IS RATE DESIGN ENOUGH FOR TOMORROW'S DISTRIBUTION GRID?

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OCTOBER 19, 2021

GOALS OR *IF YOU DON'T KNOW WHERE YOU'RE GOING …..*

- **Environmental Goals**
  - Reduce greenhouse gas emissions; exploit renewable resources
- **Consumer Goals**
  - Maintain reasonable rates
  - Nondiscriminatory treatment of customers
- **Grid Goals**
  - Optimize use of all resources -- water/gas/electric utility AND consumer Distributed Energy Resources (DER)
  - Avoid unnecessary infrastructure investments

LESSONS LEARNED
MONITOR, OPTIMIZE, SECURE

- **Need situational awareness in real time**
  - Understand capabilities of distribution grid – circuit by circuit
  - Understand status of supply, storage and load resources
- **Grid is optimized when all resources are leveraged for the good of everyone**
  - Transmission lines optimized for regional benefits – coordinated planning and utilization
- **Grid operation requires a secure, resilient, reliable, low latency private network**
  - President's National Infrastructure Advisory Council's #1 recommendation
    - Private network for grid operations, NOT connected to the public internet
  - Up and running DURING a disaster, NOT a week later
  - De-energizing a falling line before it hits the ground requires extreme low latencies (meaning the time it takes data to get to its destination across a network

WHAT IS OPTIMIZATION?

- **Used to be easy**
  - Fossil fired peakers and load management from anyone on the grid
- **World of high DER and electrification of transportation and buildings**
  - **MONITOR** all electric, water and gas utility resources along with BTM customer resources AND distribution level circuits
  - **COORDINATE** operation of all resources
  - **COMPENSATE** appropriately for contributions of all participants

WHAT IS COORDINATION?

- **Letting everyone do "their own thing" is not a good idea.**
  - Like removing all traffic signals and one-way signs from downtown NY City
  - Chaos is not a good look for a modern grid
- **Coordination to optimize resources while maximizing existing resources will require dispatch of**
  - Exactly the **right types of resources**
  - On exactly the **right circuit**
  - At exactly the **right time**
  - For exactly the **right length of time**
- **Maximize the value of each resource for the benefit of ALL**

RATES OR DIRECT CONTROL?
RATES

- **Historically rates were sufficient**
  - Optimizing just balanced generation with demand from any consumers, from any part of the grid
- **Rates were supposed to be accurate, but in fact they are blunt instruments**
  - Avoid “undue discrimination” – all customers w/in a class get same rate options
    - Static rates – Time of Use, seasonal, etc.
    - Dynamic rates – change with conditions – Critical Peak Periods, Emergencies
- **Rates often require consumers to see the rate and respond**
- **Technology provides better response but challenges**

RATES OR DIRECT CONTROL?
DIRECT CONTROL

- **High DER, electrified transportation/building sectors requires targeted signals**
  - Controlable and non-controlable supply, demand and storage
  - Coordinating resources has been shown to increase hosting capacity by 4x
- **Small cloud impacts can be offset by cutting water heaters, AC compressors, EV chargers on the same circuit**
- **Some utilities already providing compensation for agreed upon flexibility**

DON'T STOP SHORT

- **Direct control on a regional basis can dispatch resources to optimize their usage with benefits flowing to all consumers**

- **"Regional" communication networks will enable a large utility to do the following:**
  - provide modernization services to some of the 50,000 small water utilities
  - leverage the above ground resources (poles and towers) to build a lower cost network
  - leverage all resources within the "region" to optimize for the benefit of all
  - enable world class cyber security for many of the smaller utilities

THANK YOU

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