



# Catalogue of Research Reports on Infrastructure Sectors

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# ABOUT US

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**India Infrastructure Research** is a division of India Infrastructure Publishing Private Limited, a company dedicated to providing information on the infrastructure sectors through magazines, conferences, newsletters and research reports.

**India Infrastructure Research** publishes research reports in the areas of power, oil & gas, ports & shipping, roads & bridges, telecommunications, aviation and water.

Our reports are acknowledged as high-quality, user-friendly, up-to-date, accurate and comprehensive sources of information. They range from sector overviews (**Power in India**, for example) to more intensive studies of segments and subsegments (such as **Power Transmission in India** and **Power Distribution in India**).

Our clients include most organisations involved in the infrastructure sectors – multinationals, top Indian corporates, commercial and investment banks, consulting companies, public sector companies, government agencies, multilateral agencies and legal firms.

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There is a rising popularity among developers, especially renewable energy players, to go for third-party direct sale agreements. States of Karnataka, Tamil Nadu, Andhra Pradesh and Telangana in the southern region of India and Rajasthan, Punjab and Haryana in the northern region of the country are fast catching up with open access transactions. But there are significant challenges in the growth of this segment, especially those pertaining to discoms' resistance to let go of their high-end consumers.

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- Industry Experts' Opinions and Recommendations

**3. EXISTING OPEN ACCESS POLICY AND REGULATORY SCENARIO . . . . .**

The policy and regulatory framework in this space is currently highly dispersed and varied across states, and is not even stable over the years. There is always a risk of open access charges changing year on year, making it a risky proposition to invest in.

- Overview of Open Access Charges and Losses: For Solar Projects, For Wind Projects
- Model Regulations for Intra-state Open Access and Group Captive
- State-wise Orders of Open Access/Group Captive
- State-wise Implementation Status Overview
- State-wise Power Demand and Supply Overview
- RPO Trajectory for Open Access Consumers
- Key Issues and Challenges

**4. INDUSTRY STRUCTURE AND BUSINESS MODELS . . . . .**

The industry structure in the renewable open access segment has been emerging gradually with more number of players entering into this space. Project developers and investors are currently cautious of investing significantly in this segment, but the trend is now changing.

- Power sale options: Bilateral, Collective, REC
- Industry Structure
- Key Players and Capacities: Solar Segment, Wind Segment
- Risks and Concerns

**5. TERMS OF THIRD-PARTY POWER SALE CONTRACTS . . . . .**

It is important for both the buyers and sellers to clarify and list out their expectations and accordingly draw up the commercial power sale contract as per the applicable regulatory framework in the respective state.

- Time Period
- Extension Provision
- Tariff and Escalations

- Provision for Changes in Regulatory Charges
- Penalties
- Legal Terms

**6. ROLE OF ENERGY BANKING, F&S AND DEVIATION SETTLEMENT MECHANISM . . . . .**

Energy banking will play a key role in the success of solar and wind power-based open access projects. Banking is presently allowed by SERCs upon the levy of a banking charge, which differs in magnitude across states.

Rules around energy banking are specified in different types of documents in various states. Additionally, various attributes of the energy banking framework also differ across states.

- State-wise Energy Banking Mechanism for Open Access Projects: Banking Charge, Banking Period, Buy-back Rate, Restrictions on Time of Injection, Withdrawal of the Banked Energy, Other Attributes (seasonality constraints, buy-back rates, accounting for RPO, etc.)
- State-wise Emerging Energy Banking Framework
- State-wise Forecasting and Scheduling
- Deviation Settlement Charges

**7. STATE PROFILES . . . . .**

This chapter will include profiles of Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, Gujarat, Rajasthan, Madhya Pradesh, Telangana, Uttar Pradesh, Chhattisgarh, Haryana, Delhi, Punjab, etc.

- Open Access Charges and Exemptions for Solar and Wind Power: Transmission Losses, Distribution Losses, Wheeling Charges, Cross Subsidy Surcharge, Additional Surcharge, Reactive Energy Charges, Standby Charges, Banking of Surplus Solar Power, Scheduling of Power, Energy Metering
- Key Players and Capacities: Overall Solar, Solar Open Access, Overall Wind, Wind Open Access
- Landed Cost and Return Analysis
- Process and Approvals for Open Access Projects
- Key Industrial and Corporate Clusters: Existing, Upcoming

**8. PROJECTED OPEN ACCESS MARKET . . . . .**

Over 2 GW of green power is being sold to big corporates through direct agreements and the trend is northbound as more and more corporates and industries are joining in the race. The business case for renewable energy based open access is getting stronger with the decreasing cost of green power and increasing cost of thermal power.

- Short-term (2019-23) and Long-term (2024-28) Projections
- Renewable-based Open Access Capacity Projections
- Open Access Projected Tariff and Pricing Trends
- IRR Projections
- Future Growth Drivers
- Expected Market Restraints

**EXPERT OPINION . . . . .**

The report will feature 5-8 interviews of senior representatives at regulatory commissions, large open access consumers and key open access project developers, and experienced industry consultants

*The report is available in a PDF format.*



### EXECUTIVE SUMMARY

With the growing demand for power in urban areas and industries, underground cable systems are becoming an increasingly indispensable part of power transmission and distribution systems. With improved technologies and increased reliability, the cost differential between underground cables and overhead power lines is narrowing and utilities are acknowledging the benefits associated with underground cabling. This report will attempt to take a look at the key trends in the deployment of underground cables so far; analyse the plans and proposal of T&D utilities; examine new and evolving technology improvements and solutions being offered by the industry; as well as assess the key issues and challenges.

### 1. T&D INDUSTRY OVERVIEW

The T&D industry has been growing steadily with investments being made in system strengthening and capacity additions. This chapter gives an overview of the T&D industry and will focus on:

- Growth and Size of Existing T&D Networks
- Recent T&D Network Additions
- Projected T&D Network Additions
- Projected Capex (till 2022-23)
- Future Outlook
- Issues and Challenges

### 2. MARKET SIZE AND GROWTH FOR UNDERGROUND CABLES

Most of India's T&D network continues to be strung overhead across the country; however, concerns about reliability and quality of supply are making utilities gradually replace their networks with underground lines. This chapter gives an overview on the new and emerging utility requirements in the underground cabling segment and will cover the following:

- Experience so far in T&D Networks
- Emerging Utility Requirements
  - Transmission
  - Distribution
- Major Projects Commissioned
  - Transmission
  - Distribution
- Major Projects Awarded/Under Construction
  - Transmission
  - Distribution
- Key Recent Tenders
- Issues and Challenges

### 3. RECENT TRENDS AND ADVANCES

Well-designed and well-installed underground cable systems are expected to have a service life of 30-40 years. Utility providers, transmission companies and cable manufacturers are hence, looking for new technologies and solutions to respond to new grid challenges. This chapter looks at the new and promising technologies, designs and solutions for underground cable networks.

- Design, Laying and Construction Processes
- Product and Technology Trends
- Market Trends and Developments (JVs/Acquisitions/Partnership Deals)
- Pricing and Cost Trends

### 4. OPPORTUNITIES UNDER KEY CENTRAL/STATE GOVERNMENT PROGRAMMES

Underground cables are an important part of several central government initiatives for improving T&D networks under IPDS. This chapter provides the details of plans and targets of works proposed to be taken up under various schemes.

- Snapshot of Key Government Programmes (IPDS, Green Energy Corridors, State Government Initiatives, etc.)
- Physical Targets for UG Cabling Works
- Funding Availability for UG Cabling Projects
- Issues and Concerns

### 5. OPPORTUNITIES UNDER SMART CITIES MISSION

The Smart Cities Mission offers significant opportunities for underground cabling in key cities. Some cities such as Indore, Belagavi, Dharamshala, Lucknow, Kanpur and Tirupati are implementing projects for setting up underground cabling network for utilities such as electric wires, water pipelines, stormwater drains, sewers and telecommunication cables. This chapter provides the details of plans and targets of works proposed to be taken up under various schemes.

- Snapshot of the Mission
- Physical Targets for UG Cabling Works
- Projects Completed so Far in Key Cities
- Projects Under Construction/ Awarded
- Proposed Projects
- Issues and concerns

### 6. OUTLOOK AND PROJECTIONS (till 2022)

This chapter will give a snapshot of the investments and physical targets proposed for underground cabling networks by transcos and discoms. The information presented in this chapter is based on both primary and secondary information collected from transcos and discoms.

- Growth Drivers for UG Cabling
- Expected Demand for UG Cables
- Plans and Targets of Utilities by Segment
  - Transmission
  - Distribution
- Budgeted Capital Expenditures on UG Cabling
- Future Outlook

### 7. LEADING PLAYERS

This chapter primarily focuses on the profiles of key vendors and technology providers for underground cabling. Each profile covers the following information:

- Brief Company Overview
- Key Product Offerings
- Existing Manufacturing Capacity
- Financial Performance
- Future Plans

*The report is available in a PDF format.*

## Changing Landscape, Growing Role of Digitisation and New Opportunities

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**1. EXECUTIVE SUMMARY**

Solar plants are built to last 20-25 years. After the engineering procurement and construction period is completed, developers need to ensure that the operations and maintenance (O&M) activities are seamless for sustained energy generation over the project lifetime. The report will highlight the emerging opportunities in this space and the growing role of new technologies like automation and artificial intelligence.

**2. MARKET OVERVIEW**

In the initial years of solar power development in India, O&M was often coupled with EPC and performed by the same vendors, but of late, solar O&M has emerged as a separate market with its own landscape, trends and dynamics. This chapter will cover the following areas:

- ❖ Current size of the solar O&M market
- ❖ Market size by segment
  - Utility-scale, Rooftop, Canal-top & floating solar
- ❖ Key growth trends and drivers
- ❖ O&M Evolution - Reactive to Predictive Analysis
  - Applications in solar O&M, Cost and time savings
- ❖ Emerging Role of Energy Storage
- ❖ Key issues and concerns

**3. COST TRENDS**

The cost of O&M services has been declining over the past few years and the downward trend is expected to continue. The cost composition itself is changing due to greater automation and use of advanced tools. This chapter will cover the following areas:

- ❖ Solar O&M cost trajectory (2012-18)
- ❖ Cost breakup analysis
  - Vehicles and logistics, Equipment and tools, Overheads, Personnel/ Manpower, Digital, Others
- ❖ Cost projections (2019-24)
  - Business model evolution, Key cost considerations, Impact of scale, Impact of energy storage, Future cost estimates

**4. EMERGING O&M BUSINESS MODELS**

Globally, there has been a rise of third party solar O&M service providers. As more sophisticated and structured approach emerges in the solar O&M market, third party providers are able to deliver more value to solar investors and owners. This chapter will cover the following areas:

- ❖ Capex-based
- ❖ Profit-sharing
- ❖ Fixed cost
- ❖ O&M extensions
- ❖ Others

**5. TERMS OF O&M CONTRACTS**

It is important for both developers and O&M service providers to clarify and list out their expectations and accordingly draw up a long-term contract. An effective contract will result in higher plant efficiencies. This chapter will cover the following areas:

- ❖ Time periods
- ❖ Product warranties
- ❖ Performance guarantees/SLAs
- ❖ Penalties
- ❖ Ownership
- ❖ Legal terms

**6. GRID MANAGEMENT BY O&M PLAYERS**

As the government becomes stricter in its implementation of forecasting, scheduling and deviation settlement mechanism regulations, grid management will become a key component of O&M players. Integration of energy storage on to existing plants will lead to a greater O&M play. This chapter will cover the following areas:

- ❖ Forecasting and scheduling
- ❖ Deviation settlement management
- ❖ Integration of energy storage into existing plants
- ❖ Cost implications
- ❖ Experience so far

**7. O&M COMPANY PROFILES**

A large number of O&M focused players are coming up, some as hive-offs from existing EPC companies and others as independent specialists. This chapter will have 5-8 profiles of key O&M players in India covering the following:

- ❖ Project portfolio
- ❖ Service offerings
- ❖ Technology tie-ups
- ❖ On-ground experience
- ❖ In-pipeline capacity
- ❖ Etc.

**8. DIGITALISATION AND AUTOMATION AT PLANT LEVEL**

Digitalisation and automation will play a key role in providing efficient O&M services, thereby changing the current O&M cost composition, which is currently dominated by manpower expenses. New technologies are being adopted for improving asset lifecycle management, predictive maintenance, remote sensing and control, cloud computing, and use of drones for visual imaging. A number of companies have also already started using robotics for cleaning modules. This chapter will cover the following areas:

- ❖ Emerging role, applications and use case for the following
  - Manpower and material management, Automated monitoring and big data analytics, Robotics, drones and wearables
- ❖ Growing role of artificial intelligence
  - Machine learning applications, AI field assistants and predictive analytics, Existing use cases
- ❖ Key technology providers
- ❖ Industry Perspective  
(Views of key personnel from the solar O&M industry and technology providers on the growing role of AI, robotics and data analytics)

**9. KEY CHALLENGES, BEST PRACTICES AND CASE STUDIES**

The lack of attention given to O&M practices is one of the primary challenges that the segment is facing. If the plant is not maintained properly, developers can lose up to 15 per cent of the returns. This chapter will cover the following areas:

- ❖ O&M challenges matrix
- ❖ Best practices (Globally and in India)
- ❖ Case studies (This will cover successes and failures of various technologies, business models and strategies adopted by O&M players)

**10. PROJECTED O&M MARKET SIZE (FROM 2019-20 TO 2024-25)**

The total addressable market for solar PV O&M is expected to reach 30 GW in 2018-19. It is likely to more than triple by 2022 to exceed 100 GW. In fact, going forward, as the installed base gets larger, O&M revenue may even exceed the development and construction revenue. This chapter will cover the following areas:

- ❖ Impact factors
- ❖ Emerging O&M industry structure
- ❖ Short-term projections
- ❖ Medium-term projections
- ❖ Long-term projections

*The report is available in a PDF format.*



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## Key Trends, Risks, Alternatives and Outlook

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- Private Sector: JSW Energy; Tata Power Company Limited; JP Power Ventures; AHPC
- Others: Malana Power Company Limited; Gati Infrastructure; Everest Power Private Limited; Dans Group; Sneha Kinetic Power Projects Limited

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This section has 30 chapters pertaining to the renewable energy scenario and outlook for 30 African countries. These includes Algeria, Angola, Botswana, Cameroon, Democratic Republic of the Congo, Egypt, Ethiopia, Ghana, Guinea, Kenya, Libya, Madagascar, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia and Zimbabwe.

Each country profile provides information on:

- Economic Scenario and Demography
- Power Demand and Supply Scenario
- Resource-wise Renewable Energy Potential
- Segment-wise Size and Growth (Solar, Wind, Bioenergy, etc.)
- Key Growth Drivers
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The franchises covered include:

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- Nagpur (Spanco Nagpur Discom Limited)
- Agra (Torrent Power Limited)
- Muzaffarpur (Essel Vidyut Vitaran (Muzaffarpur) Limited)
- Bhagalpur (SPML Infra Limited)
- Gaya (India Power Corporation Limited)
- Kendarapara Division I & II, Jagatsinghpur, Dhenkanal, Talcher and Angul (Enzen Global Solutions Private Limited)
- Khurda, Balugaon, Puri and Nayagarh (Feedback Electricity Distribution Company Limited)
- City Electrical Division (Cuttack), Athagarh and Salipur (Riverside Utilities Private Limited)
- Nimapara (Seaside Utilities Private Limited)
- Kota, Bharatpur and Bikaner (CESC Limited)
- Ajmer (Tata Power Company Limited)

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(January 2018)

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*Each profile provides an overview of the airport, traffic projections, ownership structure, expected capacity, future timelines, recent contracts; expansion, etc.*

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*Each profile covers the project scope (network length, alignment details, number of stations, rolling stock, fare system, signaling and telecommunications, traction, etc.), ownership details, implementing agency, cost estimates, key consultants, key contractors, key milestones, funding pattern, actual/expected ridership, recent contracts, upcoming tenders, and the detailed current status.*

*The report is available in a PDF format.*

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The dataset covers the following:

- Mastersheet of Key Upcoming Projects; Zone-wise Expenditure in 2019-20; Tracks; Signalling and Telecommunication; Traction Distribution Works; Electrification; Dedicated Freight Corridors (DFCs); High Speed Rail (HSR) Projects; Suburban Rail Projects; Rapid Regional Transit Systems; Station Redevelopment Projects; Rail Tunnel Projects; Key PPP Projects

The report is available in a PDF format.

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The report is available in a PDF format.

## Sector Analysis, Project Pipeline, Emerging Opportunities and Outlook

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The report is available in a PDF format.



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*This chapter will analyse the impact of these initiatives and policy changes on container terminal operators, container train operators, road transporters, trucking industry, shipping companies, CFSs, ICDs, etc.*

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*Each profile will cover information on throughput, current capacity & capacity utilisation, key facilities, draught levels, dwell time, equipment availability and planned expansion.*

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*Each profile will cover information on company operations, existing infrastructure, network covered, financial performance, future plans, etc.*

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*Each profile will cover information on company operations, existing fleet, geographical coverage, financial performance, future plans, etc.*

*The report is available in a PDF format.*

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*The report is available in a PDF format.*

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*The report will be available in a PDF format.*

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*The report is available in a PDF format.*

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*The report is available in a PDF format.*

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*Each project provides information on the scope of work, location, capacity, implementing agency, developer/contractor, current status, expected date of completion, etc.*

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*The report is available in a PDF format.*

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*(Each state profile will give an overview of the housing scenario, role of key agencies and housing boards, state policy on affordable housing, new initiatives and incentives, and ongoing and upcoming housing schemes/projects.)*

*The report is available in a PDF format.*

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*The database will provide a detailed list of completed, ongoing and announced/planned/proposed projects in the sector including door-to-door collection and transportation projects, treatment and processing facilities, WtE plants, biomedical waste treatment facility, landfill development and disposal facilities with details on scope, location, cost, capacity, funding sources, implementing agency, contractor (wherever available), current status, expected date of completion, etc.*

*The report will be available in a PDF format.*

## Trends, New Initiatives, Outlook and Opportunities

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**SECTION IV: DATABASE OF KEY PROJECTS**

The report will also provide a comprehensive Excel-based database of ongoing and upcoming projects across the water supply, sewerage, waste, energy, mobility, buildings, roads, safety and security, e-governance, parking, and healthcare segments.

Each project will provide information on:

- Scope; Project Cost; Type of Project (Area-based or Pan-City) ; Mode of Implementation ; Implementing Agency; Contractor/ Developer/Technology Vendor (wherever available); Current Status; Expected Date of Completion Etc.

The report is available in a PDF format



### SUMMARY AND KEY INSIGHTS

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*(Each player profile will give an overview of the company's operations, focus areas, current production capacity, manufacturing facilities, key projects and tenders, financial performance, capex and expansion plans)*

*The report is available in a PDF format*

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**OPINION AND INSIGHTS**

- Niraj Didwania, Head, Corporate Development and Investor Relations, Healthcare Global Enterprises
- Nitin Nag, Regional Director (South), Cloudnine Group of Hospitals
- Dr. Nitiraj Gandhi, Senior Manager, Business Advisory Services, EY
- Dr. Kirti Chadha, Senior Vice President - GRL Operations and Medical Affairs, Metropolis Healthcare
- Dr. Manjiri Bakre, CEO and Founder, OncoStem Diagnostics
- Nitin Sisodia, Founder and CEO, Sohum Innovation Lab
- Arun Agarwal, Founder, Janitri Innovations

*The report is available in a PDF format.*



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*The report is available in a PDF format*

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*Each country profile covers the economic scenario, sector-wise global competitiveness rankings, current state of infrastructure, sector-wise size and growth, snapshot of project pipeline and trends in budgetary allocations.*

*The report is available in a PDF format*

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*Each profile gives an overview of the company's operations, key contracts, recent collaborations, joint ventures, and future plans and strategies.*

*The report is available in a PDF format.*

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**India Infrastructure Research**

B-17, Qutab Institutional Area, New Delhi 110016

Phone: +91-11-4103 4600-01 Fax: +91-11-2653 1196

Email: [reports@indiainfrastructure.com](mailto:reports@indiainfrastructure.com)

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