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Research Brief

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Innovative Ideas to Finance Resiliency in the Water Sector

Overview

Distributed, or decentralized, water systems have the potential to increase the resiliency and flexibility of freshwater supply networks by reducing the load on aging infrastructure, eliminating or postponing the need to replace, expand or build centralized systems, decreasing energy requirements for conveyance, and offering alternative solutions if centralized infrastructure fails. Despite these and other potential benefits, financing distributed systems remains a key barrier. To overcome this challenge, Stanford researchers have examined innovative financing models in the electricity sector, which started the transition nearly twenty years ago from a purely centralized system to a hybrid model that includes distributed energy such as wind and solar, to draw applicable lessons for the water sector.

The Framework

Four critical elements for financing distributed solutions:

Case studies of successfully implemented distributed electricity projects – renewable energy and energy efficiency – were assessed and used to propose a conceptual model that could be applied to the water sector. The four elements are:

1. **Catalyzing change through an external stimulus** – an outside stimulus must motivate the shift from traditional to non-traditional solutions.
2. **Establishing a portfolio of reliable funding sources** – a set of steady and reliable funding resources has to be established before project implementation can begin.
3. **Transferring financial and technological resources to end users and other implementers through new distribution pathways** – many pathways incentivize residential, commercial, and industrial end-use customers to install new technologies or adopt new practices by offering cost sharing opportunities or by eliminating up-front costs.
4. **Creating innovative governance structures** – governance structures can help move transactions, push collaborations, and enable project construction that might not be possible in a traditional project management scheme.

Points for Policymakers

Within their model, recommendations for consideration are made for each of the four critical elements identified in the framework and include:

Catalyzing Change

- *Implement standard-setting regulations like Renewable Portfolio Standard (RPS) and Energy Efficiency Resource Standard (EERS) policies.* A water version of a state or regional-level RPS might mandate that utilities meet specific supply portfolio diversification metrics to enhance system reliability and resiliency.

- *Expand EPA's WaterSense program.* A closer synergy with the more well-known ENERGY STAR program would also be beneficial given the interrelationship between water and energy.

Funding

- *Create a mechanism like a Public Benefit Fund (PBF) to finance innovative programs, access to clean water and projects outside of normal operating procedures.* Water sector PFBs could be supported by a variety of sources, such as volumetric or flat fees, taxes or utility operation budgets.

- *Utilize a stormwater surcharge to encourage customers to decrease surface water runoff.* This fee-based program charges customers based on their parcel's ratio of permeable to impervious surface, thereby encouraging green infrastructure.

Resource Pathways

- *Supplement existing grants and loan programs with initiatives targeted at small projects with low cost requirements.* Rebates for such things as turf removal and water-efficient appliances have proven effective in reaching end-users and reducing water use up to 10%.

- *Expand existing on-bill programs such as Property Assessed Clean Energy (PACE) to include distributed water systems.* As some small-scale, distributed systems are installed on individual properties, customers could be more willing to make upgrades if the repayment transfers to future property owners.

- *Create a federal tax credit program, like the solar investment tax credit (ITC), for installation of distributed water systems.* A successful model for encouraging solar installation, an ITC for distributed water could increase installations of on-site reuse systems, green infrastructure, or water conservation projects.

Innovative Governance

- *Implement performance-based financing, such as Environmental Impact Bonds (EIBs).* In these "pay-for-performance" contracts, investors are repaid based on the effectiveness of the infrastructure.

- *Adapt net metering for the water sector to encourage green infrastructure and groundwater recharge.* In one example, rebates are calculated based on the amount of stormwater capture and corresponding groundwater infiltration before and after the green infrastructure intervention.

- *Adopt and encourage establishment of new governance structures and models that enable aggregation of resources.* New governance structures can help expedite project implementation by facilitating transactions, encouraging collaborations, engaging new funders, actors, and beneficiaries, and enabling project construction that might not be possible in traditional project delivery and management schemes. Examples of these mechanisms include project or financial aggregation, alternative investment structures and end-to-end service companies.

Background

Water systems around the globe are facing multiple and complex challenges: environmental degradation, climate change, urbanization, aging infrastructure, and increasing operation and maintenance costs. The integration of distributed technologies into the water system mix could provide a suite of new options that would increase reliability and improve resiliency to these many challenges.

Despite the potential benefits, many obstacles have prevented distributed water solutions from being adopted at a wide scale in the United States. One of the main obstacles is financing. Funding challenges can be more difficult for smaller projects or those that are perceived by investors as involving novel or risky technologies. For example, projects funded through the federal Water Infrastructure Finance and Innovation Act program (WIFIA) must cost at least $20 million to be eligible for assistance, with the exception of projects in rural areas that can be a minimum of $5 million, a threshold still higher than the cost of many distributed water projects.

At the same time, the integration of distributed solutions has advanced at a much faster rate in the electricity sector, which can provide insightful lessons for the water sector. Although important differences between the two sectors exist, for example, water has extensive public health requirements that electricity does not, both entities face similar challenges. The water and electricity

sectors must both secure supplies for growing populations amid a changing and uncertain climate while facing environmental realities, resulting in water and electricity supply and demand regimes that require new technologies, management strategies and funding practices.

Beyond the electricity sector, other sectors such as transportation and the built environment could also provide insight for the water sector. Additionally, researchers should investigate performance metrics that measure success of distributed water systems as this information could be useful to engage stakeholders and incentivize investment. For distributed water solutions to gain traction in the future, the water sector must embrace creativity, not only in finding innovative engineered solutions, but also reinventing the social, institutional and governance structures that overlay them.

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