Foreword

The past few years have seen major developments in the power distribution sector in India. We have now achieved universal access to electricity.

However, power distribution continues to be the weakest link in the supply chain of the power sector. Most distribution utilities are making major losses as a consequence of expensive long-term power purchase agreements, poor infrastructure, and inefficient operations, among others. These losses, in turn, prevent them from making the investments required to improve the quality of the power supply and to prepare for the wider penetration of renewable energy. The distribution utilities' inability to pay power generators endangers the financial health of the generators and their lenders, causing a negative domino effect on the economy.

The Electricity Act, 2003, was a milestone in the reform journey. Since then, several states have reformed their distribution sectors along different paths. This Report, prepared as a collaboration between NITI Aayog and Rocky Mountain Institute (RMI), USA, presents a review of the reform efforts in the Indian distribution sector. The Report aims to contextualize learnings and best practices from domestic as well as global experience, to provide a set of options for state governments that are considering further reforms to put their distribution sector on the track to efficiency and profitability.

It is hoped that the Report will be useful to researchers and practitioners in the distribution sector, and particularly to policy makers. I congratulate the Energy Vertical Team of NITI Aayog, and the team at RMI, for bringing out this Report, and I hope it becomes a valuable reference document in the debate on this very important topic.

Dr Rajiv Kumar
Vice Chairman, NITI Aayog

Foreword

The power sector, globally as well as in India, is undergoing a sea change. This is visible in the increasing deployment of clean renewables and the rising prevalence of grid-connected distributed generation. While these trends create churn and disruption in the power sector, they also create opportunities for new and innovative business models.

These changes will require flexibility throughout the power sector. Most new generation capacity is likely to be renewable. Increased flexibility in generation will be required - both physical (flexible generation, and demand response) and institutional (such as access to markets). The transmission sector will require greater capacity to evacuate power from renewable-rich regions to the rest of the nation. Digitalisation of the grid will enable bidirectional flow of information and power. Utility-scale energy storage, being able to act as load or as supply, will play an important role in enhancing the flexibility of the system.

In India, this transition is all the more challenging because of the poor operational and financial condition of the distribution sector. The distribution companies, as a whole, are loss-making and debt-ridden; consequently, they are not able to invest in better infrastructure, to provide better services to their customers, or to pay generators on time. Distribution sector reform is of utmost importance.

Fortunately, within the country, we have a large reservoir of useful policy experience. This report, which extracts lessons from these experiences, is extremely timely, and I am certain it will be useful to all policy makers engaged in the essential task of reforming the distribution sector.

Dr V K Saraswat
Member, NITI Aayog

Foreword

The Indian power sector is on course for a decade of transition and transformation. India's progress on renewable energy generation over the past decade has been inspiring and Hon'ble Prime Minister Narendra Modi's continued commitment to achieve 450GW has underpinned this momentum. Recent efforts, including the draft National Electricity Policy 2021, the announcement of the Ancillary Services Market regulation and the Market-Based Economic Dispatch (MBED), signal promising progress. Once implemented, these developments will allow new assets such as batteries and demand response to participate in providing grid services and will transition power procurement to a market-based mechanism that enables least-cost, clean generation.

These developments signal the resolve of the Government of India to transform the power sector by incorporating new business models and clean energy portfolios that can modernise the grid and improve the sector's financial and operational performance.

India's distribution companies (discoms) are a vital stakeholder group in this transition that may hold the key to the future of the sector. The ₹ 3,00,000 crore power discom reform scheme that the Indian cabinet has recently approved attests to the importance of discom transformation efforts. India has an opportunity to seize the moment and leverage the cost savings, system efficiency, and environmental benefits that clean energy portfolios bring to bear. The benefits of discom turnaround driven by clean energy portfolios will stand to pay long-term dividend in the sector's march towards a clean energy transition.

Jules Kortenhorst
CEO, RMI

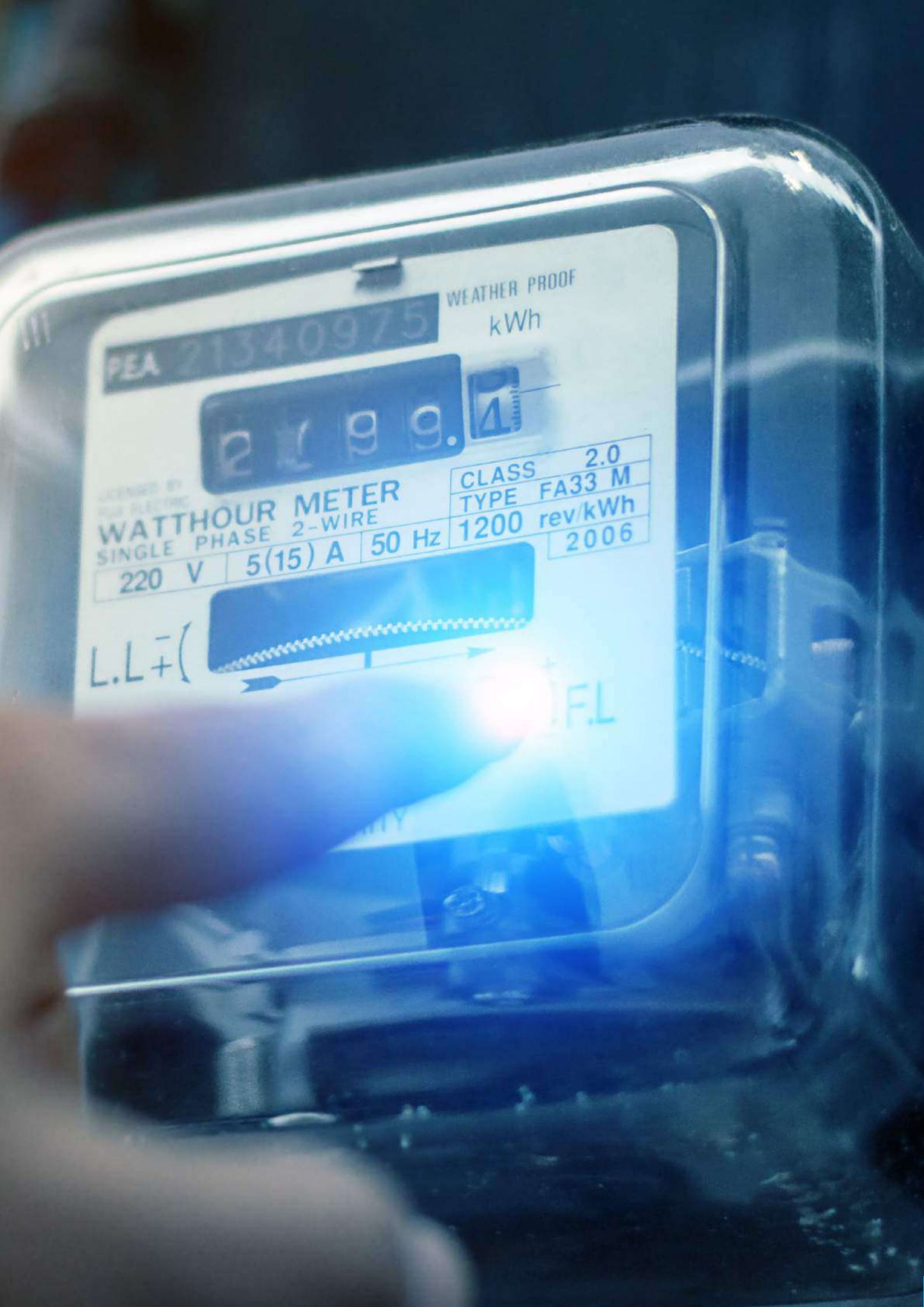
Preface

India has set ambitious targets for the power sector. We are aiming for 24X7 power for all, with 450 GW of renewable capacity by 2030. Many of the government's major initiatives, such as Make In India or Aatmanirbhar Bharat, require access to reasonably priced, high quality power to take off.

However, the distribution sector has been the Achilles' heel of the power sector, consistently making large losses (estimated at Rs 90,000 cr for FY 21), reflecting weaknesses in operations, infrastructure, and regulation. We will not be able to achieve a high-growth, low-carbon economy unless the distribution sector achieves profitability. The solution to this problem will include smart meters and smart grids, but the most important solutions might lie in institutional smartness - whether in power procurement, in ensuring high-quality regulation, or in encouraging private participation in distribution.

Different states in India have followed different reform trajectories, and today, policy-makers can draw upon a wealth of accumulated experience. This report aims to document the best practices and lessons from across India, and where required, across the world. I congratulate the authors at the Energy Vertical of the NITI Aayog, and at Rocky Mountain Institute. I am certain the report will be an extremely useful resource for policy-makers.

Amitabh Kant
CEO, NITI Aayog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List of Abbreviations

Abbreviation	Definition
ACS	Average Cost of Service
AMS	Advanced Metering System
APPC	Average Power Purchase Cost
ARR	Average Revenue Realisation
AT&C	Aggregate Technical and Commercial
BTM	Behind-the-Meter
C&I	Commercial and Industrial
CAGR	Compound Annual Growth Rate
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
CRM	Customer Relationship Management
DBT	Direct Benefit Transfer
DDUGJY	Deen Dayal Upadhyaya Gram Jyoti Yojana
DF	Distribution Franchisee
DL	Distribution License
DRE	Distributed Renewable Energy

Abbreviation	Definition
DSM	Demand-side Management
DT	Distribution Transformer
DVB	Delhi Vidyut Board
EA	Electricity Act
ERC	Energy Regulatory Commission
FOR	Forum of Regulators
GTAM	Green Term Ahead Market
IEX	India Energy Exchange
IPDS	Integrated Power Development Scheme
IPP	Independent Power Producer
MBED	Market-based Economic Dispatch
NTP	National Tariff Policy
OA	Open Access
PPA	Power Purchase Agreement
PXIL	Power Exchange India Limited
RE	Renewable Energy
REC	Renewable Energy Credit
REMC	Renewable Energy Management Centre
RLDC	Regional Load Despatch Centres
RTM	Real-time Market
RTS	Rooftop Solar
SARAL	State Rooftop Attractiveness Index
SERCs	State Electricity Regulatory Commissions
SLDC	State Load Despatch Centre
SLT	Strategic Leadership Team
ToD	Time of Day
TPDDL	Tata Power Delhi Distribution Limited
UDAY	Ujwal DISCOM Assurance Yojana
UT	Union Territories