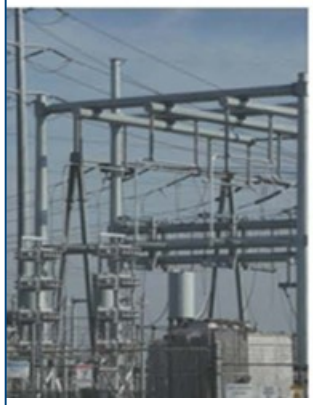
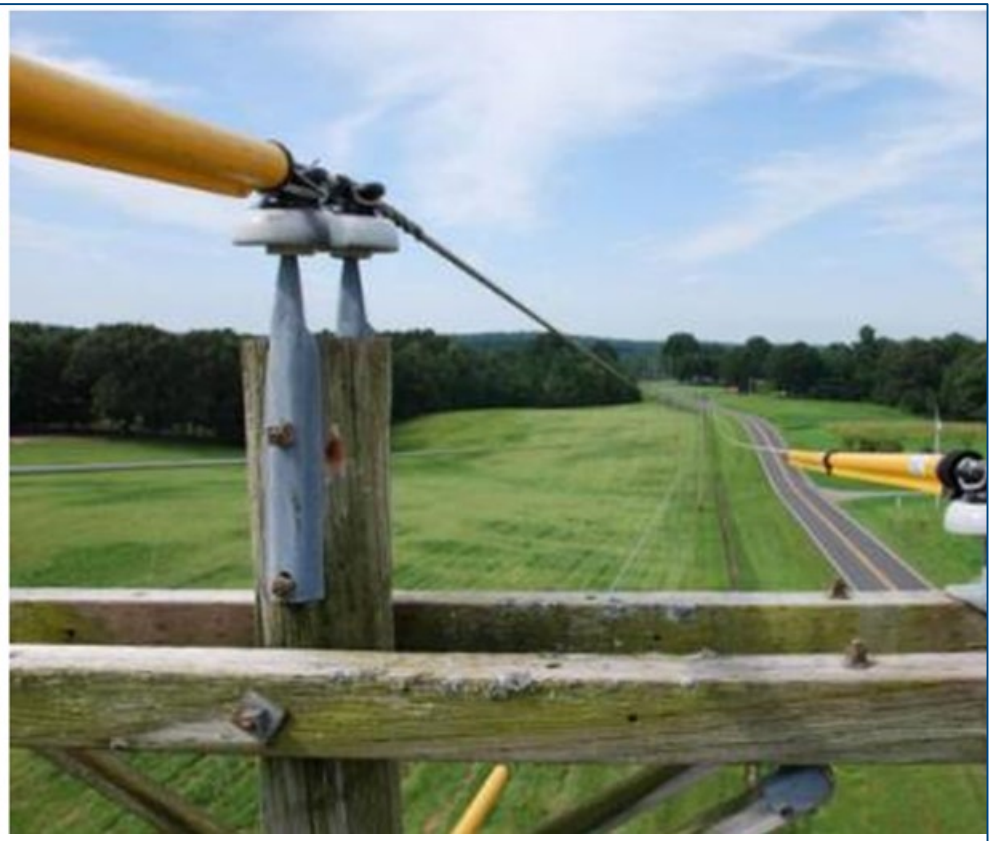
U.S. DEPARTMENT OF ENERGY

Office of Electricity





Integrated, Resilient Distribution Planning

Paul De Martini

Newport Consulting

Electricity Advisory Committee

May 29, 2020

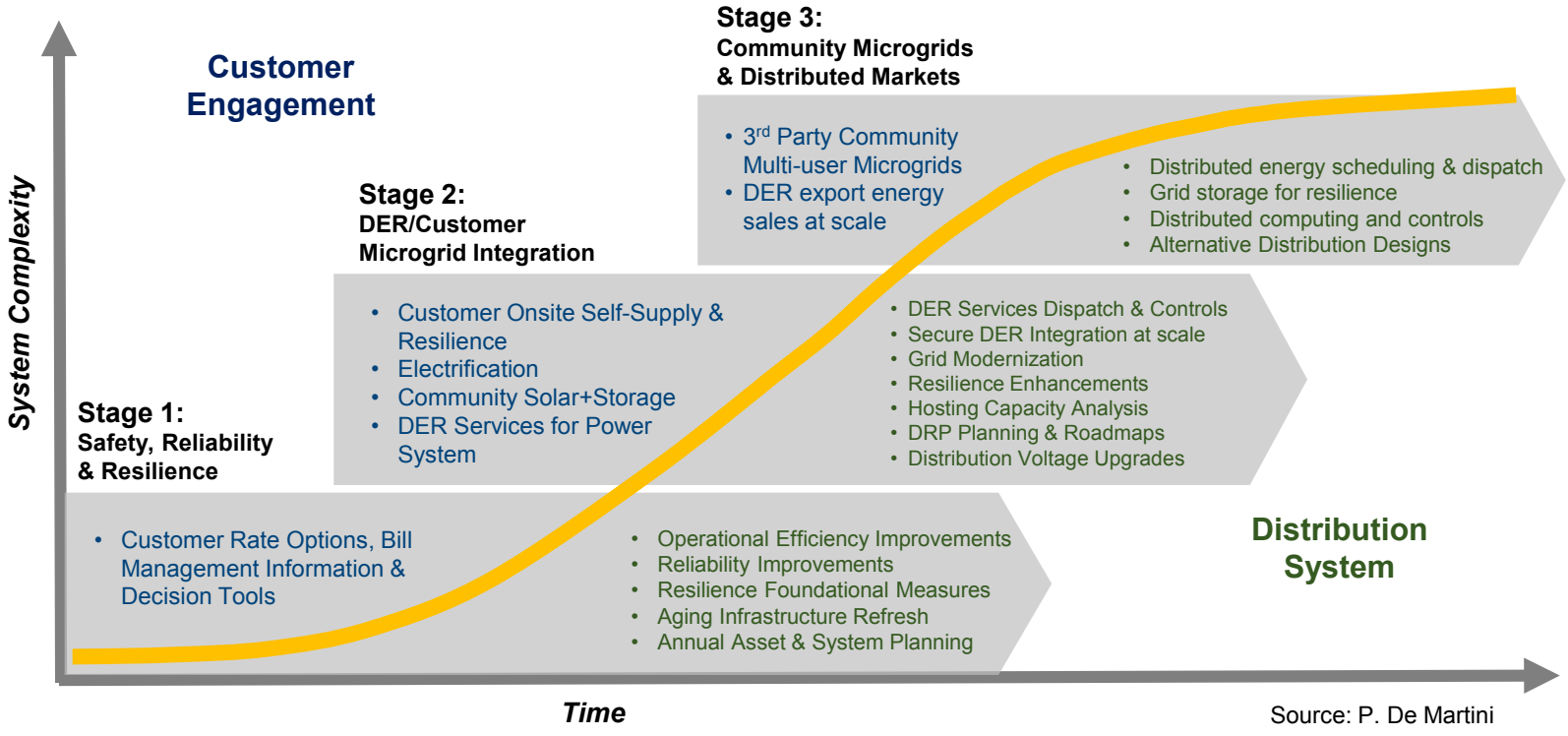
Distribution System Planning

- 3 principle aspects of modern distribution planning need to be integrated into a unified process
  - Resilience & Reliability
  - DER Integration & Utilization
  - Safety & Operational Efficiency

- Requires combining the grid needs identified from the 3 different planning analyses to assess overlapping needs
  - Resilience/Reliability Planning
  - Asset Planning
  - Grid Expansion/Modernization Planning

Addressing Complexity

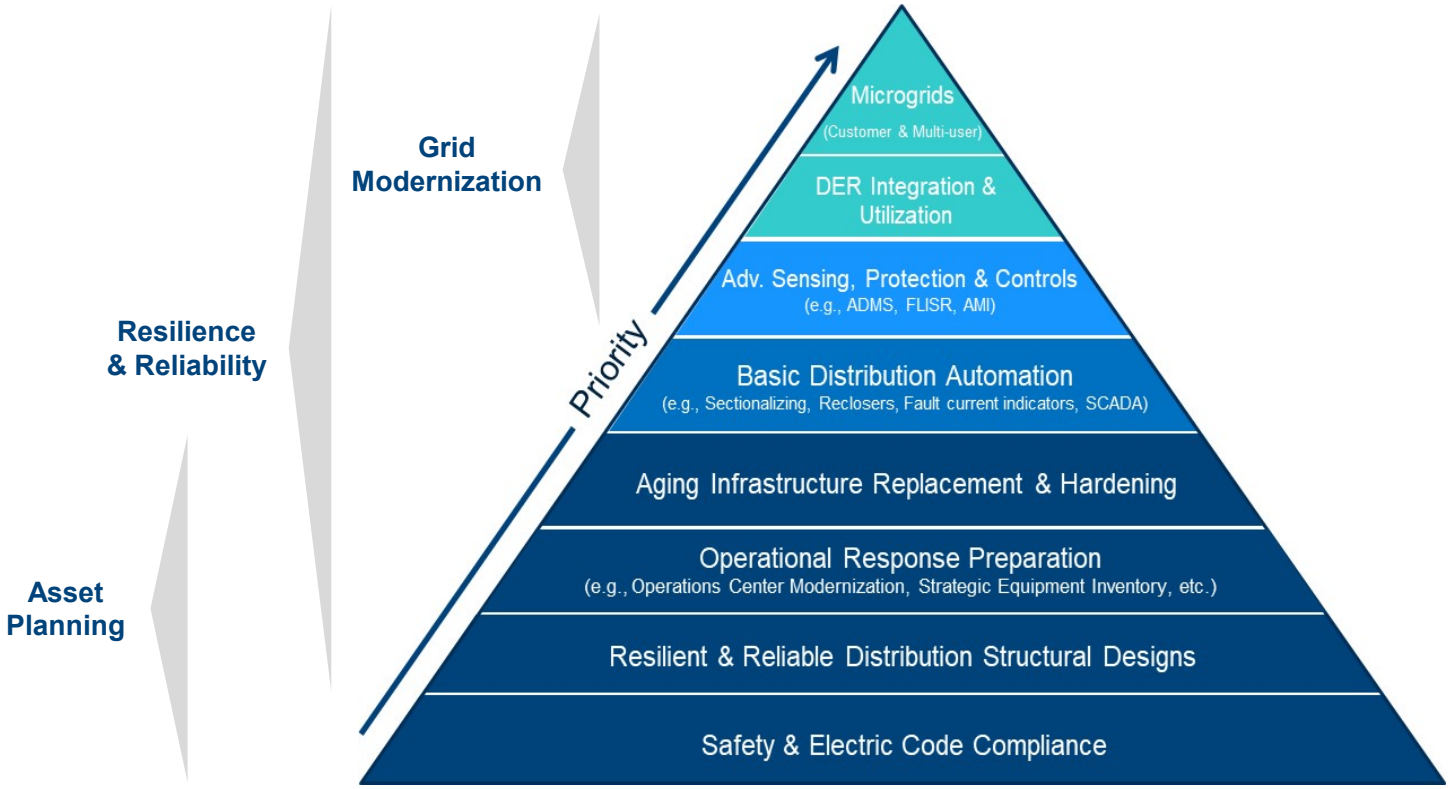
Increasing DER/microgrid development & utilization combined with reliability and resilience considerations drive infrastructure planning & operational requirements



Source: P. De Martini

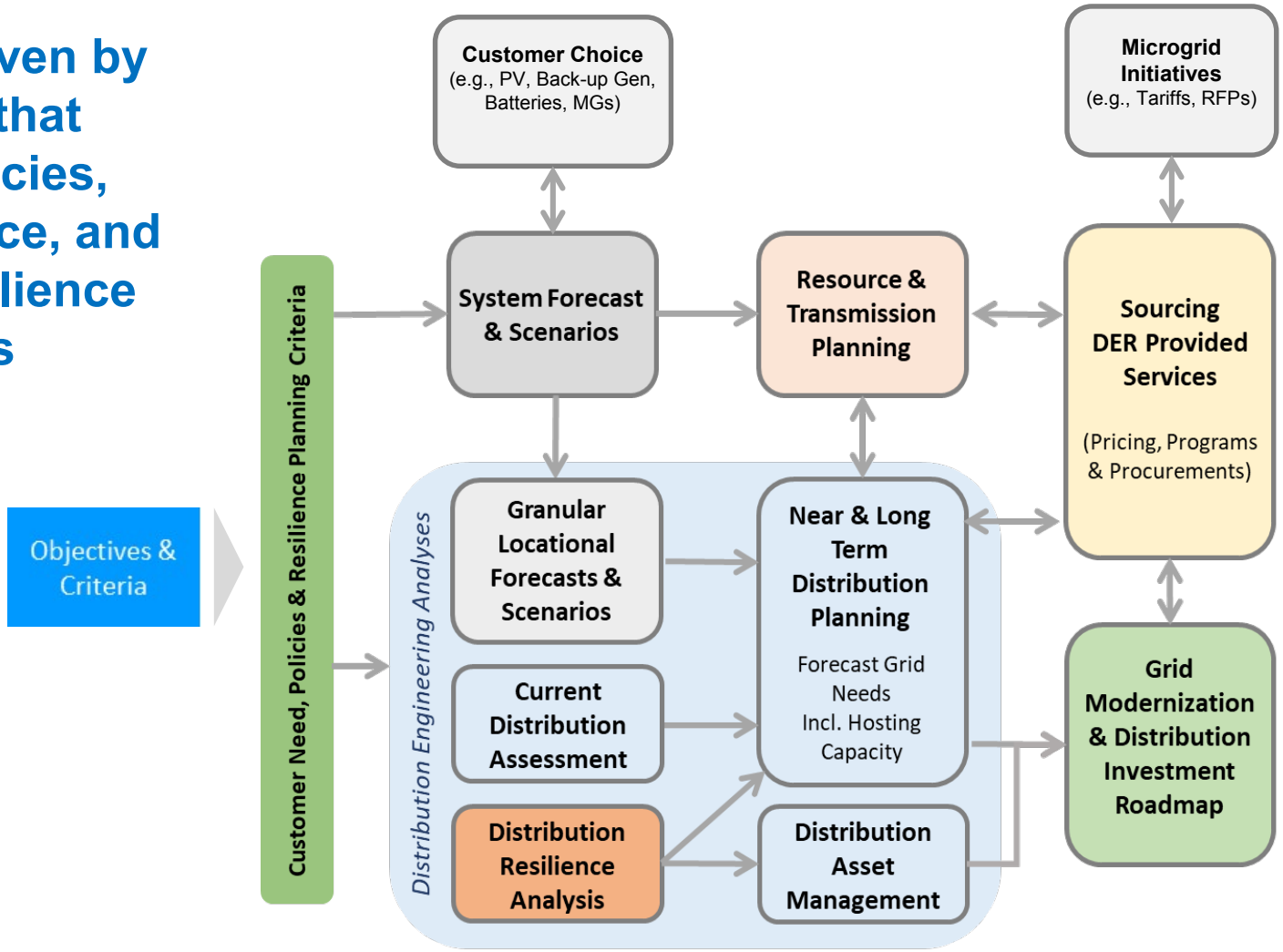
Investment Hierarchy

Foundational investments are needed to support more advanced applications



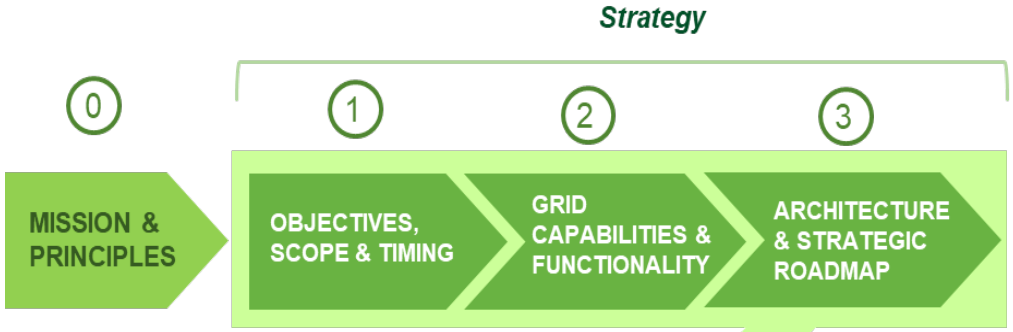
Integrated Distribution System Planning

Process is driven by objectives that address policies, customer choice, and reliability/resilience priorities

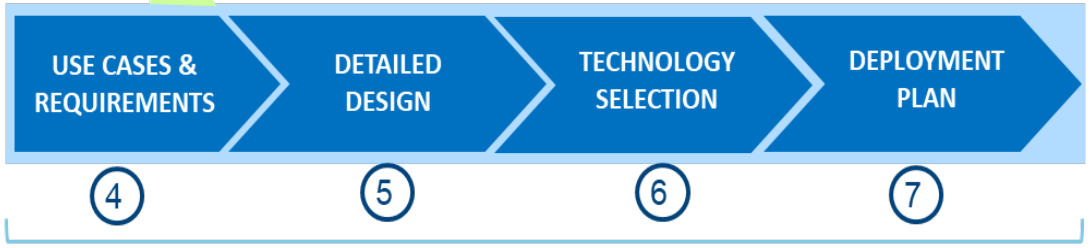


Grid Mod Strategy & Implementation Process

Grid modernization strategy and implementation planning is part of a more comprehensive, integrated planning process



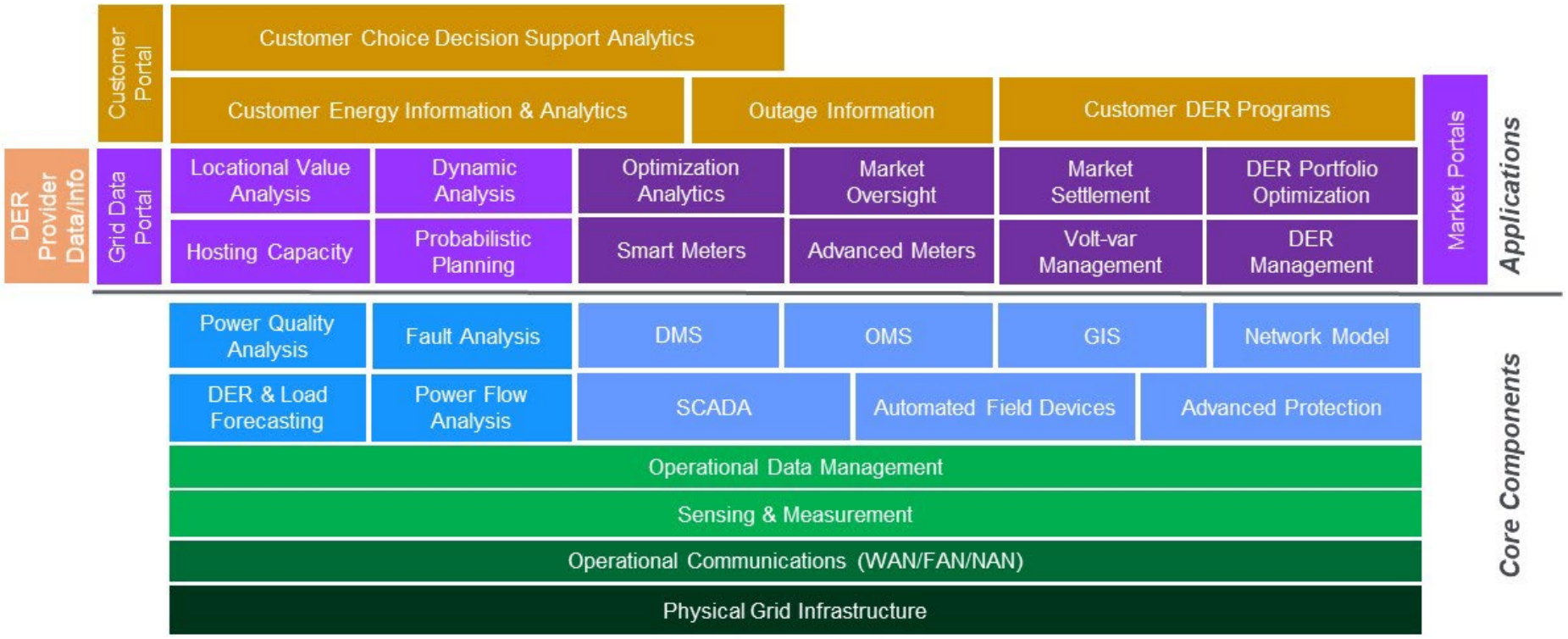
1. Identify Grid Mod Objectives, Scope & Timing
2. Identify Grid Capabilities & Functionality Needed
3. Identify Grid Architecture & Develop Strategic Roadmap



4. Develop Functional Use Cases to Identify Detailed Business & Technical Requirements
5. Develop Detailed Architecture & Design
6. Technology Assessment & Selection
7. Develop Deployment Plan & Cost Effectiveness Assessment

Distribution System Platform

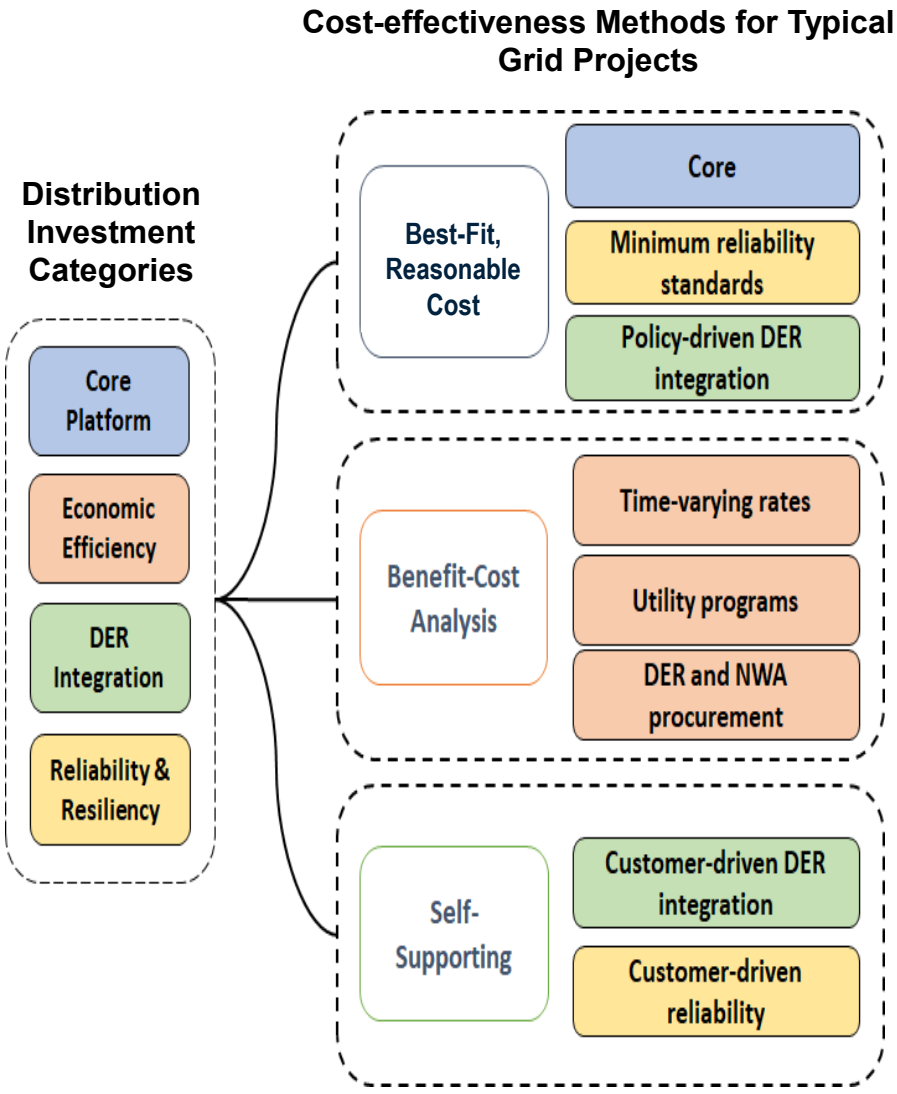
Logical layering of core components that enable specific applications



Green - Core Cyber-physical layer
Blue - Core Planning & Operational systems
Purple - Applications for Planning, Grid & Market Operations
Gold - Applications for Customer Engagement with Grid Technologies
Orange - DER Provider Application

Source: U.S. Department of Energy-Office of Electricity Delivery and Energy Reliability, 2017. *Modern Distribution Grid, Volume III: Decision Guide*.

Distribution Cost-Effectiveness Framework



Best-Fit, Reasonable Cost for core grid platform and grid expenditures required to maintain or reliable operations as well as integrate distributed resources connected behind and in front of the customer meter that may be socialized across all customers.

Benefit-Cost Analysis for grid expenditures proposed to enable public policy and/or incremental system and societal benefits to be paid by all customers. Grid expenditures are the cost to implement the rate, program or NWA. Various methods for BCA may be used.

Customer Self-supporting costs for projects that only benefit a single or self-selected number of customers and do not require regulatory benefit-cost justification. For example, DER interconnection costs not socialized to all customers. Also, undergrounding wires at customers' request.

Assessing Threats

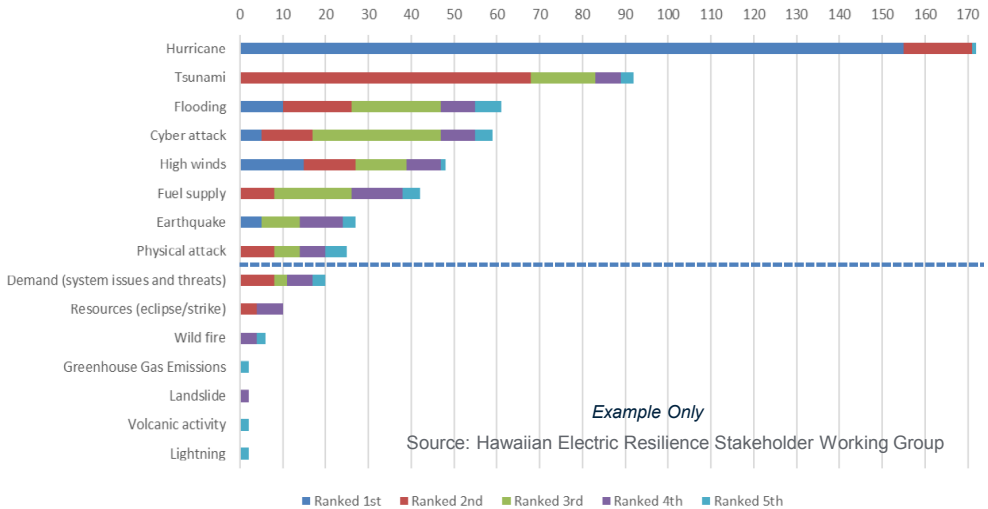
No single set of distribution resilience planning criteria

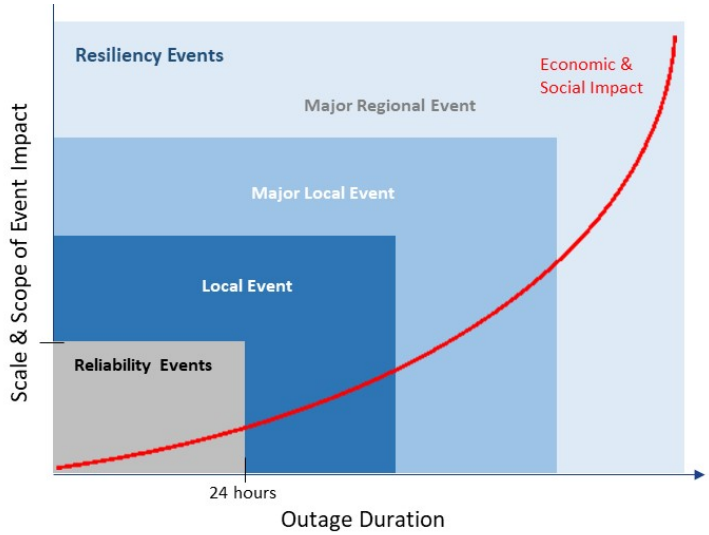
Threat based risk assessments are integral to understanding the potentia impact of various physical and cyber threats

Distribution resilience events involve various potential scales and scopes based on different events

- Scale and scope of potential events inform structural considerations and functional requirements
- Scale and scope shape the economic impact and related value of solutions

Need to also unpack distribution resilience to gain insights into the nature of grid failures and potential structural/design options





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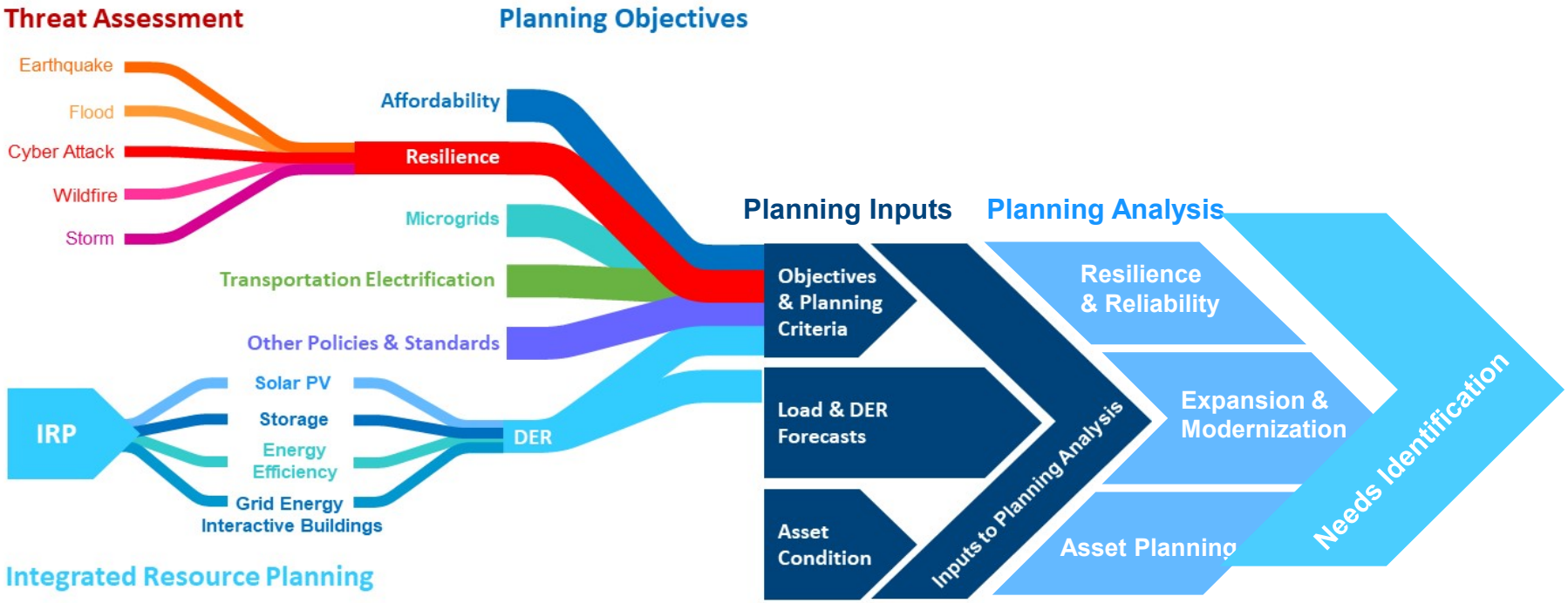
DSP Planning Inputs

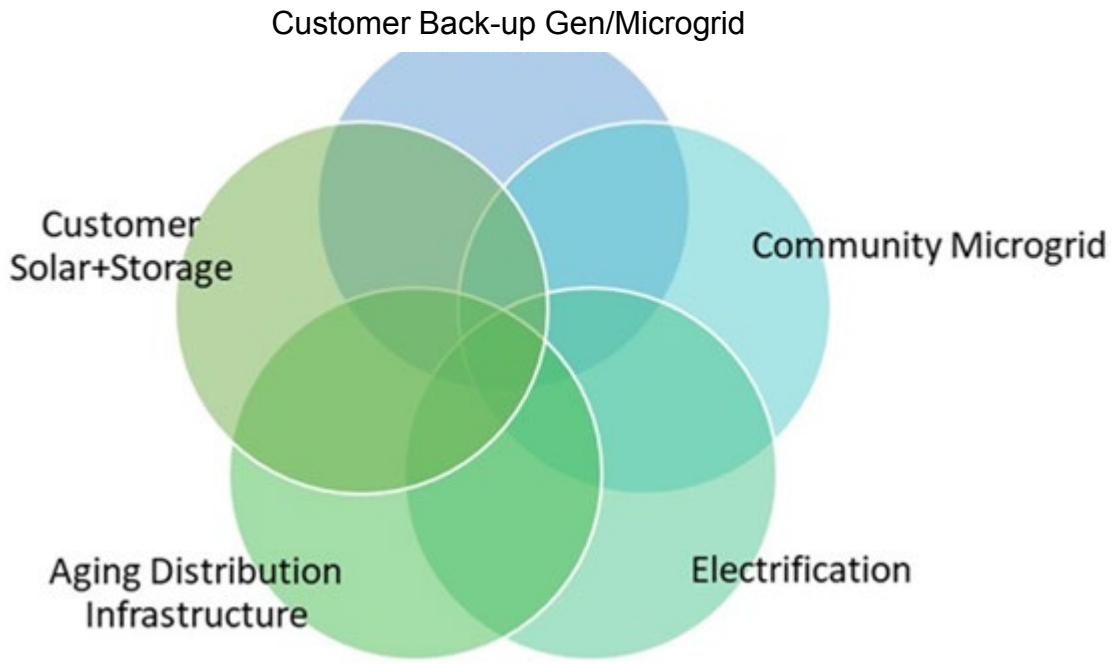
Methods are needed to a) translate threat-based risk assessment with prioritization into planning objectives and criteria and b) coordinate planning between IRP and DSP



Resilience Threat Assessment and IRP inform Objectives/Criteria & Forecasts

Multi-Objective Distribution Planning

Integrate the planning "criteria" and needs for each of the relevant objectives



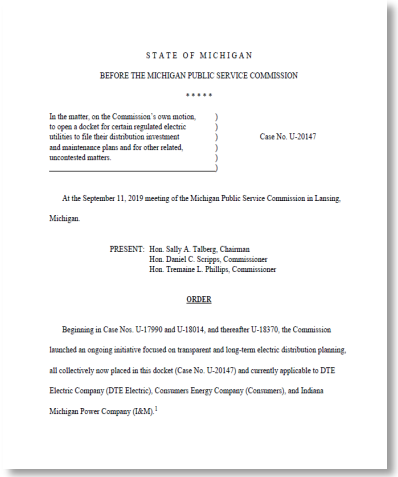
Future grid designs should address multiple criteria

Thank You

Contact: Paul De Martini, paul@newportcg.com

References:

Michigan PSC
2019 IDP Order



STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

*****

In the matter, on the Commission's own motion, to open a docket for certain regulated electric utilities to file their distribution investment and maintenance plans and for other related, uncontested matters.

Case No. U-20147

At the September 11, 2019 meeting of the Michigan Public Service Commission in Lansing, Michigan.

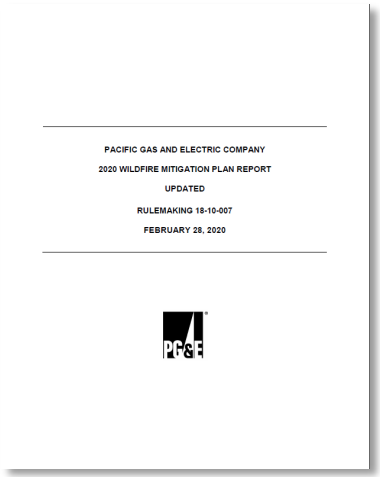
PRESENT: Hon. Sally A. Talberg, Chairman
Hon. Daniel C. Scripps, Commissioner
Hon. Tremaine L. Phillips, Commissioner

ORDER

Beginning in Case Nos. U-17990 and U-18014, and thereafter U-18370, the Commission launched an ongoing initiative focused on transparent and long-term electric distribution planning, all collectively now placed in this docket (Case No. U-20147) and currently applicable to DTE Electric Company (DTE Electric), Consumers Energy Company (Consumers), and Indiana Michigan Power Company (I&M).[1]

https://mi-psc.force.com/sfc/servlet.shepherd/version/download/068t0000005XvREAA0

PG&E Wildfire
Mitigation Plan 2020



PACIFIC GAS AND ELECTRIC COMPANY

2020 WILDFIRE MITIGATION PLAN REPORT

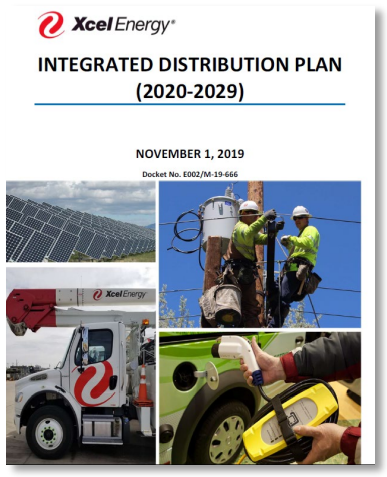
UPDATED

RULEMAKING 18-10-007

FEBRUARY 28, 2020

https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/wildfire-mitigation-plan/2020-Wildfire-Safety-Plan.pdf

Xcel Energy
2019 IDP



Xcel Energy

INTEGRATED DISTRIBUTION PLAN
(2020-2029)

NOVEMBER 1, 2019

Docket No. E002/M-19-666

https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/IntegratedDistributionPlan.pdf

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Hawaiian Electric
Maui Electric
Hawai'i Electric Light

https://www.hawaiianelectric.com/clean-energy-hawaii/integrated-grid-planning/stakeholder-engagement/working-groups/resilience-documents