ECONOMIC RECOVERY AND LONG-TERM VISIONING FOR THE POWER SECTOR TRANSFORMATION

30th June 2020
Agenda

- **Welcome and Introduction** (5 min) – ALP Secretariat

- Context on long term visioning, economic recovery and a framework to consider actions and investments in the power sector (15 min) – Sadie Cox, NREL

- Case study: India’s experience on the long term power sector planning and economic recovery actions (15 min) – Shantanu Dixit, Prayas India

- Q&A and discussions (50 min) – All

- Next steps and closing (5 min) – ALP Secretariat
• The ALP launched in Sep 2012 is a voluntary regional network promoting LEDS in Asia

• LEDS GP launched in 2011 operates through four regional platforms

• LEDS GP Global Secretariat is hosted currently by the GIZ within the Support Paris Agreement project, funded by BMU

- ALP membership: 1165 (386 Organizations and 779 Individuals)
- 45 Government Agencies from 14 Asian countries
Focus area: Energy Storage and the Long-Term Strategies (LTS) for Power Sector Transformation

60+ participants 11 Countries: Bangladesh, China, India, Laos PDR, Myanmar, Nepal, Palestine, Philippines, Sri Lanka, Vietnam, Mongolia

Grid Integration Study has resulted in various policy thrusts:

The study has enabled the development of the country’s RE sector at a fast track pace. The evidence-based study is now considered as the backbone of various decision-making processes within the country’s power sector. Based on the study outcomes, the recently published National Energy Policy of the country suggested the development of RE sources as an important measure for enhancing energy security in the country. Sri Lanka has also committed to reducing 20% of its GHG emissions by 2030 by taking inputs from the study on its long-term RE development.

The study provided key technical recommendations for Sri Lanka to undertake such as establishing VRE forecasting systems, grid scale storage units such as pumped hydro, RE monitoring and controlling desk for system control center, implementing a network strengthening project enhanced operational flexibility of plants, and other strategies such as enabling VRE curtailment right for operators and prioritizing RE for future development.
## Other Communities of Practice

<table>
<thead>
<tr>
<th>Community</th>
<th>Focus and Activities</th>
<th>Registration Link</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clean Mobility CoP</strong></td>
<td>• Moving towards clean mobility by strengthening the operational and energy efficiency of public transport policies and systems</td>
<td>Registration link</td>
</tr>
<tr>
<td><strong>NDC Finance CoP</strong></td>
<td>• Focuses on blended capital and green bonds to support achieving NDC targets</td>
<td>Registration link</td>
</tr>
<tr>
<td><strong>Building Energy Efficiency</strong></td>
<td>• Focuses on BEE policy, technologies and Financing</td>
<td></td>
</tr>
</tbody>
</table>

**To join ALP membership click here**
Speakers

Sadie Cox
NREL, USA

Shantanu Dixit
Prayas Energy Group, India
Asia LEDS Partnership
GRE Community of Practice – Long Term Visioning to Support Near Term Economic Recovery & Climate Action

Sadie Cox
June 29, 2020
Economic Recovery Context

- With trillions of dollars to be invested in economic recovery, investments made now will have extremely important implications for the future
  - We can avoid lock in of carbon-intensive technologies
  - We can align these investments with ambitious climate and clean energy goals
- ALP GRE CoP can support countries in designing stakeholder-led visions that prioritize near term urgent needs from a forward-looking perspective
What works? Exploring the appropriate role for clean energy to support recovery

Renewable energy and energy efficiency

- 1M invested in building efficiency creates 8 full time jobs, 3X compared to fossil fuel investments
- RE investments have been found to create 50% more jobs than fossil fuels
- Investing significantly in RE post-COVID-19 crisis could spur global GDP gains of $98 trillion dollars between now and 2050, with $3 to $8 return for each dollar invested.
- Every $1B investment in grid modernization is estimated to create $2.40B in economic benefits (e.g., jobs, reliability, etc.)

Transportation

- Every $1 in public transportation creates $4 of economic activity
- 1 billion investment in public transit can create more than 50,000 jobs.
- Based on US experience, “An ARRA dollar spent on public transportation produced 70 percent more job hours than an ARRA dollar spent on highways.”
- However… Will COVID 19 change the way we travel? More emphasis on bikes, motor-bikes, EV, and autonomous vehicles?
Example actions from past stimulus programs

US – 2009 ARRA

- Energy efficiency - government building retrofits, residential weatherization, and block grants for states
- Renewable energy - promoting RE with production tax credits and loan guarantees
- Grid modernization - deploying smart grid technology and enhancing transmission capacity in the Western Area Power Administration
- Transportation - supporting car battery manufacturing, investing in mass transit, and accelerating replacements or retrofits of heavy-duty diesel engines

Korea – 2010 Green Stimulus

Breakdown of the $30.7 billion South Korea green stimulus in 2010

Sources:
http://siteresources.worldbank.org/INTSDNET/Resources/5944695-1247775731647/INFRA_Korea_Newsletter.pdf and
Resilient clean energy economic recovery actions

- **Infrastructure**
  - Analysis and investment in transformative clean, resilient power, transport, buildings, and industry systems tailored to country needs and conditions

- **Innovation**
  - Cutting-edge, resilient clean energy technology demonstrations and pilots

- **Business, incentive, and financial support**
  - Support to de-risk and mobilize resilient, clean energy investment

- **Workforce development**
  - Programs with local universities and communities to advance resilient clean energy manufacturing, business development, and system design and operations

Resilience as the foundation for all actions (and a key metric for prioritization)
Options for Collaboration with the ALP Grid Integration CoP and a Framework for Power Sector Transformation
Option 1: Targeted, rapid support for long term visioning and economic recovery analysis and prioritized action advancement

1. Rapid analysis of visions and clean energy options for achieving economic recovery
   - Together with a small country team, do a rapid analysis of visions and clean energy options for economic recovery to feed into near term decisions

2. Identify one prioritized action area for further technical assistance
   - Based on the analysis, identify one priority action area (e.g., support for grid modernization analysis, clean energy incubators, workforce development programs for DG, etc.) where the LEDS GP can team with the country on technical assistance to advance the action.
Option 2: Comprehensive process to support countries on long term visioning and economic recovery (with other partners and additional funding for the full process)

1. Establish economic revitalization stakeholder teams
   - Establish stakeholder teams in partner countries to develop visions, advance coordination, leverage resources, and convene forums to advance resilient, low carbon economic revitalization

2. Prioritize highest impact actions to enliven a resilient, low carbon economy
   - Support development of data-based decision metrics for prioritization of solutions to ensure that critical human and financial investments are optimized toward resilient, low carbon economic revitalization and rapid job creation

3. Develop resilient, low carbon economic revitalization action plans
   - Based on above analysis, develop and enable implementation of resilient, low carbon economic revitalization action plans led by the stakeholder teams and in collaboration with a world-class network of leading experts

4. Enable peer learning to inspire action
   - Connect leaders through the LEDS GP and other networks to capture and share effective solutions, good practices, and lessons learned for economic recovery and to inspire replication
Long Term Sector Visioning to Support Near Term Economic Recovery

Establish stakeholder teams with country partners to lead the visioning process in collaboration with the CoP

Identify economic recovery objectives – job creation, resilience, emission reduction (near and long term)

Create a vision for sector transformation with identified objectives as the foundation
- Vision will support critical near-term goals (e.g., rapid job creation) and align with the country’s medium to long-term goals (e.g., climate)
- CoP will share frameworks to assess pathways most aligned with these near and long-term goals
- CoP support will set the stage for (or perform) analysis of power sector pathways that could have the greatest impact in these areas (near and long term) and within the context of COVID 19
- CoP will support identification and advancement of actions within these pathways to inform near term investments, e.g., DER investments, grid modernization, etc. and long-term actions

This process would be simplified in relation to Option 1
An example of a visioning support framework for the power sector.
Diving in on objective setting and alignment with pathways to inform visions

Example country X prioritizing economic development (job creation) and resilience

<table>
<thead>
<tr>
<th>Relevance of factors for country X</th>
<th>Pathways and level of alignment with factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance based on aspirations, goals or anticipated future</td>
<td>DER Revolution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area #1 - Local Power System Transformation Objectives</th>
<th>1</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: Economic Development</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Objective: Energy Access</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Objective: Environmental Sustainability</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Objective: Resilience and Energy Security</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Objective: Energy Democratization + Responsiveness to Consumer Demand</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Some key characteristics of each pathway and possible focus on T&D interactivity pathway – country X example

<table>
<thead>
<tr>
<th>DER Revolution</th>
<th>Bulk Power Transformation</th>
<th>T&amp;D Interactivity</th>
<th>Transactional Future</th>
</tr>
</thead>
</table>
| • Massive scale up of ultra-low cost PV and distributed storage and grid-edge EE | ◯ Bulk power technology improvements and innovations  
 ◯ Improved flexibility management  
 ◯ Improved bulk-system interconnections and sub-hourly markets  
 ◯ Reduced capital uncertainty for bulk clean generation and storage  
 ◯ Design of markets for value of services | ◯ Continued acceleration of DER adoption  
 ◯ Integrated planning between T and D system operators  
 ◯ Co-optimized operation of entire grid, respecting constraints on both the T and D system  
 ◯ Improved, publicly available data on the system’s real time and forecasted needs  
 ◯ Increased presence of microgrids | ◯ Increased number and complexity of control points on the grid system  
 ◯ New ways to value, coordinate and procure services from DER  
 ◯ Massive revolution in digitization, automation and interoperability of energy-related technologies  
 ◯ Seamless, real-time markets and transactions for power services |
Example near term investments/actions that could support the Transmission and Distribution Interactivity Pathway

- Grid modernization to support interaction between transmission and distribution systems which could also support greater resilience with extreme shifts in demand seen during COVID-19.
- Massive DER investment and workforce development for installers and employees required along the whole value chain.
  - Mini grid investments, especially for critical facilities in the near term.
- Bulk clean power investments complementing DER and allowing for near term large-scale climate benefits.
- Implementation of innovative clean energy financing programs to support both DER and bulk power.
- This pathway also sets the stage for scale up of EVs which may be an important aspect of transport visions and broader investment packages.
What we know about DER and economic development

• Development and installation of DERs is a job-intensive endeavor relative to utility-scale projects. A 2018 survey of solar jobs in the United States estimated that residential installations require 38.7 jobs per MW of installed capacity, whereas utility-scale solar installations require 3.3 jobs per MW.

• Beyond project development and installation activities, DER can enable job creation through operation and maintenance, software development, and operation and oversight of virtual DER assets, among others.

• DERs can also play an important role in providing power to large-scale manufacturing facilities, a key economic engine in many countries.

Source: The Solar Foundation 2019
### Technical T&D actions over time to complement near term investment on massive workforce development, etc. on the previous slides

<table>
<thead>
<tr>
<th>Now Actions:</th>
<th>2025 Actions:</th>
<th>2030 Actions:</th>
<th>2040/2050 Actions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree on scope, frequency and formats of data exchange between TSO and DSO</td>
<td>Cultivate regular sharing of data between TSO and DSO on current system status</td>
<td>Develop data hub for access to current system conditions and forecasted system needs</td>
<td>Regularly updated access to current and forecasted system conditions DER generation data</td>
</tr>
<tr>
<td>Develop shared network models between DSOs and TSO</td>
<td>Develop shared models needed for planning; DSOs should share long-term plans for their networks; TSOs should share long-term rolling plans (10+ years) for their system</td>
<td>Interconnect isolated microgrids to one another and to the transmission system where feasible (and not already achieved)</td>
<td>Regular incorporation of microgrid capabilities in planning and operation</td>
</tr>
<tr>
<td>Pilot new products for enhanced system flexibility; clearly define DER technical parameters for supplying any service</td>
<td>Address remaining barriers to aggregation; consolidate markets where possible</td>
<td>Develop integrated planning approaches that coordinate the results from TSO and DSO as inputs in an iterative fashion</td>
<td>Full incorporation of DERs in forecasting, planning and modeling of the TSO and DSO and their interactions</td>
</tr>
<tr>
<td>Pilot DER aggregation scheme for TSO and DSO energy and reliability in wholesale power market</td>
<td>Develop microgrid pilots with focus on local reliability, resilience and islanding</td>
<td>Develop price signals and mechanisms to incorporate the physical/operational constraints on both the TSO and DSO system</td>
<td>Open access to all markets for DER for any services which they are technically capable of providing</td>
</tr>
<tr>
<td>Promulgate rules and regulations which clearly delineate responsibilities between TSO and DSO; Align incentives of DSO and TSO to focus on supporting optimization of entire power system in integrated manner</td>
<td>Begin developing standard agreements and protocols for DER aggregators wishing to meet local distribution needs</td>
<td>Pilot microgrids acting as aggregators for provision of DSO-TSO-level services</td>
<td></td>
</tr>
<tr>
<td>Begin coordination across utilities, TSOs and manufacturers for communication and security protocols for smart infrastructure and responsive equipment</td>
<td>Begin coordinating TSO-DSO actions for identifying and responding to contingency events</td>
<td>Pilot mechanisms which allow TSO to procure services from DER while respecting DSO constraints</td>
<td></td>
</tr>
<tr>
<td>Begin regulatory proceedings to ensure open access and fair compensation for aggregated DER in wholesale markets</td>
<td>Begin identifying need for new ancillary service products</td>
<td>Establish mechanism for the activation of reserves on the distribution system for use on the transmission system; Develop guidelines to ensure minimum requirements for observability and active power management of DER are observed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Begin standardization of interconnection agreements to include DERMS capabilities</td>
<td>Review communication standards and update as necessary</td>
<td></td>
</tr>
</tbody>
</table>
Next steps

• Identify 1 country partner within ALP GRE CoP for collaboration on economic recovery and climate visions and actions – July 2020 – If you are interested in support please email Sadie.Cox@nrel.gov

• Implement work with country partner, tailoring the process in relation to unique needs of each country – visions developed by end of 2020 (and in relation to near term recovery investment discussions and plans)

• Collaboratively improve and develop frameworks to support this process (building on ideas in this ppt) – July 2020

• Ongoing peer learning across countries on “what has worked” for clean energy economic recovery and on learning from work with country partners
Long term power sector planning in India: Challenges and Opportunities

Webinar on:
Long term power sector planning to support economic recovery
30th June 2020
Shantanu Dixit, Prayas (Energy Group), Pune
www.prayaspune.org/peg
Outline

• Overview of Indian power sector

• Power sector and COVID-19

• Increasing evidence for techno-economic feasibility of RE based power sector transition

• Chronic challenges before the electricity sector

• Need for innovation and concerted policy efforts to leverage on emerging opportunities
India Snapshot

- Federal Structure: Union + state governments \(\rightarrow\) concurrent powers
- Utilities esp. transmission & distribution state-owned
- Mostly regulated cost-plus business
- Retail competition for +1 MW consumers via open access

Generation

- Capacity predominantly coal, mostly private
  - Major new addition by state
- RE share in generation \(\rightarrow\) 10% (21% with large hydro)
- Significant thermal capacity addition:
  - 76 GW added between 2007 and 2017
  - 73% increase in coal-based capacity
- Contract duration: 25 years, short-term @10%
India Snapshot

Transmission

- Significant investment in transmission
  - Growing at 7% per annum
  - Private sector investment growth at 18%

Distribution

- 51% sales to residential and agricultural consumers, 37% to C&I
- DISCOM cost of supply more than Rs. 7/unit
  - Rooftop PV cost < Rs. 5/unit,
  - 70% of non-agricultural sales pay > Rs.5/unit, as just energy charge
  - Consumer migration to open access and captive (20 to 30% of sales and ↑)

Source: CEA Executive Summary on Power Sector, March 2020

Power Sector and CoVID-19

- Fall in demand by 20% on average due to lock-down
  - Fall in C&I demand
  - Managing power procurement, contracted capacity a challenge
  - Revenue loss for DISCOM, especially cross-subsidy revenue → working capital strain
  - Meter Reading, billing and collection affected especially w.r.t to small consumers

Source: Compiled by PEG from various monthly reports by POSOCO

Pray as (Energy Group)
COVID: Pan India Lights Off Event (9 PM-9 minutes) on 5th April 2020

- Residents requested to switch off lights for 9 minutes at 9 PM by Indian Prime Minister
- Massive Response to call:
  - Drop in demand by 31 GW between 20:45 and 21:10.
  - 117 GW at 20:45 hrs to 86 GW at 21:10 hrs
  - Expected reduction: 11 GW
- Successful Management of event:
  - Synchronised action and close coordination by all load dispatch centres, generation, transmission and distribution utilities in the country.

Source: POSOCO Report on Pan India Lights Off Event(9 PM 9 Minutes) on 5th April 2020

Prayas (Energy Group)
Pan India Lights Off Event: Role of Hydropower

Source: POSOCO Report on Pan India Lights Off Event(9 PM 9 Minutes) on 5th April 2020
Power Sector and COVID-19

• Central Sector Initiatives
  • Liquidity infusion of Rs. 90 K crore to address working capital strain
    • DISCOMs potentially to make annual interest savings of Rs. 2,700 crores (355 Million USD)
  • Relaxation in payment security to generators to 50% against initial contract till 30th June
  • Payment moratorium for distribution utilities to central sector utilities and reduction in delayed payment charges
  • Rebate and deferred recovery of fixed charges by Central Public Sector Units
    • NTPC: Rebate → Rs. 1363 cr. (≈ 25% rebate on fixed charges for period), Deferred fixed charge: Rs. 2064 cr.
    • Power Grid → 25% rebate in charges during period

• State Sector Initiatives
  • Rebate/deferred recovery in fixed charges for C&I consumers (Punjab, Gujarat, Maharashtra, Uttar Pradesh)
  • Special dispensation to meet working capital requirement
  • Increase in time limits to ensure payments
Indian RE sector status

• RE installed capacity: 88 GW (May, 2020), of which 38 wind and 36 solar.
  • 23% of total generation capacity (370 GW)
  • 30-40 GW under construction
• RE generation: 138 TWh/BU in 2019-20, 10% of total generation (1390 TWh)
  • 64 TWh from wind and 50 TWh from solar.
• Targets
  • 175 GW by 2022 (~21% of generation), 450 GW by 2030 (~35-40% of generation)
  • All states have mandatory RPOs akin to RPS in the US.
  • Most of wind and solar resource is located in the southern and western India.
• Prices
  • Solar and wind prices at Rs 2.5-3/kWh (USD 3.3-4 cents/kWh); lower than new coal.
  • Rooftop solar prices also significantly below tariffs for C&I consumers.
  • Both these aspects driving sales migration based on renewables.
• Grid Integration remains a major challenge, given the relative in-flexibility of the grid.
<table>
<thead>
<tr>
<th>No</th>
<th>Study</th>
<th>Agencies</th>
<th>Platform</th>
<th>Published Date</th>
<th>Transmissio n</th>
<th>Geography</th>
<th>What is being modelled</th>
<th>Resolutio n</th>
<th>Terminal Year</th>
<th>VRE contribution (Energy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Greening-the-Grid</td>
<td>NREI-LBNL, POSOCO, CEA State LDCs</td>
<td>PLEXOS</td>
<td>June, 2017</td>
<td>36 nodes</td>
<td>India-regions</td>
<td>Production Cost</td>
<td>15 min</td>
<td>2022</td>
<td>22%</td>
</tr>
<tr>
<td>2</td>
<td>Dispatch modelling - MSEDCL system for 2030</td>
<td>Prayas (Energy Group)</td>
<td>PLEXOS</td>
<td>Sep-Dec, 2019</td>
<td>Copper Plate</td>
<td>State Maharashtra</td>
<td>Production Cost</td>
<td>15 min</td>
<td>2030</td>
<td>50%</td>
</tr>
<tr>
<td>3</td>
<td>Modelling the integration of RE by 2030</td>
<td>TERI</td>
<td>PyPSA</td>
<td>Draft stage</td>
<td>25 Nodes</td>
<td>India</td>
<td>Production Cost</td>
<td>Hourly, 15 min as sensitivity case</td>
<td>2030</td>
<td>25-32%</td>
</tr>
<tr>
<td>4</td>
<td>Report on optimal generation capacity mix for 2029-30</td>
<td>CEA</td>
<td>ORDENA</td>
<td>Draft: July 19</td>
<td>Copper Plate</td>
<td>India</td>
<td>Capacity Expansion, Production Cost</td>
<td>Hourly</td>
<td>2030</td>
<td>31%</td>
</tr>
<tr>
<td>5</td>
<td>Least-Cost Pathways for India’s Electric Power Sector</td>
<td>NREL</td>
<td>REEDS</td>
<td>June, 2020</td>
<td>5 regions and 34 balancing areas</td>
<td>India</td>
<td>Capacity Expansion</td>
<td>Hourly, 35 time-slices</td>
<td>2047</td>
<td>54% to 72%</td>
</tr>
</tbody>
</table>
## Recent bids for high CUF and peaking RE Capacity

<table>
<thead>
<tr>
<th>MW</th>
<th>Type</th>
<th>CUF</th>
<th>Peak price (Rs./ kWh)</th>
<th>Off-peak (Rs./ kWh)</th>
<th>Lev. Tariff (Rs./ kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1200</td>
<td>Hybrid RE</td>
<td>41%</td>
<td>6.3</td>
<td>2.88</td>
</tr>
<tr>
<td>2</td>
<td>400</td>
<td>RTC RE</td>
<td>100%, minimum 80% annually, 70% monthly</td>
<td>2.91 +3% annual esc</td>
<td>3.59</td>
</tr>
<tr>
<td>3</td>
<td>5000</td>
<td>RE + Thermal RTC</td>
<td>80% min availability annually, min 51% RE</td>
<td>yet to be known</td>
<td></td>
</tr>
</tbody>
</table>
Likely reduction in grid scale BESS

Estimated capital cost of (stand-alone & co-located) storage in India
(1 MW-4 MWh system, CAGR 0% for non-pack costs)

Source: Estimating the Cost of Grid-Scale Lithium-Ion Battery Storage in India, LBNL, April, 2002
Shaking fundamental pillars of electricity sector

• Direct generation cost of new renewables is less than avg. tariff of existing generation.
• Generation projects no longer require long gestation periods and are modular.
• Electricity can be stored with increasing ease and affordability
• Grid services are likely to be as critical as supply.

➔ A very significant techno-economic case and opportunity for Power Sector transition

BUT ....
Chronic Problems faced by DISCOMs

Lack of financial viability of DISCOMs
- Issues with power procurement
  - 80% costs due to power purchase
  - High cost of generation
  - Flawed planning

Poor planning, high cost of supply
- Operational inefficiency
  - Persistent AT&C losses
  - High operations and maintenance expenses
  - Inefficiencies in capital expenditure

Inadequate access, poor supply quality
- Skewed tariffs
  - Subsidy to agriculture, other consumers
  - Excessive cross subsidy

Non-competitive tariffs for large consumers
Challenges before the sector

- 4 major bailouts since 2001 (averaging 2% of GDP)
- Annual losses of distribution utilities at Rs.50-60k crores (USD 8 Bil.)
- Working capital short-term borrowing is rising @ 5% p.a
  - Rs. 75k crores in FY18 (10 billion USD)

2001: State Electricity Board Bailout

2001→SEB Bailout: Rs.41,000 crores (5.4 billion USD)

2003: Transfer scheme during unbundling of utilities

2003→Transfer scheme during unbundling of utilities

2012: Financial Restructuring Plan

2012→Financial Restructuring Plan: Rs. 1.19 lakh crores (16 billion USD)

2015: Ujjwal DISCOM Assurance Yojana

2015→UDAY: Rs. 2.79 lakh crores (37 billion USD)

2020/21: Plans for another bailout??
Decreasing cross-subsidy potential, Increasing competitiveness of alternate supply options, at least as part supply options

**Average cost of supply (ACOS) ~ Rs.7 to 8 / unit**

**Tariffs**
- Cross subsidy significant for HT, LT industrial, commercial consumers > 130% of ABR
- **Power from Alternate Sources**
  - Cost of RE power < Rs. 4/unit
  - > 70% of non-agri. sales with energy charges > Rs. 5/unit
  - Short/medium term power < Rs. 4 unit

*Share of non-agriculture sales with energy charge greater than Rs.5/kWh*
Path to transition must address DISCOM viability challenge

• Without conscious decisions to leverage on opportunities, challenges will persist and changes will unfold chaotically

• This will lead to significant cost to tax payers, consumers and rate payers and disproportionately affect small consumers

  – Stranded assets and resource lock-in
  – Increase in avoidable subsidy burden and bailouts
  – Lack of investment in quality of supply and services for small consumers
  – Delay in necessary investments in grid services
  – Non-optimal utilisation of critical resources
Recognize and Plan for (Inevitable) Changing role of the DISCOM

**Current scenario**
- Wires and supply
- Universal supply obligation (USO) for all consumers
- Dominant grid user
- State demand ≈ DISCOM demand
- Cross-subsidy-based model

**Future scenario**
- Mainly, wires licensee
- Provider of last resort
- Grid balancing
- USO only for small consumers
- New revenue models
### Encourage Long-term sales migration of large consumers
- Minimum duration of OA to be extended to 1 year
- Fixing sales migration charges (CSS & AS) for a five year period to provide certainty.
- OA consumers to procure from DISCOMs only via ‘non-regulated’ tariffs, contracts

### Avoid long-term, base load power purchase contracts
- Reevaluate need for 25 year base load PPAs, given RE capacity addition, demand uncertainty.
- Given current trends, many states may not need new capacity for a decade or so.
- New PPAs after rigorous analysis of demand, supply alternatives
- Use analytical tools - load forecasting models, power sector models for exercise
- Capacity addition planning through a public process

### Agricultural demand met through solar feeders
- Deploy 2-10 MW scale solar PV plants at the substation, where agriculture feeders have been separated.
- Capacity procurement through competitive bidding and PPAs at fixed tariff for 25 years.
- Significant reduction in subsidy requirement with fixed solar tariff of ~ Rs 3/kWh and rising cost of grid supply (APPC).
• ‘Chief Ministers solar feeder policy in Maharashtra’.
  • ~ 3.5 GW tendering underway, ~ 1 million (25%) ag pumps will be solarised in couple of years.
• KUSUM program at the national level
• Many states implementing similar scheme
• ~ 10 – 12 GW solar capacity under development
### Rationalising tariff design
- Move away from cost-plus regulation; explore price cap/benchmarking
- Have uniform tariff slabs for all industrial, commercial and domestic consumers with consumption <300 units
- High intra-category cross subsidy to ensure revenue neutrality of approach
- Link tariff increase of small consumers (< 300 units) to inflation

### Developing robust markets
- Innovation in power procurement contract design
- More flexible market instruments
- *Provide transparent procurement options for > 1 week*
- *Allow industrial consumers on DEEP*
- Develop institutional capacity to regulate/monitor markets
- Move towards transparent capacity markets for rather than PPA approach

### Accountability for service quality
- Monitoring actual supply hours.
- Improve metering and billing systems- third party audits by SERCs
- Public hearings on supply and service quality issues
- Harnessing technology to improve efficiency- use of more real time, automatic, publicly available data for accountability.

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*Prayas (Energy Group)*
Schematic representation of suggested approach

- Long-term sales migration of large consumers
- Developing robust markets
- Shrinking the pie - DISCOMs focus on wires, cater to small consumers
- Agricultural demand met through solar feeders
- Avoid long-term, base load power purchase contracts

Key elements:
- Transparency
- Accountability
- Developing robust markets
- Public participation
- Strong institutions
- Analysis-driven approach

Prayas (Energy Group)
Other wheels that need to sync for fundamental long-term transformation
Thank you

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Do you have any lessons to share in relation to previous investments in clean energy related to economic or disaster recovery? What has worked or not worked?

How is your country thinking about linking economic recovery with longer term low carbon visions and climate goals?

Are there any specific clean energy investments that are already being considered to support economic recovery?
Closing and next steps

- Presentations and webinar recording will be shared via email/posted online at www.asialeds.org
- Please share with your colleagues/peers
- Join the GRE CoP
- For availing technical assistance please write to us
- Inform us the country priorities/needs and how ALP/LEDS GP can support
- Keep in touch!
Thank you!

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