

Energy Services of the Future

Effective Models for
Micro Grids & District Energy

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What Makes an Effective Model?

- Location and Regulatory Environment
- Structure and Economics
- Risk Assessment and Mitigation

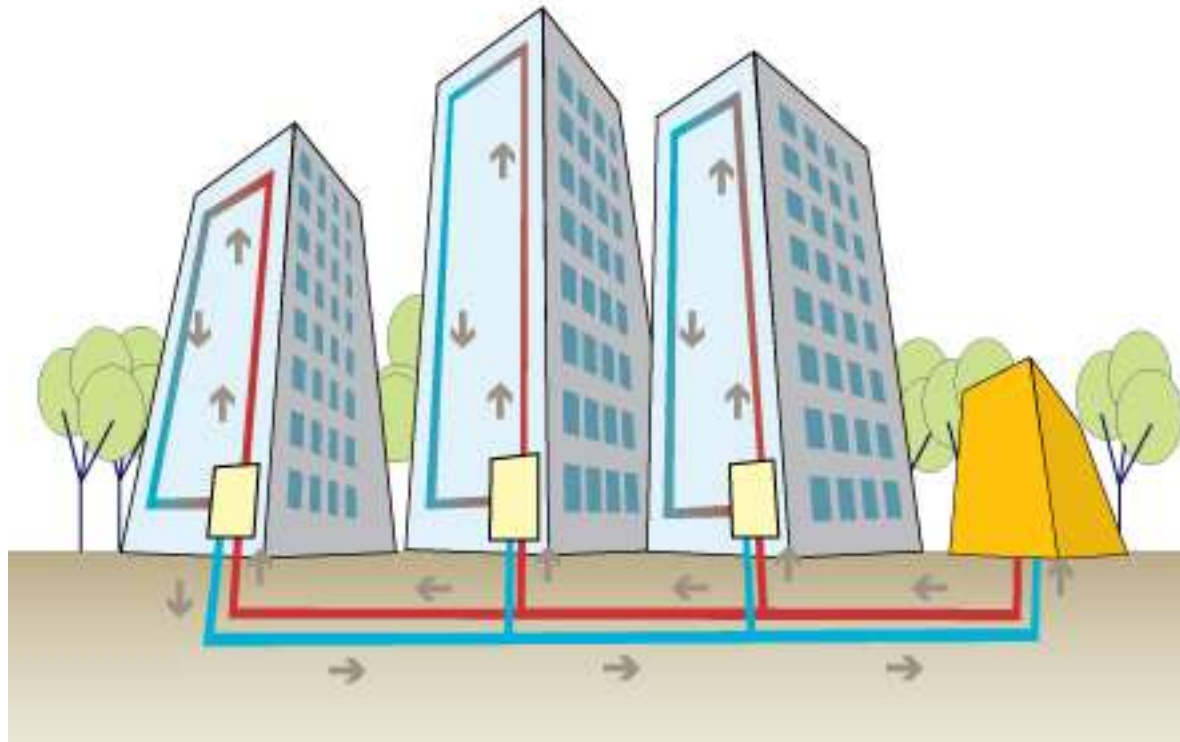
What elements are optimal for an effective eco-district sustainability project?

- Location, Location, Location
 - Availability of heat source
 - Density of development – existing or growing
- Anchor businesses/buildings strategically located or co-located with a history of collaboration
- Municipal support – permitting and incentives
- Strong interest in sustainability

Structure and Economics: Establishing Viable Business Case

- Why an Eco District or Microgrid Structure?
 - As an alternative to power from the Bulk Electric System?
 - Actual economic objectives to be achieved?
- Financial, operational and maintenance savings and energy efficiencies
- Cost-effective environmental benefits, bottom line improvement, community value
- Viability = profitability

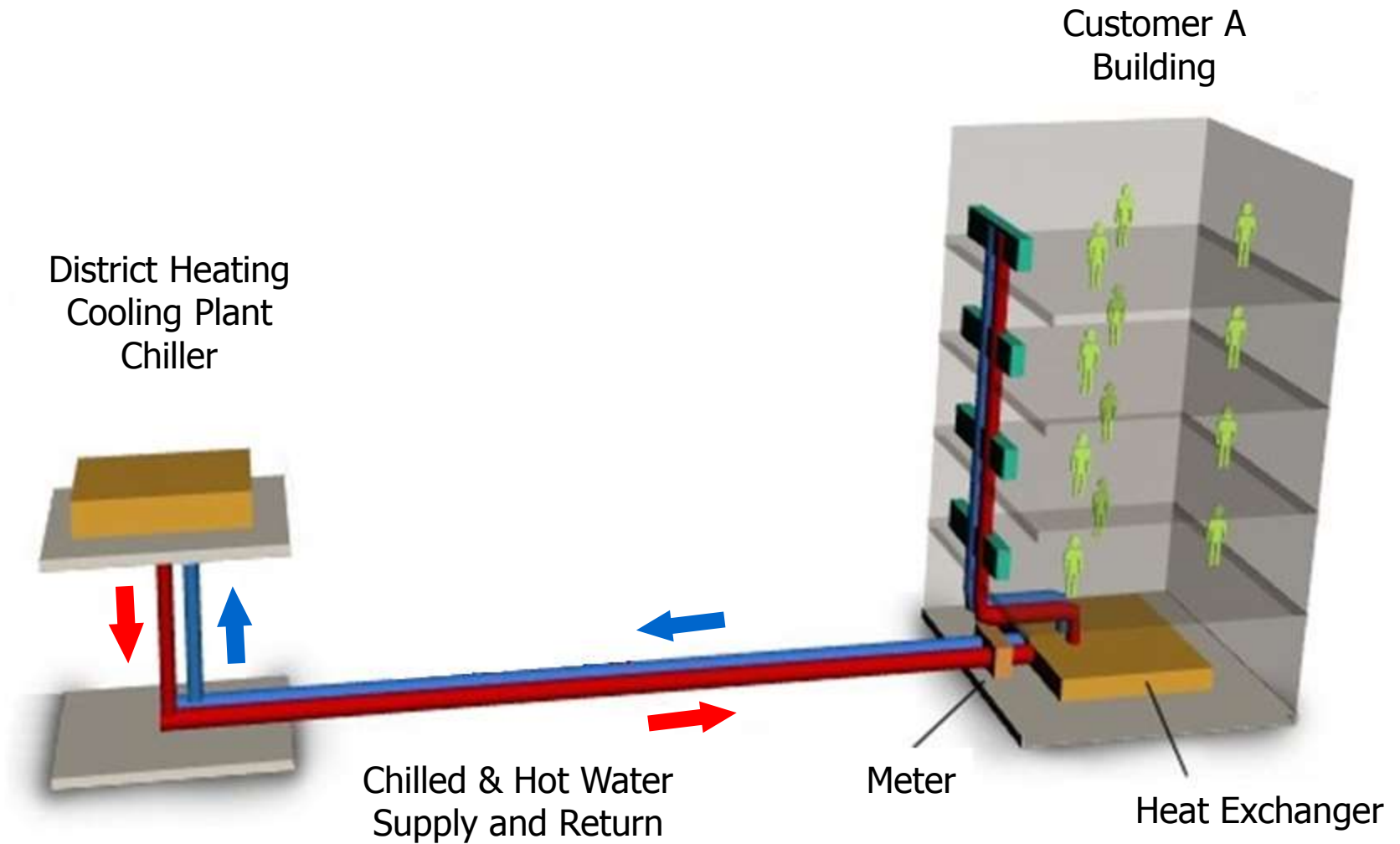
Structure and Operational Considerations



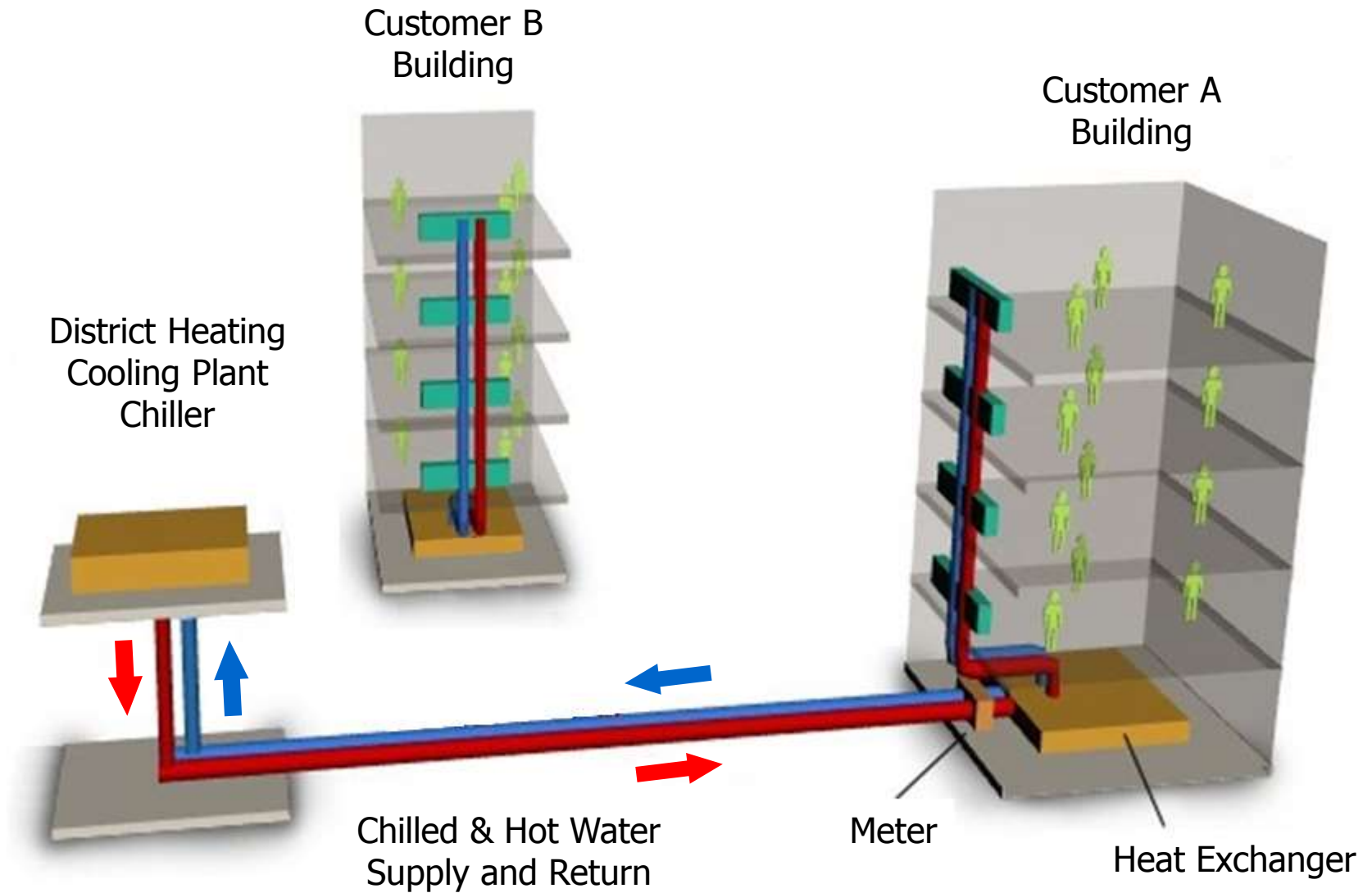
What are Critical Considerations?

- How long will the heat source be available?
 - What happens if or when it goes away?
 - Does the building code require a retrofit?
- Will the system be expanded?
 - Think reliability improvements and cost sharing
 - Think about rebuilding damaged systems – breakage, storms, vandals, terrorists
 - Additional heat sources and additional users
 - How will services be priced for the additional user(s)?
- How are upgrade decisions made and costs allocated?
 - How the system expansion is structured affects who is involved in the decision making

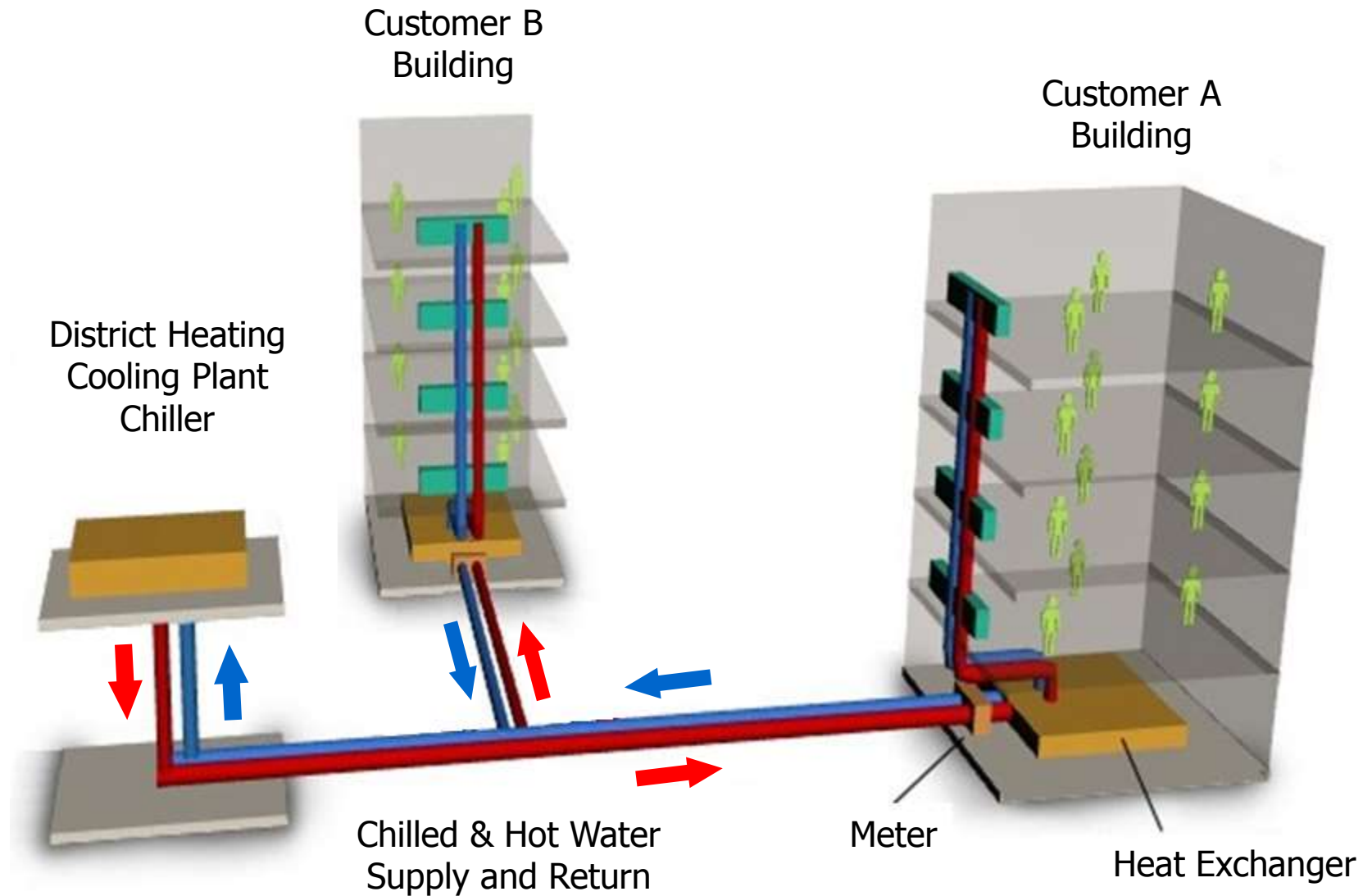
Day 1 System



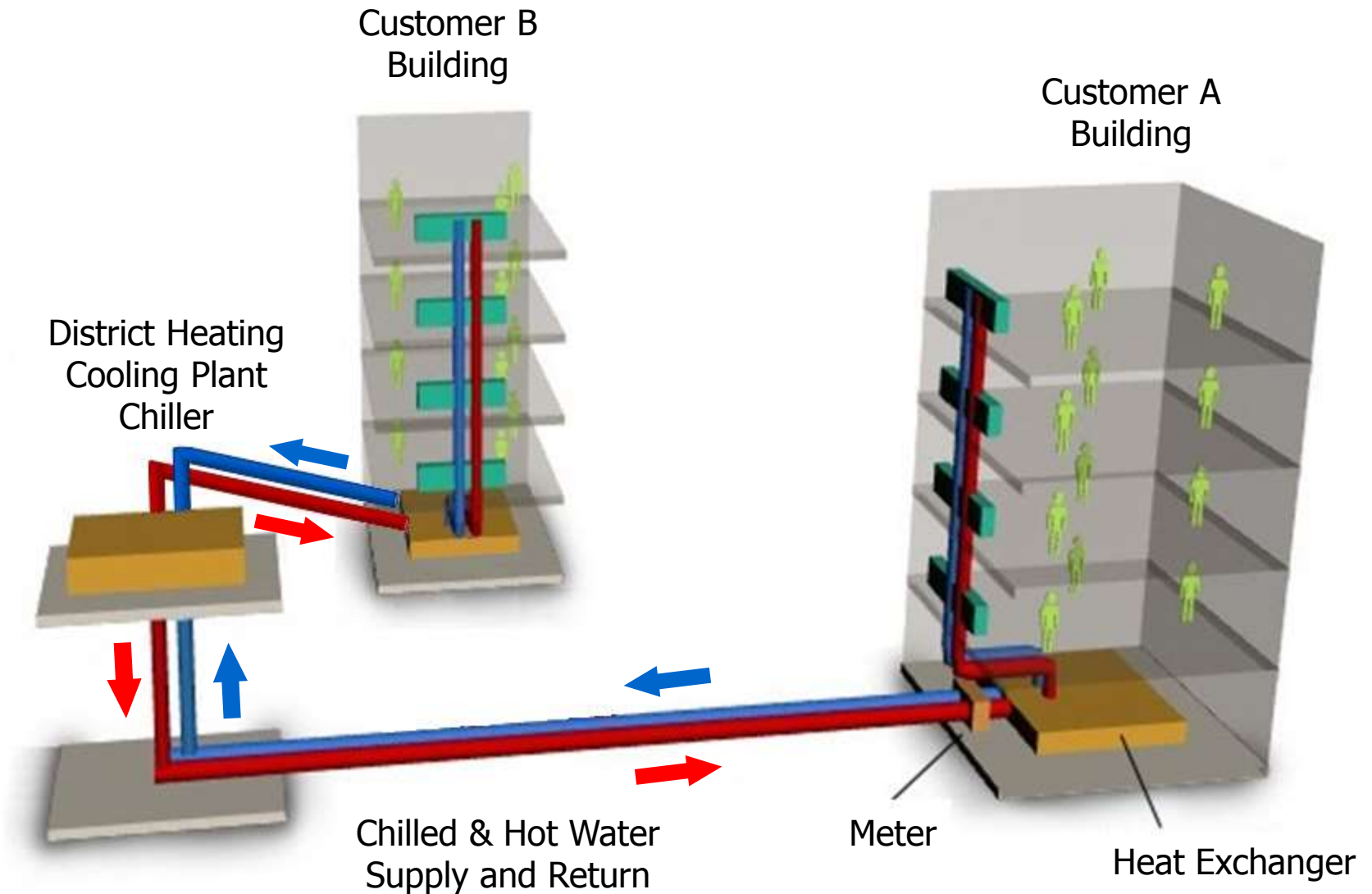
Expanding customers



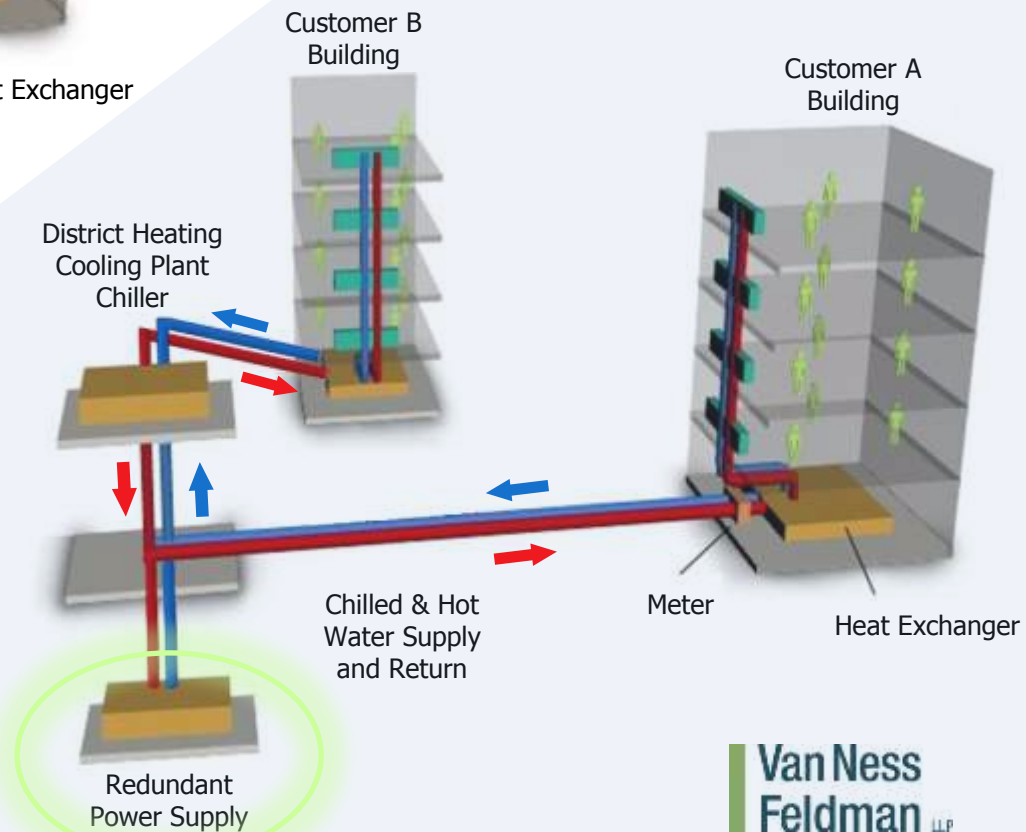
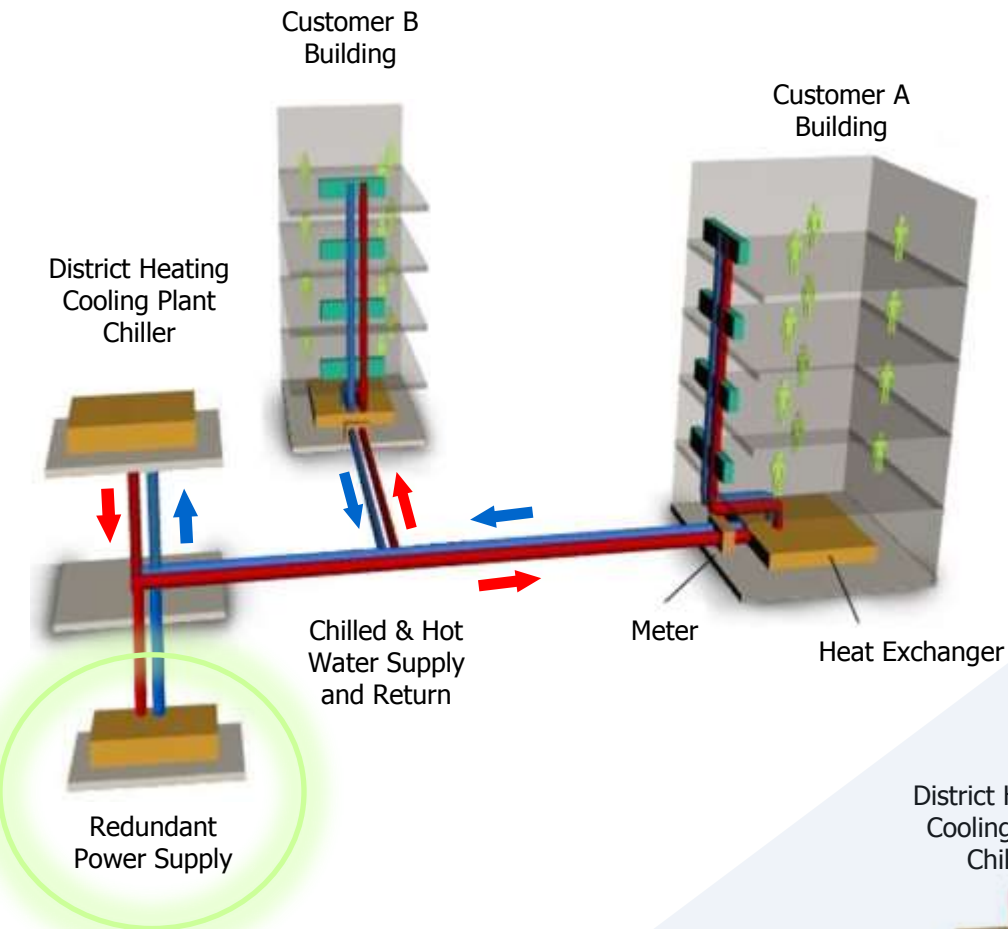
Expanding customers: Option A



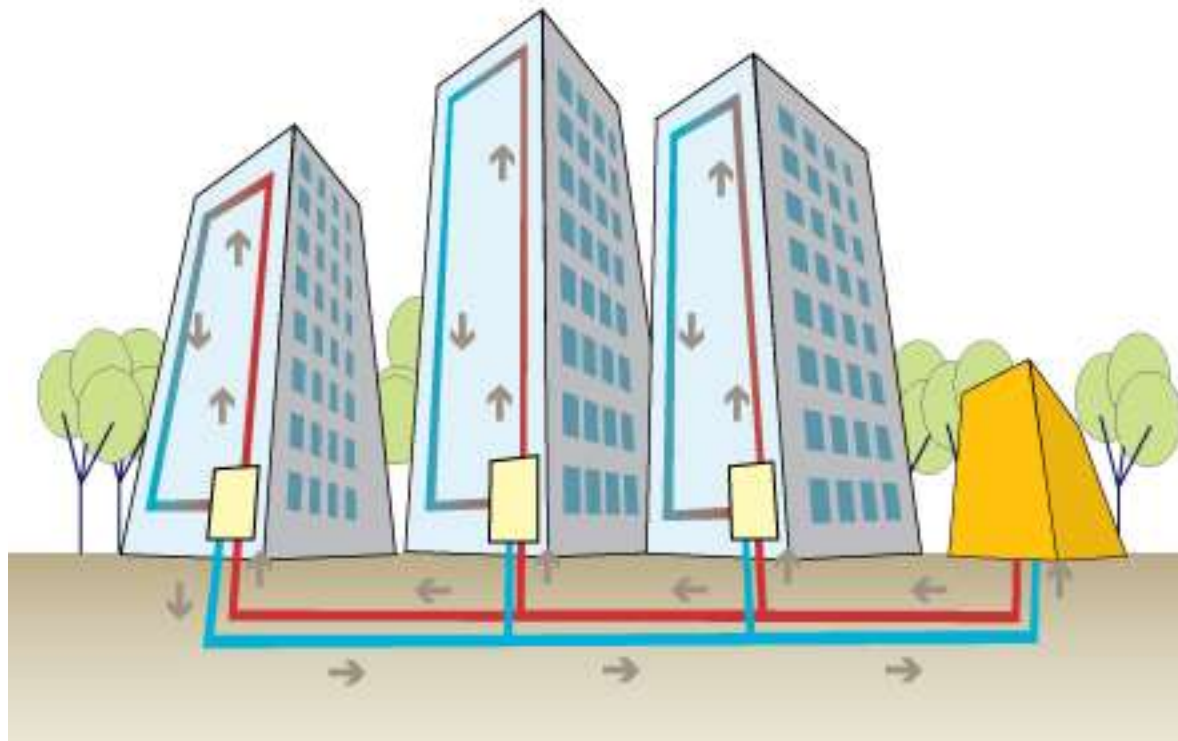
Expanding customers: Option B



Redundant Supply



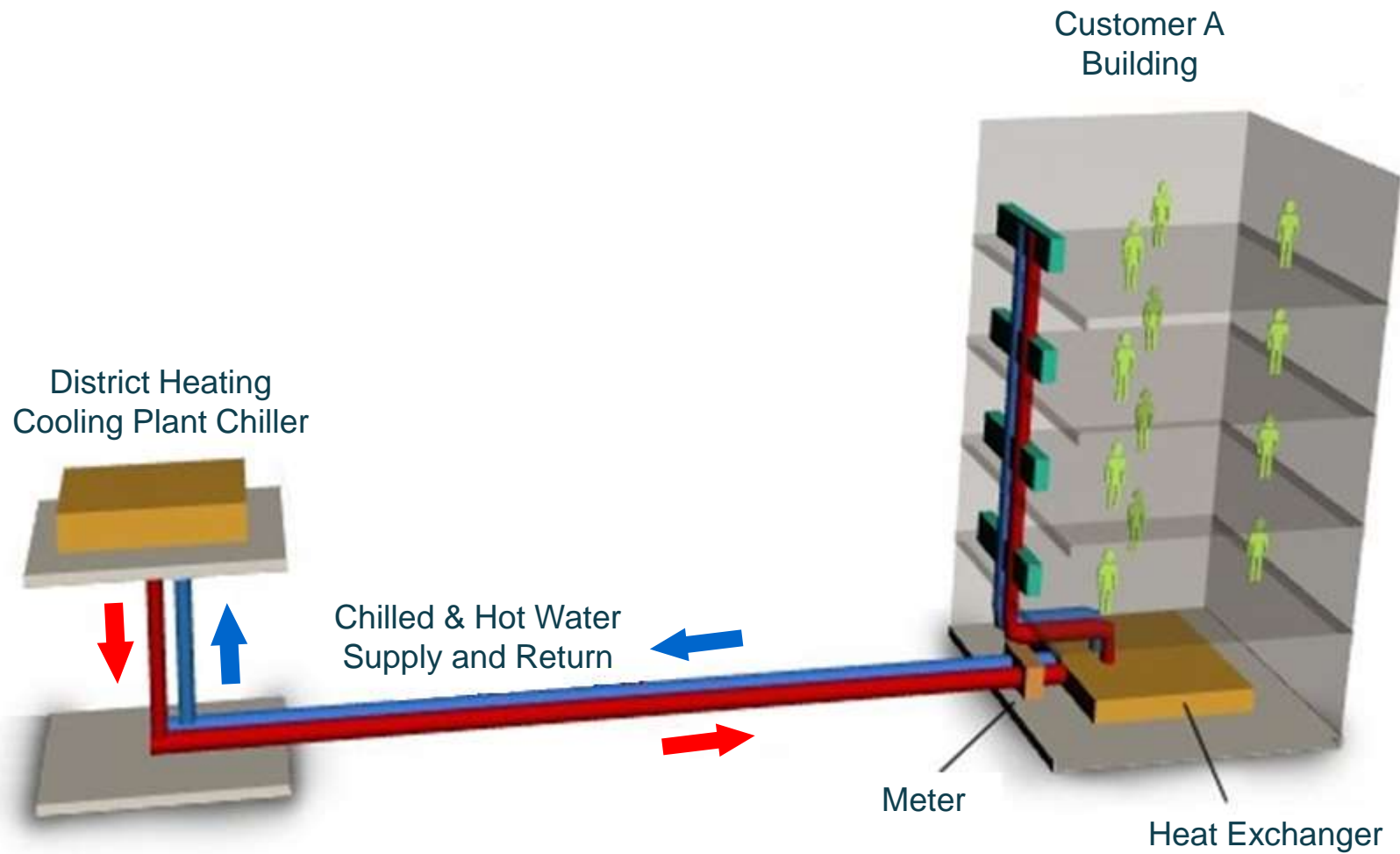
Hidden Ownership Considerations



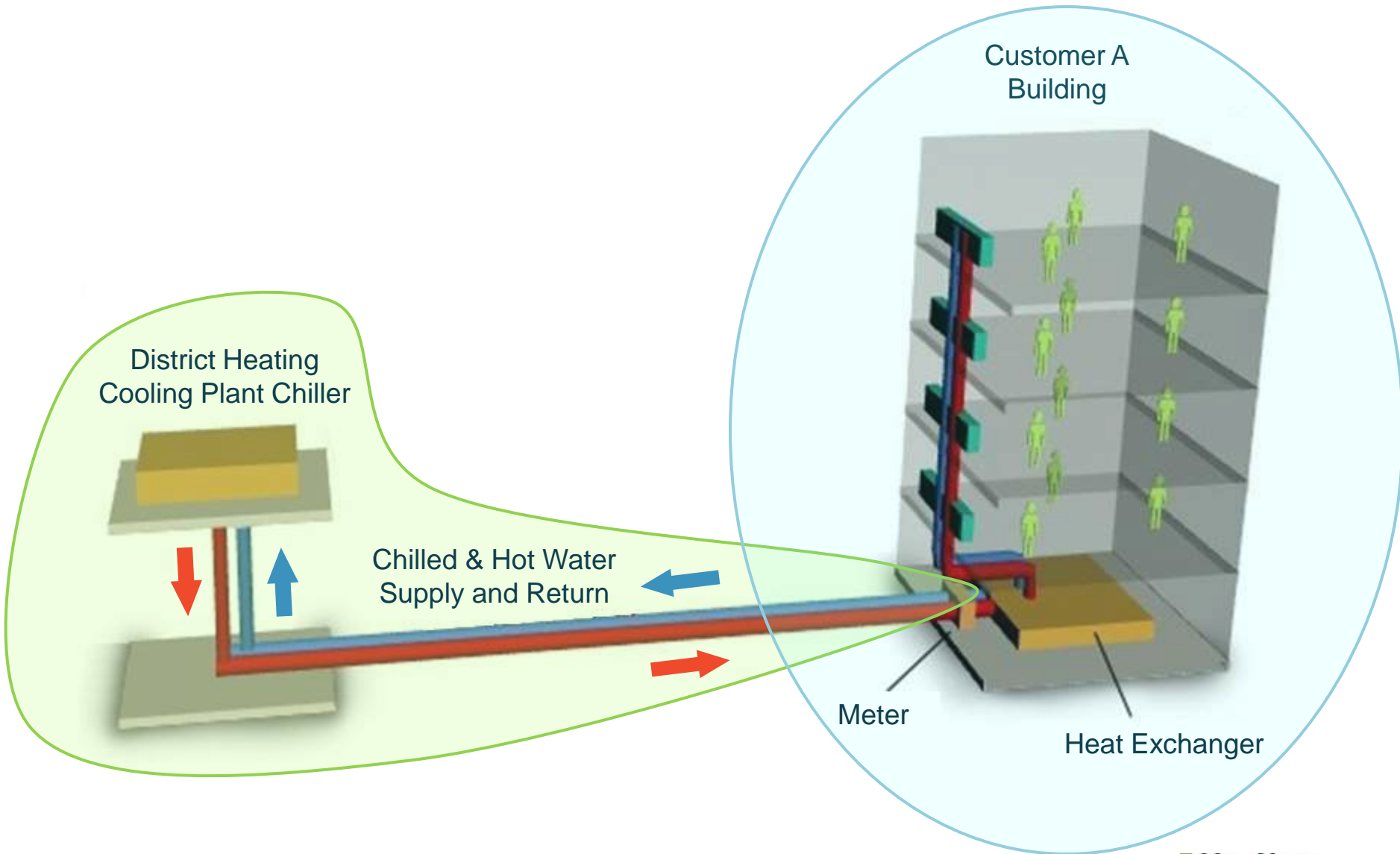
Hidden Ownership Considerations

- Ownership model or services model
 - Consideration of infrastructure ownership (privately-owned district infrastructure vs. shared or joint ownership)
- How do ownership changes occur?
- How are contracts/services assigned?
- Access to qualified maintenance/operational personnel
- Eco Districts likely unregulated (today), but **tomorrow**?
 - Think EPA 111(d) rulemaking initiated June 2, 2014
- MicroGrid could be regulated (today)
 - Think electric reliability standards and physical and cyber security
- Cost of purchasing additional power from utility or returning to the utility

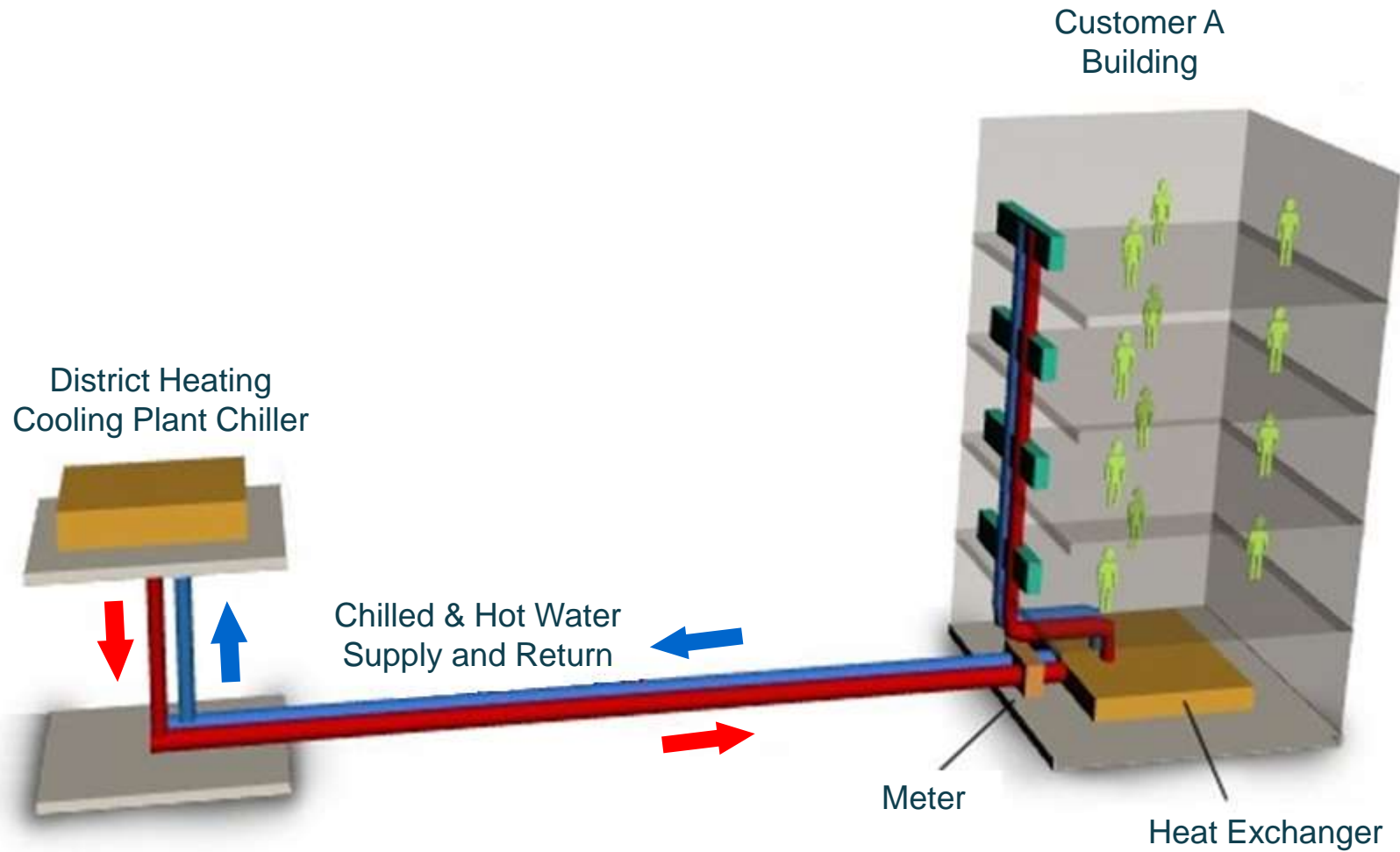
Option A: One owner



Option B: Two owners (Service Provider Model)



Changes in ownership?



Risk Assessment:

Property Owner Perception of Risk

- Concern about relinquishing control over delivering tenant energy to independent operator – replacement of existing electric utility provider
- Risk of service interruption, “loading order issue”
- Potential to become captive to unregulated, third party energy operator with little ability to control energy costs over time
- Impact of privately owned district infrastructure on property values, or as potential barrier to resale
- Stranded asset liability

Risk Mitigation: Contract Issues and Opportunities

- Allow property owners to exercise greater control over interconnection of property to shared system
- Maintain or seek some ownership interest in the district energy system (e.g., maintaining or acquiring ownership of generation infrastructure)
- Caveat: Joint ownership can become onerous if more than one or two property owners are involved
- Subject contractual service agreements to public utility commission review
- Redundant systems for critical operations

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