Ownership Guide for Thermal Energy Networks

Introduction

Thermal Energy Networks (TENs) may be owned by municipalities, cooperatives, corporations, non-profits, and other kinds of organizations.

Different ownership models come with different advantages and challenges. One model may work for one project, but may not be feasible for another. Within one community, multiple TEN-owning entities may operate independently, and some may physically interconnect. TEN development is highly flexible, as are the ownership models that may spur new TEN projects.

Ownership Models vs. Business Models

An *ownership model* for who will own and operate a TEN creates a structure in which a *business model* can be identified. A business model covers how services are provided, revenue streams are established, costs are recovered, and systems are maintained or expanded.

TEN Services

A TEN provides thermal energy to multiple customers. Thermal energy may be provided via hot water for direct use in a building for space heating or domestic hot water, chilled water for direct use in building space cooling, or moderate temperature water for use by a water source heat pump within or adjacent to a building to produce space heating, cooling, and/or domestic hot water.

TEN Revenue and Cost Recovery Mechanisms

Operating a TEN generates revenue that can be used to recover upfront costs, to pay for ongoing services, and potentially to create a profit.

A business model can use one or more revenue streams and can recover costs via:

- A one-time connection fee for customers,
- A monthly user fee,
- A metered usage rate to determine how much thermal energy each customer uses and charge based on that amount (which can be based on gallons of water per minute pumped to a customer's water source heat pump), and/or
- A capacity fee based on peak use, set annually during the full system peak. This may also be set as a customer demand charge, which is based on the customer's annual peak usage whether or not this is coincident with the system peak.

While there are relatively established best practices associated with billing cost recovery mechanisms for TENs, billing metrics are established on a project-by-project basis and can depend on the needs of customers or owners.

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The Focus of this Ownership Guide

This guide describes three possible TEN ownership models and related opportunities:

- Establish or tie into an existing **municipal** utility.
- Set up a new **cooperative** or add TENs to an existing organization.
- Hire a **third party** to develop, own, and operate a TEN as a private enterprise.

For each model, we provide short lists of the main advantages and challenges as well as accompanying financial considerations. There are also questions you can use to explore which model works for your project or vision and a few examples that illustrate the model.

To learn about the role of investor-owned regulated utilities in TEN development, see Which Ownership Model?

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Municipal Ownership

Municipal ownership of a TEN is similar to a municipal water or sewer department or other municipal corporations performing an activity on behalf of the municipality. Its structure and responsibilities are familiar to any municipality that operates shared infrastructure or hires a third party to own or manage it. Customers of a municipal TEN receive a bill similar to a water or sewer bill.

ADVANTAGES

1. Local control and regulation keeps decision-making in line with community priorities, and elected officials can be held accountable by customers.
2. Municipalities can enact zoning and planning to shape a network and can easily coordinate with broader economic development and decarbonization efforts.
3. Projects can be more equitable. Customers can be prioritized based on need rather than profitability, and decisions may not be influenced by investor pressure to deliver economic projects.
4. Access to existing resources, systems, and rights of way are already established, including access to some thermal energy resources (e.g. a wastewater treatment plant).
5. Municipalities have established stakeholder relationships and communication systems, and may already have the ability to manage and maintain a pipe network and bill customers (e.g. a water department).

CHALLENGES

1. Projects may be constrained by a lack of technical expertise among elected officials and municipal staff, as well as limited capacity, budget, and bonding ability.
2. Pace can depend on local politics, leadership priorities, and capacity. Planning periods may not align with political cycles.
3. Substantial outreach and education may be needed to pass a bond or authorization vote where required.
4. Project development may encounter hesitation to expand the municipality's liability. As municipalities are not usually accustomed to taking on market risk, systems that depend on growth for financial feasibility may broaden the risk profile of municipalities. These perceived risks may make it politically difficult to advance a municipally owned TEN.

NOTES

Some drawbacks of municipal ownership may be reduced or eliminated through establishing a municipal corporation to implement TENs.

A **municipal corporation or special district** is an authorized entity with bonding capacity tasked with developing and completing a project. It has a separate governance structure with a board elected or appointed by elected officials.

The special district is separate from the surrounding municipality. Debt issued by the special district may benefit from tax authority but will not have the broad tax support of a municipality

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and is therefore a higher risk structure. Conversely, the surrounding municipality will be isolated from project risk.

Benefits of a municipal corporation or special district:

- Allows project development to happen faster because not every decision needs an official action by elected officials or municipal staff who may have other priorities.
- Tasked with completing a specific project and may have more autonomy to get it done outside political cycles and considerations.
- Can be financially advantageous by creating dedicated operating and capital budgets separate from municipal general funds, with TEN revenues dedicated to supporting operations or expansion.

QUESTIONS TO CONSIDER

1. What is the political viability of embarking on TENs development?
    - Does the community support spending municipal resources on climate action or energy in general?
    - What existing policies, regulatory frameworks, or ordinances support or authorize action on TENs?
2. What is the financial viability of a TEN development?
    - What is the municipality's current bonding capacity and does the municipality have authority to bond for this purpose? Can a project receive bond proceeds if it serves a portion (and not the whole) of the town?
    - What financial risk is the community willing to absorb to support a TEN? Who takes on the risk of TEN investment — the entire town or just those that access the network?
3. What thermal energy resources exist, and which are under the control of the municipality?
4. Are there large anchor institutions or facilities located nearby that may benefit from or support the implementation of TENs?
5. What bandwidth does municipal staff have to dedicate to the exploration and development of a TEN?

Financing Considerations

Municipal ownership offers strong financing opportunities. Cities and towns have the authority and ability to raise money through taxation and fees. They also may have capacity to bond for infrastructure projects and access to low cost capital, though any borrowing for a TEN may have to be weighed against other projects planned by the municipality. Typically, borrowing capacity is limited to the political will behind raising revenue to pay for additional bond debt service.

With the Inflation Reduction Act (IRA), non-taxpaying entities such as municipalities can now take advantage of significant tax incentives. Municipalities qualify for *elective pay* (formerly "direct pay"), which allows for a direct payment to the municipality even though the municipality doesn't owe federal taxes. Towns can receive a check from the IRS for qualifying discounts on TEN installation costs. These discounts are direct subsidies and are modeled after the Investment Tax Credit (ITC) rules dictated in the IRA. Typically, a TEN project qualifies for a 30% federal subsidy under these rules. (See IRA Incentives for TENs for more information.)

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"Because of the Inflation Reduction Act, a local government that makes a clean energy investment that qualifies for the investment tax credit can file an annual tax return with the IRS to claim elective pay for the full value of the investment tax credit, as long as it meets all of the requirements including a pre-filing registration requirement. As the local government would not owe other federal income tax, the IRS would then make a refund payment in the amount of the credit to the local government." https://www.irs.gov/pub/irs-pdf/p5817.pdf

Examples

A majority of municipally owned TENs in North America are long-standing district steam or traditional high-temperature geothermal systems. Although TENs are a different technology, these examples show how a municipality can own and operate a district heating (and cooling) system.

West Union, IA: The City of West Union owns a geothermal network, completed in 2012 and operated by a local district energy LLC. Customers pay a monthly fee based on usage. The geothermal bores and a loop field are located under a green space and city streets. The City is exploring how to expand a project of 11 users to a network serving the larger community.

Jamestown, NY: A municipally owned high-temperature system moves heat from a municipally owned power generating station. Jamestown is a rare municipality that provides all utility services and regulates itself through its own Public Utilities Commission, separate from the New York State Department of Public Service.

Boise, ID: A non-profit operated thermal energy utility known as the Boise Warm Springs Water District has provided geothermal heating to residents and businesses since 1892. The system uses traditional high-temperature hot spring geothermal heat without the need for heat pumps. The largest district geothermal system of its kind in the world, it serves over 5.5 million square feet of conditioned space.

Nashville, TN: The Metro Nashville District Energy System is a traditional 4-pipe steam and chilled water district energy system owned by the City, managed by the City's water department and operated by Constellation Energy, a private third-party operator. The system serves large office, institutional, and entertainment buildings in downtown Nashville.

Other municipally owned district thermal systems:

- Tucson, AZ
- San Bernardino, CA
- Pagosa Springs, CO
- Hartford, CT
- Lansing, MI
- Hibbing, MN
- New Ulm, MN
- Rochester, MN
- Virginia, MN
- St. Louis, MO
- Buffalo, NY
- Akron, OH
- Klamath Falls, OR
- Manitowoc, WI

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Cooperative Ownership

A cooperative ownership model requires joint control of a business entity owning and managing the TEN. Members may include both customers and suppliers of thermal energy to the TEN. Under a co-op model, any TEN profits are mutually shared.

ADVANTAGES

1. Self-governance and local control can help reduce potential conflicts or hurdles to implementing a project.
2. Equitable ownership and fair distribution of resources and benefits can help gain support for a project.
3. A place-based identity can enhance participation. In particular, a cooperative organization that has a local or grassroots origin can foster an organic sense of ownership and belonging to a project.
4. Membership is strengthened when interests are aligned in a virtuous cycle: e.g. an industrial or farm co-op of member manufacturers or suppliers.

CHALLENGES

1. It may be difficult for a co-op to source enough members or launch the entity with local members.
2. Identifying a consistent lead member or leader over time would be limited to local members and could be harder to maintain.
3. Co-op buy-in may be expensive for individual members.
4. Cohesive membership and unity can be difficult to sustain over time. Member behavior may jeopardize a co-op's existence or its ability to cooperate with local government.

NOTES

A co-op may be a for-profit or non-profit composed of individual members and/or member entities. It can provide a diversity of members by including both the thermal energy resource owner and thermal energy users. The co-op model can also influence the scale of a TEN, as a cooperative may be easier to manage as a smaller entity and:

- Better suited to serve a portion of a town versus all residents and businesses, and
- More likely to grow organically over time rather than as part of a strategic decarbonization plan.

QUESTIONS TO CONSIDER

1. Does the community have an anchor institution or organization that could lead or launch a co-op?
2. Does the community have a history of similar co-op activity?
3. What thermal energy resources are under the control of a potential co-op member?
4. What sources of financing and borrowing capacity exist with potential co-op members?
5. What is the collective political power of potential co-op members?

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6. Are co-op members and possible thermal energy resources located on contiguous parcels to avoid crossing public rights of way?

Financing Implications

Selling shares and diversifying a risk profile by including a diversity of members can help to raise capital for TEN project development.

Examples

Examples below show cooperative ownership of district steam systems rather than TENs, but provide illustrations of how a co-op model can work for thermal networks.

Rochester District Heating Cooperative, NY: A non-profit, customer-owned district heating system provides steam to customers who also own a stake in the system. The steam pipes serve existing buildings in Downtown Rochester and have provided heat for new development in its service territory.

Pittsburgh Allegheny County Thermal, PA: A customer-owned district heating system serves the core of downtown Pittsburgh. A central power-generating plant delivers steam to nearby buildings, providing heat, hot water, and in some cases, cooling to customers.

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Third-Party Ownership

Third-party ownership models include TENs constructed, owned, and managed by private, non-municipal entities that are often hired from outside a community. These can include either for-profit or non-profit organizations that specialize in developing and managing infrastructure. Some companies offer "turnkey" service, covering an entire project from conception through feasibility, design, financing, construction, and management.

For the purposes of this guide, third-party ownership does not include businesses incorporated by municipalities (see section on Municipal Ownership).

ADVANTAGES

1. Third-party companies may be able to act faster than more politically invested entities, as they tend to operate with fewer decision-makers and more objectivity.
2. Entities hired to develop and/or operate a TEN are often located outside of the community and can function mostly outside political or other government constraints.
3. Third parties include and/or subcontract the expertise needed to develop, construct, and manage a project.
4. Entities that offer services from project conception to completion can provide a more seamless transition to operation and can be more flexible in terms of transfer of ownership or management.
5. A third-party owner that exists as a public benefit corporation or mission-driven non-profit may more easily align values and interests with a host community.

CHALLENGES

1. A third-party owner that is unregulated but functioning as a de facto monopoly may set or increase customer fees without factoring in customer ability to pay.
2. Decision-making may be opaque to customers and the community, as the level of transparency is up to the company.
3. As a third-party entity is more likely to originate outside a host community, it may see itself as less accountable to that community.
4. Third-party ownership may be in jeopardy if project economics offer lower profit margins over time.

Challenges Specific to For-Profit Entities

- A for-profit owner's drive to create returns for investors can result in lack of customer trust.
- With less local control over providing equitable service throughout a town, decisions may be driven by a company's needs or profit motive rather than the public good.
- Capital returns for investors draw money out of a host community rather than fostering reinvestment (unless the for-profit entity is hosted locally and it or its affiliates conduct no other business elsewhere).

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Challenges Specific to Non-Profit Entities

- Non-profits without a source of recurring revenue may encounter the perception that they are reliant on outside funding and may therefore seem less reliable.
- Non-profits can also be perceived as having less expertise or lower quality leadership than a for-profit entity can attract.

NOTES

Third parties may be regulated by a state Public Utilities Commission or by a local government. Each form of regulation likely requires public utility designation by the state legislature or municipal leadership.

- Third-party TEN providers need authorization by municipalities to access public rights of way, unless access is granted by private entities on and between privately-controlled properties.
- A third party that enters into private, bilateral agreements with other third parties, avoiding public rights of way, is unlikely to become a regulated entity.

Currently, most third parties for TEN ownership are for-profit entities. Non-profit third-party entities are emerging. Some third parties begin as unregulated, then become regulated utilities.

QUESTIONS TO CONSIDER

1. Do the conveniences of third-party ownership outweigh the benefits of municipal or cooperative ownership?
2. How does the expectation of investor returns on a TEN impact the community?
3. For a particular third party: Are TENs the entity's core business? What other work does that entity do that profits may be supporting? Are there conflicts between local values or goals and the third party's or its affiliates' other business (e.g. climate adverse activity)?

Financing Implications

Third parties can seek TEN development and construction capital from a variety of sources including grants, private equity, tax equity, etc.

- A third party with tax equity appetite can take advantage of federal or local investment tax credits to assist with underwriting a project.
- Grant funds, which are generally more available to non-profit rather than for-profit entities, can potentially lower customer fees.

Non-profit entities may have more difficulty raising capital to install or expand a system. With no profits for investors, they have less access to investor capital markets.

Examples

Toronto, ON: Enwave, a private for-profit corporation, operates a district cooling system which provides cooling services to a multitude of buildings in the city's downtown core. The network contains a deep lake water cooling system whereby summer building heat

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is rejected to the bottom of Lake Ontario, which provides a consistent temperature throughout the year. Enwave is exploring opportunities to convert the system to a TEN that would provide both heating and cooling through the year.

Chicago, IL: CenTrio provides district cooling services to 53 million square feet of building space in the densest part of downtown Chicago. The system includes a large bank of ice storage, allowing CenTrio to shift when electricity is used to provide cooling, reducing electric peaks and costs by avoiding peak usage.

Syracuse, NY: Syracuse University partnered with CenTrio under a 40-year concession agreement to upgrade, maintain, operate, and manage the campus' district heating, cooling, and electric systems. The company is exploring ways to expand the system beyond the campus and into surrounding neighborhoods.

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