Integrated Distributed System Planning

- Necessary for planning and operating the evolving grid
- An opportunity for closer collaboration across the electricity value chain

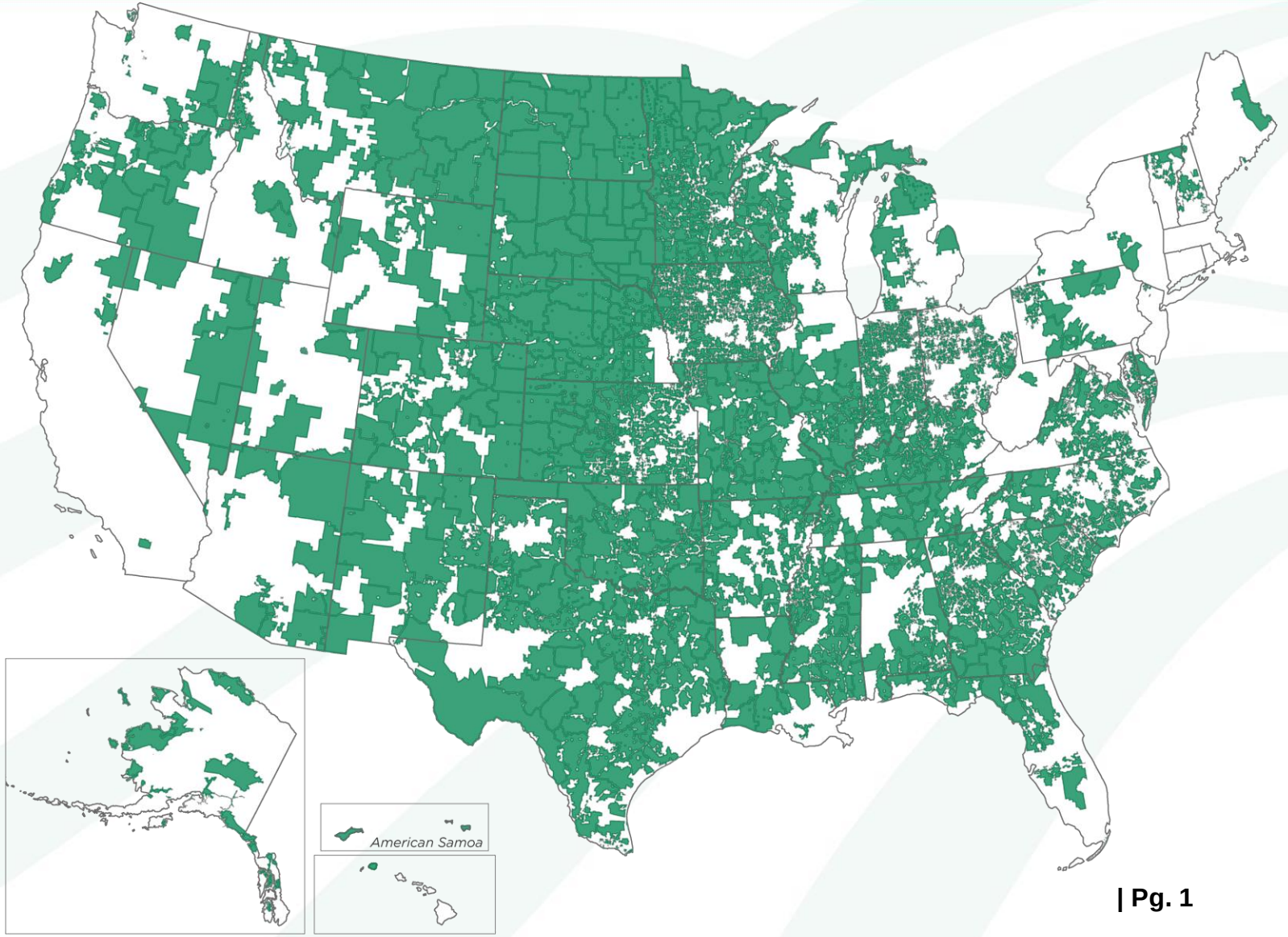
Venkat Banunarayanan

Vice President, Integrated Grid, NRECA

NRECA
America's Electric Cooperatives

America's Electric Cooperatives

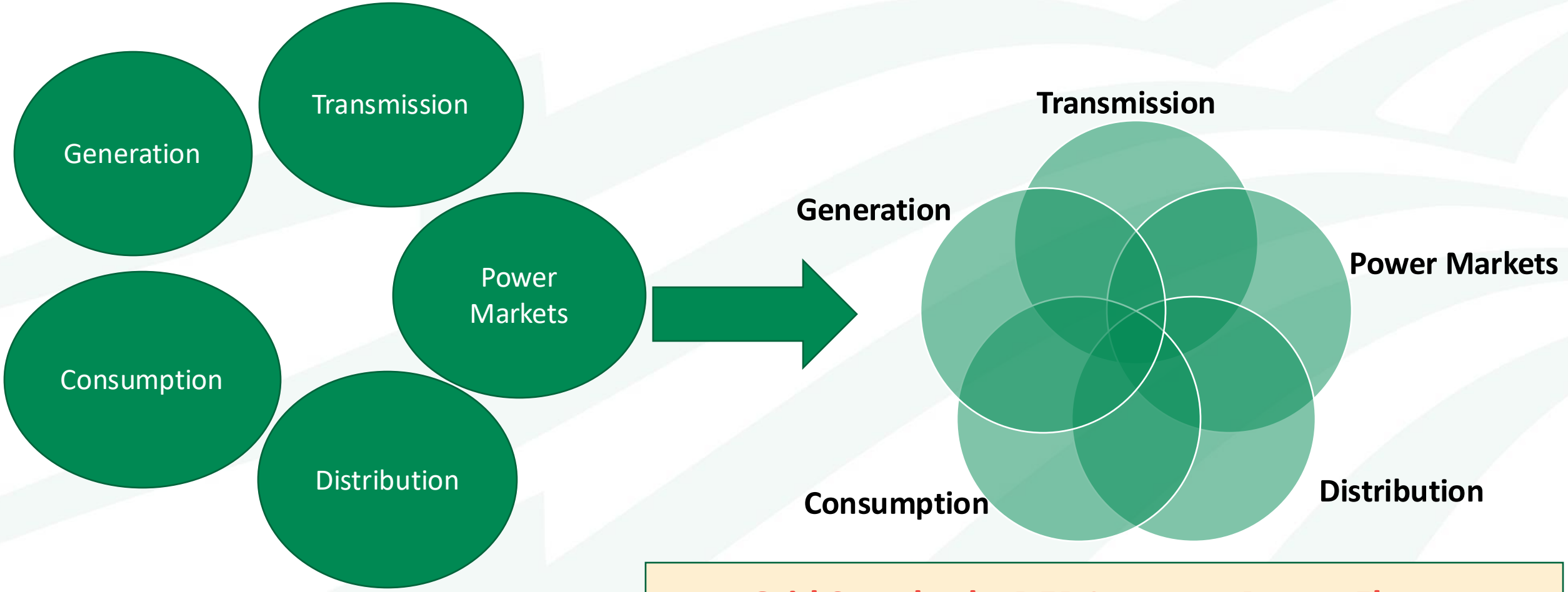
- Are not-for-profit, locally governed, and member-owned electric utilities (833 distribution and 62 G&T co-ops)
- Serve 13 percent of U.S. electric customers of all types, and 42 million people in 48 states
- Own and maintain 42% of the nation's electric distribution lines
- Average 8 consumers per mile of line vs. 32 for the rest of the industry
- Serve 150+ Military and Coast Guard facilities, including 33 utility privatization (UP) contracts



NRECA
America's Electric Cooperatives

REV: February 2020

Increasing interdependencies



Grid Standards, DER Impacts, Power Flows, Equipment Loading, System Protection, Price Signals

NRECA
America's Electric Cooperatives

Need for system plan that considers an integrated view of the grid (G-T-D-C)

- Determining optimal infrastructure investments and to plan for reliable grid operations
- Development process based on objectives, regional characteristics, and other factors such as regulatory compliance

- Developing IDSP enables utilities to explore the following:
  - How will changes in consumer actions, grid and technologies evolution, and other factors impact grid planning and operations?
  - How to determine optimal set of capital investments for the future?
  - What are the set of “no-regrets” investment decisions that will be cost-effective while preparing grid to accommodate future changes?
  - What are the risk factors that will impact those investment decisions?

NRECA
America's Electric Cooperatives

Considerations in developing an IDSP framework

- Flexible but rigorous process - Try to minimize complexity
- Focus on collaboration opportunities across the energy value chain on joint planning/operations, information/data sharing, aggregate optimization, workforce needs
- Optimize utilization of all grid and consumer assets to meet grid needs
- Identify opportunities for grid performance, reliability, resiliency and security enhancements

NRECA
America's Electric Cooperatives

Integrated Distributed System Planning - Key Steps

Inputs:
- Utility Objectives
- DER adoption
- Member-owners choice
- Regulatory Requirements
- Current Assets status
- Generation/Demand profiles

Assessments:
- Reliability analysis
- Multi-scenario DER and load forecasting

Results:
- Projected System Needs
  - Infrastructure, Power, Energy, Communications, Processes, Analytics

Integration:
- Bulk Power Supply (G&T) Planning and Operations

Risk Analysis:
- Alternative solutions evaluation

IDSP:
- Set of resource and infrastructure needs
- Operational processes
- **Coordination across the energy spectrum**
- Workforce needs
- Investment profile – capital and operations

NRECA America's Electric Cooperatives

Enterprise Risk Management Framework

Current Activities

- Participation and Collaboration in Industry initiatives – ESIG, EPRI, AEIC
- Preconference workshops on Scenario-based planning and Integrated Planning at NRECA Regionals
- NRECA CEO Close Up planned panel session on scenario planning
- Disseminating the IDSP concept to electric cooperatives – (GRE, Hoosier, NCEMC)

<u>Exploring Pilot Projects – Phased Approach</u>

- Phase 1: Scenario Formation
- Phase 2: Data and Information Exchange
- Phase 3: Modeling and Simulation
- Phase 4: Creating IDSP Solution Set

NRECA
America's Electric Cooperatives

Concept: IDSP Playbook Template

IDSP Category	Description	Collaboration	Tools and Resources	Examples	Results	Comments
Inputs	Long-term Utility Objectives					
	Member-owners' choices					
Assessments	DER Forecasts					
	Reliability and Safety					
Results	Projected System Needs					
	DER Performance					
Integration	Wholesale power planning					
	Solution set identification					
Risk Analysis	Identify risk factors					
	Create alternatives					
IDRP	Monitor Performance					

Leverage LBNL's IDSP Interactive Toolkit and Link to the Phased Approach for Pilot Projects

Next Steps

- Complete the IDRP Playbook
- Continue to disseminate and collect feedback on the latest versions of the IDRP Framework and Playbook.
- Identify co-ops (G&T – Distribution co-op teams) for pilot projects.
- Perform pilot projects

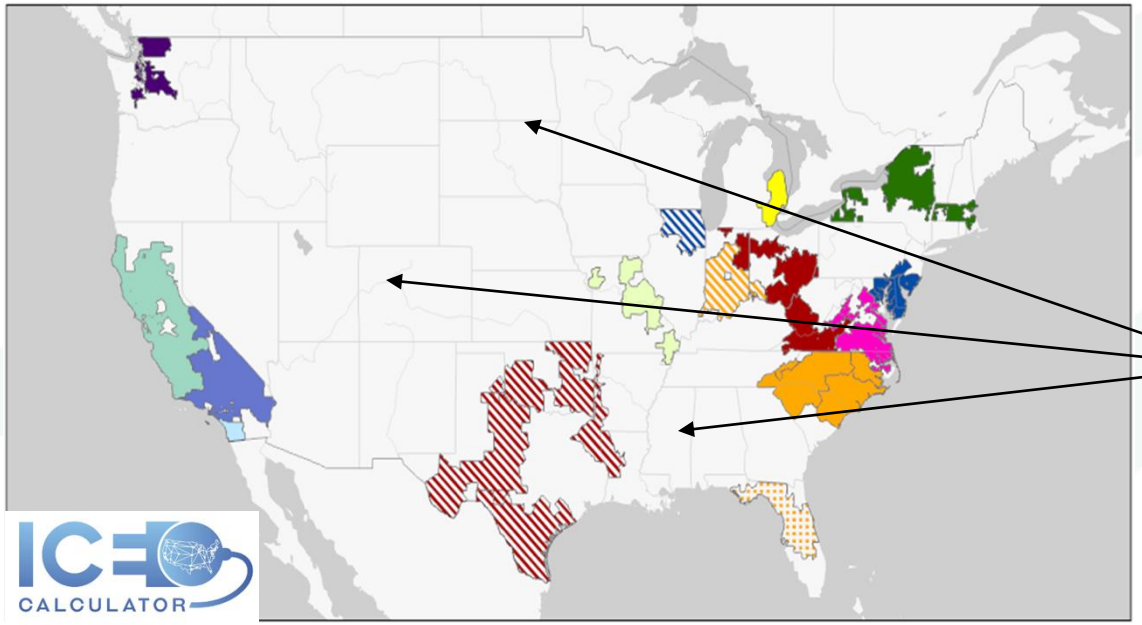
NRECA
America's Electric Cooperatives

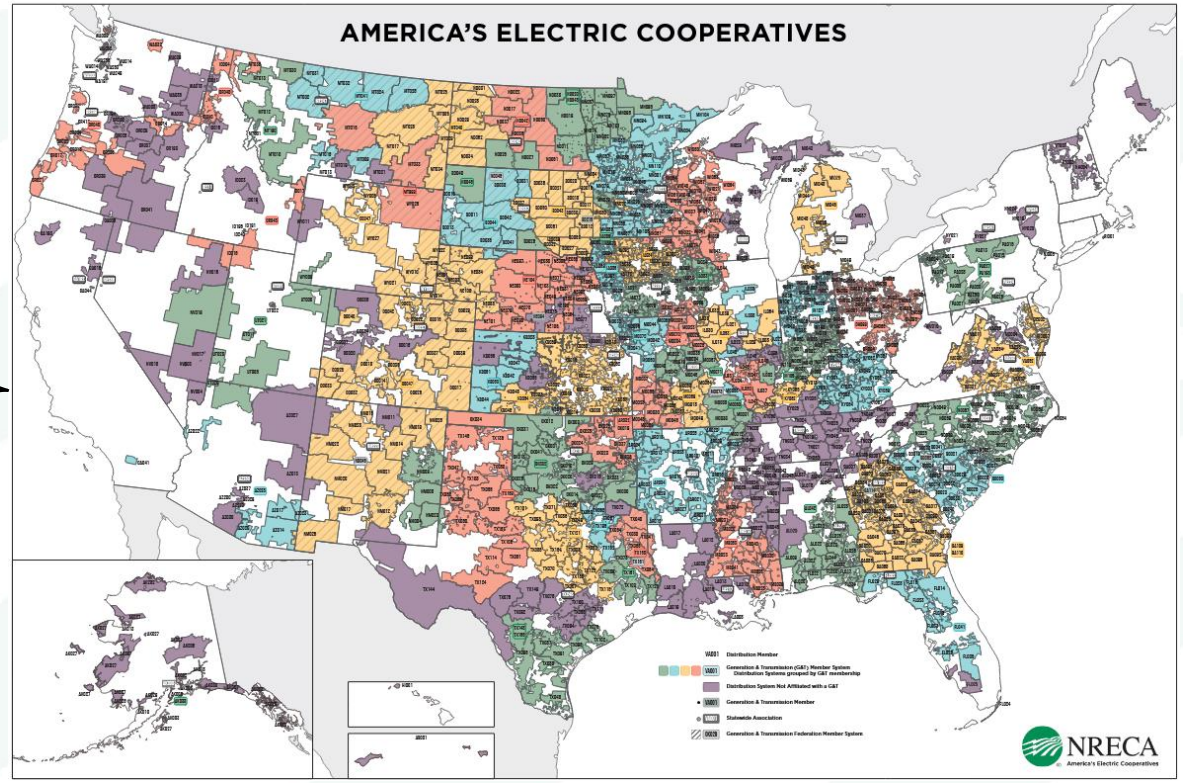
Interruption Cost Estimator (ICE)

- Estimating the Economic Impacts of Power Interruptions
- Provides another level of justification for grid investments

NRECA
America's Electric Cooperatives

Importance of surveying customers in rural cooperatives





- Rural impact of electricity outages differ from other areas
- Makes the ICE more comprehensive – with multiple use cases – justifying investments, assessing benefits.

NRECA
America's Electric Cooperatives

Sampling and sample size considerations for recruitment of co-ops to participate in the survey

- Three distinct, regionally-focused survey activities: Mountain, Upper Midwest, Southeast – to address current gaps in geographic coverage and target regions with significant populations of co-op customers
- Target number of completed surveys by customer class for each distinct survey activity:
  - Residential: 250; Small/Medium Non-Residential: 250; Large Non-Residential: 70
  - Target sample sizes assuming 10% response rates for residential: 2500, and 5% response rate for non-residential: 5,000 (SMNR) and 1,400 (LNR)
- Explore aggregating multiple co-ops within each region in order to develop a sufficiently large and representative pool of customers from which to sample
- An initial survey is proposed for Fall, 2024 in order to test and refine survey procedures, followed by two additional surveys in Winter 2024/2025

NRECA
America's Electric Cooperatives

Thank you

NRECA
America's Electric Cooperatives