NextGrid Illinois

DISTRIBUTION PLANNING

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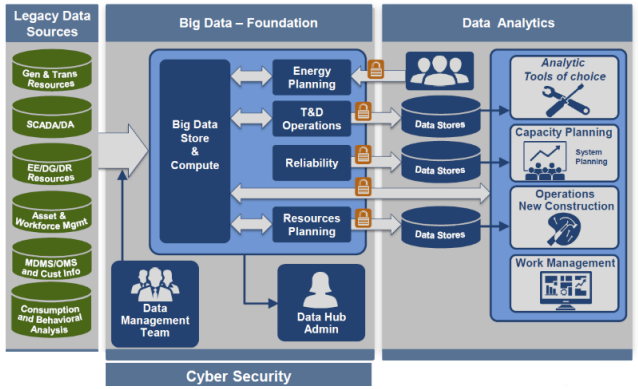
DISTRIBUTION PLANNING AT COMED

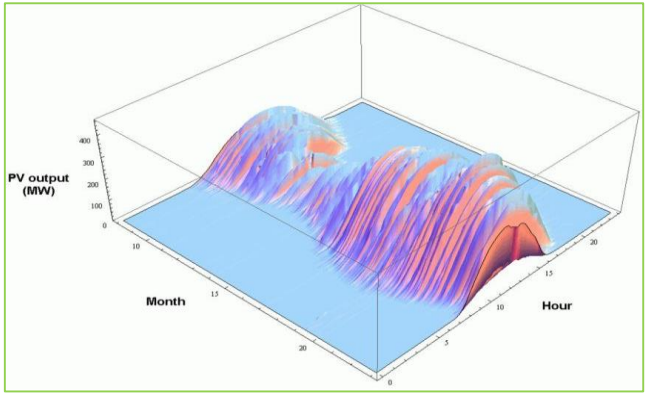
What do we plan for?	▪ Load that may result from once in 10-year weather conditions ▪ Planners review forecasts results to identify issues and assess solutions, including alternatives ▪ Criteria include 105% loading on the feeder and 100% terminal loading
How long do we plan for?	▪ There are several planning cycles: 2-year, 5-year, 20-year, emergent planning
What are forecasts based on?	▪ Combination of known load forecast, new load projections and scan for any new data ▪ Data include Weather adjusted historical values, projected load growth based on economic activity, residential construction and customer service requests in the area ▪ Contracted capacity reserve obligations
How complex is our system?	▪ Over 5,000 feeders / lines (4kV, 12kV and 34kV), supply over 800 substations, supplied by 12, 34, 69, and 138kV level radial circuits and/or networks ▪ Several views of the system: all components or substation level
Potential actions	▪ Actions include phase balancing, power factor correction needs and voltage review, etc.

CHANGES IN DISTRIBUTION PLANNING

- The changing resource mix, increased connectivity are changing the construct of distribution systems, also impacting the distribution planning process.
- Some of the changes distribution planning include:
  - Planning for bi-directional distribution grid
  - Accommodation of new and more granular data to the planning process (e.g. solar irradiance, electric vehicle charging patterns, demand response)
  - Planning evolving to consider multiple scenarios
  - Analysis methods evolving from peak focused to time-series based
  - Tools adapting from steady-state to consider dynamic behavior
  - Moving from accommodating Distributed Energy Resources (DERs) to integrating DERs
  - Becoming even more integral part of operations
  - Planning across both transmission and distribution domains



Source: http://www.ieee-pes.org/presentations/gm2014/14_02176_IEEE_PES_Final.pdf



Seasonal and Daily Variation of PV DG output

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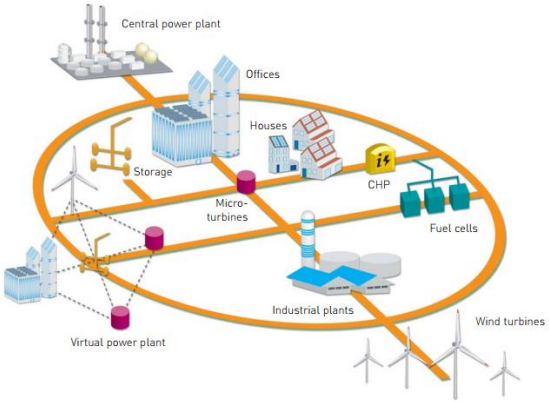
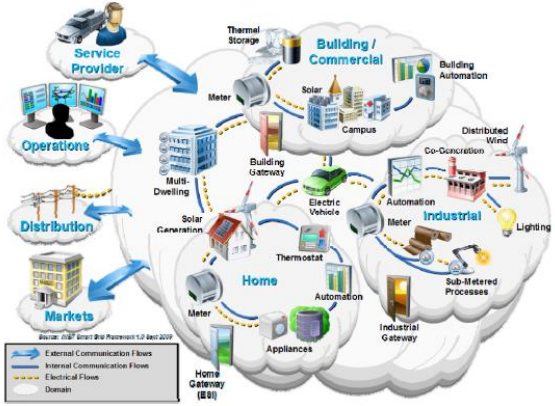
FUTURE DISTRIBUTION SYSTEMS

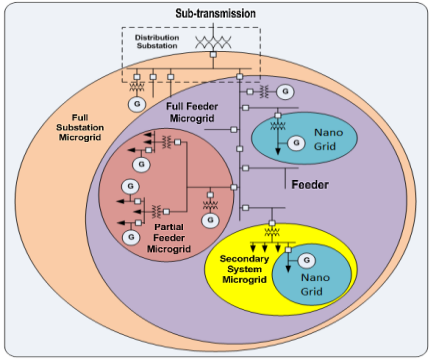
- Changing grid construct will add further complexity to the existing distribution planning process.
- Several potential future realizations however all share common characteristics (distributed, reliable/resilient, efficient, connected, customized etc.)
- Planning processes of the future will adapt to accommodate/integrate the characteristics of the future distribution grids.



Source: European Smart Grids Technology Platform



Source: NIST



Source: Department of Energy

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