

U.S. DEPARTMENT OF
ENERGY

Office of
Electricity Delivery
& Energy Reliability



T-D Coordination

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EAC Meeting

Confluence of Factors Driving Grid Transformation

Evolving Federal and State Policies

- Renewable Portfolio Standards
- Asset Utilization
- Reliability and Resilience
- Integration of Distributed Energy Resources

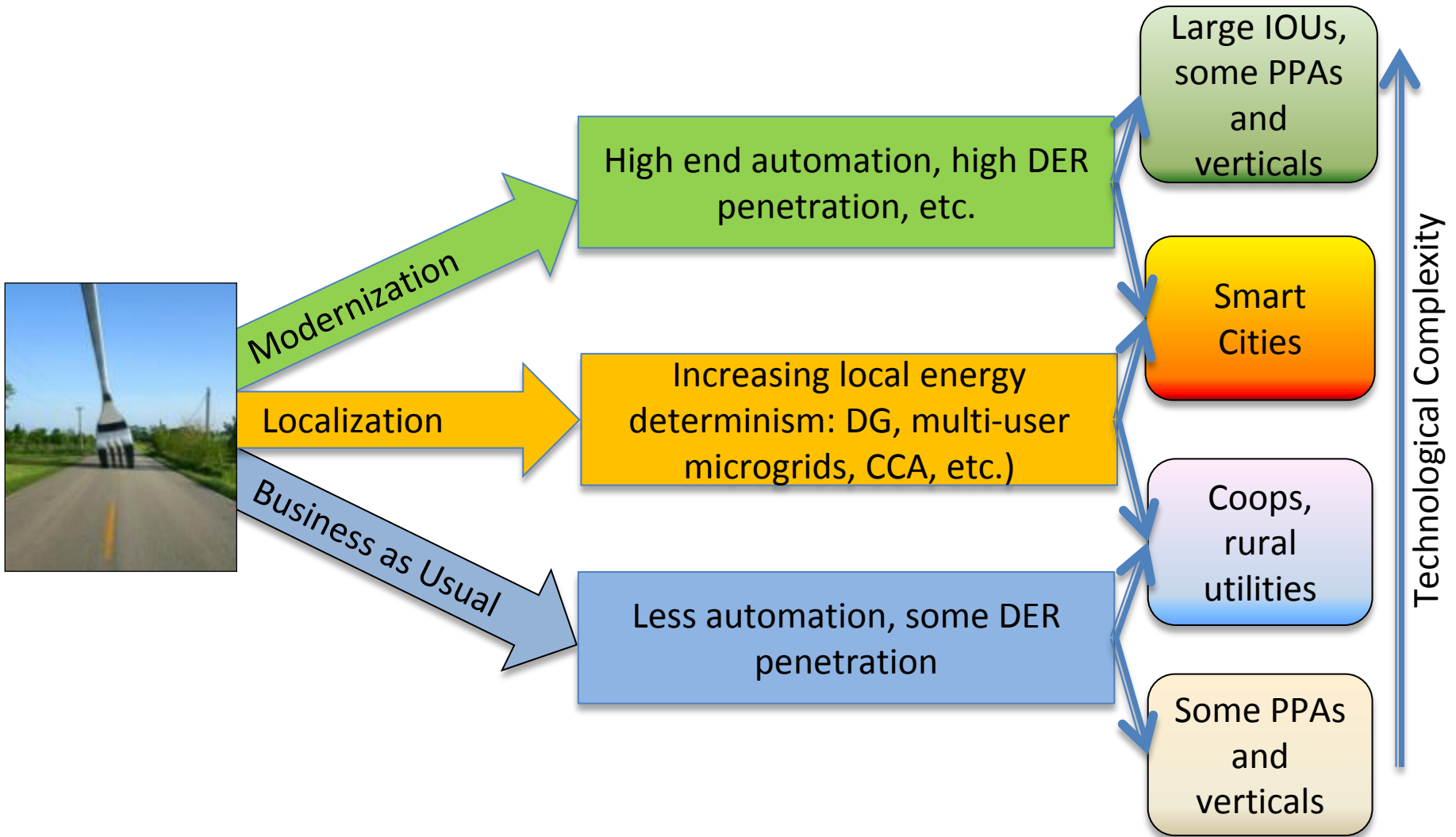
Emerging Technology

- Information and Communication Technology (ICT) &
- DERs:
 - Solar and Wind
 - Energy Storage
 - Electric Vehicles
 - Microgrids
 - Building Systems

New Market Entrants

- Generation and Management of Electricity by Customers and 3rd Parties
- DER Service Providers

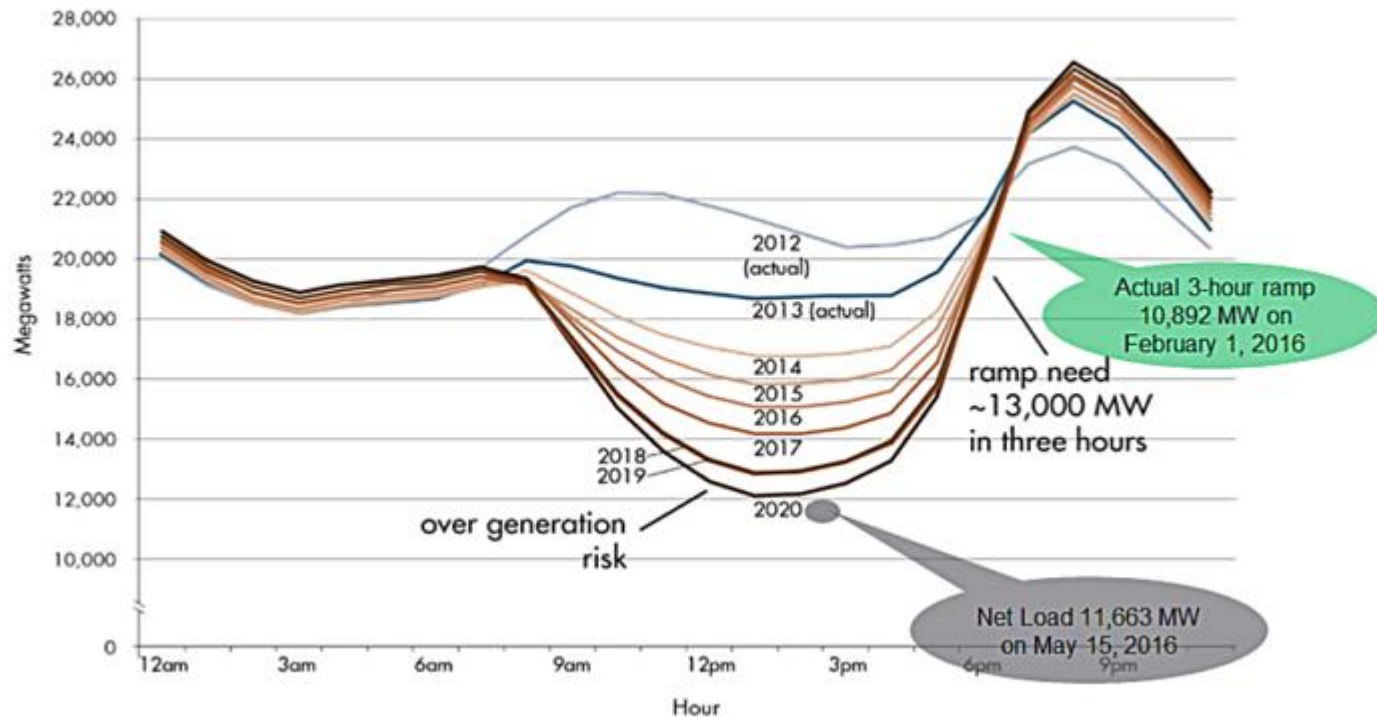
Co-Existing Futures



From Jeffrey Taft, Pacific Northwest National Laboratory

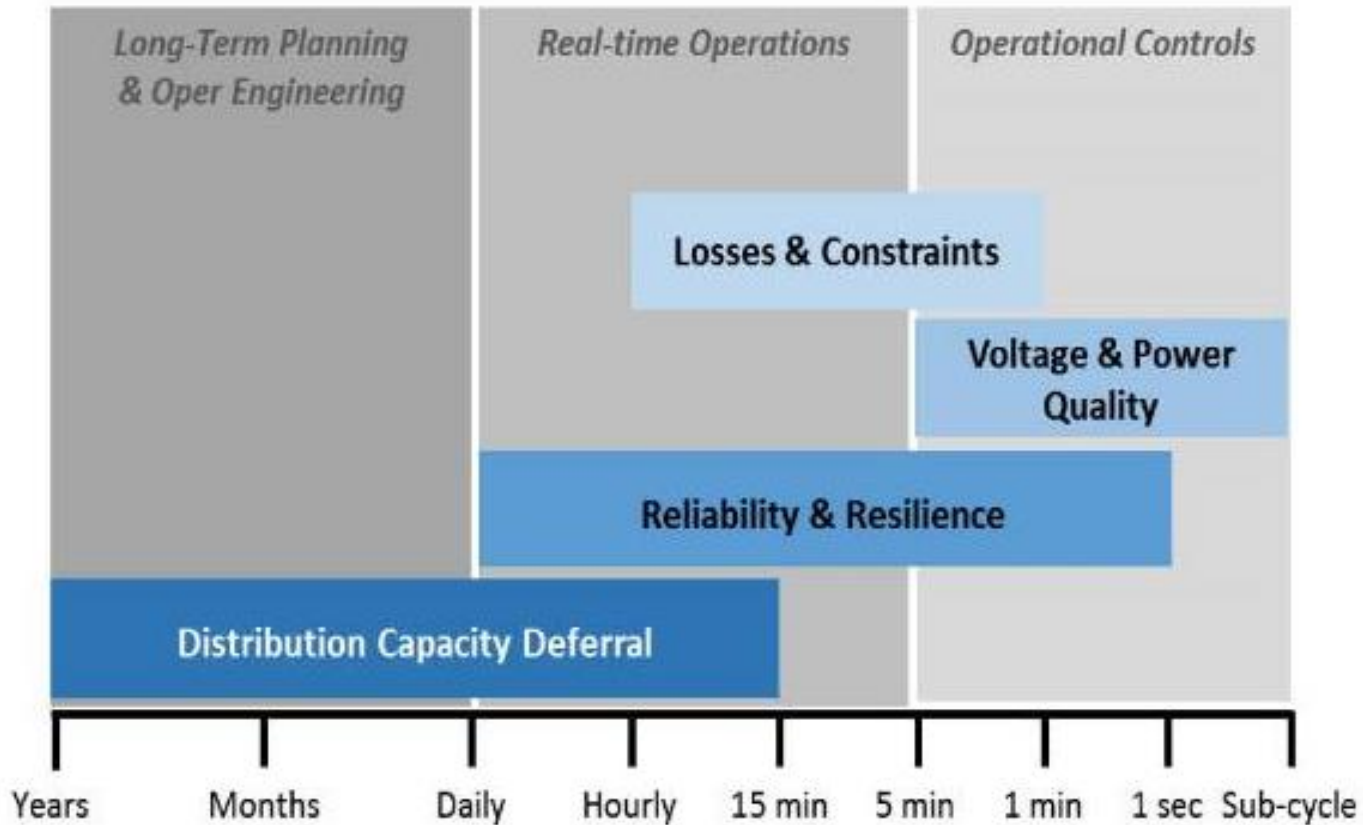
System Requires More Flexibility

California “Duck” Curve



DERs (and bulk-system factors) present considerable variability and uncertainty in both generation and load profiles challenging both planning and operations

DERs Provide Value

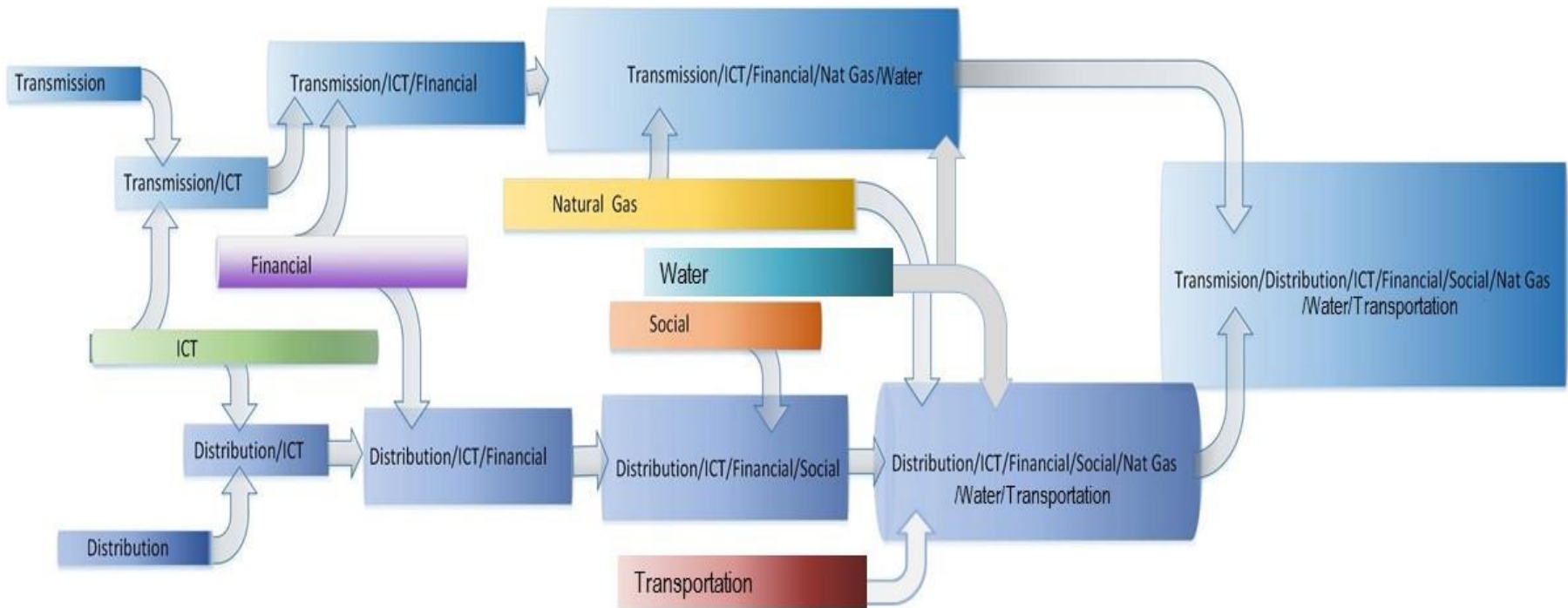


From “Evolving Distribution Operational Markets” by Paul De Martini, Resnick Institute, Caltech, and Brenda Chew, Dale Murdock and Steve Fine at ICF

Considerations

- DERs provide capacity, energy and ancillary services, yet require flexible systems due to the variability they introduce.
- Integrated T, D (& C) planning, operations and markets are required at some level of DER integration (and to enable their full value)
- Coordination frameworks (establishing rules, responsibilities, points of interconnection and data requirements among participants) are required:
 - For scheduling and dispatch:
 - Transmission system operators require the predictability and assurance of DER commitments (visibility component)
 - Distribution system operators will need dispatch rights to ensure local reliability (or markets)
 - To enable scalability and optimization (local vs system)
 - To determine the communication and control structure (e.g., who controls the DER resource?)
- Need better optimization tools (to handle various time-scales)
- Need technologies to enable flexible operations (e.g., smart inverters and energy storage)

Convergence



From “Value Creation Through Integrated Networks and Convergence”, De Martini and Taft, February 2015