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**Paper/Presentation Title:** Maximizing Innovation and Minimizing Interruption Using Design-Build for Major Cogen System Upgrade

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## Abstract

### Maximizing Innovation and Minimizing Interruption Using Design-Build for Major Cogen System Upgrade

In 2011, Miami-Dade discovered that methane gas produced at the landfill and digester gas produced within the South District WTP could significantly cut back electric power imported from the grid, reducing the facility's reliance on fossil fuel-produced electricity. This project required close collaboration between the design-builder and operations to ensure that the construction activities were staged in a manner that eliminated process interruptions to the existing system.

#### Learning Objectives:

- Design-Build Project Contracting and Delivery Best Practices to Effectively and Fairly Manage Risk: DB Team incorporated DBIA best practices throughout project development and into operations. The Design-Build process was not new to MDWASD but was their first venture into design-build delivery for a complex combined heat and power project to be designed and built within the confines of an existing treatment facility. The owner hired experts to advise on the best methodology to implement to project delivery. The attributes relative to DBIA best practices, and the employment of those practices on projects delivered by other municipal owners, were factors in the decision to use design-build delivery. The owner attended DBIA functions to gain a better understanding of best practices, their application as applied to their potential project, and to interact with other owners to understand the application of the associated best practices attributes. The involvement from the onset of key stakeholders as partners in the procurement, design, and delivery, became the construct within which the team communicated, set expectations, and made adjustments along the course of project delivery to assure that the project met its critical success factors: keeping existing facility operating without any unplanned shutdowns or outages, enhancing digester gas quality and quantity, and the opportunity to produce 8 Mw of reliable electrical power to be consumed all with the existing facility, thereby saving rate-payers millions of dollars.
- Project Planning and Execution Methods to Create Best Value Assets Using Design-Build: Design the project so that the design-builder can build the project without interrupting facility service. Keeping the facility online while doing tie-ins and installing equipment was imperative as the facility used the existing cogeneration units to maintain heat in their digesters. PK and BC implemented a plan to install equipment without interrupting power generation. In the end, success was achieved through the combined efforts of the DB Team, Owner and Owner's operations staff working together.
- Design-Build Project Contracting and Delivery Best Practices to Effectively and Fairly Manage Risk: One challenging aspect stemmed from the requirement that the new cogen system had to use three different types of fuel feedstocks (digester, landfill, and natural). Each feedstock has different heating values and the cogen engines were required to meet defined mechanical

efficiency and air emissions standards for any given feedstock. To meet schedule milestones, the DB Team worked with the engine manufacturer to define fuel feedsource chemical components for a finite number of combinations so they could develop a functioning engine map. Developing an engine map became a required a lot more effort to meet Contract requirements.

- Design-Build Project Delivery Strategies to Promote Effective Collaboration: The design-builder's collaborative approach provided an opportunity for the "Designer" to communicate the main design/ technical challenges and proposed solutions while allowing the "Builder" to communicate the best and most efficient way to implement and accomplish these solutions. This integration resulted in maximum engagement during the project's design phase and minimized the risk of developing any design concepts or approaches that were contrary to the project scope of work (bid price) or that would complicate or delay construction. The result was there were no significant "do overs" during the design. Avoiding extensive "do overs" was critical to ensure that the project was "designed to budget" and that it met the project schedule requirements.