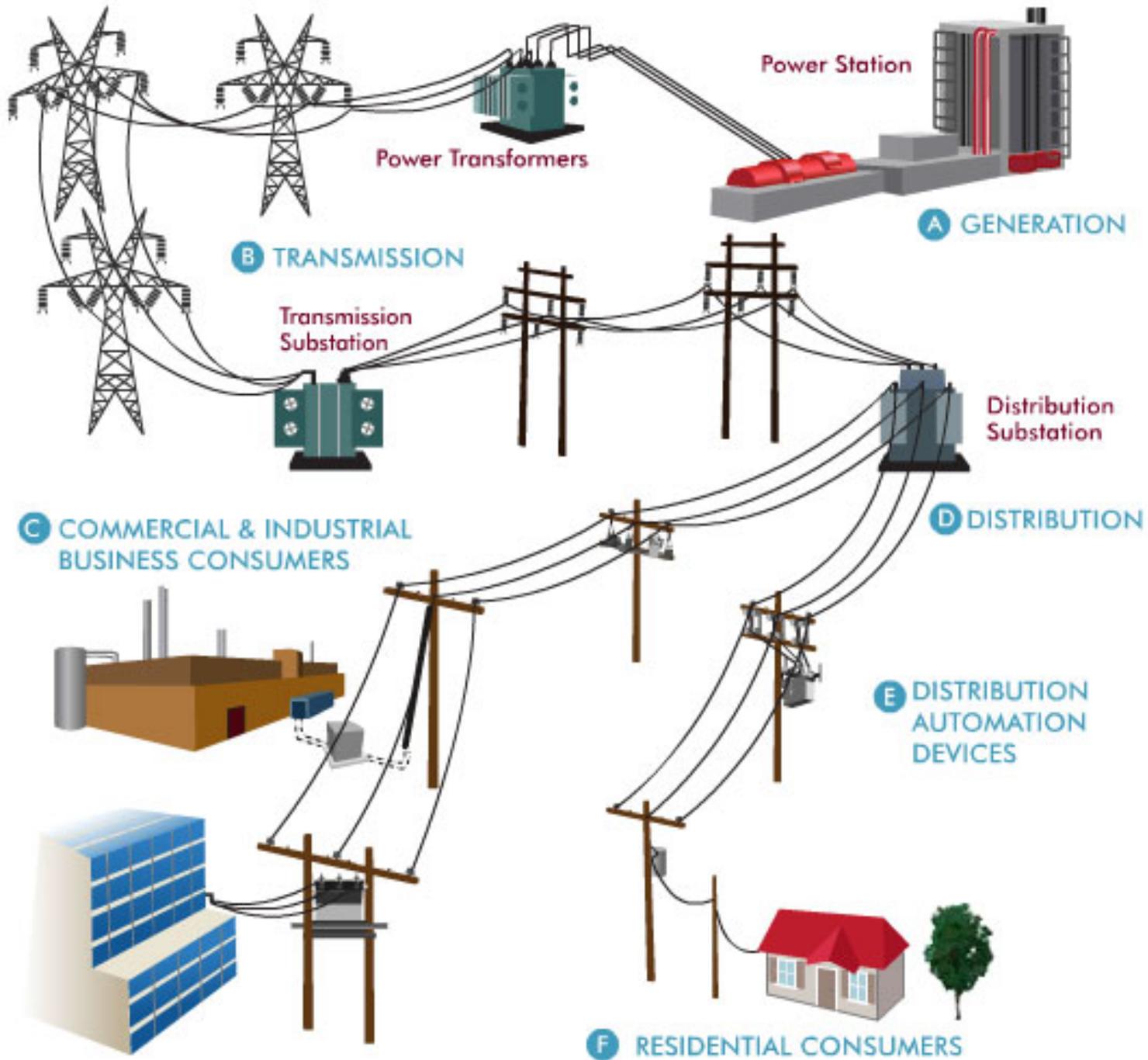


Smart Grid and Alternative Energy Resources— A Regulator's Perspective

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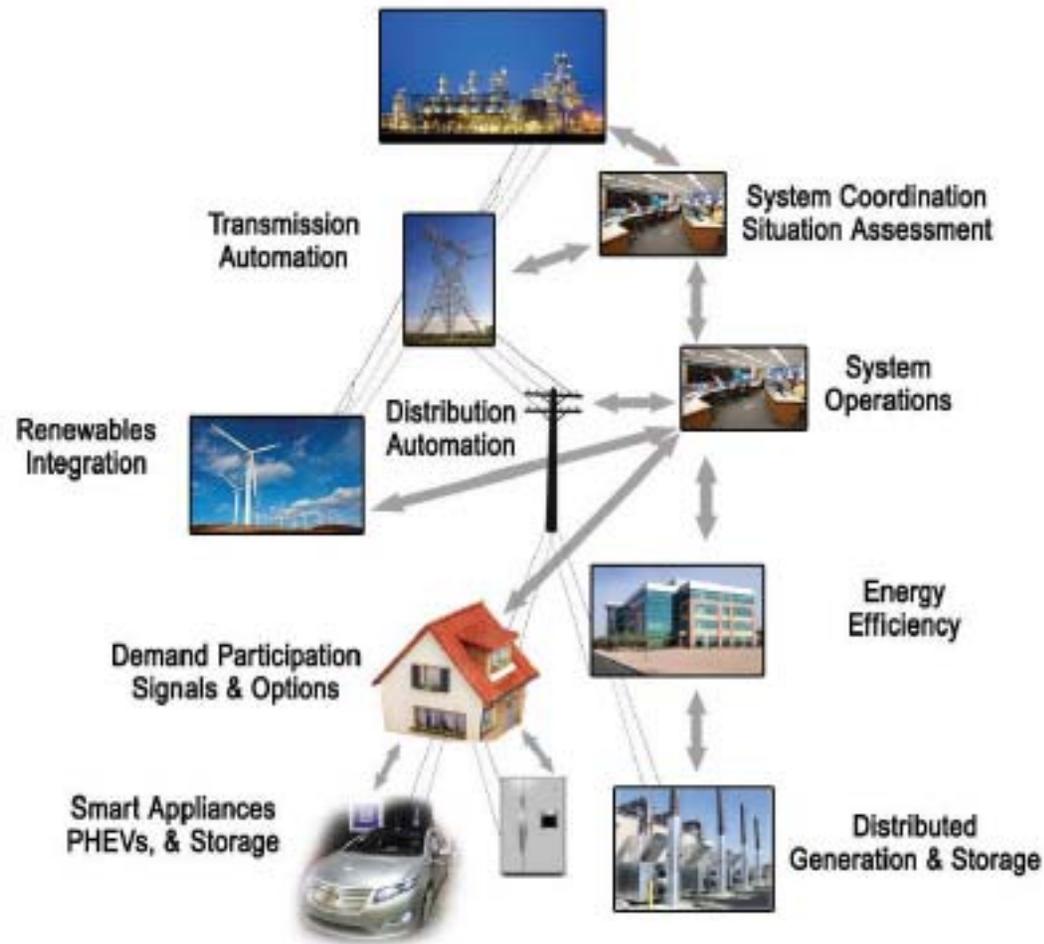
The Current Electrical Grid

- Delivers one-way flow of electricity from points of generation to consumers
- Consists of three primary systems:
 - The **generation system** consists mainly of central power plants that generate electricity
 - The **transmission system** delivers electricity from power plants to distribution substations
 - The **distribution system** delivers electricity from distribution substations to consumers.



What is the smart grid?

- An upgraded electrical grid that will allow the two-way flow of electricity and information.



Why Smart Grid?

- Future expansion of renewable energy resources, energy efficiency resources, and plug-in electric vehicles will be tightly connected to utility deployment of Smart Grid
- Key issue #1: market penetration
 - High RPS targets
 - Large number of distributed renewable resources
 - Growing PEV market share -clusters
- Key issue #2: need for EE technology innovations

Caution is the Word

- 2005 – 2009 past history
- Venders oversold the state of development of Smart Grid technology
- Cost/benefit analysis based on wishful thinking and speculation
- Regulators asked to make a **leap-of-faith** that future applications will be developed

Caution is the Word

- The billion dollar question: Who bears the financial risk for this Smart Grid leap-of-faith?
- Regulators acknowledge room for some risk-sharing
 - But utilities must bear the brunt of deployment risk

A New Smart Grid Era

- As we enter the fourth quarter of 2010 we see a new era of pragmatism
- State utility commissions will be more critical in their review of Smart Grid projects
- PUC pragmatism is good for the SG investment climate
- Industry will have an increased confidence that investments in SG technology will pay off
- So the outlook is good

Current Developments

- National Standards development is well on its way
 - Wireless upgrade standard a milestone
 - NEMA SG-AMI 1- 2009
- Difficulty in engaging customers better understood
 - PUC's and utilities developing strategic plans including behavioral research

Grid Infrastructure: Opportunities

- Electric transmission and distribution modeling
 - synchrophasors
- Enhanced reliability
 - Decentralized automation – self healing grid
 - Improved outage restoration
 - Advanced battery storage: peak management; dispatchable renewable generation
- Increased grid efficiency
 - Improved voltage profiles
 - Tighter volt/var control
 - Substation voltage reduction programs

Advanced Metering Infrastructure: Core Benefits & Investment

- Two way communications between utility and meters
- Allow customers to monitor prices and consumption in real-time
- Metering-data foundation for time-based rates
- Home Area Network (HAN)
- Utility direct load-control programs
- Software and hardware that allows consumers to modify behavior via energy usage awareness
- Networked intelligent appliances that manage power consumption

What the Future Holds...

- Less than 10% of Smart Grid communication bandwidth is required for basic operations
 - Balance available for innovation
- Most consumer SG enabling devices have not been invented
 - A future in which all energy consuming appliances will have an IP address?

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SMART GRID COLLABORATIVE

