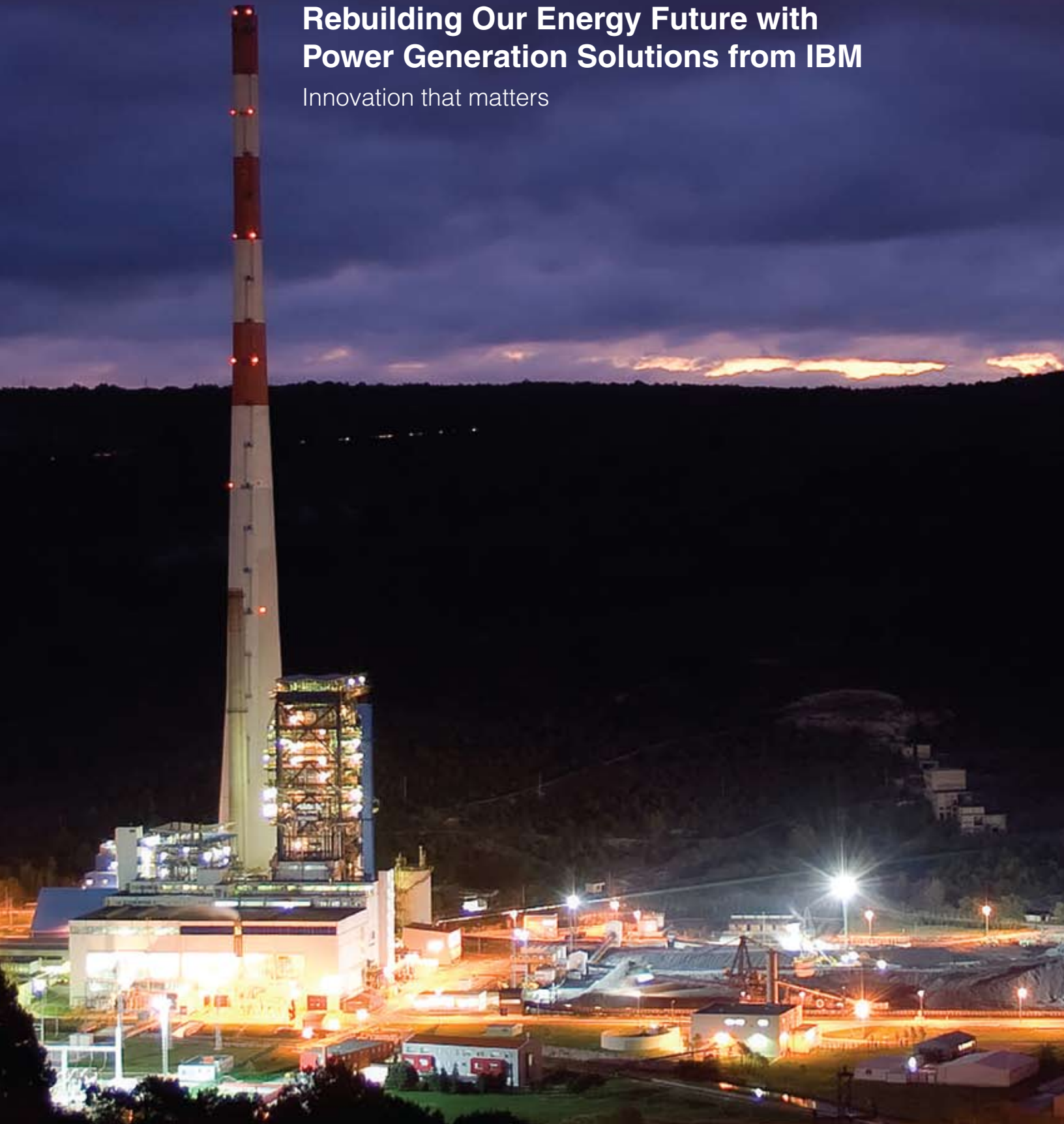


Rebuilding Our Energy Future with Power Generation Solutions from IBM

Innovation that matters



Today's challenges

Globally, the power generation business has never been more turbulent. Carbon constraints due to global warming concerns are a major disruptive force. Power generation companies—as a group, a leading contributor to greenhouse gases—are being forced to restructure the way they build and operate generation assets. At the same time, demand growth is shifting away from developed countries to those with emerging economies. As these countries build substantial numbers of conventional technology plants to maintain their GDP growth, they increase global carbon emissions while shifting and straining global supply of fuel and materials. This is putting upward pressure on the cost of

construction of new and cleaner power generation facilities world wide.

These influences are creating global interest in new nuclear generation, extending the life of existing nuclear plants, acceleration of clean coal plant construction, and rapid integration of renewable and distributed energy. All of which has created a host of challenges. Nuclear generation faces issues with re-licensing existing plants and permitting for building new ones. Fossil power plant owners struggle to increase efficiency of the existing fleet and to build clean coal and natural gas facilities. Renewable energy companies face management and integration issues of large wind farms and

distributed solar with demand response and load control.

At IBM, we believe the utilities industry can better weather the storm by adopting the right information lifecycle management environment. IBM provides a constellation of solutions and consulting services to the power generation business—spanning the nuclear, fossil and renewable sectors. Through advanced solutions and thought leadership, IBM supports improved design, construction, supply, safety, and the operation of power plants as countries around the world work to rebuild our energy future.



Power Generation solutions from IBM – Transforming the utilities industry

IBM's power generation strategy applies advanced information lifecycle management solutions that enable integrated plant and fleet optimization. Using IBM Power Generation solutions, we address today's industry challenges in four significant ways:

Increasing availability and reducing risk across the existing fleet.

Because the fastest, most cost-effective supply increase can come from the existing fleet, IBM helps improve asset management, maintenance procedures and operation efficiencies by delivering advanced enterprise asset management solutions as a key component to enhance operational plant performance. IBM also helps utilities take a fleet-wide approach to assure adequate supply and market efficiency.

Managing overall carbon footprint.

The decisions made in the next few years with regards to global power generation fleets will have long lasting influence on CO₂ production globally. IBM helps utilities plan for a portfolio mix for the future in light of future carbon restraints as well as the cost and availability of fuel and material supplies.

Maintaining an effective workforce.

In the face of today's aging workforce, IBM can help utilities capture knowledge through automation, adopt effective knowledge transfer programs, and implement human capital management solutions.

Planning for supply expansion.

Capital planning for nuclear, clean coal, and renewables is critical today. Utilities are staring at global shortages of steel and capacity, backlogs to build certain components, and an uncertain regulatory environment. To help navigate through these turbulent waters, IBM

has developed a comprehensive plant lifecycle management solution to manage data and information throughout the design, build, operate, and maintain (DBOM) lifecycle.

Ultimately, our goal is to help generation companies decrease the risk and cost of new and complex capital-intensive construction projects, decrease schedules, and facilitate operational excellence. For existing generation facilities, IBM solutions can minimize operation risk while improving operational efficiency and utilization.

IBM's strategic vision is to help generation companies develop, manage and optimize a diverse energy portfolio – including nuclear and renewable energy as well as more efficient fossil generation – using asset data and lifecycle management solutions.

Key Solutions

IBM Power Generation solutions are comprised of four offerings, which can be tightly integrated or used as stand-alone solutions. This flexible approach provides IBM multiple entry points to work with a generation company. It also distinguishes IBM as a solutions integrator with unsurpassed qualifications, especially in light of its recent acquisitions and world-class partner network. The four solutions include:

Generation Performance

Management—Delivers value and transparent information to provide an integrated view of the generation business—nuclear, fossil, and renewables. This integrated view enables complex analysis, process improvement and scenario planning for supply chain sourcing, fuel management, enterprise asset management, and generation portfolio management.

Generation Virtualization—

Delivers a transactional platform to aggregate and bring to market non-traditional power supplies. This solution creates a “virtual generator” for distributed generation (such as wind and solar) and energy storage (batteries, pumped hydro, flywheels, etc.) as well as demand response and load control of industrial and residential loads.

Intelligent Plant Lifecycle

Management (iPLM)—Delivers consistent use of current information throughout the entire DBOM cycle. This can improve supply chain, plant construction, operations, financial reporting, training, and compliance

through a combination of plant lifecycle management, enterprise asset management, and supply chain management solutions. This solution can help enable “input once, use many times” capability for plant design data.

Power Operations Toolbox—

Addresses niche areas of high value to power generation companies, and leverages key, differentiated capabilities of IBM. Solutions include nuclear HPC (high performance computing) and visualization, location awareness, knowledge management to capture, and reuse enterprise information, and analytics.



Power Generation and the smart grid

IBM's information lifecycle management solutions—Generation Performance Management, Generation Virtualization, iPLM and Power Operations Toolbox—are becoming a vital part of a revitalization of today's utilities, which includes the emergence of the Intelligent Utility Network (IUN) from IBM. The IUN is a smart grid strategy that comprises a suite of advanced meter management, network automation and analytics solutions that are key to the energy industry's digital economy of the future.

IBM's energy value chain technology platform for electricity, gas, and water—is an information architecture that helps

utilities to improve operational excellence on the network and in the field. The IUN is designed to improve a company's financial performance by optimizing assets and reducing costs, and to create regulatory goodwill through innovative environment initiatives and customer satisfaction.

Moreover, as carbon constraints, geographical redistribution of demand growth, and security of fuel and material supplies challenge the energy industry, IUN and Power Generation solutions provide processes, technology and even partnerships to optimize plant construction and diversify fleets—while minimizing risks.

IBM Maximo® Asset Management Solution

IBM Maximo has been a leading asset and service management solution in the utilities industry for more than 20 years. The IBM Maximo Asset Management solution helps utilities optimize the performance of every asset. Together, these programs contribute to a utility's goals of reducing costs and increasing asset uptime. Widely used for work and asset management by water, gas, and electric utilities, Maximo is a master asset information repository for the Intelligent Utility Network.

IBM Filenet— Document Management

Keeping pace with the dramatic growth of unstructured data is a challenge today. That's why many utilities are turning to IBM Filenet solutions that share a common platform. As a complete, open and secure framework, the Filenet P8 platform provides a single enterprise catalog across all of an organization's content repositories. It also helps ensure compliance with various legal, regional, and industry regulations and policies, among many other document management benefits.



Major Benefits

IBM Innovation in Power Generation

The Global Center of Excellence for Nuclear Power in La Gaude, France, supports safe, reliable and efficient electricity generation by energy companies worldwide. The Center extends IBM's on-going work with leading nuclear power companies to support improved design, construction, safety and operation of power plants based on IBM software, hardware, consulting, and services industry offerings. The Center also serves as a demonstration center for joint IBM and industry partner solutions.

"The nuclear power industry will need to engage in more collaboration across the ecosystem—even amongst competitors—in order to address the serious challenges which the industry is facing. The IBM Nuclear Power Advisory Council has a unique opportunity to lead by example, and demonstrate the power of teaming to innovate."

—Craven Crowell, Managing Director
Oliver Wyman, former Chairman
of the Tennessee Valley Authority,
and member of the IBM Nuclear
Power Advisory Council, which
provides governance for the
IBM Global Center of Excellence
for Nuclear Power

Enhance asset utilization and unit availability

The world-class Maximo generation asset management solution, combined with IBM supply chain and data integration capability, helps generation plants enhance information utilization and deliver better asset performance.

Manage knowledge loss and human capital

The industry's looming 'brain drain' is considered a top problem that utilities will contend with in the next decade. IBM Power Generation solutions, including information management, business process automation, and human capital management, help utilities to find ways to capture knowledge from aging employees about key processes and then to integrate that knowledge into business process automation tools.

Manage new plant information lifecycle

IBM's iPLM solution delivers a modern data management architecture that provides for continuous, consistent use of data and information throughout a plant's lifecycle, improving construction and operational efficiency. With iPLM, information is managed as an asset, providing value across the entire organization through data and information transparency and consistency—by creating a "single version of the truth."

Incorporate high performance computing and visualization into operations

Leveraging world-leading high-performance computing capabilities, IBM helps utilities drive simulation-based solutions, modeling, and visualization into operations. Whether building or modifying an existing plant, HPC can improve everything from design validation to compliance.

Optimize market interaction—fuel, electricity, emissions

Facing carbon restraints and global shortages of fuel and construction materials, utilities need to optimize the way they interact with the market. IBM applies advanced optimization algorithms to minimize risk and maximize productivity across fuel, wholesale, and carbon markets.

Assure regulatory compliance and plant/data security

To meet regulatory compliance requirements, utilities must manage cyber security, physical security, and reliability concerns affecting grid integrity, emissions, safety and, in some jurisdictions, new governance and accounting requirements. IBM provides cyber and physical security solutions to assure secure operations while taking advantage of open information

technology architecture. At the same time, IBM's information lifecycle management solutions secure content and manage compliance.

Architecture matters

Underlying the IUN and Power Generation solutions from IBM is the flexible and open Solution Architecture for Energy (SAFE) architecture. SAFE—based on Service-Oriented Architecture (SOA)—enables various assets and information to be integrated across the enterprise—with grid and distribution management, finance and administration, customer management, human resource, and procurement.

SOA is the foundation of an information lifecycle management infrastructure that supports a flexible business model, allowing power generation utilities to be more responsive and innovative. More than a technology solution, SOA is a springboard to a successful on demand business.

Why IBM

In helping to revitalize today's energy industry, IBM understands that power generation executives and managers are faced with increasing costs, efficiency pressures, and the need to make long-term portfolio decisions in an increasingly uncertain environment. IBM has vast experience in addressing these challenging issues around the world.

Comprehensive services and depth of resources—With more than 3,000 energy and utilities industry consultants and 30 years of services and solutions design for energy and utilities, IBM's commitment to the industry is hardwired.

We also provide new and innovative solutions through the establishment of industry facilities worldwide, including the IBM Global Center of Excellence for Nuclear Power in La Gaude, France.

Substantial footprint in power generation—IBM has made acquisitions of Maximo for enterprise asset management and supply chain, Filenet for document management, and ISS for security. Together, they give IBM a comprehensive set of architectural and project management tools for power generation deployment.

Extensive know-how and technology leadership—In the shipbuilding and aircraft industries, IBM's deep experience has many similarities to building new plants. IBM also is a leading high performance computing company worldwide, with advanced simulation capabilities.

Substantial partner ecosystem—IBM has many active partners in the energy and utilities industry. Our alliances with innovative, best-of-breed Business Partners reduce customer project costs and minimize implementation and integration risks.



***Knowledgeable consulting
professionals worldwide***—IBM

Consulting and System Integration Service is the largest business intelligence consulting practice with more than 2000 worldwide consultants.

Global reach with local service—IBM's unique capabilities and presence in 160 countries mean utility companies around the globe have the resources and responsiveness they need to implement and support power generation and IUN solutions—no matter how large or complex the project.

Financing options—IBM Global Financing offerings are available. Flexible payment structures allow utilities to more effectively distribute initial costs and match payments to service benefits.

For more information
To learn more about how Power Generation solutions from IBM can benefit your company, please contact your local IBM representative or visit our Web site at:

ibm.com/energy

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