BRUCE TOBEY AND SEAN McGINNIS

P3s and the Water–Energy Nexus: Opportunities for Water Sector Energy Projects

A PUBLIC–PRIVATE PARTNERSHIP STUDY INFORMS BEST PRACTICES FOR WATER–ENERGY PROJECTS THAT CAN REDUCE COSTS AND ENVIRONMENTAL IMPACTS.

The following article summarizes the Water Research Foundation (WRF) report, *Public–Private Partnership Opportunities for Water and Water Resource Recovery Utility Energy Projects* (Hammond et al. 2017). The report was produced to assist water and water resource recovery utilities (W&WRRUs) in undertaking energy projects through public–private partnerships (P3s). The scope of the report includes a detailed review and discussion of relevant P3 issues, including energy and P3 project drivers, legal matters, allocation of risk, financing options, contractual drafting, and monitoring and oversight. Two of the report's authors summarize key findings and conclusions in this article.

BACKGROUND

The energy use of W&WRRU operations is becoming more significant to the operating budgets of local governments. With substantial power demand from large equipment such as pumps and unit treatment processes, utilities can be among the largest consumers of electricity in a community, accounting for 30–40% of the total electricity consumed (Liu et al. 2012). Collectively,

A full report of this project, *Public–Private Partnership Opportunities for Water and Water Resource Recovery Utility Energy Projects* (project 4634), is available for free on the Water Research Foundation website at www.waterrf.org/PublicReportLibrary/4634.pdf.

W&WRRUs spend about $4 billion annually on energy (USEPA 2008).

Given that most electricity in the United States is generated from fossil fuels (Eisen et al. 2015), utility electricity use contributes to emissions of greenhouse gases (GHGs) and other air pollutants. According to the US Environmental Project Agency (USEPA), W&WRRUs account for approximately 3–4% of energy use in the United States and emit more than 45 million tons of GHGs annually (USEPA 2013).

Furthermore, certain biological treatment processes at water resource recovery facilities produce biogas; its primary component, methane, is a much more potent GHG than carbon dioxide. Facilities with anaerobic digesters flare the biogas—i.e., continuously burn it off—thereby wasting the energy content and releasing carbon dioxide. The composition of anaerobic digester gas is 60–70% methane (the rest being mostly carbon dioxide) (USEPA 2011), and for every mgd of treated wastewater, anaerobic digester biogas can produce 26 kW of electric capacity and 2.4 million Btus/day (USEPA 2013).

Energy projects at utilities provide significant opportunities both for controlling costs and minimizing environmental impacts (Tarallo et al. 2015). Depending on a facility's age, processes, and operations, efficiency measures can reduce costs as much as 25% (USEPA 2008); USEPA estimates an average 10% reduction in costs through efficiency measures alone, which amounts to a savings of more than $400 million annually (Lieby & Burke 2011). For suitably sited utilities, generating electricity from wind or solar power is a meaningful option (Environmental Financial Advisory Board 2008).

For utilities, energy optimization can provide cost savings, introduce new revenue streams, provide tax benefits, improve reliability, and reduce the facility's environmental footprint. Given all of these considerations, reducing energy use and related costs has become an achievable goal for W&WRRUs. At the same time, local governments and utilities have increasingly embraced policies and cultures of sustainability, providing W&WRRUs opportunities to reduce their environmental impacts.

Energy projects include a wide spectrum of activities, from undertaking efficiency measures to self-generating electricity. P3s offer a promising way to assess and allocate risks, raise new capital, tap private expertise, and promote innovation while meeting utilities' obligations to their consumers. Energy projects can be particularly well suited to P3s because they often require expertise outside of W&WRRU capabilities; moreover, such projects involve many financing mechanisms that are attractive to private partners.

As we discuss P3s, it is important to answer a basic question: what kind of partnership is a P3? The authors subscribe to the following working definition from the Environmental Financial Advisory Board (2008):

> A [P3] is a contractual, institutional, or other relationship between government and a private sector entity that results in sharing the duties, risks, and rewards of providing a service in which the government has an interest, recognizing that the government retains ultimate responsibility for insuring that social needs and objectives are met.

THE ENERGY PROJECT LANDSCAPE AND P3s

Whether a utility is exploring P3 options to tackle a potential energy project or seeking to enhance one already in progress, there are four important drivers to consider:

- Engineering drivers reflect needs to manage costs and risks, upgrade equipment, enhance reliability, and manage resource streams.
- Environmental and sustainability drivers include requirements to reduce harmful emissions, build resilience, and enhance social responsibility.
- Federal statutory and regulatory drivers, which are subject to change and therefore require close consultation with qualified legal counsel, include investment and production tax credits, policies promoting renewable energy, and energy market incentives.
- State statutory and regulatory drivers provide grant funding, set standards, create secondary markets, and authorize contracting mechanisms; as these are also subject to change, utilities should consider them in consultation with knowledgeable counsel.

Four classifications effectively describe the range of projects that utilities typically consider to produce energy, manage costs and risks, and promote sustainability:

- Demand-side measures, including energy efficiency upgrades and demand response efforts
- Combined heat and power, such as biogas resource recovery technologies and applications
- Alternative biogas applications, which capture, treat, and feed biogas into a natural gas pipeline

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- Non-emitting renewables, which involve technologies focused on solar, wind, and in-pipe and effluent hydro

There are six areas utility decision makers should keep in mind when evaluating the relative merits of conventional design–bid–build procurement against those of alternative P3 options:

- Access to private sector expertise—conduct an analysis to determine the best contractual framework for capturing required access to the industry-wide best practices, advanced technologies, and enhanced asset management skills.
- Efficiency gains—compare the economies of scale, input optimization, integrated project delivery, cost, and performance guarantees of each procurement option.
- Transfer of risk—identify the best way to spread between the utility and its project partner the risks of potential regulatory, financial, managerial, performance and technology, project delivery, and output projection issues.
- Value for money—conduct a comprehensive project delivery financial evaluation, based on a life cycle accounting of costs, risks, and benefits, to determine which project delivery option produces the best value over the life of the project.
- Alternative financing—measure the extent to which each procurement option provides access to private capital, avoids adding to public debt, and leverages guaranteed cost savings and other revenue streams and incentives such as grants or tax credits.
- Accountability—assess the capacity of each procurement approach to produce a contract with needed performance specifications, transparency, and oversight.

Broadly speaking, four types of structures are used in undertaking P3 energy projects:

- Energy savings performance contracts (ESPCs) guarantee that the infrastructure improvements, replacements, or upgrades will deliver a specified amount of energy, water, or operational savings over a period of time. ESPCs represent a combination of project financing–design–upgrading funded by a guaranteed pool of economic savings or cost avoided.
- Power purchase agreements (PPAs) are contracts providing a guaranteed price on electricity purchases; these create a dedicated revenue stream to attract investors and may be embedded into other structures or stand alone.
- An alternative delivery model based on best value relies on a request for proposal (RFP) process to generate a contract with a private partner that assumes full responsibility of timely new project financing, delivery, operations, and performance. A PPA is a key contracting mechanism. A common energy-focused P3 model in this category is design, build, own, operate, and transfer, through which the private partner provides design and building services, owns and operates the facility for a period of years, and then transfers it to the utility.
- Leases are used when the private partner is merely operating on utility property and accessing utility assets to produce and sell an energy resource.

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BEST PRACTICES FOR CONDUCTING A P3 ENERGY PROJECT

There are valuable lessons to be learned from P3 energy projects already undertaken at other utilities. The WRF report features five P3 utility energy projects from around the United States (Hammond et al. 2017). Following are some of the best practices used to address the most common challenges a utility P3 energy project will likely encounter. The best practices have been grouped around the following areas:

- Setting utility priorities, selecting the energy project, and identifying the optimal project delivery tool
- Socializing the P3 by designating a political champion who engages both internal and external stakeholders in a sustained consensus-building dialogue
- Approaching the procurement process, which includes bidding, requests for qualifications and proposals, proposal review, partner selection, and contract negotiation
- Ensuring that the final P3 contract is as detailed and comprehensive as possible, including a term-by-term guide to contract provisions

It is important to remember that these best practices prescribe steps that will often take place simultaneously and adaptively as further information becomes available. In fact, an overarching best practice is adaptive management, which reflects the ability to remain flexible throughout the project development and procurement processes and to update expectations and approaches as needed. Such an approach is critical to success.

Setting utility priorities and selecting the energy project. A utility needs to get started by identifying its energy priorities, creating an action plan, establishing an energy improvement leadership team, and conducting a project delivery evaluation and a value-for-money analysis. The first step is to evaluate the utility's energy use and costs. Armed with that information, the utility can then establish clearly defined goals. Easily articulated examples include the following:

- Improve a facility's energy efficiency by 15%.
- Leverage excess biogas to turn a profit.
- Self-generate 65% of a facility's power and heat.

The utility should then align these well-defined goals with its operational needs, including current or planned upgrades and construction, and engage in a planning process to develop an action plan. This should identify tasks, responsibilities, and priorities, as well as potential capacity constraints and the necessary resources to carry out a project. It is critical to seek top management's approval, commitment, and involvement even at the early stages of goal setting and action-plan development. The authors therefore suggest the utility establish an energy improvement leadership team to advance the effort.

Because a P3 can help a public partner transfer or mitigate risk, thinking in terms of risk allocation is key. The authors recommend engaging in a risk analysis that considers the project's entire life cycle. It would include three tasks:

- Identify all risks.
- Assess their likelihood and severity.
- Consider options to manage or potentially reallocate those risks to a private partner.

This process will also inform the value-for-money evaluation, which will aid in identifying the most appropriate project delivery model by enabling the utility to determine whether an alternative P3 option is financially preferable to a traditional approach for undertaking a project.

With all these steps completed, the utility can identify the optimal delivery tool for its energy project.

Socializing the P3 project. New approaches differing significantly from established norms have a small chance of success unless a political champion steps forward to socialize the project and pave the way for its success. The political champion should be a recognized and respected community leader, whether a private citizen or a public figure, including but not limited to a mayor, county or city manager, or utility director. Whoever assumes the role of political champion must take the lead by engaging and educating all stakeholders, including representatives of the local government, the community, the utility, any affected unions or business groups, and local media.

Furthermore, the political champion must build an environment of trust and transparency, developing strategic partnerships with stakeholders who are necessary participants in the engagement and evaluation of vital project predevelopment objectives. This is hard work, and it can take time, but time spent up front promoting awareness, understanding, and buy-in will save time later. Sample objectives include the following:

- Explain the need for the project.
- Anticipate and overcome barriers.
- Design a communication and outreach strategy.
- Build and maintain support for the project.

The champion must engage stakeholders and draw them into a consensus-building dialogue with diplomacy and transparency and without dictating a preferred outcome. Ensuring that all project analyses, such as the findings of the value-for-money analysis, are disclosed to the public as part of the communication effort will engender public understanding of and support for the project and encourage greater accountability for the investment of public dollars. In the end, the critical importance of the political champion to a P3 project's success cannot be overstated.

Approaching P3 procurement and selecting a partner. On the basis of the findings from the WRF report, the authors recommend a two-part competitive bidding process beginning with a request for qualifications (RFQ) phase followed by an RFP phase. The benefits of this approach are many, but key is that it will help ensure an expansive, competitive search and the opportunity to evaluate and compare multiple proposals.

The RFQ phase prequalifies potential bidders and lays the foundation for an effective competitive process. It will typically yield a short list of three to five qualified bidders based on a screening process reflecting three key parameters: (1) financial capacity (i.e., historical financial health), (2) financial capability (i.e., ability to raise needed capital), and (3) organizational stability and experience. Subsequently,

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the RFP phase leads to bidder presentations of detailed proposals; using an interactive RFP process to exchange feedback and clarifications is ideal for promoting creativity and reducing the possibility of misunderstanding or inappropriate reliance on a predefined solution.

When selecting the optimal partner, unless required by law, a utility should award a contract on a best-value basis, and not on a lowest-bid basis. This is best done by selecting the winning proposal through the combination of lowest life-cycle cost and best value, which includes an analysis of a private partner's past successes in performing its assigned tasks and meeting quality standards, as well as its financial strength and technical expertise.

Creating a win–win partnership. A win–win partnership relies on the strength of a well-written contract underpinning the arrangement. Especially if the utility is entering into a P3 energy contract for the first time, the best practice is to enlist the assistance of outside counsel that specializes in such agreements. Simply put, the contract needs to be akin to a well-written owner's manual: it should address all the obligations of both parties as well as state how any contingencies will be handled. The contract should be able to answer all questions that might arise in the future even after the original personnel involved in developing the agreement are no longer there.

A high-level statement of important contract considerations includes the following examples:

- Clear and objective performance criteria
- Ongoing accountability and oversight, with periodic reporting and monitoring provisions designed to assess contractual performance
- Mechanisms for dispute resolution
- Mechanisms for renegotiation and readjustment that maintain the parties' relationship and aim at fair results for all concerned

With a well-drafted contract in place, contract management becomes the priority. Defining monitoring and oversight responsibilities will help in achieving a successful project.

Lastly, a successful project requires that the project champion and the utility's top management continue to engage stakeholders as the project proceeds, keeping everyone updated on the project's progress, announcing any major milestones and successes, and sharing measured effects to support future utility initiatives.

CONCLUSION

As W&WRRUs increasingly adopt cultures of sustainability while seeking to manage costs or develop new revenue streams, the number of P3 energy projects will likely grow. Moreover, it is estimated that more than 3,800 water resource recovery facilities could support energy projects through biogas systems development alone (ABC 2018). Critical success factors for energy-related P3s include the following:

- Understanding the utility's energy use and needs and its alignment with strategic and operational priorities
- Identifying a political champion who can engage stakeholders in a sustained consensus-building dialogue that will obtain buy-in and commitment from the local government, top managers, the workforce, and the public
- Building on that consensus to create an action plan that has concrete goals and is supported by stakeholders
- Selecting the right project delivery mechanism using risk tools and a value-for-money analysis
- Undertaking a procurement process that leads to a win–win contract with clear terms and flexibility for contingencies
- Monitoring contract performance while collaborating with the P3 partner(s) to address issues as they arise and ensure successful outcomes

ABOUT THE AUTHORS

__Bruce Tobey__ (to whom correspondence may be addressed) is Of Counsel at Pannone Lopes Devereaux & O'Gara LLC, Northwoods Office Park, Ste. 215 N, 1301 Atwood Ave., Johnston, RI 02919 USA; btobey@pldolaw.com. He brings extensive experience to the use of public–private partnerships as a means for achieving wastewater utility goals from his service as the mayor/chief executive officer of Gloucester, Mass., his past work as a senior attorney at the Massachusetts Water Resources Authority, and his many years of private legal practice in the municipal infrastructure sector at Pannone Lopes Devereaux & O'Gara LLC. He was the principle investigator for and coauthor of the WRF study, Public-Private Partnership Opportunities for Water and Water Resource Recovery Utility Energy Projects, *which was published in 2017. __Sean McGinnis__ is vice-president at the COEFFICIENT Group, a Washington, D.C.-based strategic consulting practice that combines legal, government relations, and corporate advisory services specialized in managing energy and environmental risks and investments.*

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