WorleyParsons
resources & energy

EcoNomics

Global Power
Capability & Experience

Innovative, customer-driven solutions

WorleyParsons provides innovative solutions that result in on-time delivery, cost savings, and risk reductions. We bring global expertise and training to local communities, increasing their professional capabilities to further socio-economic growth. Our full range of power services and experience is driven by our customers' needs and tailored to optimise project results.

Over 100 years delivering customised power solutions around the globe

We listen carefully to our customers to develop and deliver project execution plans that heighten performance and lower costs. Our solutions improve the performance of existing assets, reduce carbon footprints, and meet the growing demand for environmental and profitable sustainability.

WorleyParsons' extensive global resources, combined with 163 offices throughout the world, support our ability to rapidly respond to our customers' dynamic requirements.

We use cost, schedule, and forecasting tools to deliver estimates, plans, and real-time status reports that ensure cost-certainty and work control.

Our phased approach covers the *Select* Phase (identify and evaluate), the *Deliver* Phase (define and execute), and the *Improve* Phase (operate and maintain). This approach optimises the value of our customers' assets through the complete project lifecycle.

Our Power Markets

WorleyParsons' expertise spans the entire energy industry:

- Coal Power
- Advanced Coal
- Gas Turbines
- Hydroelectric Power
- Renewable Energy
- Power Networks
- Nuclear Power
- D4 Services (Decommissioning, Deactivation, Decontamination, Demolition)

Our combined expertise ensures customised solutions for any power project.

Committed to the communities in which we serve

WorleyParsons has developed an expansive geographic presence that provides our customers a unique combination of global resources, world-recognised technical expertise, and in-depth local knowledge.

WorleyParsons draws upon our extensive global resources to deliver top-notch engineers, project managers, and power experts anywhere in the world. We bring industry best practices from around the globe to the local community, which results in improved skills for the local workforce and overall socio-economic growth.

WorleyParsons is committed to the growth and development of the communities where we work. To achieve this, we provide localisation programs that deliver complex engineering services while facilitating the training of local engineering personnel. These programs are supported by the training, mentoring, and leadership necessary to ensure we achieve our global standards in a collaborative partnership with the communities we serve. WorleyParsons' in-country employment and development programs focus on recruitment of local employees while implementing formal training programs, resulting in committed, empowered, and rewarded communities.

Our established local offices and personnel understand the local challenges and will tailor the solution to those needs. Our global network will deliver world-class resources and experience. Combined, we are able to ensure low-risk, optimum solutions to any project.

Why WorleyParsons?

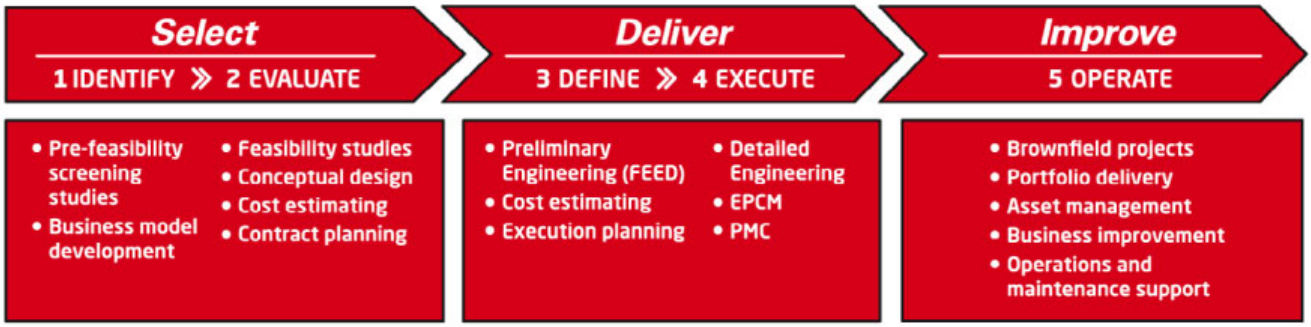
WorleyParsons delivers innovative solutions, consistently resulting in on-time delivery, cost savings, and risk reduction. These solutions include:

- Tools to quantify the impact of the project on the community
- Extensive global networks with local manufacturers for cost-effective procurement
- A proprietary Find -Me-an-Expert tool to locate hard-to-find engineers
- Performance-based contracts that ensure we deliver on our promises

We support all sizes of projects and tailor our approach to our customers' specific requirements, delivering optimum value. We offer over 3,000 full-time and part-time employees that can be ramped up or scaled down to provide cost-efficient staffing and rapid response.

We offer full-service engineering, ranging from concept to operation:

- Feasibility studies
- Detailed engineering
- Construction management
- Procurement
- Vendor quality assurance
- Start-up
- Operations and maintenance
- Decommissioning



Our phased approach covers the *Select* Phase, the *Deliver* Phase, and the *Improve* Phase. This approach optimises the value of our customers' assets through the complete project lifecycle.

Capability overview

Full-Service Coal Power Solutions
page 08

We tailor our full-service coal-fired plant capabilities to improve heat rate availability, optimise cooling systems, and implement the latest pollution control innovations, providing the scale and flexibility to save time and money.

Advanced Coal Technologies
page 10

We are a forerunner in all aspects of advanced coal technologies including integrated gasification combined cycle and oxyfuel combustion to ensure economical and environmental new generation solutions.

Leading-Edge Gas Turbine Technologies
page 12

WorleyParsons provides leading-edge innovations utilising the latest gas turbine generation technologies, both simple and combined cycle installations, to deliver customised low-risk solutions.

High-Value Hydroelectric Power Solutions
page 14

WorleyParsons is a leading provider of hydroelectric services. With over 100 projects delivered around the world, we offer high-value services for plants ranging from less than 1 MW to as large as the 11,233 MW Belo Monte HPP.

Renewable Energy Services that Support Future Needs
page 16

Our renewable services support our customers' transition to the power systems of the future. Through development and design, deployment, and operation, WorleyParsons delivers renewable energy technologies, their enablers, and hybrid solutions.

Power Network Solutions
page 18

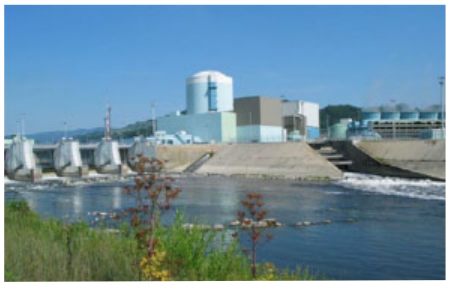
WorleyParsons' worldwide system planning expertise includes overhead, underground, and submarine electric power lines and substations, allowing us to design and implement customised new and upgraded transmission projects based on customer needs.

Power capabilities for any challenge

WorleyParsons understands the power industry's critical issues, including:

- Constrained budgets
- Increased environmental regulations
- Growing power demands
- Dynamic environment
- Rapidly changing requirements

We offer the latest technologies, combined with cost-estimating tools and a strong procurement network, to deliver cost efficiencies that support limited budgets.



A Leader in Nuclear Power
page 20

WorleyParsons has been a leader in the nuclear industry for over 50 years, actively engaged in all phases of nuclear power plant licensing, design, start-up, modification, construction, operation and decommissioning.

D4 Services:
Decommissioning
Deactivation
Decontamination
Demolition

page 22

Worley Parsons provides the technical expertise and innovative approaches for minimising costs, streamlining processes, and achieving closure status that decreases hazards to the environment and reduces risks to the customers.

Power *Select*
page 24

Power *Select* brings real world experience into project assessment, development, and concept selection to maximise investment return and customer value, ensuring a successfully executed project.

Power *Deliver*
page 26

Power *Deliver* helps our customers to take projects from their formative phase to successful handover and operation. We bring the ability to safely and consistently deliver projects large and small in line with customer expectations.

Power *Improve*
page 28

Power *Improve* delivers better market positioning for our customers by accessing our capabilities in plant assessment, execution, and outage readiness to reduce costs, improve processes, and increase productivity to assets.

Coal Power

WorleyParsons is an industry leader in providing successful full-service coal plant engineering to hundreds of customers worldwide.

We offer the required expertise to deliver coal-fired power generation projects of all technologies and configurations to ensure the right contemporary solution for our customers' generation needs.

WorleyParsons' extensive experience in solid fuel designs is utilised in every aspect of project execution. We offer improvements such as cooling system optimisation, carbon management, and heat rate availability that can rapidly be implemented in both new and existing coal plants.

Our operations personnel work collaboratively with our customers to plan, prepare for, and execute major outages with minimal impact.

WorleyParsons provides coal project designs that are compliant with the latest local environmental regulations, including supercritical pulverised coal and circulating fluidised bed boilers, to ensure all projects are sustainable and profitable.

Our creative, overlapping construction plans resulted in saved cost and time.

Collaborative success at generating station

- CUSTOMER **SANTEE COOPER**
- PROJECT **CROSS GENERATING STATION 3&4**
- LOCATION **CROSS, SOUTH CAROLINA**
- PHASE IDENTIFY EVALUATE DEFINE EXECUTE OPERATE

WorleyParsons worked collaboratively with our customer to provide project management, engineering, procurement, construction management, start-up, and testing for Cross Generating Station Units 3 and 4 in South Carolina. Santee Cooper and WorleyParsons worked as an integrated team in the early stages of design, through construction management, and on to start-up.

Cross Units 3 and 4 were placed into operation on schedule, with one of the lowest total installed cost of any coal-fired project of its generation.

Air quality control

Over the past century, WorleyParsons has emerged as a world leader in air quality solutions through new flue gas desulfurisation (FGD) design and installation. Our experience has led the Southern Company to select us to study, define, and execute retrofitting SCR and FGD for all fossil units at Plant Scherer, totalling 3,272 MW. We continue to analyse all available AQC technology, which includes solving the specialty issues of mercury and carbon capture.

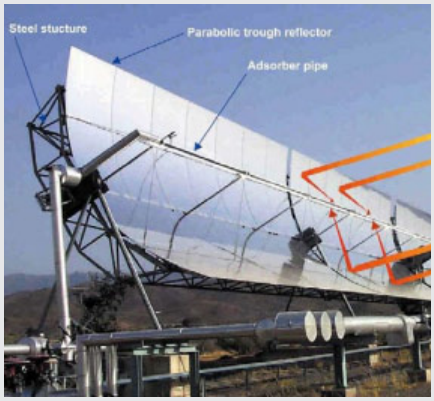
Advanced Coal Technologies

WorleyParsons' advanced coal capabilities effectively utilise our customers' coal resources by maximising efficiency, minimising environmental impact, and optimising lifecycle costs. WorleyParsons is experienced in numerous advanced coal technologies including gasification, oxy-combustion, carbon capture, supercritical/ultra-supercritical design, solar-thermal integration, and much more.

WorleyParsons evaluates and designs gasification projects in an environmentally responsible manner to economically fuel new generation requirements, or refuel existing combined cycle plants. We are committed to an independent approach and work with all technology providers, including Siemens, Lurgi, GE Energy, Phillips 66, Shell, and British Gas/Lurgi.

Our customers around the globe are facing increasing requirements for reductions in carbon dioxide emissions. To face these challenges, WorleyParsons considers a broad range of the potential carbon reduction options, such as carbon capture and carbon emission avoidance. We also analyse options for increased efficiency, cogeneration, or biomass co-utilisation. Increased efficiency options could include coal drying technology, cycle optimisations, upgrading of plant systems, or integrating solar.

WorleyParsons stays engaged with state-of-the-art material advances capable of providing advanced supercritical/ultra-supercritical steam conditions that directly improve plant efficiency and reduce emissions. Working with our global alliance partners, WorleyParsons develops carbon capture designs coupled with transportation of CO2 for sequestration or enhanced oil recovery.



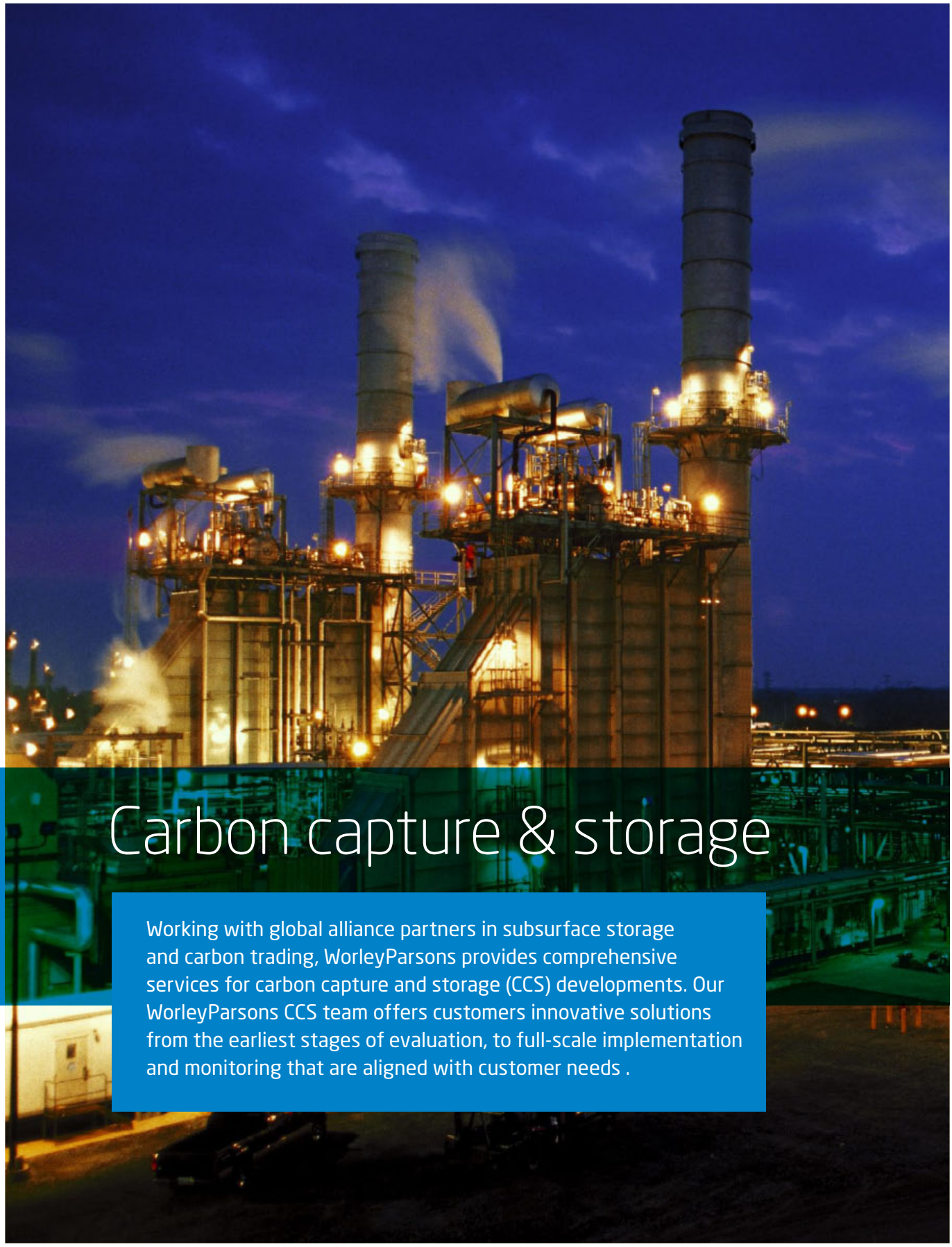
WorleyParsons provides environmentally responsible integration opportunities.

Solar augmented steam cycles for fossil plants

- **CUSTOMER** EPRI
- **PROJECT** CSP AUGMENTED STEAM FOSSIL PLANTS
- **LOCATION** MULTIPLE LOCATIONS, USA
- **PHASE** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

WorleyParsons provided technical and economic evaluations of using concentrated solar power (CSP) to generate steam for the steam cycle augmentation of a number of fossil-powered plants. The studies evaluated four coal-fired plants, two gas-fired combined cycle plants, and one heavy oil-fired plant, which ranged in plant capacity from 250 to 750 MWe.

We determined the best combination of technology and design approach for the plant by assessing how to integrate the solar energy into the existing steam cycle, modelling the thermodynamic performance of the integrated systems, and estimating the capital, operating, and maintenance cost of each case.



Carbon capture & storage

Working with global alliance partners in subsurface storage and carbon trading, WorleyParsons provides comprehensive services for carbon capture and storage (CCS) developments. Our WorleyParsons CCS team offers customers innovative solutions from the earliest stages of evaluation, to full-scale implementation and monitoring that are aligned with customer needs .

Gas Turbine Solutions

WorleyParsons delivers successful lifecycle projects through full-service engineering and consulting to help customers achieve their business goals in today's competitive gas turbine power generation market.

Our project teams deliver leading-edge applications using the newest combustion turbine generation technology such as simple cycle to combined cycle plant conversions, repowering of existing plants, and cogeneration. We implement these applications throughout our worldwide projects, which include simple and combined cycle installations for gas turbine plants, ensuring optimum solutions.

WorleyParsons designed the first 60 Hz single-shaft 107H units for General Electric, as well as their single-shaft 109FB 50 Hz combined cycle reference plant.

For large capacity machines, our design and implementation experience is unparalleled in the industry. Our project references feature machines from all major gas turbine OEMs including General Electric, ALSTOM, Siemens, and Mitsubishi Heavy Industries.

We excel as our customers' single point of accountability for simple to complex gas turbine power projects. Our reference plant approach meets today's aggressive project objectives to facilitate design and shorten schedules, yet allows flexibility to accommodate customer-specific conditions.

Our global geographic presence provides customers optimum solutions.

Global support for combined cycle plant

- CUSTOMER **CHINA CAMC ENGINEERING LTD**
- PROJECT **EL VIGIA COMBINED CYCLE PLANT**
- LOCATION **EL VIGIA, VENEZUELA**
- PHASE IDENTIFY › EVALUATE › DEFINE › **EXECUTE** › OPERATE

WorleyParsons provides engineering services to the El Vigia 570 MW 2x1 Combined Cycle Power Plant in Venezuela. We are responsible for geo-tech study, topographic survey, basic engineering design, detailed design, and site construction support.

The contract is executed collaboratively by WorleyParsons Beijing, China and Reading, USA Offices; utilising this combined expertise to deliver a successful project.

Combined heat & power

Natural gas combined heat power is a cleaner, more efficient, reliable, and more sustainable option that offers economic advantages for owners and stakeholders. WorleyParsons delivers this highly reliable source of thermal energy and power to our customers, significantly reducing energy and O&M costs.

Hydroelectric Power Solutions

WorleyParsons has more than 50 years of hydroelectric experience. We provide a comprehensive range of professional services on a continuing basis to support hydropower projects for our customers around the globe.

With our Hydroelectric Centre of Excellence based in Brazil, one of the largest hydropower countries in the world, augmented by our offices in Canada, leaders in small hydropower, WorleyParsons provides high-value services at a competitive cost to our customers .

Our strength in technical solutions is matched by our depth in environmental and social appraisals, delivering complex hydroelectric projects to our customers that are both profitable and sustainable.

WorleyParsons participates in hydropower projects throughout every phase of the lifecycle, allowing us to:

- Consider customer preferences and needs to provide long-term cultural and social fit with all stakeholders
- Optimise technical, environmental, and economic solutions that are balanced with project goals
- Introduce a basis for world-class project solutions that facilitates financing and environmental approvals

Our proven experience in all stages of hydroelectric development, operation, and refurbishment is applied to maximise the probability of success.

This 855 MW plant now has an innovative tunnel aqueduct and intermediary reservoir.

Innovation at Foz do Chapecó

- CUSTOMER **FOZ DO CHAPECÓ S.A.**
- PROJECT **FOZ DO CHAPECÓ HYDRO POWER PLANT**
- LOCATION **CHAPECÓ RIVER, BRAZIL**
- PHASE IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Due to adverse weather conditions, WorleyParsons proposed a new design for the Foz do Chapecó dam. The proposed innovation for the proposition of the first asphaltic core in Brazil enabled the construction of the dam in record time.

This innovative solution was awarded an International Milestone Project, from ICOLD 2011.

Environmental & social impact assessments

WorleyParsons is the world leader in environmental and social impact assessments. We have extensive experience in ecologically sensitive, inaccessible, or otherwise difficult areas and bring this depth of understanding to project development. As an international firm, we fully understand the requirements of the international community, including the World Bank and other multilateral funding agencies, requirements of the Equator Principles, and the World Commission of Dams.

Renewable Energy Solutions

The growth of renewable energy is driving rapid change in the power sector. In 2010, renewable energy represented half of all newly installed electric capacity worldwide. Covering a broad range of technologies, renewables offer emissions-free, virtually inexhaustible energy that is rapidly becoming more competitive.

The future brings a growing portfolio of renewables working alongside traditional sources, sometimes integrated in hybrid form. Enablers, such as energy storage and smart energy systems, will play an important role in this transition.

WorleyParsons' expertise in renewable energy spans from concept decision making to hands-on operations. These global services utilise a broad experience base and cover diverse roles, such as:

- Engineering of North Sea offshore wind farm structures
- Operations of biogas plants in Australia
- Evaluation of biomass facilities in Chile
- Study of solar/gas hybrid plant in Kuwait
- Planning of energy storage systems for renewables in the United States

WorleyParsons combines a thorough understanding of traditional energy technologies and leading systems, renewables, and their enablers to provide broad value to our customers. We merge the experience and maturity of the past to the needs and drivers of the future, allowing renewables to meet and exceed expectations of both energy markets and asset owners.

WorleyParsons installed Sewage Gas Engines for wastewater systems.

Renewable support across all project phases

- CUSTOMER **SYDNEY WATER**
- PROJECT **SYDNEY WATER ALLIANCE**
- LOCATION **SYDNEY, AUSTRALIA**
- PHASE IDENTIFY › EVALUATE › DEFINE › EXECUTE › OPERATE

Under an Alliance arrangement with Sydney Water, WorleyParsons, and energy market specialists, Energetics, pursue the development of renewable projects sited within Sydney Water's plant operations. Aimed at commercial projects utilising on-site renewable resources, WorleyParsons has undertaken the design, procurement, installation, and operation and maintenance of the resulting facilities. This currently includes the use of biogas from wastewater treatment works and small-scale hydro facilities, extracting energy from flows within Sydney Water's water and wastewater systems.

Solar power investment solutions

Arizona Public Service Co. (APS) and WorleyParsons have entered into an agreement for the APS AZ Sun Program. Under this program, APS, Arizona's largest and longest-serving electricity utility, is investing in the development of 200 MW of solar photovoltaic power stations across Arizona. WorleyParsons provides project management and owners engineering oversight for the projects, including concept engineering, the writing and issuing of specifications, procurement oversight, and delivery management.

Power Networks

WorleyParsons brings more than 100 years of experience in transmission, distribution, and industrial networks. Our staff has the superior technical expertise to deliver a full range of high-quality power networks services beyond those of traditional transmission and distribution engineering.

This very broad background covers overhead, underground and subsea networks for numerous utilities and other clients around the globe. We work in every type of terrain, climate, and location from inner city to neighborhood, industrial, rural, desert, mountain and sea ensuring local customized solutions.

Our power systems analysis provides system owners and operators, investors, and resource customers with the critical services on which to make business decisions, resolve operating constraints and develop plant and associated control and protection scheme designs.

WorleyParsons is uniquely placed to support customers in the evolution of Smart Energy. Our multi-disciplinary skills cover all aspects of power generation, energy management, recovery and complex power systems. This expertise is of benefit to utility, government agency, industrial, resource and municipal clients, including those for "Smart City" or town developments.

Our staff has experience in all phases of transmission and distribution project phases, enabling us to provide optimised, cost-effective lifecycle solutions.

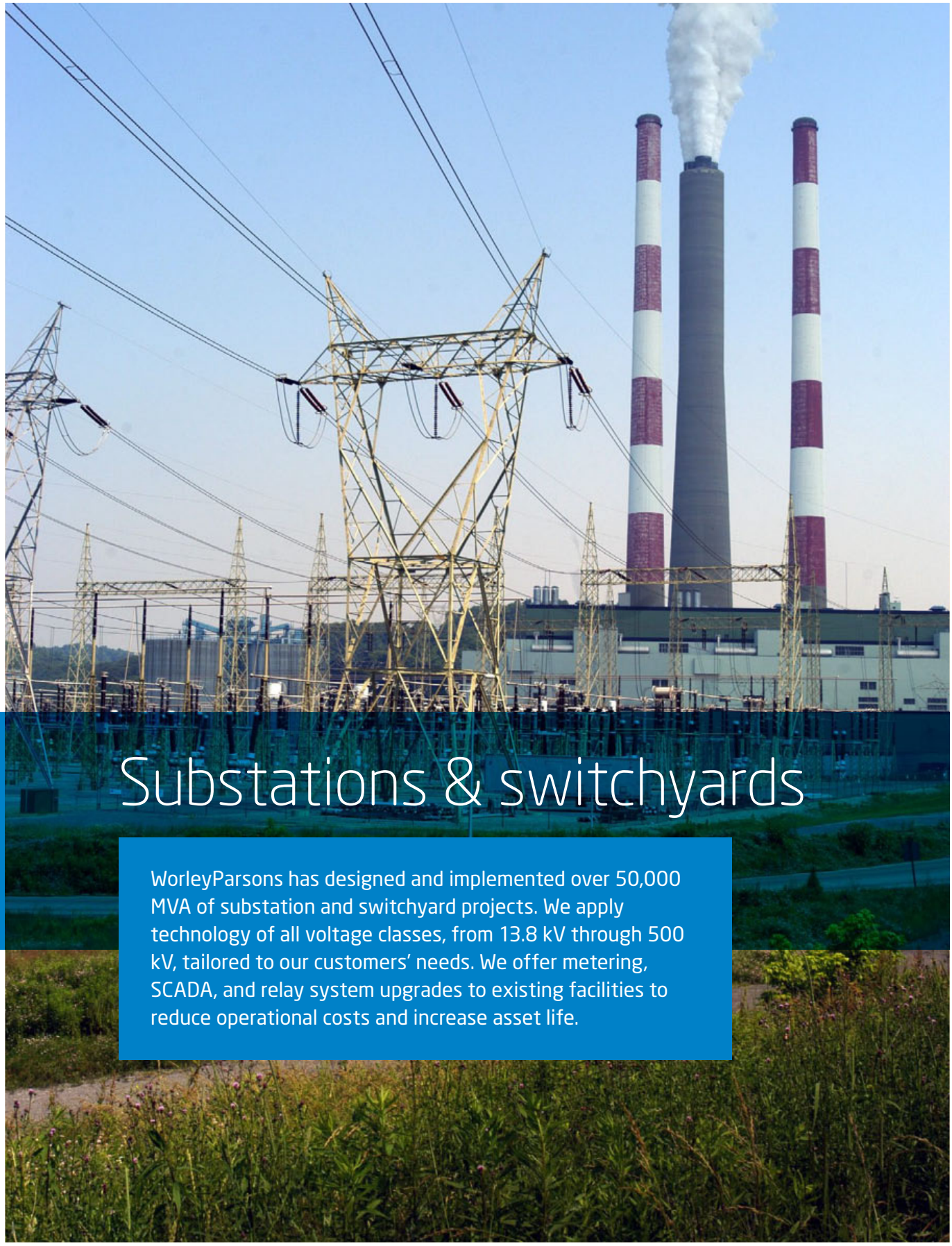
WorleyParsons managed over 50 submarine cable crossings from multiple locations.

Critical power supply upgrade

- CUSTOMER **QATAR PETROLEUM**
- PROJECT **FEED POWER SUPPLY UPGRADE**
- LOCATION **HALUL ISLAND, QATAR**
- PHASE IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Facing a shortage of power at Halul Island and at NFA Platform and with projected power demand increasing, Qatar Petroleum decided to feed power from onshore through 66kV and 132kV subsea cables. WorleyParsons employed cross sector, multi-entity solutions to meet the challenging scope.

WorleyParsons implemented power upgrades for both island and platform, completed ahead of schedule, under budget, and without a single safety incident.



Substations & switchyards

WorleyParsons has designed and implemented over 50,000 MVA of substation and switchyard projects. We apply technology of all voltage classes, from 13.8 kV through 500 kV, tailored to our customers' needs. We offer metering, SCADA, and relay system upgrades to existing facilities to reduce operational costs and increase asset life.

Nuclear Power

WorleyParsons is one of the most successful nuclear companies in program management and Front-End support, having fulfilled critical consultancy and engineering services for construction of new nuclear capacities of Generation 3 in a number of countries in Europe, US, Middle East, and Africa in different political, cultural, and regulatory environments.

WorleyParsons provides professional technical, construction, and project management services to the nuclear industry, from first generation plants to today's post-Fukushima challenges. WorleyParsons has demonstrated our commitment to this industry as well as our capability to deliver each phase of the nuclear project lifecycle, from uranium mining to the low-level radioactive waste (RAW) management.

Our work on worldwide commercial and government nuclear programs includes original, generation 3, and 3+ nuclear power plant support. From design and licensing through construction management and operation, WorleyParsons tailors solutions to address regional, customer, and international requirements.

Our experience encompasses the full spectrum of reactor designs, including evolutionary and advanced pressurised and boiling water reactors, heavy water and gas-cooled reactors. Our intimate familiarity with US and European nuclear supplied technology and deep understanding of emerging Japanese, Chinese, and Korean technologies, combined with our support for small modular reactors (SMR) as well as Gen IV projects, allows us to provide customers unbiased and fully informed assistance for the system best-suited to their needs.

With worldwide coverage, WorleyParsons is the only company with a global strategy and systemised approach to post-Fukushima realities, delivering solutions in the US, EU, Canada, and Japan.

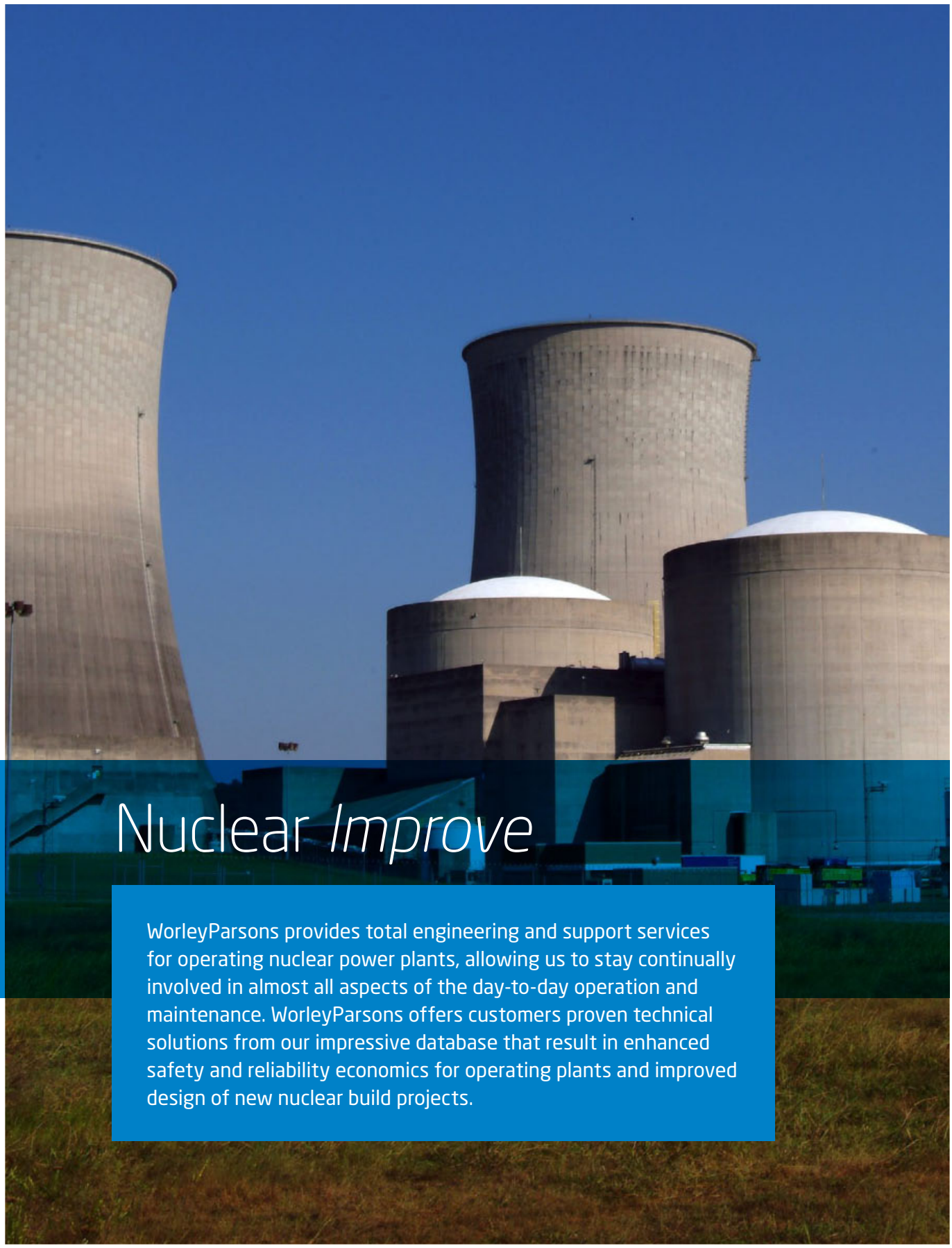
We developed the site characterisation and provided the hazards evaluation.

Preconstruction at Akkuyu nuclear plant

- CUSTOMER **AKKUYU NPP JSC**
- PROJECT **CONSTRUCTION OF AKKUYU NPP**
- LOCATION **TURKEY**
- PHASE IDENTIFY | EVALUATE | DEFINE | EXECUTE | OPERATE

WorleyParsons has been providing a wide range of preconstruction consultancy services covering licensing and permitting support; development of the Environmental Impact Assessment and organisation support in its approval process; analysis of the compliance of the regulatory base of the design with Turkish and IAEA requirements for nuclear energy; and stress test analysis of the Russian Gen 3 design AES 2006 proposed for construction

WorleyParsons met the aggressive schedule and helped the customer achieve the crucial requirements set in the Intergovernmental agreement.



Nuclear *Improve*

WorleyParsons provides total engineering and support services for operating nuclear power plants, allowing us to stay continually involved in almost all aspects of the day-to-day operation and maintenance. WorleyParsons offers customers proven technical solutions from our impressive database that result in enhanced safety and reliability economics for operating plants and improved design of new nuclear build projects.

D4 Services

Decommissioning, Deactivation, Decontamination, Demolition

WorleyParsons provides the technical expertise and innovative approaches to all aspects of D4 and site remediation. These approaches minimise costs, streamline processes, and achieve closure status that decrease hazards to the environment and reduce risks for our customers.

Planning

Using the Decommissioning Restoration Toolkit (DRT), our suite of proprietary, fit-for-purpose planning processes, we analyse risks from a portfolio perspective for a range of asset classes. These planning tools are deployed for each asset class by examining the economic, environmental, and community implications while ensuring project scope, budget, and schedule goals are met.

Technical Support

Customers face considerable challenges from the costs and scheduling risks created by approval and regulatory hurdles. WorleyParsons addresses these elements, assesses risks and opportunities associated with the asset portfolio, and creates effective and achievable outcomes.

Project Delivery Support

WorleyParsons assists in the delivery of projects by supporting operational readiness, field implementation, and Care and Maintenance (C&M) Optimisation. Our project and cost planning, risk management support, and innovative improvements will increase efficiency and effectiveness of core processes and project execution to reduce project costs.

We improved the safety culture through active safety training and program updates.

Nuclear decontamination & decommissioning

- CUSTOMER **US DOE**
- PROJECT **RIVER CORRIDOR CLOSURE PROJECT**
- LOCATION **WASHINGTON, USA**
- PHASE IDENTIFY › EVALUATE › DEFINE › EXECUTE › OPERATE

WorleyParsons provides a wide range of D4 technical and management support services at the Hanford Site in Washington. This Closure Project includes demolishing 486 buildings, remediation of 370 waste sites and burial grounds, placing two reactors in interim safe storage, and surveillance and maintenance (S&M). Our subject matter experts assist in the technical planning of closure activities to ensure projects are safe, effective, and efficient.

Our burial ground remediation at an interim safe storage support helped reduce implementation and long-term S&M cost and received the Project Management Institutes' 2009 Project of the Year award.

Coal plant idling management

WorleyParsons manages and executes complex plant layup or idling and remediation programs for our customers, while maintaining schedules, controlling costs, and reducing HSE risks. Through our deconstruction management process, we identify and evaluate equipment eligible for refurbishment and resale, providing our customers a more cost effective idling process.

Courtesy of TVA Web Team

Power *Select*

Power *Select* supports decision making on critical front-end planning issues that track and enhance our customers' ultimate business objectives.

Select brings real-world experience into the front-end value adding phases to maximise investment return and underlying confidence. *Select* delivers the highest potential value option for executing a fully defined and successful project.

Technical Development

Select makes use of our extensive design project databases and existing facility archives to quickly assemble concepts for screening.

Value Adding

- Through *Select*, we form an integrated team with customers to identify maximum front-end loading within the constraints of schedule and budget.
- Our proprietary Delta tool analyses each design option to show their effects on environmental issues and project economics.

Business Model Creation

Select assists in the creation of the required business models:

- Creating Capital Expenditure (CAPEX) validated, up-to-date estimates
- Building the ongoing Operating Expenditure (OPEX) models, enabling lifecycle cost comparisons
- Providing risk-based Net Present Value modelling for future-proofing businesses

Project Planning

Our customers have access to world-class planning, procurement, and construction project execution personnel to form the Decision Support Package (DSP).

Our strategic front-end planning, integrated with extensive execution capabilities, together with WorleyParsons' commercial neutrality, differentiates Power *Select* as a provider of lowest-risk, highest-return projects.

ZeroGen is the 1st power plant in the world to combine IGC and CCS.

Technology assessment for power plant

- CUSTOMER **QUEENSLAND GOVERNMENT**
- PROJECT **ZEROGEN IGCC POWER PLANT**
- LOCATION **QUEENSLAND, AUSTRALIA**
- PHASE **IDENTIFY** **EVALUATE** **DEFINE** **EXECUTE** **OPERATE**

ZeroGen Project is an Integrated Gasification Combined Cycle (IGCC) Power Plant demonstration facility. It consists of two main areas: IGCC plant and CO2 Geosequestration for carbon capture storage (CCS).

WorleyParsons' scope included technology assessment and FEED. Our technology assessment included process configuration, definition of major system components, heat and mass balance development, plant performance and emissions profiles, and characterisation for CO2 capture and processing for geosequestration. The project has changed its configuration and secured support from Mitsubishi Corporation and Mitsubishi Heavy Industries.

Future-proofing your business

Within a carbon constrained future, WorleyParsons brings technological know-how of sustainable power solutions (including both new generation options and improved existing plant performance), coupled with environmental and carbon management techniques to enable our customers to future-proof their businesses. This, together with current capital and operating cost knowledge, provides the basis for the best solution tailored to our customers' abilities and needs.

Power *Deliver*

During the *Deliver* phase, WorleyParsons converts the highest potential value options identified in the *Select* phase into fully defined, safe, and successfully executed projects, realising maximum value for our customers.

WorleyParsons' *Deliver* capability takes the value identified by *Select* and ensures it is realised during the Define and Execute phases. We work closely with our customers and contractors to

- Achieve our vision of zero harm
- Maximise alignment of project goals
- Ensure the efficient utilisation of resources

The WorleyParsons Project Management Process, part of our global Enterprise Management System, provides a scalable, risk-based framework for project execution, and ensures the quality, efficiency, and consistency of our project delivery approach; regardless of size or location.

Define

During the Define phase, our teams optimise the technical scope, capital cost, schedule, and execution plans for the selected developments. This includes appropriate front-end loading to maximise the value in the investment decision prior to project sanction.

Execute

Following project sanction, WorleyParsons mobilises an Execute phase project team, with the full range of EPCM or PMC capabilities and experience. Our comprehensive resources will deliver projects for customers facing a variety of challenges, including tight schedules, remote and logistically constrained sites, and unique or innovative environmental or technological considerations.

Our construction services excelled in safety, cost, schedule, and function.

Optimising projects through *Deliver*

- CUSTOMER **SENOKO POWER LTD**
- PROJECT **SENOKO POWER STATION STAGE 1**
- LOCATION **SEMBAWANG, SINGAPORE**
- PHASE IDENTIFY › EVALUATE › DEFINE › EXECUTE › OPERATE

WorleyParsons provided owner's engineer services at Senoko Power Station in Singapore from the *Select* through *Deliver* phases. The project required the repowering of 3 x 120 MW condensing steam turbines (25 years old) within the conventional oil-fired steam power plants into multiple shafts combined cycle power plants (CCPP) of 360 MW each in two phases.

WorleyParsons selected Alstom Power GT26B gas turbine as the highest value prime mover. Through our project execution management, we optimised the turbine to fire natural gas from two sources for higher efficiency.

Project management

WorleyParsons has an outstanding track record as a PMC contractor. As program manager we form a working partnership to ensure that customer interests and business objectives are met in the most cost-effective manner. This operational methodology produces a quality program that is safe, cost effective, technically sound, environmentally compliant, and deliverable in a minimum time frame.

Power *Improve*

WorleyParsons' *Improve* is a suite of solutions tailored to our customer needs for existing plant operations, focusing on operations, maintenance, and the delivery of major projects, upgrades, and efficiency improvements. *Improve* supports successful project portfolio management and production support services to sustain assets and improve business performance.

Using the knowledge accumulated from more than 120 alliances and long-term contracts, we have developed a culture that incorporates industry best practices in capital planning and benchmarking. Our suite of unique tools, systems, and delivery methodologies ensures reduced costs and improved process efficiencies.

We have strong, technology-specific knowledge in the power industry and a track record of success using our performance-based relationship contracting model. Through our model, WorleyParsons delivers maximum value to customers using local teams, supported both regionally and globally.

Improve draws upon our experience, capability, tools and systems to provide a variety of services within the operate phase.

***Improve* can be delivered through long-term contracts and relationships, aligning to our customers' requirements and delivers value-added improvements to our customers and their assets.**

WorleyParsons delivers demonstrable value through O&M services

Value through operations and maintenance

- CUSTOMER **VERVE ENERGY**
- PROJECT **COLLIE POWER STATION UPRATE**
- LOCATION **WESTERN AUSTRALIA**
- PHASE IDENTIFY › EVALUATE › DEFINE › EXECUTE › OPERATE

As part of a joint venture, WorleyParsons has continued to provide full operations and maintenance services at Collie Power Station. WorleyParsons achievements at Collie are substantial:

- Successfully restored and upgraded the station's performance by 15 MW. Collie has continued to perform at the higher rated capacity
- The Betterways Program has identified and delivered over $1M p.a. savings in operating costs during the first four years of operation

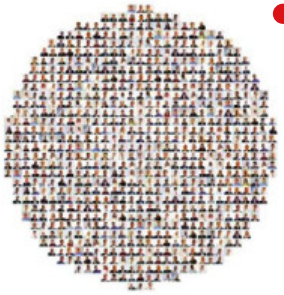
Capital planning

WorleyParsons *Improve* works with our customers to improve and optimise their assets as part of the journey to operational excellence. WorleyParsons implements systematic and rigorous planning through a capital works program that ensures projects are correctly prioritised to maximise our customers' operations. Through capital planning, WorleyParsons has delivered over $20 million in net value to OneSteel in Australia, through reduced cycle times, enhanced operations, and improved staffing efficiencies by over 20 percent.

Our differentiators

Differentiator 1

Combined empowerment and technically capable people



Differentiator 4

Outstanding operational and corporate performance

Differentiator 5

Focus on long term contracts and asset-based services

Differentiator 2

Industry leadership in health, safety and environmental performance

Differentiator 6

Success in project delivery - large and small

Differentiator 3

Economics™ – delivering profitable sustainability

Differentiator 7

Comprehensive geographic presence

Leading global service provider

WorleyParsons is a leading global provider of professional services to the resources and energy sectors, and the complex process industries.

We cover the full asset spectrum, both in size and lifecycle, from the creation of new assets, to services that sustain and improve operating assets.

Our business has been built by working closely with our customers through long-term **relationships**, anticipating their needs, and delivering inventive solutions through streamlined, proprietary project delivery systems. Strong growth continues to characterise our performance, both through organic development and through strategic acquisition, as we strive to provide tailored services wherever our customers need us.

HYDROCARBONS

POWER

MINERALS, METALS & CHEMICALS

INFRASTRUCTURE & ENVIRONMENT

OneWay™ to zero harm

Zero Harm is our corporate vision for health, safety, and the environment (HSE).

We are committed to our vision and apply it to all operations, at all times, in all locations, and at all levels of responsibility. We will actively work to align our expectations and behaviours to achieve Zero Harm in our dedication to continuous improvement. These expectations are reflected in our integrity management framework, OneWay™, and linked to our global systems and procedures.

EcoNomics™

EcoNomics™ provides our customers with the systems, technologies, and expertise to optimise and balance financial, social, and environmental outcomes, improving sustainability performance while enhancing profit and long-term viability.

WorleyParsons' vision is to be a leader in sustainability by helping our customers capture new markets and business opportunities created by the new energy economy.

Global Power

Capability & Experience

www.worleyparsons.com/csg/power