XCEL ENERGY'S INTEGRATED RESOURCE PLAN AND INTEGRATED DISTRIBUTION PLAN 101 WORKSHOP

September 26th (virtual) and September 27th (in-person), 2022

AGENDA

Welcome: Patti Leaf
Introduction to Xcel Energy
Integrated Resource Planning
Integrated Distribution Planning
IRP/IDP Coordination

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WELCOME AND OVERVIEW

- Involve stakeholders in the Xcel Energy Integrated Resource Plan (IRP) and Integrated Distribution Plan (IDP) planning process
- General discussion on the planning processes
- Welcome environment for all
- To obtain feedback/input on those plans
- Opportunity to ask questions
- Additional workshops on specific content will be offered going forward
- General

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AGENDA

- Welcome
- **Introduction to Xcel Energy: Monsherra Blank**
- Integrated Resource Planning
- Integrated Distribution Planning
- IRP/IDP Coordination

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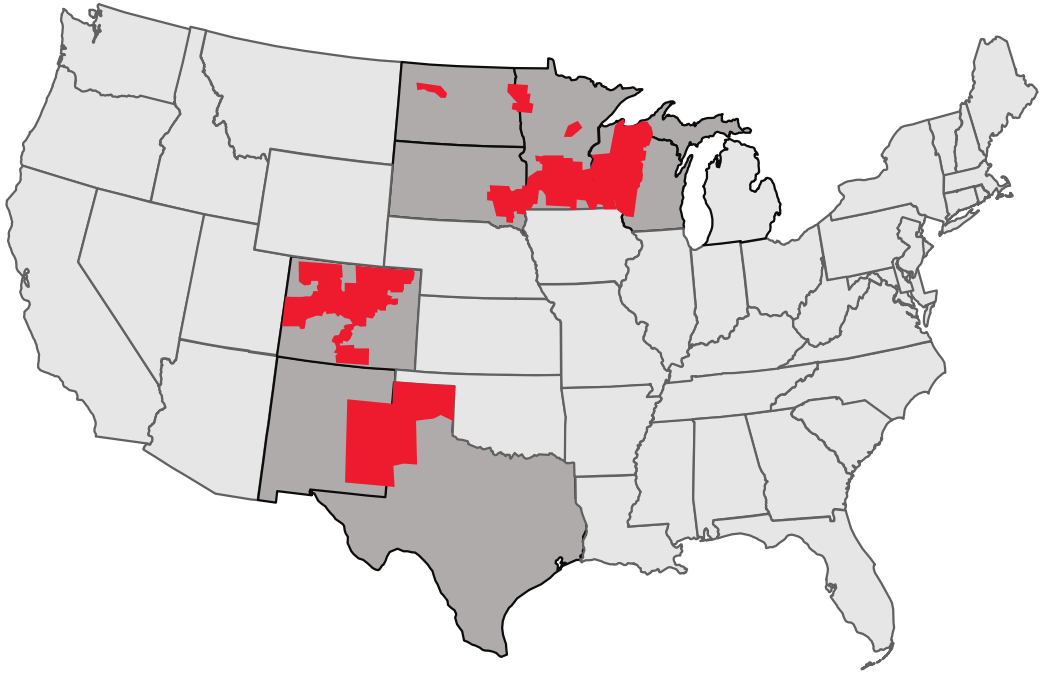


Serving eight states

3.7 million electricity customers

2.1 million natural gas customers

Nationally recognized leader:

Wind energy

Energy efficiency

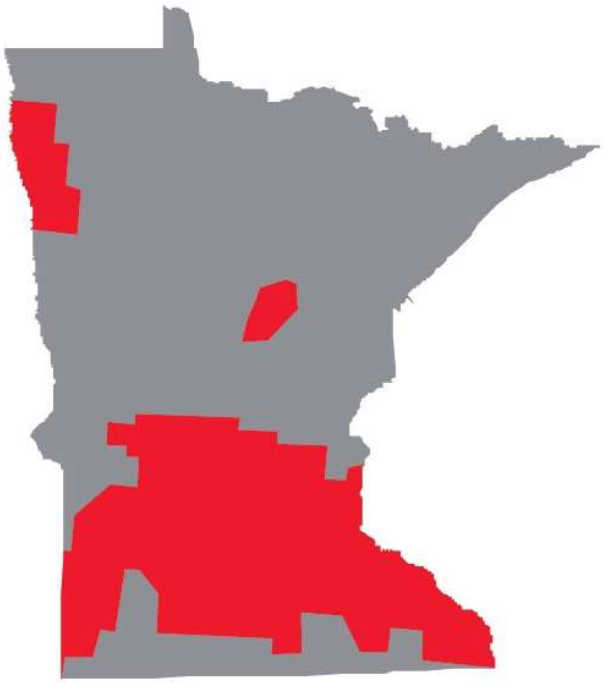
Carbon emissions reductions

Innovative technology

Storm restoration

2020 Data

Powering Minnesota



1.3 million Electric Customers

472,000 Natural Gas Customers

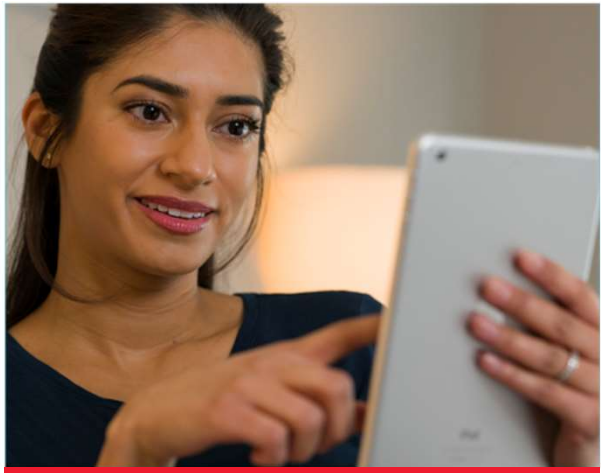
99.9% Electric Reliability

Electric Power System Today

Xcel Energy Priorities

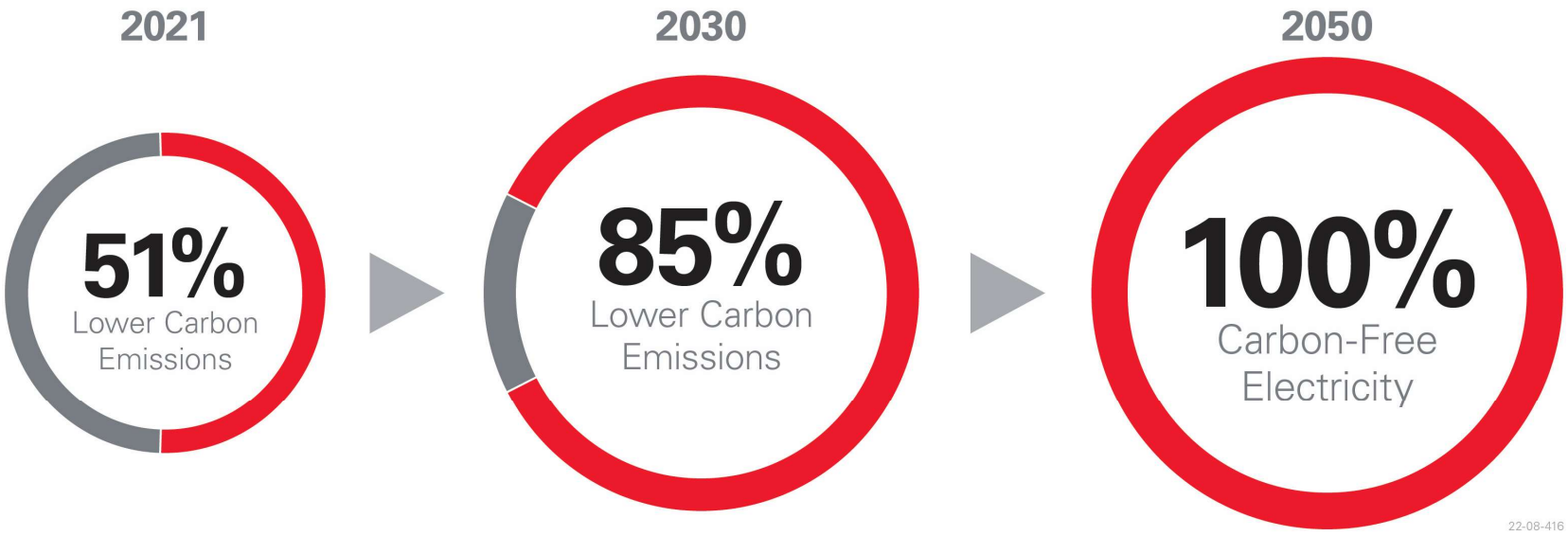
Lead the Clean Energy Transition

Enhance the Customer Experience



Keep Bills Low

A Bold Vision for a Carbon-Free Future

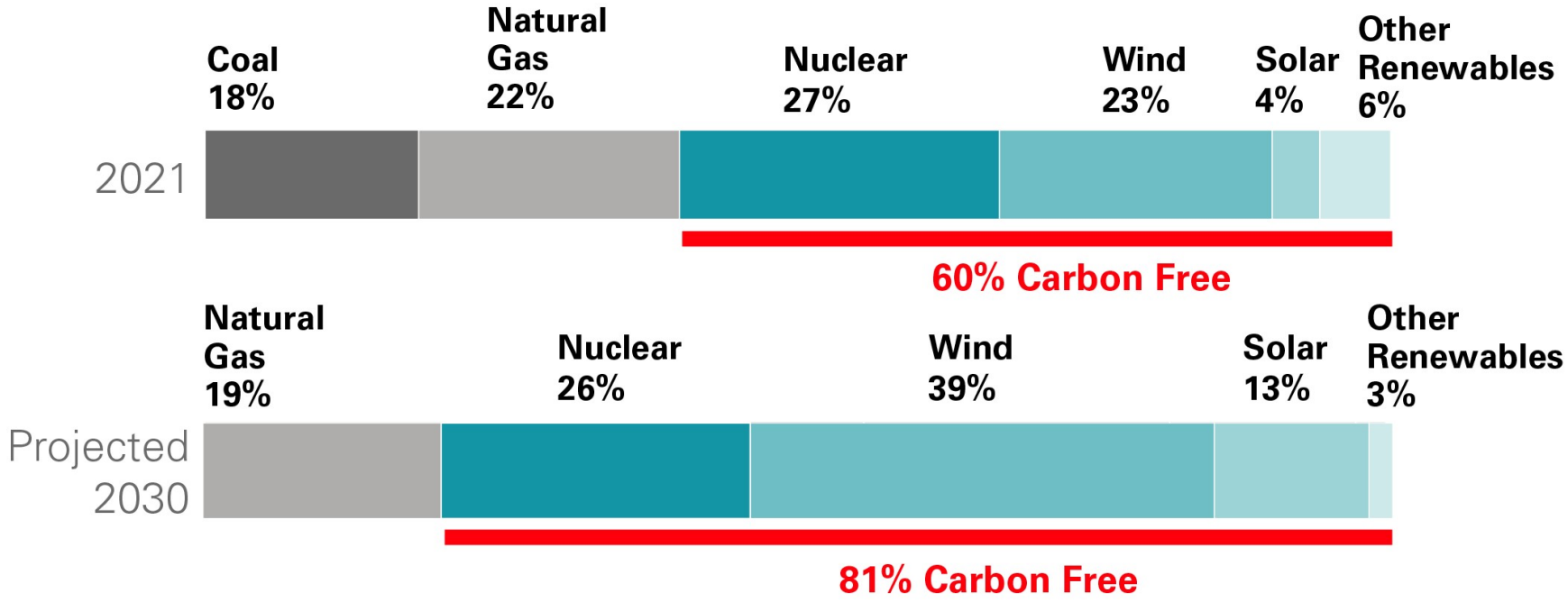


One of the top providers of clean power in the U.S.

Upper Midwest system emissions reductions compared to 2005

Cleaner Energy Mix

Upper Midwest electricity sources



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- Welcome
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- **Integrated Resource Planning: Farah Mandich and Jared Nelson**
- Integrated Distribution Planning
- IRP/IDP Coordination

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RESOURCE PLAN REGULATORY REQUIREMENTS

MN Statue 216B.2422

Subd. 1(d) "Resource plan" means a set of resource options that a utility could use to meet the service needs of its customers over a forecast period, including an explanation of the supply and demand circumstances under which, and the extent to which, each resource option would be used to meet those service needs. These resource options include using, refurbishing, and constructing utility plant and equipment, buying power generated by other entities, controlling customer loads, and implementing customer energy conservation.

Subd. 2.Resource plan filing and approval. (a) A utility shall file a resource plan with the commission periodically in accordance with rules adopted by the commission. The commission shall approve, reject, or modify the plan of a public utility, as defined in section 216B.02, subdivision 4, consistent with the public interest.

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RESOURCE PLAN PROCESS

1. Xcel Energy is required to file a plan to the Public Utilities Commission (PUC) every 5 years.

2. Interested parties may file as intervenors and have the opportunity to submit their comments on our plan to the PUC. Xcel Energy can then submit comments on their comments- this can result in many rounds.

3. The Department of Commerce (DOC) reviews the record and makes recommendations to the PUC on what should and what shouldn't be approved in our plan.

4. Hearings are then held by the PUC with witnesses providing testimony to discuss the plan.

5. The PUC approves a plan which has been modified by the process.

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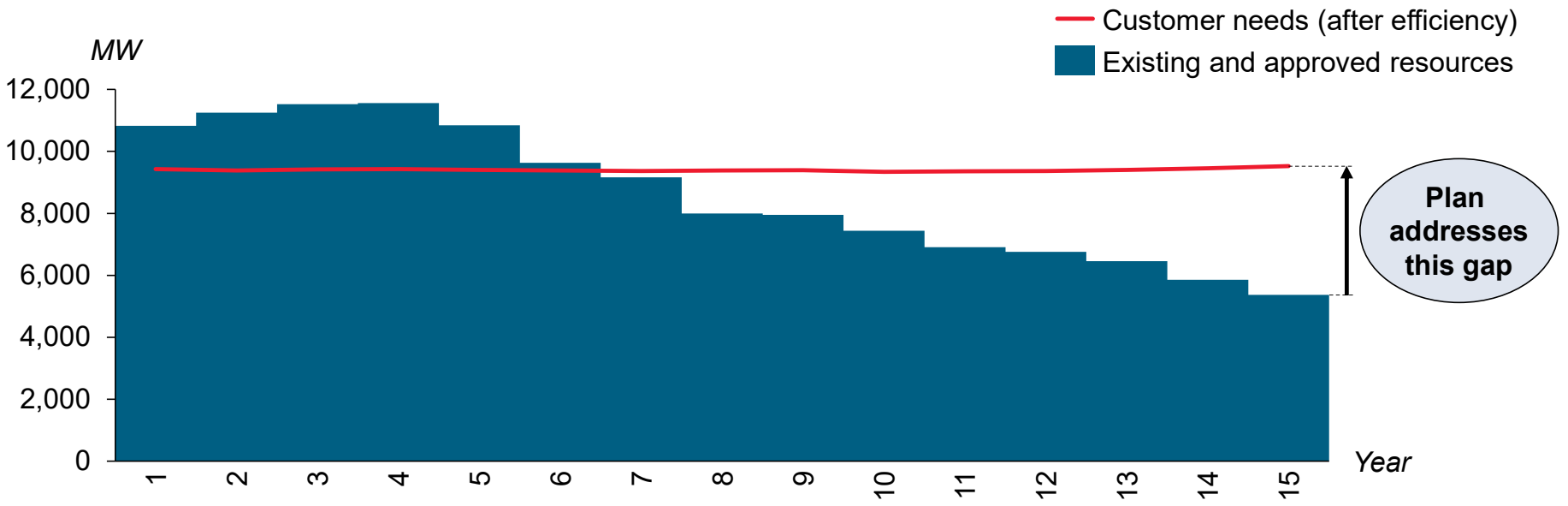
Upper Midwest Integrated Resource Plan Overview

- **15-year plan for 5-state Upper Midwest** service area
  - ~1.8 million electric customers
  - States have varying requirements
- Tests multiple plans and contingency scenarios to **determine Preferred Plan**
  - **Size, type, and timing** of new resource additions over next 15 years, with focus on **next 5 years actions**
  - Uses **EnCompass economic modeling tool** to analyze multiple future scenarios
- Key question: in alignment with our planning objectives, what is the **least cost *and* best fit generation portfolio to serve customers**?
  - Modeling output is key but not sole consideration
  - Other qualitative and quantitative factors also considered when selecting a Preferred Plan

At its core, IRP is about identifying best set of resources to meet future customer needs

Customer demand and resources available each year of plan (illustrative)
Units: Megawatts (1 MW = ~1,000 homes/yr)



Analysis approach emphasizes striking a balance between core objectives

- Meet reserve margin requirements
- Meet customer energy needs every hour, every day

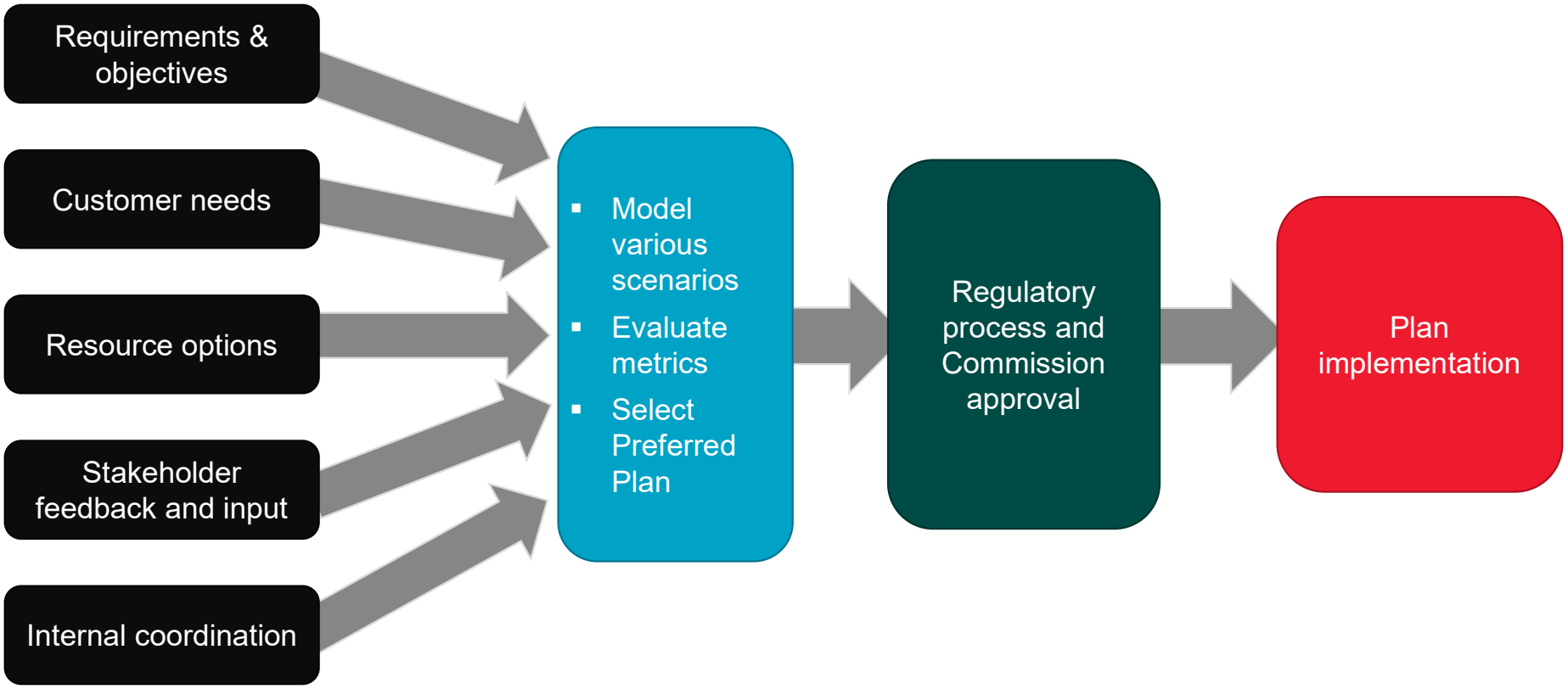
- Minimize customer bills
- Minimize portfolio costs
- Weigh near vs long-term operating costs

- Meet policy requirements
- Reduce carbon emissions
- Grow renewable energy

- Maintain portfolio diversity
- Retain options for new tech
- Manage market exposure

Core planning objectives align generally to MN Commission requirements for review of our plan

Overview of our Integrated Resource Planning process



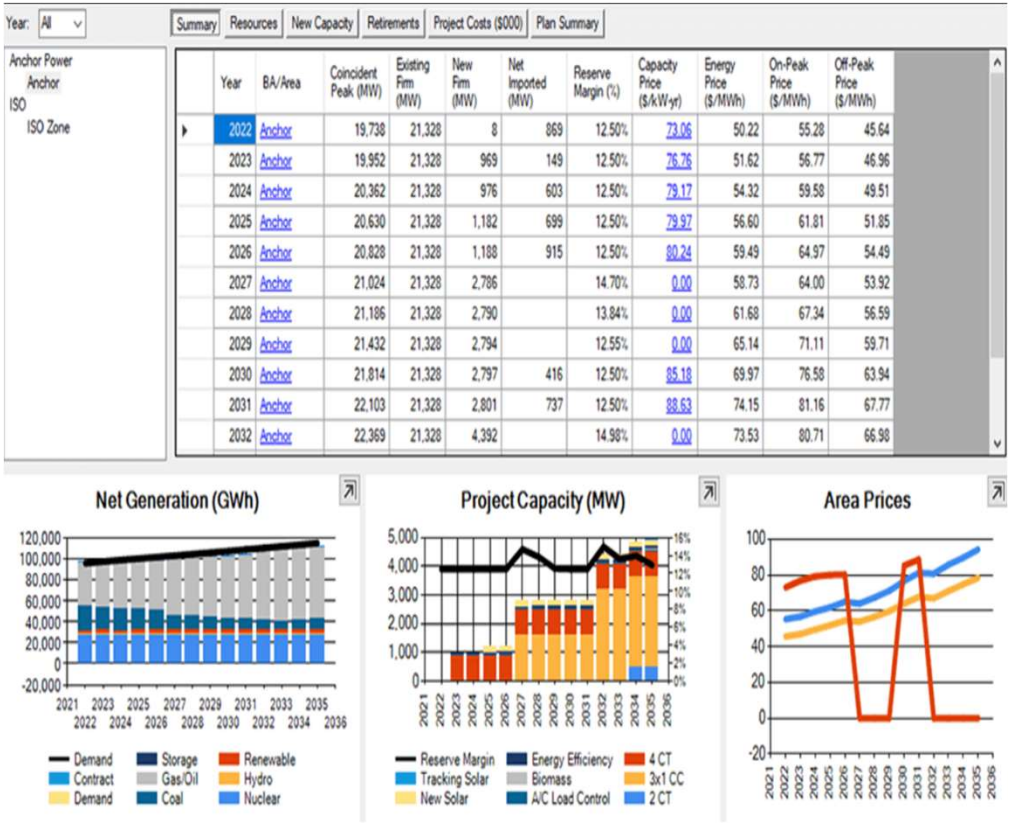
We use complex economic modeling to support our planning process

Long-Term Generation Planning Model:

EnCompass Power Planning Software

- Utilizes mixed integer programming to determine the optimal solution for new resource portfolios and how they operate to serve customer needs
  - Identifies optimal generation fleet given set of inputs and constraints
- Each run gives us many data points: Costs, emissions, energy generation by unit type, etc.
- Serves as the basis for regulatory filings in 17 states (including largest MN utilities)

- *Just one part of a comprehensive analysis we collaboratively develop with stakeholders inside the company and outside input*

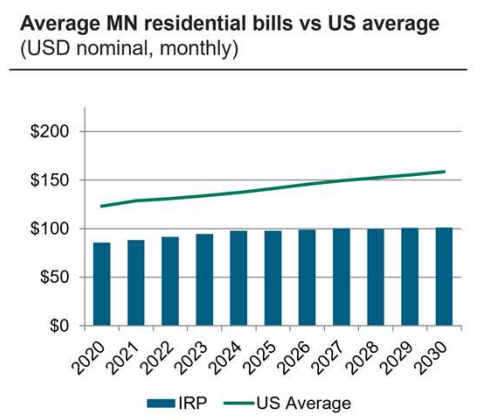


Year	BA/Area	Coincident Peak (MW)	Existing Firm (MW)	New Firm (MW)	Net Imported (MW)	Reserve Margin (%)	Capacity Price ($/kW-yr)	Energy Price ($/MWh)	On-Peak Price ($/MWh)	Off-Peak Price ($/MWh)
2022	Anchor	19,738	21,328	8	869	12.50%	73.06	50.22	55.28	45.64
2023	Anchor	19,952	21,328	969	149	12.50%	76.76	51.62	56.77	46.96
2024	Anchor	20,362	21,328	976	603	12.50%	79.17	54.32	59.58	49.51
2025	Anchor	20,630	21,328	1,182	699	12.50%	79.97	56.60	61.81	51.85
2026	Anchor	20,828	21,328	1,188	915	12.50%	80.24	59.49	64.97	54.49
2027	Anchor	21,024	21,328	2,786		14.70%	0.00	58.73	64.00	53.92
2028	Anchor	21,186	21,328	2,790		13.84%	0.00	61.68	67.34	56.59
2029	Anchor	21,432	21,328	2,794		12.55%	0.00	65.14	71.11	59.71
2030	Anchor	21,814	21,328	2,797	416	12.50%	85.18	69.97	76.58	63.94
2031	Anchor	22,103	21,328	2,801	737	12.50%	88.63	74.15	81.16	67.77
2032	Anchor	22,369	21,328	4,392		14.98%	0.00	73.53	80.71	66.98

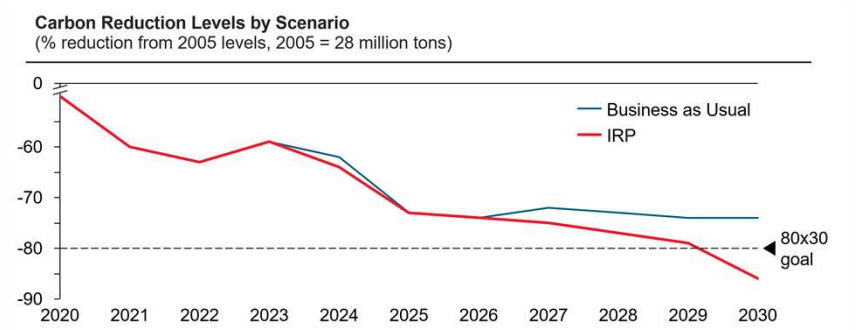
Metrics we use to evaluate our plan align to our core planning principles

Reliability

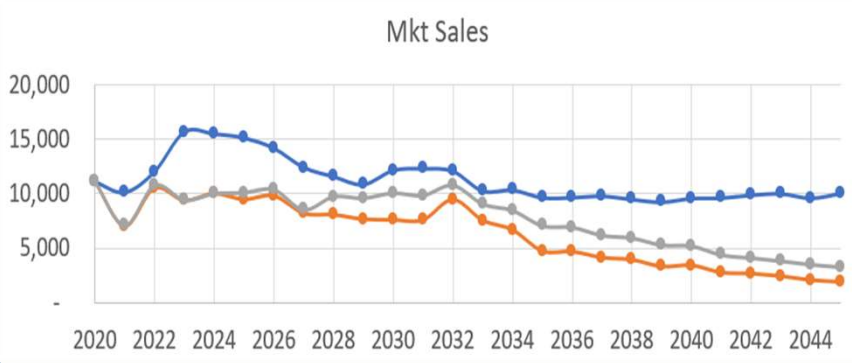
Cost



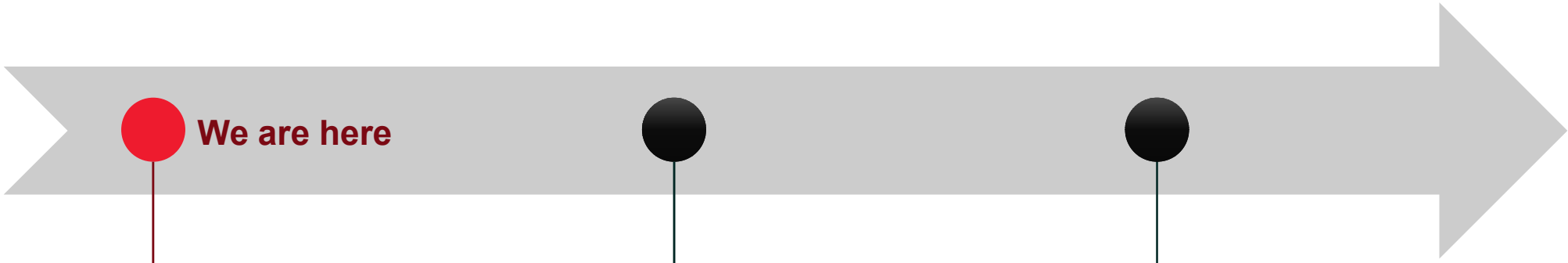
Environment



Risk



What's next – starting the 2024-2038 IRP!



Scoping and information gathering

- Initial stakeholder meetings
- Work planning and research
- Updating models and developing new methods

Prepare next IRP

- Evaluate new technologies, analyses
- Develop scenarios, select Preferred Plan
- Continued internal and external stakeholder discussions

File next IRP

- Due by 1 Feb 2024

IRP QUESTIONS?

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- Integrated Resource Planning
- **Integrated Distribution Planning: Brian Monson**
- IRP/IDP Coordination

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Minnesota Integrated Distribution Planning (IDP) Filing

- **Minnesota Public Utilities Commission established reporting requirements as an outcome of its Grid Modernization proceeding**
  - First Xcel Energy IDP filed in 2018, biennial since 2019
  - **Next Xcel Energy IDP due November 1, 2023**

- **Integrated Distribution Planning (IDP) continues to be an emerging industry trend**
  - Particularly in states with significant level of DER

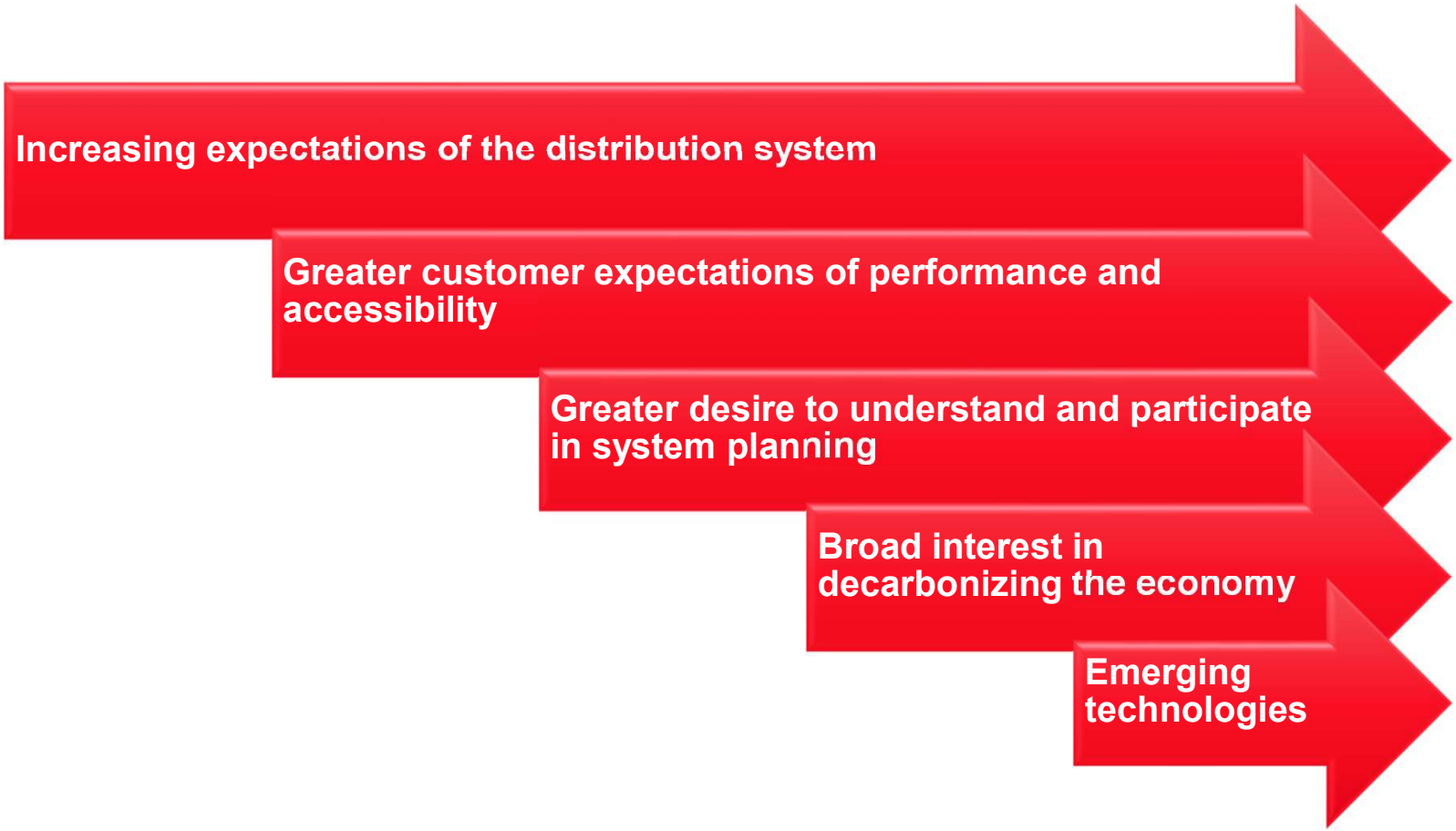
Minnesota IDP – Objectives

- Maintain and enhance the safety, security, reliability, and resilience of the electricity grid, at fair and reasonable costs, consistent with the state's energy policies,
- Enable greater customer engagement, empowerment, and options for energy services,
- Move toward the creation of efficient, cost-effective, accessible grid platforms for new projects, new services, and opportunities for adoption of new distributed technologies, and
- Provide the Commission with the information necessary to understand Xcel Energy's short- and long-term distribution system plans, the costs and benefits of specific investments, and a comprehensive analysis of customer cost and value.

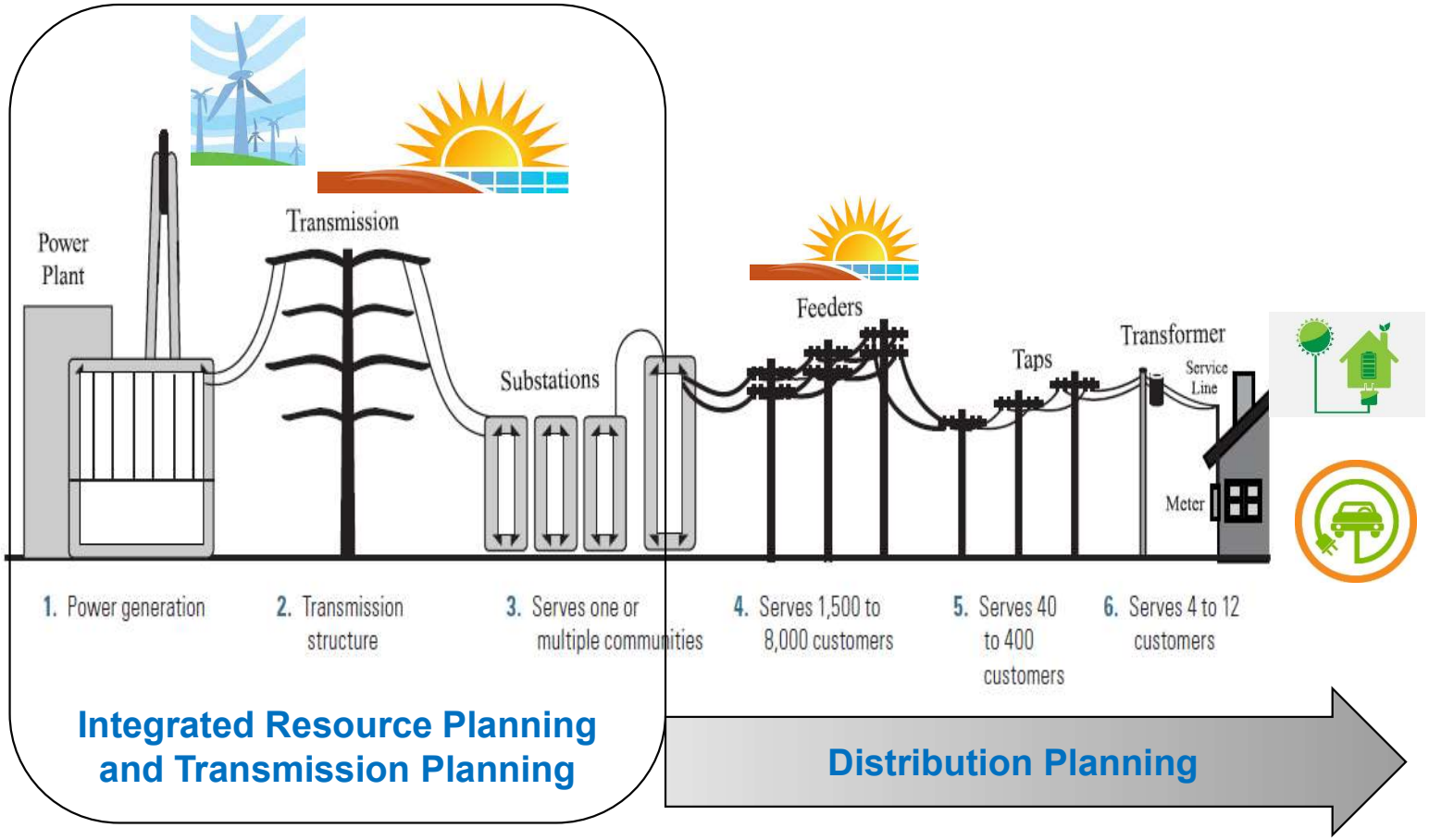
Minnesota IDP – Filing Process

1. Xcel Energy is required to file an Integrated Distribution Plan (IDP) to the Public Utilities Commission (PUC) every 2 years.
2. Interested stakeholders can submit their comments on our plan to the PUC, including recommendations on what should or shouldn't be accepted from the plan, and changes to future filing requirements.
3. Xcel Energy can then submit a reply to stakeholder comments.
4. Hearing held by the PUC to discuss, vote to accept the plan, and provide additional order points for future filings.

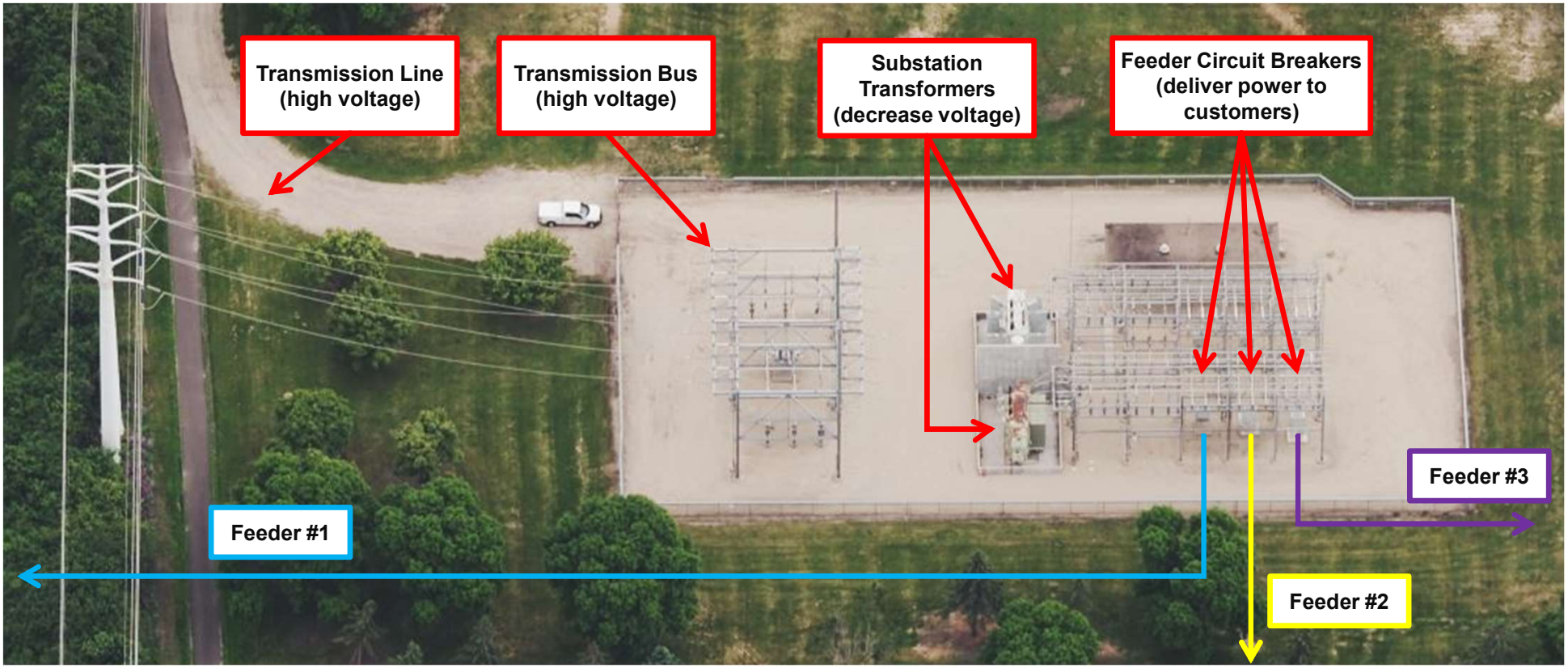
Drivers – Distribution Business Evolution



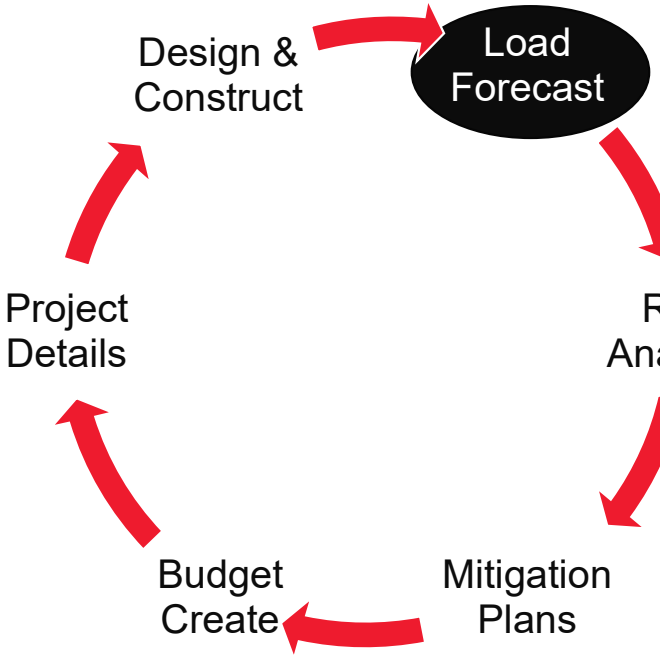
Electric Power System Planning

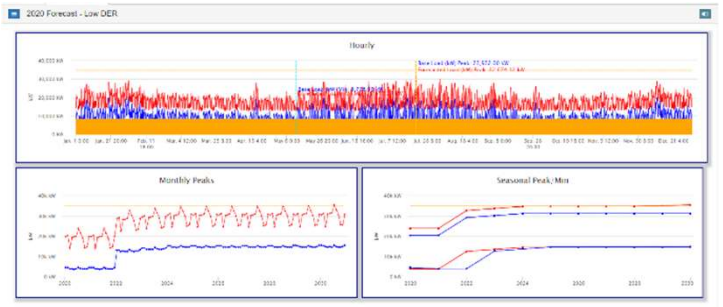


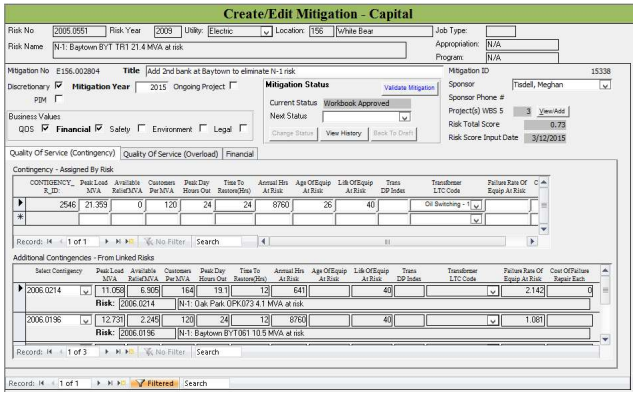
Distribution System - Substations



Fundamental Distribution Planning Process







Load Forecast

- **Objective:** Identify future distribution system peak loading based on known and anticipated load growth
- Forecast up to 30 years into the future, years 2-5 are focus for analysis
- Forecast developed for each feeder circuit and substation transformer
  - Location specific – *where* is the load growth expected to occur
- Layer impacts of multiple different high-level forecasts into distribution forecast
  - Corporate load growth forecast
  - EV and charging station adoption forecasts
  - DER adoption forecast

LoadSEER Forecast Concept

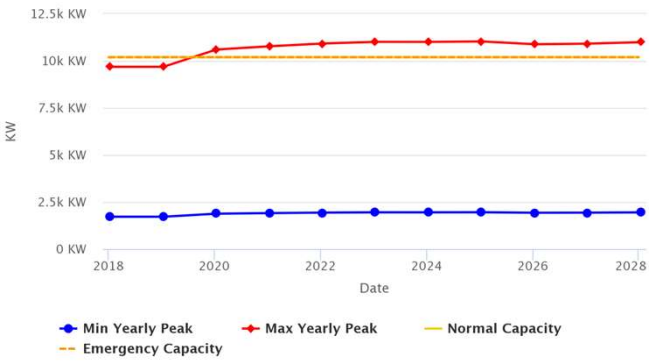
Forecast = Base Load + Growth

Tool

Forecast Scenario

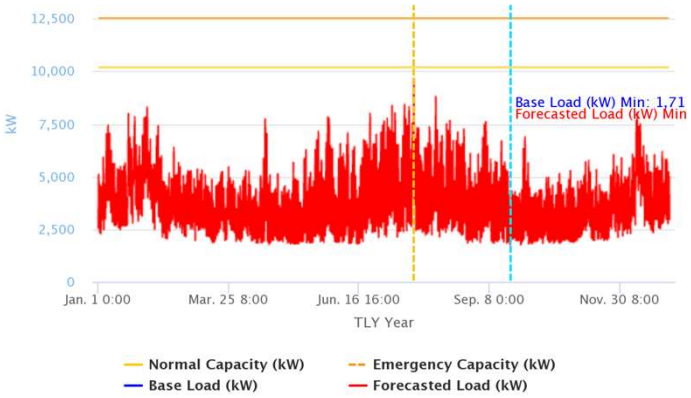
Produces

Forecast Compute



SCADAScrubber

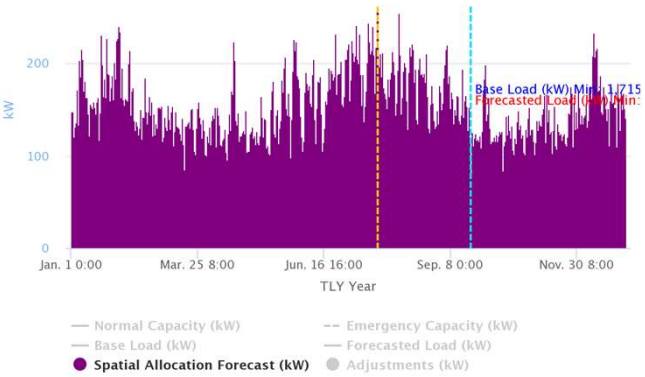
TLY Shape



Growth

1. Map Adjustments
2. Spatial Allocation

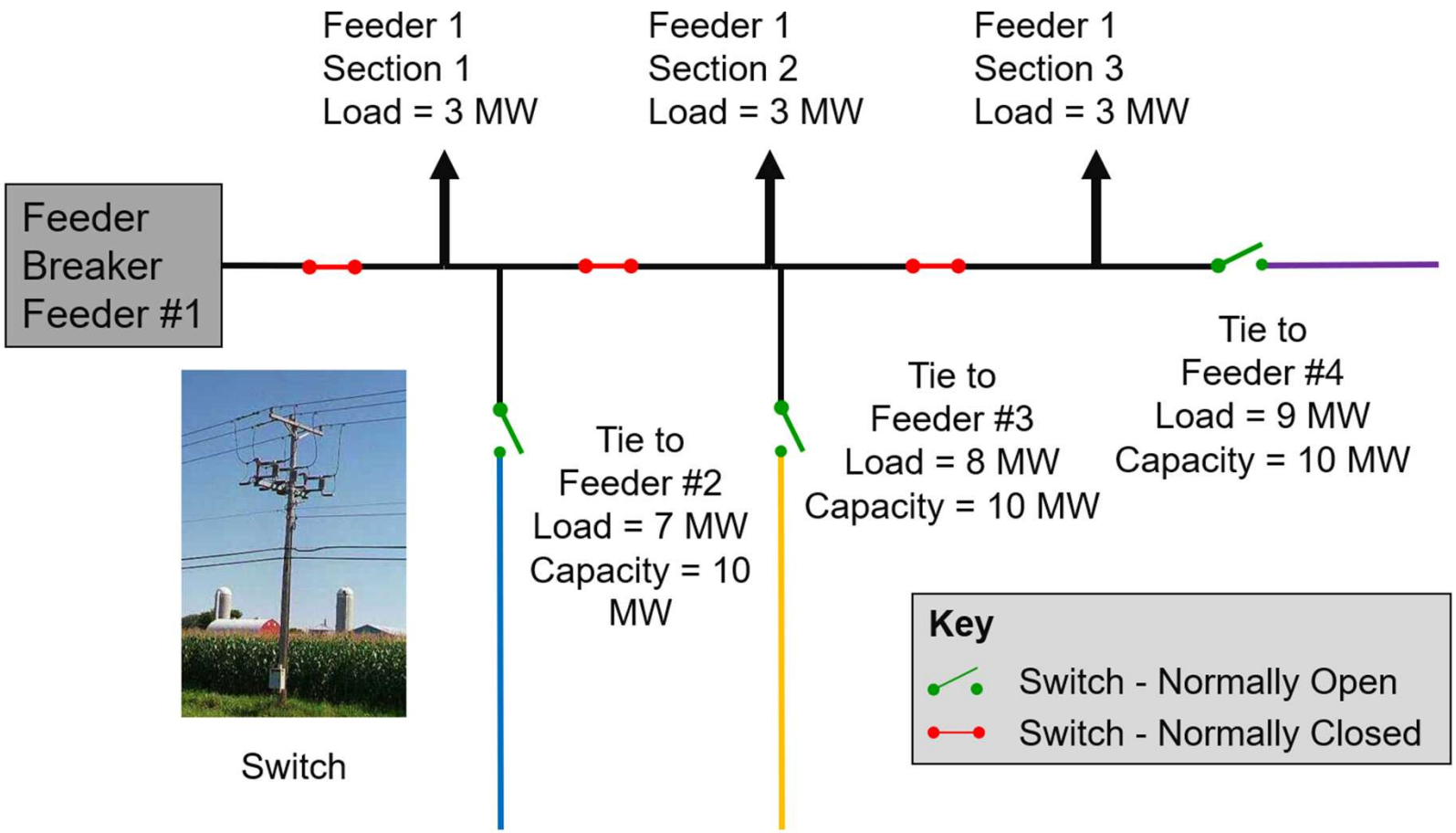
1. Future Services
2. Adopting Agents



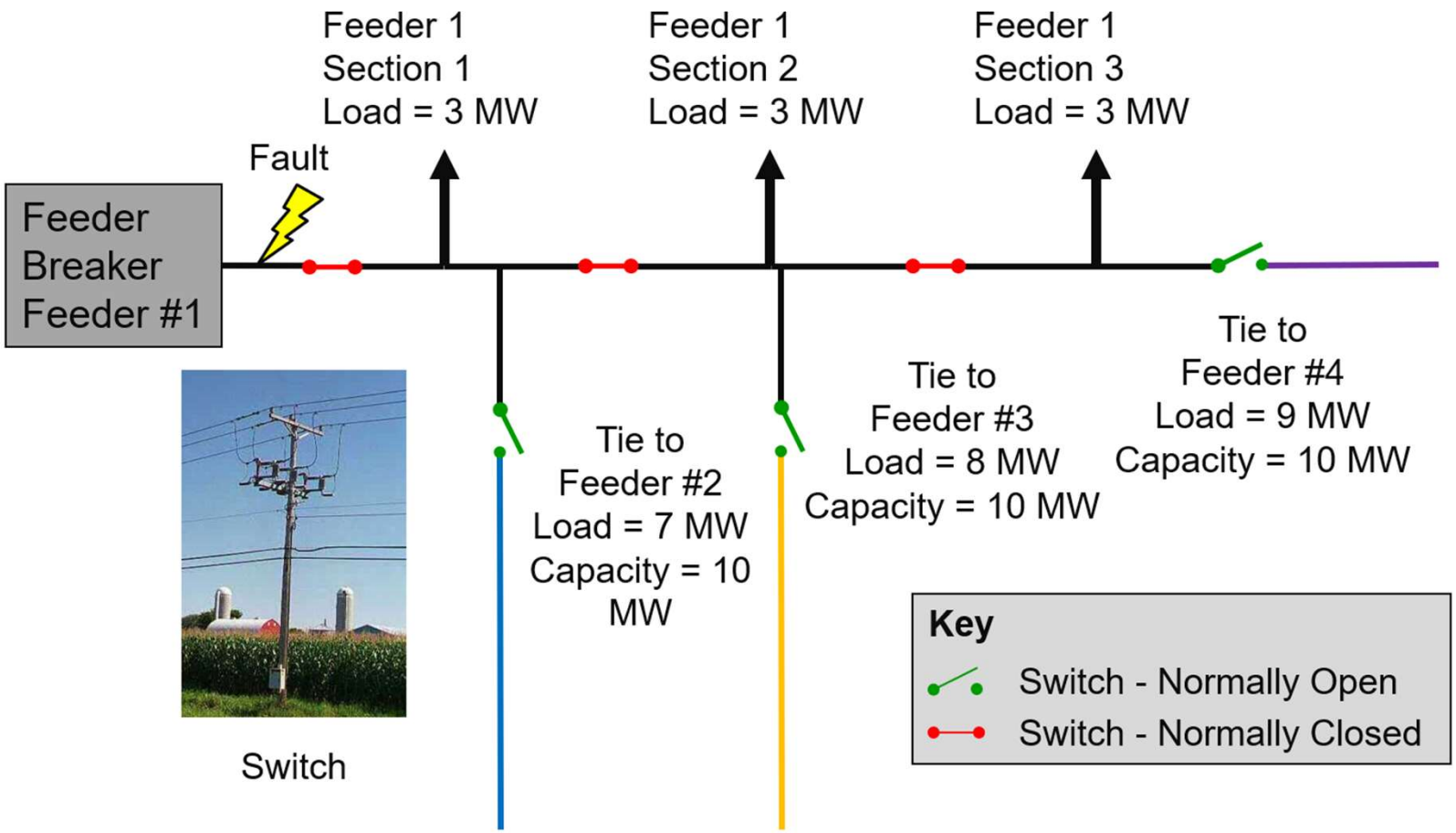
Risk Analysis

- **Objective:** Identify future system capacity risks based on load forecast
- Analyze feeders and substation transformers
  - N-0 – normal system conditions with the system fully intact
    - N-0 overload risk: forecasted load exceeds rated capacity
  - N-1 – abnormal system conditions after the failure/loss of one feeder or substation transformer
    - N-1 overload risk: resultant loading on adjacent feeder or substation transformer exceeds the rated capacity after load transfers to restore customers

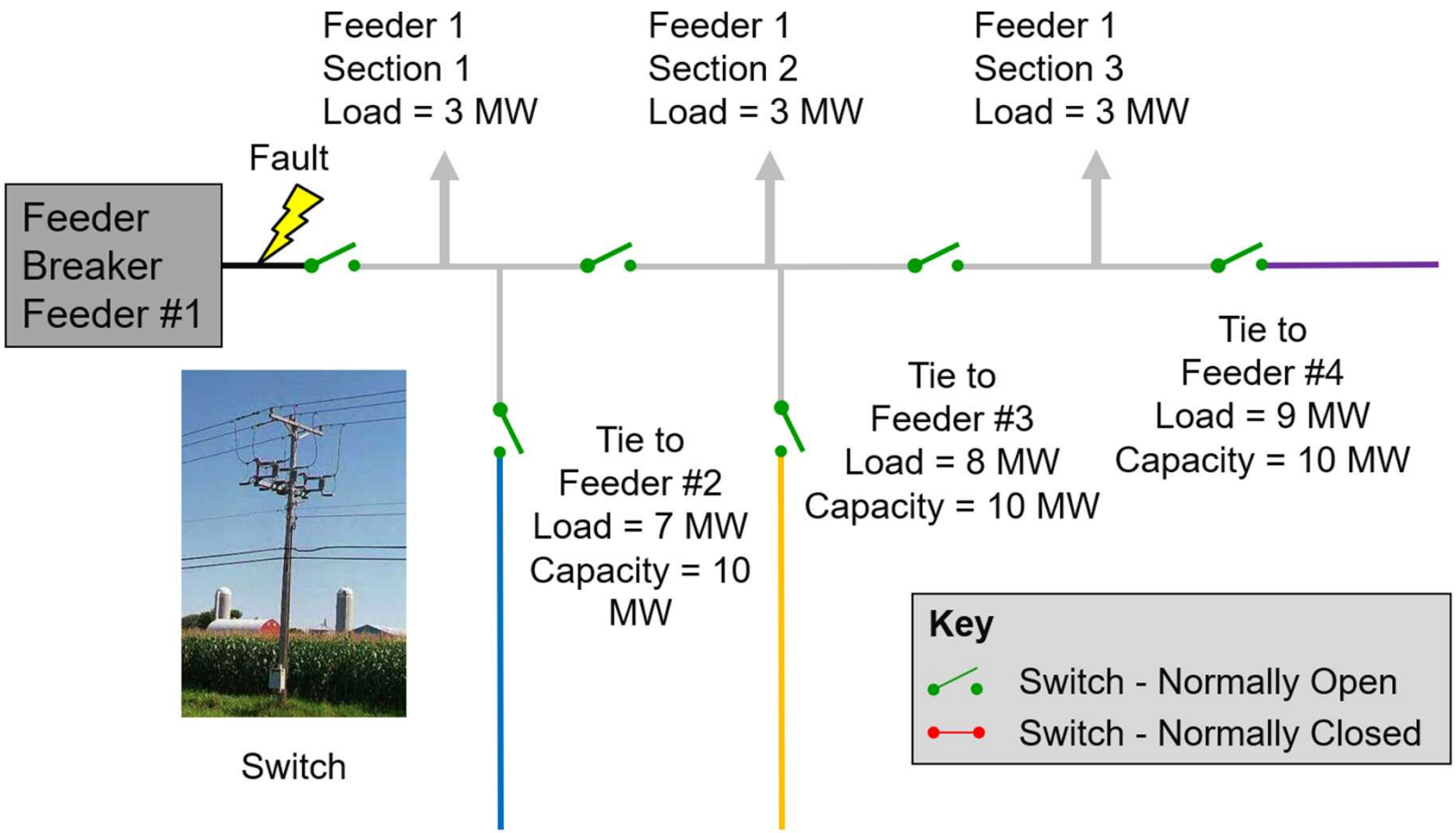
Risk Analysis – Feeder N-1s



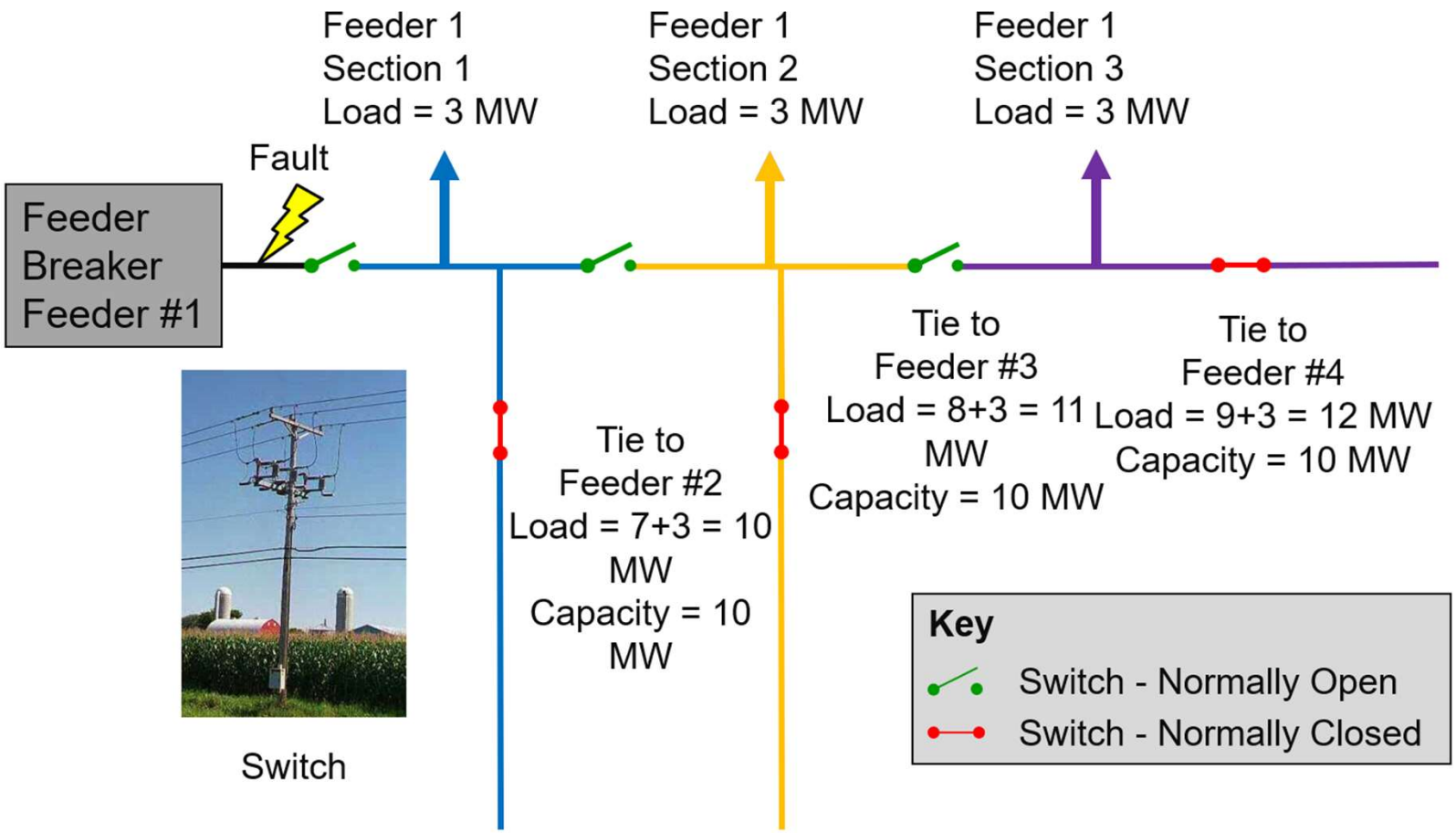
Risk Analysis – Feeder N-1s



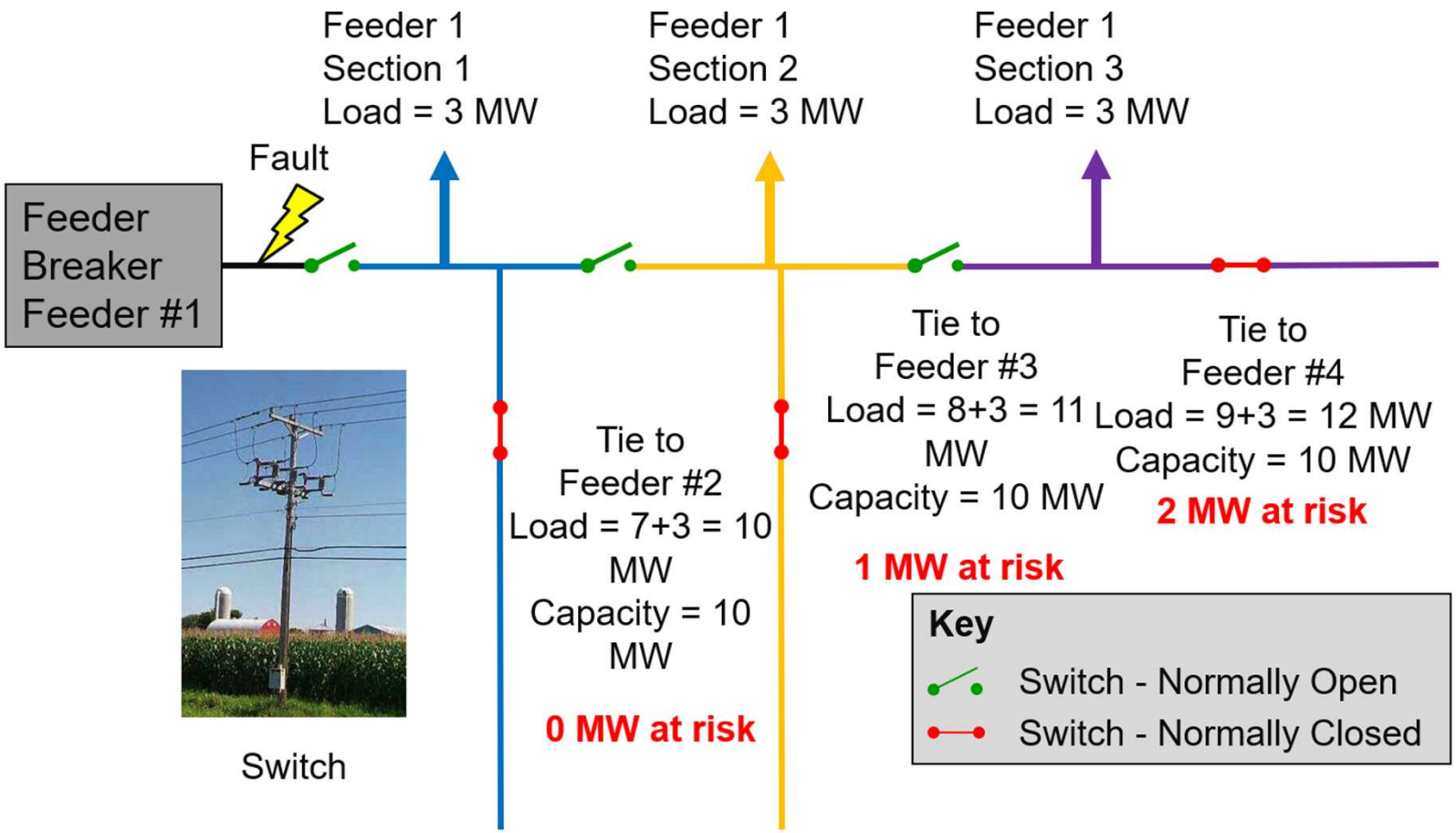
Risk Analysis – Feeder N-1s



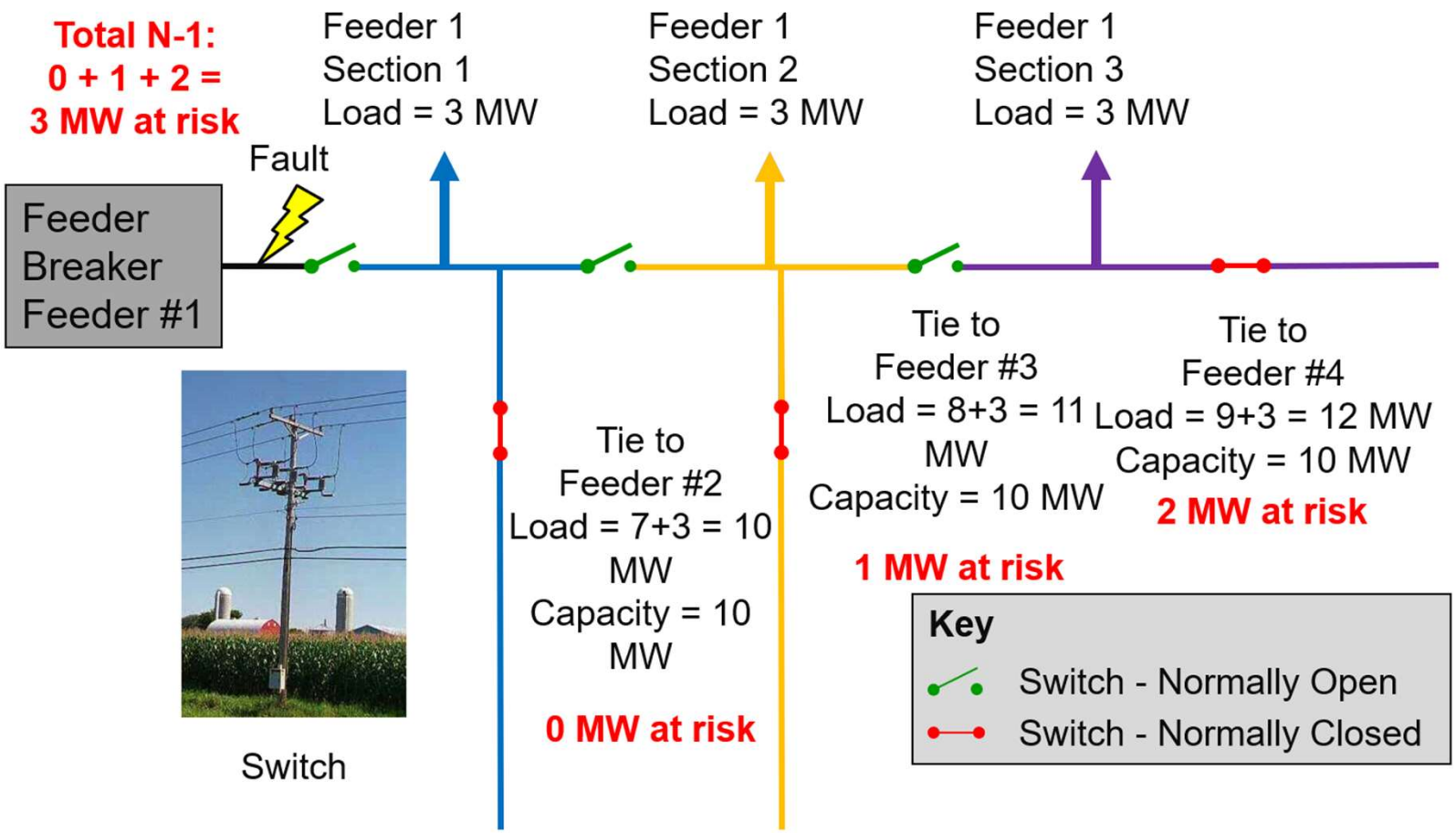
Risk Analysis – Feeder N-1s



Risk Analysis – Feeder N-1s



Risk Analysis – Feeder N-1s



Mitigation Plans – Traditional Solutions

Objective: Initiate projects to address system capacity risks

Possible mitigations for capacity risks

	N-0	N-1
Feeder	• Upgrade feeder capacity • Transfer load off of feeder (new feeder or extend existing feeder)	• Extend a feeder for a new feeder tie • Add section switch to change sections • New feeder to pick up load and reduce overall loading • Upgrade capacity of feeder tie
Substation TR	• Upgrade transformer • Transfer load off of substation TR	• Add a transformer • Transfer load away from substation • Add feeder ties to external substations

Mitigation Plans - Non-Wires Alternative (NWA)

Projects in which a utility uses distributed energy resources (DER) to solve a constraint on the grid, instead of relying on conventional transmission and distribution assets

What is DER in the context of our Integrated Distribution Plan?

Supply and demand side resources that can be used throughout an electric distribution system to meet energy and reliability needs of customers, and can be installed on either the customer or utility side of the electric meter. This definition may include, but is not limited to distributed generation, energy storage, electric vehicles, demand side management, and energy efficiency.

Mitigation Plans – NWA Requirements in the IDP

Base IDP Requirements for NWA:

Xcel Energy must file an annual update of baseline financial data and non-wires alternatives analysis.

For any distribution project in the current year or 5-year budget that costs $2 million or more, provide an analysis on how non-wires alternatives compare in terms of viability, price, and long-term value. Provide the following information:

- Project types that would lend themselves to non-traditional solutions (i.e., load relief or reliability)
- The timeline needed to consider alternatives to traditional project types
- Cost threshold of any project type that would need to be met to have a non-traditional solution reviewed
- A discussion of the proposed screening process for potential non-wires alternatives

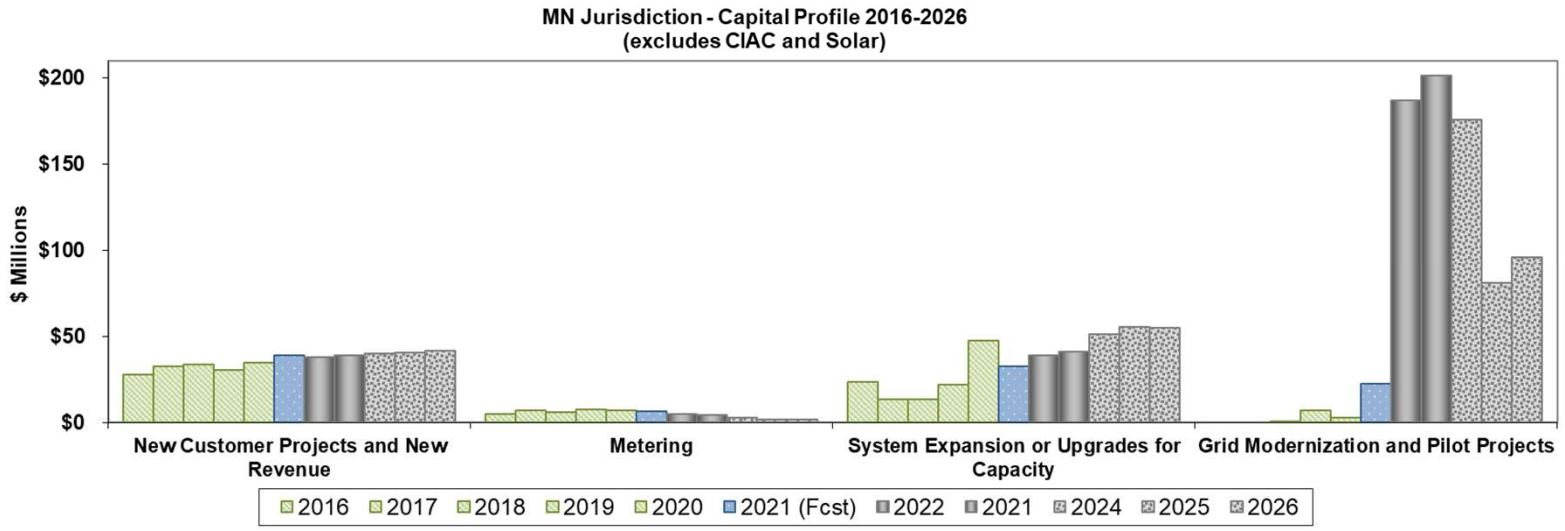
Xcel Energy must engage stakeholders in further advancing the Company's NWA Analysis, including, but not limited to, screening criteria, analysis methodology and assumptions, and NWA evaluation parameters.

2022 Commitments – The Company will consider a broader set of values and revenue streams in future NWA analyses and continue working with stakeholders on NWA analysis.

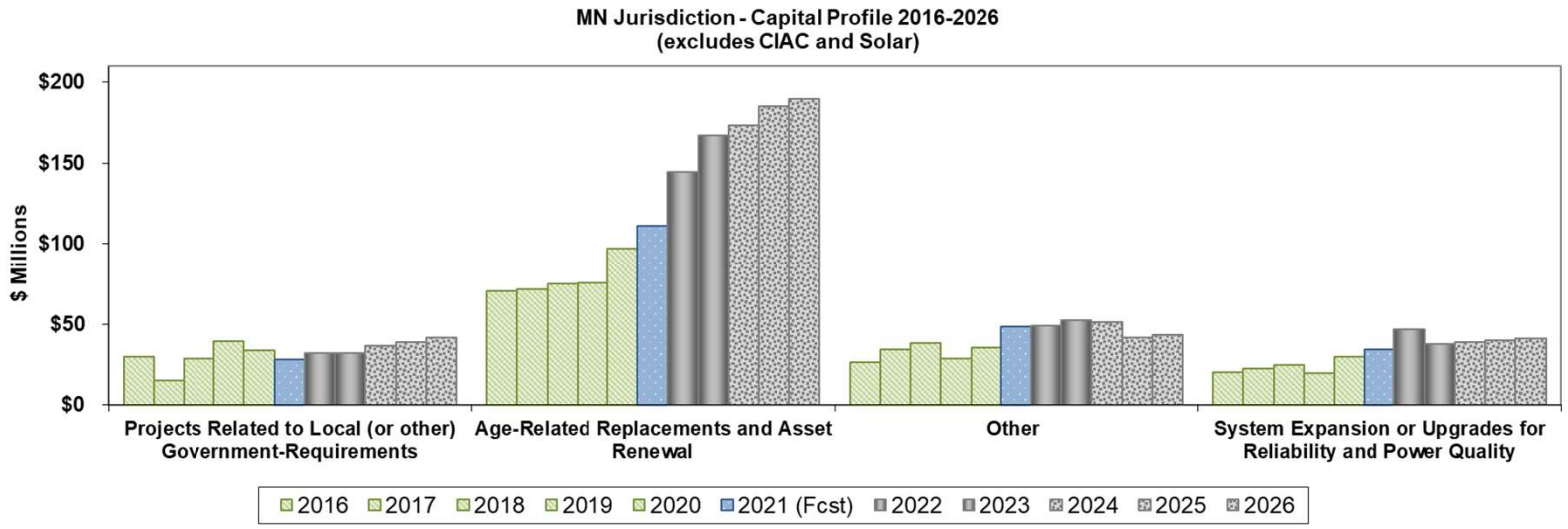
Budget Create

- **Objective:** Develop a 5-year capital budget for Distribution
- Discretionary projects are scored based on project cost and estimated reliability benefit
  - Projects are funded and prioritized in budget based on this score
- Projects are mapped to various budget categories:
  - System Expansion or Upgrades for Capacity
  - Age-Related Replacements and Asset Renewal
  - System Expansion or Upgrades for Reliability and Power Quality
  - New Customer Projects and New Revenue
  - Grid Modernization and Pilot Projects
  - Projects related to local (or other) government-requirements
  - Metering
  - Other

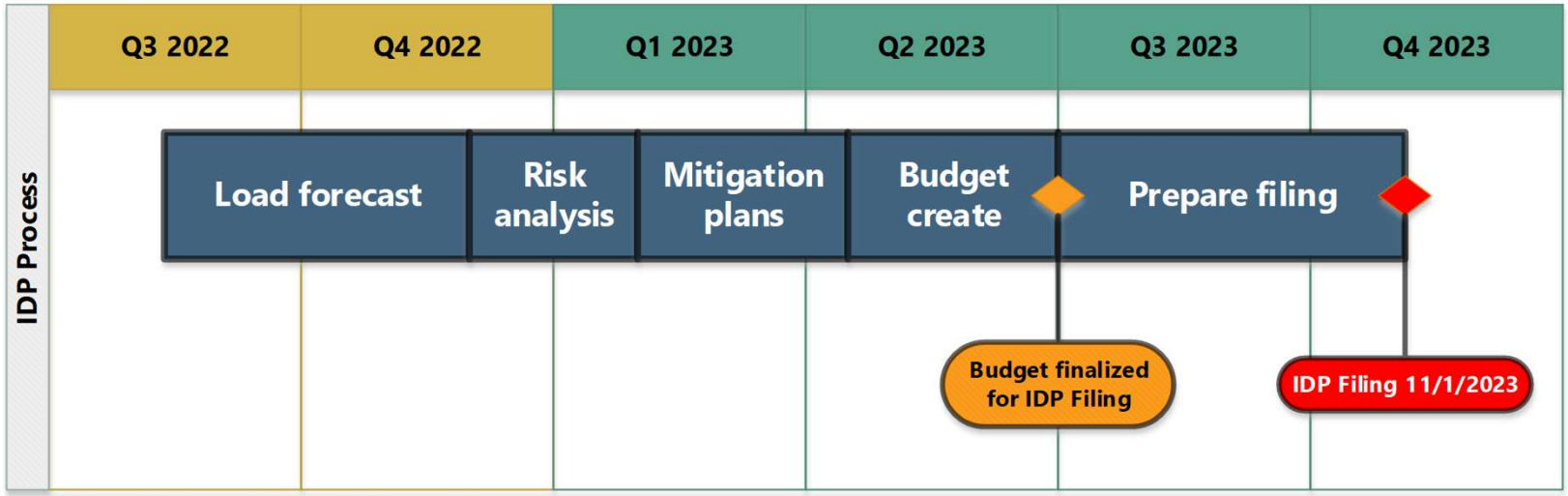
Budget Create – *Trend by Category*



Budget Create – *Trend by Category (cont'd)*



2023 IDP Process Timeline



IDP Questions?

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- Integrated Distribution Planning
- **IRP/IDP Coordination: Jared Nelson and Brian Monson**

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How IDP and distributed resource considerations factor into IRP planning

*IRP interacts with IDP by identifying **likely to be adopted or cost-effective levels** of distributed energy resources or "DER" whereas IDP plans for likely to be adopted*

Supply-side only planning	Optimizing demand-side resources
▪ Planning focuses on large-scale "utility side of the meter" resources ▪ DERs, when considered, included as static forecasts of customer adoption ▪ IRP and IDP forecasts aligned for consistency	▪ DER modeled as "selectable" resources ▪ Model can choose them instead of large-scale resources to meet customer needs, if cost effective ▪ Incorporates more load flexibility ▪ Move from aligning IRP and IDP to having them inform each other

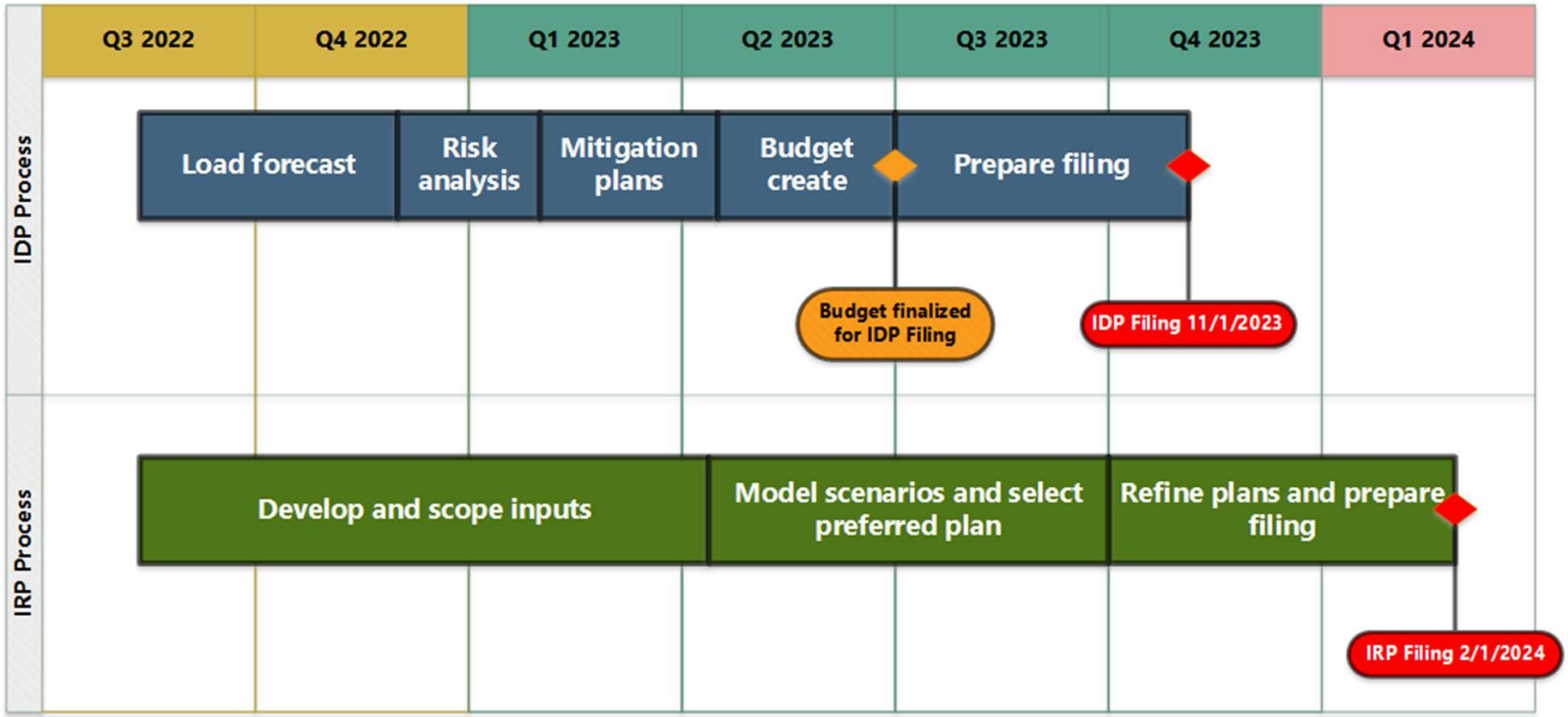
Outside scope for IRP

- Where DERs will be installed
- Distribution upgrades needed to accommodate DER adoption
- Designing new customer programs

Some IDP-related topics we'll address in our next IRP

- ✓ Continue modeling energy efficiency and demand response as selectable resources
- ✓ Continue forecasting electrification adoption levels and impact on plans
- ? Approach to modeling distributed solar as selectable, rather than static forecasts, and impact on customer rates/bills
- ? Demand flexibility and impact on our planning
- ? Evaluating and accounting for community goals in our IRP

IDP and IRP Process Timelines



Note: exact timelines of each phase are subject to change

Questions?

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If you have referenced reports, studies, modeling, data, etc. in your comments, please send this information within 5 business days to:

patricia.b.leaf@xcelenergy.com

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IRP Docket NO: E002/RP-19-368

IDP Docket NO: E002/M-21-694

Slides will be posted to these dockets.

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Next Workshop:

Electrification: date TBD.

Meeting details will be posted to IDP and IRP dockets and sent via e-mail to interested parties list.

If you did not get an invite to this workshop via e-mail, you are not on Xcel Energy's interested parties list. E-mail patricia.b.leaf@xcelenergy.com to be added.

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Other Questions?

THANKS FOR JOINING US!

Xcel Energy®

BACKUP SLIDES

Reductions Beyond Carbon

Environmental Improvement Since 2005