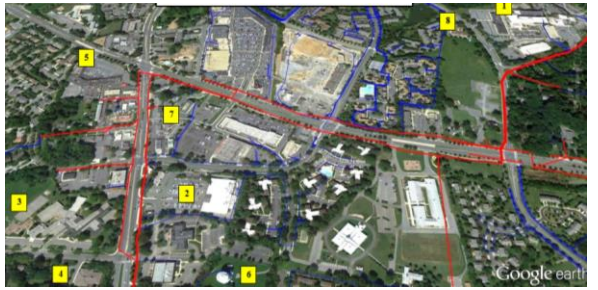
Some utility thoughts on Microgrids

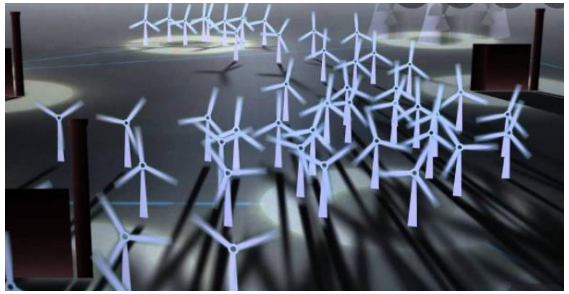
- Traditional Micro-grid
  - Generates a portion or majority of load
  - Can isolate and rejoin the large grid providing resiliency
  - Provides energy efficiency and possible reduction in emissions
  - Can participate in ancillary services, grid support, etc.
- Temporary Micro-grid
  - Much lower cost
  - Generally focused on resiliency only for emergency events
  - Generators may be rolled in
- Campus Style
- Public Purpose

Note: What is shown is in concept only, none were actually built.



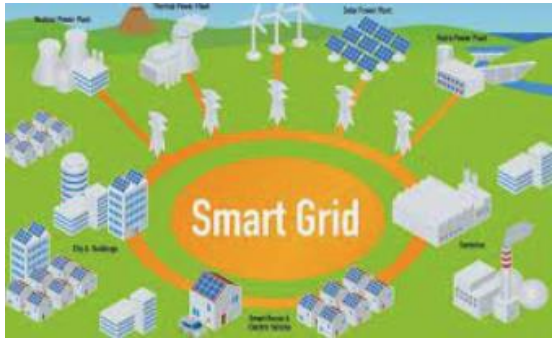
Credit: Pepco Holdings, Inc. an Exelon Company

- Smart Generation - -more distributed generation and control
  - Overcoming Intermittency
    - Thermal Storage
    - BESS
    - V2G
    - Hydrogen Storage
      - Fuel Cells
      - Rotating Equipment



Credit: Wartsila

- Smart Grid
  - Accommodating More Renewables (Solar, Wind)
  - Accommodating More EVs (charging)
  - More centralized and distributed control
  - Improved Cybersecurity



Credit: MissionCriticalMagazine.com

- Smart Premises & Smart City
  - Smart Control of Load
  - New Sensors across the City
  - AI (computational power) to process sensors and crowd sourced data

Credit: BusinessWest.com