PLANT IMPROVEMENT ENGINEERING SERVICES
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Black & Veatch Plant Improvement Engineering Services include consulting, engineering, design, procurement and owner’s engineer services to support retrofit projects at existing conventional and renewable energy-fueled power generation facilities.

TYPES OF SERVICES

Plant Improvement Engineering Services span the power plant life cycle from initial startup through retirement. Our mission is to support our clients with any plant retrofit or improvement need throughout the operating life of the plant.

These services include:

- Conceptual design, cost estimating and detailed design encompassing all plant expansion and improvement projects.
- Equipment specification, bid evaluation and other procurement-related services. We also provide vendor surveillance services at nearly any location in the world.
- Resident engineering services, checkout, startup and commissioning, outage scheduling and construction management services.
DIAGNOSIS
Black & Veatch provides superior experience, tools and approaches to diagnose plant operating issues. Our primary objective on each plant improvement project is to diagnose the underlying root cause of operating issues, improving plant operation for the long-term. Some examples of our diagnosis capabilities include:

- **Systems Engineering Approach** – Our engineers have experience with the design of new power generation facilities, which provides you with expertise on overall system performance and design. Therefore, diagnosis is performed on a system level rather than a component level.

- **Collaborative Approach** – We believe that involving plant personnel in diagnosing and solving operating issues is absolutely critical to developing the best long-term solution.

- **Monitoring & Diagnostics/Online Performance Monitoring** – Real-time monitoring of your generating stations allows us to proactively diagnose performance/reliability issues and improve plant performance.

SOLUTIONS
Black & Veatch firmly believes that solutions to plant operating issues must:

- Address long-term improvement of operations for the plant.
- Minimize the life cycle cost of the retrofit project.
- Minimize impacts to existing plant operations.

We accomplish these objectives by developing a thorough plan for each project at the front end, taking a systems engineering approach to improve the operation of the overall system and applying a collaborative approach to ensure that your preferences are incorporated into the design. Progress is reviewed regularly to ensure project objectives are being satisfied. We take your objective of providing a reliable, cost-effective supply of power seriously and develop solutions with those goals in mind.

IMPLEMENTATION
Solid implementation is essential to the success of any plant improvement project. We diagnose each plant issue with solution-implementation in mind, ensuring cost-effective construction. We follow through by providing a complete suite of services to successfully implement any plan from engineering through operation.

- **Engineering** – Our engineering processes and procedures have been optimized through our experience as an engineering, procurement and construction (EPC) contractor, and we apply those same tools and procedures on plant retrofit projects to reduce cost and schedule for conceptual and detailed engineering services.

- **Procurement Support** – Engineering support to develop procurement specifications, evaluate bids and administer contracts. We have dedicated procurement experts and optimized procedures through our experience as an EPC contractor.

- **Field Engineering** – Support on-site during construction to ensure that the design is constructed according to plan and started up in a safe manner.

- **Complete Outage Management** – Expert support to assist with outage planning and coordination of contractors on-site during outage. We have an unblemished record for meeting outage schedules when we have served as the outage manager.

EXPERIENCE
Black & Veatch works with all types of clients, including independent power producers, investor-owned utilities, municipal utilities, electric cooperatives and industrial customers. For detailed information about our qualifications and experience, please visit bv.com. The following is a representative list of clients with whom we have worked.

- Arizona Public Service
- Muscatine Power & Water
- Consumers Energy
- FirstEnergy
- Alliant Energy
- Black Hills Electric Cooperative
- Board of Public Utilities, Kansas City, Kansas
- Kansas City Power & Light
- Portland General Electric
- Alabama Electric Cooperative
- Ameren
- City Water, Light & Power
- Hawaiian Electric Company
- Hawaiian Electric
- TransAlta
- Michigan State University
- American Electric Power
- Indianapolis Power & Light Company
- JEA
- Orlando Utilities Commission
- Dominion
BUILDING A WORLD OF DIFFERENCE®

Black & Veatch is an employee-owned, global leader in building Critical Human Infrastructure™ in Energy, Water, Telecommunications and Government Services. Since 1915, we have helped our clients improve the lives of people in over 100 countries through consulting, engineering, construction, operations and program management. Our revenues in 2011 were US $2.6 billion. Follow us on www.bv.com and in social media.

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