The Financial Impacts of Alternative Water Project Delivery Models:

A Closer Look at Nine Communities

The Environmental Finance Center at The University of North Carolina studied the financial structure and outcomes of alternative water service delivery models in nine communities across the country. This document summarizes the key similarities and differences of the models used by these communities.

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Acknowledgements

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About the Environmental Finance Center

The Environmental Finance Center at the University of North Carolina, Chapel Hill is part of a network of university-based centers that work on environmental issues, including water resources, solid waste management, energy, and land conservation. The EFC at UNC partners with organizations across the United States to assist communities, provide training and policy analysis services, and disseminate tools and research on a variety of environmental finance and policy topics.

The Environmental Finance Center at the University of North Carolina, Chapel Hill is dedicated to enhancing the ability of governments to provide environmental programs and services in fair, effective, and financially sustainable ways.
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About the Water Infrastructure Resiliency Finance Center

The Water Infrastructure and Resiliency Finance Center identifies financing approaches to help communities make better-informed decisions for drinking water, wastewater, and stormwater infrastructure that are consistent with local needs.
https://www.epa.gov/waterfinancecenter

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Background

One of the most challenging issues surrounding water infrastructure finance relates to the choice of what project and service delivery models are employed to build new assets, improve existing assets, and to operate, maintain and finance those assets. The most common "traditional" project delivery model used by local government utilities in the U.S. (often referred to as the "project sponsor" or "sponsor") relies heavily on phased procurement of services. In phased procurement, a project sponsor develops infrastructure assets by bidding the necessary services sequentially, starting with the procurement of a design firm to supply the infrastructure design. Under competitive bidding rules, different firms then submit bids for construction that are based on the preliminary design work. The public entity normally arranges financing for the project and retains ownership for the assets and facilities once they go into service.

State and local laws heavily influence these processes and often require (or at least orient) governmental sponsors to select qualified bidders on the basis of the lowest cost bid in response to a completed design.[1] This model is often referred to as a Design, Bid, and Build ("DBB") approach. While this approach tends to achieve lowest cost bids for project construction, it may not incentivize creativity and may include construction elements that contribute to higher future operation and maintenance costs than if construction and operation were more integrated. Further, this approach can also expose the project sponsor to a disproportionate amount of risk that arises over the lifecycle of the proposed assets. This includes risks stemming from project construction change orders and operating inefficiencies that can be directly tied to the "lowest cost" procurement models used in project construction.

There are many terms and labeling conventions for alternative service delivery models. Terms such as Public Private Partnership (P3) and Performance Based Infrastructure Delivery are common, but they can carry slightly different meanings in different geographic settings (different states, different countries) and different sectors (water vs. transportation). For example, Public Private Partnership, Performance Based Infrastructure Delivery and Service Model ("P3", "PPP" or "PBI") (together, "alternative service delivery models"), are used in Europe, Canada, and Australia.

These models are touted as an approach to delivering better quality infrastructure services in a shorter build period and often at a lower cost than the more conventional U.S. infrastructure procurement models. There are multiple guides that describe the different approaches and hundreds of case studies focusing on various aspects of these models. At the same time, there is considerable debate concerning

[1] Houston, Norma. *North Carolina Local Government Contracting: Quick Reference and Related Statues.* UNC School of Government. November 18, 2014.

the effectiveness of different approaches. Many in the field are convinced that with the proper design, alternative service delivery models offer advantages over more traditional approaches and offer substantial opportunities to meet the country's sizable water infrastructure challenges.[2,3] There are also fierce critics of many of these models, particularly models that involve a higher level of participation by the private sector.[4]

Many of the publications and analyses of these models have been developed and/or published by organizations with a stated objective of either discouraging or encouraging the use of alternative models. In order to provide a different perspective on the impacts of these models, the U.S. Environmental Protection Agency (EPA) and the West Coast Infrastructure Exchange (WCX) requested that the Environmental Finance Center at The University of North Carolina Chapel Hill (UNC), a non-advocacy applied research program within the UNC School of Government, study a small sample of communities that have employed diverse models involving public-private partnerships and public-public partnerships.

Study Objective

The goal of this study was to highlight variation in approaches to alternative water project/service delivery models and the different financial impacts of these models. The study was not designed to answer the question about whether alternative service delivery models are universally beneficial or detrimental, but to show the variation in implementation and design that allows communities to customize them to fit specific needs. The study documents several components of how the models were implemented, including how the project was developed and procured and how risks were allocated. However, the primary focus of the study was on the key financial features of the models. The study examined the financial goals and features of each model as they were originally envisioned and promoted to the community leaders that approved them. In addition, to the extent possible, the study assessed whether the outcome differed from initial expectations. The study was not designed to be a detailed quantitative evaluation of each model. Rather, the study is comprised of a portfolio of "financial profiles" that provide enough detail for communities considering these models to better understand how the models can be structured and the range of financial outcomes communities can expect.

Methodology

The UNC research team worked with staff from the West Coast Infrastructure Exchange and the EPA Water and Infrastructure Resiliency Finance Center to select communities that implemented diverse service delivery models for different types of projects and services.[5] The research team investigated

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[2] Friedman, Stephen. *Successful Public/Private Partnerships: From Principles to Practices. Urban Land Institute/Private Partnership Councils*. 2016. http://uli.org/wp-content/uploads/ULI-Documents/Successful-Public-Private-Partnerships.pdf

[3] Sabol, Patrick, and Puentes, Robert. *Private Capital, Public Good. Drivers of Successful Infrastructure Public-Private Partnerships*. Brookings Institute. December 2014. https://www.brookings.edu/wp-content/uploads/2016/07/BMPP_PrivateCapitalPublicGood.pdf

[4] *Trends in Water Privatization: The Post-Recession Economy and the Fight for Public Water in the United States. Food and Water Watch*. November 2010. http://www.foodandwaterwatch.org/insight/trends-water-privatization

[5] While staff from the EPA, WCX, and representatives from many of the communities and service providers reviewed drafts of the profiles to provide comments and insights, the content presented in the study (including the description of the different models and analysis conclusions) are solely the responsibility of the authors and do not represent the official views of the EPA, WCX, or the University of North Carolina.

projects and programs in 9 communities across the country and 11 distinct examples of alternative delivery models. The communities and their partners invested in new facilities and/or capital improvements for a variety of water and wastewater services and projects. In several of these communities, the project delivery model evolved over the course of the project, resulting in the opportunity to study multiple models within a single community. In some cases, communities began their efforts with one delivery method and ultimately decided to shift to another model.

Table 1 presents a list of the communities and the different service delivery models profiled. The research team acquired and carefully reviewed contracting and other background documents for each of the project delivery methods. The team carefully reviewed technical studies, board meeting notes, and press coverage of the models to better understand how the models were presented to the public and the governing boards that ultimately approved them.

Most of the models studied involved a private sector partner or team of companies providing services to a governmental entity such as a city, county, or government utility agency; however, in one case (Allentown), the model involved a local government (Lehigh County Authority) providing services to another local government (the City of Allentown). What separated this model from a more traditional regional project was that the relationship arose from a competitive Request for Proposal process involving public and private sector bidders. The resulting public-public relationship followed a strict performance-based contractual agreement rather than a more traditional interlocal service agreement.

In some cases, partnership agreements were crafted to allow a partnering entity to manage all the components of the public entity's water and wastewater system (Bayonne, Rialto, and Allentown). In other cases, private partners were tasked with upgrading a single major existing facility (e.g. Regina Wastewater Treatment Plant). In some cases, private partners constructed completely new facilities that were to be owned by the public partner but operated by the private partner (Phoenix Water Treatment Plant and Davis Woodland Water Supply Project). Finally, in some cases private partners were tasked with constructing new facilities that were initially owned by the private sector and for the purpose of providing services under a service purchase agreement (Santa Paula Water Recycling Facility and Tampa Bay Desalination Plant).

Table 1. Communities and projects included in the study

Community/Project Sponsor	Primary Service Provider Partner (s)	Project Agreement	Model Description/ Outcomes	Facility/Facilities Served by the Model	Services Provided by Partner
City of Allentown, PA	Lehigh County Authority	Allentown Water and Sewer Utility Concession and Lease Agreement	A public-to-public partnership between the City of Allentown and the Lehigh County Authority led to a more integrated regional utility system. At the same time, the partnership generated a large initial payment that helped Allentown meet non-utility financial obligations.	Water and wastewater system	Initial capital improvements, operation and maintenance, arrangement of financing
City of Bayonne, NJ	Bayonne Water Joint Venture, LLC (Partnership between Suez/United Water and Kohlberg Kravitz & Roberts)	Bayonne Water and Wastewater Concession Agreement	After a period of underfunding and deferred maintenance, the Bayonne Water and Wastewater Concession Agreement monetized existing assets, restructured debt, and transferred asset management responsibility to the private sector. The agreement led to improved service efficiency, stronger general government financial condition and modestly higher rates.	Water, wastewater, and stormwater system	Initial capital improvements, operation and maintenance, arrangement of financing
City of Davis, City of Woodland, and University of California at Davis/Woodland Davis Clean Water Agency	CH2M Hill	Service Contract for the Design, Construction, and Operation of the Woodland-Davis Regional Water Treatment Facility	The Cities of Woodland and Davis California joined together to construct a new surface water treatment plant using a 15-year Design Build and Operate ("DBO") agreement and public financing from State Revolving Fund ("SRF") loans to reduce the lifecycle cost of the project.	River water withdrawal, transmission system and new water treatment plant	Facility permitting, project design, construction, start-up and on-going operation and maintenance

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Community/Project Sponsor	Primary Service Provider Partner (s)	Project Agreement	Model Description/ Outcomes	Facility/Facilities Served by the Model	Services Provided by Partner
City of Phoenix, AZ	American Water Services (Project Leader and Operations), Black & Veatch (Design), and McCarthy Building Companies (Construction)	Lake Pleasant Water Treatment Plant Design Build and Operate Project	The Phoenix Lake Pleasant Water Treatment Plant is one of the nation's first large-scale Design Build and Operate (DBO) water treatment plant projects. The City of Phoenix used the DBO approach to increase the speed of construction, foster technological innovation, reduce risk, and achieve lifecycle cost savings. Customer usage and operating conditions were different than originally anticipated, highlighting the potential impact of how risk associated with reductions in demand is allocated in service delivery agreements.	New Lake Pleasant Water Treatment Plant	Facility permitting, project design, construction, start-up and on-going operation and maintenance
Prince Georges County, Maryland	Corvias Prince George's County (Program Manager), CH2M Hill Constructors Inc. (General Contractor);Bowman Consulting Group, Ltd and CH2M Hill Engineers, Inc. (Design Engineers)	Prince George's County Urban Stormwater Retrofit Public Private Partnership Master Program Agreement and Master Maintenance Agreement	The Prince George's County Urban Stormwater Retrofit Public Private Partnership is a Pay for Performance service delivery model designed to improve water quality through installation of high impact stormwater control measures throughout Prince George's County. The approach delegates project selection, design, construction, operation, and maintenance responsibility to a team of private partners. The agreement also requires the development and implementation of social and economic development programs.	Urban Stormwater Retrofits	Project identification, project implementation, operation and maintenance

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Community/Project Sponsor	Primary Service Provider Partner (s)	Project Agreement	Model Description/ Outcomes	Facility/Facilities Served by the Model	Services Provided by Partner
City of Regina, Saskatchewan, Canada	EPCOR Prairies Inc.	Agreement to Design, Build, Finance, Operate and Maintain: Regina Wastewater Treatment Plant Upgrade Project	The City of Regina's detailed analysis and planning process led it to use the Design, Build, Finance, Operate, and Maintain (DBFOM) delivery mechanism to carry out necessary upgrades to their wastewater treatment plant. The City's model incorporated private sector financing, carefully allocated risks, expedited construction, and minimized facility lifecycle costs.	Upgraded Wastewater Treatment Plant	Facility permitting, project design, construction, arrangement of financing, start-up and on-going operation and maintenance
City of Rialto, California	Rialto Water Services Inc., Table Rock Capital (project lead and equity provider), Ullico Infrastructure Fund (equity provider), and Veolia Water (Operator)	Concession Agreement: Service Contract for the Design, Construction, and Financing of Upgrades and for the Operation of the Rialto Utility Authority Wastewater Facility and Water Facility	The City of Rialto, California used a 30-year concession agreement to improve operations of its water and wastewater system and to raise a significant amount of capital from private equity partners and capital finance markets. The initial funds allowed the City to accelerate capital improvements in its water and wastewater system, monetize system value by arranging to pay itself deferred utility system lease payments, and fund several strategic reserve funds.	Water and wastewater system	Initial capital improvements, operation and maintenance, arrangement of financing

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Community/Project Sponsor	Primary Service Provider Partner (s)	Project Agreement	Model Description/ Outcomes	Facility/Facilities Served by the Model	Services Provided by Partner
City of Santa Paula, CA	Santa Paula Water, LLC, a special purpose entity owned by Alinda Capital Partners (capital investor) and contracted with PERC Water Corporation (project developer and DBO firm)	Design, Build, Operate and Finance Agreement	The City of Santa Paula, California relied on an innovative project delivery model to build a new privately-owned and operated wastewater treatment facility, taking advantage of private capital as well as integrated design, construction and operations. Perceptions about the high cost of private capital led the City to issue tax-exempt debt to buy back the facility five years after its completion.	New Wastewater Treatment Plant ("Water Recycling Facility")	Facility permitting, project design, construction, arrangement of financing, start-up and on-going operation and maintenance
Tampa Bay Region, Florida	Initial: S&W Water, LLC, a partnership of Stone & Webster and Poseidon Resources Corporation	Agreement for the Construction and Operation of a Seawater Desalination Plant and Water Purchase Agreement	In Tampa Bay Region, multiple service delivery methods, each with different risk sharing approaches, contributed to the construction of one of the nation's largest seawater desalination plants.	New Seawater Desalinization Water Treatment Plant	Facility permitting, project design, construction, arrangement of financing, start-up and on-going operation and maintenance

Approaches to Project Development and Procurement

In addition to variation in the type of service delivery model used in each community, there were also many different approaches to project development and procurement that occurred even before the delivery model was chosen.

Evaluating Financial Impact of Different Options

A decision to follow an alternative delivery model usually begins with some type of financial analysis of the relative value of the alternative approach versus the status quo approach (often a Design, Bid, Build Approach). While there are some practices in the area of financial analysis and evaluation that are widely used, in most cases, in this study the financial analysis approach in each community was customized to local conditions and needs. As a result, there was little standardization in the analyses used across the study population.

For example, one of the communities, Regina, followed a rigorous analytical approach called a Value for Money ("VfM") analysis which involves modeling and comparing the estimated project lifecycle cost outcomes based on conventional versus an alternative P3 procurement. Regina evaluated 12 separate delivery methods before deciding on a final approach. This type of analysis incorporates the benefit of risk elimination and transfer into the analysis. Regina's internal financial policies encouraged this type of analysis, and carrying out a VfM was a requirement of a national grant program[6] that supported the final project. The other communities studied prepared a range of different financial analyses that were presented under different titles to governing boards. In most cases, the analyses involved a calculation of net present value analysis of life cycle costs, but the methodologies varied considerably in how these analyses were formatted and presented. In some cases, the results were presented in terms of present value total "savings," and in other cases, results were presented in terms of the unit cost of production.

Procurement and Bidding

Most of the communities studied followed a two-tier winnowing approach that involved a general call for interest through a request for qualifications. Communities "qualified" a subset of firms that expressed interest who were then invited to respond to a formal request for proposals. The process of designing and implementing a robust procurement method can require significant resources. In most of the communities, an independent advisor or team of advisors assisted the public entity with procurement. Evaluating different approaches, developing procurement and contracting documents, and evaluating and interacting with bidders can cost hundreds of thousands, or even millions, of dollars depending on the scope of the project. The City of Phoenix reported spending over $600,000 in advisor fees for assistance carrying out a highly participatory evaluation of delivery options that included technical analyses, stakeholder meetings, detailed legal research, financial analysis, and preparation of reports.[7] The City of Regina estimated that its service delivery preparation and procurement process cost over $5 million dollars, taking into consideration preliminary technical design, financial analysis, and

[6] The P3 Canada Fund is a program of PPP Canada that is a merit-based program designed to incent innovation in P3s and encourage inexperienced governments to consider P3s in public infrastructure procurements. It is the first infrastructure funding program in Canada that directly targets P3 projects. Learn more at: http://www.p3canada.ca/en/apply-for-funding/the-p3-canada-fund/

[7] City of Phoenix Request for Council Action (RCA) Items. June 9, 1999.

extensive oversight during the active phases of the procurement.[8] The City of Regina's efforts included establishing and maintaining a standalone procurement office, engaging the services of an independent fairness advisor, and providing $500,000 in stipends to the proposal entities. This was an amount that only covered a fraction of the private entities' proposal costs, but which demonstrated the City's commitment to the process.

Public Participation and Political Debate

How a community delivers water and wastewater services has the potential to have major environmental, public health, and economic impacts on a community. In some of the communities studied, a segment of the community was either in vocal opposition or support of a particular service delivery model. For example, in the City of Regina, a petition led to a public referendum on the use of a Design, Build, Finance and Operate model, which in turn initiated a costly educational and lobbying campaign that highlighted the benefits and potential dangers of different approaches. In the City of Rialto, a campaign initiated by a labor union resulted in a change in the operator selected to participate in the City's utility system concession. In other communities, the debate occurred primarily within the governing board chambers with a subgroup of board members adamantly opposed to a specific course of action.

Key Financial Features

While there were some similarities among the different projects, each was structured differently and had different financial features and outcomes. Some of the differences are briefly described below.

Initial Outlays

Each of the models studied included a significant initial outlay of funds over the first few years of the project. Funds were raised through a variety of approaches and used for diverse purposes. Table 2 shows a summary of the initial outlays involved in each project and how the funds were raised. In some cases, the initial outlays were used for traditional design and constructions costs. In other cases, funds were raised to make upfront concession payments that were used for both utility and non-utility purposes. In Allentown, the majority of the initial outlays went to satisfy general government pension liabilities. In both Rialto and Bayonne, the initial outlays included important system improvements spread out over the first few years; however, these outlays were small compared to the overall funds initially raised ($41 of $177 million in Rialto and $6.5 of $174 million in Bayonne). In Santa Paula, Tampa Bay, and Phoenix, almost all of the initial outlays went towards costs associated with the development, design and construction of a new facility. In Regina, the funds went towards the expansion of an existing facility. In Prince Georges County, the funds were used for the implementation of new stormwater control measures.

[8] Rob Court (Manager, Environmental Engineering Branch), email correspondence with author, July 29, 2016.

Table 2. Summary of initial outlays

Community/Project Sponsor	Title of Agreement	Estimated Initial Major Outlays	Primary Methods Used to Raise Initial Outlay Funds	Major Uses of Initial Outlays
City of Allentown, PA	Allentown Water and Sewer Utility Concession and Lease Agreement	$307 Million	Tax exempt and taxable revenue bonds issued by service provider	Upfront concession payment used to meet pension liability; Retirement of existing utility debt; and funding reserves
City of Bayonne, NJ	Bayonne Water and Wastewater Concession Agreement	$174 Million	Private equity and taxable bonds issued by service provider	Upfront concession payment used to retire debt and to support general government services/projects; initial capital investments
City of Davis, City of Woodland, and University of California at Davis/Woodland Davis Clean Water Agency	Service Contract for the Design, Construction, and Operation of the Woodland-Davis Regional Water Treatment Facility	$141 Million	California Clean Water and Drinking Water State Revolving Fund loans issued by project sponsor	DBO design and construction fees for new water supply project
City of Phoenix, AZ	Lake Pleasant Water Treatment Plant Design Build and Operate Project	$237 Million	Tax exempt revenue bonds issued by project sponsor	DBO design and construction fees for new water treatment plant and other project development costs (legal, consulting etc.)
Prince Georges County, Maryland	Prince George's County Urban Stormwater Retrofit Public Private Partnership Master Program Agreement and Master Maintenance Agreement	$100 Million	Tax exempt revenue bonds issued by project sponsor and Maryland Clean Water State Revolving Fund loans issued by project sponsor	New stormwater project implementation fees covering design, construction, and oversight

Community/Project Sponsor	Title of Agreement	Estimated Initial Major Outlays	Primary Methods Used to Raise Initial Outlay Funds	Major Uses of Initial Outlays
City of Regina, Saskatchewan, Canada	Agreement to Design, Build, Finance, Operate and Maintain: Regina Wastewater Treatment Plant Upgrade Project	$180 Million	Private equity structured as loan to project sponsor, national government grant, and project sponsor reserves	Costs of design and construction for upgraded and expanded wastewater treatment plant
City of Rialto, California	Concession Agreement: Service Contract for the Design, Construction, and Financing of Upgrades and for the Operation of the Rialto Utility Authority Wastewater Facility and Water Facility	$177 million	Private equity and privately placed loans issued by service provider	Upfront concession payment used for economic development projects; retirement of existing debt; system capital improvements; project development costs; and funding reserves.
City of Santa Paula, CA	Design, Build, Operate and Finance Agreement	$62 Million	Private equity and privately placed loans issued by service provider	Design and construction costs for a new wastewater treatment plant

Community/Project Sponsor	Title of Agreement	Estimated Initial Major Outlays	Primary Methods Used to Raise Initial Outlay Funds	Major Uses of Initial Outlays
Tampa Bay Region, Florida	Agreement for the Construction and Operation of a Seawater Desalination Plant and Water Purchase Agreement (Initial Agreement)	$158 Million	Regional grant and tax exempt bonds issued by project sponsor (prior to unexpected early transfer to project sponsor, tax exempt private activity bonds were planned but not utilized)	Design and construction of new seawater desalination plant

Revenue Models

The revenue models deployed throughout the communities rely on different financial flows; however, in every case the public entity retained ultimate responsibility for setting rates. The Bayonne, Rialto, and Allentown projects depended on a contracted partner collecting bills directly from customers. In the remainder of the communities, the public project sponsor collected rates from customers and used the revenue to make contractual payments to private entities. The terms of payment depended on how the contract was designed and whether the private entity had been responsible for arranging and retiring financing.

In situations where the private partner maintained debt or return on equity requirements, the public entity was required to make fixed capital payments that were independent of the quantity/volume of services provided. Private entities were reimbursed for the operating services they provided through a range of methods, but generally these included a fixed and variable component. In most cases, the fixed component of the operating fee was so significant that the private entity was guaranteed a stable source of revenue even if the demands were much lower than projected. Electricity costs and chemical costs were often treated as direct pass-throughs; however, most contracts contained clauses that set maximum electricity usage caps to provide public entities with protection against excessive energy expenditures due to operator error or inefficiency. Alternatively, some of the contracts, such as Santa Paula's, contained clauses that allowed private entities to retain a portion of electricity savings if the savings were due to an intentional measurable efficiency gain attributable to the actions of the private operator.

Cost of Capital

The cost of capital associated with the different approaches to raising the initial funds varied among communities. These ranged from "free" in the case of the sizable grants used in Regina and Tampa Bay, to as high as 20% for some of the private equity used in Rialto. All of the projects involved some form of debt for at least a portion of the initial outlay; however, the type and structure of the debt varied considerably between projects. Woodland and Davis tapped into the state revolving loan funds for very low interest long-term debt for all of their initial outlay requirements. Phoenix and Tampa Bay each issued tax-exempt revenue bonds. Bayonne, Rialto, and Santa Paula included debt issued by the private partner. In the case of Regina, private financing was structured as a loan between the private partner and the project sponsor, yet payment was integrated into the performance requirements of the contract. In other words, unlike a traditional loan, if the private partner did not perform, their payments were at risk.

This concept of integrating risk into financing makes comparing the cost of capital across different approaches complicated. Prior to Tampa Bay Water's purchase of the partially completed desalination plant, the private partners had been responsible for financing construction. At the time of the purchase, the private partners reported that unexpected technology, business, and operational challenges had far exceeded what had been projected (and thus exceeded the negotiated settlement price from Tampa Bay Water). Once Tampa Bay Water took over full ownership and financing responsibility, it was able to use its strong credit rating to access tax-exempt "low cost capital". However, Tampa Bay Water also assumed full responsibility for subsequent construction risks.

Debates over the cost of capital of different partnership models are often intense and can influence how projects are structured and perceived. In the case of Santa Paula, vocal concern over the cost of capital incurred by the private partner contributed to the City's decision to buy back the facility and put it under public ownership. While the cost of capital for initial outlays is important, focusing only on the cost of capital as a metric for financial efficiency can be misleading, since it may not take into account other financial advantages

associated with the capital structure. Financing provided by the private sector can incorporate ancillary costs that contribute capital costs that are higher than a simple public sector debt issuance. For example, the Santa Paula private capital arrangement absorbed millions of dollars in interest during construction. In Tampa Bay and Regina, private financing took significant permitting, construction, performance and operating risk. Santa Paula, Rialto, and Bayonne incorporated private equity into their capital structures in a way that resulted in the transfer of some level of risk to their private partners. In each case, the equity was blended with lower cost debt to reduce the overall cost of capital associated with the initial outlay. The reported return requirements for this equity were in line (10 to 20%) with other types of private investment, but were much higher than tax-exempt bond financing or publically subsidized programs such as a state revolving fund.

Table 3. Diverse Examples of Capital Financing Involved in Projects

Project	Description of Capital Sources	Terms/ investment tax status	Notes
Regina	$78.7 Million in Private Sector (EPCOR) financing structured as loan to public sponsor	27 ½ years, 6.46%[9] (Taxable)	Payment of return to private sector is contingent on performance
Davis Woodland Water Supply	$95.5 Clean Water State Revolving Fund Loan issued by public sponsor	30 years, 1.7%[10]	California state law changed to allow project to access state revolving funds
Rialto	$25 million in private equity (Table Rock Capital and Ullico Infrastructure Fund) integrated into overall project financing	30 years, 19.6%[11] (Taxable)	Equity was blended with privately placed debt projected to result in a blended rate of 8.6% for entire deal
Allentown	$308 million in bonds issued by service provider (Lehigh County Authority)	29 years, 5.45% (Tax-exempt)	Bonds sold at discount resulting in $297 million of proceeds
Bayonne	$110 million in privately placed taxable bonds issued by private service provider	18 years, 5.07%[12] (Taxable)	

[9] *Agreement to Design, Build, Finance, Operate and Maintain: Regina Wastewater Treatment Plant Upgrade Project.* The City of Regina and EPCOR Water Prairies, Inc. July 3, 2014.

[10] *Woodland and Davis Receive Initial Installments of State Funding for Water Supply Project.* Woodland-Davis Clean Water Agency. February 16, 2015. http://www.wdcwa.com/images/uploadsdoc/WDCWA_MediaRelease_SRF__FundsReceived_21615.pdf

[11] *Proposed financing included in Agenda Report for the City Council/RUA Meeting of March 27, 2012.* City of Rialto. March 22, 2012.

[12] *Bayonne Water & Wastewater Concession | InfraDeals "Funding Details".* Infra-deals. September 15, 2015. http://www.infra-deals.com/deals/950558/bayonne-water-and-wastewater-concession.html

Financial Impacts of Alternative Service Delivery Models

Evaluating the financial impact of an alternative service delivery project in a robust, quantitative fashion is difficult for several reasons. First, the analysis would involve comparing a path or approach that was chosen with a path that was not chosen. In other words, it is impossible to know exactly what would have happened if a community had chosen another alternative. Nevertheless, the experiences in the communities studied provided many opportunities to assess different financial impacts based on how projects were implemented, particularly comparing and contrasting promised results with actual outcomes.

The anticipated positive financial impact of a particular project varied based on each community's objective at the outset and the type of service delivery model chosen. None of the service delivery models were implemented solely based on the anticipated savings; however, for many of the projects, the anticipated positive financial impact was an essential part of how the project was presented.

Reduced Design and Construction Costs

Santa Paula, Regina, and Davis and Woodland faced urgent regulatory deadlines that they believed could not be achieved through traditional procurement. However, in each case, the projects were presented to highlight the potential savings. In the case of Regina and Santa Paula, integrating the design, construction and financing was seen as a way of accelerating construction and reducing construction and permitting risks that could have led to change orders. Regina estimated that its delivery approach (excluding the grant it received), cost approximately 20% less than what it would have cost with a traditional design build and bid approach; however, this figure compares an assumed cost (DBB) with an actual expenditure. The cost of Santa Paula's new wastewater treatment plant ($62 million) was substantially lower than the $80-$95 million estimated cost if the project had relied on DBB. Regina and Santa Paula incorporated private financing in their models to further incentivize their private partners to perform and assume construction risk.

Davis Woodland and Phoenix relied on integrated DBO models, but retained responsibility for financing their facilities. In both cases, the communities had access to such low cost capital that they believed retaining financing responsibly and foregoing the added performance incentive that private financing can add was prudent for their communities.

The projects in Phoenix, Regina, Santa Paula and Davis and Woodland all proceeded relatively smoothly during construction and projects were completed well within their deadlines.

Operating Efficiencies

All of the communities studied used their chosen alternative delivery model to assign operating responsibility to their partners. In some cases, such as in Tampa Bay, Santa Paula, and Rialto, the communities had historically relied on private sector operators. In Regina and Phoenix, where the public sector had operated most of the system assets prior to the projects, the transition to private management was more significant. For Regina, the cost savings associated with private sector operations had much more to do with integrating the operation of the facility with the design and construction of the facility under a single contract rather than an assumption that the private sector was innately able to operate a facility more cost effectively than the public sector. The opportunity to consider operating costs from a lifecycle approach (when both operating and construction costs are linked in a contract) influenced the design of many of the facilities. The contracts are structured to take advantage of financial incentives that may at times motivate the private sector more than the public sector. Specifically, the private sector may be more willing to take risks and invest in creative solutions in order to gain

financially. For example, the contract in Santa Paula provided direct financial benefits to the operator to reduce energy usage during the operation phase. As a result, the operator modified the design and implemented operational changes that reduced the energy use of the facility resulting in added profit for the operator and savings in terms of costs sharing for the public entity. Additionally, Santa Paula and Phoenix's facilities both required less staffing than similar facilities in their respective regions. While operational efficiencies were mentioned in many of the projects studied, there were few quantified projections. In areas such as Bayonne and Regina, the projects were structured to provide workforce transition measures such as employment and benefit protection that reduced opportunities for measures that drastically reduce labor costs.

The partnership in Allentown was unique for many reasons, including the fact that the service delivery partner was a public entity rather than a private entity. From an operational efficiency standpoint, the partnership generated efficiencies that were linked to the ability to consolidate two nearby interconnected systems. It is worth noting that the consolidation could have occurred in other ways, such as through the creation of a new authority, but that may not have led to the monetization of the equity that Allentown sought. In summary, the Allentown model included a consolidation that generated cost savings, which were then used to monetize system equity and generate funds for non-utility purposes in a way that had a reduced impact on City taxpayers.

Models that included the operation of energy and/or chemical intensive facilities dealt with those costs in several different ways. In general, agreements specified that these costs were essentially pass-through costs that the public sponsor had to pay with possible maximum usage (but not expenditure) caps to guard against inefficiency. Several agreements such as Santa Paula included clauses that allowed the private sector to tap into energy savings that they were able to create through innovation or operational changes thereby incentivizing efficiency. If the goal is operational efficiency and cost savings, these clauses clearly provide more efficiency drivers than a simple pass-through agreement.

Impact Outside Water Services

In several of the communities, the most pronounced financial impact involved aspects other than pure cost savings or project economies. While Allentown, Bayonne, and Rialto chose alternative delivery models that were designed to improve service, in each case monetization of the equity in their systems was an equal or primary driver for the model. In the case of Allentown and Bayonne, the concessions were designed to generate significant upfront payments that the communities used for essential general government services outside of the water system. Allentown's arrangement generated a cash influx to plug a pension liability that was adversely affecting the City's financial health and future. Bayonne tapped into its concession payment to slow the rise of property taxes and to carry out economic development projects. In the case of Prince George's County, the County used the private sector to help catalyze economic and community development initiatives while meeting environmental objectives. In some situations, the positive financial impacts had tradeoffs in terms of customer bills. In the case of Allentown, Bayonne, Rialto, and Prince George's County, the private sector partnerships provided community economic benefit, but the underlying cost of the benefits shifted onto the water service customer.

Reduced Demands and Retained Revenue Risk

Many of the projects studied for this report were designed and constructed during a period of unforeseen declines and variability in water demand.[13] Water demands and water service sales in many parts of the country

[13] Hughes, Jeff, et. al. *Defining a Resilient Business Model for Water Utilities.* Water Research Foundation. 2014. http://www.waterrf.org/Pages/Projects.aspx?PID=4366

began to flatten or decline in ways that historic demand models failed to predict. A portion of the drop in demand was attributed to historic economic downturns. Other reasons for demand drops include rapid uptake of water efficient appliances and fixtures and increased service prices.

Untangling the impact of the demand drop from the positive impact of the delivery models during this time requires understanding how demand risk was allocated. The majority of the projects studied and the majority of alternative service delivery models are designed to shift many financial risks (such as construction risk and permitting risk) to private partners. However, very few models shifted the financial risk of demand drops. In fact, some of the models were designed to protect private partners from demand risk that may have amplified the negative financial impact of reduced demands on the public partner. For example, the operating contract associated with Phoenix's DBOM facility was structured with large fixed payments. When demand dropped in Phoenix, the cost of running the contracted facility was higher than other operating cost scenarios that would have involved significant curtailments at the facility. In the end, the City of Phoenix was able to renegotiate its agreement, but the lack of operational flexibility left Phoenix wary of a similar agreement in the future. Bayonne's payment structure was designed to guarantee the private partner a set revenue amount. The rate adjustments needed to produce those revenues assumed sales that did not materialize, leading to higher than anticipated rate adjustments. These adjustments cast a negative light on the service delivery model, even though the root cause of the higher rates was linked to faulty demand projections by the City, not an inherent operational problem.

When Things Do Not Go as Planned

The alternative delivery experience in Tampa Bay Water was arguably one of the most complex service delivery experiences in the water sector. The service delivery model evolved over time for reasons linked to the project itself (new technology design challenges) as well as factors well outside the project, such as the bankruptcy of the international firm originally tasked with construction. Unraveling the financial impacts associated with the different service delivery models was particularly challenging. The project is often cited as an example of a case of problematic project implementation, given the well-documented construction delays and cost overruns. However, in many ways the experience also demonstrated some of the financial benefits of alternative service delivery models. At the time of construction, desalination technology was still in early stages of development. The Tampa Bay model succeeded in that the early costs associated with construction problems remained with the private operator up until the point that problems with their parent company led to bankruptcy and exit from the project. While Tampa Bay had to pay more for an unfinished plant, it is impossible to know if Tampa Bay could have done it any cheaper under a different model. It is possible that the public utility would have encountered many of the same challenges as the private sector, but under a different contracting mechanism would have incurred the expensive change orders and construction delays that are typical for many complicated construction projects.

The project was also built in the midst of the same declining demand trends mentioned above. The project was originally framed as providing water at a rate of under $2.00 per thousand gallons, an extremely competitive rate for desalination water. However, this estimate was based on what now proves to be unrealistic construction costs and higher sales. Tampa Bay now estimates that water from the plant costs over $4.00 per gallon based on the production needed and final costs. Yet the project is still seen as a success by the utility given the essential role it plays in providing an alternative water source to an area that has been plagued by over-pumping of its ground water source. Tampa Bay is also a cautionary tale for communities that believe they can use an alternative service delivery model to protect the public entity from all risks.

The Danger of Focusing on Financial Impacts Alone: Risk and Service Quality Matter

The research team focused primarily on identifying the financial impacts of alternative delivery models because the issue of financial impact typically dominates public debate and governing board discourse and is often presented and analyzed in overly simplistic terms. In almost every community, "cost savings" were highlighted at some time during the project development process as an essential component of the project. Often cost saving promises depended on favorable assumptions or framing. In some cases, projects were sold primarily on a basic presentation of financial benefits even though the underlying objective of using an alternative service delivery model may have had more to do with project and service quality than cost savings. For example, in Regina the key public message supporting the project was that the alternative service delivery model allowed the City to tap into grants to which it otherwise would not have had access, even though the detailed assessment used to justify the project focused much more on risk reduction than access to grant funds. There was clear evidence that in some communities, the use of alternative service delivery models provided direct financial benefits to the ratepayers. However, there were other examples where the models deployed led to ratepayers clearly paying more for services than they would have under other models, but in which the alternative model nerveless provided significant benefits (e.g. Allentown's use of the upfront payment to pay down public pension liabilities).

The models that involved extensive service provider arranged financing tended to rely on multiple assumptions to show significant cost savings. In the communities chosen, there was not clear evidence that the use of service provider financing directly resulted in significant ratepayer savings, but there was evidence that the use of service provider arranged financing provided incentives that contributed to project quality. In cases such as Allentown, Rialto and Bayonne, service provider arranged financing facilitated the monetization of existing utility equity to be used for general community goals in a way that may have been more challenging if the project sponsor's capital had been used.

General Observations and Trends Among the Communities Profiled

In addition to the general financial impacts described above, the research team noted a number of commonalities among many of the communities studied that are worth noting by public officials considering alternative delivery models.

Service Delivery Model Advocates

Most of the communities had an individual or small group of individuals that strongly believed in the service delivery model that was ultimately implemented in their communities. These advocates ("champions") included elected officials, staff, and advisors. In some cases their advocacy and support helped overcome the basic inertia linked to long-practiced approaches. In other cases their support was essential to overcoming more vocal opposition such the public campaigns waged in Regina or the internal leadership disagreements in Santa Paula.

Commitment to Oversight

All of the communities studied employed agreements and resulting models that were quite complex. Most of the communities studied devoted significant resources to analyzing service delivery options and to designing conditions, documents, and processes that supported a chosen model. In some cases, larger communities were

able to devote skilled staff to this oversight function while in other cases the community relied primarily on hired advisors. This attention to oversight (both at the outset of projects and in some cases on a recurring basis) required a significant time and resource commitment. It seems difficult to imagine these projects advancing without continued public oversight, so the cost of this oversight should taken into account when considering and evaluating costs.

Understanding the Benefits of Private Sector Financing

The use of private sector capital or private sector issued debt is often touted as a means to fill a need for additional capital. However, there is little evidence to suggest that the communities studied would not have been able to find other sources of capital for their project needs, and in many cases, capital could have been obtained at a lower cost. Private sector arranged capital in non-risk corrected terms costs more (sometimes significantly more) than publically arranged capital. The benefits of the privately provided capital in the communities studied had much more to do with other goals. In these cases, obtaining private capital was a strategy to monetize existing equity for use in non-utility purposes, to incentivize performance, and potentially to reduce costs by promoting innovation or reducing cost overruns or delayed implementation.

Contractualized Service Performance

One of the universal results of all the service delivery models studied is that the models "contractualized" specific performance outcomes that prior to the contract were considered more discretionary on the part of the public body. The contracts studied included a range of mandatory initiatives such as specific asset investments, replacement reserve funding contributions, and asset management practices that without the contract, the public entity may have been able to ignore or postpone in order to realize short term savings. To paraphrase one of the public officials interviewed, the contract protected the public entity against themselves by taking away the temptation to reduce key services or investments. Of course, the other side is that contractualizing a service level does lock a community into a set service level and the potential higher costs associated with that service level. Communities that have a tradition of artificially maintaining low rates by delaying investment and cutting corners will have to be prepared to defend the value and resulting higher rates linked to service improvement. There is no evidence among the communities studied that it is possible to enter into alternative service delivery models that result in significantly improved services and increased investments while also reducing what customers pay compared to what they paid in the past for "unimproved services." All of the communities studied involved contracts that improved services, added new infrastructure, and required rate increases which in some cases were very significant.

Overall, this study of alternative service delivery models suggests that alternative delivery models will not solve all the challenges facing the water sector, but for some communities, a carefully implemented model may be an option to help reach some of their goals.