# NARUC-NASEO Task Force on Comprehensive Electricity Planning

Distribution System Planning Fundamentals & Promising Practices

August 21, 2019


- Curt Volkmann, GridLab
- John Shenot, Regulatory Assistance Project
- Commissioner Dan Lipschultz, Minnesota PUC
- Tricia Debleeckere, Minnesota PUC

# Overview of Integrated Distribution Planning

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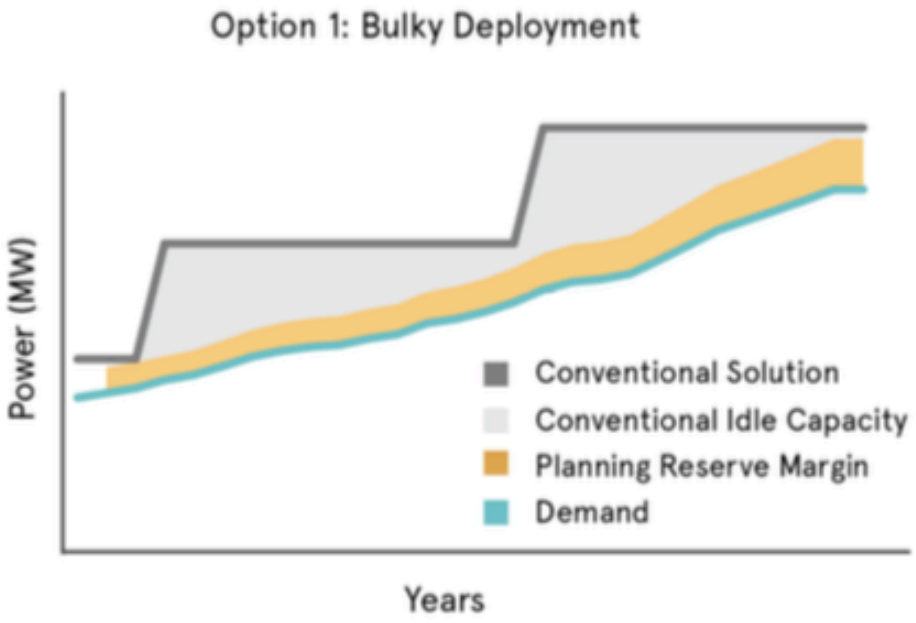
August 21, 2019

# DER Growth and its Implications

- Significant growth in distributed generation, EE, DR, CHP, EVs, energy storage, microgrids
- Increased complexity of distribution system planning and operations
- Increased flexibility
- New opportunities for customers and third parties to provide ***Local Distribution Grid Services***, reducing the need for conventional ratepayer-funded capital investments
  - Distribution capacity or peak load reduction
  - Voltage regulation
  - Reliability/resilience
  - Hosting capacity

# Small and Targeted Investment

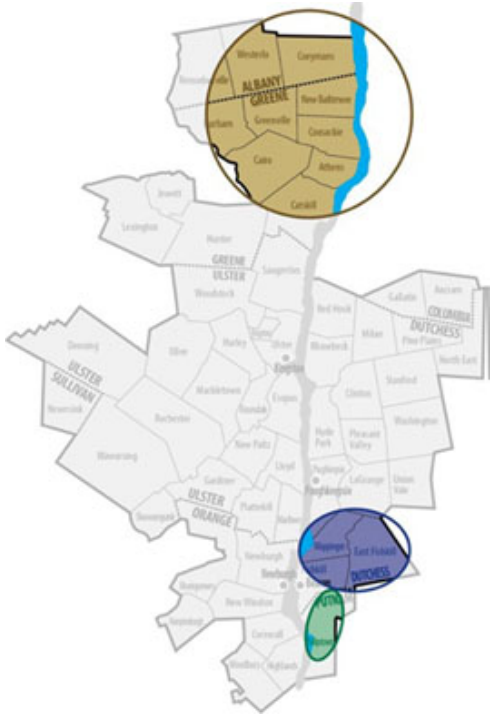




Source: SolarCity Grid Engineering, 2016

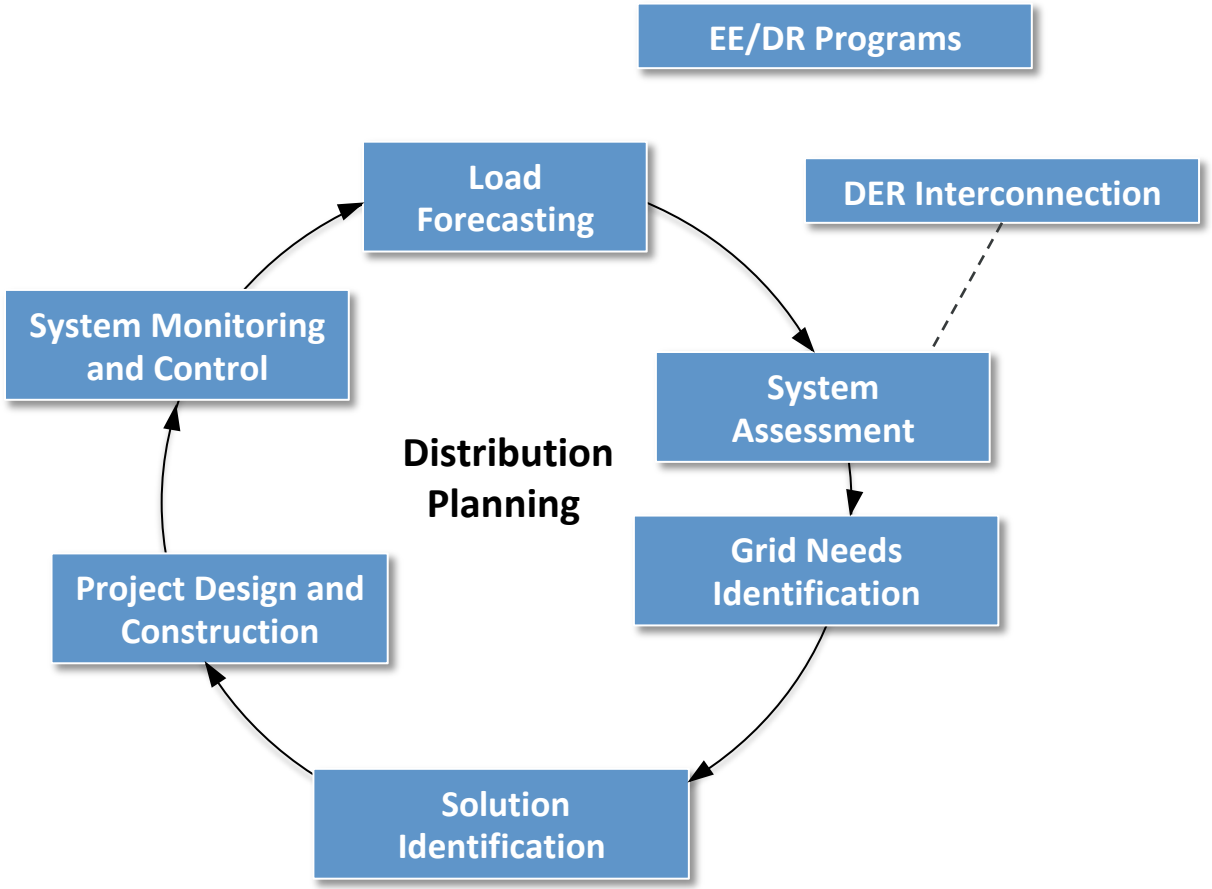
# Geo-Targeted Demand Response

Individual customers providing and receiving compensation for ***Local Distribution Grid Services*** to reduce costs for all customers …




CenHub
Peak Perks


# From today's Distribution Planning …



# Typical Load Forecasting Today

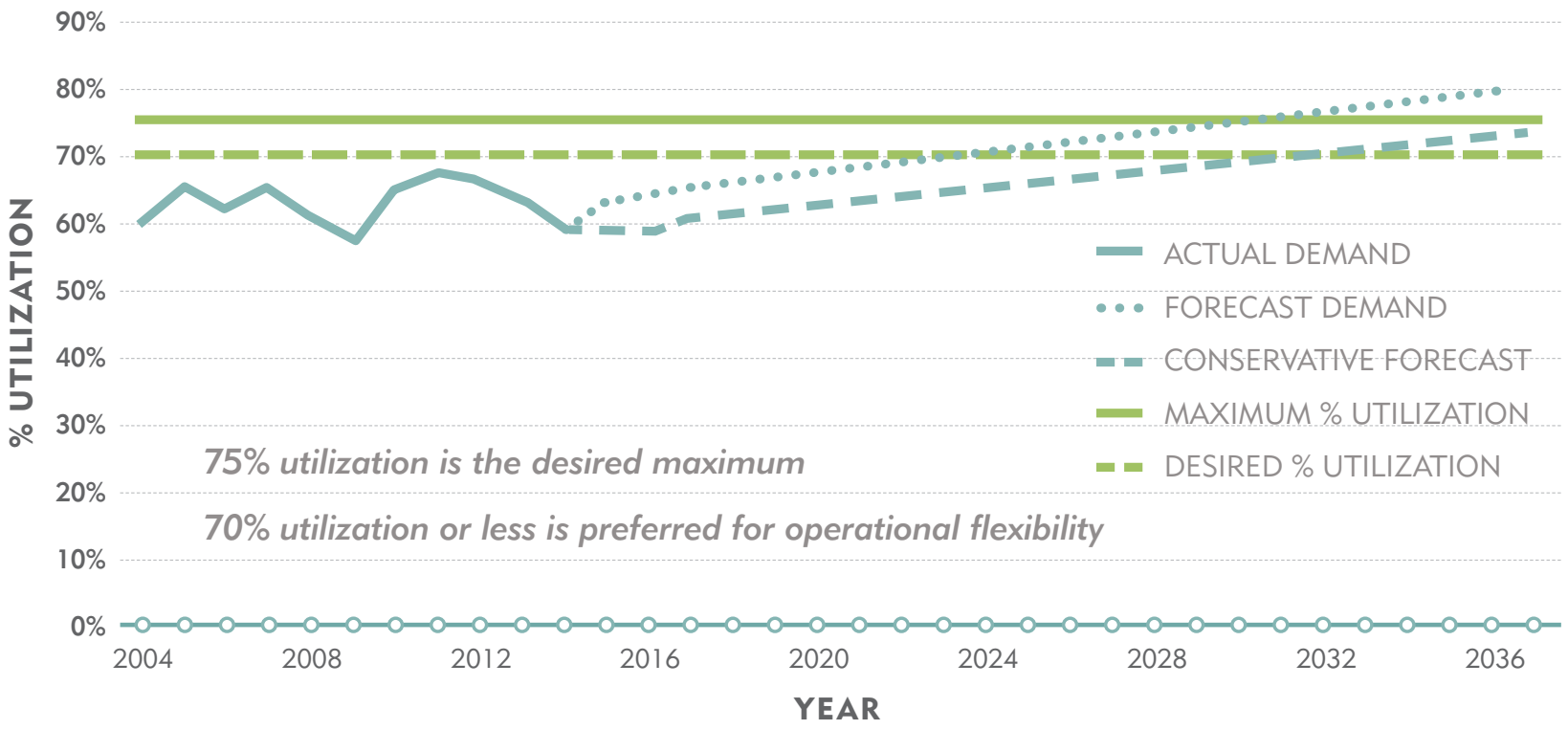
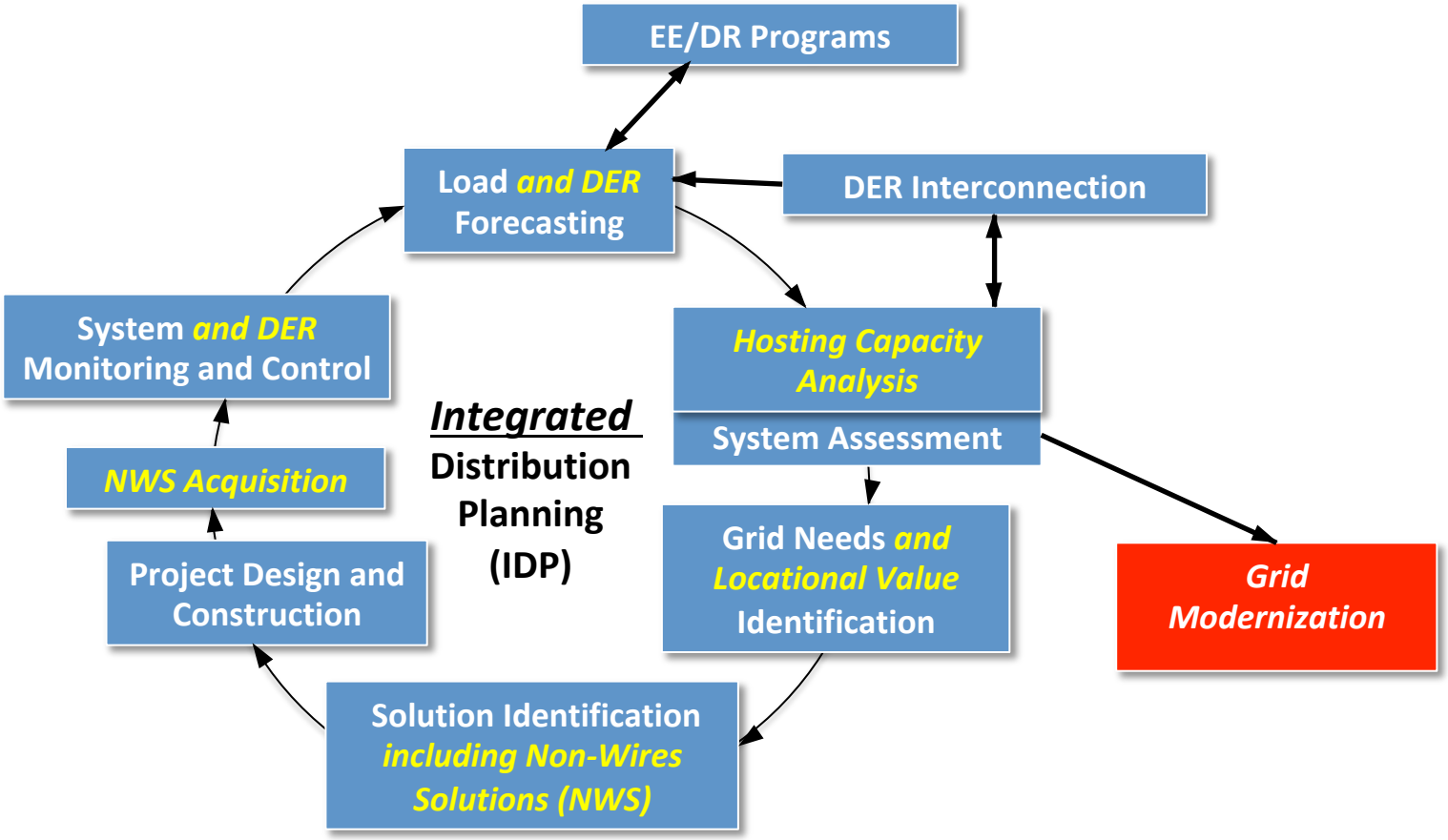



**FIGURE 3.** Typical Distribution Load Forecasting Results

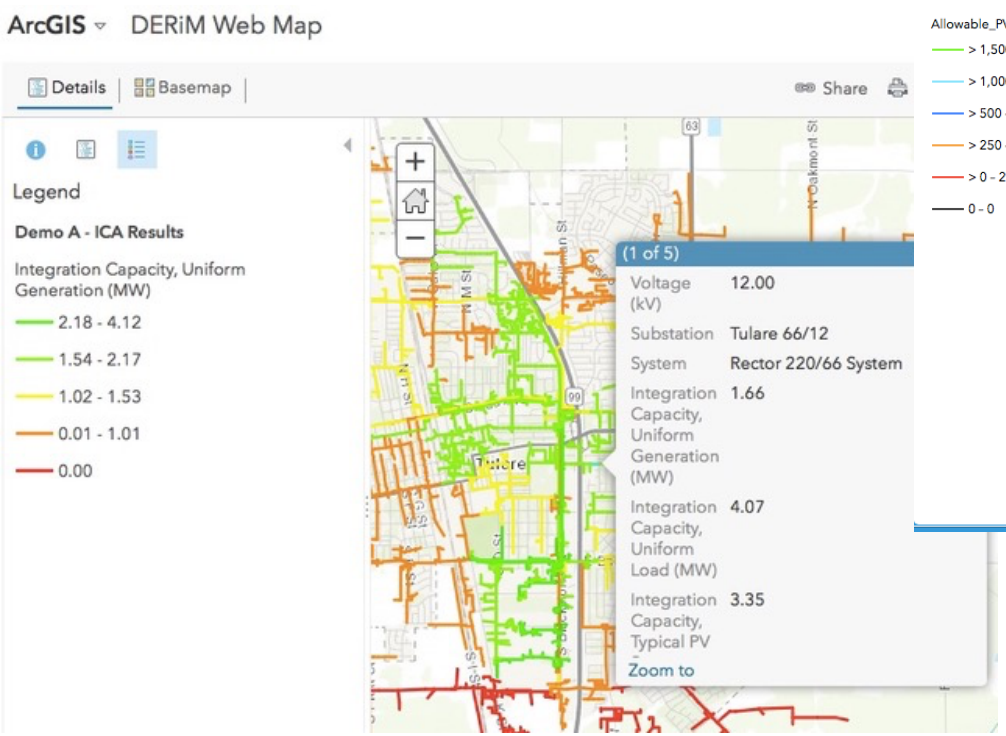
# … to Integrated Distribution Planning

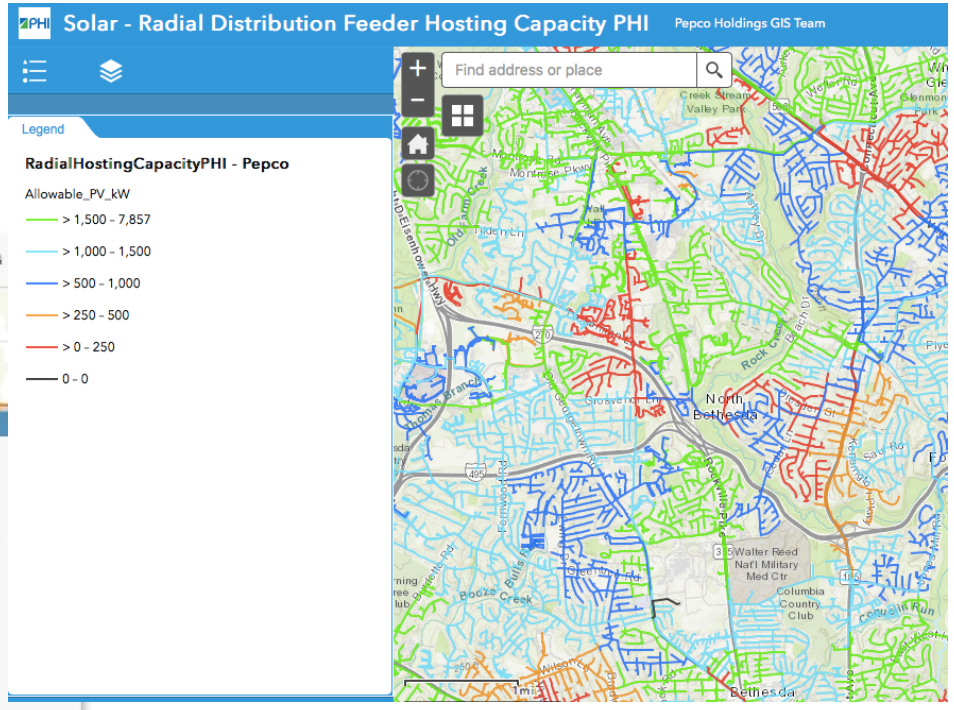


# New IDP Capabilities

| Capability | Description |
|---|---|
| 1) **Advanced Forecasting and System Modeling** | Probabilistic planning and DER adoption scenario analyses; more granular load and power flow modeling; enhanced modeling of new smart inverter capabilities; and the ability to monitor, manage and optimize DER connected to the system. |
| 2) **Hosting Capacity Analysis** | Determining how much additional DER each distribution circuit can accommodate without requiring upgrades. |
| 3) **Disclosure of Grid Needs and Locational Value** | Identification and publication of locations where DER can provide grid services as non-wires solutions (NWS). |
| 4) **New Solution Acquisition** | Acquiring or sourcing DER to provide grid services using pricing, programs or procurement. |
| 5) **Meaningful Stakeholder Engagement** | Establishing processes for open dialogue, transparent information sharing, collaboration, and consensus building among stakeholders. |

# Hosting Capacity Results

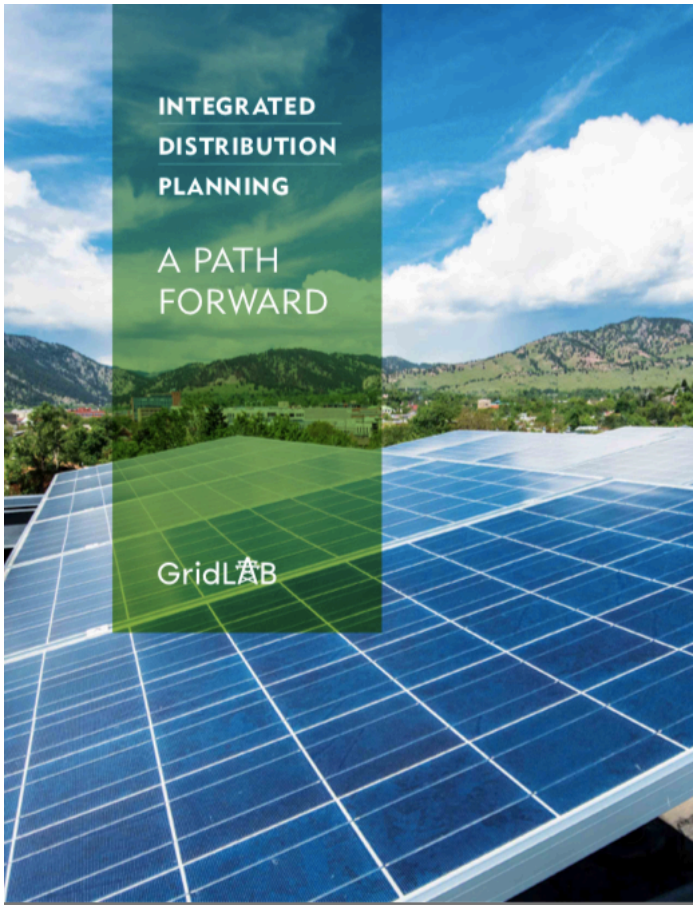


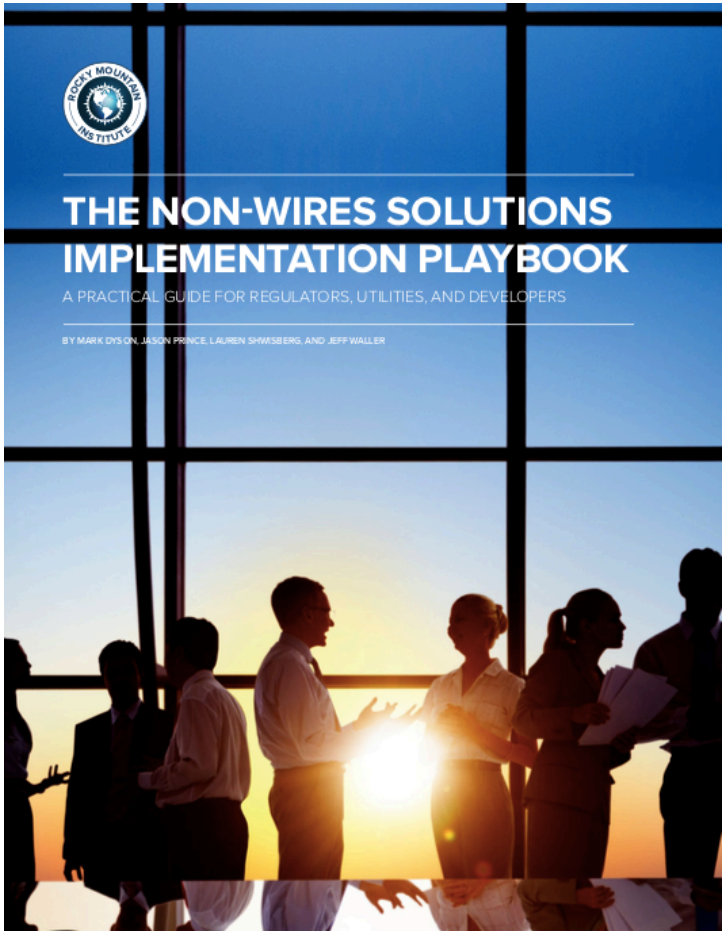
# Getting Started with IDP

- Establish clear objectives and guiding principles
- Require utility reports to understand current capabilities
  - Planning methods and tools; spending categories and amounts; proposed HCA use cases; NWS suitability criteria and pilots
- Establish IDP Technical Working Group(s)
  - DER adoption and growth scenarios; smart inverter functions and settings; NWS suitability criteria and process for pilots; HCA use cases, methodology, timeline for implementation; development of data sharing portals

# Additional resources …




https://gridlab.org/publications/




https://rmi.org/insight/non-wires-solutions-playbook/

# Thank you!

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21 AUGUST 2019

# Oversight of Distribution Planning: Guidance for Public Utility Commissions

## NARUC-NASEO Task Force Webinar: Distribution System Planning Fundamentals & Promising Practices


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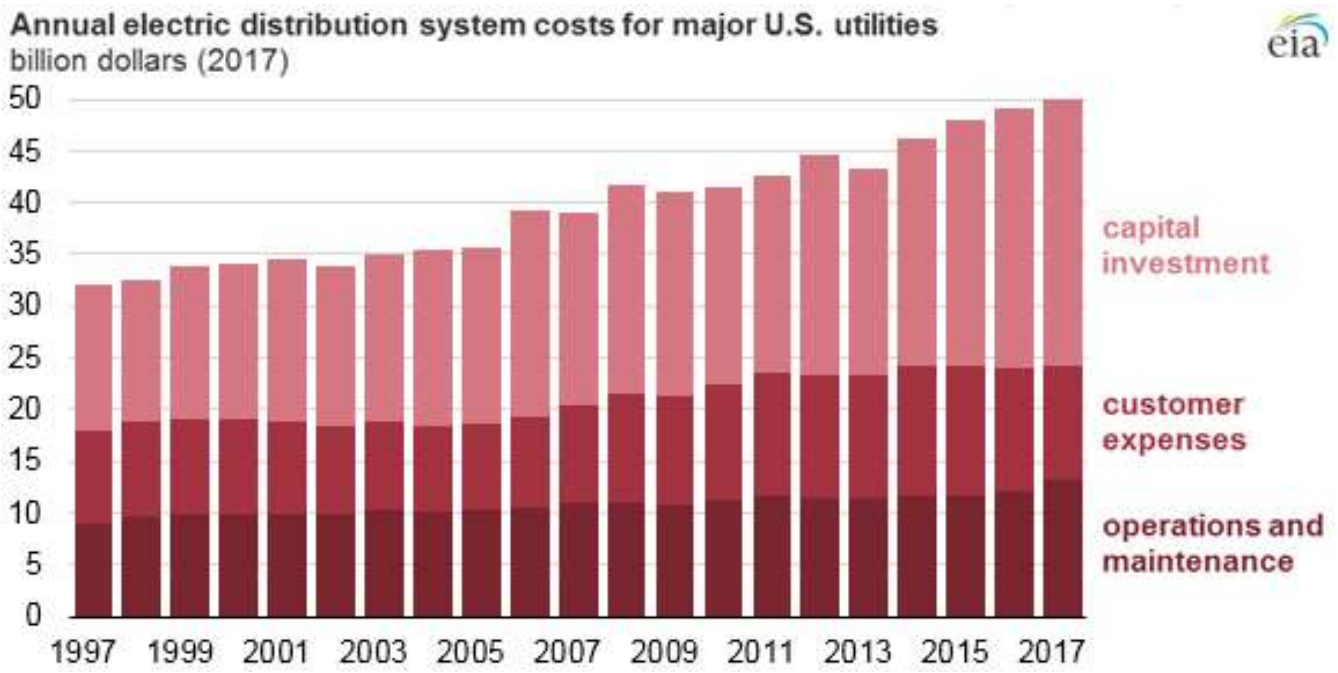
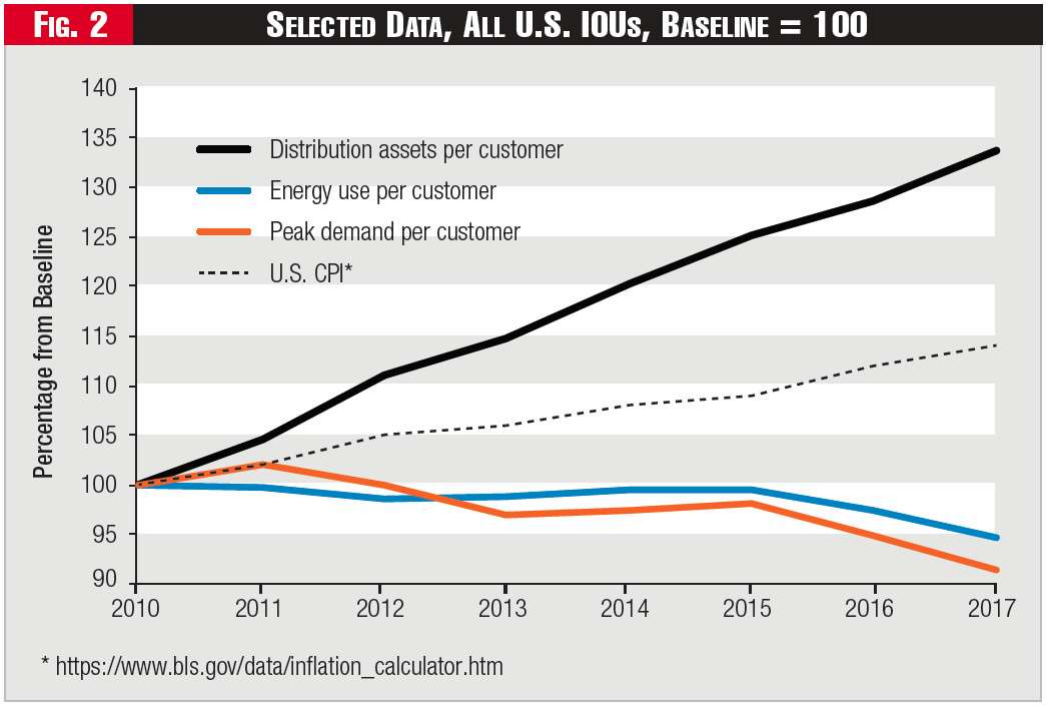
# 1 Why might PUCs consider taking an active role in distribution planning?

# Distribution System Costs are Rising Steadily…



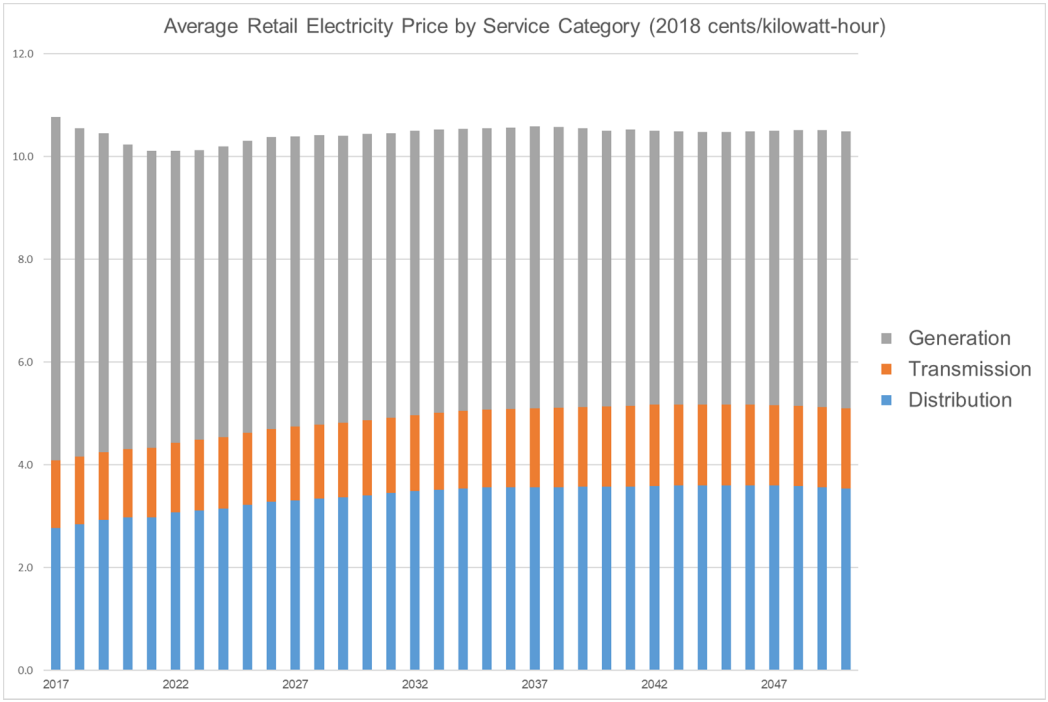

Source: U.S. Energy Information Administration (EIA), Federal Energy Regulatory Commission (FERC) Financial Reports, as accessed by Ventyx Velocity Suite

# …and Much Faster Than Inflation




Source: Alvarez, P., Ericson, S., and Stephens, D. (2019, July). The Rush to Modernize: Distribution Planning, Performance Measurement. *Public Utilities Fortnightly*. Retrieved from: https://www.fortnightly.com/fortnightly/2019/07/rush-modernize

# Distribution Share of Retail Bills is Large and Projected to Grow



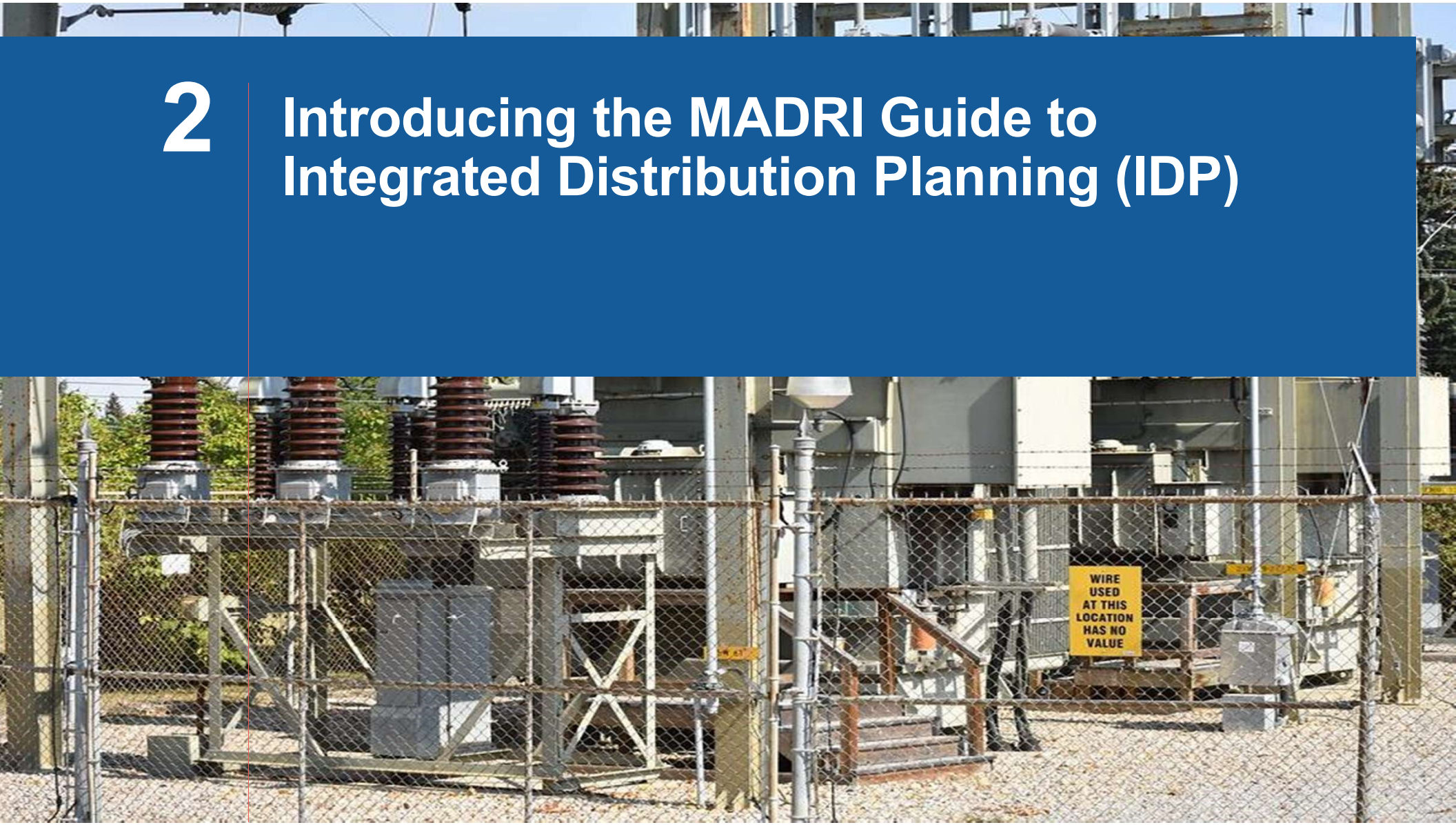

2017: 25.8%

2030: 32.7%

2040: 34.0%

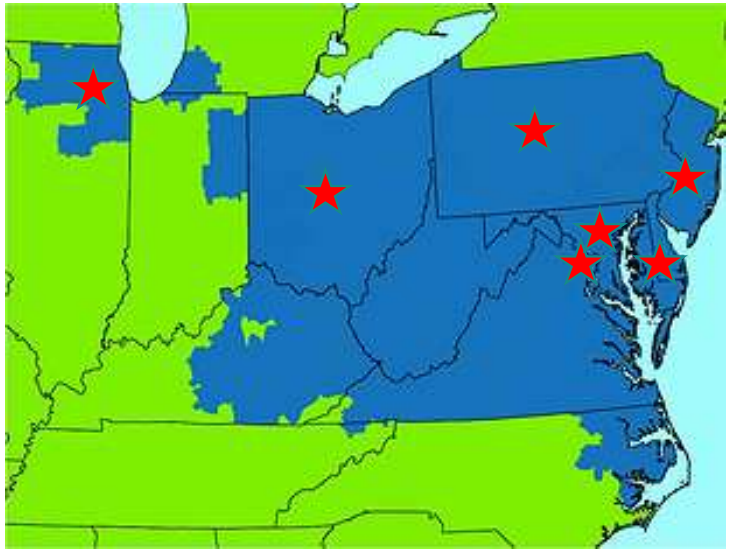
Data Source: EIA Annual Energy Outlook 2019

# 2 Introducing the MADRI Guide to Integrated Distribution Planning (IDP)

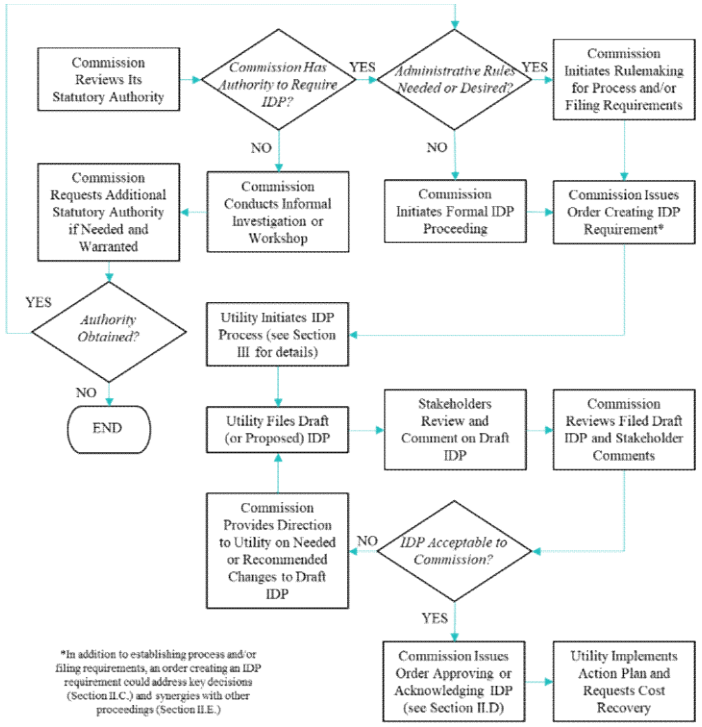


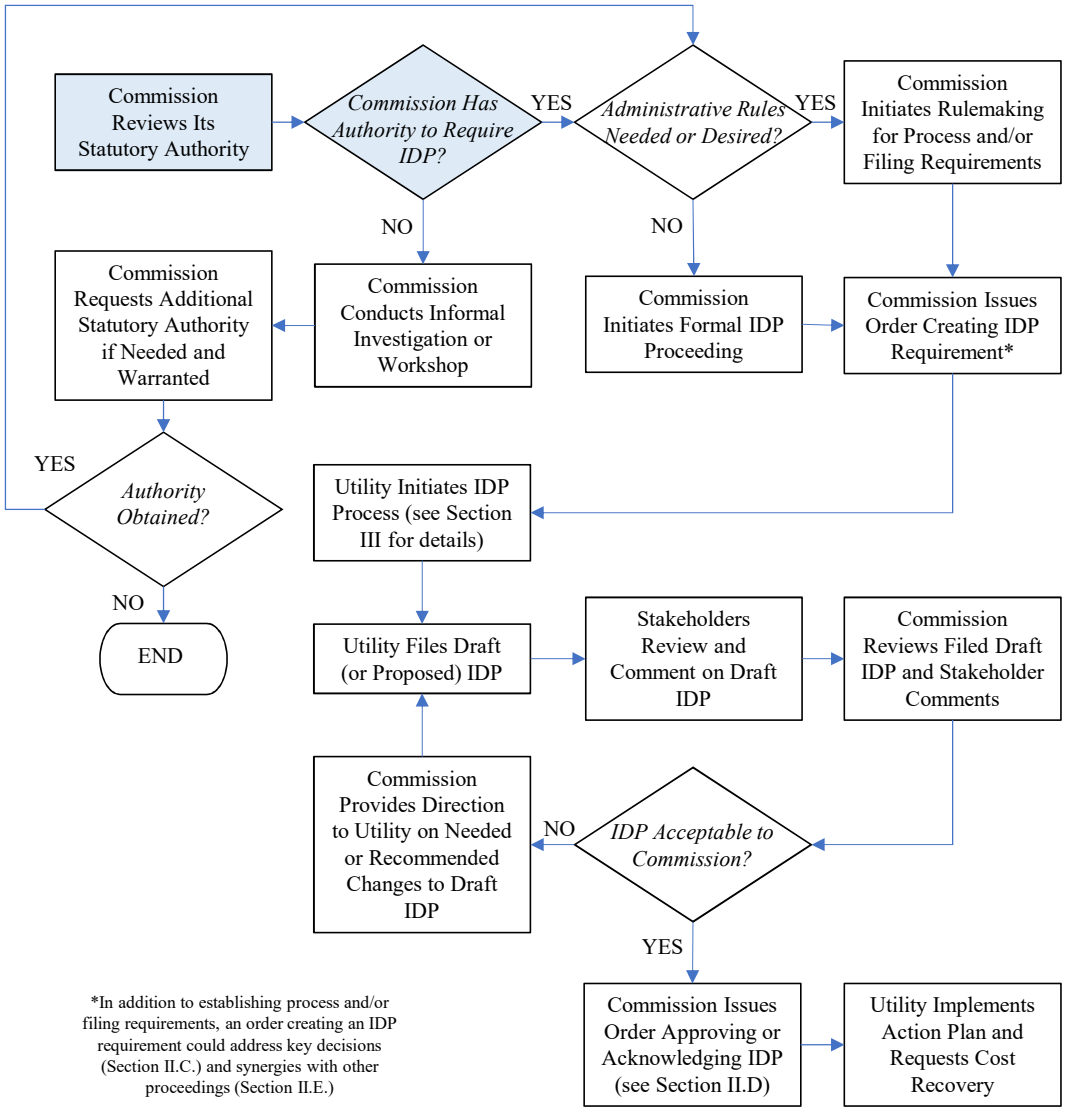
# Mid-Atlantic Distributed Resources Initiative (MADRI)

- Informal stakeholder collaborative
- Restructured states in PJM market (DC, DE, IL, MD, NJ, OH, PA)
- Began in 2004
- Meets ~quarterly to explore and discuss DER issues



# Process Map for Commission Oversight of an IDP Requirement




Commission Reviews Its Statutory Authority
Commission Has Authority to Require IDP?
YES
Administrative Rules Needed or Desired?
YES
Commission Initiates Rulemaking for Process and/or Filing Requirements
NO
NO
Commission Requests Additional Statutory Authority if Needed and Warranted
Commission Conducts Informal Investigation or Workshop
Commission Initiates Formal IDP Proceeding
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YES
Authority Obtained?
Utility Initiates IDP Process (see Section III for details)
NO
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IDP Acceptable to Commission?
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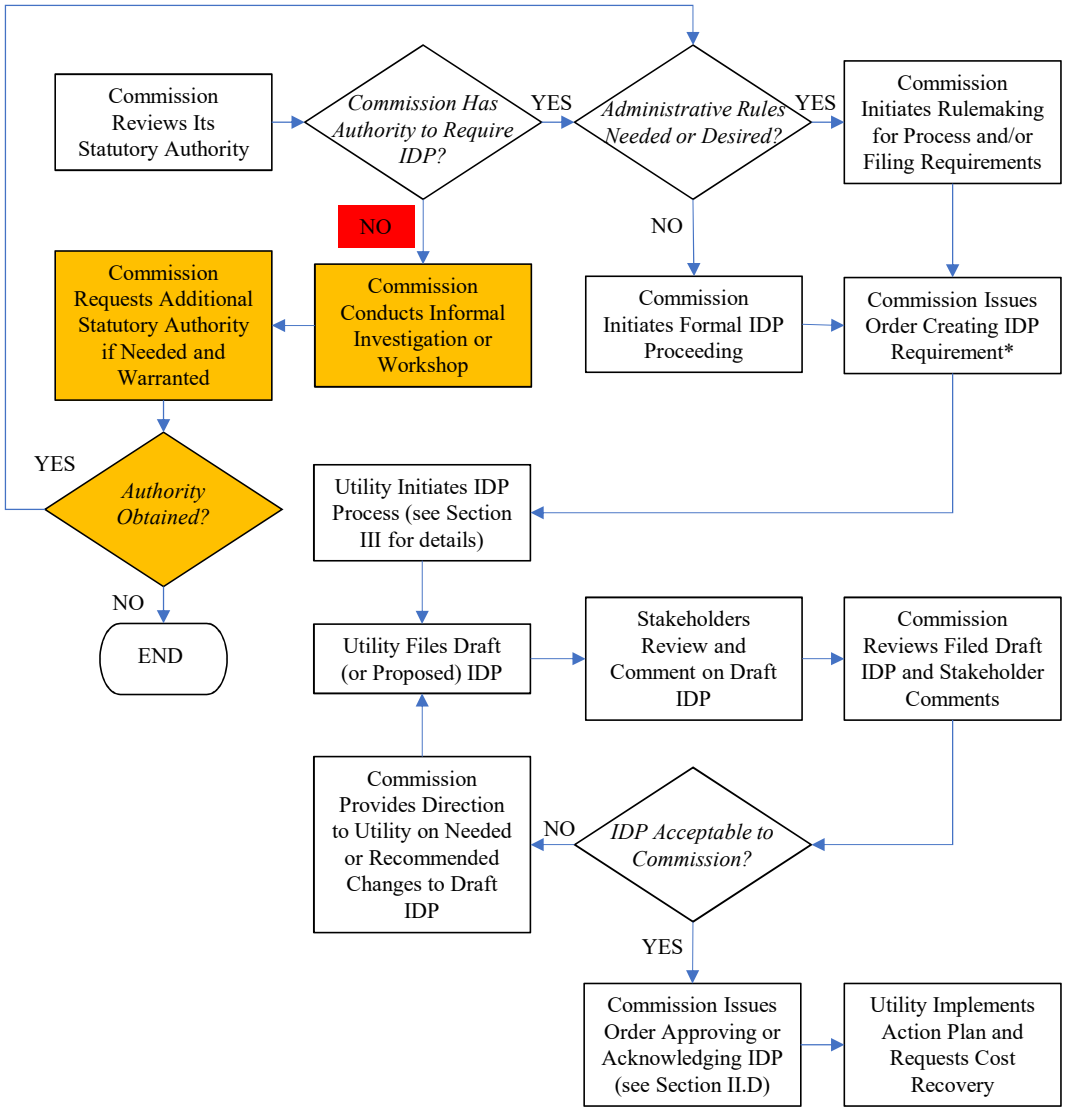
Utility Implements Action Plan and Requests Cost Recovery
*In addition to establishing process and/or filing requirements, an order creating an IDP requirement could address key decisions (Section II.C.) and synergies with other proceedings (Section II.E.)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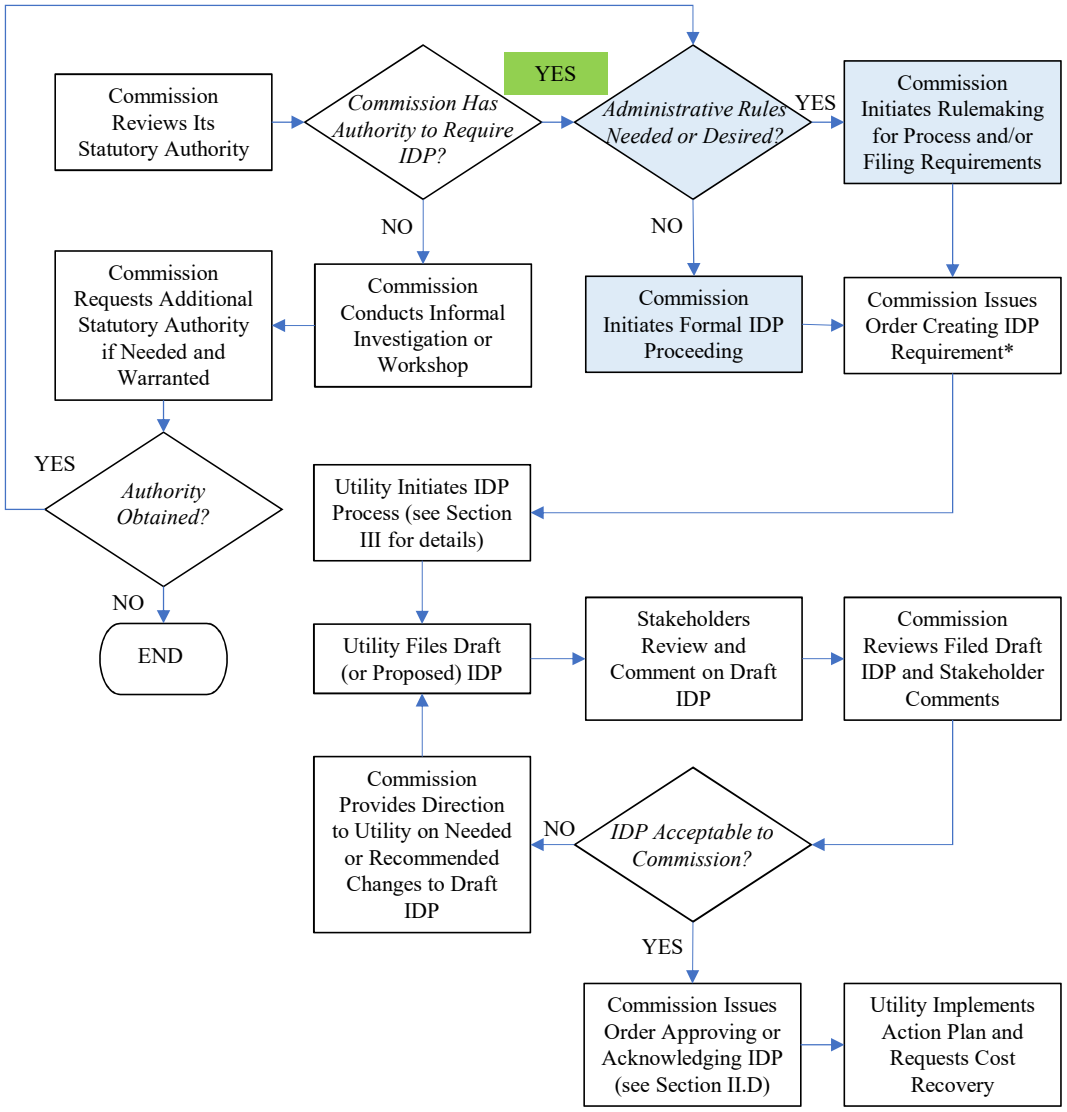
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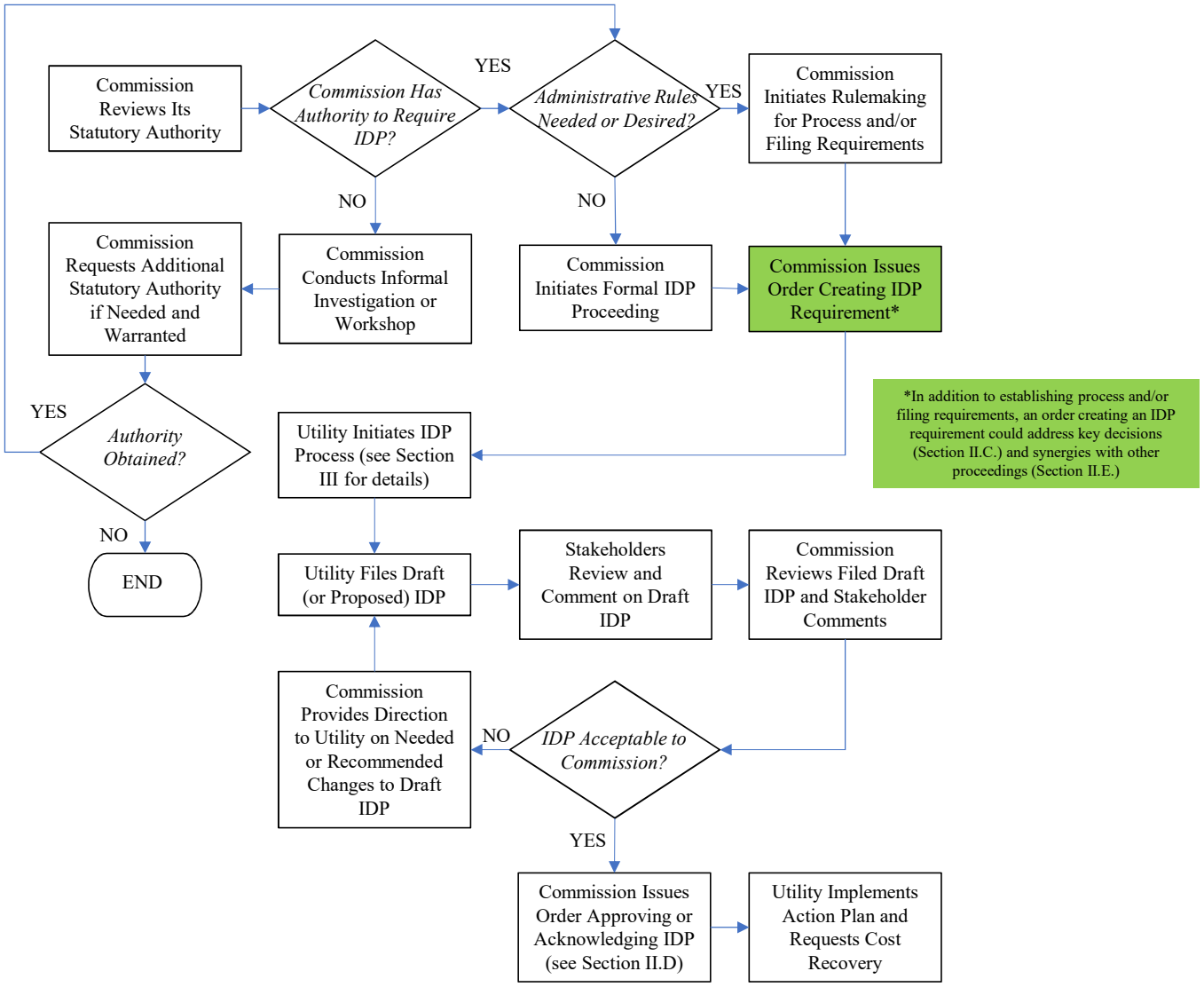
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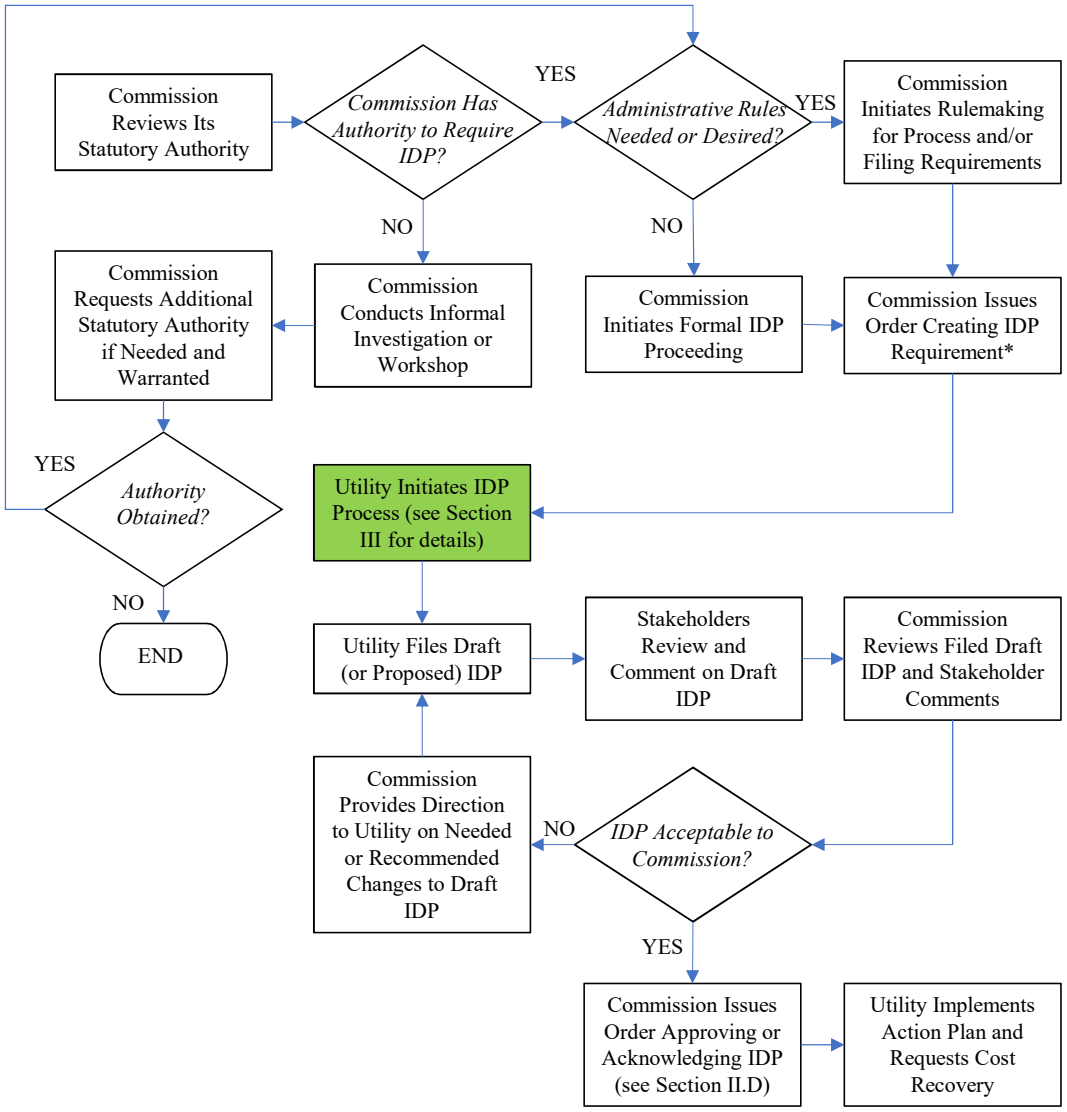
# Key Decisions at the Outset

- Scope: Utility versus Jurisdiction-Wide Planning
- Scope: DERs to Consider
- Planning Horizon, Timing of Filings and Update Frequency
- Stakeholder Participation
- Binding or Nonbinding Effect of a Completed IDP

# Possible Synergies with Other Regulatory Proceedings

- Grid modernization initiatives
- DER interconnection standards and procedures
- Resource planning
- Transmission planning
- Changes to the electric utility business model and alternative ratemaking options
- Creation of a distribution system operator?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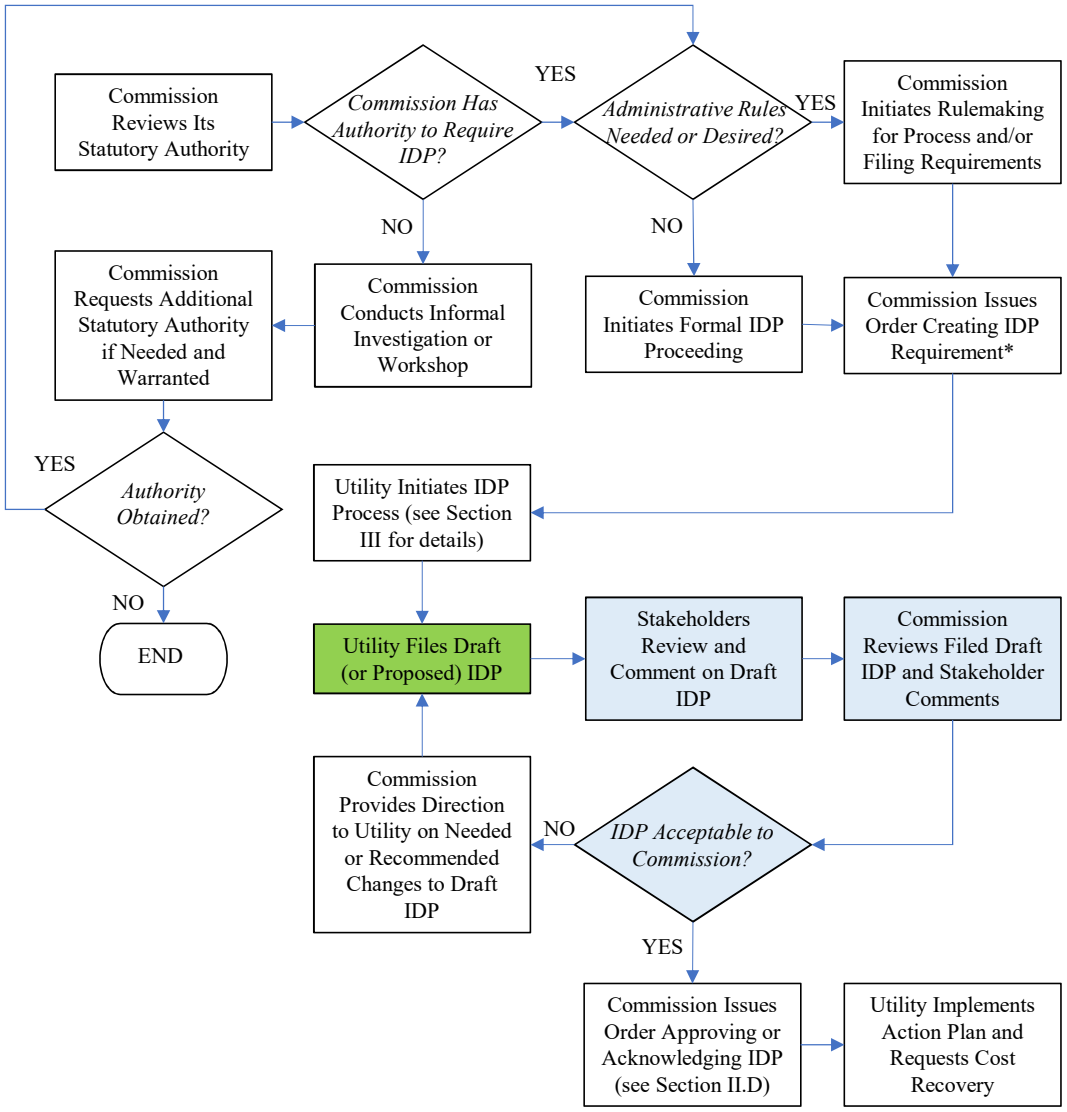
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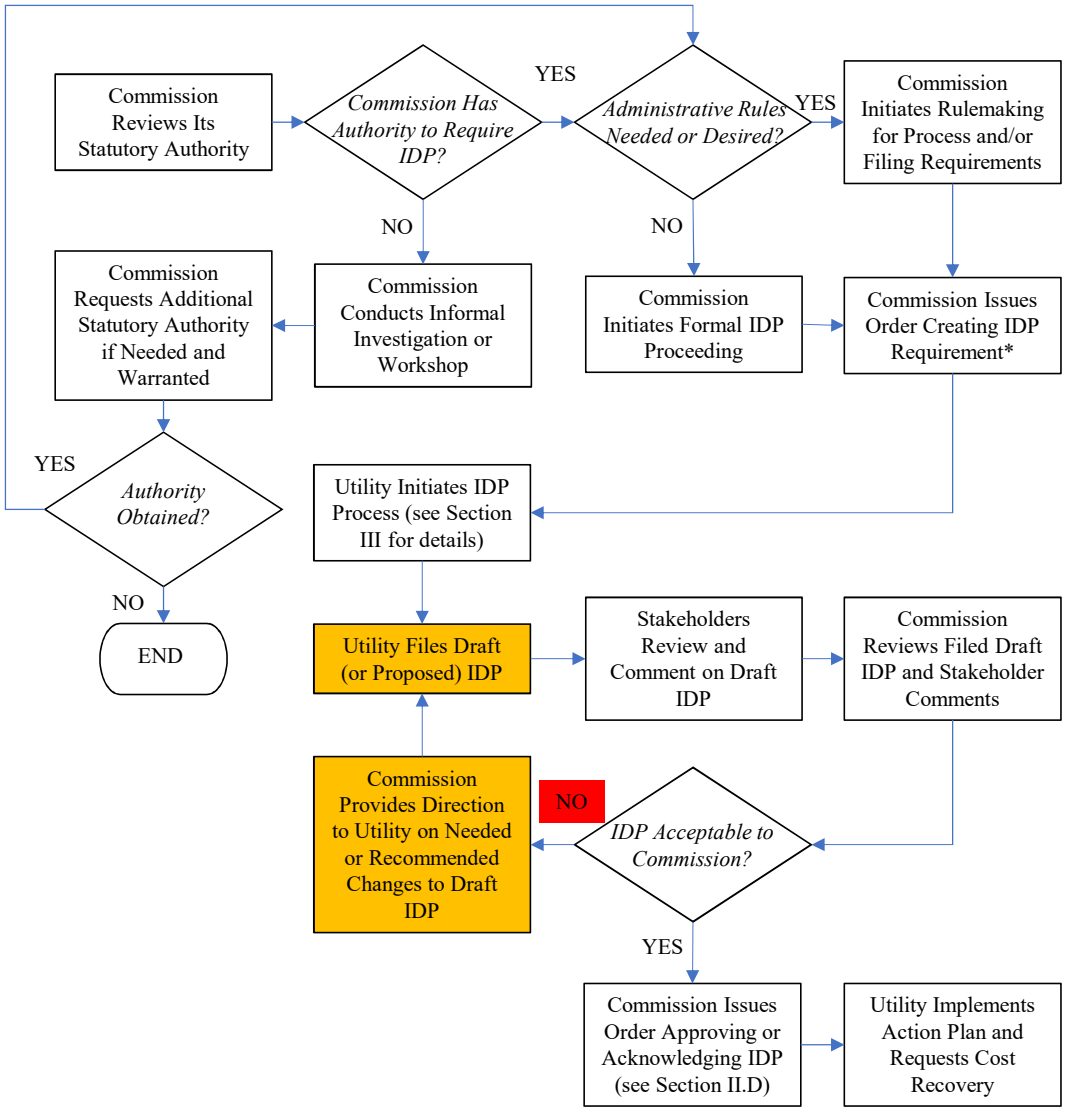
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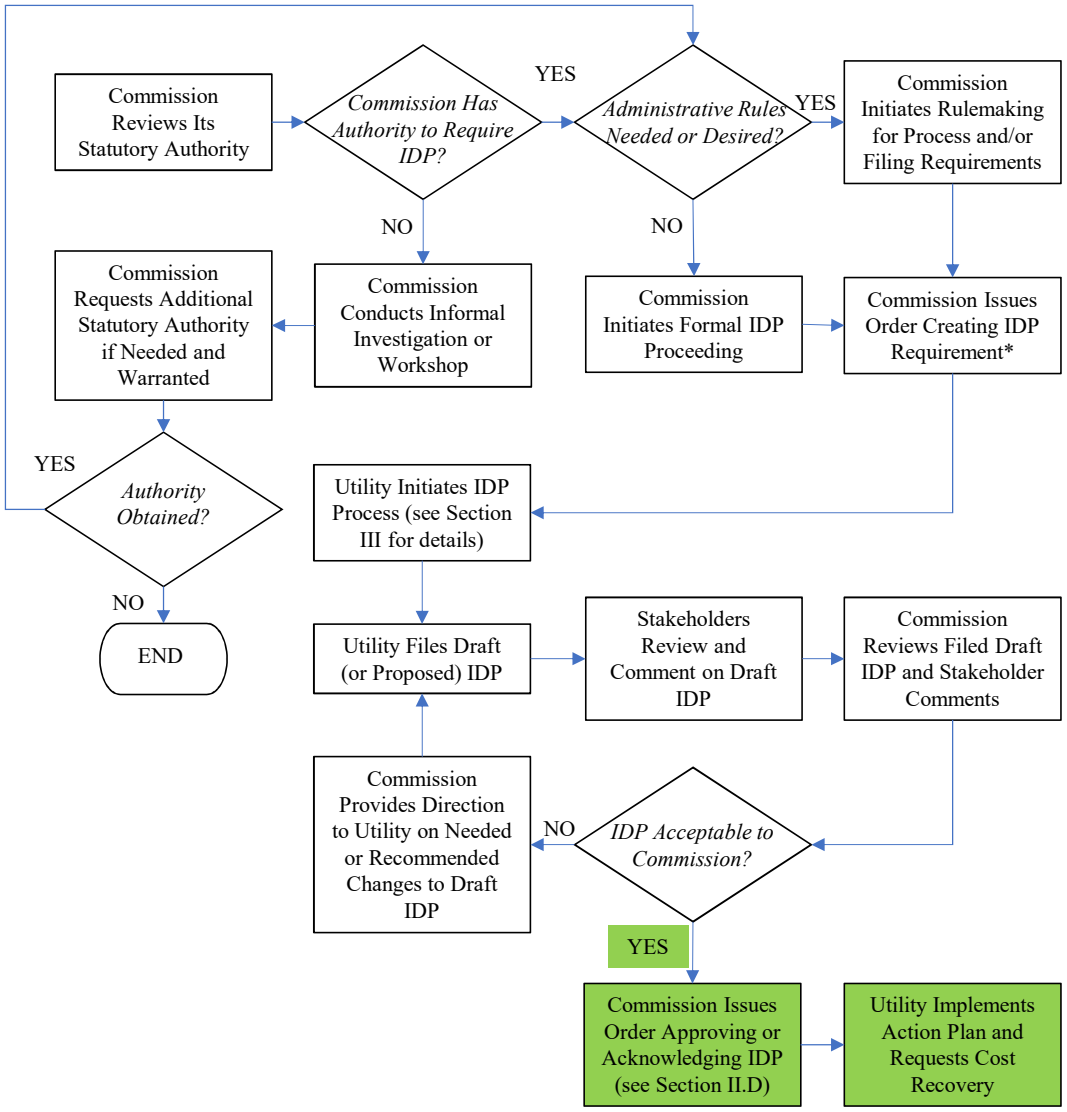
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# Resource – Coming Soon!!!

- Integrated Distribution Planning for Electric Utilities: Guidance for Public Utility Commissions
  - Draft available at https://www.madrionline.org/resources/
  - Final to be published soon

# About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

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# Minnesota's Actions and Developments in Distribution System Planning

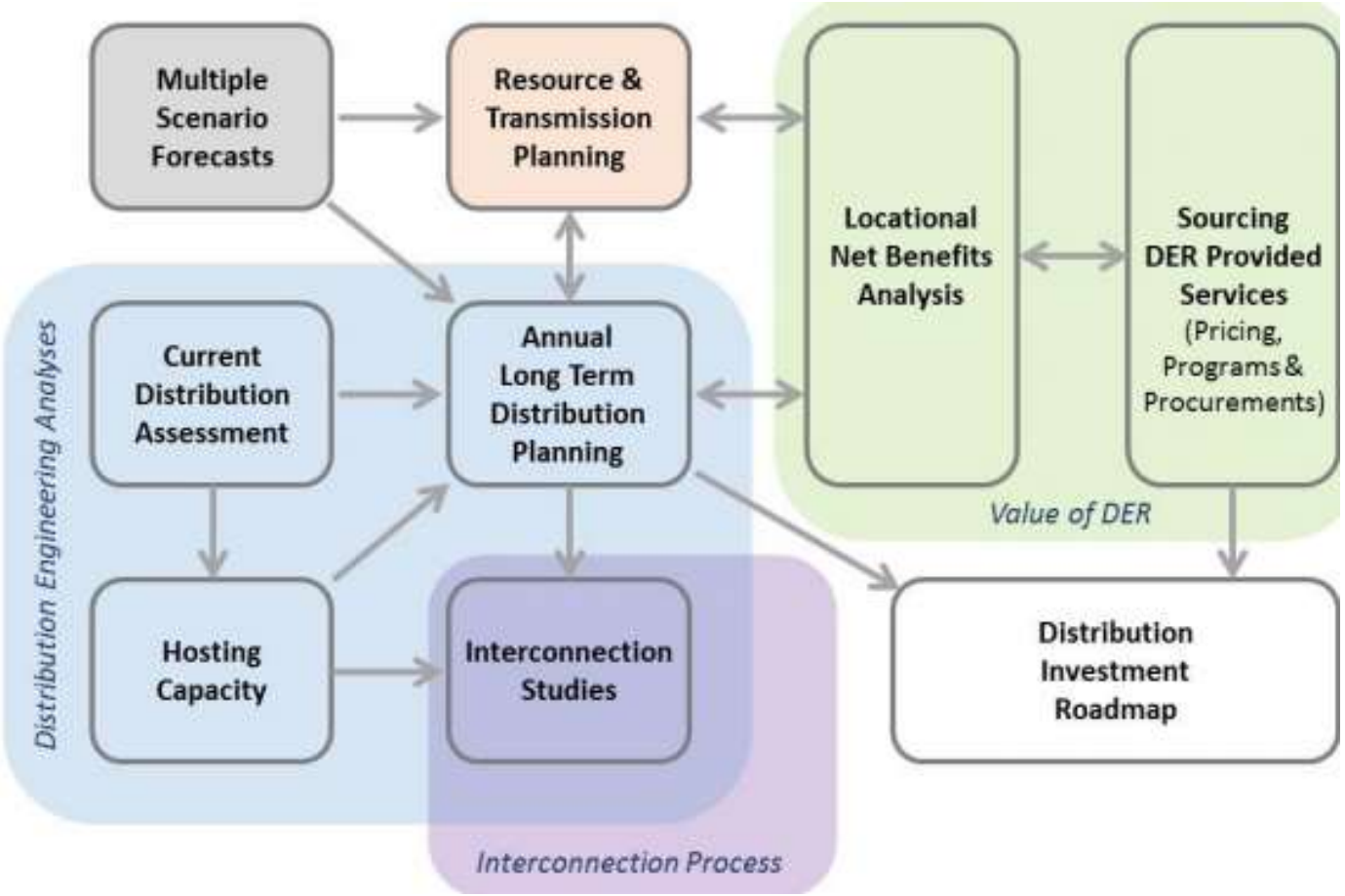
MINNESOTA
PUBLIC UTILITIES COMMISSION

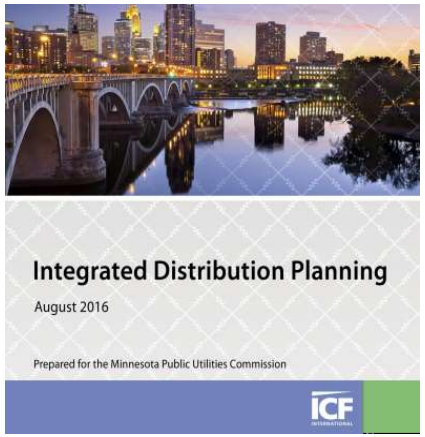
https://mn.gov/puc

# How It Started

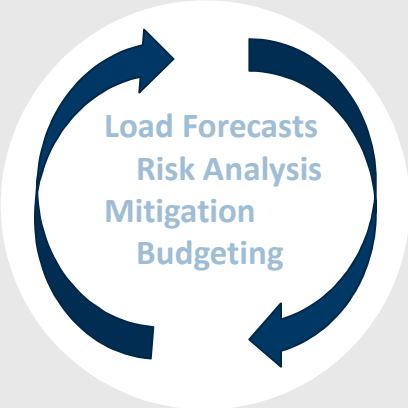
- Commission-led Investigation
- Commission/Staff – Opened Individual Investigation Dockets for each of the four-rate regulated utilities
- Distribution Planning Filing Requirements Established by Order
- Initial Plans filed in 2018 and 2019

# Workshops


Multiple Scenario Forecasts
Resource & Transmission Planning
Locational Net Benefits Analysis
Sourcing DER Provided Services (Pricing, Programs & Procurements)
Current Distribution Assessment
Annual Long Term Distribution Planning
Hosting Capacity
Interconnection Studies
Distribution Investment Roadmap
Distribution Engineering Analyses
Value of DER
Interconnection Process


Integrated Distribution Planning
August 2016
Prepared for the Minnesota Public Utilities Commission
ICF

# Questionnaire




**A. How do Minnesota utilities currently plan their distribution systems?**

Establish a baseline understanding of our utility planning processes


**B. What does each utilities current year plan look like and assume?**

Understand the current state of plans


**C. Are there ways to improve or augment the utilities' planning processes?**

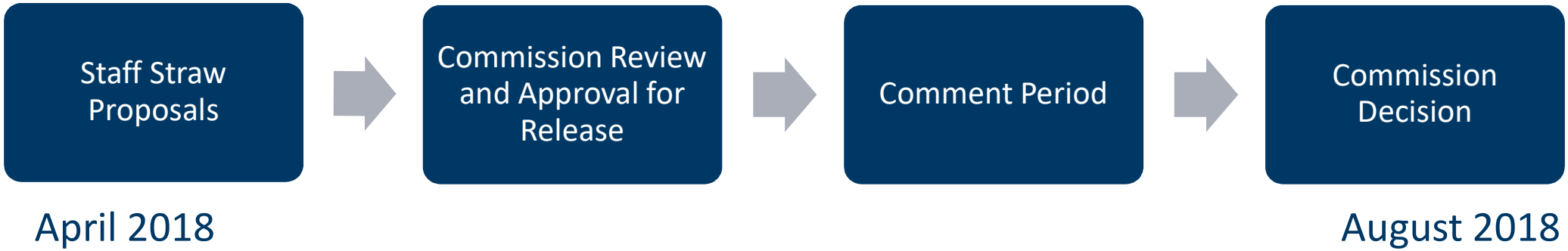
Provide stakeholders an opportunity to identify potential improvements in planning processes

# Goals for Integrated Distribution Planning Process

Minnesota-based Integrated Distribution Plan ‘wants’:

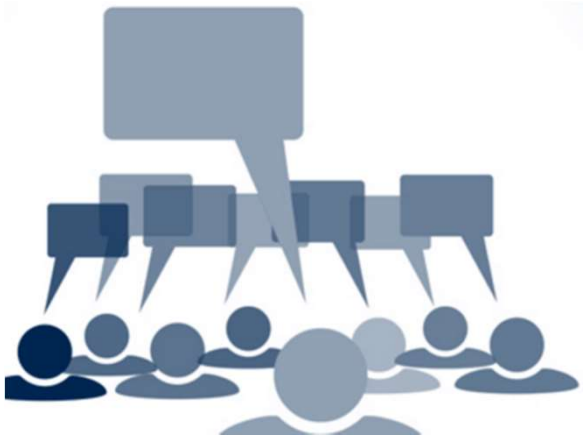
- foundational understanding of utility’s long-term distribution plans;
- context for individual utility investment requests;
- proactive consideration of potential futures and non-traditional methods of planning;
- system reliability, efficient uses of resources, and maximized customer benefits; and,
- public policy goals achievement.

# Process for Setting Distribution Plan Requirements



# Integrated Distribution Plan Requirements

1. **Administrative Requirements (Timing)**
2. **Stakeholder Process**
3. **Filing Requirements**



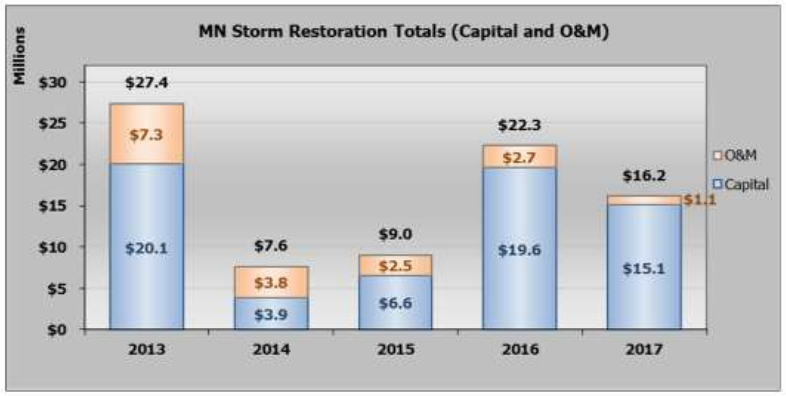
A. Baseline Data
B. Hosting Capacity and Interconnection
C. DER Forecasting
D. Long-Term D'sys Modernization and Infrastructure Investment Plan
E. Non-Wires Alternatives Analysis

# Integrated Distribution Plan Requirements
# Baseline Data

## Baseline Data

*System, Financial, DER*

Figure 43: Escalated Operations – State of Minnesota Electric Jurisdiction
Capital and O&M Expenditures (2013 to 2017)



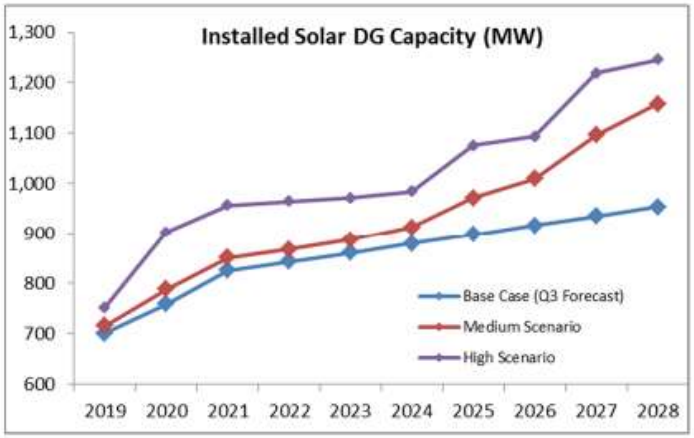
# Integrated Distribution Plan Requirements
# Hosting Capacity & Interconnection

## Hosting Capacity and Interconnection

# Integrated Distribution Plan Requirements
# DER Scenario Analysis

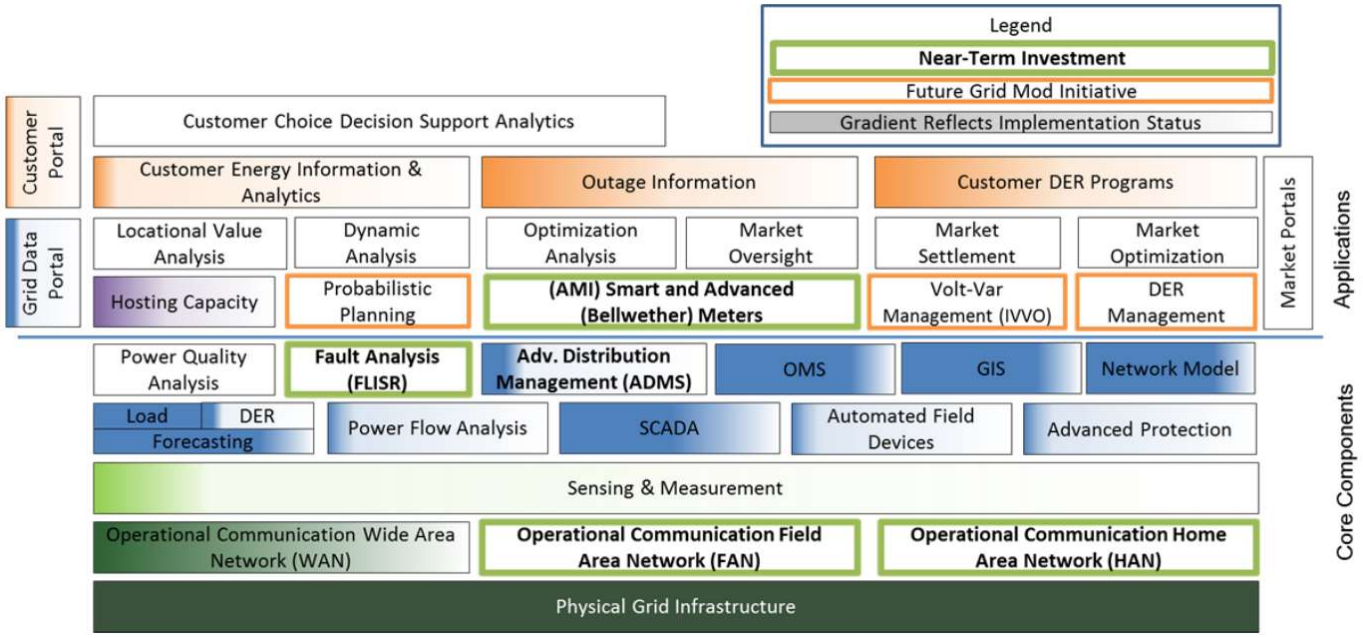
## DER Scenario Analysis

Figure 58: Distributed Solar PV Forecast



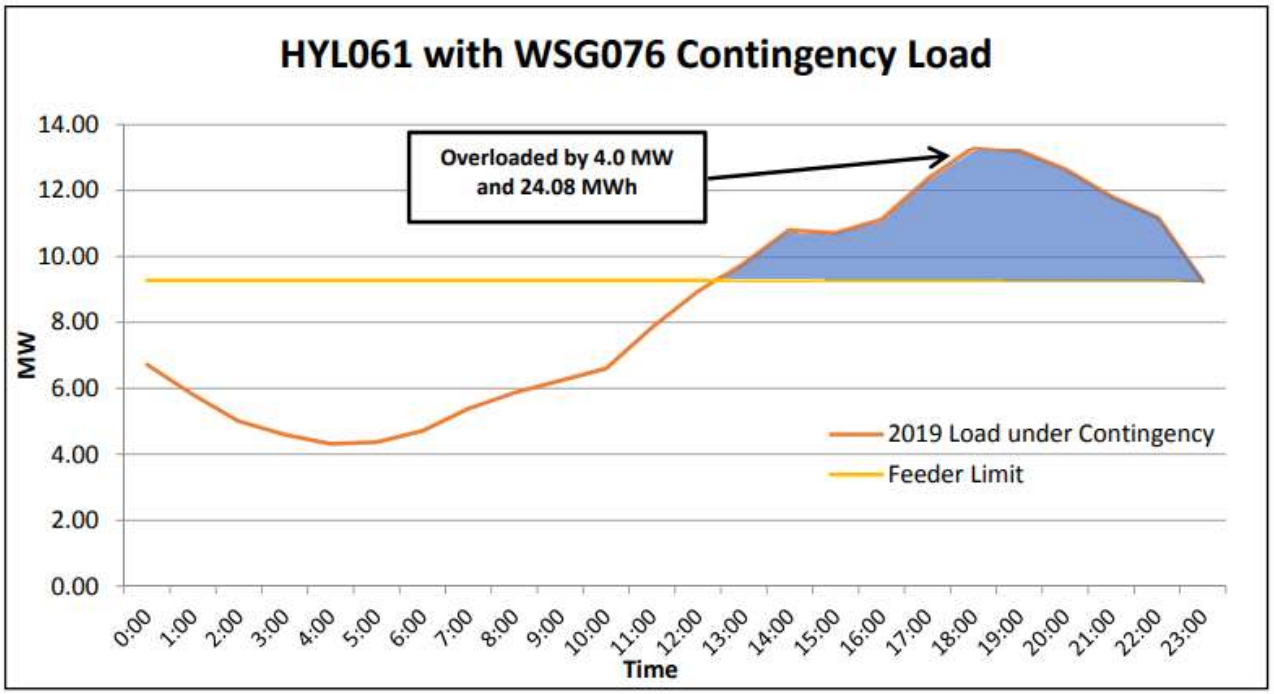

# Integrated Distribution Plan Requirements
# Grid Modernization

## Long-Term Distribution System Modernization and Infrastructure Plan



# Integrated Distribution Plan Requirements
# Non-Wires Alternatives

## Non-Wires Alternatives Analysis



# Integrated Distribution Plan Requirements
# What Lies Ahead?

How will integrated distribution system planning evolve?

**To be continued…**

MINNESOTA
PUBLIC UTILITIES COMMISSION


# Questions?

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