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Clerk's Office
N.C. Utilities Commission



**Integrated System & Operations Planning (ISOP)
North Carolina Utilities Commission Technical Conference**

August 28, 2019

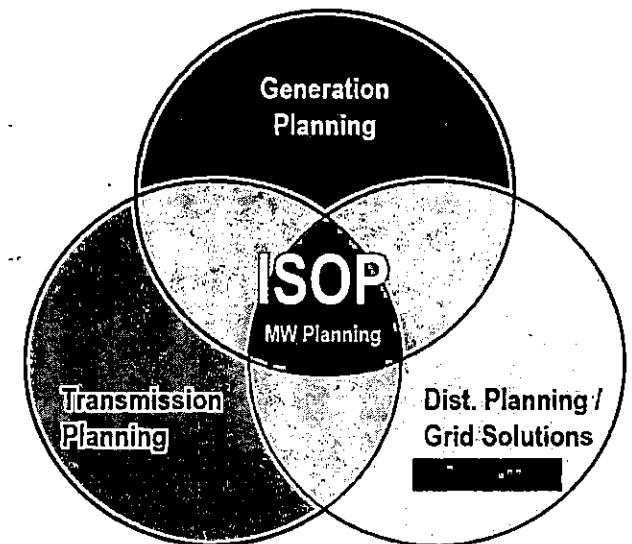
Opening Comments

- We recognize that there is interest from the Commission, customer groups, and other interested parties in learning more about Duke's vision for Integrated System & Operations Planning (ISOP).
- We believe that some form of stakeholder process could be helpful in several ways:
 - To improve understanding of future planning challenges, available tools, and gap areas to address.
 - To gather constructive input from stakeholders to shape and build credibility for our overall process.
- Duke has been proactively reaching out to stakeholder groups to gather input on what the stakeholder process should look like.
- We welcome feedback on format and approach for a potential Stakeholder Engagement process.
- It will be important to include a broad range of stakeholders representing both North Carolina and South Carolina to ensure balanced outcomes for both states.

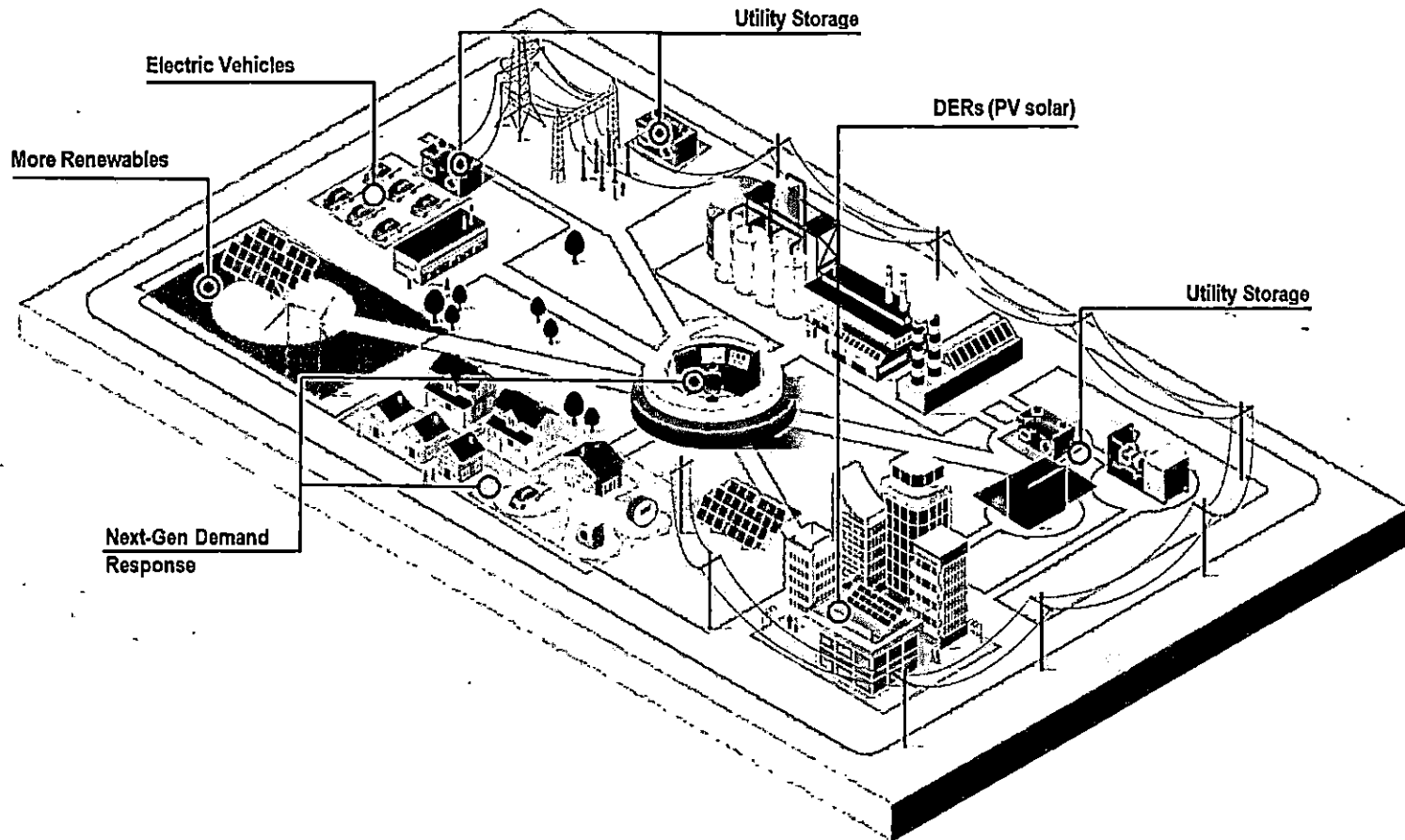
What is ISOP?

The Integrated System & Operations Planning (ISOP) vision is a planning framework that optimizes capacity and energy resource investments (MW/MWh) across Generation, Transmission, Customer Delivery and Customer Solutions. The framework will address:

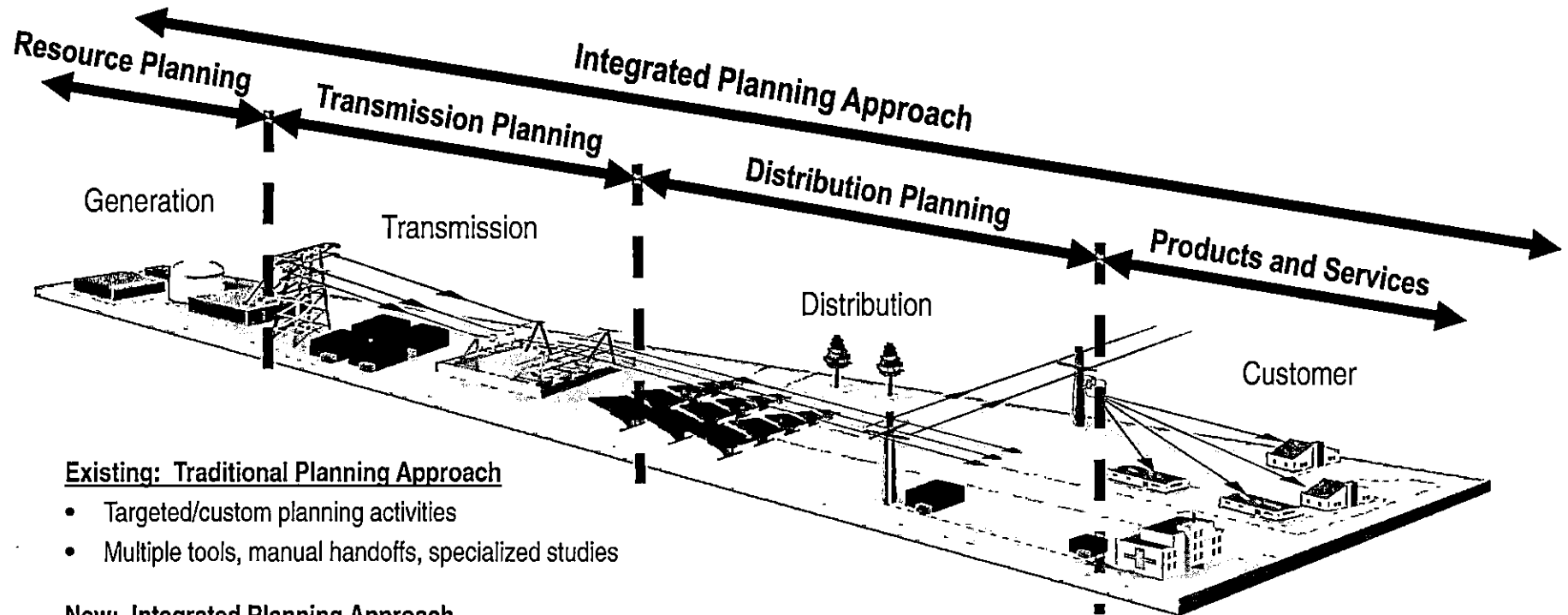
- Operationally feasible plans while accommodating rapid renewable growth
- Enhanced modeling to value new technologies such as energy storage, electric vehicles, and intelligent grid controls/customer programs (non-traditional solutions for Distribution and Transmission)
- Ability to evaluate different asset portfolios across a broader range of potential future scenarios



Emerging grid and customer-side technologies will impact supply/demand balancing



Existing Planning Paradigm Vs. New Integrated Planning Approach



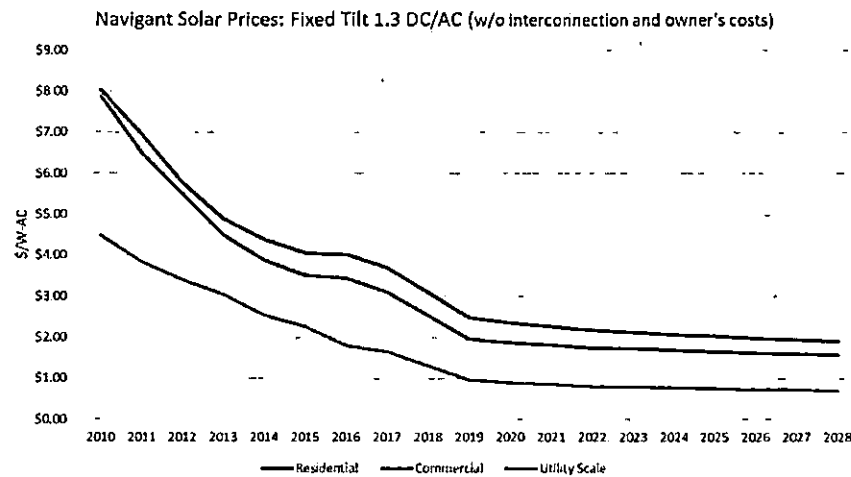
Existing: Traditional Planning Approach

- Targeted/custom planning activities
- Multiple tools, manual handoffs, specialized studies

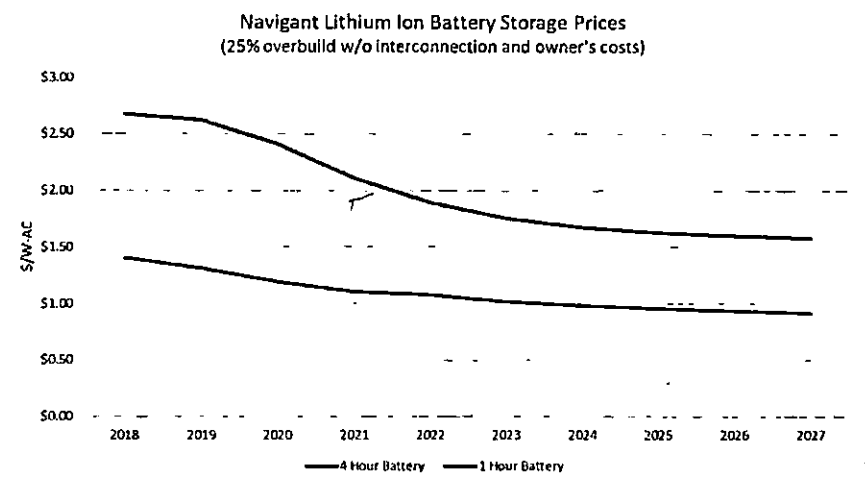
New: Integrated Planning Approach

- Integrated, automated processes and tools for planning
- Non-traditional solutions studied to address system needs

What is Driving the Change?



Rapid drop in PV costs; rate of decline is slowing.

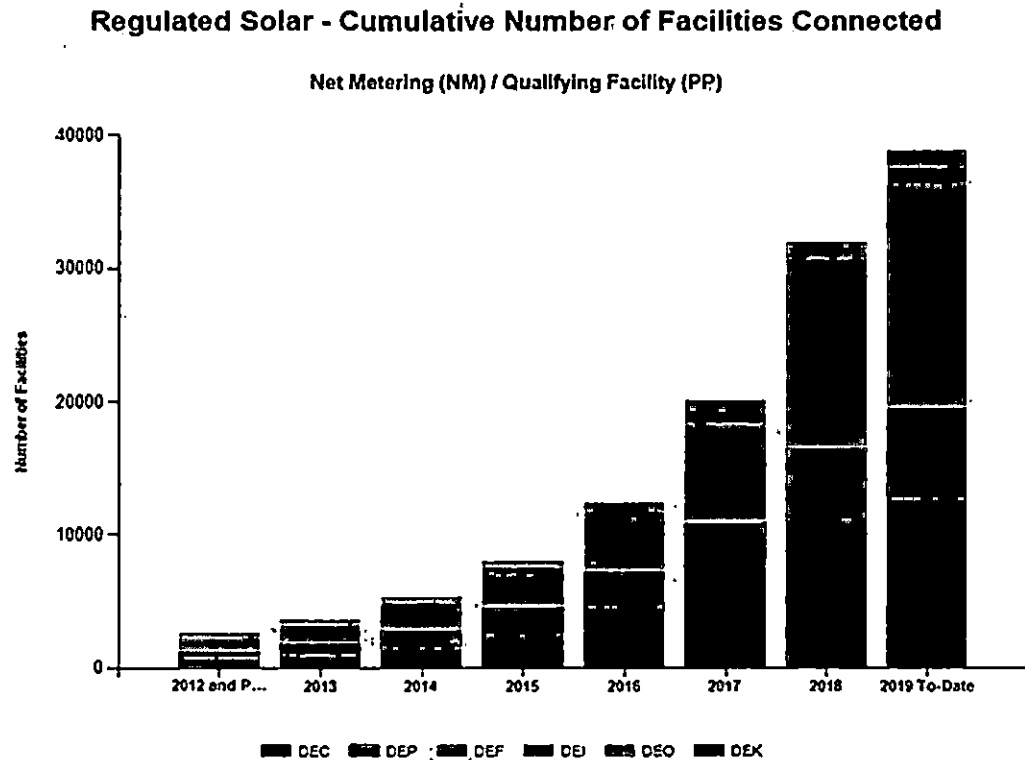


Storage costs expected to drop 40% by 2025, but economics are still challenging.

Solar costs appear attractive, but solar does not contribute effectively to the winter capacity needs that factor heavily into the economics of Carolinas resource planning.

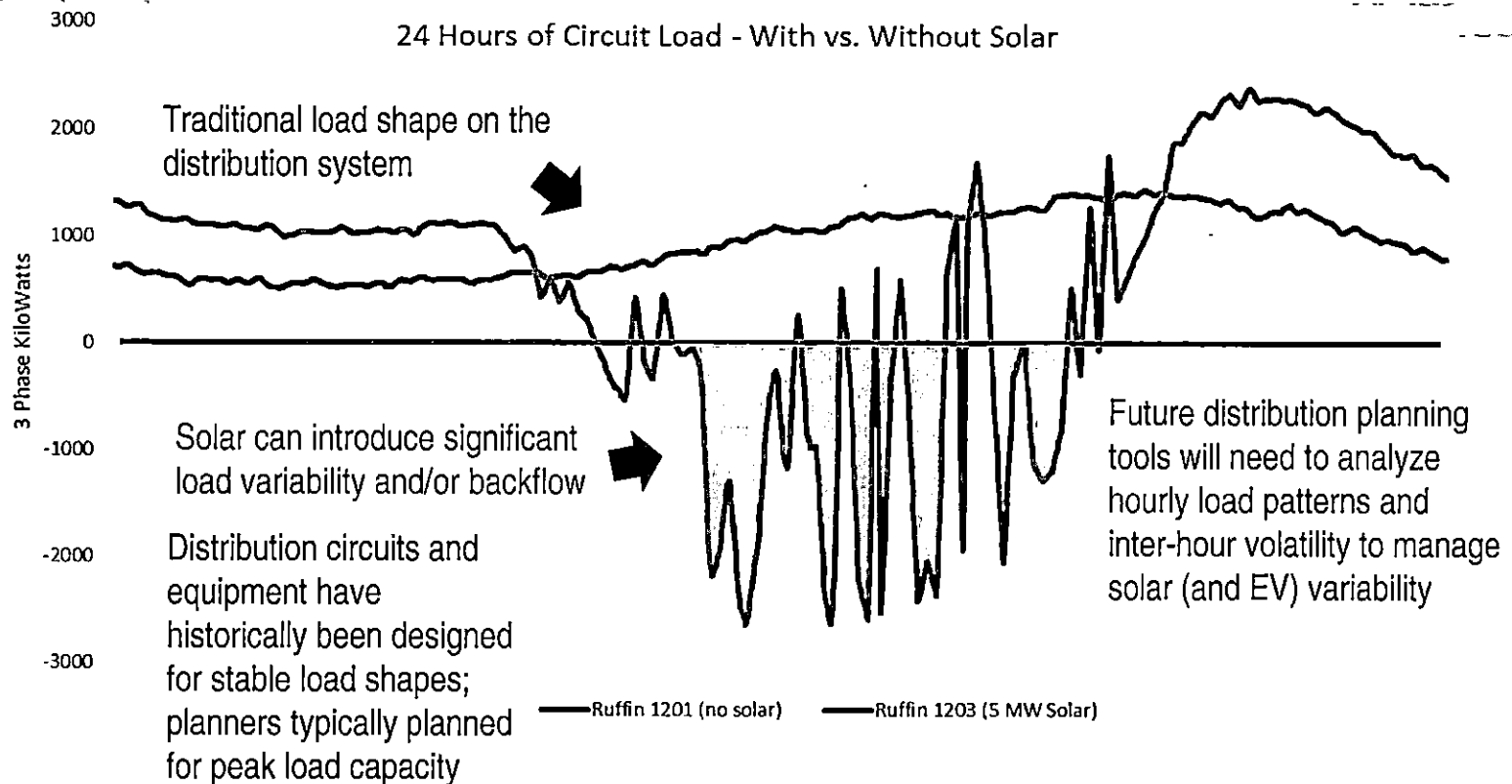
The Pace of Solar Interconnections Continues to Increase

Over 40,000 solar interconnections in Duke's territories since 2012



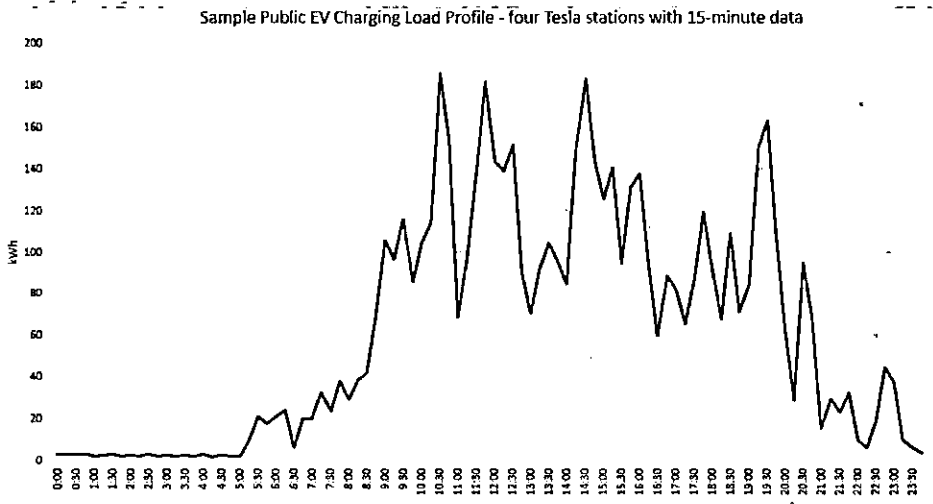
The trend of solar growth is continuing and will become increasingly impactful.

What does this mean for Distribution and Transmission Planning?



Utility storage can help address intermittency and reverse flow challenges. Detailed hourly analysis is needed to assess costs and benefits for storage applications.

EV charging can introduce localized impacts on Distribution & Transmission Planning



Loading Example for Tesla Fast Charging Station

EV's are critical for reducing GHG, and also put downward pressure on electric rates, but can pose planning challenges in high penetration areas:

- Increase load volatility
- Concentrate large new delivery points
- Introduce short lead times for upgrades
- Accelerate circuit capacity needs

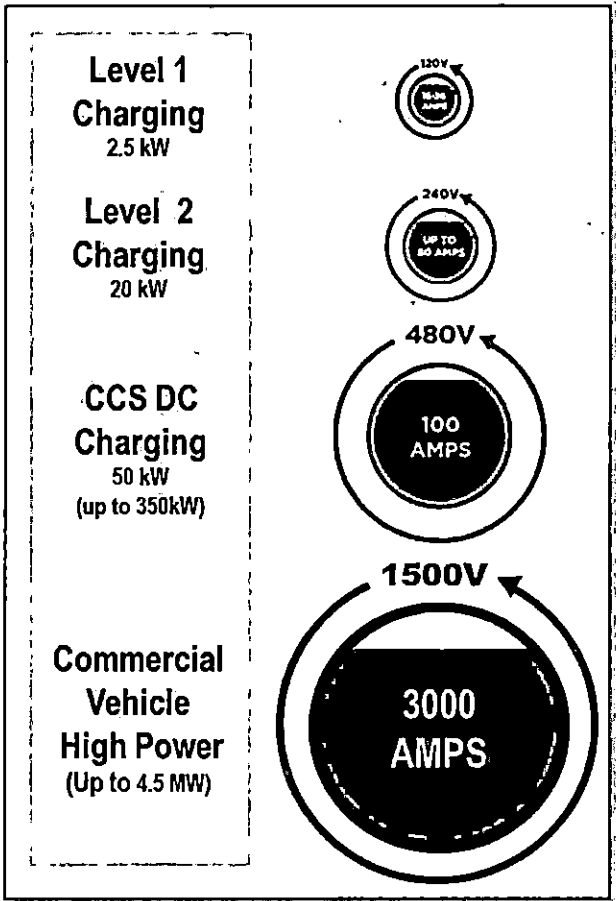
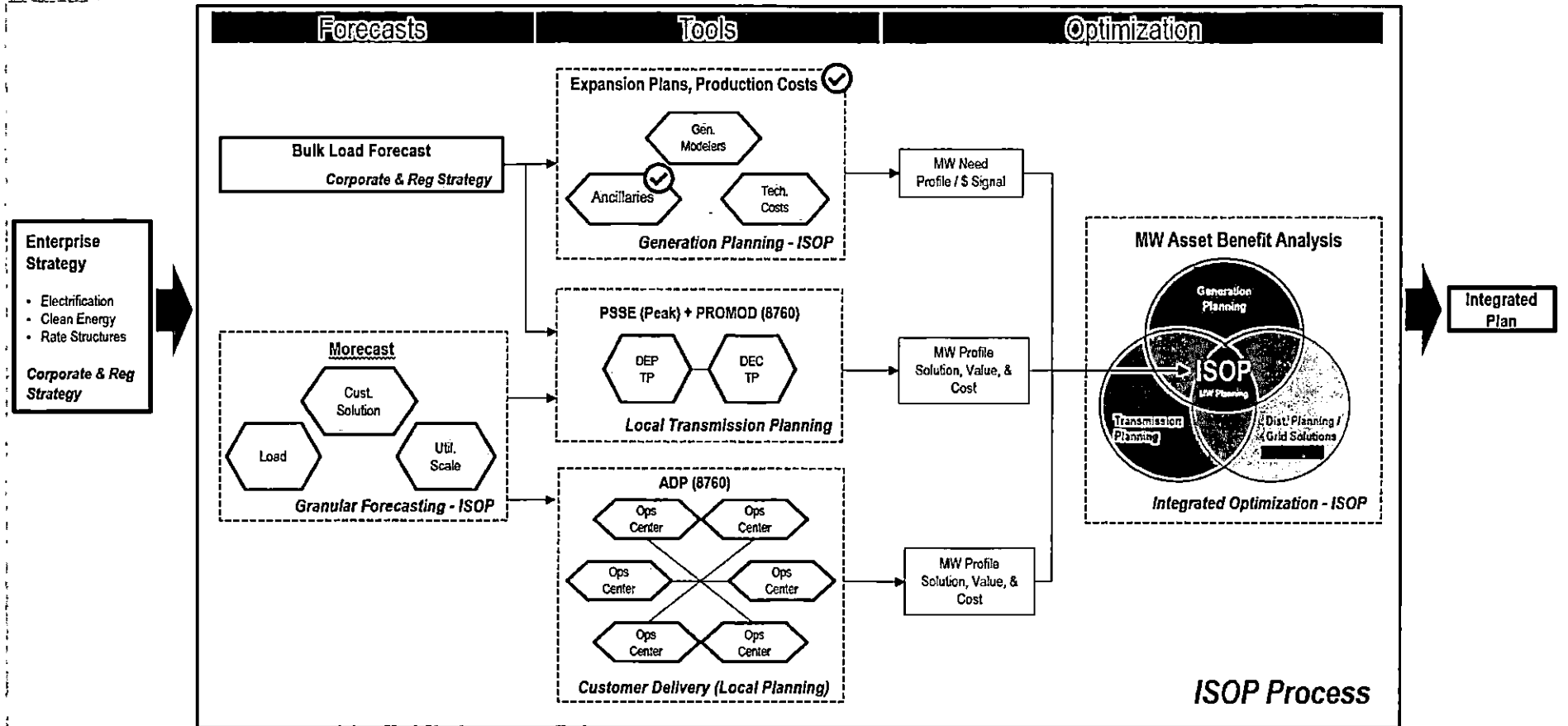


Illustration – Last Mile Logistics Customer

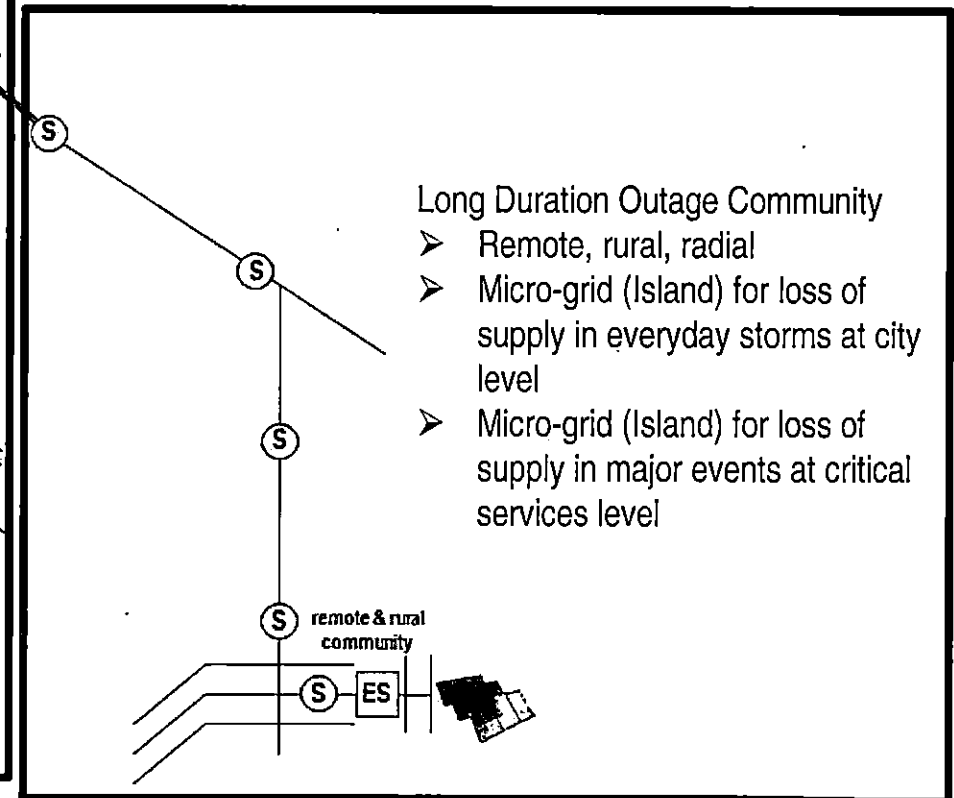
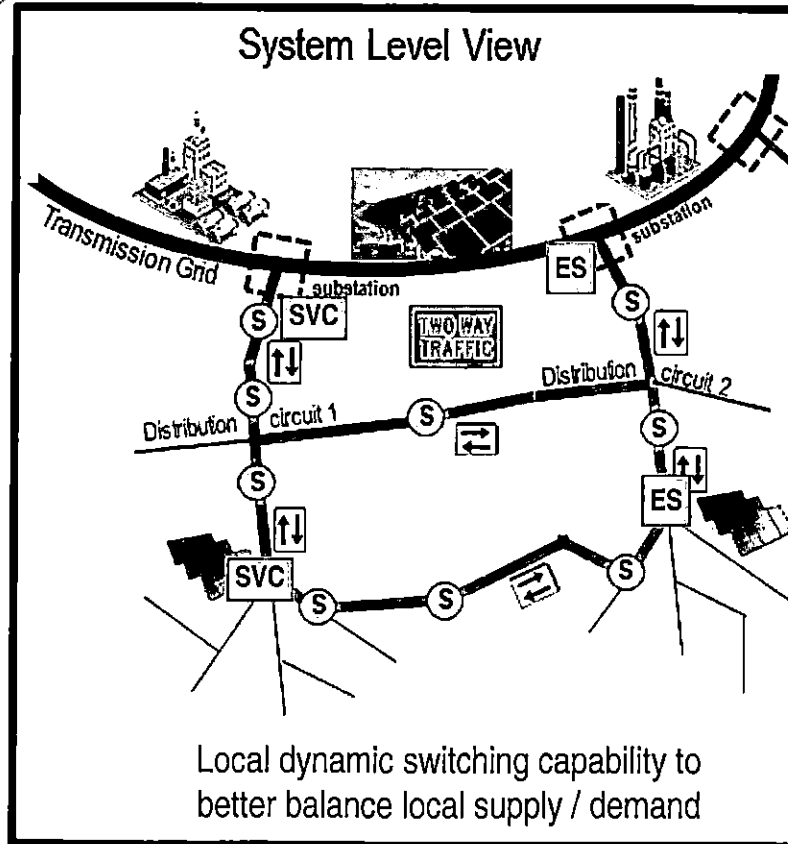
- Existing facility load ~ 1 MW
- 50 Medium-Duty Package Delivery trucks
 - 15 kW each (overnight)
- 20 electric semi-trucks
 - 2 “mega-chargers” @ 1-1.5 MW each (day)
 - 5-10 “slow” chargers @ 100 kW (night)
- Vehicles arriving in late 2020
- Expected load increase ~ 3-3.5 MW
- Circuit capacity ~ 3.5 MW
- Total vehicles on site (if full electrification)
 - 60 Semi-trucks
 - 200 Delivery trucks



ISOP High Level Process Flow



How Does ISOP Relate to the Grid Improvement Plan ?



Questions?

