Supporting Structural Reforms in the Indian Power Sector

Electricity Markets of the Future

Supporting Structural Reforms in the Indian Power Sector

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September 5th, 2019

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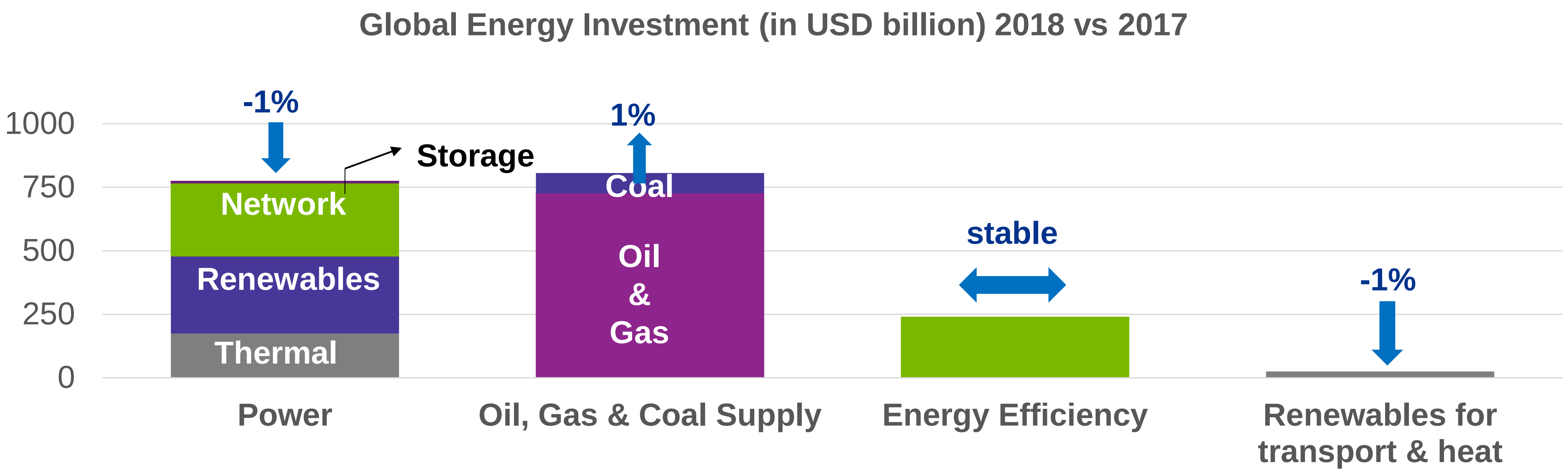
Outline

1. The Energy Transition
2. Critical challenges in power sector
3. Options and pathways for market development
4. Building blocks
5. Way forward to implementation

The dynamics of energy sector investments are changing

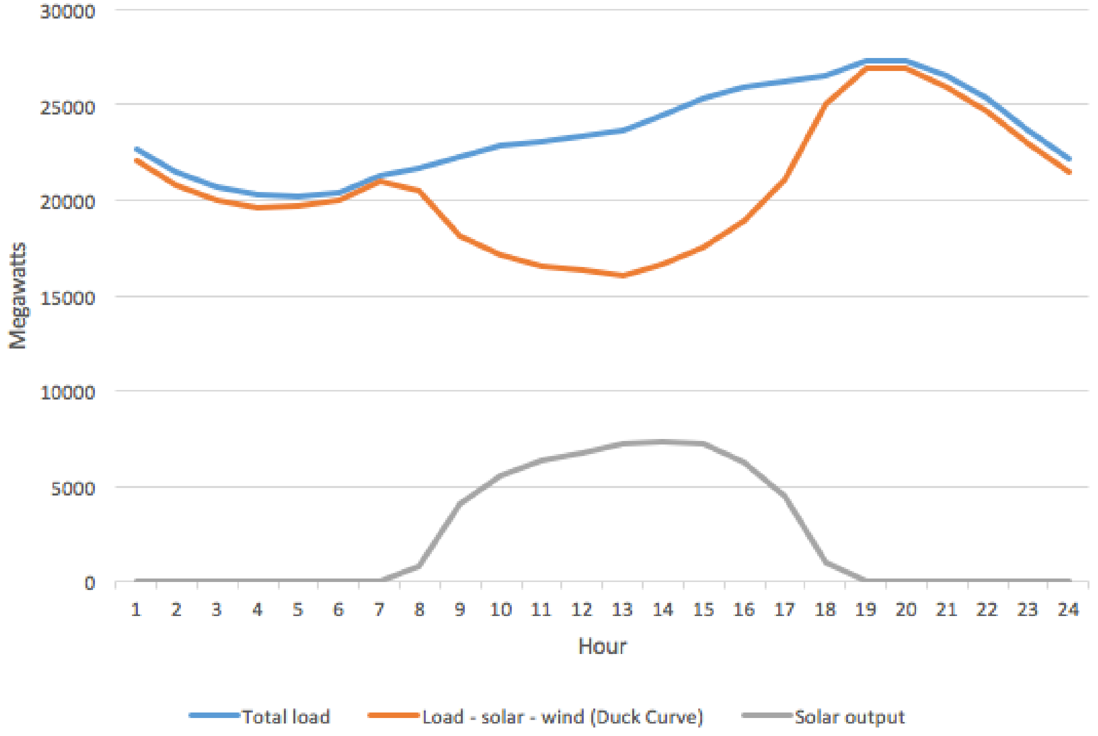


Source: IEA World Energy Investment 2019

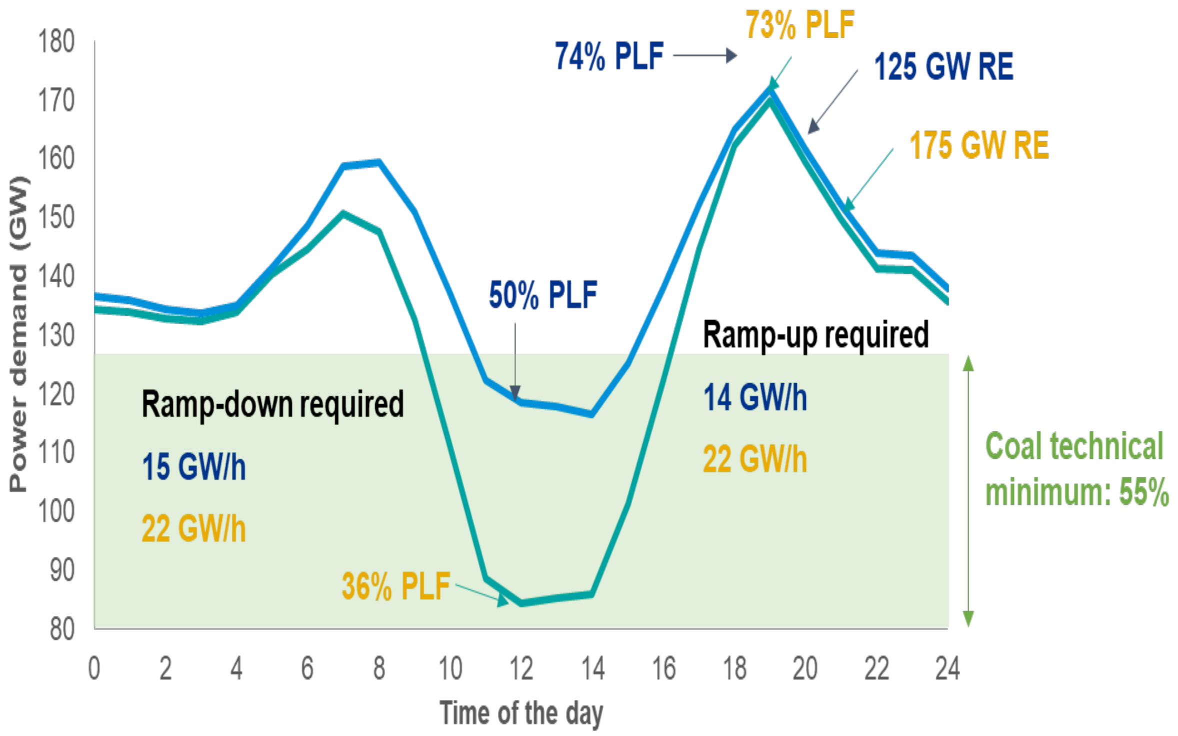
- **Low-carbon power & grids accounted for 85% of total power spending in 2018**
- **Investment in battery storage rose by 45% to a record of over $4 billion in 2018**
- **China and India will remain the largest market for renewables investment in Asia**

Increasing RE penetration will drive the need for flexibility solutions

1 **Illustrative Example:** California load curve net of solar and wind in FY 2017



2 **Illustrative Example:** Typical Indian load curve net of solar and wind in FY 2022



To counter the variable and uncertain nature of RE, demand for balancing & ancillary markets and consequently for new business models and products will grow

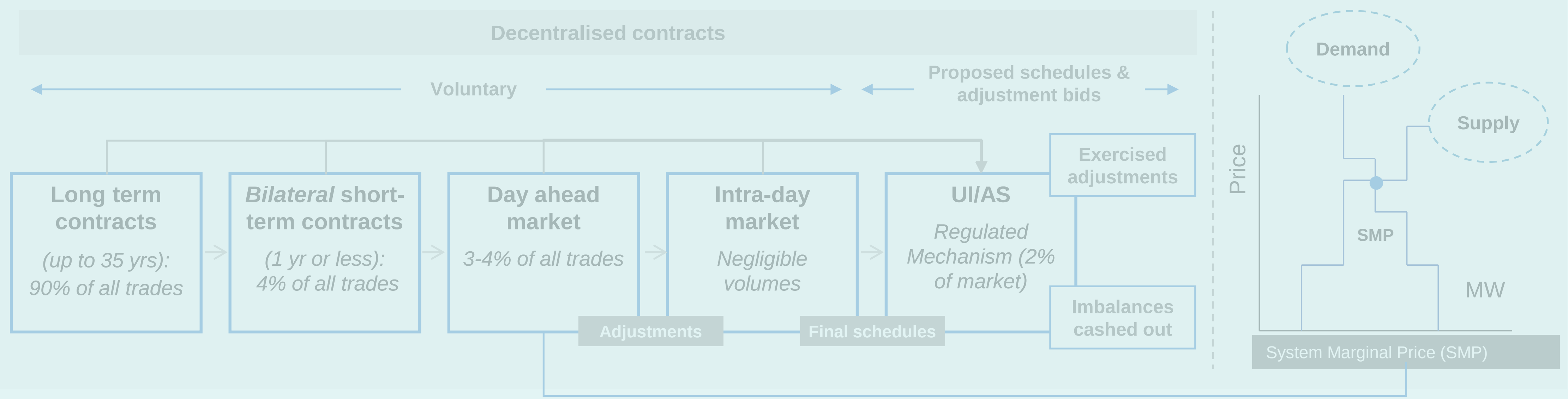
Renewables are assuming centrality in power sector. Due to **variability** and **intermittency** planning, commercial and regulatory arrangements, systems and processes need radical changes

Other critical challenges that need to be addressed

1	Power purchase and dispatch mechanisms
2	Fuel Allocation mechanisms
3	Stressed Assets
4	Network utilization and system operations
5	Utility sustainability

The choices have to be reflected in market design elements

Current state of play



Possible changes

- Shorter, more flexible contracts
- Capacity markets
- More exchange traded contracts, Trading in Futures and Derivatives
- More liquidity over time with changes in long term contracts
- Real Time Market (RTM)
- Transition from administered to multi-product AS market mechanism
- Tightened imbalance settlement band. High deviation costs
- Potential game changing impact on market if Carriage & Content separation is legislated and implemented

In the progression to deeper markets future exchange traded products could include (a) OTC forwards with standardised contracts (b) Contract for Differences (CfD) (c) Financially settled trades (d) Derivatives

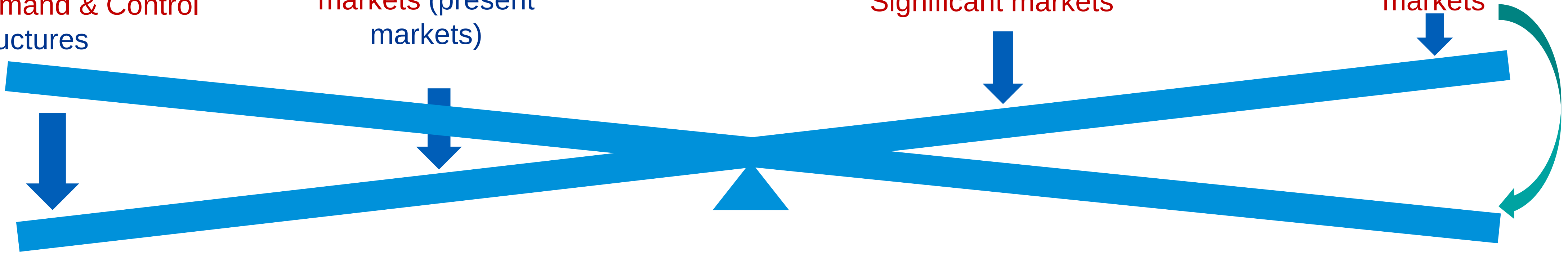
For markets to have significant impact, choices are to be made

Archetype A: LT contract driven Command & Control structures

Archetype B: Thin markets (present markets)

Archetype C: Significant markets

Archetype D: Full markets



	Archetype A	Archetype B	Archetype C	Archetype D
Requisites for success	• Mandatory demand coverage/ capacity adequacy • Enforcement and penalties for above • Centralised merit order dispatch	• LT contract dominated. Trading in residuals • Mandatory demand coverage/ capacity adequacy • Enforcement and penalties for above	• Markets serve as reference for transactions • More platform traded products. Large market share of such products • Transmission access overhaul	• Substitution/migration of traditional LT contracts. Vibrant DAM • Deep financial markets • Very strong surveillance • Deep distribution reforms
Considerations	• Practicability in federal structure • Responsiveness of state owned utilities to penalties	• Practicability in federal structure/state ownership • Adequacy of price signaling by thin markets	• Creating marketplaces that generate confidence • Reining in “state actors”	• Creating marketplaces that generate confidence • Risks to universal distribution reforms in federal structure and polity

Discussions on AS and RTM have generated significant awareness and momentum. The general view that is emerging is that subject to requisite ground-work, the stage could now be set for significantly deeper markets

Getting the building blocks right…

Better planning and forecasting

Transmission planning and access

Revision of gate closure norms

Enforcement of capacity adequacy measure

Institution-al capacity creation

Fuel market reforms

Step up governance

Data disclosure

Way forward: What could be done from here…

Long Term Market

Redesign PPAs – shorter term with flexibility for periodic review

Signal capacity addition using long term planning and forecasting, gradually moving to Capacity Markets

Move towards **retail competition**

'Obligation to Serve' to subsume quality of supply

Medium to Short Term/ Day Ahead

Increase supply in electricity markets – by reducing price volatility and encouraging participation of Discoms/ Gencos/ IPPs

Equip Discoms and LDCs with **tools to support forecasting, scheduling and dispatch**

Ensure **compliance with Declared Capacity**

Discourage contract reneging on DEEP portal

Alternative for post-facto bill revision to reflect change in Variable Cost

Fuel Market Reforms – increase fuel availability and access to IPPs, reduce price volatility, induce competition in mining

Introduce Financial products such as Contract for Difference (CfD), Derivatives

Real Time/ Intra-Day

Introduction of Gate Closure mechanism to increase URS supply

Introduce **Auction based mechanisms in Intra-Day market**

Market based on **System Marginal Price**

Need for more granular intra-day products, especially in RE rich states

Transition from AS mechanism to AS market – introduce new products, generators and technologies

Approach for **market power mitigation**

Introduce Real Time market

Regulations for ensuring Data Availability and Disclosure

Institutional and People Capacity Creation

A possible time line for changes: Reforms happen in Modules

Modularity Framework of Reforms

Module Wholesale Electricity Markets: DAMs, RTMs

Module Balancing and Ancillary Services Markets

Module Transmission Access Rights

Module Distribution Access

Module Retail Markets

A version of DAM is already in place – Increase in depth will require changes in fuel and capacity adequacy mechanisms

RTMs expected within the year 2019

Associated Financial Products and CfDs (along with deepening of DAMs by 2020)

AS Markets – last quarter of 2019 / early 2020

Distribution Access – Already exists in "parts" but will be strengthened concomitantly with RTM

The above will happen concomitantly with *Module* ***Long Term Contracts*** and *Module* ***Capacity Markets/ Mechanisms*** and also *Module* ***Decarbonisation*** (which has been implemented in parts but without a strong overall framework that supports reliable and predictable deployment)*

* Excludes Module Fuel Markets due to jurisdictional issues. However power market reforms would greatly benefit from reforms in the fuel markets, which have been otherwise slow or have stalled

Thank You