BDC

Financing Thermal Energy Networks

A Reference Guide for Municipalities & Community Advocates

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Infrastructure Financing and Why It Matters

Infrastructure financing is the set of tools and processes that communities use to pay for the physical systems that keep society running, like roads, water systems, public buildings, and transit. These are massive, long-term investments that shape neighborhoods, economies, and the environment for generations.

While the term might sound technical or remote, infrastructure financing is at the heart of whether your community gets what it needs.

Financing can be considered separate from *funding*. Funding often refers to the source of money, such as taxes, fees, or grants. Financing is the method used to access and distribute that money over time, such as through bonds or loans. Financing is typically paid back with interest. Financing structures can be designed for short-term payback or long-term payback, and with low interest or high interest rates.

Why does infrastructure financing matter? It matters because money shapes what gets built, who benefits, and how quickly we can move from ideas to working assets. It's not just the money part that matters; financing structures are the design lever that determines affordability, equity, speed, and long-term success of projects.

Too often, decisions about how projects are financed—who pays, who benefits, who bears the risk—are made without community input. Yet these decisions are not neutral. They can either advance equity and resilience or reinforce patterns of disinvestment.

Why Infrastructure Financing Matters for Thermal Energy Networks

Thermal energy networks (TENs) are heating and cooling infrastructure systems that use underground water-filled pipes to transfer thermal energy. Like most infrastructure projects, TENs require a large upfront capital investment. The pipes, borefields, and equipment need to be paid for long before they provide heating and cooling to buildings.

This is why financing tools that lower initial capital barriers—like public loans, green banks, or tax-exempt bonds—are so important. Financing also needs to match the lifespan of the infrastructure. Long-term, low-interest financing is crucial for keeping annual costs down and rates affordable for customers. The longer the hold period and cheaper the capital, the more financially viable a project becomes. In addition, the more a project's financial uncertainties or risks can be mitigated—by implementing public-private partnerships, demand or usage guarantees, or strong policy support—the lower the cost of financing. That's especially important for emerging technologies like wastewater heat recovery or geothermal energy networks.

Understanding existing infrastructure financing tools could assist thermal energy advocates and municipalities in building TENs in their communities. Beyond reducing costs, smart financing can actually bring in more investment. Public dollars can serve as a catalyst, attracting private capital from pension funds, insurance companies, or impact investors. When structured well, every public dollar can leverage several private dollars, scaling up the effort.

Why Community Voices Are Critical in Financing Decisions

The people who live with the consequences of infrastructure decisions should have a voice in how those decisions are made. Community members bring critical insights into:

- What infrastructure is needed most.
- Which solutions are culturally appropriate or climate-resilient.
- How projects can avoid harm and deliver shared benefits.

Without community input, financing mechanisms may:

- Concentrate in wealthier communities that can issue bonds more easily.
- Overlook environmental justice communities with the most urgent needs.
- Rely on regressive financing tools that raise utility costs for low-income residents.
- Miss out on creative solutions, like community-driven public-private partnerships.

When community voices are at the center of financing and funding decisions, infrastructure becomes a vehicle for justice, dignity, wealth-building, and local empowerment.

Who This Guide is For

This guide is designed for advocates, community leaders, municipal officials, and public or mission-driven utilities who are working to advance thermal energy networks (TENs). It is specifically focused on non-investor-owned utility (non-IOU) contexts, where local governments, cooperatives, and public agencies often play a leading role in planning, financing, and governing infrastructure.

What this guide does *not* cover:

- This is not a comprehensive survey of every financing tool available. It focuses on the most relevant and common mechanisms for non-IOU communities.
- It does not include financing tools or incentives that were introduced through H.R. 1 or subsequent federal tax code changes. The Treasury and Internal Revenue Service are developing details and guidelines for those federal programs and incentives, and we plan to add them when they are finalized.

Infrastructure Financing Mechanisms At-A-Glance

What they are, how they work, and what they mean for your community

Financing Tool	How It Works	Next Steps	Pros	Cons	Community Watch-outs
Municipal Bonds (e.g., General Obligation or Revenue Bonds)	Local governments borrow money and repay with interest over time (via taxes or project revenue).	Check the bonding capacity of the municipality; do they have the legal right to issue bonds?	Long-term funding for big projects; can be voter-approved.	Repayment increases debt burden or taxes (for general bonds). Voter-approved bonds require public education.	Wealthy municipalities with higher credit ratings may have easier access to bond funding.
Green Bonds	A municipal bond earmarked for climate-friendly projects.	Ensure that TENs count as an approved investment.	Aligns financing with climate goals; attracts ESG investors.	Must prove environmental benefit; similar repayment burdens to municipal bonds.	Watch for greenwashing; ensure real accountability to climate and equity goals.
Grants	Federal, state, or philanthropic funds awarded to support specific infrastructure goals.	Identify grant programs (e.g., from DOE, EPA, HUD) that offer technical assistance. If needed, partner with nonprofits to apply.	No repayment; great for frontline and low-income communities.	Competitive, complex applications; ongoing reporting requirements; matching funds often required.	Underserved communities may lack grant-writing capacity or political influence.
Tax Increment Financing (TIF)	A new district is created where anticipated tax revenue increases are used to repay project costs today.	Attend TIF board meetings. Demand inclusionary zoning, housing protections, and energy equity conditions in TIF projects.	Funds local economic development without raising current taxes.	Can divert new district revenue from schools and services.	TIF districts can accelerate gentrification if not community-guarded.
Public-Private Partnerships (PPPs)	Private entities finance, build, or operate public infrastructure in partnership with the government.	Call for transparency in PPP contracts and public benefit clauses. Request public review of proposed partnerships.	Access to private capital; once negotiated, can accelerate implementation.	May prioritize profit over public benefit; complex contracts may limit public input; private capital often costlier than municipal bonds.	Hold partners accountable to equity and long-term affordability.

Financing Tool	How It Works	Next Steps	Pros	Cons	Community Watch-outs
Community-Based PPPs	Similar to PPPs, but private entities partner with community organizations or co-ops.	Organize or join a local energy cooperative. Apply for seed funding to start a pilot project.	Retains local control; aligns with community goals.	Community organizations may have limited capital assets; requires strong, sustained organizing.	Needs sustained engagement and strong governance models.
Public-Public Partnerships (PuPs)	Two or more public agencies or jurisdictions collaborate and pool resources including money, personnel, or assets.	Encourage collaboration between school districts, water utilities, and housing authorities on shared energy projects.	Maximizes public benefit; promotes local coordination to potentially share costs.	Can be bureaucratically slow; depends on political will across entities.	Use to share resources for equitable projects across agencies or jurisdictions.
Green Banks	Public or nonprofit financial institutions that leverage public funds to attract private investment in clean infrastructure.	Advocate for your state or region to establish a green bank. Encourage programs for thermal energy networks and low-income access.	Catalyze private investment with flexible financial tools; often offer competitive low-interest loans.	Still emerging in many states. Green banks come with startup costs for entities creating them.	Green banks may prioritize creditworthiness or project scale, unintentionally excluding low-income communities or small-scale projects.
Loans (e.g., State/Federal)	Municipalities and community orgs borrow from state & federal programs.	Advocate for low-interest, long-term loans for climate infrastructure with ratepayer protections.	Flexible terms; can layer with grants, bonds and other financing.	Requires repayment; interest costs vary, although typically lower than private capital.	Ensure repayment terms don't burden low-income ratepayers.
State Revolving Funds (SRFs)	State-run low-interest loan programs, often for water and energy projects.	Contact your state agency to learn about SRF availability. Advocate for community access, equity scoring, and technical assistance.	Great for environmental justice communities; can include principal forgiveness; long-term affordability.	Availability varies by state; technical application process.	Push for equity set-asides or technical assistance for frontline groups.

Financing Tool	How It Works	Next Steps	Pros	Cons	Community Watch-outs
Public Improvement Districts (PIDs)	Property owners in a district agree to tax themselves to fund shared infrastructure improvements.	Advocate for tenant protections and equitable voting structures in PIDs.	Localized control; direct funding for shared benefits.	Formation processes and voting rights vary, and can prioritize property owners at the expense of tenants. Dissenters are still subject to taxes.	Risk of excluding renters or frontline communities from decisions or benefits.
Municipal Utility Districts (MUDs; may go by other names)	Special-purpose districts that use bonds to finance, build, and operate utilities in new development or growing communities.	Encourage climate-friendly codes in new MUDs. Explore MUDs as governance models for TENs in new developments.	Can be used to create utility-scale infrastructure from the ground up.	Typically used in suburban development; may lack equity focus. May require local vote, charter amendment or legislation.	Ensure MUDs are climate-aligned and community-responsive, not just growth-oriented.
Public Utility Districts (PUDs)	Publicly owned utility districts that can finance and operate energy infrastructure.	Explore enabling legislation or public vote to create a PUD. Advocate for including thermal networks in PUD charters.	Public ownership allows for democratic governance and climate-aligned investment.	Not available in all states; may need to be created by local vote, charter amendment, or legislation.	Used to transition communities away from IOUs and center equity in utility governance.

How to Finance A Thermal Energy Network

During each step of development there are potential funding sources that align with the specific activities in that step as summarized below.

Step 0: Feasibility & Market Assessment

Purpose: Determine if a TEN project is technically, financially, and socially viable.

Potential Funding Sources:

- **Federal feasibility programs** (e.g., past Department of Energy Community Geothermal grants, Department of Housing and Urban Development Community Development Block Grants)
- **State Energy Office technical assistance funds**
- **Philanthropic support** (especially for EJ/frontline community assessments)
- **Utility-funded pilot studies**

Activities in this step include: Site selection and screening for key suitability criteria (for example, rights-of-way, upcoming street work, diverse thermal loads, leak-prone gas pipelines), preliminary cost-benefit analysis, market sounding with potential customers, and early stakeholder engagement to gauge support.

Key Stakeholders: Potential anchor customers (campuses, data centers, civic buildings, hospitals; properties with sufficient space to house geothermal borefields), residents, community leaders, local government or utility, community-based organizations.

Step 1: Pre-Development & Planning

Purpose: Build the case for the project before construction capital is committed.

Potential Funding Sources:

- **State Energy Office planning grants**
- **Federal programs** (Environmental Protection Agency Environmental Justice Grants, Department of Energy Community Benefits Plans)
- **Philanthropic or mission-driven early-stage capital**

Activities in this step include: Load/thermal demand modeling and mapping, technical feasibility studies, engineering design, community engagement, permitting, environmental review.

Key Stakeholders: Local government, community-based organizations, universities/technical partners, developers/utilities, community advocates, regulators, local agencies.

Step 2: Capital Stack Design

Purpose: Determine which funding sources will finance each part of the project.

Potential Funding Sources and their uses:

- **Municipal or Green Bonds:** Especially for long-term assets, such as borefields & distribution piping network
- **State Revolving Funds:** Water/wastewater integration, shared trenching for pipes
- **Tax Increment Financing:** Especially for development or redevelopment areas.
- **PIDs/MUDs/PUDs:** Long-term assets, such as distribution piping
- **Grants** (DOE, EPA, HUD, state climate programs): Useful for retrofits, workforce development, outreach and engagement, monitoring and evaluation
- **Green Banks** (low-interest loans or credit enhancements): Useful for retrofits, building-side equipment
- **Philanthropy:** Especially for demonstration/EJ projects, outreach and engagement, capacity building

Activities in this step include: Map out project costs by component (borefields, distribution piping network, energy centers, in-building equipment), select appropriate financing tools for each component, structure debt/equity mix.

Key Stakeholders:
Public finance teams, municipal advisors, green bank partners.

Step 3: Ownership & Governance Model

Purpose: Decide who owns, operates, and maintains each piece of infrastructure.

Potential Funding Sources: Funding in this step depends on who will own and oversee the operation of the TEN. Options include:

- **Public Ownership:** Municipality, public utility, special district
- **Public-Private Partnerships (PPPs):** Shared investment and risk; this could include partnering with an IOU
- **Community-Owned Cooperative:** Member-owned thermal utility
- **Private Ownership:** Developer or energy-as-a-service provider with service agreements

Activities in this step include: Determine public vs. private ownership of borefields, pipes, and energy centers; explore community-owned co-ops or infrastructure-as-a-service models; and set governance and cost-recovery approach (rate structures, tariffs, lease payments).

Step 4: Construction & Implementation Financing

Purpose: Secure capital and build the system.

Potential Funding Sources (by Component):

- **Thermal Reservoir (Borefields, Waste Heat Recovery, Lakes, etc):** Municipal/green bonds, SRFs, grants
- **Thermal Distribution Piping Network:** Bonds, TIF, PIDs/MUDs, developer contributions
- **Energy Centers:** PPPs, green bank capital, developer equity
- **Customer Connections and equipment:** Utility rebates, C-PACE, on-bill financing, retrofit grants

Activities in this step include: Issue bonds or secure loans, close financing agreements (PPPs, developer contributions), and draw on grant funds and match requirements. Utilize bridge loans to cover the period between the construction and permanent financing.

Step 5: Operations, Maintenance & Cost Recovery

Purpose: Ensure financial sustainability and affordability long-term.

Potential Funding Tools:

- **On-bill tariffs:** Cost recovery for customer equipment
- **Performance-based service contracts:** Energy Service Companies (ESCOs)
- **Revolving loan:** Repayment for reinvestment

Activities in this step include: Establish rate design or cost recovery model, monitor performance (energy, emissions, savings), and maintain community accountability.

Step 6: Community Engagement & Equity Oversight (Ongoing)

Purpose: Keep community voices central and ensure benefits are equitably shared.

Potential Funding Sources:

- **Philanthropy**
- **State and local government community benefit funds**
- **Federal environmental justice programs**

Activities in this step include: Regular community meetings; transparency reports; equity advisory boards or community benefit agreements; and tracking metrics on affordability, jobs, emissions reductions.

Financing Tools In-Depth

Traditional Public-Sector Financing Tools

Municipal Bonds

These are debt securities (tradable financial instruments that can be bought, sold, or traded) issued by municipalities to fund public projects. There are multiple types of municipal bonds. General obligation bonds are backed by the municipality's full taxing power and require voter approval. Revenue bonds are repaid from project-generated revenues (e.g., toll roads, utility rates).

Features

- Often tax-exempt at the federal level.
- Sold by municipalities to investors in denominations (typically $5,000).
- Have maturity dates, coupon rates, and yields (e.g., Yield to Maturity, Yield to Call).

Common uses

- Construction of schools, libraries, and community centers.
- Building or repairing highways, bridges, and public transportation systems.
- Funding for water and sewer systems.
- Financing public hospitals and healthcare facilities.
- Development of parks, recreational facilities, and other public spaces.

Advantages

- Typically low-risk for investors; municipal bonds have historically low default rates.
- Interest income from municipal bonds may be exempt from federal taxes, and at times, exempt from state or local taxes.
- Long-term, stable returns through regular coupon payments over the life of the bond.

- TENs have many characteristics that align well with bond financing:
    - TENs require significant upfront capital for piping, heat pumps, distribution systems, and interconnection.
    - Components have long lifespans (25–50+ years), aligning with long-term bond maturities.
    - TENs offer predictable revenue streams (e.g., from anchor customers or utility rates), which help secure bond repayment.

What's Required to Use Bonds for TENs?

- **Legal and Regulatory Authority.** Municipalities or utilities need enabling legislation to issue bonds for thermal (or other energy) infrastructure. In some cases, new laws or charter amendments may need to define TENs as an eligible public purpose.
- **Revenue Model & Creditworthiness**
    - A clear plan for cost recovery (rates, service fees, contracts) is essential.
    - Credit rating agencies—firms that assess the creditworthiness of borrowers, like S&P Global, Moody's, and Fitch Ratings—will evaluate the project's stability, revenue predictability, and management.
- **Anchor Tenants or Long-Term Contracts**
    - Hospitals, schools, or commercial customers willing to sign long-term service agreements de-risk repayment.
    - These contracts can serve as collateral for revenue bonds.
- **Capital Planning Integration**
    - TENs should be incorporated into the city or utility's capital improvement plan (CIP) to compete for bond capacity.

Risks and Considerations

- Revenue risk if customers exit or reduce energy usage.
- Construction risk, especially with complex trenching or retrofitting.
- Technology risk if systems underperform or require expensive maintenance.
- Policy risk if regulatory or political support wanes.

Strategies to Ease Bond Issuance

- Performance guarantees from contractors.
- Credit enhancement, or techniques to improve the creditworthiness of a borrower by reducing the perceived risk for investors, e.g., bond insurance, letters of credit.
- Layering with grants or tax credits (e.g., IRA incentives for thermal infrastructure).

Bond Use for a TEN Example

- **Scenario:** A city-owned district TEN serving downtown + university
- Uses a revenue bond based on 30-year service contracts with a university, hospital, and municipal buildings.

- A green bank loan and federal grants provide supplemental financing.
- City raises $25 million to cover construction and interconnection, with annual payments from customers covering debt service.

Debt Financing (Loans)

Definition

Borrowing funds from federal, state, or private sources, with a commitment to repay with interest. Loans are a foundational tool for financing thermal energy networks (TENs), especially during the early stages of the project or when bond issuance is not feasible. Loans can bridge funding gaps, de-risk projects, and help municipalities or developers avoid lengthy bond approval processes. “Bridge loans,” in particular, refers to short-term capital that can bridge a gap in financing.

Common sources of loans include commercial banks as well as federal and state programs (e.g., USDA Rural Development loans).

Common uses

Loans are suitable for projects with predictable revenue streams or budgetary support.

- Transportation Infrastructure
    a. Roads & Bridges
    b. Mass Transit & Airports
    c. Railways
- Energy Infrastructure
    a. Power Plants
    b. Transmission and Distribution
    c. Pipelines
    d. Energy Infrastructure Reinvestment (EIR) Loans
- Water Infrastructure
    a. Water Treatment Plants
    b. Wastewater Systems
- Other Infrastructure Projects
    a. Telecommunications
    b. Social Infrastructure: Projects like building schools and healthcare facilities can also be financed with loans.
    c. Public Safety Infrastructure: Upgrading police stations, fire departments, and emergency response systems can be funded through loans
    d. Waste Management

Sources of Infrastructure Loans

- Government Agencies: Entities like the U.S. Department of Transportation (USDOT), the U.S. Department of Energy (DOE), and the Environmental Protection Agency (EPA) offer various loan programs for infrastructure projects.
- State and Local Governments: State Infrastructure Banks (SIBs) and Revolving Loan Funds (RLFs) provide financing to state and local government entities, according to the California Infrastructure and Economic Development Bank (IBank).
- Commercial Banks: Offer long-term debt products, often using project finance structures, where the loans are secured against project cash flows.
- Export Credit Agencies (ECAs): Can offer debt and risk management solutions if certain conditions are met.
- National Development Banks (NDBs): Provide debt products to infrastructure projects with varying mandates and ratings.

City-Backed TEN Loan: Example

- **Scenario:** A mid-sized city wants to build a district-scale thermal network to decarbonize a civic campus and adjacent housing.
- Uses a $12 million low-interest loan from the state's green bank.
- Repayment via long-term energy service agreements with city departments and a university.
- Supplemented with a $3 million federal resilience grant and IRA incentives for ground-source heat pumps (GSHPs).

Grants

Definition: Non-repayable funds from state or federal agencies. They are competitive and criteria-based and often require matching funds or coordination with other financing sources. Ideal for one-time capital projects, pilot programs, or underserved communities.

What Grants Can Pay For:

- Grants can cover key components of TEN projects that are hard to finance with repayable capital.

How to Layer Grants in a TEN Financing Stack:

Grants are typically used to reduce the amount of repayable financing needed, or to make a project bankable by:

1. Covering non-revenue generating costs (like outreach, design, or subsidies).
2. Offsetting high initial capital outlays that slow payback periods.
3. Enabling early adopters (e.g., affordable housing) who cannot afford connection costs.

4. Funding public good features (resilience hubs, workforce development, equitable access.

Tax Increment Financing (TIF)

Definition: A district-specific financing tool that uses future increases in property tax revenue (from rising land values) to fund present-day infrastructure.

How it works:

- Baseline tax revenues are frozen.
- Any incremental increase due to development is diverted to repay project costs.

Common uses:

- Economic development districts
- Downtown revitalizations
- Transit-oriented development

Innovation District Thermal Energy Network: Example

- **Scenario:** A city redevelopment agency is planning an Innovation District anchored by a community college, start-up incubator, and mixed-income housing.
- To support the district's clean energy and climate goals, the city establishes a Tax Increment Financing (TIF) district to help fund a district-scale thermal energy network (TEN).
- The $15 million TIF allocation covers installation of shared borefields, thermal piping under public rights-of-way, and interconnection points for new and existing buildings.
- As development within the district progresses, increased property tax revenues generated by higher property values are used to repay the TIF bonds that financed the network.
- The TIF proceeds are combined with $5 million in developer contributions and $2 million in state clean energy grants to complete the project's capital stack.
- The city retains ownership of the TEN infrastructure and contracts a local utility to operate and maintain the system under a long-term service agreement.
- The financing structure allows the city to capture value from economic growth and reinvest it directly into low-carbon, community-serving infrastructure that supports both climate and economic development goals.

Public-Private Partnerships (PPPs)

Definition: Long-term contracts between public agencies and private firms to finance, build, and/or operate infrastructure.

Structure:

- Typically include private capital investment and risk-sharing.
- Return on investment through user fees or availability payments, a form of payment in which a public entity compensates a private partner for making a facility or service available.

Variants:

- Community-Based P3s (CBP3s): Integrate green infrastructure and community benefits, especially for stormwater and underserved neighborhoods. See below for more detail on community-based P3s.

Common uses:

- Toll roads
- Water treatment facilities
- Public transit
- Energy systems

Advantages:

- Reduces public upfront costs.
- Leverages private sector expertise.
- Promotes life-cycle efficiency.

Risks and Considerations:

- **Higher Costs:** PPPs can be more expensive than traditional public procurement due to the private sector's need for profit and risk premium, along with higher financing costs.
- **Reduced Public Control:** Private partners may have significant influence over project design and operation, potentially leading to a focus on profit or on outcomes that don't fully align with public needs or priorities.
- **Potential for Corruption:** The complex nature of PPPs can create opportunities for corruption, with private companies potentially gaining unfair advantages or engaging in questionable practices.
- **Risk of Cost Overruns and Failure:** If the private partner fails to deliver, the public sector may face cost overruns, delays, or even have to take over the project, potentially at a higher cost.

- **Complex and Lengthy Processes:** PPPs involve complex tendering and contract management, which can be time-consuming and costly.
- **Fiscal Risks:** PPPs can create long-term financial obligations for the public sector, and changes in economic conditions or technology can impact the project's viability and cost.
- **Inclusivity and Affordability Issues:** PPPs can struggle to ensure affordability and inclusivity in essential services like healthcare and education.
- **Limited Flexibility:** PPPs may lack flexibility to adapt to changing circumstances, such as technological advancements or shifts in public needs.
- **Potential for Inequality:** PPPs can exacerbate existing inequalities if they lead to higher costs for essential services or exclude vulnerable populations.

Downtown District Thermal Energy Network: Example

- **Scenario:** A mid-sized city aims to decarbonize its downtown core, including municipal buildings, affordable housing, and commercial offices.
- The city forms a Public-Private Partnership (PPP) with a local energy services company (ESCO) and a real estate developer.
- The city uses a $10 million Tax Increment Financing (TIF) package and $8 million in private equity from the ESCO to design and construct the borefields, thermal distribution piping, and central energy plant.
- The city retains ownership of the underground infrastructure (borefields and distribution network), while the ESCO designs, builds, and operates the energy center under a 25-year concession agreement.
- Revenue and repayment come from long-term Energy-as-a-Service contracts with connected buildings, including city hall, a university facility, and two mixed-use developments.
- Supplemented by a $2 million federal Community Energy Innovation Grant to fund planning, workforce development, and affordable connection costs.
- The city sets performance targets for emissions reduction, energy cost stability, and equitable access through the PPP contract, ensuring community benefits and accountability.

Community-Based Public-Private Partnerships (CBP3s)

Definition: A specialized form of PPP designed to deliver **community-driven infrastructure** with equity and environmental goals.

Examples or common use of municipal bonds:

- Green stormwater infrastructure
- Community resilience

- Clean energy projects

Key features:

- Long-term, portfolio-based delivery (not project-by-project).
- Emphasizes local workforce development and community ownership.
- Often used to leverage federal/state funding with private investment while centering community benefits.

Advantages:

- May be ideal for disadvantaged, environmental justice or frontline communities, where traditional partnership and financing models may fall short.

Public-Public Partnerships (PuPs)

Definition: Collaborative partnerships between public sector entities (e.g., city-to-city, utility-to-city, or between agencies or levels of the same government).

Purpose:

- Share technical expertise, services, or infrastructure.
- Pool resources to improve scale and efficiency.
- Reduce costs and avoid privatization.

Examples or common uses for PuPs:

- Regional water/wastewater systems.
- Shared procurement or service delivery agreements.
- Knowledge/technology transfers.

Advantages:

- Aligns public interest across agencies or jurisdictions, without a profit motive.
- Retains public control and accountability, as partner agencies answer to elected officials and are designed to serve constituents.
- Enhances capacity for smaller municipalities that may gain access to bulk purchasing power, technical expertise, and staff capacity through the partnership.

Risks and Considerations:

- **Bureaucratic complexity** resulting from coordinating across multiple agencies or governments, which may have different budget cycles, approval processes or procedures.

- **Political will** across multiple agencies or governments is required to commence and maintain a partnership.
- **Fewer resources** than some private-public partnerships, which can unlock access to private capital.

Green Banks

Definition: Green banks are mission-driven financial institutions that use repayable low-cost financing to fund clean energy and climate-resilient infrastructure. In essence, green banks act as intermediaries, using public resources to de-risk and structure attractive investment opportunities that entice private capital to flow into the clean energy sector.

Purpose

- Use public funds to mobilize and leverage private capital from, e.g., institutional investors, foundations, impact investors, and private lenders.
- Fill gaps that conventional financing does not serve due to perceived risks or unfamiliar technologies.
- Invest in technically viable and replicable clean energy projects to build markets and reduce risk over time.

Examples:

- Connecticut Green Bank: Leverages ratepayer funds with private capital to offer low-cost, long-term financing.
- New York City Energy Efficiency Corporation (NYCEEC): Partners with lenders to improve energy efficiency financing through private capital.
- Coalition for Green Capital (CGC): Has facilitated over $25.4 billion in clean energy investments through public-private partnerships.
- Minnesota Climate Innovation Finance Authority (MNCIFA): has granted a $4.7-million loan for a geothermal energy system at the new housing and industrial development on the city of St. Paul's East Side in Minnesota.

Green Bonds

Definition: Fixed-income instruments (bonds) are a type of debt security that pays a fixed rate of interest and are used to finance environmentally beneficial projects. They are structurally identical to conventional bonds, but have explicit commitments to use funds for environmental or climate purposes.

Features:

- Can be structured like traditional bonds—including general obligation *or* revenue bonds—but with use-of-proceeds restrictions that legally bind issuers to environmental projects.
- Third-party verification may be required, and is often certified via the **Green Bond Principles** or **Climate Bonds Initiative**.
- Municipalities, utilities, corporations, and development banks can issue green bonds.

Common uses:

- Renewable energy infrastructure, including solar farms, wind projects, energy storage, or geothermal systems.
- Energy efficiency upgrades, including retrofits or HVAC systems.
- Water infrastructure, including water treatment plants, stormwater management or water conservation projects.
- Climate adaptation and resilience, such as green infrastructure or resilient buildings.

Variants:

- **Blue Bonds**: Focused on ocean and marine ecosystem protection.
- **Climate Bonds:** Specifically targeted to climate mitigation (e.g., emissions reduction).

Risks and Considerations:

- Greenwashing concerns persist due to absence of clear standards, allowing projects with limited or uncertain environmental benefits to be labeled “green.”
- Lack of a required, binding environmental assessment standard, or inconsistent application, can also result in investor confusion and difficulty in assessing actual environmental Lack of standardization
- Regulatory uncertainty can affect bond performance; evolving reporting requirements and climate standards can impact green bond valuations and returns. Stricter regulations may reclassify existing projects as non-qualifying; investors might demand higher interest rates on future green bonds. e.g. risk related to the potential negative impact on the value or performance of green bonds and the projects they finance due to shifts in governmental policies, environmental regulations, and reporting standards related to climate change.