Introduction to Microgrids
DVRPC

Local Government Models For Microgrid Deployment

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Introduction

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Topic

Microgrid Implementation Models

In this session we will examine the various development and ownership models currently being used and proposed for Microgrids.

- Privately Owned Campus or single user microgrids
- Third Party Owned Campus microgrids on contiguous property
- Utility owned microgrids on contiguous property
- Utility owned microgrids on non-contiguous properties (Urban systems)
- Hybrid Utility and private owned microgrids.

Key Definitions

- Microgrid (DOE & EPRI)
- A microgrid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid and that connects and disconnects from such grid to enable it to operate in both grid-connected or “island” mode
- MRC adds that a microgrid also provides a significant amount of normal power on-site generation

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Key Definitions

Combined Heat and Power (CHP)

The production of electric power and thermal energy from one source of fuel

Distributed Generation

Generation on-site can be CHP, generators w/emissions control, emergency generators, solar PV, battery or Storage

Resiliency

The ability of an onsite power system or microgrid to be able to operate for an extended time period (minimum 72 hours) disconnected from and independent of the electrical grid. Providing the host site with all critical power needed to sustain essential operations.

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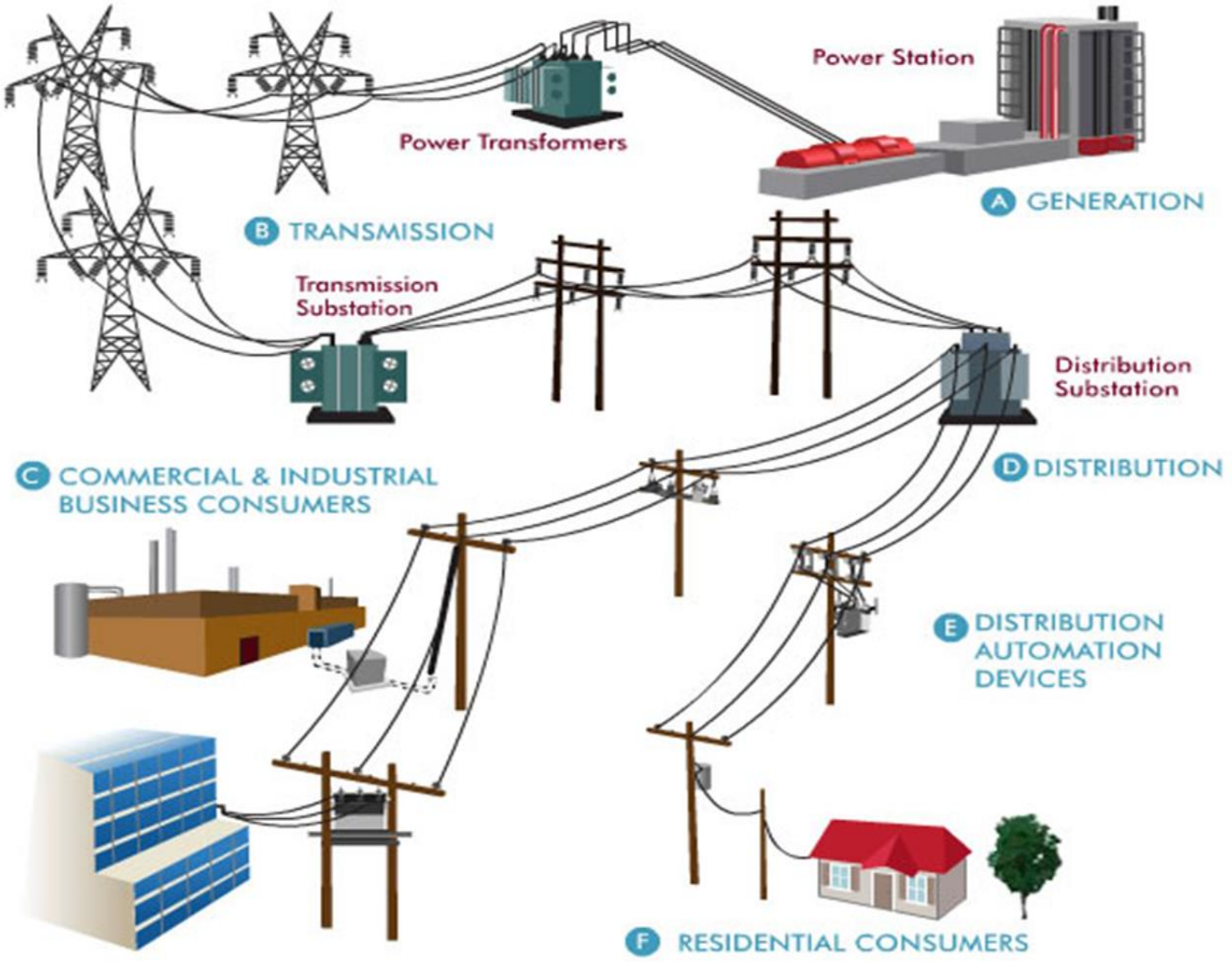
Current Electric Grid



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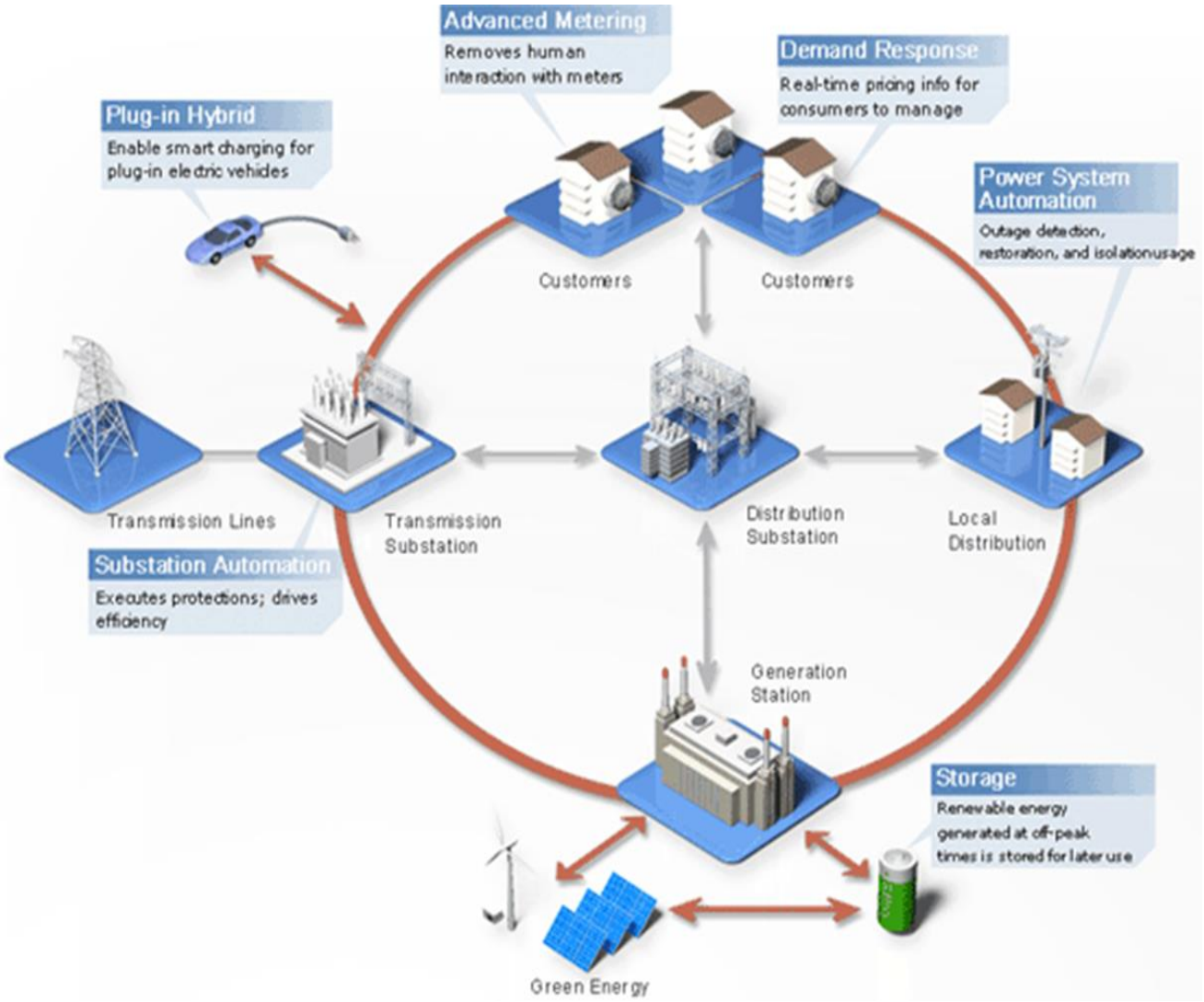
Future Electric Grid



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Ownership or Development options

1. Privately Owned Campus or single user microgrid
2. Third Party Owned Campus Microgrid on Contiguous property
3. Utility owned microgrid on contiguous Property
4. Utility owned microgrid on non-contiguous property (urban)
5. Hybrid utility and private owned microgrids

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Privately Owned Campus or Single User Microgrid (Traditional Private Wires)

- Single contiguous property
- Electric power integral to microgrid typically CHP
- Electrical distribution by owner
- Chilled Water distributed from Central Plant
- Hot Water/Steam distributed from Central Plant

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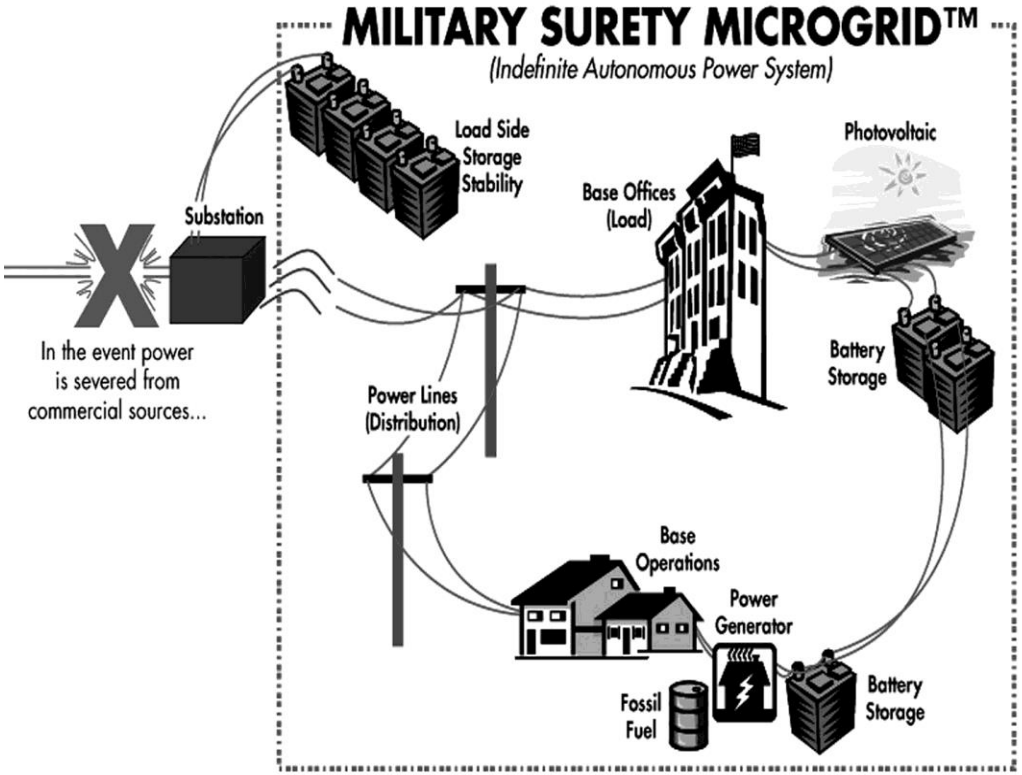
Private Owned Campus Contiguous Property Military Base Example for Single User Microgrid (Private Wires)



Ownership Options

1. Privately owned generation and wires and pipes Campus, Hospital, Base
2. Third party owned generation private wires and pipes (U MD)
3. Third party owned generation, wires and pipes (MSU)
4. Proposed Utility owned (mostly prohibited in deregulated markets)

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Utility Owned on Contiguous or Non Contiguous Property (Urban)

- Multiple properties/buildings within defined area individually metered EDC service
- Microgrid islandable power source DG, solar & batteries, CHP
- Electric power sold/delivered to participants through regulated utility
- Chilled Water may be distributed from Central Plant
- Hot Water/Steam may be distributed from Central Plant

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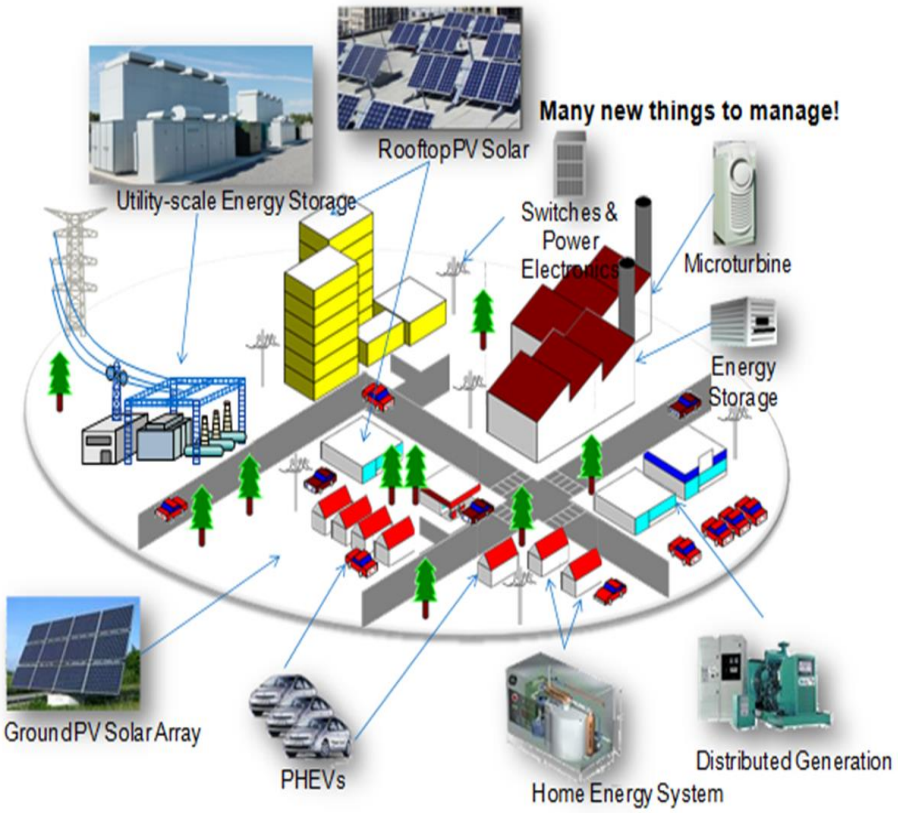
Community or Urban Microgrid



Ownership Options

- Utility owned electrical power source utility owned wires and no district energy/pipes
- Utility owned electrical power source private wires and private district energy/pipes (Shands Hospital Gainesville Municipal Power)
- Utility owned electrical power source and wires with private district energy/pipes (TDEC)
- Third party owned electrical power source Utility owned wires no district energy/pipes
- Third party owned electrical power source, Utility owned wires and private district energy/pipes (Proposed Connective Thermal and TDEC)

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The Current Regulatory Environment

- General regulatory climate has been favorable to DG and net metering, but ambivalent or frequently adversarial about microgrids (DUKE "microgrids are ok as long as we own them")
- PURPA QF paved the way for onsite CHP
- First most frequently cited barrier: requirement for microgrid to have public utility status as precondition for electric sales to others (with exception of onsite or sometimes contiguous property)
- Second most frequently cited barrier: franchise violations when selling to utility customers or running wires across public rights-of-way
- Interconnection issues exist, but these have substantial precedent for CHP and DG and are manageable
- Utility and regulatory common perception: if utilities are doing their jobs, then microgrids should not be necessary (Storm Hardening)

Obstacles

- Standby Charges
- Who pays (i.e. all customers on microgrid, owners, generators, etc.)
  - What is appropriate level?
  - Tariff design ISO, EDC
- Exit Fees Recovery of System Costs (California) Poison Pill
- Interconnection Costs
  - Engineering Studies
  - Distribution System Upgrades
- Siting of power sources
- Relationship with Incumbent Utility

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Some Proposed Favorable Regulatory Approaches

- Establish a clear (but sufficiently broad and flexible) definition of microgrids, with corresponding rights and responsibilities within the electrical grid
- Provide an equitable methodology for compensation of services provided by microgrids to the regulated grid, and for standby-services provided to the microgrids by regulated entities
- Support unbundling and the growth of a diversity of services on the grid, both by and to microgrids, and where these are competitively provided, allow market-based pricing and/or unregulated offerings
- Establish and maintain a level playing field for all services provided on the grid, with utilities, their affiliates, and third parties given the right to provide any or all of these services, subject to appropriate codes-of-conduct
- Identify when and under what conditions utilities can own, operate, and/or partner with microgrids – either completely, or in part

Questions?

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