

DELIVERY METHODS

For Water Infrastructure Development



Research Study Prepared by
PERC Water Corporation

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PERC Water is a water recycling company focused on returning water to nature. We design, build, operate and manage water recycling facilities throughout the United States, are committed to producing water of the highest quality, and guarantee the risks associated with water recycling for every client. PERC Water has designed 55 Water Recycling Facilities with an aggregate capacity of over 75 MGD and an average of 1.4 MGD, of which 20 have been built and operated by PERC Water to an aggregate of 25 MGD and an average of 1.3 MGD. The company guarantees water of the highest quality and assumes the risks associated with water recycling. PERC Water is headquartered in Costa Mesa, CA. See www.percwater.com for more information.

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EXECUTIVE SUMMARY

Municipalities face difficult decisions when implementing major water and wastewater capital projects with significant uncertainties with respect to cost, schedule and performance. There are various delivery methods to consider and it is important that public agencies understand the advantages and risks associated with each one.

This study evaluates four delivery methods: Design - Bid - Build (DBB), Design - Build (DB), Design - Build - Operate (DBO), and Design - Build - Operate - Finance (DBOF). The goal is to provide municipal decision-makers with a deeper understanding of the advantages and challenges of each method.

PERC Water has extensive experience with alternative delivery methods, such as DB, DBO and DBOF. Since 1998, PERC Water has completed 20 DB, DBO, and DBOF projects, including the Santa Paula Water Recycling Facility, the first 100% privately funded water recycling facility in the US.

The City of Santa Paula was required to comply with waste discharge standards mandated by the Regional Water Quality Control Board. The City's existing wastewater treatment plant, originally built in 1939 was in need of replacement. The City spent several years designing alternatives and incurred significant dollars during this time, with a looming deadline ahead of them and \$8 million of accrued fines. In 2007, the City entered into a settlement agreement with the RWQCB to achieve full compliance with the permit by December 15, 2010. Following years of design efforts and millions of dollars of engineering consulting fees, the City voted to solve its wastewater problems using a DBOF delivery method.

In May 2008, the City of Santa Paula awarded a DBOF contract to the team of Alinda Capital and PERC Water. Two months later, PERC Water broke ground and commenced construction and in parallel completed the engineering documents for the project. In May 2010, the new water recycling facility was treating 100% of the City's wastewater in full compliance with the DBOF contract, seven months ahead of the deadline mandated by the RWQCB. The award winning plant has been operating in full compliance with the DBOF contract since the commencement of operations.

The City's goals were fully achieved, as follows:

- Provide certainty of financing – *Achieved*
- No capital outlay by City – *Achieved*
- Local job creation – *Achieved, 88% of hours were local labor*
- Provide certainty of schedule – *Achieved, seven months ahead of schedule*
- Provide certainty of costs – *Achieved*
- Provide certainty of compliance with RWQCB – *Achieved, seven months early*
- Provide transfer of risk for energy costs – *Achieved, 38% lower than expected*
- Provide a facility that would meet the City's future objectives – *Achieved*

- No or limited Change Orders – *Achieved, 1.7% change orders including extra work requested by the Owner*

Santa Paula’s Vice Mayor Bob Gonzales was Mayor at the time the DBOF contract was signed and he said, “The cost of doing business was significant for us. We had to build a new wastewater treatment facility and we did not have the necessary funds. The DBOF delivery method gave the City a lot more latitude and the risk was transferred to the company who was doing the work.”

John Quinn, the City of Santa Paula’s former Finance and Public Works Director, said, “In this challenging economic environment, California cities are eagerly seeking cost saving opportunities. The City of Santa Paula is enthusiastic about our new water recycling facility’s reduced power costs as it means savings for our citizens over the long term.”

The Santa Paula Water Recycling Facility project, team members and City were awarded the 2011 Public-Private Partnership Award for Innovation from the National Council for Public-Private Partnerships for their successful demonstration a significant new advancement in the field of public-private partnerships.

Please refer to [“The Santa Paula Solution” video](#) and the [facility website](#) for more information regarding the Santa Paula Water Recycling Facility.

We hope you find this document useful and welcome questions and comments.

RECOMMENDATION

Select the delivery method that provides the highest level of risk transfer and the highest degree of certainty of life-cycle cost and asset performance for the Owner.

It is our recommendation to the Staff and Councilmembers of municipalities to carefully consider the alternatives available and decide which delivery method provides the highest level of certainty to their municipality, with a life-cycle perspective that delivers the best level of value to their citizens. It is our experience that a delivery method that provides the highest level of risk transfer to the private sector is the delivery method that provides the best “Value for Money” to a municipality. We highly recommend municipalities make their decisions following a thorough understanding of life-cycle costs and effective long-term risk management, avoiding the pitfalls of focusing exclusively on design control and initial capital cost. Therefore, we suggest municipalities consider the following items in its decision making process, and ask, “Which delivery method...”:

- provides the highest level of certainty to the municipality and ratepayers?
- provides the highest level of risk transfer to the private sector?
- provides the highest level of cost certainty over the long-term?
- provides the most guarantees of performance?
- provides the lowest overall net present value for the long term?
- provides the most modern form of technology?
- locks in future construction costs today (“treatment plants are on sale”)?
- most likely to meet future permit changes?
- provides the highest level of innovation?

Delivery Methods Risk Allocation Table

| | | Design-Bid-Build (DBB) | Design-Build (DB) | Design-Build- Operate (DBO) | Design-Build- Operate-Finance (DBOF) |
|--------------------------|---------------------------|---------------------------|----------------------|-----------------------------------|--|
| Design/ Build | Design/Build Cost | Owner | DB Entity | DBO Entity | DBOF Entity |
| | Schedule/Completion | Owner | DB Entity | DBO Entity | DBOF Entity |
| | Construction Warranties | Owner | DB Entity | DBO Entity | DBOF Entity |
| Asset Mgt | Water Quality Performance | Owner | Owner | DBO Entity | DBOF Entity |
| | Capital Replacement | Owner | Owner | DBO Entity | DBOF Entity |
| | Power | Owner | Owner | DBO Entity | DBOF Entity |
| | Biosolids | Owner | Owner | DBO Entity | DBOF Entity |
| | Life Cycle Costs | Owner | Owner | DBO Entity | DBOF Entity |
| | Operation & Maintenance | Owner | Owner | DBO Entity | DBOF Entity |
| Finance | Long-Term Financing | Owner | Owner | Owner | DBOF Entity |
| | Interest Rate | Owner | Owner | Owner | DBOF Entity |

It is PERC Water’s opinion that the DBOF delivery method meets all of the bulleted objectives. There are various industry reports supporting the benefits of DBOF and PPPs, and some of them are available at the following links:

- [Deloitte, Closing the Infrastructure Gap: The Role of Public-Private Partnerships](#)
- [Deloitte, Partnering for Value, Structuring effective public-private partnerships for infrastructure](#)
- [PricewaterhouseCoopers, Delivering the PPP Promise](#)
- [KPMG, Delivery Water Infrastructure using Private Finance](#)

The PERC Water Approach / Customized Design Report (CDR™)

PERC Water performs projects using DB, DBO and DBOF as core delivery methods. We believe that DBO and DBOF offer the best long-term value and risk management to a municipality. The “traditional DB” approach where an Owner prepares a performance specification and a 30% preliminary design so DB teams can provide a firm capital cost quotation. Although a better risk profile for the Owner than DBB, this DB approach can be very costly and timely.

Alternatively, PERC Water prepares a Customized Design Report (“CDR™”) that is also a 30% level design; and a CDR can be submitted within 90 days of contract. PERC Water has prepared almost 60 CDRs in the last 10 years, of which 20 have been developed as DBO or DBOF projects. The CDR is the foundation of a DB, DBO or DBOF project and is intended to clearly align the expectations of an Owner and practitioner. The PERC Water CDR contains the following items:

- Project Approach
- Basis of Design
- Outline Specifications and General Clarifications
- Asset Management Overview
- Customized Drawings
 - Site Plan
 - Equipment Schedule
 - Line Diagrams
 - Mechanical Layouts and Sections
 - Electrical Single Line Diagrams
 - Electrical Load Calculations
 - Architectural Renderings
- Detailed Critical Path Schedule with Schedule Narrative
- Project Cost
 - DB Approach
 - DBO Approach
 - DBOF Approach (Service Fee structure)

We recommend that municipalities authorize PERC Water to prepare a CDR for a new, state-of-the-art water recycling facility that will meet the current and future needs of the City. We do not suggest that Cities abandon their current paths of exploring delivery methods, but recommend pursuing a parallel path. We are confident the outcome of the CDR will meet or exceed the expectations of the City, and will deliver a capital and life-cycle cost significantly lower than the current engineer's estimate.

PRIVATE FINANCING

Private Financing is typically integrated into DBOF or DBOOT (Design, Build, Own, Operate, Transfer) contracts, as private investors generally require an operations contract for the same duration of the finance term. This is the case as private investors will generally seek to manage their infrastructure investments with their own personnel or affiliated partners. Given this integration of private financing with the long-term operating commitment inherent in the DBOF structure, private investors typically approach such projects from a lifecycle perspective, whereby they invest up front in design and construction costs as required to deliver the appropriate level of service over the life of the project.

Private financing for municipal infrastructure is usually in the form of private equity managed by large infrastructure fund managers. Private financing for projects is also referred to as Project Financing, which typically has a long investment horizon of 30 years or longer. Public infrastructure attracts funds such as teacher and other public employee pension funds, university endowments or other types of institutional investment funds. These funds are seeking predictable, safe returns from investments into mission critical infrastructure with a low risk profile, such as water and wastewater related assets.

Accelerated Schedule

By utilizing private financing, a municipality can accelerate the timing of a new project launch and completion. In the current market, private financing sources are readily available to be deployed into new projects, typically without the timing constraints that are required for State Revolving Fund and/or municipal bond financing arrangements. Furthermore, municipalities can only raise debt in given tranche sizes and at a pace that the markets and their internal staff resources will allow. As a result, private sources of capital are valuable in expediting the pace at which projects can be undertaken. Private financing can be considered a mechanism for extending the municipalities “bandwidth” for ongoing infrastructure investment – that is, the rate at which they can implement new projects that would otherwise be constrained either by the capacity of their fundraising/Treasury functions or the ability of the markets to absorb their bond issuance.

Common questions about private financing include the cost of capital. This is perhaps the major objection to PPPs; however, this question overlooks several important points:

- **Difference between Cost of Capital and Cost of Debt**
Cost of capital and cost of debt are not one and the same. Cost of capital encompasses the risk-adjusted weighted average cost of debt and equity capital, taking into consideration the risks associated with cost overruns, schedule delays and performance related risks. Cost of debt is considered at a risk free rate.

- Lower Lifecycle Cost offsets higher Weighted Average Cost of Capital**

Owners commonly focus on the cost of financing without taken into account the total lifecycle cost. Due to the transfer of risk to the private entity, and the private entity’s ability to manage such risk, the lifecycle cost using private financing may be lower than the lifecycle cost using public debt.
- Value For Money**

Irrespective of the procurement structure used, any public agency should have a methodology to demonstrate that Value for Money (“VFM”) has been achieved. VFM testing considers whether the procurement structure being considered offers the lowest overall cost (in present value terms) relative to an estimate of the risk-adjusted costs were the public sector to deliver the project itself (commonly referred to as the Public Sector Comparator or PSC). A key first step in developing a PSC/VFM framework is to define “conventional” public procurement. This is usually performed by analyzing a DBB or DB method of procurement with some form of bond financing to a PPP structure where private funding is utilized and adjusting both sets of figures for the respective level of risk to the Owner.

| ADVANTAGES | DISADVANTAGES |
|---|--|
| Owner Transfers Risk to Private Firm | Education of Value for Money |
| Transfer Risk of Interest Rate Change | Education of Financing vs. Service Fee |
| Transfer Risk of Cost Overruns | Potential Higher Cost of Capital vs. Public Debt |
| Transfer Risk of Delays | |
| Fast Deployment of Capital | |
| Accelerated Project Start | |
| Fast Job Creation | |
| Preserve Capital for Other Projects | |
| Diversify funding Sources | |
| Lower Project Lifecycle Costs | |
| Increased “Bandwidth” for stretched Municipal Human Resources | |
| Project Reverts to Municipality upon End of Concession Period | |
| Municipality can Retain Control over Rate Setting and Collections | |
| Must Maintain Water Quality Standards/Regulatory Requirements | |

DELIVERY METHOD: Design - Bid - Build (DBB)

Design-Bid-Build is a project delivery method whereby an Owner contracts with separate entities for the design and construction of a given project, thereby splitting the responsibility for design and construction into two distinct phases. DBB is the least efficient delivery method, and places the highest level of risk onto the Owner. DBB is not performance or “qualified selection” based, and ignores accountability for life-cycle costs. Significant uncertainty exists under DBB and knowledge of construction costs usually becomes fully known at the completion of construction, after all change orders are calculated. Engineering consultants tend to be restricted by associations and insurance to provide guaranteed cost, schedule and performance, therefore placing the entire risk for such components onto the Owner. DBB is known for creating “significant uncertainty” for municipalities and can breed contention between engineers, contractors and Owners.

Greater Risk for the Owner

It is a common belief that DBB provides greater control to the Owner, and as much as this may be true with respect to controlling the design, the irony is that the Owner takes on a significantly higher level of risk by controlling such design. For example, due to the separation of design and construction, the Owner represents and warrants to the Contractor that the plans and specifications prepared by the Engineer are complete and accurate; therefore, the Owner assumes liability for changes to the design.

DBB was a reaction to the favoritism, corruption, and waste associated with major infrastructure projects in the 19th century. Ever since contracting reforms formally separated the design and construction phases at the turn of the century, design-bid-build became the traditional procurement method for public agencies. However, some public officials are concerned about the efficiency of the design-bid-build method in terms of project cost, schedule, productivity and lack of certainty. For this reason, there is growing interest among local and state agencies to consider utilizing alternative project delivery methods.

Professional Liability / Errors and Omissions Insurance carried by the Engineer will typically exclude claims made by the Contractor for design errors and omissions, therefore placing such risk onto the Owner. Since the Engineer is retained by the Owner, any design claims will likely need to originate by the Owner resulting in potential significant legal costs and attorney’s fees for the Owner. Surety bonds typically exclude performance of operations for the Contractor’s contract; therefore, the Contractor’s bond will be limited to construction performance in accordance with the plans and specifications provided by the Owner.

Change Orders

Change Orders are very typical to the DBB delivery method, and Contractor's are usually entitled to Change Orders under the following situations:

- Impacts caused by Owner (i.e. scope changes, interference or disruption by Owner or other parties for whom Owner is responsible)
- Changed conditions (i.e. unknown subsurface obstacles, force majeure)
- Design problems (i.e. errors, omissions, ambiguities, etc. in the plans and specifications)

Examples of DBB problems

Brush, CO

Members of the Brush City Council voiced concerns about an engineering mistake that will likely increase the projected cost of the wastewater-treatment plant construction project by more than \$600,000. More information is available [here](#).

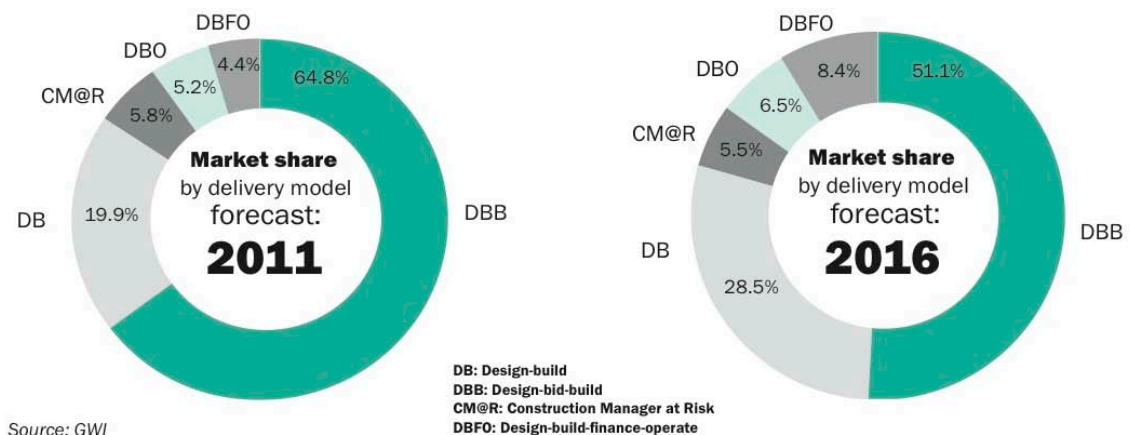
Southern Nevada Water Authority, NV

Southern Nevada Water Authority board members want more information before they approve another \$40 million for the new intake project now under construction at Lake Mead. More information is available [here](#).

City of Boerne, TX

The City of Boerne, TX voted 5-0 to table a construction project due to the low bid being at least \$5 million higher than the engineer's estimate. More information is available [here](#).

According to American Water Intelligence, the DBB delivery method is on the decline and expected to decrease over the next five years, further described in the following graph:



| DBB ADVANTAGES | DBB DISADVANTAGES |
|-------------------------------------|---|
| Owner Control of Design | Significant Uncertainty for the Owner |
| Contractors Bid Same Design | Owner Assumes Higher Risks for the Project |
| Lowest Bid Wins the Project | Requires Owner to Pay for 100% Design |
| Complete Design Before Construction | Uncertainty of Capital / O&M Cost |
| Owner's Staff Manages Projects | Uncertainty of Performance / Water Quality |
| Well Known and Understood | Uncertainty of Financing |
| Widely Used by US Municipalities | Uncertainty of Future Capital Replacements |
| | Owner Required to Fund Project (SRF/Bonds) |
| | DBB is not Performance Based |
| | Dependent on Engineer's Estimate for Funding |
| | Longer Design Schedule Delays Job Creation |
| | High Probability of Change Orders |
| | No Bidding Contractor Involvement in Design |
| | No Qualified Selection Process |
| | Emphasis on Capital Cost vs. Life-Cycle Cost |
| | Owner at Risk to Contractor for Design Errors |
| | Sequential Design and Construction Schedule |
| | Higher Cost to Owner in Managing Project |
| | Owner Required to Use "Low Bidder" |
| | Breeds Contention between Parties |

Under the DBB delivery method, the Owner will retain and assume the following risks as described in Table 1 on the following page:

- Construction Costs
- Change Orders
- Project Schedule
- Design Changes / Errors and Omissions
- Performance and Water Quality
- Operations Costs
- Capital Replacement Costs
- Equipment Failure
- Energy Costs
- Financing Costs
- Permit / Law Changes
- Legal Disputes between Engineer and Contractor

DBB Risk Allocation Table

| | | Design-Bid-Build (DBB) |
|----------------------|---------------------------|-----------------------------------|
| Design/ Build | Design/Build Cost | Owner |
| | Schedule/Completion | Owner |
| | Construction Warranties | Owner |
| Asset Mgt | Water Quality Performance | Owner |
| | Capital Replacement | Owner |
| | Power | Owner |
| | Biosolids | Owner |
| | Life Cycle Costs | Owner |
| | Operation & Maintenance | Owner |
| Finance | Long-Term Financing | Owner |
| | Interest Rate | Owner |

DELIVERY METHOD: Design - Build (DB)

Design-Build (DB) is a project delivery method whereby an Owner contracts with a single entity for design and construction of a given project through a single contract with the Owner. Generally, DB is utilized to reduce the risk to Owners, and reduce project schedule with a “fast-track” approach. DB is sometimes referred to as the “master builder” approach, one of the oldest forms of construction procedures. The Master Builder system for designing and building construction projects was the dominant project delivery system in the construction industry during the early part of the 20th century, and has since developed into the Design/Build project delivery approach.

Risk Transfer for Design & Construction

DB provides a higher level of risk transfer compared to DBB due to the combination of the designer and contractor being responsible for both disciplines under a single contract. The Owner can transfer the risk of design, construction, capital cost and project schedule to a single entity. However, the DB Entity will not assume operations responsibility; therefore, the Owner retains the risk of performance, water quality and operations / maintenance costs. The risk assumed by the DB Entity is limited to design and construction, and although a better risk profile for the Owner than DBB, it neglects to provide accountability for life-cycle costs and asset performance. Over the past 15 years, use of DB has greatly accelerated in the US, making this delivery method one of the most significant trends in design and construction today.

The DB process typically includes an engineering consultant and a general contractor forming a joint venture or the general contractor retaining the services of an engineering consultant by contract. There are very few integrated DB Entities in the water sector that have performed multiple DB projects as integrated entities – engineering consultants and general contractors may team on one given project and compete on another. This can cause some conflicts of interests between team members, and in the case of a first-time DB relationship, the Owner can assume a higher level of risk if the engineering consultant and general contractor end up in a dispute. On the other hand, if a DB Entity is an integrated company that has performed projects with the same team members, the risk to the Owner is greatly reduced.

It is a common belief that DB limits the control by the Owner. This is a misunderstanding of DB as the Owner still retains control over the design by requiring DB Entities provide a) performance guarantees and b) quality standards in accordance with a 30% preliminary design, which would be approved by the Owner. The irony of this misunderstanding is that the Owner assumes greater control of the project by transferring the risk of design and construction to the DB Entity. Typically, the DB process includes the Owner preparing a preliminary design to a level sufficient for a DB Entity to provide a guaranteed price, schedule and performance. The preliminary design will be integrated into a DB contract, and the DB Entity will be required to complete the engineering plans and specifications consistent with and a logical

evolution of the preliminary design. The DB Entity will therefore be required to build the asset in accordance with the DB contract, plans and specifications. This approach reduces the engineering fees for the Owner by about 30%, at which time the Owner will obtain a guaranteed fixed price from the DB Entity. The challenge with this approach is the Owner is still required to incur significant engineering costs in preparing a 30% preliminary design, albeit lower cost than the DBB approach where 100% design is required.

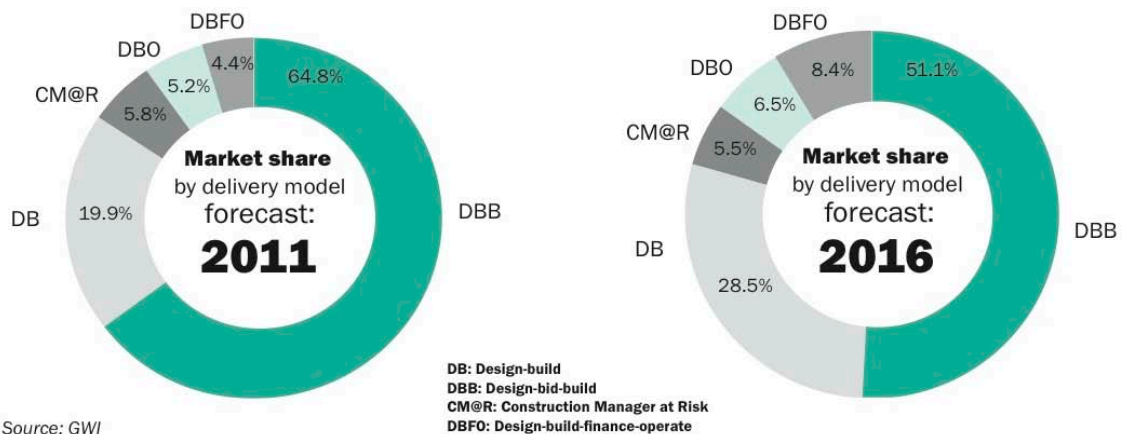
Limited Change Orders

Under a DB structure, Professional Liability / Errors and Omissions Insurance carried by the Engineer and surety bonds issued by the Contractor will now be the responsibility of the DB Entity. The Owner will be relieved of claims made by the Contractor for design errors and omissions, and associated Change Orders. Change Orders are not typical to the DB delivery method and are usually limited to requests by the Owner for additional / extra work. Since the DB Entity is responsible for design and construction, any gaps that exist will be the responsibility of the DB Entity.

Shortcomings

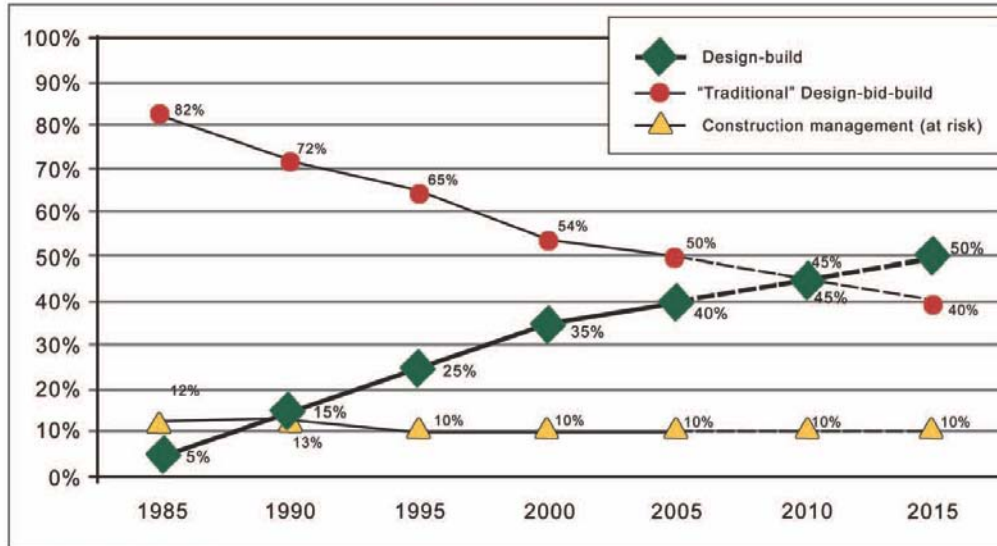
There are shortcomings with DB, although a better value proposition for the Owner than DBB, if the Owner and DB Entity fail to clearly align expectations at the contract stage. Since the DB contract integrates the 30% preliminary design / CDR and requires the DB Entity to complete the design, any changes by the Owner post-contract may result in schedule delays or change orders. In addition, any changes in applicable laws post-contract will result in a change to the DB contract. Although this is still a better risk offer than DBB (the same issue applies to the DBB), it is critical for the DB contract to clearly outline expectations.

According to American Water Intelligence, the DB delivery method is expected to increase by over the next five years, further described in the graph on the following page:



According to the Design Build Institute of America (“DBIA”), the DB delivery method is expected to increase from 2010 to 2015 by 5%, further described below:

Non-Residential Design and Construction in the United States



Design-Build Institute of America 2005



Source: Engineering News-Record, computed from ENR Top 100 Firms Ranking

| DB ADVANTAGES | DB DISADVANTAGES |
|-------------------------------------|--|
| Owner Controls Design Specification | Uncertainty of Life-Cycle Cost for the Owner |
| Reduced Risk for Owner vs. DBB | Owner Assumes Operational Risk |
| Early Knowledge of Capital Cost | Engineer / Contractor Joint Venture Issues |
| Cost Savings / Innovation | Uncertainty of O&M Cost |
| Fast Track Schedule | Uncertainty of Performance / Water Quality |
| Reduced Change Orders | Uncertainty of Financing |
| Reduced Litigation for Owner | Uncertainty of Future Capital Replacements |
| Qualified Based Selection | Owner Required to Fund Project (SRF/Bonds) |
| Not Based on "Low Bid Wins" | Emphasis on Capital Cost vs. Life-Cycle Cost |
| Engineer & Contractor Collaboration | |
| Favorable DB Procurement Laws | |
| Certainty of Capital Cost | |
| Certainty of Schedule | |
| Better Quality | |
| Single Responsibility | |
| Decreased Owner Staff Burden | |

Under the DB delivery method, the Owner will retain and assume the following risks as described in Table 2 below:

- Performance and Water Quality
- Operations Costs
- Capital Replacement Costs
- Equipment Failure
- Energy Costs
- Financing Costs
- Permit / Law Changes

DB Risk Allocation Table

| | | Design-Build (DB) |
|----------------------|---------------------------|-------------------|
| Design/ Build | Design/Build Cost | DB Entity |
| | Schedule/Completion | DB Entity |
| | Construction Warranties | DB Entity |
| Asset Mgt | Water Quality Performance | Owner |
| | Capital Replacement | Owner |
| | Power | Owner |
| | Biosolids | Owner |
| | Life Cycle Costs | Owner |
| | Operation & Maintenance | Owner |
| Finance | Long-Term Financing | Owner |
| | Interest Rate | Owner |

DELIVERY METHOD: Design - Build - Operate (DBO)

Design-Build-Operate (DBO) is a project delivery method whereby an Owner contracts with a single entity for design, construction and operations of a given project. Generally, DBO is utilized to reduce the long-term risk to Owners, and reduce project schedule with a “fast-track” approach. DBO is an extension of DB whereby the DBO Entity will perform Operations following completion of the construction of an asset.

Risk Transfer for Design, Construction & Operations

DBO provides a higher level of risk transfer compared to DBB and DB due to the combination of the designer, contractor and operator being responsible for all such disciplines under a single contract. The Owner can transfer the risk of design, construction, operations, capital cost, operations/maintenance (“O&M”) cost and project schedule to a single entity. In addition, the DBO Entity will assume operations responsibility; therefore the Owner transfers the risk of performance, water quality and operations / maintenance costs to the DBO Entity. The DBO Entity approaches a project from a life-cycle perspective and will not compromise operational performance and cost during the design and construction phase of the project.

Although similar to DB in terms of a combined engineering and construction entity, the DBO Entity is typically led by a firm that specializes in operating and maintaining infrastructure. This makes sense as the DBO Entity has a vested interest in the operational performance of the infrastructure, and the DBO Entity will have long-term responsibility for warranties, performance obligations, energy efficiency and overall life-cycle costs. DBO Entities will usually apply strict quality control measures with its engineering and construction team members, and implement quality assurance systems such as having operations staff authorize and approve engineering and construction documents. DBO also forces the construction team members to avoid some of the quality compromising cost-cutting that DBB or DB construction can spawn.

In contrast to DBB and DB, the DBO Entity will be required by contract to operate and maintain the infrastructure in accordance with the performance standards set forth in the DBO contract, which will include guarantees to produce compliant effluent and bio-solids performance. A DBO delivery method will clearly avoid the Owner’s risk of finger-pointing between the engineer, contractor and operator, therefore providing significant certainty and greater risk transfer for the Owner.

Owner Retains Control

Similar to the DB delivery method, it is a common belief that DBO limits the control by the Owner. This is a misunderstanding of DBO as the Owner still retains control over the design by requiring DBO Entities

provide a) performance specifications, b) performance guarantees, and c) quality standards in accordance with a 30% preliminary design, which would be approved by the Owner and d) long-term operational guarantees. The irony of this misunderstanding is that the Owner assumes greater control of the project by transferring the risk of design, construction and operations to the DBO Entity.

Another common belief is that a DBO delivery method restricts flexibility for future modifications to infrastructure, such as changes with regulatory permits. This is a misunderstanding of the DBO delivery method, as the infrastructure will be designed with the best estimates of future permit modifications, which is no different from a DBB or DB delivery method. Most professional engineers will design to the standard of care, and utilize best estimates of future regulations and anticipated permits changes, which will be incorporated into a DBB, DB and DBO delivery method. Ironically, under a DBO delivery method, the Owner will continue to work in the future with the entity that was responsible for design at the outset of the DBO contract, whereas under DBB or DB delivery methods, the engineering entity is long been dismissed from the project.

Under a DBO structure, Professional Liability / Errors and Omissions Insurance carried by the Engineer and surety bonds issued by the Contractor will now be the responsibility of the DBO Entity. In addition, certain Professional Liability Policies include coverage for errors and omissions, and professional negligence on the part of the operator, therefore providing greater risk management for the Owner.

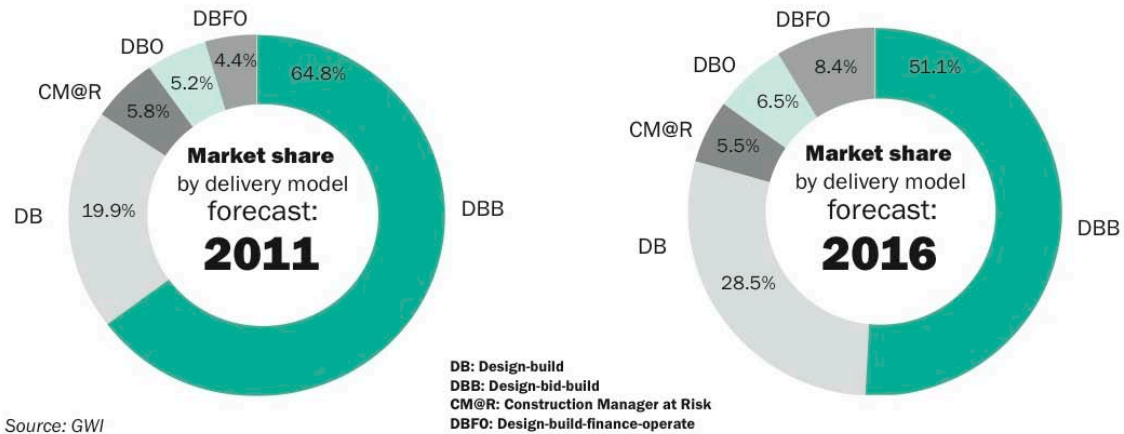
Change Orders Are Rare

The Owner will be relieved of claims made by the Contractor for design errors and omissions, and associated Change Orders. Change Orders are not typical with the DBO delivery method and are usually limited to requests by the Owner for additional / extra work. Since the DBO Entity is responsible for design, construction and operations, any gaps that exist will be the responsibility of the DBO Entity.

Align Expectations

There are shortcomings with DBO, although a better value proposition for the Owner than DBB and DB, if the Owner and DBO Entity fail to clearly align expectations at the contract stage. Since the DBO contract integrates the 30% preliminary design / CDR and requires the DBO Entity to complete the design, any changes by the Owner post-contract may result in schedule delays or change orders. In addition, any changes in applicable laws post-contract will result in a change to the DBO contract. Although this is still a better risk offer than DBB and DB (the same issue applies with DBB and DB), it is critical for the DBO contract to clearly outline expectations.

According to American Water Intelligence, the DBO delivery method is expected to increase marginally by 2016, further described below:



US municipal water and wastewater DBOs since 2000

| Year of award | Project location | State | Contractor | Capacity (m ³ /d) | Contract duration (years) | Contract scope |
|---------------|----------------------------------|-------|--|------------------------------|---------------------------|--------------------------|
| 2010 | East Providence | RI | AECOM/United Water | 39,364 | 10 | WWTP |
| 2009 | Spokane | WA | CH2M Hill | 30,280 | 20 | WWTP |
| 2008 | Santa Paula | CA | PERC/PACE/Trussell Engineering/Kennedy Jenks/W.M. Lyles | 12,869 | 30 | Water recycling facility |
| 2007 | Tampa Bay | FL | Veolia Water NA | 181,680 | 13 | Surface water TP |
| 2006 | Fillmore | CA | American Water/Boyle Eng./W.M. Lyles/Kennedy Jenks | 6,813 | 20 | Water recycling facility |
| 2006 | Clovis | CA | CH2M Hill | 10,598 | 10 | WWTP MBR |
| 2006 | Rockland | NY | Veolia Water ST/Jett Industries/CDM/Delaware Engineering | 5,678 | 5 | WWTP |
| 2005 | Twin Oaks | CA | CH2M Hill | 378,500 | 15 | WTP |
| 2004 | Tampa Bay | FL | American Water/Acciona | 94,625 | 20 | SWRO |
| 2003 | Lake Pleasant | AZ | American Water | 302,800 | 15 | WTP |
| 2003 | Lathrop | CA | Veolia Water | 2,839 | 20 | Tertiary treatment plant |
| 2003 | Stockton | CA | CH2M Hill | 208,175 | 20 | WWTP + Water |
| 2003 | Cle Elum | WA | Veolia Water | 13,626 | 20 | WWTP |
| 2002 | San Juan Capistrano | CA | ECO Resources, Inc./Boyle Engineering/ARB Inc. | 19,455 | 20 | BWRO |
| 2002 | Taunton River ⁽¹⁾ | MA | Inima/Metcalf & Eddy | 18,925 | 20 | BWRO |
| 2002 | Pawtucket | RI | Earth Tech | 94,625 | 20 | WTP |
| 2002 | Richmond | CA | USFilter (Veolia Water) | 60,560 | 20 | WWTP |
| 2001 | Seattle (Cedar) | WA | CH2M Hill | 681,300 | 25 | WTP |
| 2001 | Newport | RI | Earth Tech | 40,500 | 20 | WWTP |
| 2001 | Beverly Hills ^{(1) (2)} | CA | Earth Tech | 11,355 | 20 | WTP |
| 2001 | Camp Creek | GA | American Water/Western Summit Constructors/Parsons | 90,840 | 15 | WWTP |
| 2001 | Lynn | MA | Aqua Alliance (Veolia) | 97,653 | 20 | WWTP |
| 2001 | Glens Falls ⁽³⁾ | NY | Earth Tech | 26,495 | 20 | WTP |
| 2000 | Tampa Bay | FL | Veolia Water NA/CDM/Clark | 249,810 | 15 | Surface water TP |
| 2000 | Quincy ⁽¹⁾ | WA | Earth Tech | 19,493 | 20 | WWTP |
| 2000 | Springfield | MA | US Water (United Water) | 253,595 | 20 | WWTP |

(1) DBFO

(2) The city repurchased the plant after five years

(3) Contract terminated in 2006; also included upgrades and 20-year O&M of a 5.5MGD WWTP

Sources: Company releases, NCPPP, USCM

| DBO ADVANTAGES | DBO DISADVANTAGES |
|-------------------------------------|---|
| Owner Controls Design Specification | No Guarantee of Financing |
| Reduced Risk for Owner vs. DBB | No Guarantee of Future Capital Replacements |
| Early Knowledge of Capital Cost | Owner Required to Fund Project (SRF/Bonds) |
| Early Knowledge of O&M Cost | Public Employees Transition to DBO Entity |
| Emphasis on Life-Cycle Cost | Education to the Community of Private O&M |
| Cost Savings / Innovation | |
| Fast Track Schedule | |
| Reduced Change Orders | |
| Reduced Litigation for Owner | |
| Qualified Based Selection | |
| Not Based on "Low Bid Wins" | |
| Engineer& Contractor Collaboration | |
| Operator Approval of Design/Build | |
| Favorable DBO Procurement Laws | |
| Certainty of Capital Cost | |
| Certainty of O&M Cost | |
| Certainty of Energy Cost | |
| Certainty of Capital Replacements | |
| Guarantee of Water Quality | |
| Guarantee of Bio-Solids | |
| Better Certainty of Schedule | |
| Better Quality | |
| Single Responsibility | |
| Decreased Owner Staff Burden | |
| Long Term OEM Relationships | |

Under the DBO delivery method, the Owner will retain and assume the following risks as described in Table 3 on the following page:

- Financing Costs
- Permit / Law Changes

DBO Risk Allocation Table

| | | Design-Build-Operate (DBO) |
|----------------------|---------------------------|---------------------------------------|
| Design/ Build | Design/Build Cost | DBO Entity |
| | Schedule/Completion | DBO Entity |
| | Construction Warranties | DBO Entity |
| Asset Mgt | Water Quality Performance | DBO Entity |
| | Capital Replacement | DBO Entity |
| | Power | DBO Entity |
| | Biosolids | DBO Entity |
| | Life Cycle Costs | DBO Entity |
| | Operation & Maintenance | DBO Entity |
| Finance | Long-Term Financing | Owner |
| | Interest Rate | Owner |

DELIVERY METHOD: Design - Build - Operate - Finance (DBOF) / Public-Private Partnerships (PPP)

Design/Build/Operate/Finance or PPP is a project delivery method whereby a municipal Owner contracts with a single entity for design, construction, operations and finance of a given project. Generally, DBOF is utilized to reduce the long-term operational and limit financial risk to Owners, and reduce project schedule with a “fast-track” approach. DBOF is an extension of DBO whereby the DBOF Entity will fund the initial capital cost of construction and fund future capital replacements during the Operations period (generally 30-35 years). At the end of the DBOF term, the asset reverts to the Owner at no transfer cost and in a fully maintained condition for continued use by the Owner. A major distinction between DBO and DBOF is that the DBOF Entity retains ownership of the asset until transfer at the end of the DBOF contract. The DBOF delivery the method is *“going beyond the transaction and adopting a life-cycle perspective.”*

Best Form of Risk Transfer

DBOF provides the highest level of risk transfer for the Owner as compared to DBB, DB and DBO since the DBOF Entity takes full responsibility for a combination of critical roles (including designer, contractor, operator and financier) under a single contract. As such, the Owner transfers the risk of design, construction, operations, financing, capital cost, operations/maintenance (“O&M”) cost and project schedule to a single entity. Since the DBOF Entity will assume operations responsibility, the Owner transfers the risk of performance, water quality and operations / maintenance costs, and future capital replacements to the DBOF Entity.

Given the broad range of responsibilities assumed by the DBOF Entity over the long-term operating period, the DBOF Entity approaches a project from a life-cycle perspective (i.e. with a focus on long-term delivery of Service to the Owner rather than a near-term completion of a project). The DBOF Entity will not compromise operational performance during the design and construction phase of the project, but rather will invest in the project as required to deliver the appropriate level of Service over the life of the project. For example, they are incentivized to implement measures that allows for the greatest energy efficiency as they are responsible for the long-term operation costs. As Lawrence Summers, an economist and former President of Harvard, once said, “In the history of the world, no one has ever washed a rented car.”

Although similar to DBO in terms of a combined engineering, construction and operations entity, the DBOF Entity is typically led by a Special Purpose Entity (“SPE”) to contract with the Owner for a long term concession. The SPE is privately owned, and fully capitalized with private capital, such as public employee retirement funds, and is fully responsible for the risk of financing and capital cost. The Owner is not

required to contribute any funding towards the capital cost of the infrastructure and is only required to pay the “Service Fee” when the infrastructure is operating in compliance with the DBOF contract.

The US Government Accountability Office (“GAO”) prepared the Report to the Ranking Member, Committee on Transportation and Infrastructure, House of Representatives for Wastewater Infrastructure Financing in July 2010. The GAO focused on Stakeholder Views on a National Infrastructure Bank and Public-Private Partnerships. The GAO identified seven municipalities (as listed below) that have entered into privately funded PPPs since 1992, of which one was a new water recycling facility under a 30-year DBOF (City of Santa Paula, with PERC Water and its financial partner comprising the DBOF Entity). The remaining six DBOFs applied to leases, concessions and plant upgrades. The full report can be found on their [website](#).

Table 4: Privately Financed Wastewater PPPs Developed Since 1992 Identified by GAO

| Municipality | Company | Year initiated | Type | Initial term (years) | Assets included | Up-front payment (Y/N) |
|----------------------------------|---|----------------|---------------------------------|----------------------|---|------------------------|
| Arvin, CA | U.S. Filter (now Veolia Water) | 1999 | Lease & DBFO | 35 | Lease: existing treatment plant DBFO: upgraded treatment plant components | Y |
| Cranston, RI ^a | Triton Ocean State LLC (now Veolia Water) | 1997 | Lease | 25 | Treatment plant, collection system, pumping stations, industrial pretreatment | Y |
| Fairbanks, AK | Golden Heart Utilities | 1997 | Lease & Asset Sale ^b | 30 | Lease: treatment plant Asset sale: collection system | Y |
| Franklin, OH ^c | Wheelabrator EOS (now Veolia Water) | 1995 | Lease & Asset Sale ^d | 20 | Asset sale: treatment plant Lease: one process within the treatment plant | Y |
| North Brunswick, NJ ^e | U.S. Water (now United Water) | 1995 | Lease | 20 | Collection system & pumping stations ^f | Y |
| Santa Paula, CA | Santa Paula Water, LLC ^g | 2008 | DBFO | 30 | New water recycling facility | N |
| Woonsocket, RI ^h | U.S. Filter (now Veolia Water) with third-party financing through LaSalle Bank and ABN AMRO | 1999 | DBFO | 20 | Upgrade of existing treatment plant | Y |

Source: GAO.

In contrast to DBB, and DB and DBO, the procurement laws and process is a lot more streamlined. The procurement process would be very similar to a DBO with respect to a 30% preliminary design or a CDR in the case of PERC Water, and although there would continue to be a performance specification for selection of a DBOF Entity, the legislation that governs DBOF delivery methods in California permits competitive negotiation. California Government Code §5956 et seq. is the code that governs DBOF delivery methods in California, which encourages the use of private funding to solve municipal infrastructure challenges. Please refer to the following links for information regarding California Government Code §5956:

- [Summary](#)
- [Amendment](#)
- [Legal Memo](#)

Service Fee Agreement

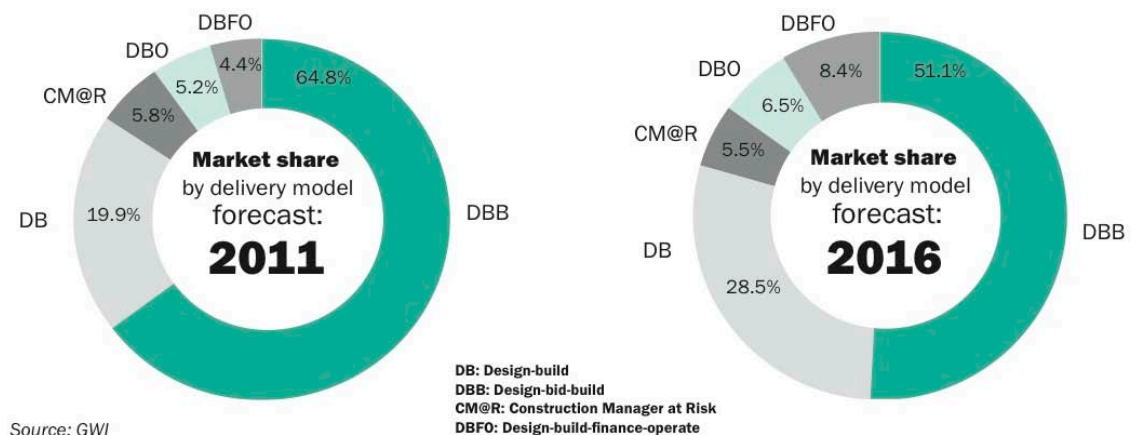
A common misunderstanding with DBOF is that many interpret the delivery method to be providing financing to a DBO delivery method. This is not the case, as the DBOF Entity is raising its own capital to fund the infrastructure and assumes the risk of such financing into the future, with limited recourse to the Owner. Therefore a DBOF delivery method is more akin to a Service Agreement whereby a private entity provides treatment and recycle services for a predetermined Service Fee that includes capital recovery, debt service, O&M costs, capital replacement reserves and energy guarantees.

A common question asked by Owners is the “what is cost of capital?” or “what is the interest rate?” As much as these questions are valid, they are very difficult to answer due to the timing of when the financing occurs by the DBOF Entity and the type of financing the DBOF Entity obtains. An important point is that the interest rate risk lies with the DBOF Entity and not with the Owner.

Another common valid question asked by many Owners is “how do we compare apples-to-apples?” The simple answer is “life-cycle analysis” and “net present value analysis.” The advantage of the DBOF delivery method is it requires Owners and practitioners to evaluate life-cycle costs and assign a risk-adjusted cost of capital to varying delivery methods. For example, under a DBB delivery method Owner’s are typically focused on the capital cost, while future operating costs are often ignored. In contrast, under DBO and DBOF delivery methods, Owners are forced to analyze both capital and long-term operating costs to make a decision on a capital project. This life-cycle outlook is healthy for the Owner.

Please refer to the DBO delivery method overview regarding design, construction and operations processes.

According to American Water Intelligence, the DBOF delivery method is expected to increase significantly over the next five years, further described below:



Socio-Economic Value

The DBOF delivery method also allows for various socio-economic values that are not available with the other methods. Because the work can be started earlier than with the other methods as a result of the secured capital funding, local job creation is expedited. In addition, the utilization of local vendors will be accelerated. The multiplier effect of an early work start date has a profound effect on the local community and must be given consideration.

| DBOF ADVANTAGES | DBOF DISADVANTAGES |
|-------------------------------------|--|
| Owner Controls Design Specification | Public Employees Transition to DBOF Entity |
| Reduced Risk for Owner vs. DBB | Education of DBOF delivery method |
| Early Knowledge of Service Fees | Perceived Higher Cost of Capital |
| Certainty of Service Fees | Education of Value for Money |
| Certainty of Sewer Rates | |
| Emphasis on Life-Cycle Cost | |
| Cost Savings / Innovation | |
| Fast Track Schedule & Job Creation | |
| Reduced Change Orders | |
| Reduced Litigation for Owner | |
| Qualified Based Selection | |
| Not Based on "Low Bid Wins" | |
| Engineer& Contractor Collaboration | |
| Operator Approval of Design/Build | |
| Favorable DBO Procurement Laws | |
| Certainty of Energy Cost | |
| Certainty of Capital Replacements | |
| Guarantee of Water Quality | |
| Guarantee of Bio-Solids | |
| Certainty of Schedule | |
| Better Quality | |
| Single Responsibility | |
| Decreased Owner Staff Burden | |
| Long Term OEM Relationships | |
| Expedited Job Creation | |

Under the DBOF delivery method, the Owner will retain and assume the following risks as described in Table 4 on the following page:

- Permit / Law Changes (*Note, same applies to DBB, DB and DBO*)

DBOF Risk Allocation Table

| | | Design-Build-Operate-Finance (DBOF) |
|----------------------|---------------------------|--|
| Design/ Build | Design/Build Cost | DBOF Entity |
| | Schedule/Completion | DBOF Entity |
| | Construction Warranties | DBOF Entity |
| Asset Mgt | Water Quality Performance | DBOF Entity |
| | Capital Replacement | DBOF Entity |
| | Power | DBOF Entity |
| | Biosolids | DBOF Entity |
| | Life Cycle Costs | DBOF Entity |
| | Operation & Maintenance | DBOF Entity |
| Finance | Long-Term Financing | DBOF Entity |
| | Interest Rate | DBOF Entity |

CONTRACT OPERATIONS

Contract Operations is a service of operations and maintenance performed by a private entity under contract with an Owner, whether a public agency or private industrial Owner. Contract Operations is a service offered by many private companies and could be integrated into a DBO / DBOF contract or separately as a stand-alone contract.

Contract Operations firms usually provide services of operations, maintenance, equipment replacements and other services necessary to maintain public infrastructure, and very often limited to an “a la carte” type contract. An extension of Contract Operations is Asset Management, which is a significantly broader offering by the private sector. Asset Management will include additional services, including:

- Operating Staff
- Maintenance Staff
- Engineering Services and Support
- Construction Services and Support
- Energy efficiency and guarantees
- Capital replacement obligations
- Security Management
- Total maintenance responsibility
- Permit facilitations / regulatory relations
- SCADA / CMMS Software Upgrades
- Alternative energy management
- Laboratory Services

| ADVANTAGES | DISADVANTAGES |
|-----------------------------------|---|
| Owner Transfers Risk to Operator | Public Employees Transition to Operator |
| Guarantee of Water Quality | Education of Contract Operations |
| Guarantee of Bio-Solids | Operator may not be Designer or Builder |
| Certainty of O&M Costs | |
| Certainty of Energy Costs | |
| Certainty of Capital Replacements | |
| Long Term OEM Relationships | |