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Empowering you to make smart energy choices

Clean Energy Finance & Investment Authority

Microgrids:

Project Economics & Financing Strategies

NESEA Building Energy 2014
March 6-8, 2014

Agenda

- **What are Microgrids/District Energy?**
- **Approaching Project Economics**
- **Financing Challenge for District Energy & Microgrids**
- **Energy Context of Connecticut**
- **Financing Options**

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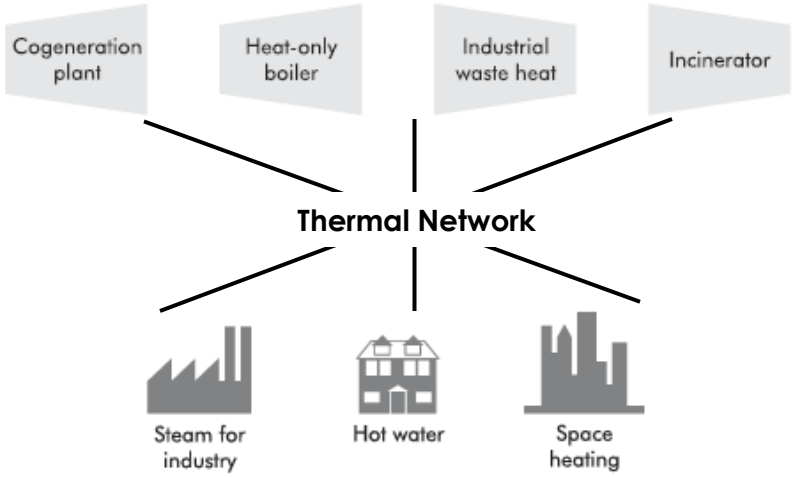
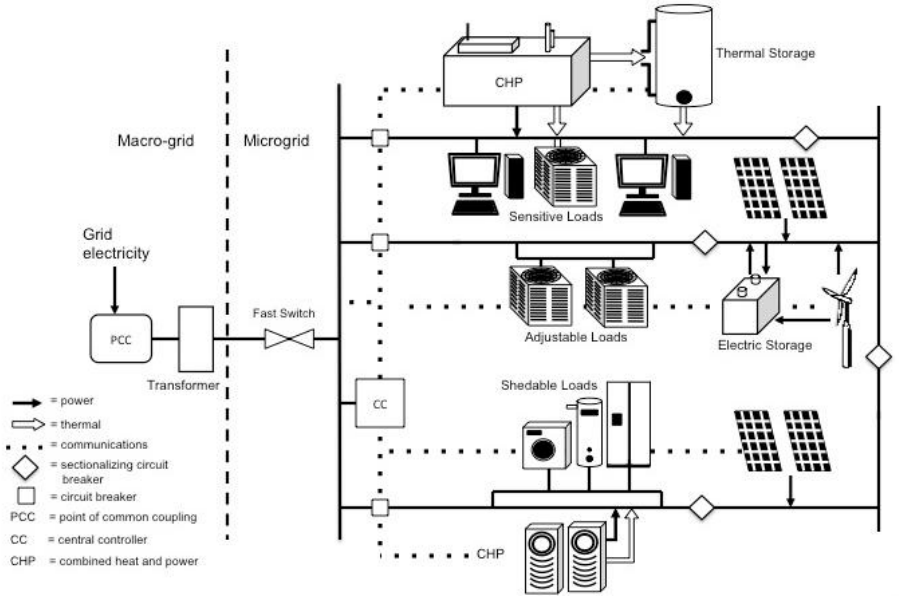
Definitions

- **District Energy** is an energy distribution system that links one or more energy generation sources to multiple buildings to provide thermal energy.



- **Microgrids** are small, self-contained electricity, heat and/or cooling distribution systems that coordinate and distribute energy supplied from multiple generation sources to a network of users in a spatially defined area.



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Project Economics – 3 Major Factors

- Technical Feasibility
  - Matching customer and generation loads
  - Grid and end user integration
  - Siting
- Economic Feasibility
  - Identifying Costs and Revenues
  - Does project exceed current cost of energy for end users?
- Financing
  - Capital Stack and investors' hurdle rate
  - Ownership / Management structure
  - Repayment structure

Approaching Project Economics

- **WHAT IS THE GOAL?** Microgrids and District Energy systems confer multiple benefits. What benefits are we trying to capture? For whom?
  - Reduced energy costs?
  - Reduced GHG emissions?
  - Increased energy security and reliability?
  - Public sector end users? Private sector?
- Some benefits may be achieved only at a cost premium. Understanding goals and beneficiaries upfront is important to later identify gaps in the business model and to craft solutions.

Project Economics – Costs & Revenues

Project Costs

- "Overnight"
  - Equipment & Labor
  - Design & Engineering Fees
  - Grid & end user integration
  - Siting & Permitting
  - Taxes
  - Warranty/Insurance
- Ongoing
  - Debt
  - O&M
  - Fuel

Project Revenue

- End users
  - Direct offset to energy purchases
- Public sources
  - Federal, state & local incentives
  - Other grants
- Regulatory/Energy Markets
  - Renewable energy credits
  - Net metering/Virtual net metering
  - Demand response
  - **Other?**
    - **Capacity payments?**
    - **Reliable power tariff?**
    - **Ancillary grid services?**
    - **Carbon pricing?**

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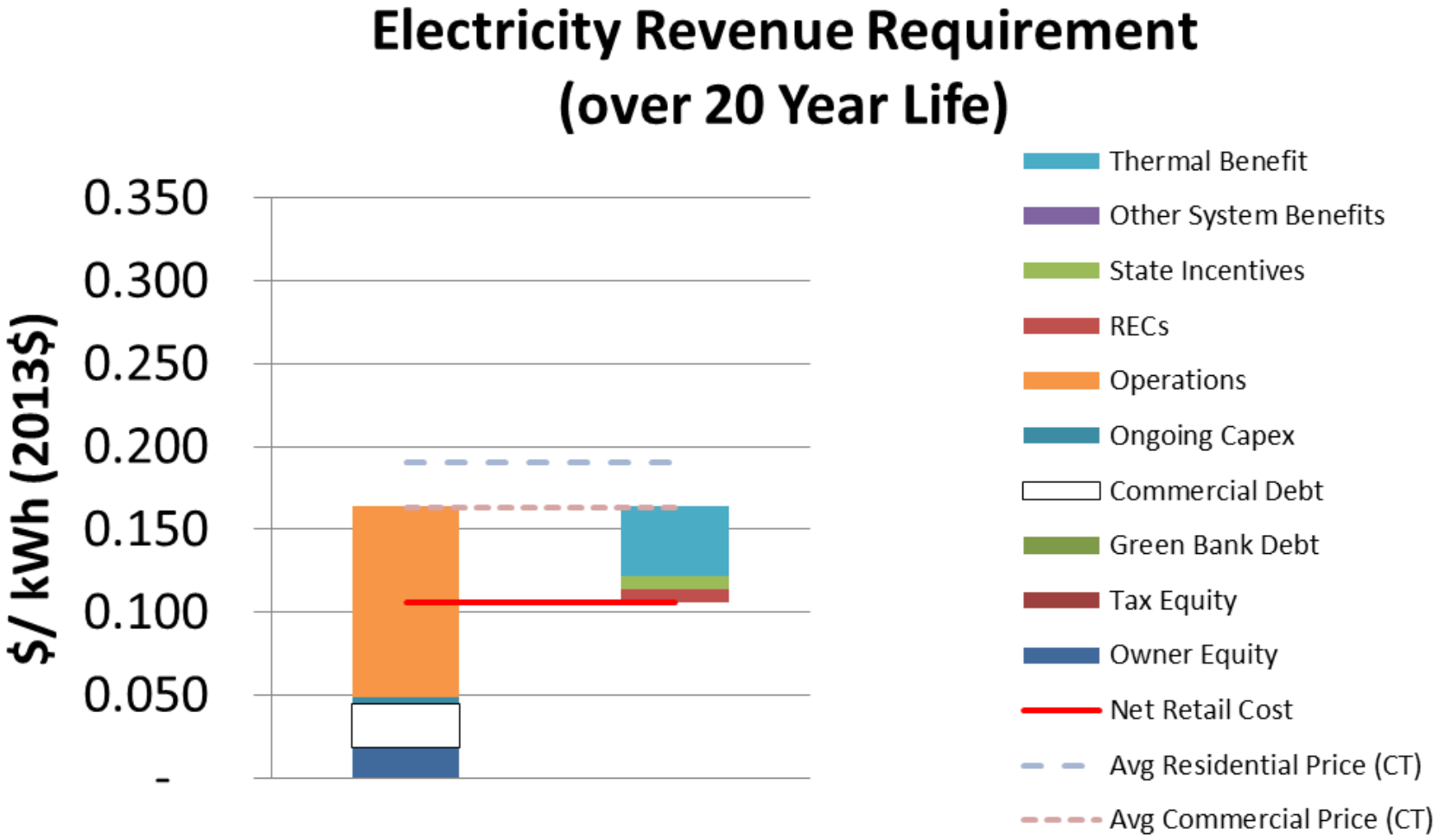
Project Finance – Strategies and Risk Mitigation

- Capital Stack
  - Owner equity
  - Senior Debt
  - Sub Debt or “Green Bank” Debt
  - Tax equity investors
- Financing strategies
  - ESA/PPA
  - ESPC
  - C-PACE
  - Tax exempt lease purchase
- Risk
  - Performance guarantee? PACE lien? Green bank debt? Other credit enhancements?

Does project exceed current cost for end users?



Financing Challenge for DE & Microgrids

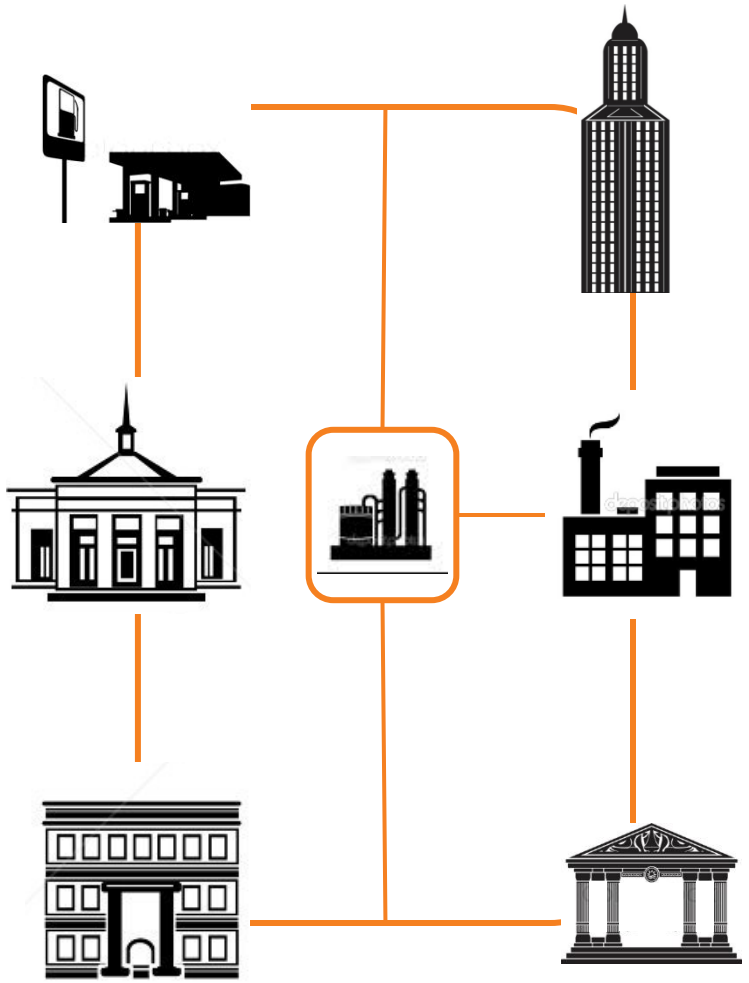
- Existing revenue programs for distributed, clean energy resources generally operate on an individual generator, individual customer basis. Microgrids & DE link one or more generators to multiple users.
- Existing incentives and financing tools for distributed, clean energy resources are designed categorically around customer building types (e.g. municipal/ commercial/ residential). Microgrids & DE serve all customer types simultaneously.
- Not all customers classes can monetize potential revenue streams
  - Public entities do not have tax liability to monetize tax credits.
  - Public entities cannot leverage financing structures like PACE
  - Commercial entities cannot net meter or interconnect across pubic right-of-ways

Financing Challenges (cont.)

- Microgrids and DE may confer multiple benefits. Some benefits may be achieved only at a cost premium.
- Financing implies a project will earn a lender a return on investment. Microgrids & DE systems are challenged where energy savings cannot carry all costs.
- Making a microgrid/DE system economical requires new revenue streams that derive from customers' willingness to pay. This will require change and innovation in utility and microgrid/DE regulation.

C-PACE District Energy : Buildings are collateral for system

- District Energy generation source(s) can be located anywhere.
- All capital costs (for generator and pipes) are assessed to DE end-users on a pro-rata basis based on their consumption and projected savings.
- DE developer locks in repayment of fixed costs over 20 years. DE owner/operator signs short term ESAs with customers for energy supply and delivery.



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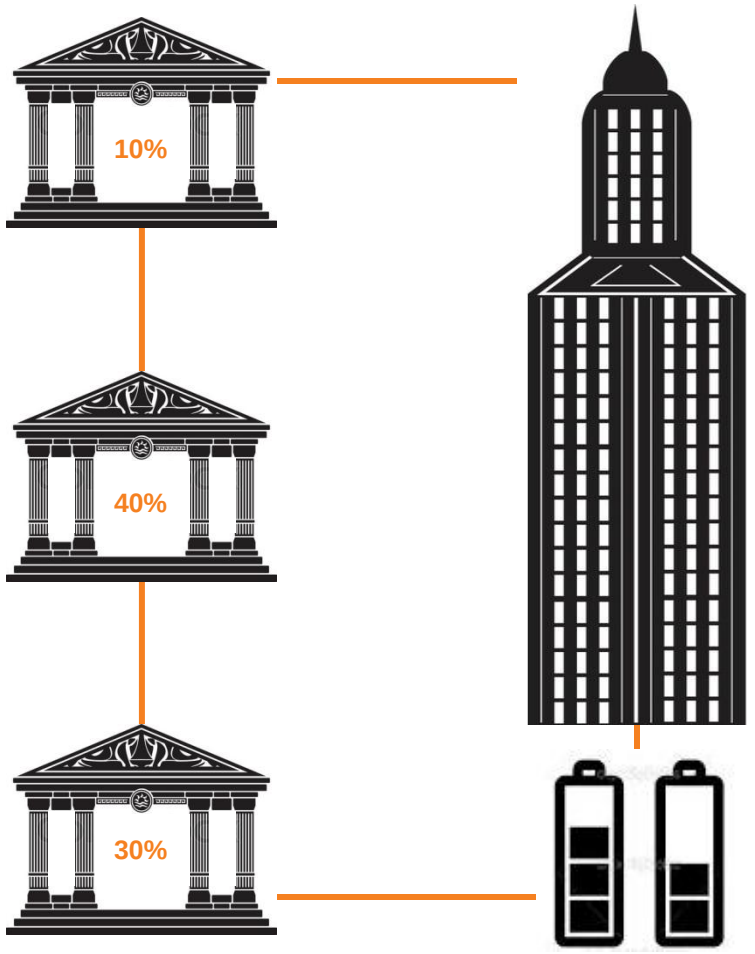
C-PACE Microgrid: “Host facility” with power sharing

- A single qualifying facility hosts the microgrid generator
- The host facility finances generator using C-PACE, monetizes tax credits, utility incentives, electric and thermal RECs, sales of thermal energy and power.
- Facilities interconnected to microgrid craft ‘power sharing’ arrangement with host facility around islanding and maintaining of critical loads.



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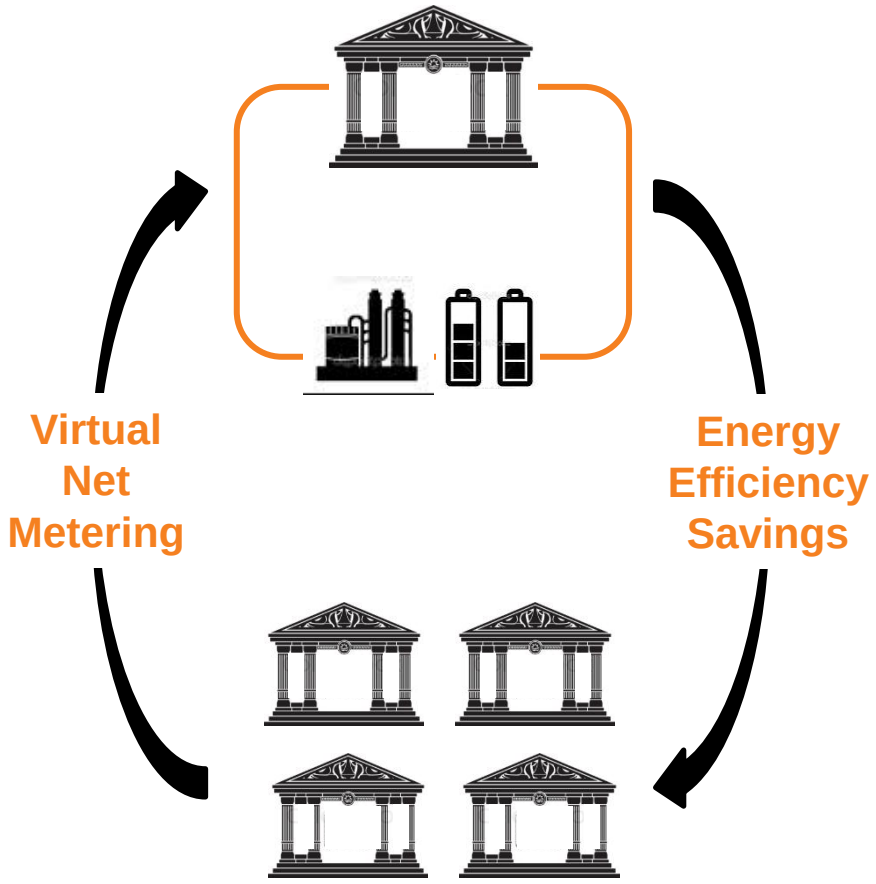
ESPC DE/Microgrid: Public facilities aggregate energy savings

- Multiple energy efficiency projects at public facilities are combined with a microgrid project under one Performance Contract
- Provides scale necessary for 3rd Party ownership of generating assets.
- Public facilities aggregate energy savings from energy efficiency projects and virtual net metering from microgrid.
- Aggregate savings underwrite long-term payback on microgrid assets.



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