

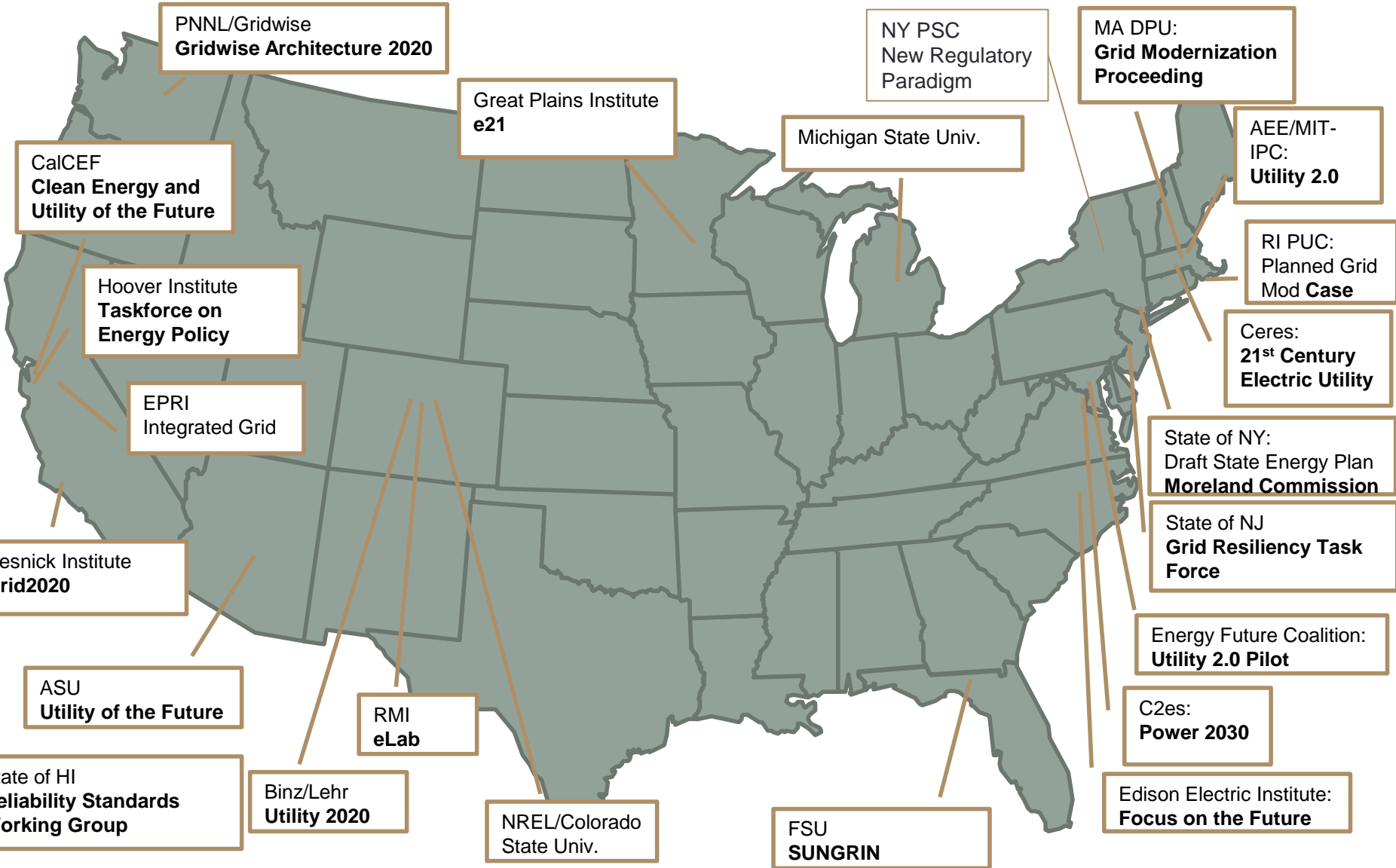
# **INFORMATION & TOOL DEVELOPMENT TO SUPPORT CONSIDERATION OF FUTURE REGULATORY MODELS**

---

DOE Electricity Advisory Committee – Smart  
Grid Subcommittee

# The Premise

- Electric Distribution Utilities are being asked to:
  - Replace Aging Infrastructure
  - Provide Higher Levels of Resilience and Reliability
  - Enable Customers to Efficiently Manage their Use of Power
  - Integrate Volt-VAR Optimization
  - Integrate Variable Renewable and Distributed Generation
  - Protect the Grid from Cyber and Physical Attack
  - Manage Workforce Transition
- Requires Significant New Investment in a Period of Slowly Growing or Declining Sales
- Requires Integrated Real-Time Distribution System Operations vs. “Build to Fit” & “Float on Transmission”
- Utilities and Regulators Challenged to Develop New Business & Regulatory Models



# Role of Department of Energy

- DOE has a Role in Development of Technologies Needed for Efficient Real-time Operation of Integrated Transmission and Distribution Systems with Variable and Distributed Resources
  - Outside the scope of this paper
- DOE may have a Role in Development of Information and Tools Useful to Utilities and Regulators in Evaluating Investments Required by Changing Utility Functions
  - Information & Tools would be available to utilities and regulators to use as they see fit
- DOE may have a Role in Supporting Facilitated Stakeholder Discussions of Emerging Regulatory Models

# Information & Tool Development

- Consistently Reported Public Data on Distribution Reliability
  - Lack Consistent Data: NERC & EIA gather Outage Data, Some States adopted IEEE 1366, Revisions to EIA 861 will identify Inconsistencies
- Improved Data to Evaluate Distribution Investments
  - Review Data Available to support Distribution Cost & Performance Benchmarks under Grid Modernization
- Updates to Customer Interruption Cost Estimates
  - DOE has developed Tool to Estimate Customer Outage Costs
  - Underlying Data Mostly pre-2000, Excludes Major Regions (Northeast & Intermountain West), & Not Include Outages >8 hours
  - Potential to Consider New Approaches to Customer Segmentation
- Reference Network Models (RNM)
  - Large-scale distribution planning model that can estimate efficient costs and probable reliability impacts of distribution expansion planning, upgrades, & distributed generation integration
  - Validated & used to support incentive regulation in other countries

# Information & Tool Development

- Assess How to Facilitate Customer Choice Engines to Manage Power Use by Air Conditioners, Water Heaters, & Other Devices with Thermal Inertia or Timing Flexibility
  - New applications capable of considering learned & preset customer preferences, building occupancy, micro-climates, & expected prices
  - Can create efficient, dynamic demand optimization with or without time varying retail rates
  - Barriers can include: Standards, Settlement Practices, Access to RTO/ISO “Look Ahead” Price Forecasts, & Distribution Integration
- Tools for Assessing the Benefits, Costs, & Impacts of Volt-VAR Optimization (VVO) Options
  - VVO is Apparent Success in Smart Grid Projects
  - Field performance varies with circuit characteristics & technology
  - VVO reduces distribution throughput & potential revenue for utilities

# Information & Tool Development

- Tools for Determining the Value and Costs of Distributed Generation in Varying Field Applications
  - Distribution Costs Vary based on System and Penetration of DG
  - Beyond Distribution Costs which could be estimated in a RNM, DG has been associated with other benefits & costs that should be quantified in the context of specific applications
- Information and Tools to Support Development of Advanced Distribution Pricing Models
  - Providing appropriate incentives for the development of distributed resources may require location based distribution pricing
  - Advanced pricing models may separate fixed component, contributions to circuit peaks by both load and generation, pricing of losses and congestion
  - Advanced pricing models are largely outside current PUC experience

# Information & Tool Development

- Information and Tools to Assess Social Costs
  - Analysis of the load profiles and price elasticity of low income consumers
  - Methods that could enable distribution improvements to be measured and considered in CAA §111d compliance
  - Compilations of information & references on social cost of carbon and health and welfare costs of other environmental impacts
- Development of Approaches to Support Innovation
  - Utilities & states may seek to strengthen the energy innovation system & expand: applied research, development, demonstrations, and testing of distribution and clean energy technology
  - A range of state & regional models have been proposed: utility funding set asides, regional institutes, public / private VC funds, & green banks
  - DOE could make states aware of alternatives, support new state or regional initiatives, and link them to DOE R&D programs



# Facilitation of Stakeholder Discussion

- Consideration of New Models Requires Stakeholder Discussions to Develop Common Understandings of Terminology, Objectives, Benefits, Costs, and Options
  - DOE could support facilitated discussions at both a national or regional level and in states that are pursuing discussions of alternative approaches outside of the traditional rate case process