NARUC
National Association of
Regulatory Utility Commissioners

NARUC-NASEO TASK FORCE
ON COMPREHENSIVE
ELECTRICITY PLANNING

NASEO
National Association of
State Energy Officials

Distribution Planning Criteria

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Today’s Speakers

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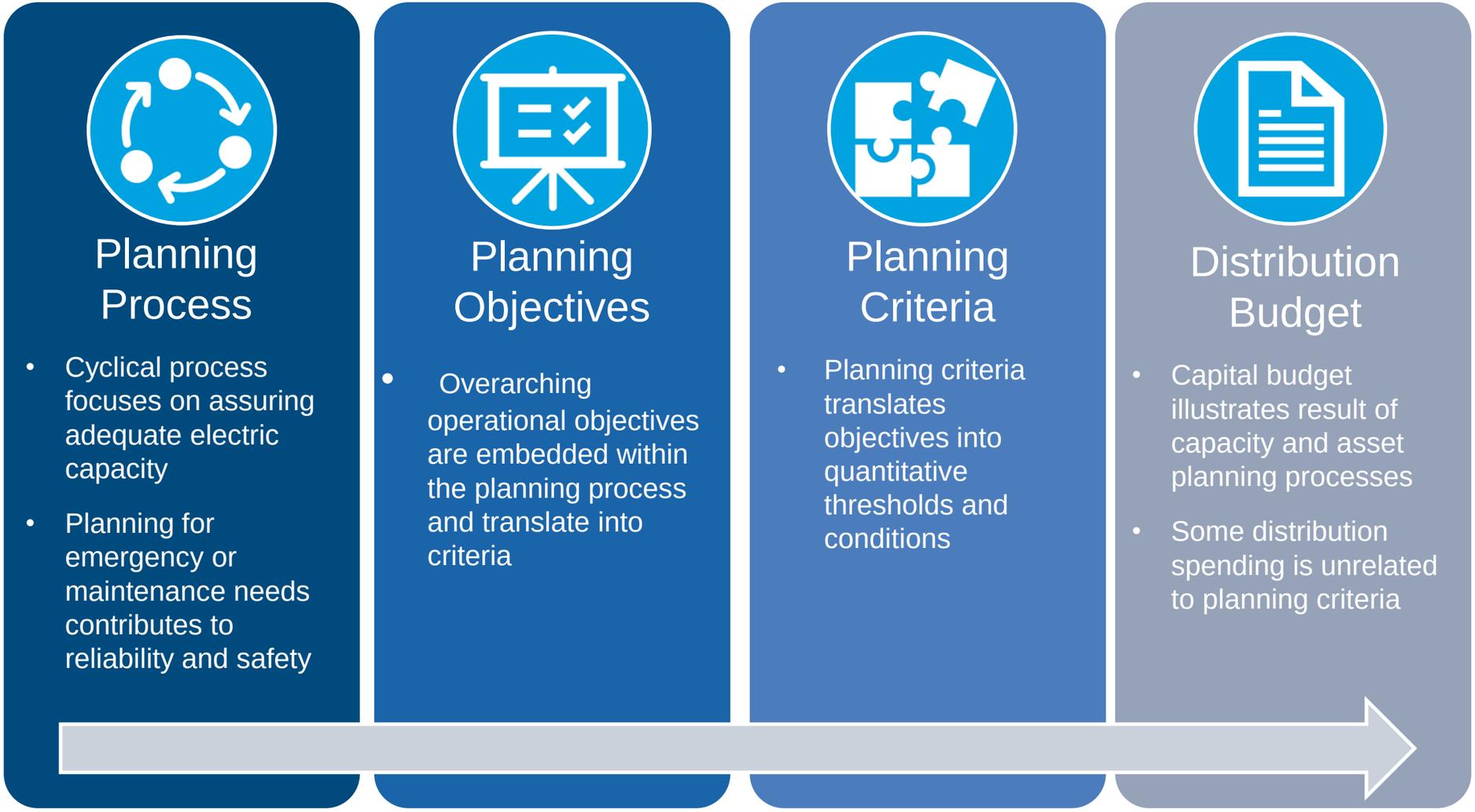
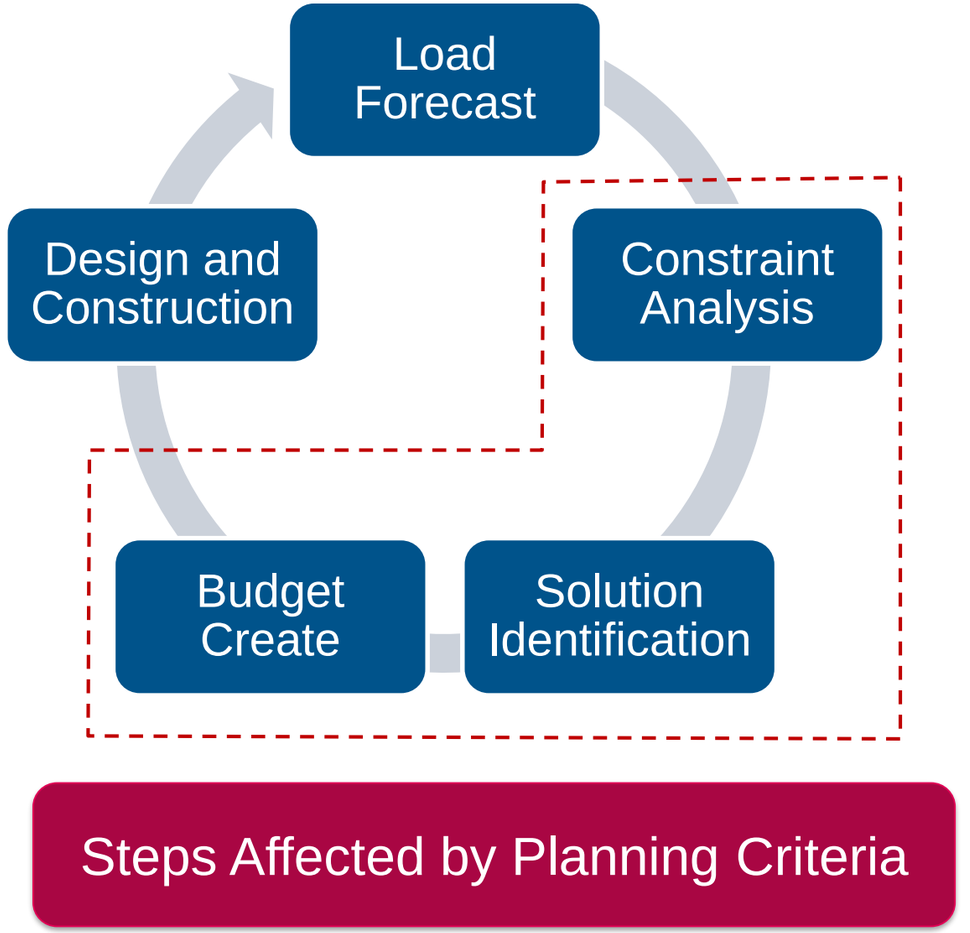
Tom Mimnagh is a Senior DER Project Advisor in ICF’s Energy Markets team. In this role he is responsible for supporting client objectives as the industry plans for increases in DER technologies. Tom has 33 years of experience in the Utility industry, the last five of which involved supporting Utility interface with New York’s REV proceeding. (thomas.mimnagh@icf.com)

Overview



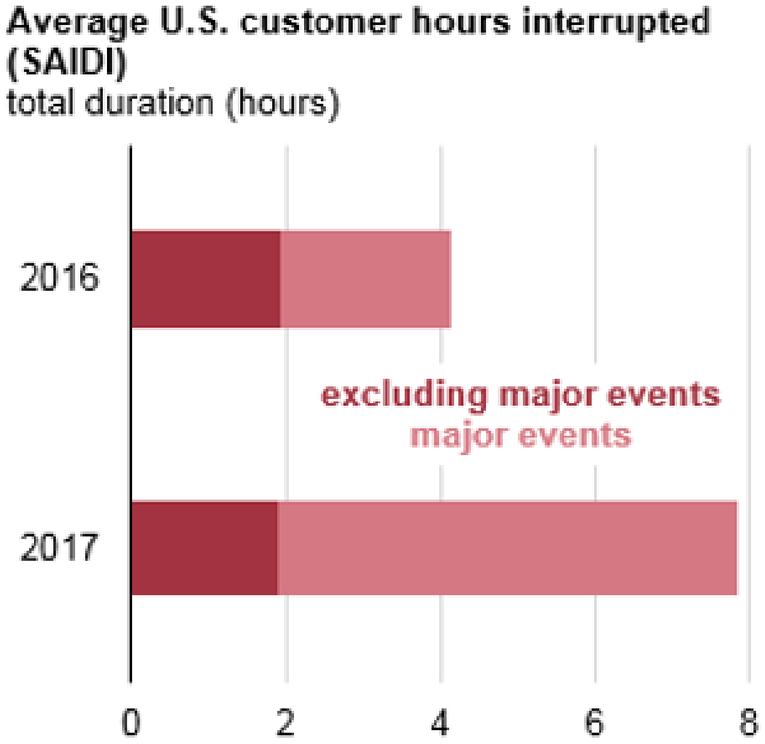
Distribution Planning Process

- **Cyclical Annual Process**
  - Incremental needs
- **Asset Management**
- **Design and Construction**
  - Distribution Projects: 1-2 years
  - Substation projects: 3-5 years



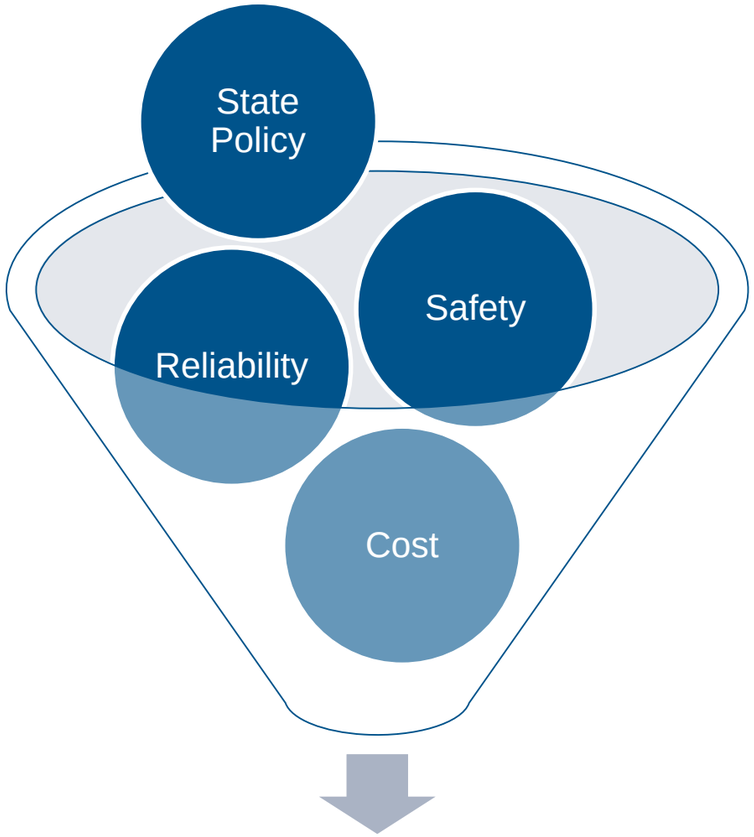
Distribution Planning Objectives

- Safety
- Reliability
- Cost
- State Policy



Source: EIA
https://www.eia.gov/todayinenergy/detail.php?id=37652

Translating Objectives into Criteria



Planning Criteria

Objectives: Goals for desirable system characteristics or attributes

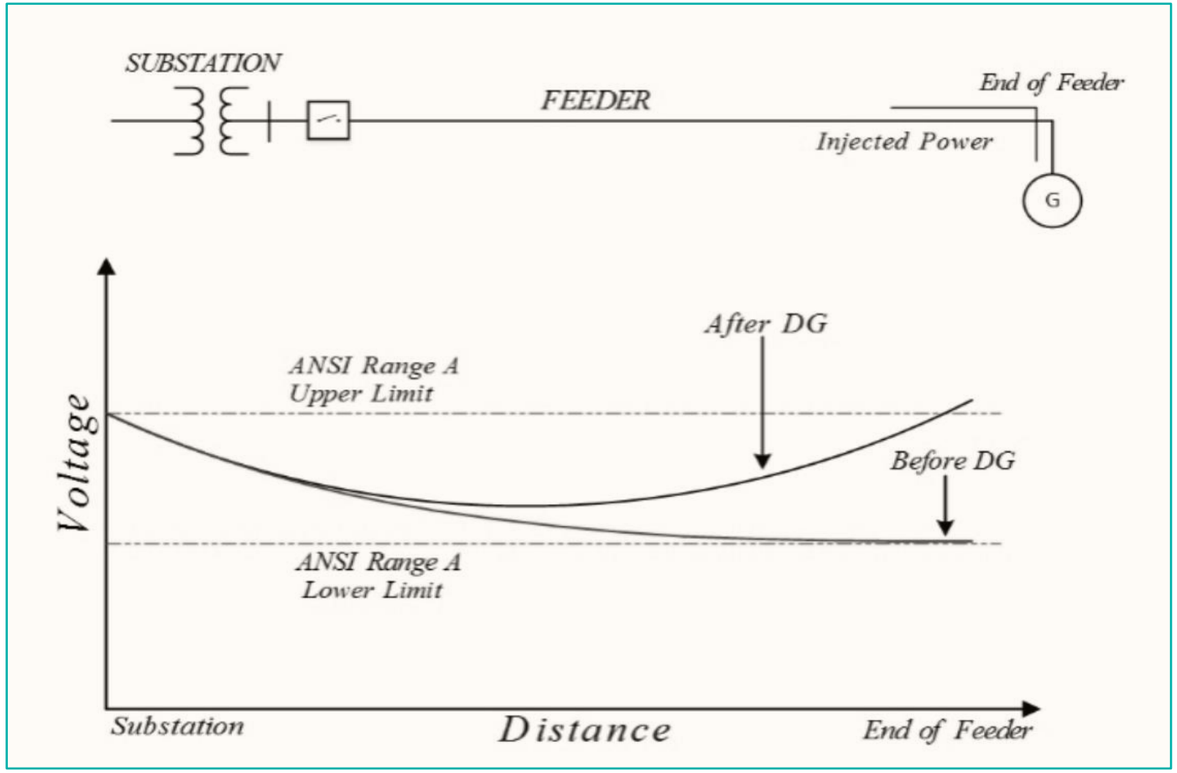
Criteria: Principles or standards by which system risks or solutions may be evaluated or prioritized

Safety Reliability

Distribution Planning Criteria

- **Electric Capacity**
  - Normal
  - Contingency
- **Voltage**
- **Reliability**

Illustration of Voltage Criteria



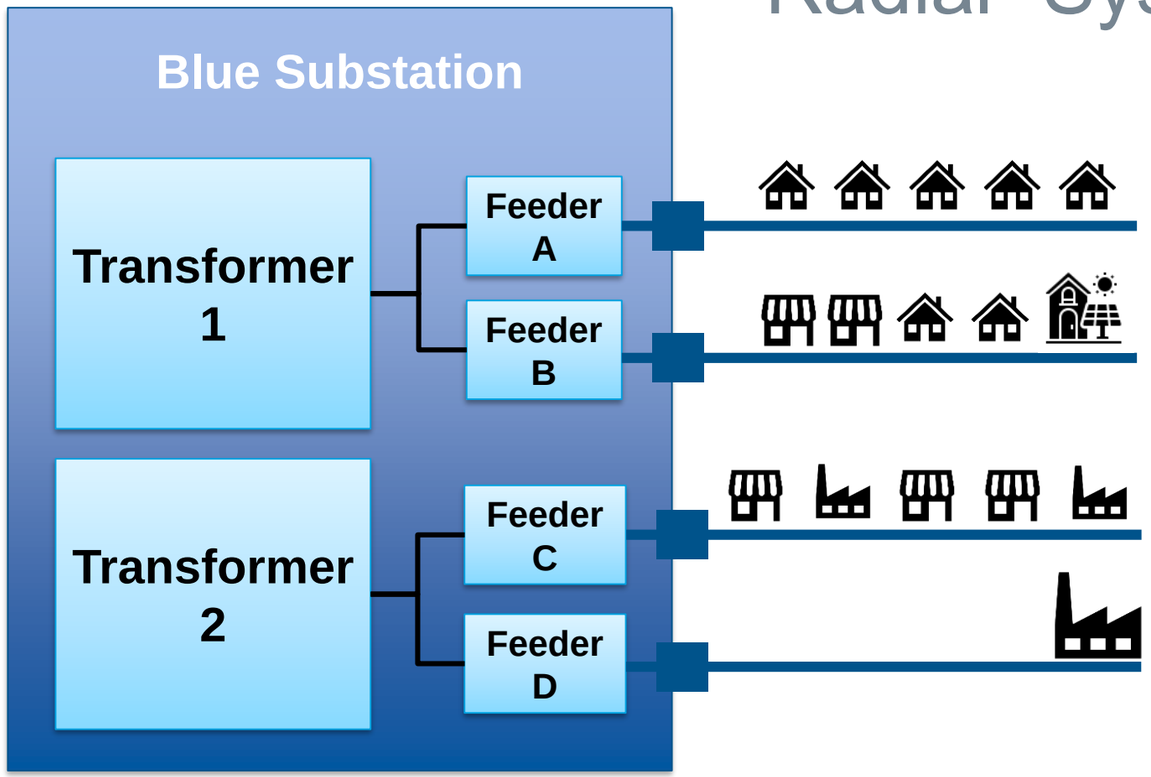
Sahito, Anwar & Memon, Zubair & Buriro, Ghulam & Memon, Sarwan & Jumani, Muhammad. (2016). Voltage Profile Improvement of Radial Feeder through Distributed Generation. SINDH UNIVERSITY RESEARCH JOURNAL (SCIENCE SERIES). 48. 497-500.

Planning for Electric Capacity

Normal Operations

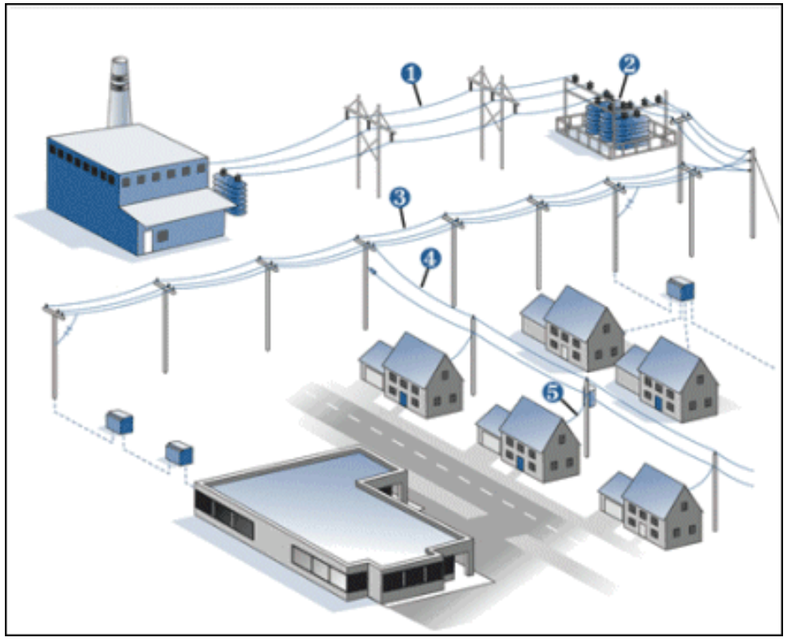
Safety Reliability

“Radial” System



Residential (~500 – 1,500 customers)

Commercial and Industrial



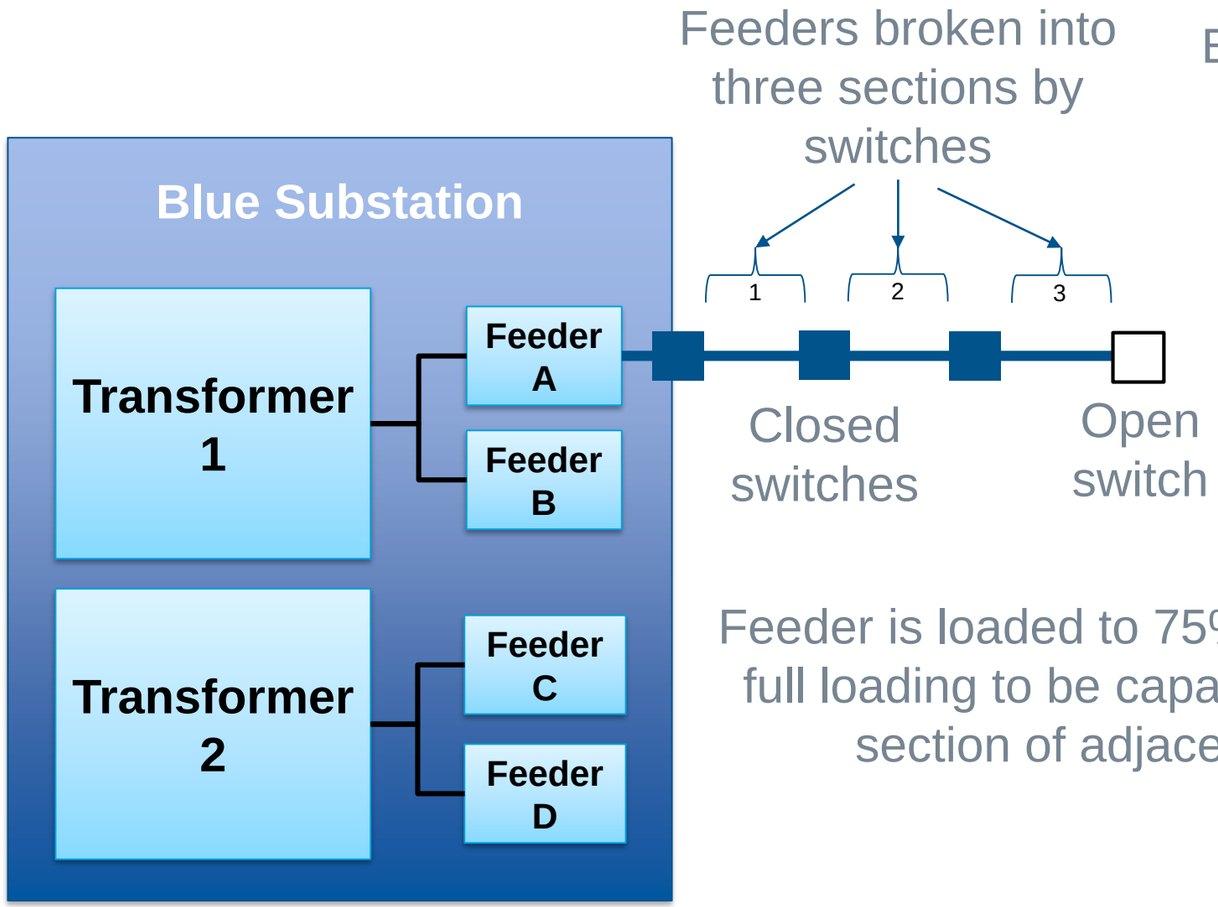
Credit: Ameren
https://www2.ameren.com/common/DistributionSystem.aspx

DER is analyzed for system normal configuration

Planning for Capacity

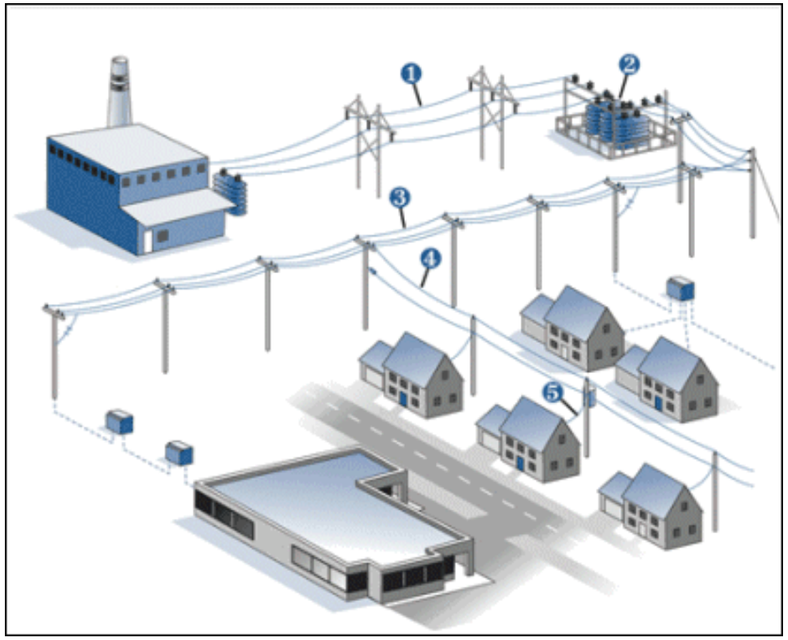
System Flexibility

Safety Reliability



Each section carries 25% of feeder capacity

Feeder is loaded to 75% of capacity at full loading to be capable of carrying section of adjacent feeder

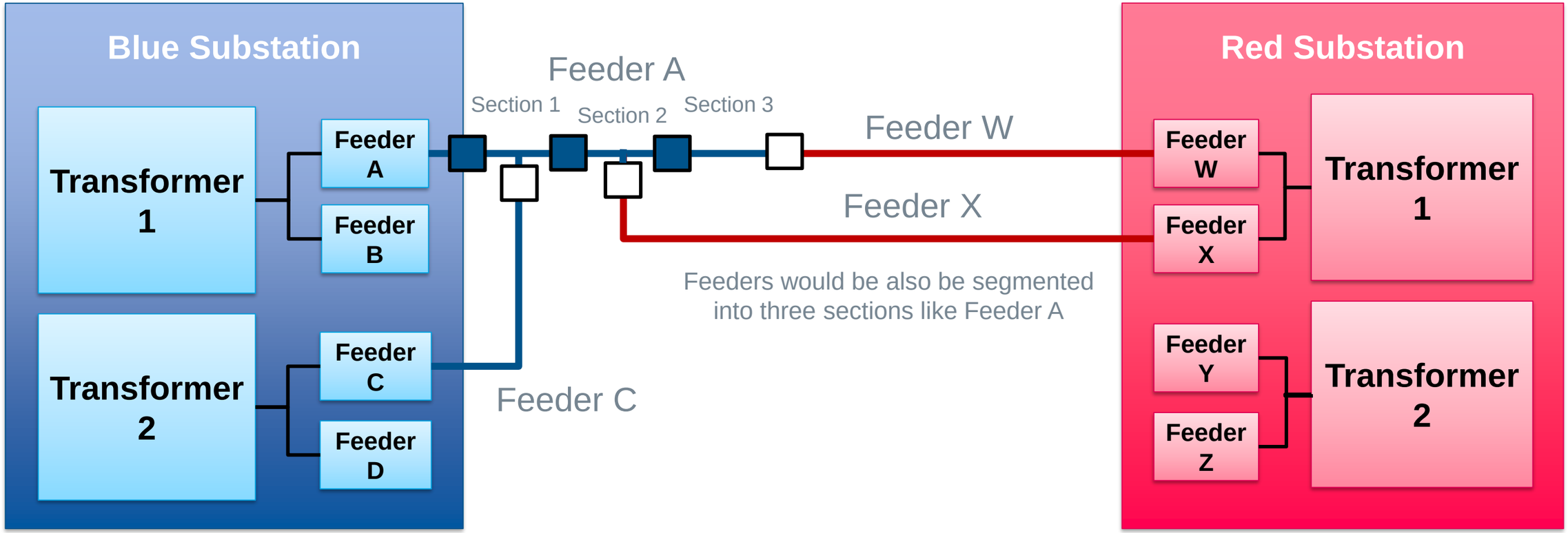


Credit: Ameren
https://www2.ameren.com/common/DistributionSystem.aspx

Planning for Capacity

Contingency Operations

Safety Reliability

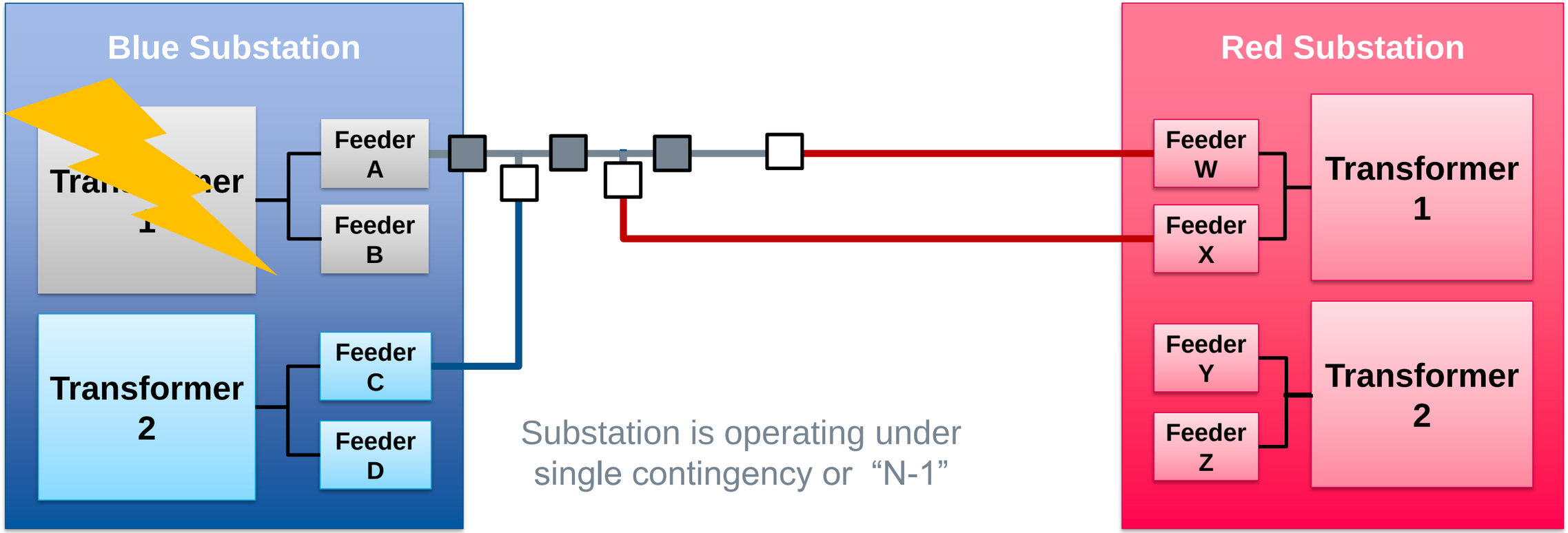


DER may not be studied for abnormal or contingency configurations

Contingency Capacity Criteria

Safety Reliability

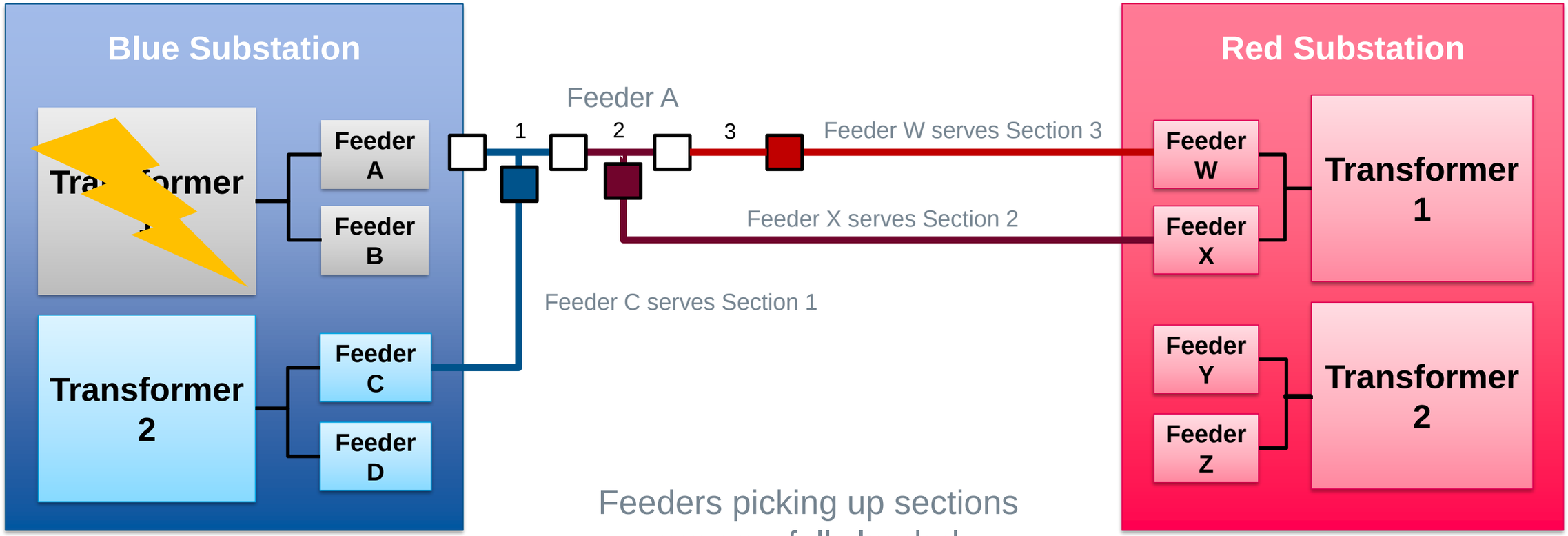
Example: Substation Transformer Outage



Substation is operating under single contingency or "N-1"

Contingency Capacity

Safety Reliability

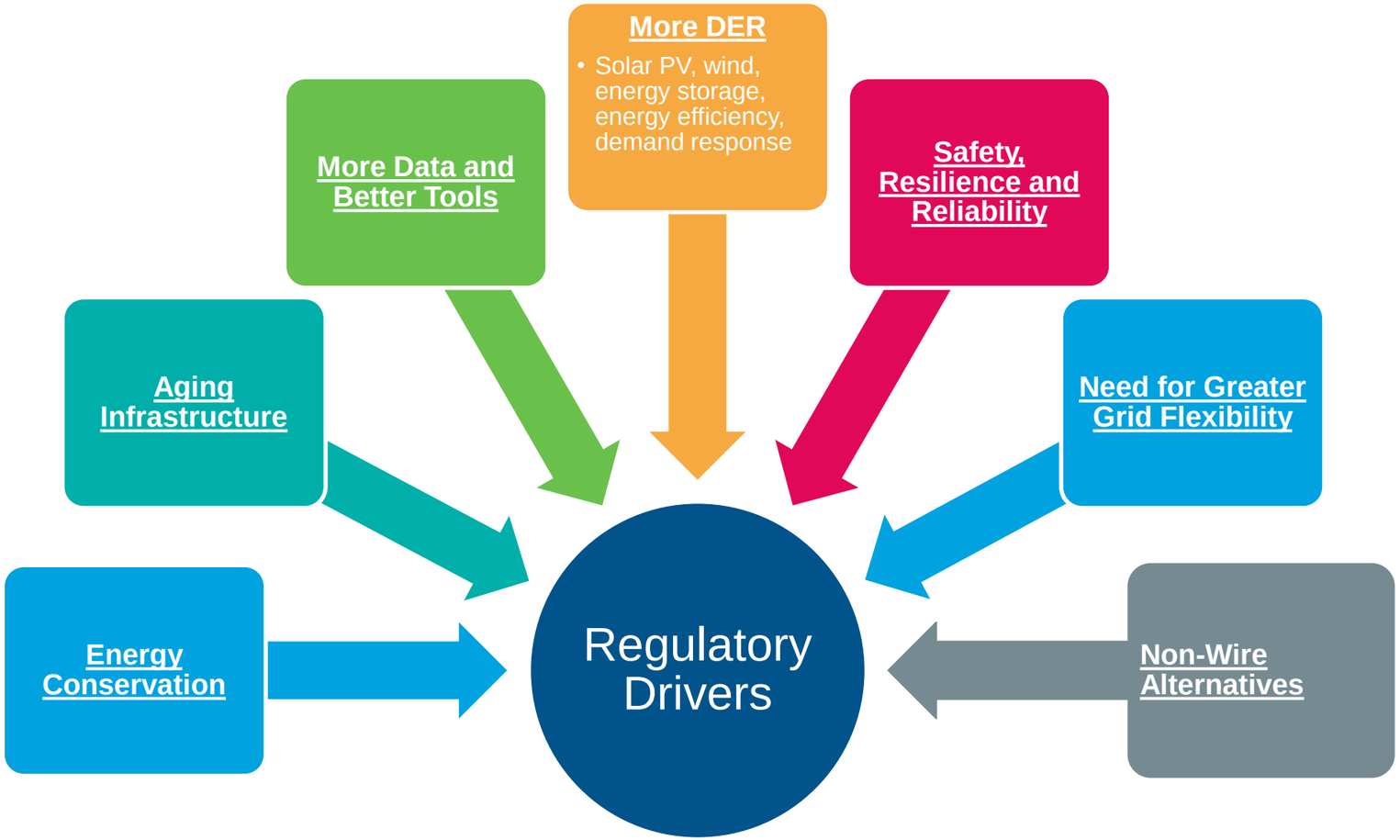


Feeders picking up sections are now fully loaded

Each feeder was previously at 75% and a 25% section of *Feeder A* was added

State policy goals driving changes to distribution planning criteria

Policy Goals



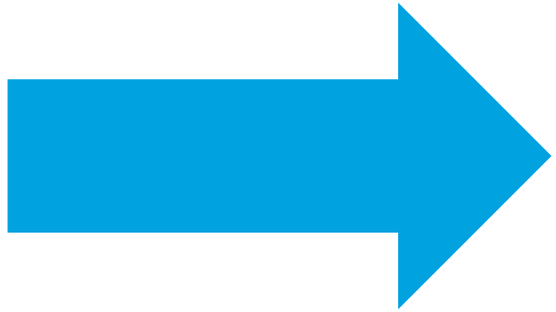
Policy Goals

Evolving Objectives and Criteria

Traditional Planning Considerations

Objectives:
- Safety
- Reliability
- Cost
- Policy

Criteria:
- Electric Capacity
- Voltage
- Reliability



Emerging Needs

- System Efficiency
- DER Integration
- Resilience
- Security
- Flexibility

?

Capacity Planning

Process to plan for adequate system capacity under normal and contingency operations

- **Capacity Planning** is typically an annual process to address load growth or movement of load around the system
- System analyzed for normal and contingency conditions
- Solutions identified and proposed to address constraints

Asset Health

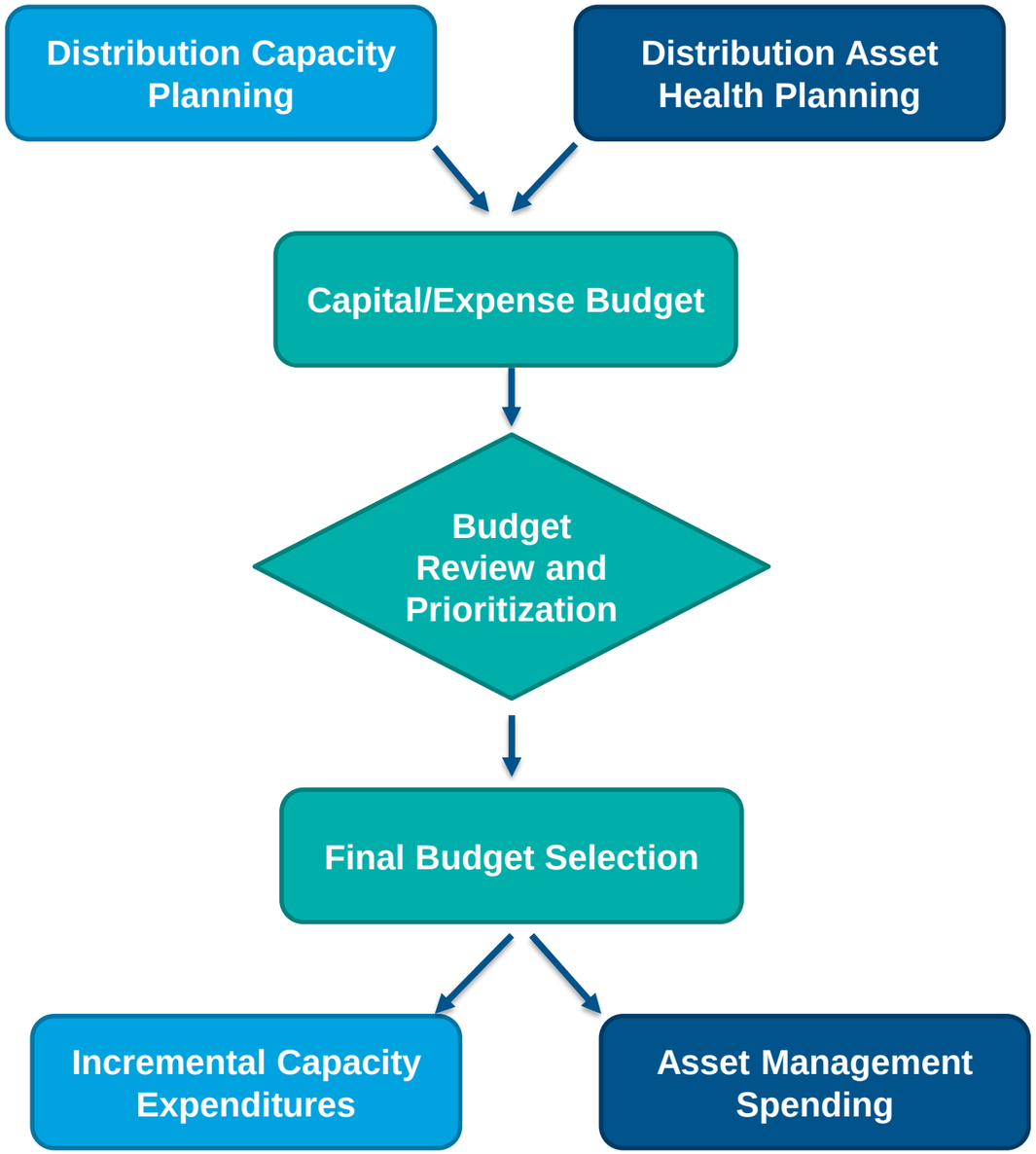
Programs to plan the replacement of aging assets

- **Asset health** programs contribute to system reliability and the customer experience
- Different approaches to asset health
  - Corrective Maintenance – replacing failed assets
  - Preventative Maintenance – replacing assets prior to failure
  - Reliability-Centered Maintenance – replace assets based on historic reliability records
  - Condition-based Predictive Maintenance – proactive and situational based

Distribution Budget

Two Main Components:

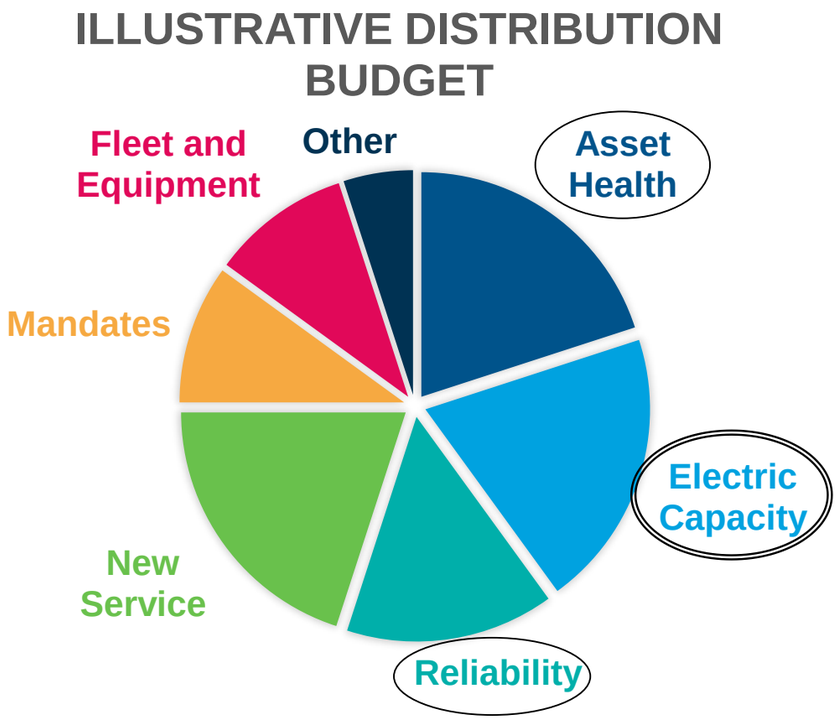
- **Capacity Planning**
- **Asset Health**



Cost

Distribution Budget for Capacity

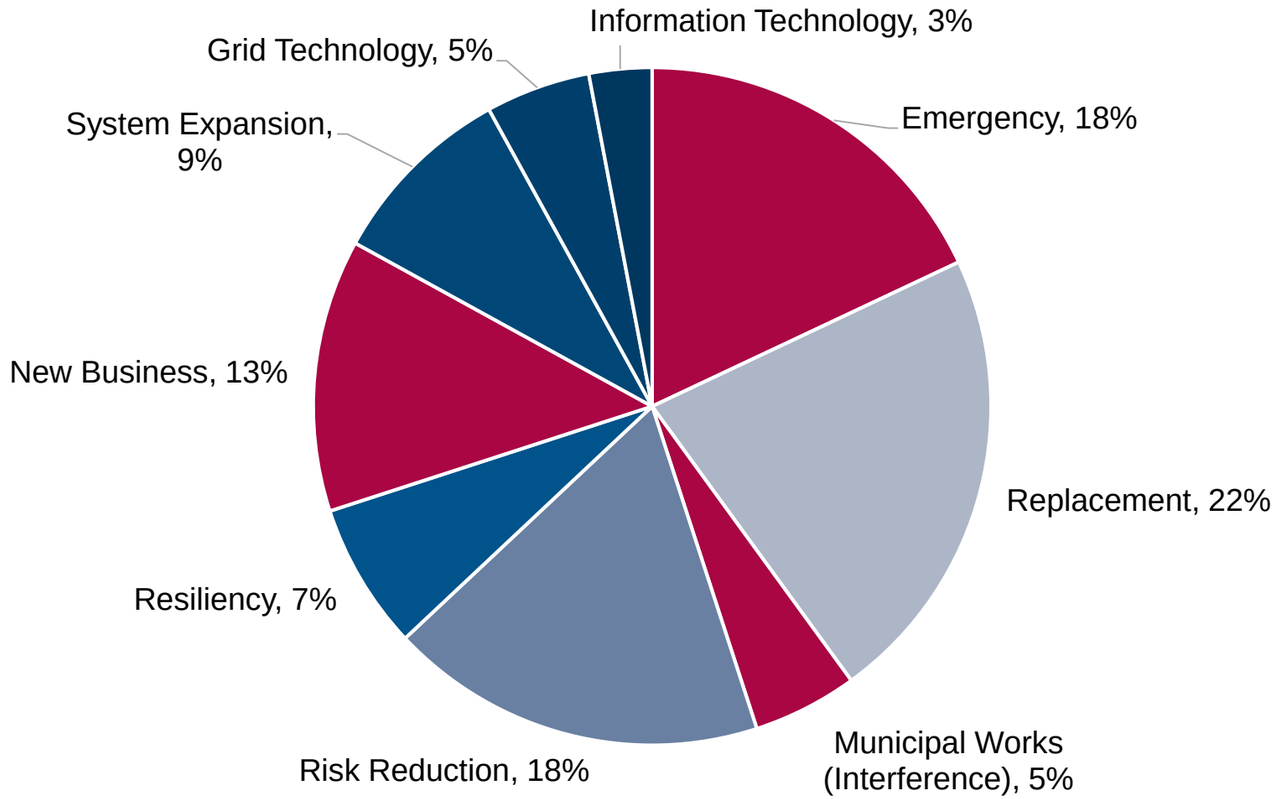
- **Traditional Planning Criteria Targets *Electric Capacity* which drives Capital Investment**
- **Spending Indirectly Effected by Planning Criteria**
  - Asset Health
  - Reliability
- **Some Budget Aspects Not Related to Criteria**



Utility Investments – Capital Budget

Cost

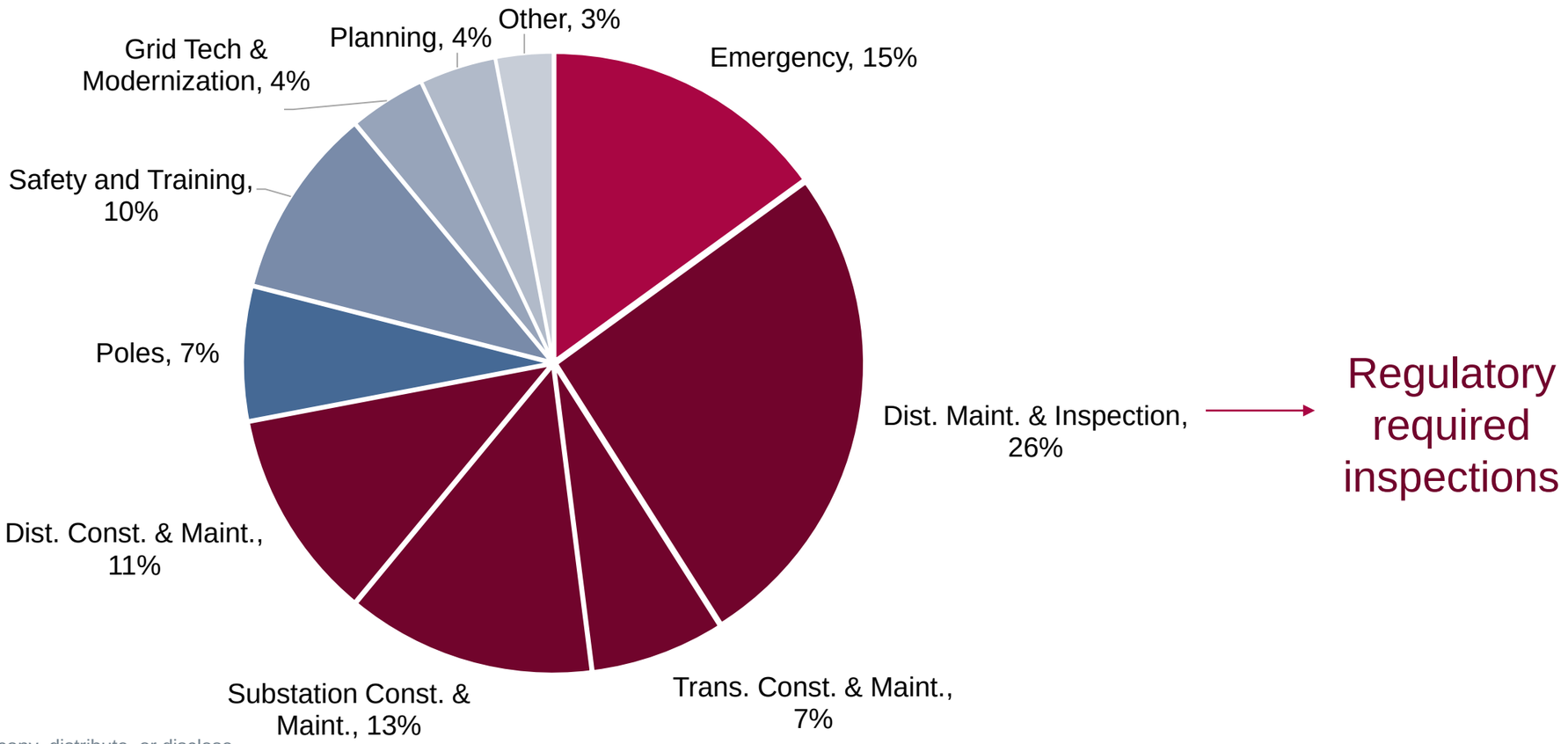
- **Distribution Planning is a key component of the utility budget and many aspects are influenced by discretionary and non-discretionary investments and costs. These are evident through both Capital and Operations & Maintenance budgets.**



Utility Investments - O&M

Cost

- Elements of discretionary and **non-discretionary investments** and costs
- Much of the required programs in support of these categories are often mandates in rate cases, driven by the need to maintain safety, reliability, and resilience.



Cost-Effectiveness

Cost

- Utilities have presented various methods to document the cost effectiveness of their proposed investments in Rate Case submittals
- The U.S. DOE-DSPx Decision Guide (Volume III) outlines cost-effectiveness methods and their application by category of grid expenditure
- There are three (3) main types of methodologies used to evaluate grid expenditures

Methodology	Grid Expenditure Category
Least-cost, best-fit	• Investments required to meet specifications and standards to maintain safety and reliability
Benefit Cost Analysis	• Investments for energy efficiency or demand side management (DSM) programs, non-wires solutions, and/or DG tariffs • Other expenditures proposed to enable public policy or incremental societal benefits
Opt-in (no regulatory justification)	• Investments deliberately paid by customers to integrate their distributed resource

Q&A – 15 min

Thank you!

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