Electricity Distribution Companies in India:
Preparing for an uncertain future

Authors: Ann Josey, Shantanu Dixit, Ashwini Chitnis, Ashwin Gambhir

Prayas (Energy Group)

Presentation by Ashwin Gambhir

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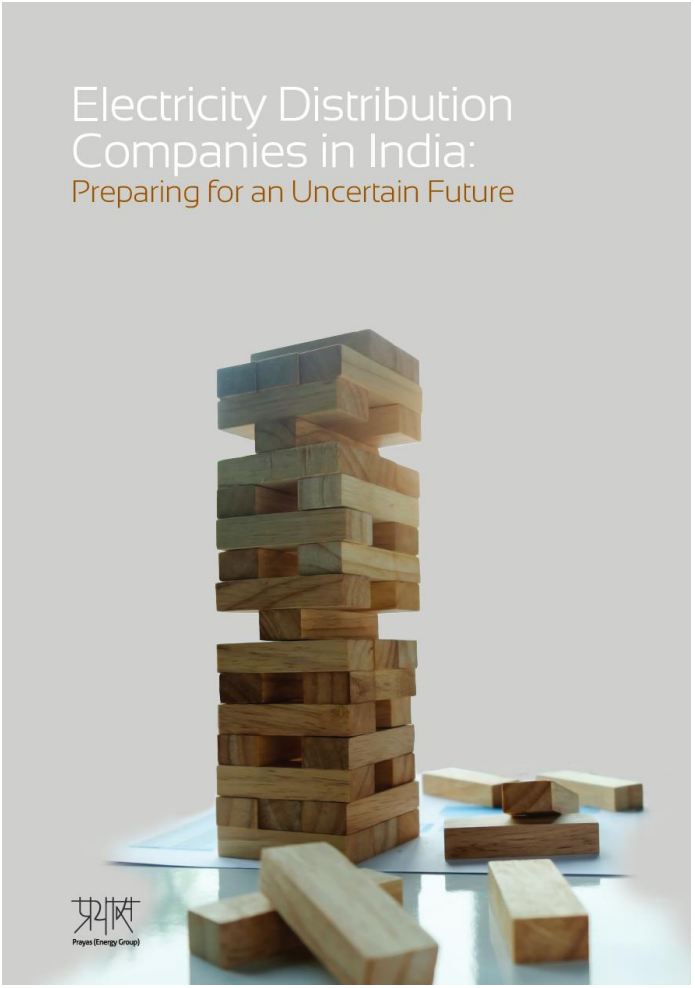
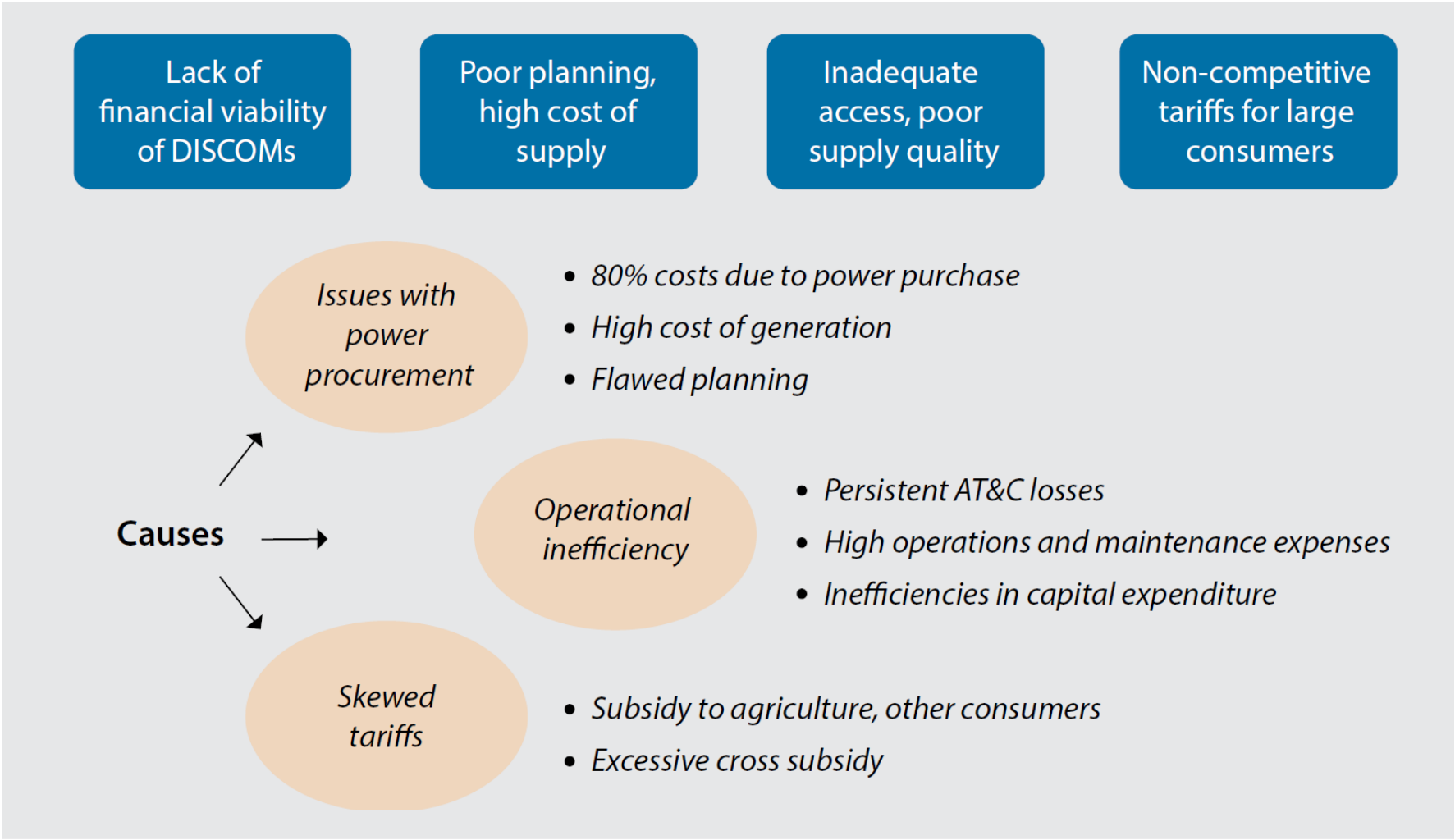
Outline

- Emerging trends in the electricity sector
- Implications for DISCOMs
- Suggested ideas for way forward



Chronic Problems faced by DISCOMs



Recent Trends

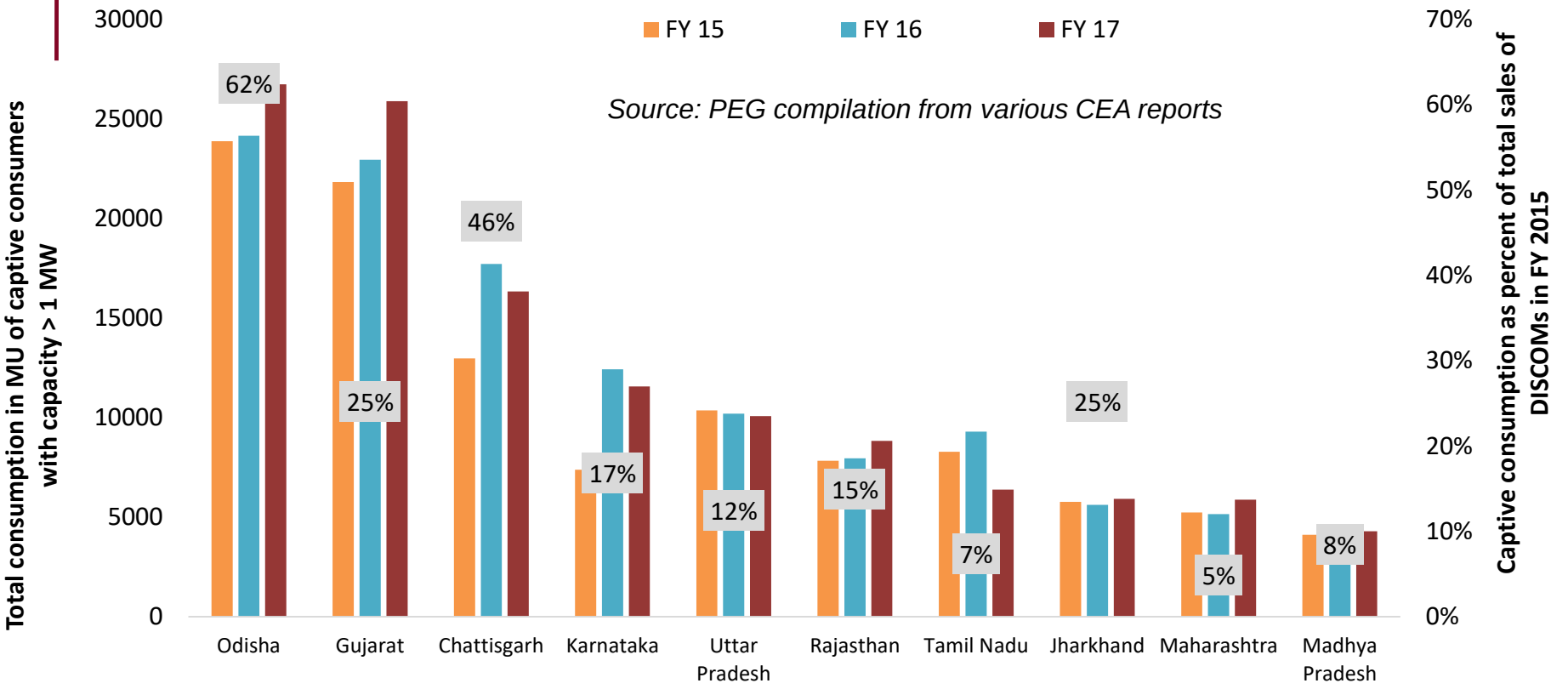
- **Wind/solar PV and coal generation prices**
  - Rs 2.5-3/kWh for wind/solar & fixed for 25 years, vs Rs 4-5/kWh for new coal.
- **Sustained surplus in base power**
- **Competitiveness of alternative supply options, increasing sales migration**
  - Open Access, Captive, net-metering – accelerating, loss of CSS, planning difficult.
- **Rising average cost of supply (ACOS) and Tariffs**
- **Relentless fall in Li-ion battery prices**

Sustained surplus in base power

- India tripled its coal capacity from 71 GW to 192 GW from 2007-17.
- ~ 40 GW, (i.e. 15% of conventional capacity) of utilities, classified as stressed assets; due to factors such as lack of demand, very high cost of power, inadequate or poor-quality fuel, unwillingness of generators to supply at contracted rates. Not a short-term transient phenomenon.
- Considering the obligation for fixed cost payments, any excess capacity will contribute to the financial distress of DISCOMs or will most likely turn into a NPA.

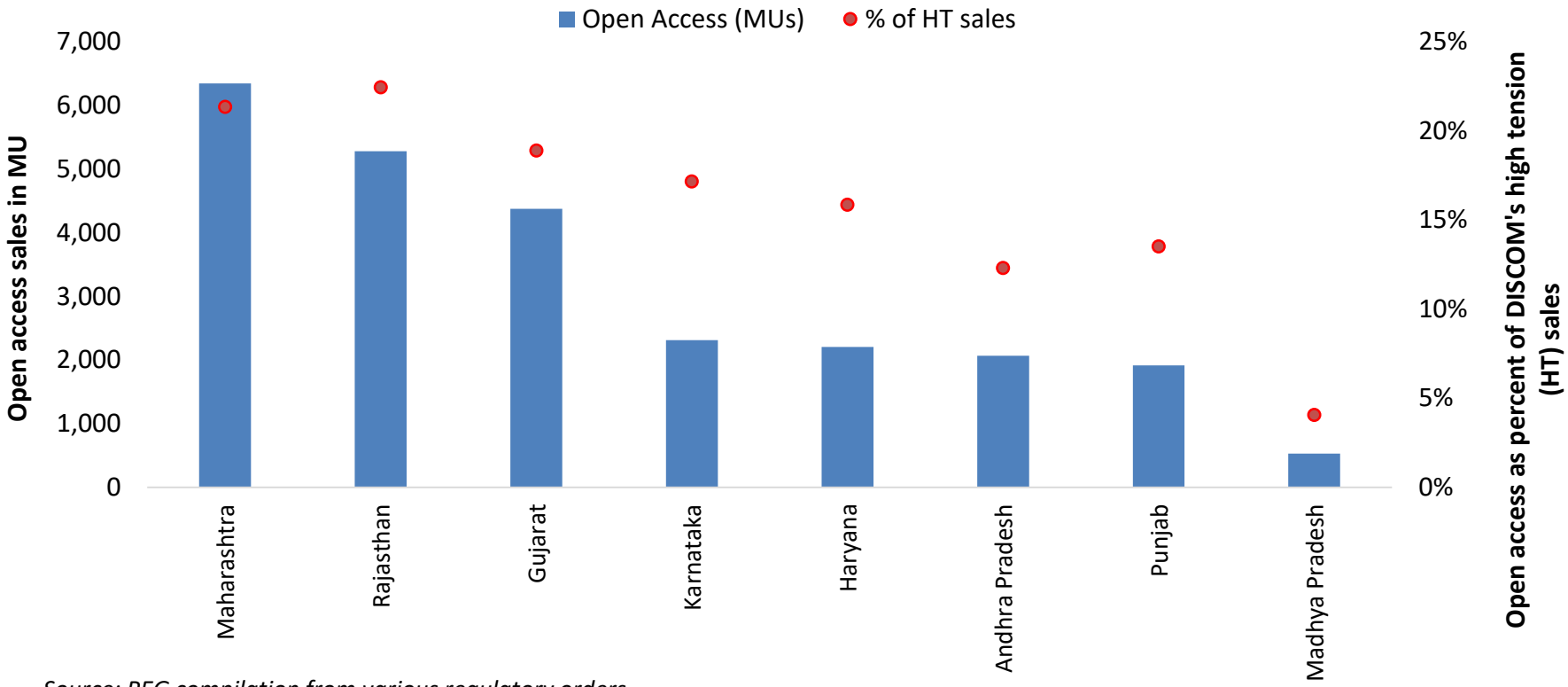
State DISCOM	Backing down reported (MW)	Backing down as % of contracted capacity	Fixed-cost payments due to backing down (Rs. crore)	Fixed-cost payments for backing down as a % of fixed cost payments to generators	Fixed-cost payments for backing down as a percentage of agricultural subsidies
Rajasthan	1798	14%	1051	16%	59%
Punjab	3457	27%	3006	33%	51%
Maharashtra*	4231	19%	2828	21%	59%
Madhya Pradesh	2444	17%	2177	28%	40%
Gujarat	5525	30%	3823	36%	104%

Proliferation of captive consumption



- Captive consumption already 20% to 30% of total sales in few states
- FY 14 to FY 15 saw 9% ↑ in Odisha, 12% in Chhattisgarh, and 34% in Karnataka
- Captive rules amendments to encourage serious players, not just CSS evaders
  - Treatment of subsidiaries
  - Preference shares and treatment of group captive

Open Access based sales migration, 2016-17



Source: PEG compilation from various regulatory orders
Estimates for FY17 for all states except Rajasthan (FY 16) and Madhya Pradesh (Sept 2015 to August 2016

- > 90% of open access is short term with durations > 1 day; makes power procurement planning challenging for DISCOMs
- In Maharashtra, Rajasthan and Gujarat, OA as high as 20% of DISCOM HT sales

Increasing costs and rising tariffs

Average cost of supply (ACOS)

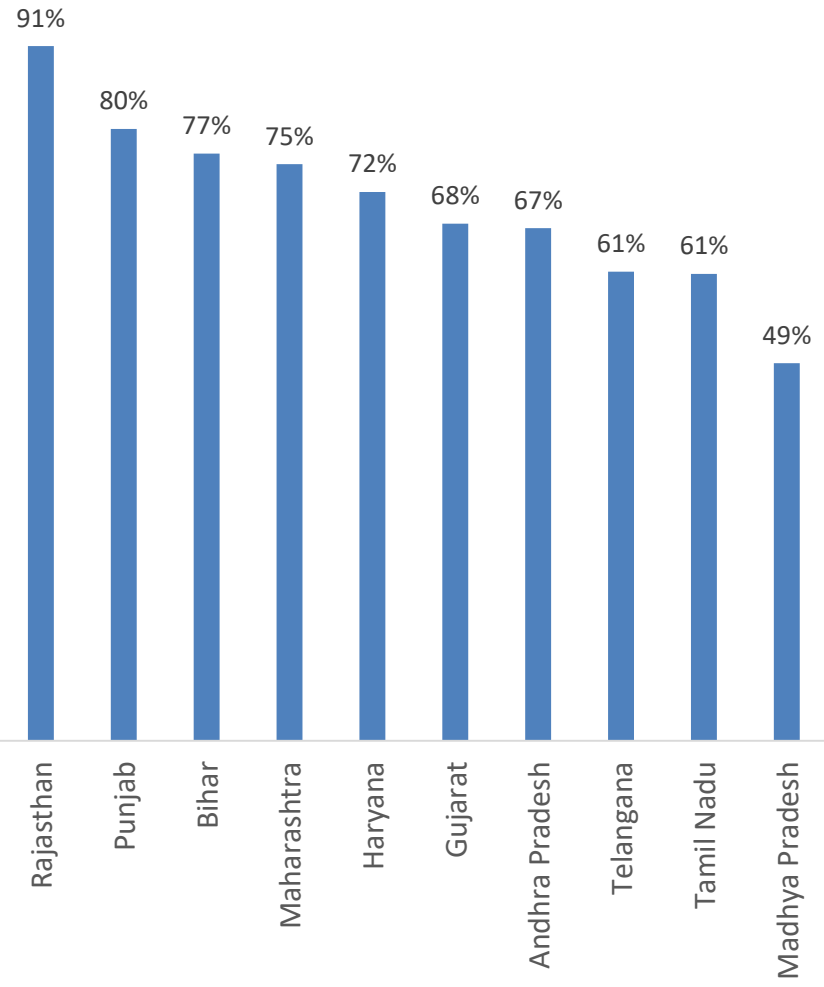
- Actual ACOS in FY 16 – **Rs.7/unit**
- Increasing at **6% per annum** (3-5 yr CAGR)
- ➔ Around Rs **8.5/kWh** in next few yrs

Tariffs

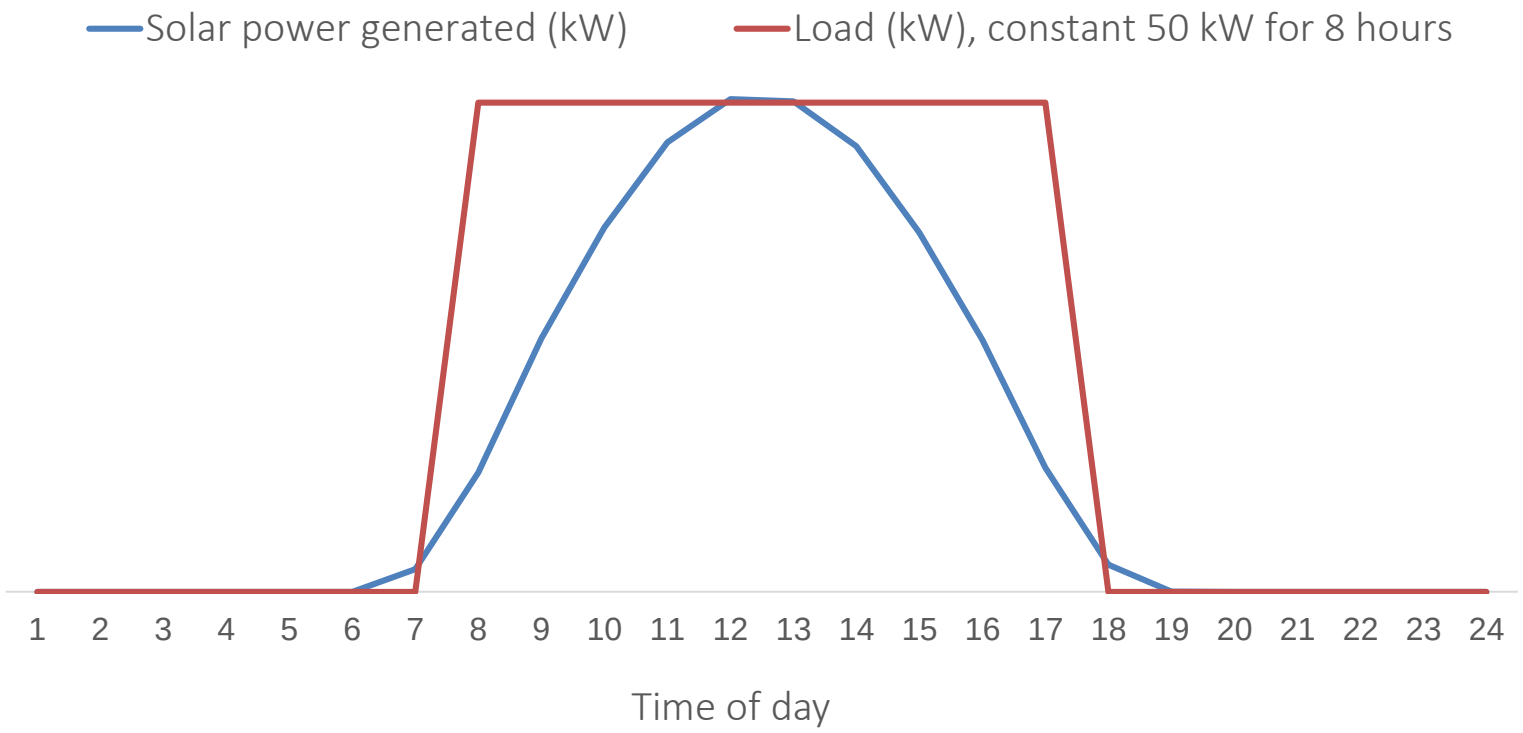
- Cross subsidy significant for HT,LT industrial, commercial consumers **> 130% of ABR**
- Average tariffs for cross-subsiding consumers **~ Rs. 9/ unit**

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**



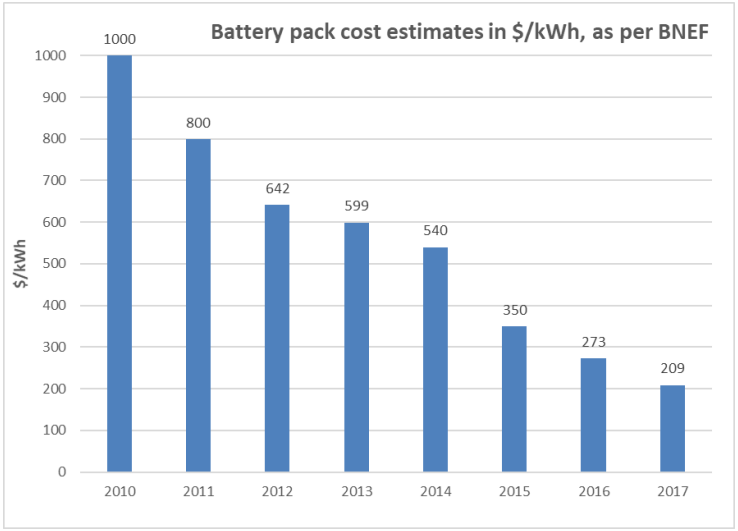
Increasing Viability of kW scale solar PV systems

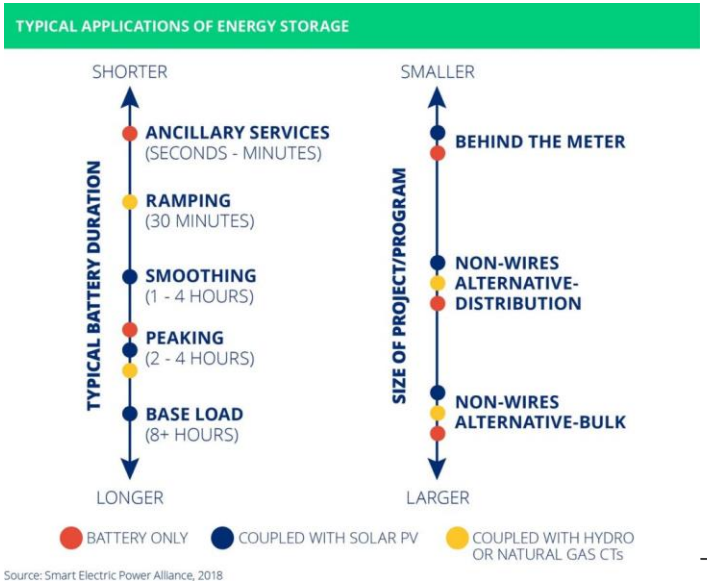


- Generation cost for such system @ or < Rs. 5/kWh.
- Even without net metering, a consumer with significant proportion of day-time load will save ~ Rs. 2/unit with rooftop solar.
- In the face of policy/regulatory hurdles to net-metering/OA, consumers will also find solar + storage options viable in the near future.

Electric Storage, esp. Li-ion batteries

- $ 1000 - 209/kWh (2010-17), 80% reduction, @ 25% annual avg. reduction
- Expected at $ 100/kWh by 2025 or even earlier. Even a lower 10% CAGR from 2017-2 would result in $ 90/kWh.
- Extremely modular, low gestation period and multiple applications





Can fundamentally change the sector planning, operation and business model of utilities.

Solar + Storage (recent bids from US)

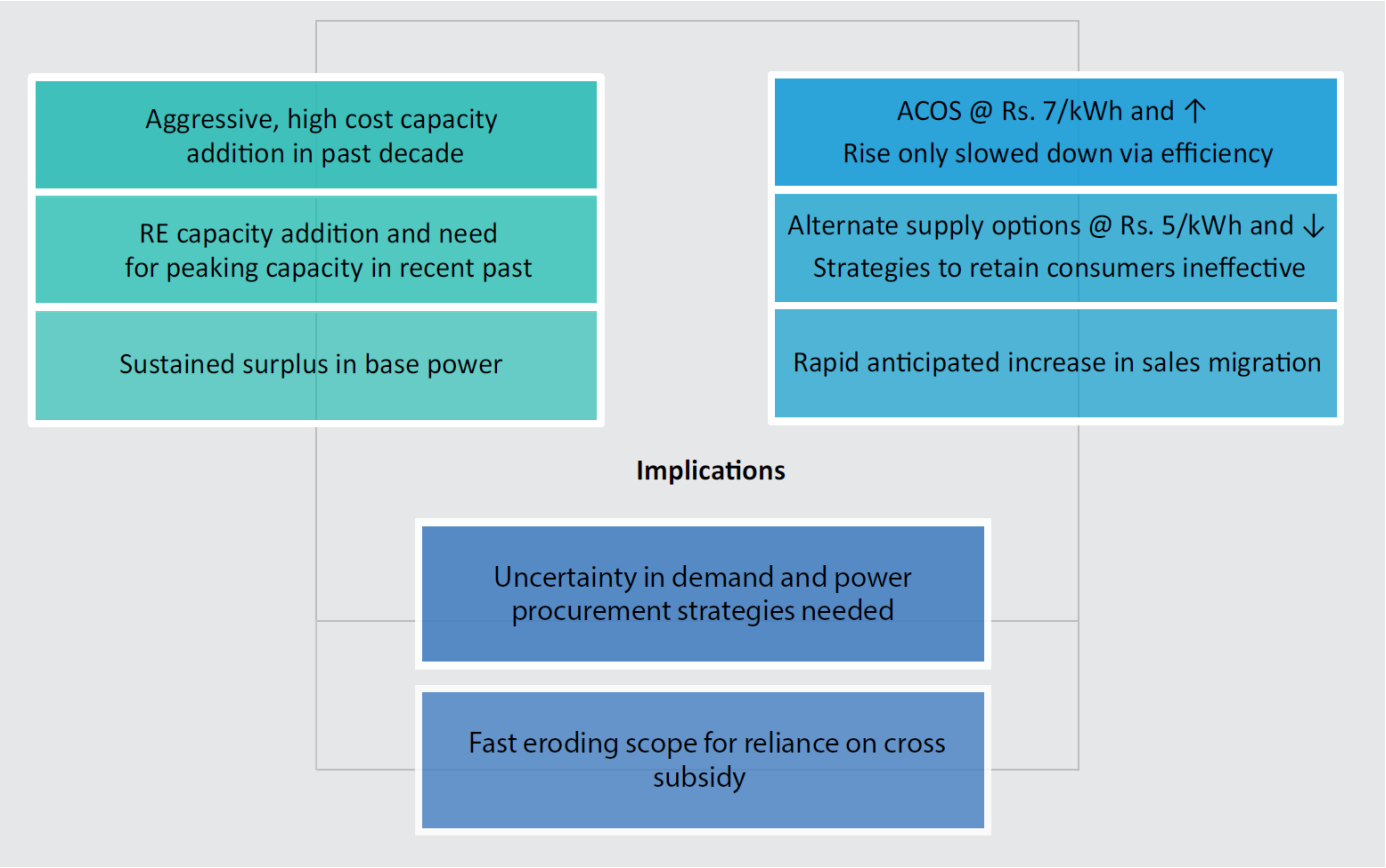
- Excel Utility, Colorado latest bids (2018)
  - Solar-560 MW, Storage 275 MW, 4 hours, i.e. 1100 MWh (operational in 2023)
  - Solar: 2.3-2.7¢/kWh (i.e. Rs. 1.5-1.76/kWh)
  - ***Solar + storage: 3-3.2¢/kWh (i.e. Rs. 1.95-2.08/kWh)***
  - 100% of its existing coal generation is now more expensive than these bids.

- NV Energy, Nevada, PPAs signed in May, 2018
  - 3 solar + storage project filed for regulatory approval
  - Solar – 401 MW, at 2.65-2.99 ¢/kWh
  - Storage – 100 MW, 4 hours, i.e. 400 MWh
    - 2 contracts are for 15 years, for a capacity payment charge of $ 6110-6200/MW-month escalating at 2%/yr. Implies a LCOS of 5.7 ¢/kWh. This configuration of storage adds ~ 0.7 ¢/kWh (Rs 0.5/kWh) to solar PPA.
    - Incremental PPA price adder for storage has fallen to ~$5/MWh.
      - *Source: Bolinger et. al, Utility-Scale Solar: Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States – 2018 Edition. 2018.*

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.

Challenges before the DISCOM in near future



- Either increase consumer tariffs or higher need for direct revenue subsidy by states.
- If not managed appropriately, can lead to severe financial stress. May reflect in tariff shocks, poor supply quality for small consumers, huge stranded assets, and greater need for repeated and larger bailouts, with associated implications for banking sector.
- Naturally, such a fallout would also have serious political implications.

Limited scope of current strategies in tackling these challenges

Improving efficiency → reduce ACoS, tariff

- Heroic efforts to increase efficiency will ↓ the rate of growth of ACoS
- Indicative calculations show that growth rate can reduce to 2 to 3% p.a from the current 5 to 6% p.a.
- Increase could be due the need for additional capex, loan repayments and wage increase
- Thus ACoS and tariffs will continue rising.

Increasing fixed charges, for same ABR

- For e.g. - fixed charges doubled to reduce energy charges to retain consumers
- Energy charges may reduce by 10-20% but will remain > Rs. 5/unit
- High incidence of fixed charges will make shift to solar PV captive more lucrative.
- Counter-intuitively, this strategy can encourage sales migration.

Reduction in tariff to retain migrating consumers

- Measures such as tariff rebates and ToD rebates provided in many states such as Punjab, AP and Maharashtra
- Despite such measures open access and captive consumption continue to rise
- Maharashtra examples
  - *Despite 16% reduction in tariffs via subsidy to industries, open access increased by 29% in FY16*
  - *Even with ToD rebate of Rs. 1.50/kWh, open access is the same in peak and off-peak hours*

(Inevitable) Changing role of the DISCOM

Trends interdependent; raise fundamental questions about viability and feasibility of current business model and role of DISCOMs, based largely on

- 'Cost-plus' method for tariffs, revenue recovery; little incentive for improving efficiency.
- Cross – subsidy based tariff design.
- Consistently increasing demand met mainly by buying baseload power, largely through long-term contracts, and often on cost-plus basis.

Current scenario	Future scenario
Wires and supply	Mainly, wires licensee
Universal supply obligation (USO) for all consumers	Provider of last resort
Dominant grid user	Grid balancing
State demand ≅ DISCOM demand	USO only for small consumers
Cross-subsidy-based model	New revenue models

Suggested ideas for way forward…1

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

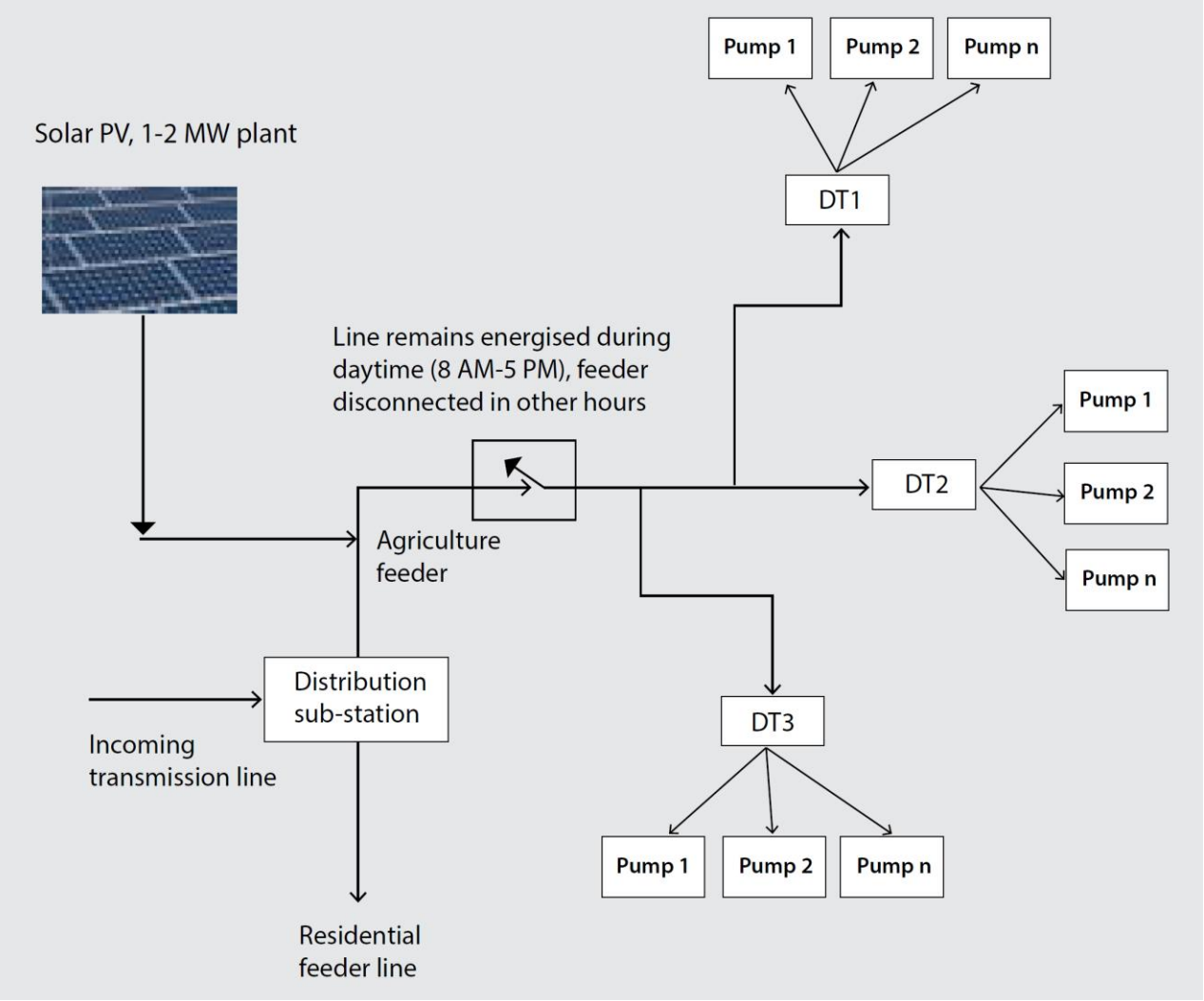
Avoid long-term, base load power purchase contracts

- Revaluate 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 sub-station, 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).

Solar Agriculture feeders - Maharashtra status



- 'Chief Ministers solar feeder policy'.
- 1.5-2 GW tendering underway, ~ 7.5 lakh ag pumps will be solarised in ~1 yr.
- Discovered price – Rs 3.1/kWh, much lower than present APPC of Rs 4/kWh.
- Plans to further scale it across state.

Suggested ideas for way forward…2

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

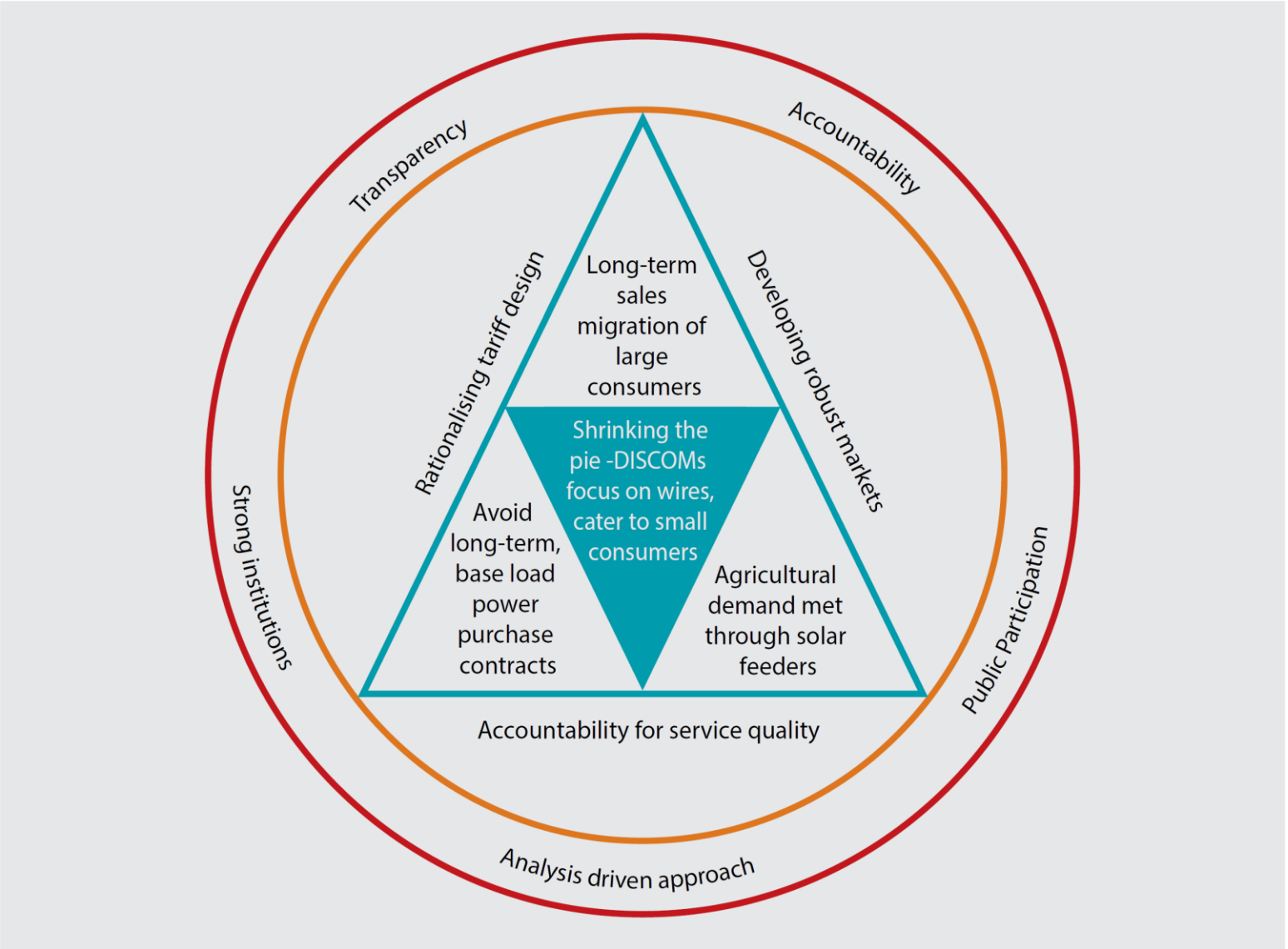
Developing robust markets

- Innovation in power procurement and contract design
- More flexible instruments in the market
- *Provide transparent procurement options for > 1 week*
- *Allow industrial consumers on DEEP*
- Develop institutional capacity to regulate and monitor markets
- Move towards transparent capacity markets for procurement 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.

Schematic representation of suggested approach



In summary

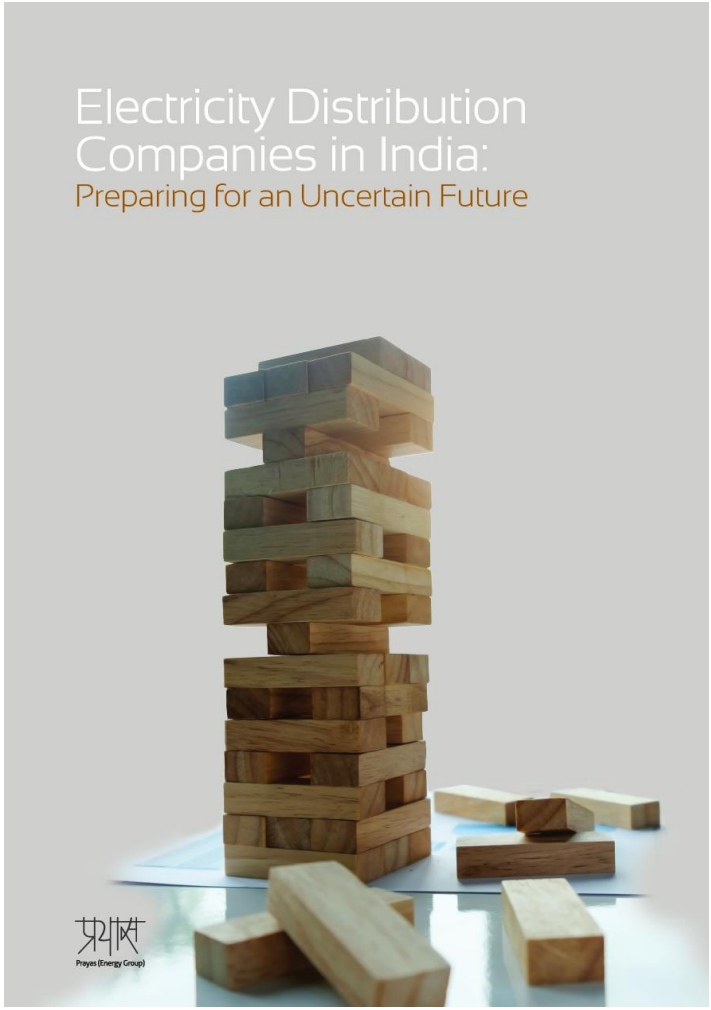
Unless guided by conscious policy decisions, these changes will unfold chaotically, leaving the distribution companies stranded with excess capacity and huge losses—and the sufferers of such a fallout will be mostly small and rural consumers with serious implications for state level politics.

To avoid such consequences, it is extremely important to intervene at the earliest.

The impending changes can be turned into opportunities only if distribution companies, regulators, and policymakers begin acting at the earliest.

THANK YOU

ann@prayaspune.org
shantanu@prayaspune.org
ashwini@prayaspune.org
ashwin@prayaspune.org



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