

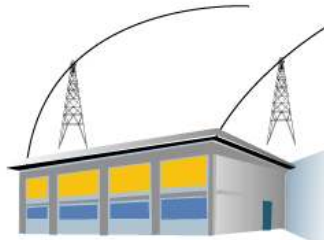


MISSION ASSURANCE, RENEWABLES and the SMART GRID

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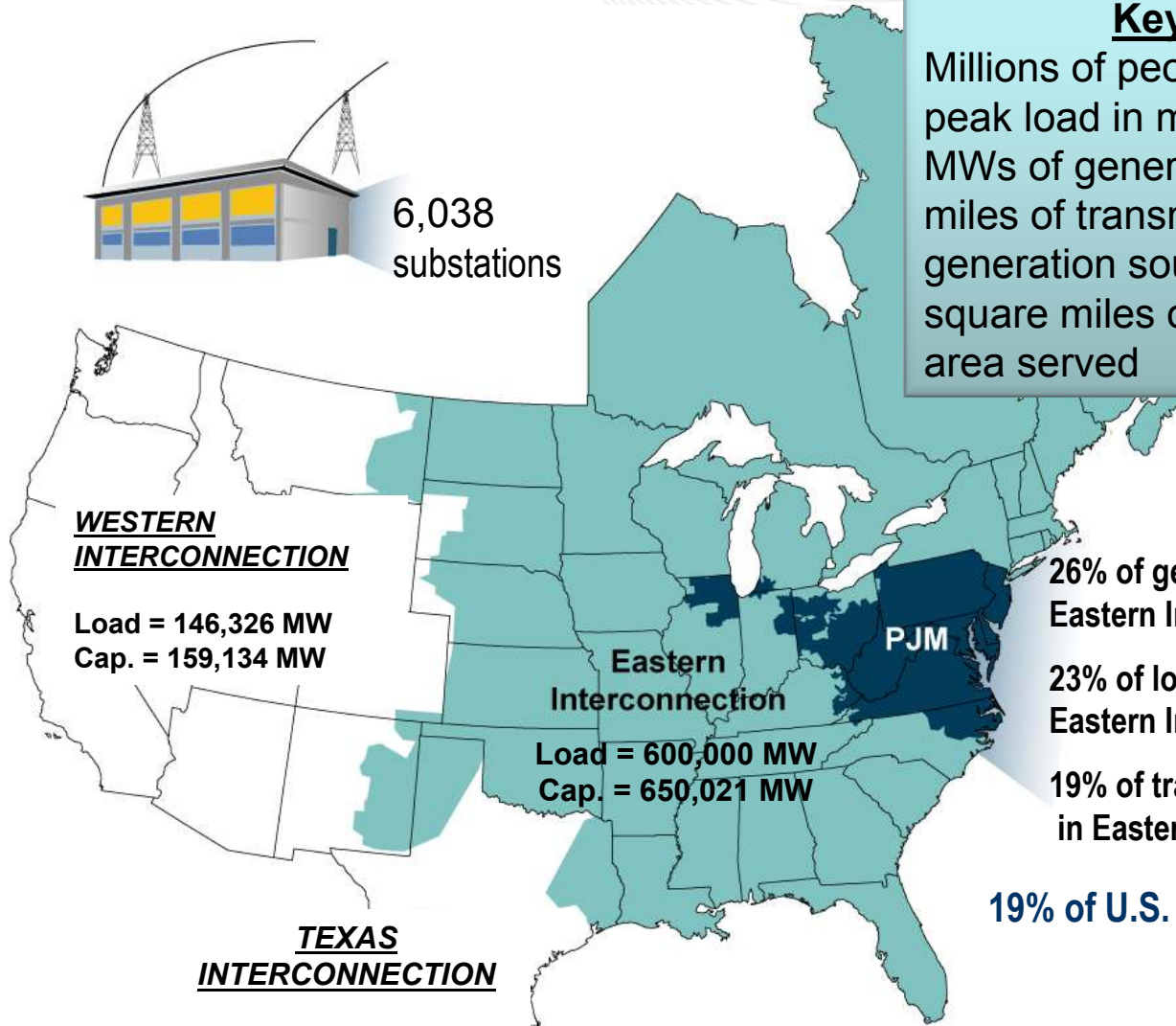


PJM as Part of the Eastern Interconnection



6,038
substations

Key PJM Statistics	
Millions of people served	51
peak load in megawatts	144,644
MW of generating capacity	164,634
miles of transmission lines	56,251
generation sources	1,271
square miles of territory	164,260
area served	13 states + DC



WESTERN INTERCONNECTION

Load = 146,326 MW
Cap. = 159,134 MW

Eastern Interconnection

Load = 600,000 MW
Cap. = 650,021 MW

PJM

26% of generation in Eastern Interconnection

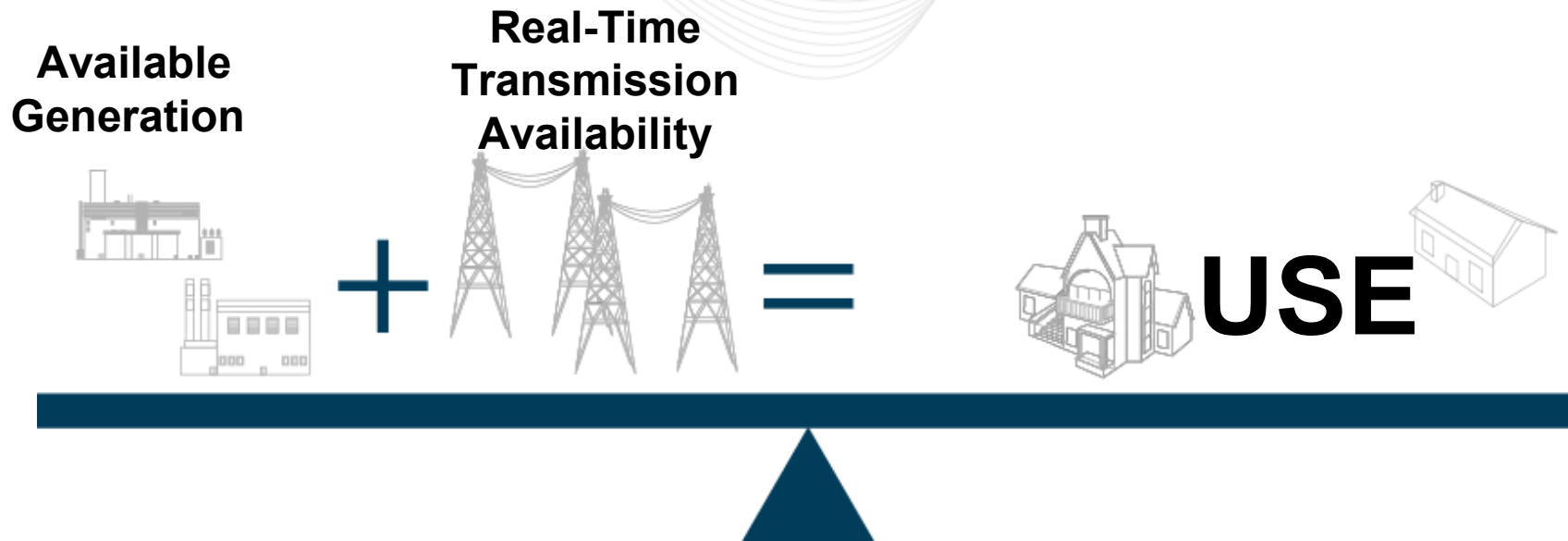
23% of load in Eastern Interconnection

19% of transmission assets in Eastern Interconnection

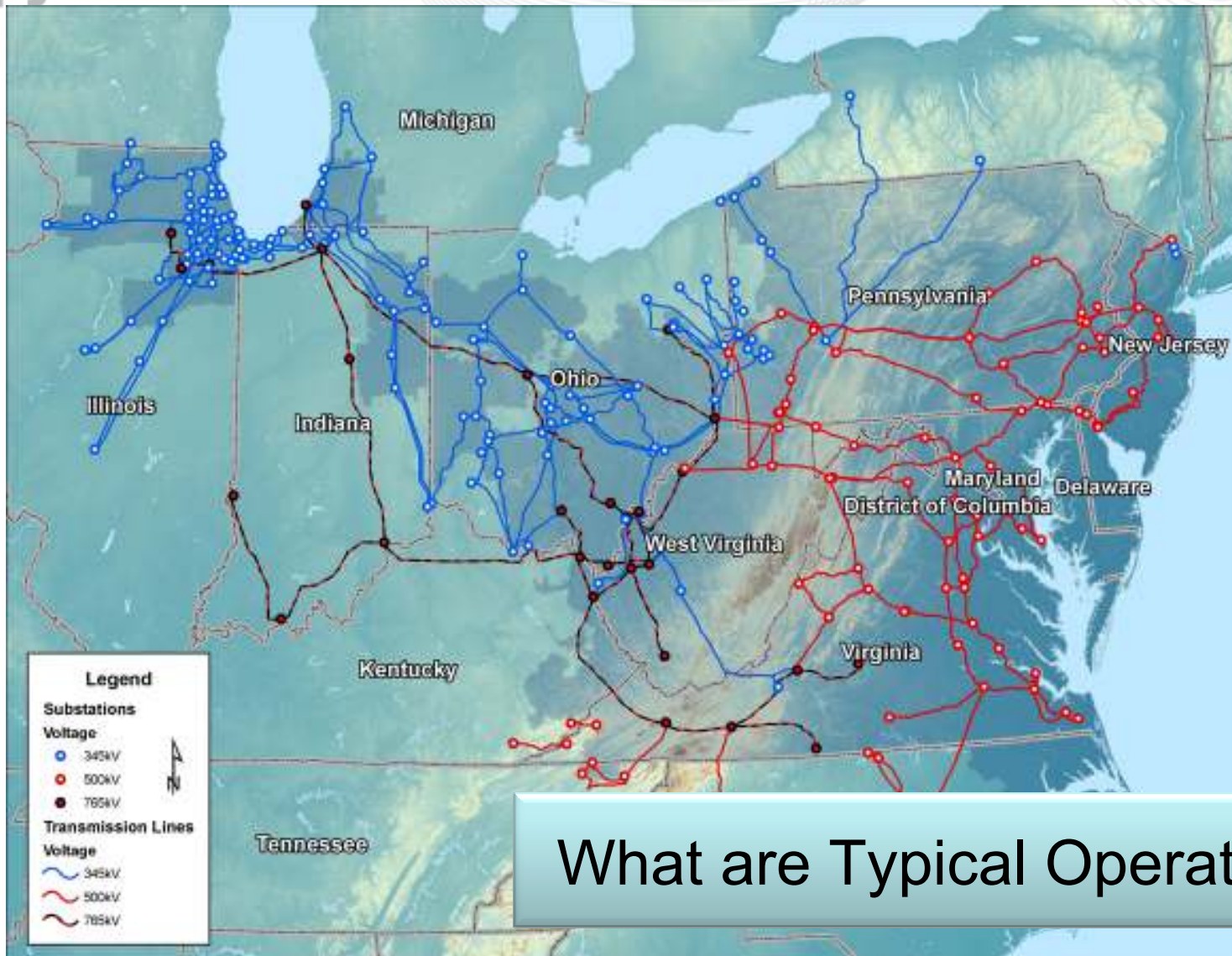
19% of U.S. GDP produced in PJM

TEXAS INTERCONNECTION

Load = 54,493 MW
Cap. = 61,751 MW



Central Question - How does the paradigm or Operational Balance change with the integration of Renewables and SMART GRID technologies?

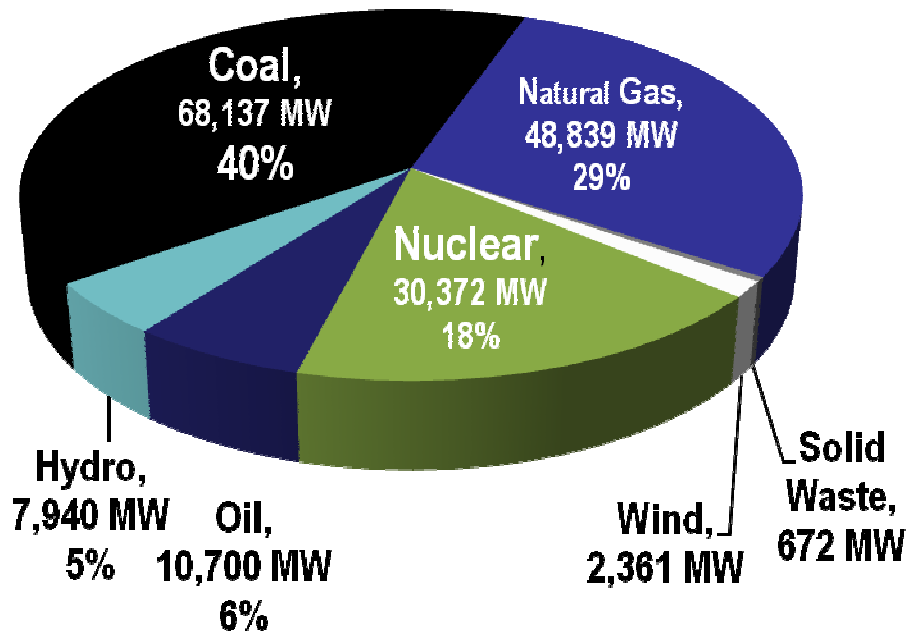


What are Typical Operations?



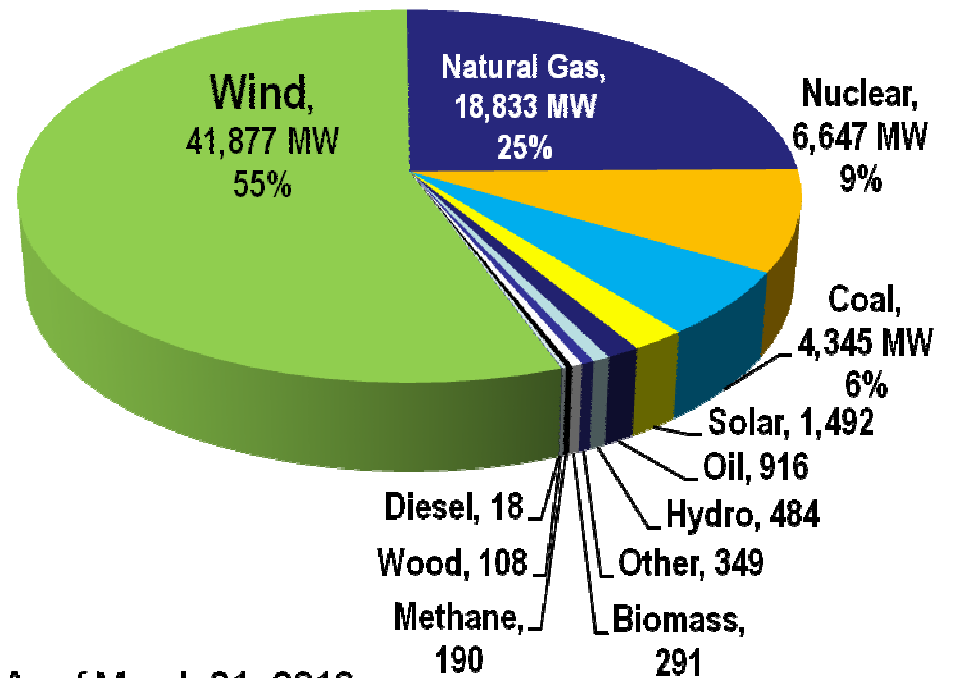
Generation To Be Built in PJM?

Existing



As of 12/31/2009

Proposed Queue



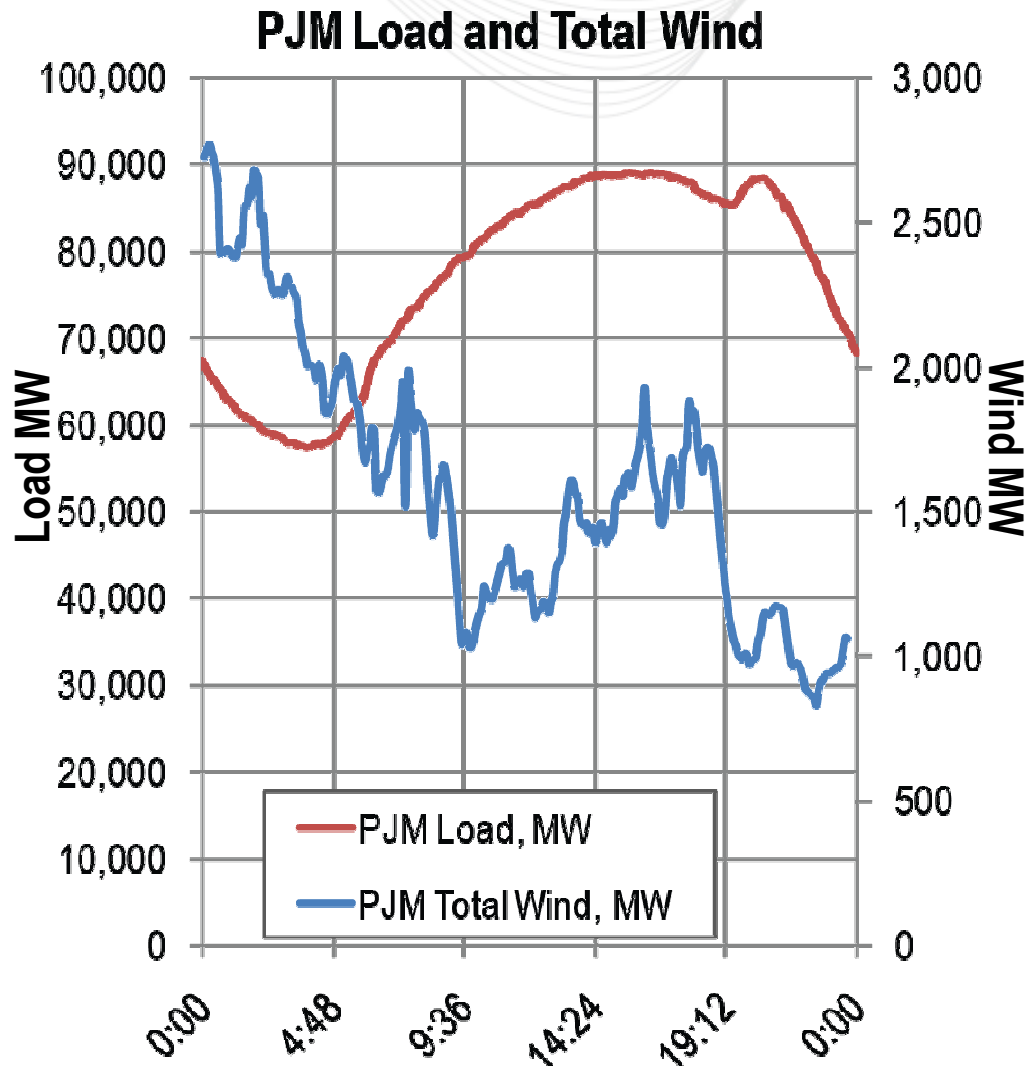
As of March 31, 2010

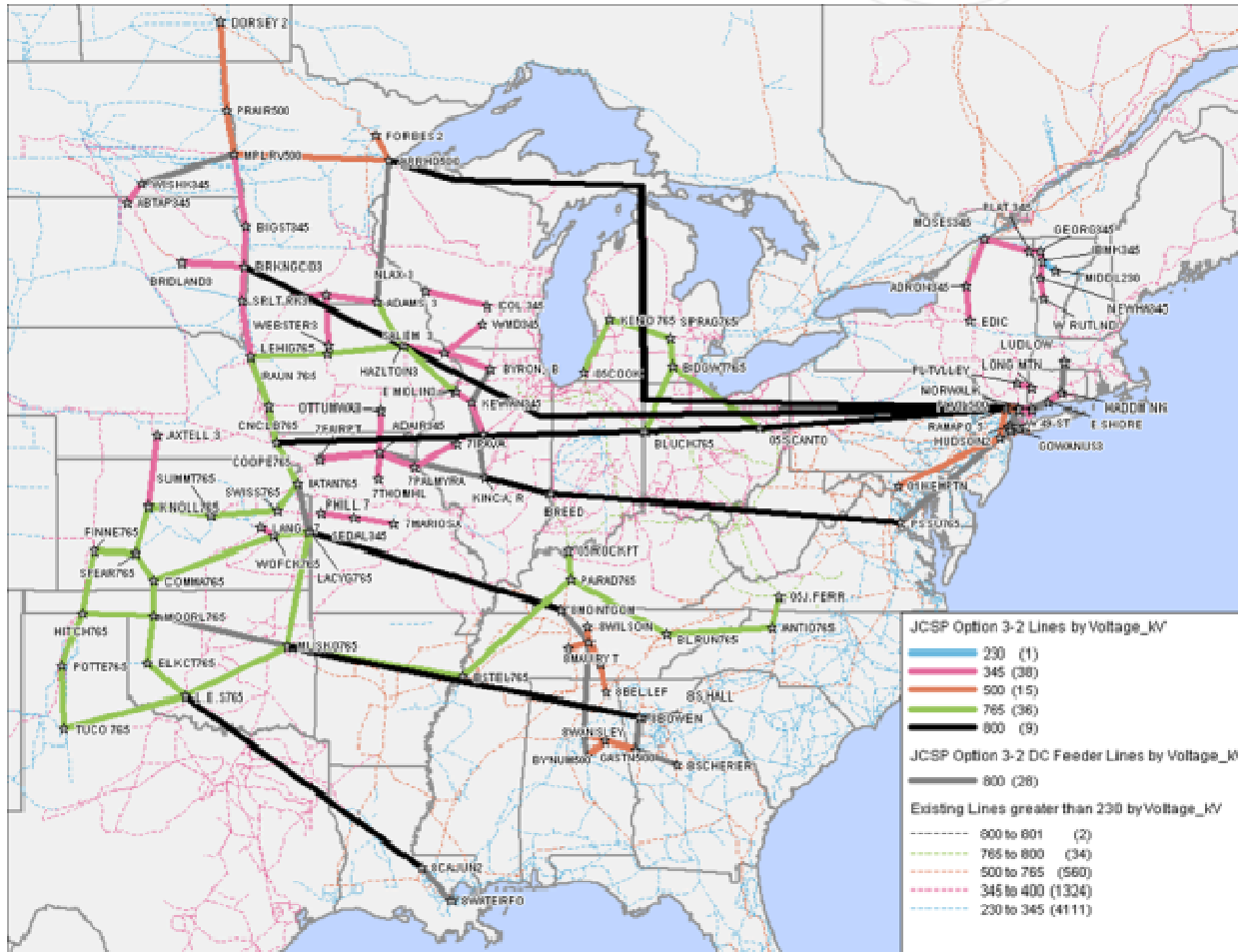


- Renewables – referred to as “Intermittent” or “Variable” Gen
- Wind is coming, but not on the peak hours
 - (in the East - 13% available at the time of peak)
- Energy Storage is needed to ensure renewables achieve their potential



PJM Load and Wind Resources – April 7, 2009





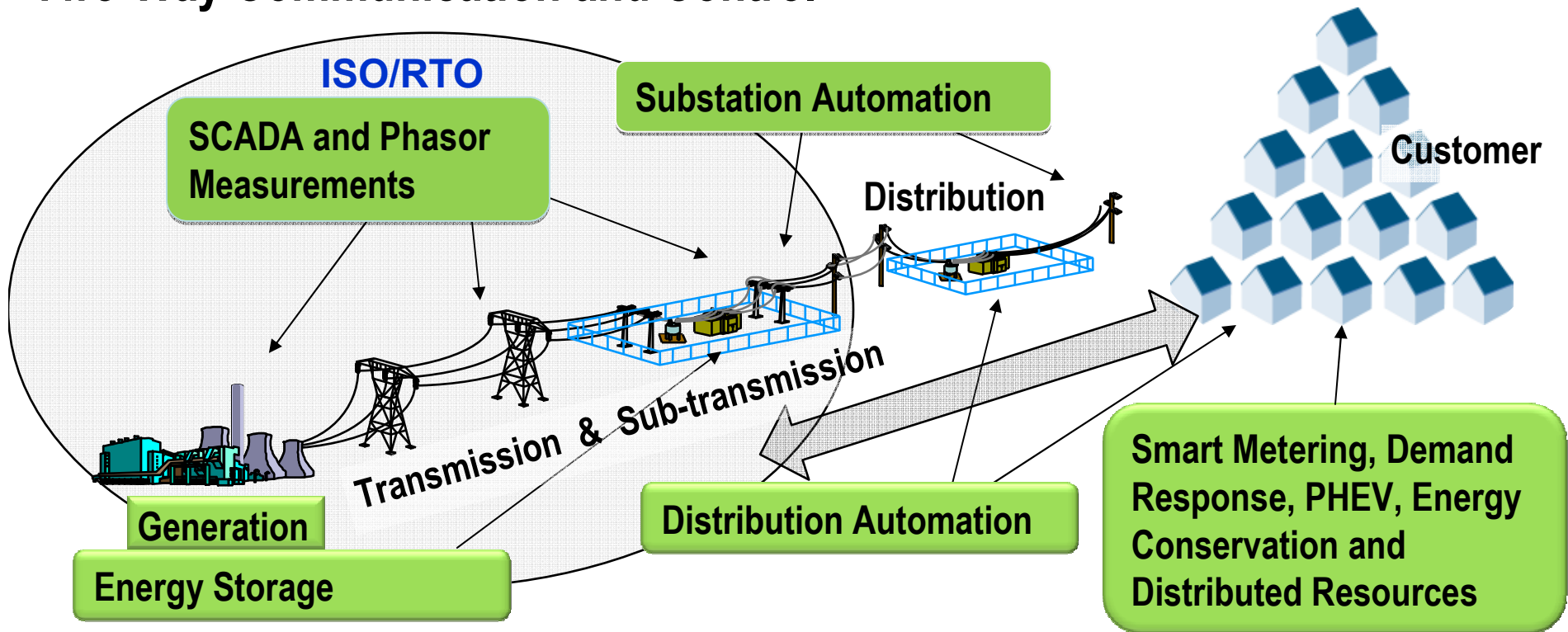
20% Wind - \$80B in Transmission

54 GW Potential of Off Shore Wind



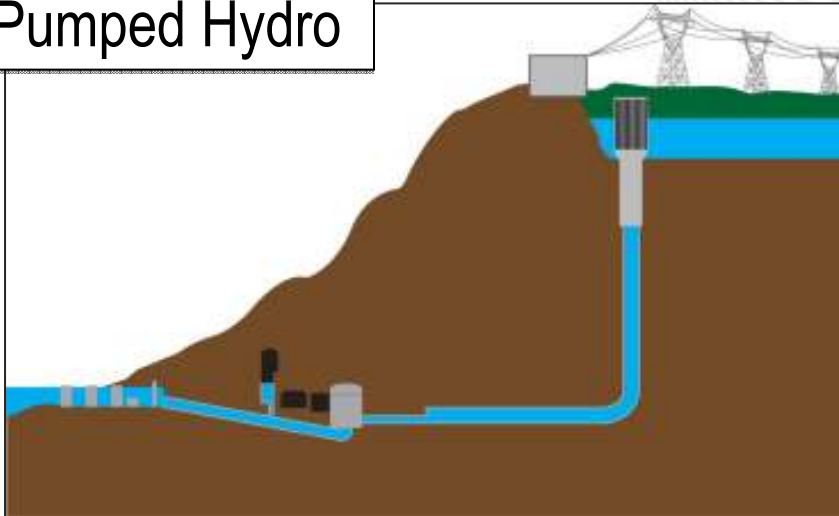
The Smart Grid is realized by merging data to achieve a total end-to-end systems view by integrating information technology and operational technology.

Two-Way Communication and Control

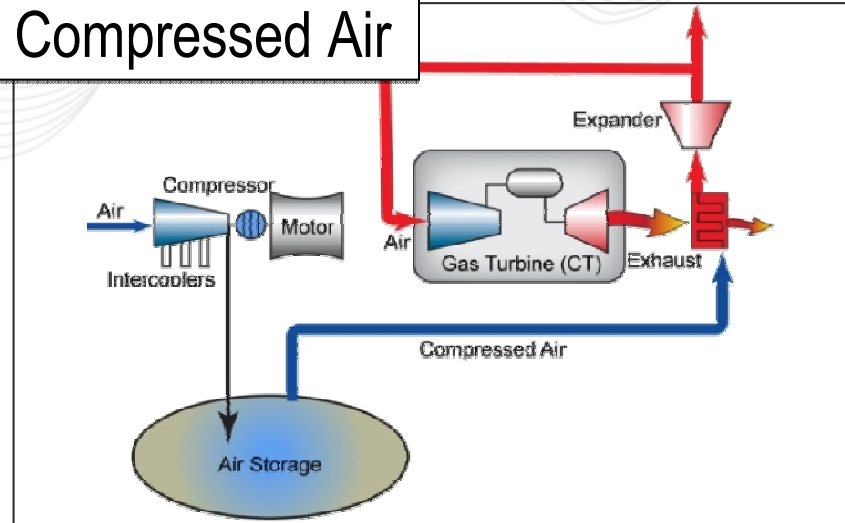


Grid Storage Types

Pumped Hydro



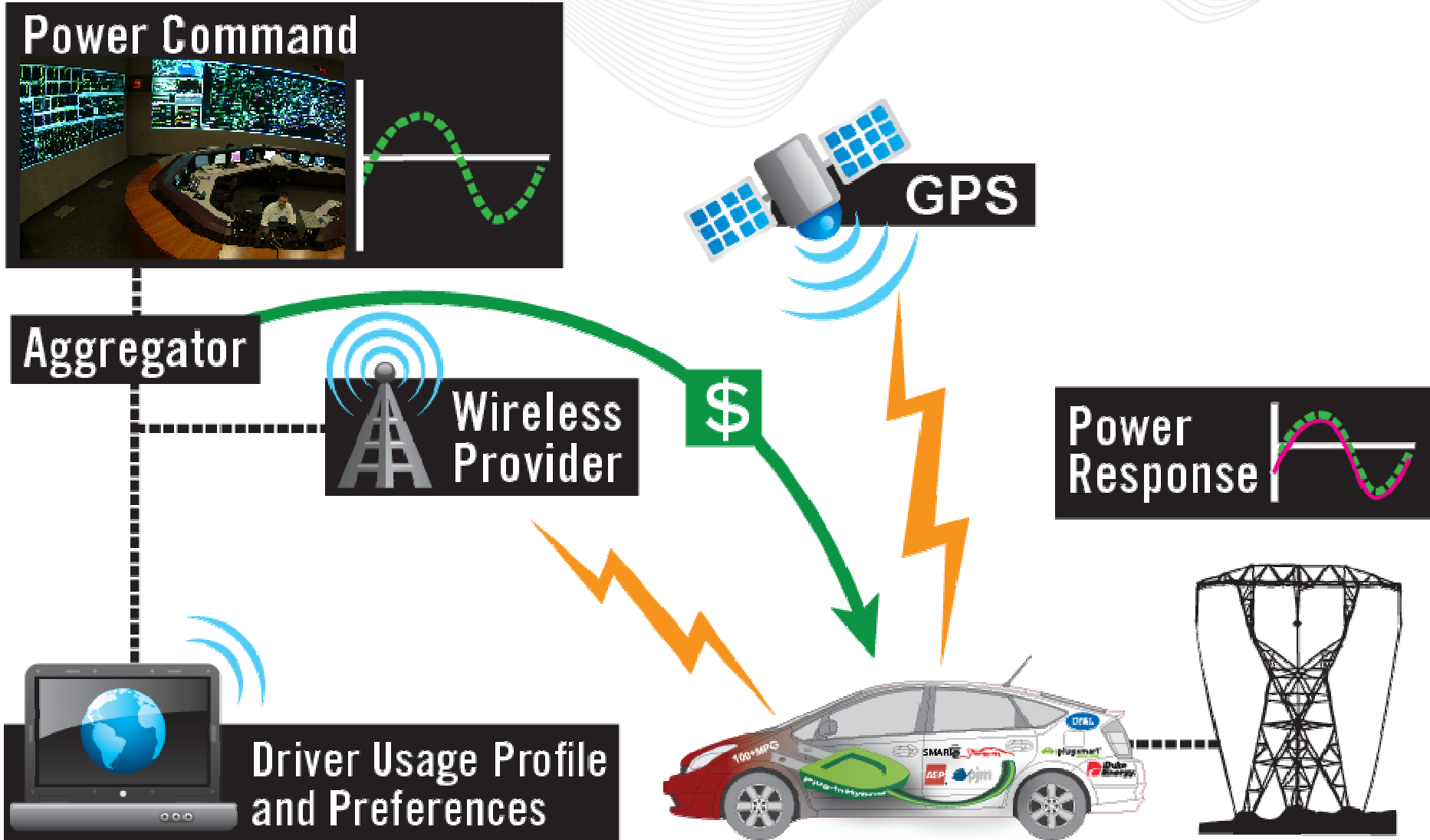
Compressed Air



Stationary Battery



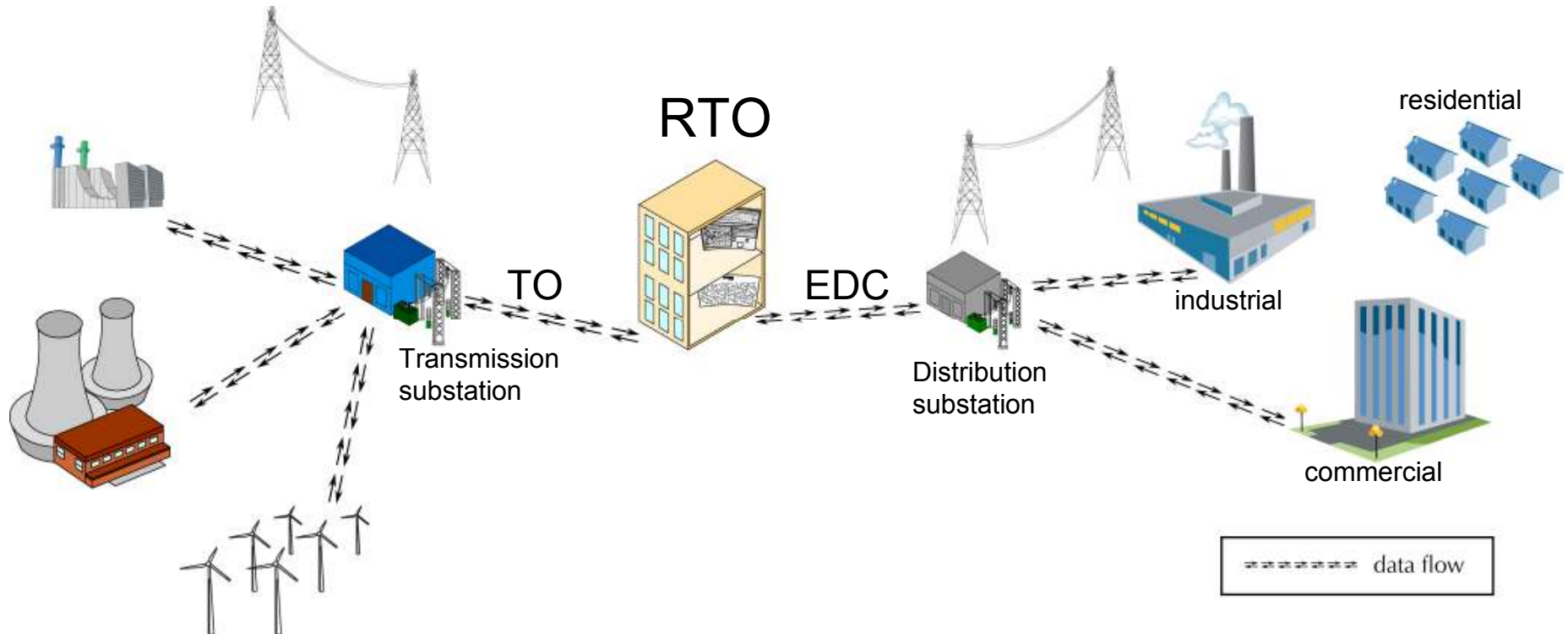
Flywheels

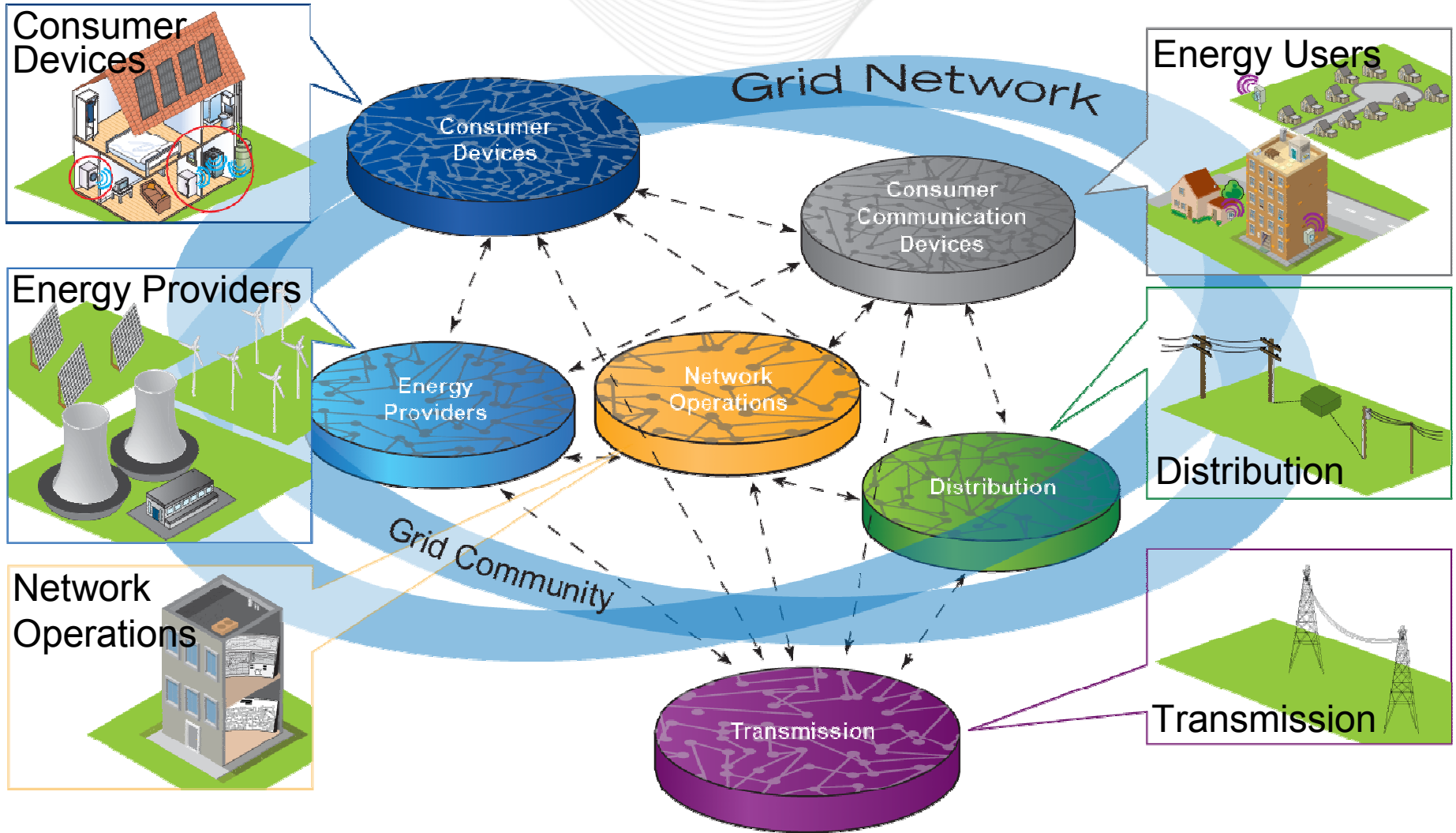


Information Flow for Today's Grid

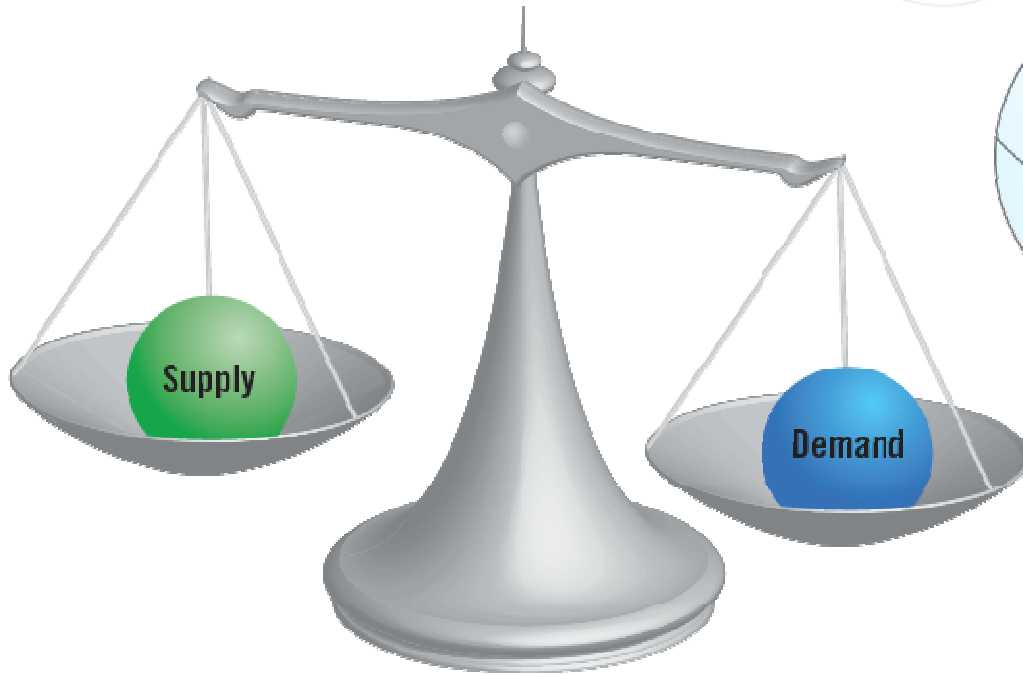
Generation

Load





A New Paradigm of Operational Balance



Reliability in
Historic Grid Operations



Reliability in
Future Grid Operations



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