Effective Feasibility and Planning Strategies for Biomass Projects
(With a Quick Update on Legislative Action)

Heating the Midwest Conference

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40 Years of Experience in Sustainable District Energy Systems

Agenda

- Overview of project development
- Key questions for initial feasibility analysis
- Market analysis
- Financial analysis
- Legislative update

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Project Development Requires a Phased and Iterative Process of Reducing Uncertainty

Project Development Process

- Objectives setting (what are we trying to accomplish)
- Data gathering (loads, costs)
- Project definition (thermal only, CHP, potential size)
- Options appraisal (technologies, efficiencies, size and phasing)
- Marketing & business development (volume & value of potential sales)
- Feasibility study (first look at integrated technical/business evaluation)
- Engineering design (plant, distribution, building interconnection)
- Financial and business modeling (ownership, capital sources, cost of capital, off-take rate structures & contracts, procurement structure)
- Procurement (design-bid-build, engineer-procure-construct)
- Construction & commissioning (build according to plan, make sure it works as intended!)

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Project Development Requires a Phased and Iterative Process of Reducing Uncertainty

Examples of Uncertainties

- Will sufficient revenue be generated?
  - Have we accurately projected loads?
  - Have we signed up enough customers for long-term off-take contracts (thermal energy, electricity)?
  - Does the rate structure mitigate risks relative to load projection accuracy, weather, or variations in operating costs?
- Do we have confidence in our cost projections?
  - Capital costs, including site acquisition, plant, distribution, and building conversion/interconnection
  - Operating costs, including long-term supply of sufficient fuel meeting the required specifications
- Can we access sufficient capital at the required cost of capital?

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Key Questions for Initial Study

1. Is there a critical mass of initial customer buildings that are technically compatible with biomass district heating?
2. Do we know what these specific buildings spend on fuel?
3. Are the customers interested in pursuing the potential to connect?
4. Do we have a technically sound concept for the plant, distribution system and building connections?
5. Do we have good preliminary capital and operating cost estimates for the technical concept?
6. Are there strategies for financing the system that cover all system costs, provide customer savings and builds a sufficient long-term repair/replacement reserve?

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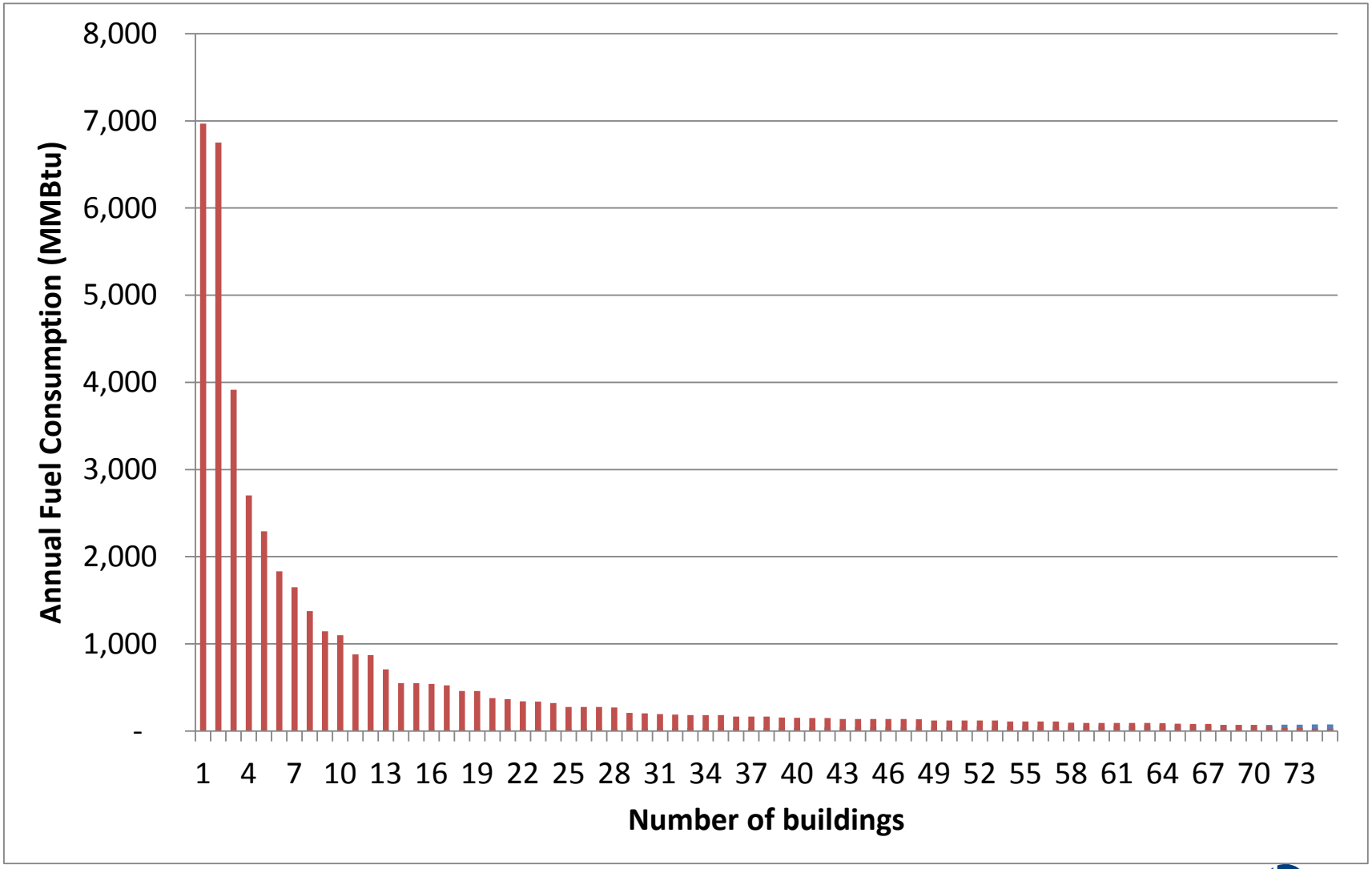
Market Analysis Example

10 of the total 75 total customers consume more than 1000 MMBtu of fuel



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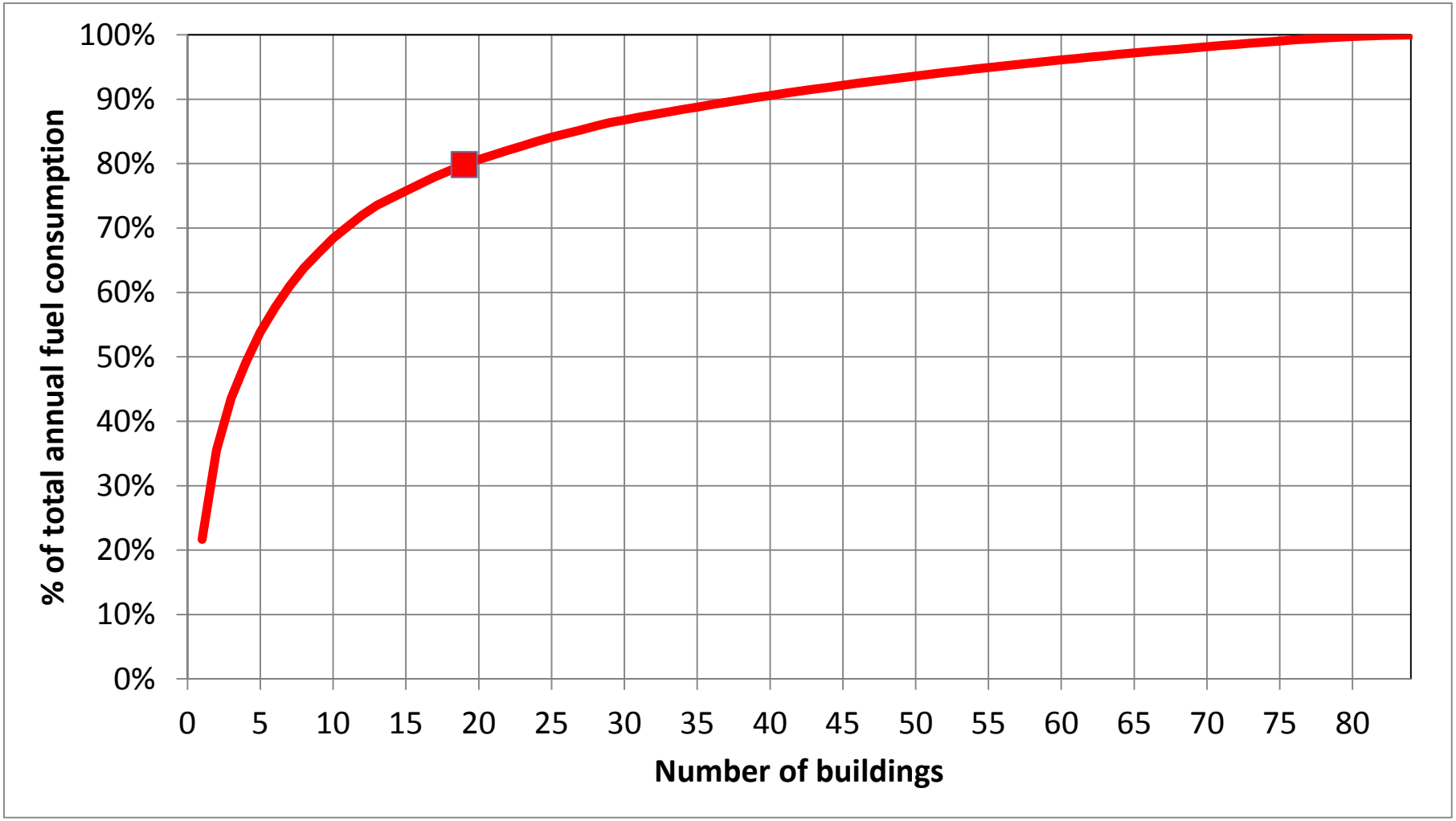
80/20 Rule

Of the 75 buildings in the full scenario, 18 comprise 80% of the heat load



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Costs of Self-Generation of Heat

	All Initial Customers ($/year)	Average ($/MMBtu)
Basic Self-Generation Costs		
Fuel or electricity costs	$ 787,826	$ 27.37
Basic non-fuel operation & maintenance	$ 51,818	$ 1.80
Subtotal	$ 839,643	$ 29.17
Other Costs		
Major repairs	??	??
Replacement of aging equipment	??	??
New equipment for expansion	??	??
Operating labor	??	??
Administrative oversight	??	??
Insurance	??	??
Subtotal	??	??
Total	$856,000 + ??	$29.00 + ??

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Financial Analysis

- Time value of money (discount rate)
- Weighted average cost of capital
- Risk assessment and mitigation
- Measures of financial viability
- Inputs to financial analysis

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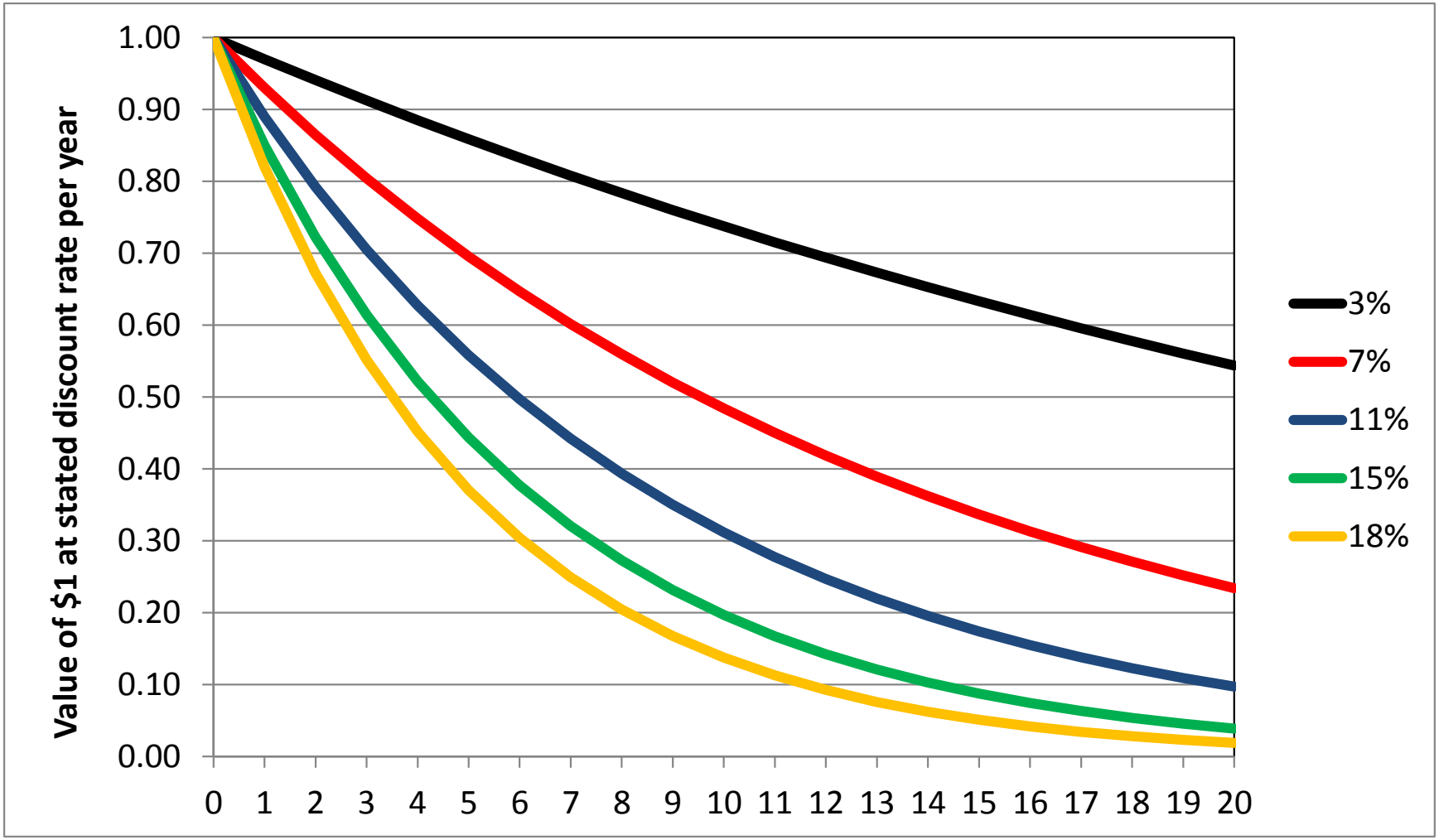
Time Value of Money (Discount Rate)



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Weighted Average Cost of Capital (WACC)

- Debt interest rate = IR
- Equity rate of return = ER
- Debt ratio = DR
- Weighted average cost of capital =

$$[IR \times DR] + [ER \times (1\text{-}DR)]$$

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Risk

Cost of capital varies depending on risk!

Ode to Risk

If you have your own cash,

And are not afraid,

Your rate of return can be quite staid.

But if you can't cross every "t" and dot every "i"

Then you'll require a return that is quite high.

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Balancing Risk

- Assign risk to appropriate parties
- Sensitivity analysis to each risk
  - Balancing generation and demand
  - Permitting and regulatory risks of plant siting
  - Cost over-run in construction
  - Plant failure; or plant efficiencies failing to reach design specification
  - Fuel price variation
  - Non-payment by customers
  - Delay in insurance payments for damage
  - Lead/lag time on capital

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Measures of Financial Viability

- Simple payback
- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Return on Equity (ROE)

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Inputs to Financial Analysis

Capital costs

- Land for central plant
- Central plant components
- Pipes and units that bring heat into the building
- Soft costs, i.e. engineering permitting, land-use approvals, and rights of way
- Construction and installation costs

Capital Contributions

- Debt
- Equity
- Grants
- Connection Charges

Operating costs

- Fuel
- Electricity for lighting, pumping
- Maintenance
- Labor
- Management
- Capital interest and repayments
- Insurance, taxes
- Contributions to sinking fund

Revenues

- Thermal energy charges
  - Consumption charge
  - Capacity charge
- Electricity revenue

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Federal Legislative Update

Master Limited Partnerships Parity Act of 2013

- Introduced April 24, 2013
- MLP is a business structure that is taxed as a partnership, but whose ownership interests are traded like corporate stock on a market
- Liquidity makes it very attractive to investors
- Double taxation (corporate and individual) is avoided because income from an MLP is taxed only at the individual level, thereby significantly reducing the cost of capital
- MLPs have been used for decades but by law have only been available to investors in energy portfolios for oil, natural gas, coal extraction, and pipeline projects

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Federal Legislative Update

Master Limited Partnerships Parity Act of 2013

- MLPPA extends the definition of “qualified” sources to include clean energy resources and infrastructure, including:
  - COMBINED HEAT AND POWER.--- generation, interconnection with the nearest electric grid, storage, or distribution of thermal energy from CHP
  - RENEWABLE THERMAL ENERGY.---generation, storage or distribution of thermal energy from closed-loop biomass, open-loop biomass, geothermal energy and municipal solid waste, solar and geothermal resources

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Federal Legislative Update

Local Energy Sustainability & Resiliency Act

- In draft stage
- Would provide cost-shared technical assistance funding and revolving loan fund for “Local Energy Infrastructure”
- Local Energy Infrastructure
  - Recovers or produces useful thermal energy from waste heat or renewable thermal energy sources,
  - Generates electricity locally,
  - Distributes electricity in microgrids,
  - Distributes thermal energy, or
  - Transfer thermal energy to building heating and cooling systems

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Thanks for your attention!

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