life.
- For selection of optimum route, the points such as avoidance of human displacement/rehabilitation, any monument of cultural or historical importance, tribal community area, any public utility services, **National Parks, Sanctuaries, area of natural resources etc.**
- In order to achieve this, POWERGRID undertakes route selection for individual transmission line in close consultation with representatives of concerned Forest Department and the Department of Revenue.

# Forest Clearance: Timelines

Head Extent of Forest Area	No. of Days			
	<5 ha	5-40 ha	40-100 ha	>100 ha
<b>PRIOR TO IN-PRINCIPLE APPROVAL</b>				
STATE GOVT LEVEL	30	70	90	100
RMoEFCC LEVEL	15	35	50	50
<b>TOTAL FOR IN-PRINCIPLE/ STAGE-I APPROVAL</b>	<b>45</b>	<b>105</b>	<b>140</b>	<b>150</b>
<b>AFTER IN-PRINCIPLE APPROVAL</b>				
STATE GOVT LEVEL	25	25	25	25
RMoEFCC LEVEL	20	20	20	20
<b>TIME FOR STAGE-II APPROVAL</b>	<b>45</b>	<b>45</b>	<b>45</b>	<b>45</b>
<b>GRAND TOTAL FOR STAGE-I AND II</b>	<b>90</b>	<b>150</b>	<b>185</b>	<b>195</b>

- Any Reserve Forest (RF)/ Protected Forest (PF) land, which has been notified under Indian Forest Act, 1927, falling within the RoW of the Transmission line;
- Any Area which is recorded in Revenue Records held by Govt. as Forest;
- Any Area which is notified as forest land as per any local/ State Act;
- Deemed/ un-classed forest area such as Oran land, community forests etc.;
- Strip plantation along the Road/ Canal crossing declared as Protected Forests in 6 states viz. Punjab, Haryana, Gujarat, Rajasthan, Uttar Pradesh, Bihar.

**A dedicated team centrally located at Corporate Office scrutinizes each proposal before submission to avoid any discrepancies.**

# Digital Ecosystem for Project Management



## Driving Digital Transformation Across the Project Lifecycle

- POWERGRID has developed an integrated digital ecosystem that connects people, processes, and technology to enable data-driven project execution and decision-making.

## Key Digital Platforms & Initiatives

- **IMPACT** – Integrated Monitoring Platform for real-time project management and control.
- **SAP/ERP** – Enterprise-wide integration of finance, procurement, contracts, inventory, and project data.
- **PG Nirmaan** – Mobile-based field monitoring and progress reporting platform.
- **Project Monitoring Center (PMC)** – Centralized monitoring through dashboards, analytics, and alerts.
- **Business Intelligence & Analytics** – Real-time insights for faster and informed decision-making.

**Digital Hindrance Register**

**PG NIRMAAN**  
Real time Data updation using Mobile application

**Contract closing port**

**Bill**

**E-PROCUREMENT PRANIT PORTAL**

**DREAMS**

**ICMS PORTAL**

**SAP**

**PS**  
**Planning & Physical Progress data**

**Project Monitoring Control Center**

**PG impact**

**Unified control and seamless data integration in PG I**

**POWERGRID & TECH PARTNERS TEAM**  
**Digital Transformation**

**POWERGRID CISO & Cyber Security team**

**GIS Based Progress Report**

**Project Mgmt. Data Analytics team**

**AI Chatbot with tech partner**

**CHATBOT**

**(Future Technology Integration)**

**AI BASED MECHANISM FOR PROJECT HEALTH INDICATOR**

**(Future Technology Integration)**

### PG NIRMAN

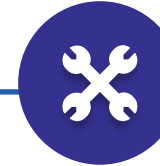
- Progress (Both SS and TL)
- TL L3 Level Planning
- Issues (Both SS and TL)
- RoW / WIP / Front Avlb
- Resources (m/p & t&p)
- TL-FQA Forms
- Supply Status
- SS-FQA Forms (Future)



TL Progress Dashboard



System Generated Agenda



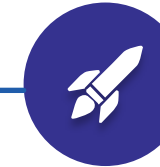
Automated MIS Reports



Vendor Performance Assessment



Substation Progress Dashboard



Digital TL SFQP Formats Repository

Single Interface to update



TL Vendor review meetings being done through System generated agenda.

# System Generated Reports



(System generated Pictorial chart)

**OLiK Analytics app** | Sheet | 6. TL Physical Progress V2

**TL Progress Dashboard** (Last updated on: 4/25/2026 8:02:50 AM)

Project Category: Region: Company: Project: Line Name: Package: Vendor: Line Category:  In-Progress  Completed **Next Sheet**

No. of Projects: **38** | No. of Transmission Lines: **75** | No. of TL Packages: **131**

TOWER FOUNDATION		TOWER ERECTION		STRINGING	
Total/Done/Bal:	25,744 / 16,341 / 9,403	Total/Done/Bal:	25,744 / 11,647 / 14,097	Total/Done/Bal:	10,609.80 / 1,923.43 / 8,686.37
ROW/Front Avbl/WIP:	2111 / 1051 / 424	ROW/Front Avbl/WIP:	414 / 970 / 226	ROW/Front Avbl/WIP:	163.05 / 198.41 / 125.57
Gangs (Tot/PG/Cont):	289 / 2 / 287	Gangs (Tot/PG/Cont):	265 / 13 / 252	Gangs(Tot/PG/Cont):	92 / 9 / 83

**Foundations Trend** Done in FY 2026-27: 558

**Erections Trend** Done in FY 2026-27: 658

**Stringing(km) Trend** Done in FY 2026-27: 163 km

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Project: Ph IV 1A BIKANER III NEEMRANA Td Ltd  
 Region: Rajasthan Projects  
 L2 Schedule: 01.03.2024 to 31.10.2025 | Anticipated Completion: 30.06.2026

	Total	L2P till date	Done	Balance	ROW	WIP	Front avbl	Total Gangs	Ven Gangs	PG Gangs
Foundation	86	86	81	5	0	1	2	0	0	0
Erection	86	86	62	24	0	1	18	0	0	0
Stringing (km)	31.23	31.40	0.00	31.23	0.00	0.00	8.33	0	0	0

**Next 4 Months Progress**

	January	February	March	April
Foundation	2	6	1	0
Erection	9	7	0	0
Stringing (km)	0.00	0.00	0.00	0.00

**Planned Locations**

	Planned	Completed	WIP	Not Started
Foundation	5 locations 7/0,7A/1,8/0,13/3,13/3	1 locations 13/6	4 locations 7/0,7A/1,8/0,13/3	19 locations 1/1,3/0,9/0,10/0,11/0,11/0,11/8,11/9,11/11,0,11/11,13/2,13/3,13/4,13/6,13/8,15/4,15/5,16A/2,17/1
Erection	19 locations 1/1,3/0,9/0,10/0,11/0,11/0,11/8,11/9,11/11,0,11/11,13/2,13/3,13/4,13/6,13/8,15/4,15/5,16A/2,17/1	9 locations 14/0,15/0,16/0,16A/0,16B/0,16B/0-17/0,17/0,17/0,18/0,18/0-19/0,19/0,20/0,20/0-21/0	19 locations 14/0,15/0,16/0,16A/0,16B/0,16B/0-17/0,17/0,17/0,18/0,18/0-19/0,19/0,20/0,20/0-21/0	19 locations 14/0,15/0,16/0,16A/0,16B/0,16B/0-17/0,17/0,17/0,18/0,18/0-19/0,19/0,20/0,20/0-21/0

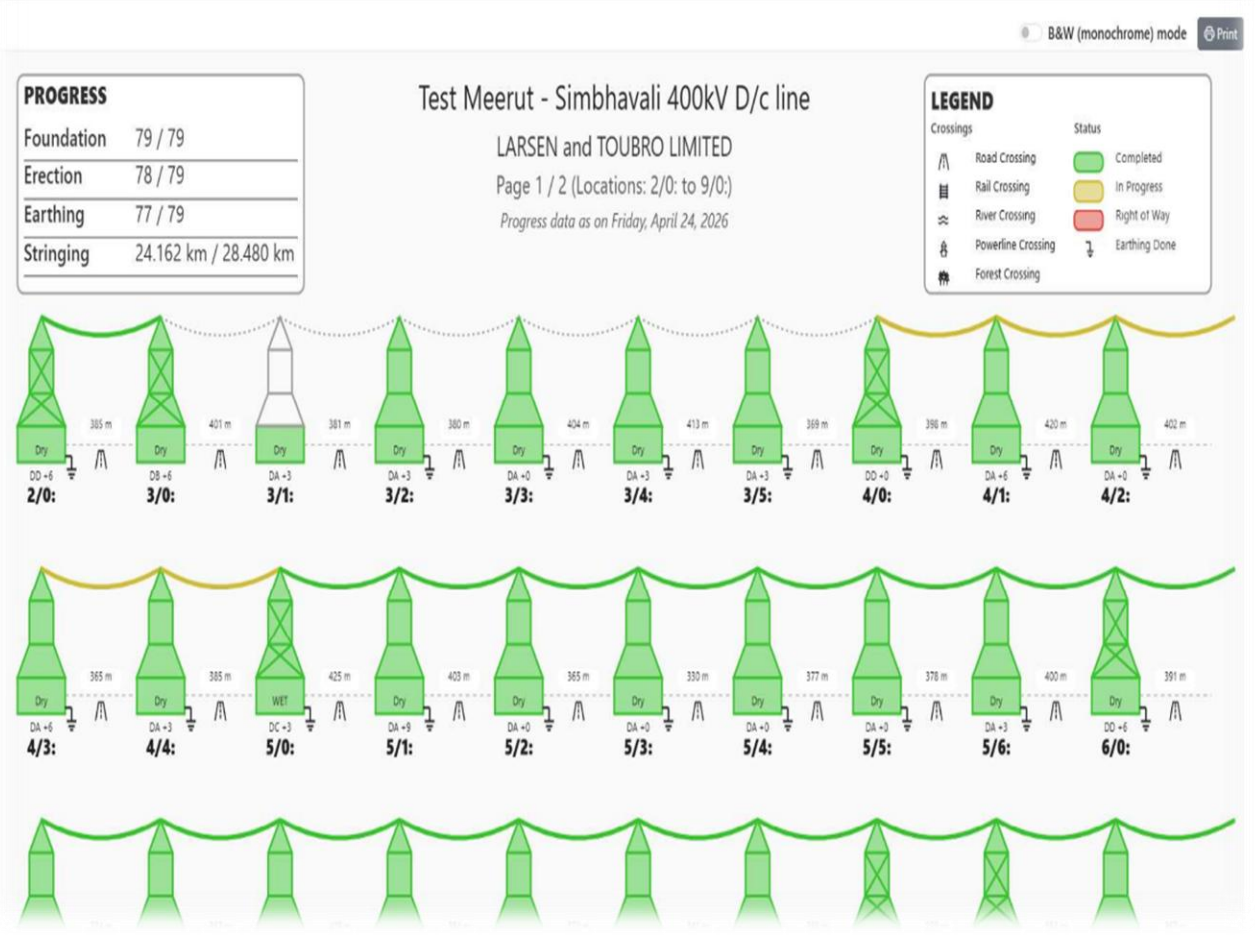
**Issues**

S.No.	Issue Type	Issue Description	Current Status
1.	Supply	Supply of balance stub and Towers to be expedited	Supply of balance 8 towers out of 86 to be expedited
2.	Others	Land Scheduling of Jaimalsar and Kawani villages to be submitted (AP-1 to 13/6, 12 km)	Not submitted yet
3.	Supply	Balance Supplies (Bal/Total) (Make): a) Stub: b) Tower: c) Conductor: d) Insulator: e) Hw Fittings: f) Earthing: g) OP:GW	Balance Supplies (Bal/Total) (Make): a) Stub: 0/86 Nos. (TLL), b) Tower: 9/80 Nos. (TLL), c) Conductor: 164/739 km (Cacon, TLL), d) Insulator: 250/2151 Nos. (SparK), e) Hw Fittings: 25/100% (Nike) f) Earthing: 0/31.366 km (UIC Udyog Ltd), g)OP:GW: 1.366/31.366 km (Sterliffe)
4.	Statutory Clearances	(Total/Submitted/Approved): a) Power Line Xing: b) NH Xing: c) Railway Xing: d) Defense: e) Civil Aviation: f) PTC: g) Forest (0.4429 Ha): h) Sec-164:	(Total/Submitted/Approved): a) Power Line Xing: 9/9/9, b) NH Xing: Nil c) Railway Xing: Nil d) Defense: NOC Received e) Civil Aviation: NOC Received f) PTC: NOC Received g) Forest (0.4429 Ha): Stage-II clearance received on 24.11.2025, h) Sec-164: Received on 18.04.2025

**Gangs Commitments:**

S.No.	Chaired by	Foundation	Erection	Stringing Manual	Stringing TSE
1.	ED Rajasthan Projects on 16.03.2026		5 by 23.03.2026		4 by 20.03.2026
			Actual: OV + DP		Actual: OV + DP

Visual Chart



# Centralized supervision through Digital means:

(National Project Management Control Centre) :



- Ensuring seamless “ON TIME” data through systemic transformation in data acquisition for pro active intervention by internal stakeholders
- Better understanding of project challenges on real time.
- Critical locations in transmission lines assisted with CAMERAs.

# Key Challenges in Transformer and Reactor Procurement



## Procurement Cycle Uncertainties

Project-specific procurement leads to irregular cycles, causing production planning difficulties and increased lead times.

## Demand Concentration Challenges

Uneven demand across voltage classes forces frequent production line changes and suboptimal manufacturing capacity use.

## Supply Chain Volatility

Post-pandemic shortages of key materials and logistical disruptions increase costs and delay equipment availability.

## Execution Timeline Pressure

Compressed schedules due to renewable targets strain procurement, causing bottlenecks and project delays.

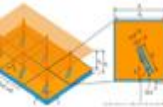
# “Bulk Procurement” of Transformers/Reactors, SS Eqp



**Governance Framework and Rolling Fund Mechanism**



**Demand Estimation and Forecasting Model**



**Design Standardization and Inter-Project Flexibility**



**Surplus-Deficit Management Model**



**Framework Agreements and Vendor Engagement**



**Flexible Logistics and Delivery Management**



**Digital Enablement and Supply Chain Visibility**



**Optimum Allocation Strategies**



# Benefits of POWERGRID's Implementation



## Lead Time Reduction

Bulk procurement framework enables substantial lead time reduction via pre-established agreements and reserved manufacturing capacity.

## Improved Price Discovery

Aggregated demand encourages competitive supplier responses, improving price discovery over fragmented project-level tenders.

## Enhanced Manufacturer Collaboration

Stronger relationships with manufacturers foster better technical collaboration and responsiveness during emergencies and urgent projects.

## Digital Procurement Governance

Integration with ERP and platforms like IMPACT enables workflow tracking, quality control, transparency, and reduces manual delays.

# Large Scale Transmission Capacities :

(Scarcity of skilled gangs-Tower erection & Stringing) – A Paradox

## SKILL DEVELOPMENT CENTRES (SDCs) -



- Established Skill Development Centres at four locations, (Resource Rich Areas):
  - Malda(West Bengal),
  - Banka(Bihar),
  - Bassi(Rajasthan) &
  - Rajgarh/Itarsi(MP).
- **COURSE DURATION** – 3 Months (90 DAYS) Per Batch
- **BATCH SIZE** – 50 Nos. trainees each batch.
- **TARGET** : 2500 Nos.

**(More than 600+ made available to Sector)**

**Supplementing efforts of EPC contractors and ensuring skill ready capacity building for entire transmission sector**

# Monitoring of Infrastructure projects by Govt:

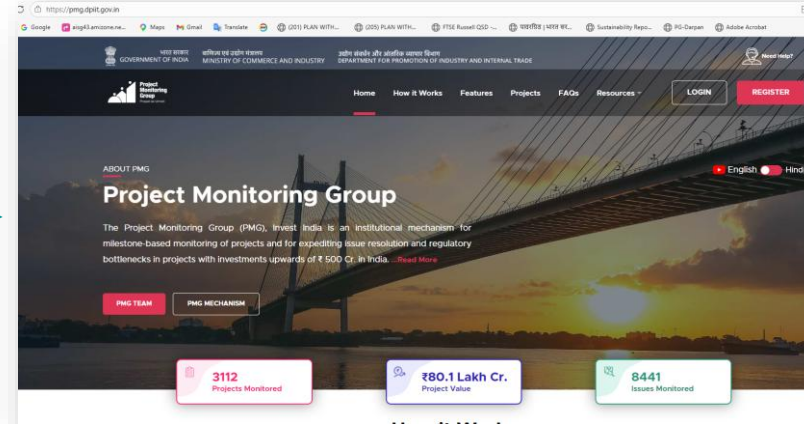
{Infra Creation – A Collective responsibility}

## Key Advantages:

- Effective Oversight.
- Faster response from all project Stakeholders.
- Public & Private
- **PRAGATI** : Pro-Active Governance and Timely Implementation

>Rs.500 Cr)

Automatically



**Projects > Rs.500 Cr migrate to PMG**  
(<https://pmg.dpiit.gov.in>)

- Up-dation of PMG issues done for respective project.
- **Monitoring at APEX Level.**



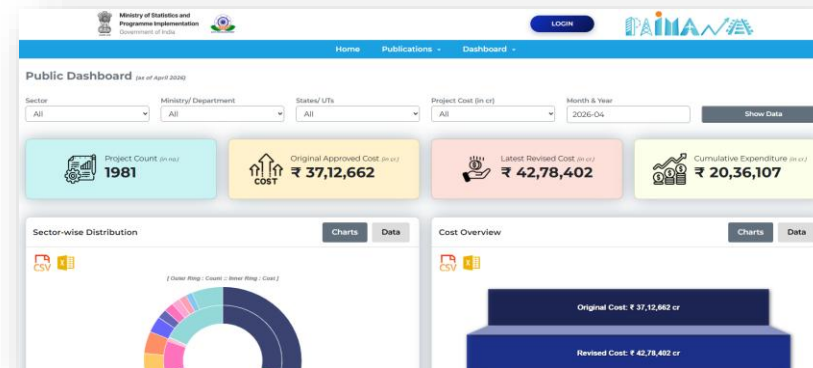
Automatically

>Rs.150 Cr)

## IIG Portal

Cumm. Physical Progress (%)	Actual Expenditure in current Month (Cr.)	Anticipated completion date if revised
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**All infra structure projects > Rs.100 Cr**  
(<https://indiainvestmentgrid.gov.in>)



**Projects > Rs.150 Cr migrate to PAMANA**  
(<https://paimana-proj.mospi.gov.in/>)

**Thank You.**