WorleyParsons provides our customers with gas turbine-based power generation facilities to maximize their return on investment, as well as minimize their environmental emissions. Our projects ensure a higher rate of efficiency for both new and current assets.
Providing leading-edge gas turbine and combined cycle technologies

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. The gas turbine combined cycle is typically the most efficient, cost-effective option with shortest to market power generation schedule.

Our project teams deliver leading-edge applications using the newest combustion turbine generation technology such as simple and combined cycles, simple to combined cycle plant conversions, repowering of existing plants, and cogeneration. We implement these applications through our worldwide project delivery networks that cover all five phases of life cycle, ensuring optimum solutions resulting in efficient, cost-effective projects.

WorleyParsons designed first of a kind plant and reference plants that include both GE and Siemens gas turbines. We did the first 60 Hz single-shaft 107H units for General Electric, as well as their single-shaft 109FB 50 Hz combined cycle reference plant. Similarly for Siemens, we designed the first 501F reference combined cycle plant design and also implemented the first 501G plant.

For large capacity machines, our design and implementation experience is among the leaders of the industry. Our project references feature machines from all major gas turbine OEMs including General Electric, ALSTOM, Siemens, and Mitsubishi Heavy Industries. We are current on the gas turbine technology development based on our routine interface with all OEMs and share their applicable software and design guide database.

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

On April 28, 2010, our team received Siemens’ Award in recognition of excellence in the category: Best Execution Project 2010 for Kallpa 3.
Gas, Today’s Fossil Fuel of Choice

Gas turbine design improvements continue to provide better performance and power emissions. Currently, most environmental regulations favor combined cycle plants. The cost to install gas turbine based facilities remain among the lowest in fossil generation.

Will low natural gas prices revive the growth of CC plants?

Gas turbine-based power generation facilities provide customers with an excellent opportunity to maximize their return on investment, as well as minimizing their environmental emissions.

Lower emissions and higher efficiencies, coupled with relatively low stable natural gas prices driven by the unconventional shale gas revolution unfolding across the globe, have accelerated the shift from solid fuels to natural gas.
Why WorleyParsons?

Key Differentiators

Solution Focused
We provide functional integration to provide a fit for purpose solution to achieve the lowest life cycle cost for any project by analyzing and screening of alternative approaches.

Prioritizing Customer Needs
We work with our customers as one team in a seamless fashion. We serve energy generation (thermal and power) needs for all customers (small to large) in any market sector.

Technology Neutrality
We are technology neutral and provide independent, unbiased opinions regarding the OEM design to meet our customers’ goals in the most efficient and economical way.

Value Engineering
Our personnel are indoctrinated to think outside the box and to provide prudent value engineering solutions to customers.

Combining our Differentiators for an Award Winning Approach
A key example of our differentiators is Combined Cycle Journal’s 2009 Pacesetter Plant Award to our team for the Termocandelaria project. The project consisted of dual fuel conversion for two “F” class peaking gas turbines to conform to Colombian grid requirements for back up power to help stabilize the country’s electrical system. We completed the project within tight schedule constraints, focusing on the best solution to the customer in order to preserve the plant’s capacity payments and produce a more reliable facility.
Experience Around the Globe

El Segundo Energy Center
CUSTOMER: SIEMENS ENERGY INC.
TIMEFRAME: 2010 - 2013
LOCATION: EL SEGUNDO, CALIFORNIA
OFFICE: SACRAMENTO, CALIFORNIA & READING, PENNSYLVANIA

WorleyParsons has been contracted by Siemens Energy Inc. to provide detailed design and engineering for two adjacent Flex-Plant™ 10 one-on-one combined cycle power blocks.

The advanced design of the Flex-Plant 10 offers an environmentally compatible solution for the peaking to intermediate market through fast-start technology, and low start-up emissions and water usage. The two Flex-Plant 10 power islands can generate an output of 300 MW within 10 minutes.

These units supply environmentally friendly power to 240,000 households.

Delaware City Refinery Repowering Project
CUSTOMER: PREMCOR
TIMEFRAME: 1997 - 2000
LOCATION: DELAWARE CITY, DELAWARE
OFFICE: READING, PENNSYLVANIA & HOUSTON, TEXAS

WorleyParsons provided lump sum turnkey EPC services for this integrated gasification combined cycle (IGCC) 235 MW repowering project.

The Motiva refinery produces approximately 2,000 tons of petroleum coke as a by product per day. The coke is gasified using twin train 900 ft³ Texaco Process gasifiers to fuel two 90 MW General Electric 6F combustion turbines and two heat recovery steam generators that supply 530,000 lb/hr 1250# steam to 55 MW of existing steam turbines.

The refinery’s excess electric power is sold into the power grid to decrease overall costs.

Kalpa CC Conversion Project
CUSTOMER: KALPA GENERACION
TIMEFRAME: 2008 - 2009
LOCATION: CHILCA, PERU
OFFICE: CHATTANOOGA, TENNESSEE

The project is located within the existing Kalpa Power Station in the city of Chilca, Peru. It is a completely outdoor facility with no buildings over the equipment and is located in Seismic Zone 4. WorleyParsons will design all plant structures to meet these requirements.

The scope includes front end engineering and design, heat balance preparation, emission estimates, water balance, and development of EPC scope documents for converting three Siemens simple cycle gas turbines (one FD2 and two FD3 models) to combined cycle.

The net plant capacity will increase from about 555 MW in simple cycle to about 825 MW in Combined Cycle (CC) conversion.
Cogeneration Study at Five Sewage Treatment Plants

The Sydney Water Corporation required a detailed feasibility analysis of installing cogeneration plants at each of the five existing Sewage Treatment Plants (STPs). WorleyParsons, through Burns and Roe Worley (BRW), conducted the project in two stages. Stage 1 was a preliminary analysis of the likely volumes of gas at each site and the feasibility of using this for a cogeneration plant. Stage 2 expanded on the fundamental feasibility of installing cogeneration plants at the specific STPs.

We identified the optimum cogeneration technology to meet the goal costs of development, the expected returns, and any technical or commercial issues that might be encountered.

Senoko Power Station

Development Resources Pte Ltd (DRPL), a company of the WorleyParsons Group, was the Owner’s Engineer of this project at Senoko Power Station in Singapore. The project required the repowering of three units of 25-year old 120 MW condensing steam turbines of the conventional oil-fired steam power plants into multiple shafts combined cycle power plants (CCPP) of 360 MW each in two phases.

Alstom Power GT26B gas turbine was selected as the prime mover. Each block of CCPP has a configuration of 1GT+1HRSG+1ST.

The gas turbines have dual fuel (natural gas and diesel oil) capability, and were designed and optimized to fire natural gas from two sources.

UCLA Chilled Water and Cogeneration Facility

Following successful engineering design, procurement, and construction services for the 20,900 ton chilled water and 44 MW cogeneration facility in 1993, WorleyParsons assumed complete responsibility through an on-site staff for O&M services of the facility under a 5-year contract that was renewed in 1999 under a 5-year extension agreement, and again in 2004.

In 2004, UCLA awarded WorleyParsons a new 5-year contract following a competitive bid process for continuing O&M services based on exemplary performance and competitive pricing.
WorleyParsons helps customers achieve their business goals in today’s competitive gas turbine power generation market. We deliver successful life cycle projects through full-service engineering and consulting.

Growth of new gas turbine combined cycle plants are mainly due to following factors in the recent past:

• Have historically been regarded as most fuel-efficient, environmentally friendly power generation option
• Lowest construction costs among all types of power generation technologies
• Relatively shorter construction duration
• New environmental regulations
• Lower water consumption with respect to other fossil or nuclear plants
• Lower emissions and carbon footprint compared to other fossil-based power generation

WorleyParsons has vast experience with new gas turbine combined cycle plants, shown by over 40,000 MW of new plant design in the last 15 years, as well as over a hundred due diligence and owner’s engineer projects. We transfer these key lessons from our past projects to our customers through low-risk, high-value solutions.

Utilizing our global gas turbine expertise

CUSTOMER    CHINA CAMC ENGINEERING
PROJECT      EL VIGIA COMBINED CYCLE PLANT
LOCATION    EL VIGIA, VENEZUELA
PHASE

WorleyParsons was awarded by CAMCE to provide engineering services to the El Vigia 570MW 2x1 Combined Cycle Power Plant in Venezuela. The project consists two phases: Phase I Simple Cycle is to be in operation in 15 months after NTP; followed by Phase II Combined Cycle of another 18 months.

WorleyParsons is utilizing multiple offices around the world to perform the Geo-tech and Topographic Surveys, Basic and Detailed Design, Procurement, Construction, and Commissioning Support.
The Lodi Energy Center was granted licensing and certification to become the first fast-start combined cycle power plant in North America – the first of its kind. Fast-start plants have several advantages, including significantly reduced fuel costs, significantly lower startup emissions, and the versatility to effectively partner with intermittent renewable energy sources. This environmentally sustainable solution sets a benchmark for future plants striving to meet new regulations.
Delivering Cogeneration for Increased Efficiency

WorleyParsons’ rich history of cogeneration, or combined heat and power (CHP) experience provides a solid foundation to ensure that your project receives expert attention and successful outcomes.

Cogeneration systems generally can be classified into two generic subgroups depending on the order of energy utilization. Systems that combust fuel primarily to generate electrical power and reject thermal energy for process uses are called Topping Cycles. Bottoming Cycles involve the use of the heat rejected from an industrial process as an energy source to generate electrical power.

The primary advantage of cogeneration, compared to separate generation of thermal and electrical energy, is the inherent thermodynamic efficiency. Cogeneration systems can achieve thermal use efficiencies as high as 85% by utilizing the reject heat of one process as a source of energy for a subsequent conversion process. We deliver this highly efficient energy system to both new and existing gas turbine assets, saving long-term costs for our customers.

Replacing existing rankine cycle thermal power plants with combined cycle cogeneration more than doubles the fuel conversion efficiency. Utility costs for industrial customers are dramatically reduced, providing improved profit margins for their core products.

Delivering successful cogeneration projects

- CUSTOMER: MAIN ENGINEERS/TERMOBAHIA LTDA.
- PROJECT: TERMOBAHIA COGENERATION PROJECT
- LOCATION: BAHIA, BRAZIL
- PHASE: IDENTIFY → EVALUATE → DEFINE → EXECUTE → OPERATE

WorleyParsons and Main Engineers provided a wide range of owner’s engineer services to Termobahia Ltda. during the design, construction, and start-up phase of the Termobahia Cogeneration Project.

WorleyParsons and Main had developed a model of owner’s engineer services that was well suited to Brazil, using the proper combination of expatriate and in-country engineering expertise.
WorleyParsons provides solar energy as a solution to increase economical and environmental value of both existing and new fossil-based assets. Hybridizing concentrated solar power (CSP) with conventional power generation technology can provide high-value, dispatchable power. Solar thermal energy can be converted to electric energy at higher efficiencies than in standalone CSP plants. Additionally, CSP integration can help eliminate daily start-up and shutdown energy losses and reduce overall costs.
As conventional rankine cycle power plants age, the efficiency of steam production generation equipment declines, while the maintenance cost and forced outage rates increase significantly based on the type of fuel used.

These factors, along with the environmental compliance cost, may make the cost of generation unattractive even with regular maintenance. Rather than replace aging steam generation equipment in kind, some utilities have chosen to replace it with new technology. This process, called repowering, offers the opportunity to increase the efficiency of the overall power generation process through the installation of new, improved equipment. Repowering with more efficient steam generation equipment can reduce net emissions greenhouse gases, and air pollutants compared to operating the original equipment. Repowering with equipment that uses lower-carbon fuels can further reduce net greenhouse gas emissions.

WorleyParsons offers several repowering options. This includes replacement of the existing steam generation equipment with a new one, or a totally new steam generation process involving gas turbines and waste heat steam generators.

We deliver repowering with natural gas-fired gas turbines and add waste heat recovery steam generator(s) to improve the overall generation efficiency, and have the potential to increase the electrical output of the facility by twofold. This process also reduces greenhouse gas emissions per MW basis, as natural gas is lower in carbon than the fuel previously used. Repowering with natural gas fired gas turbine(s) also has environmental benefits of more effective control of SO2, NOx, and particulate emissions.

Repowering to increase asset value

CUSTOMER HRVASTSKA ELEKTRONJORDULA (HEP)
PROJECT TE-TO ZAGREB POWER PLANT
LOCATION ZAGREB, REPUBLIC OF CROATIA
PHASE IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

WorleyParsons provided full lump sum turnkey EPC services to repower an existing district heating plant with 2 x 70 MW, General Electric 6FA gas/oil-fired combustion turbines and a 60 MW steam turbine. The district heating plant provides industrial, commercial, and residential heating for the city of Zagreb.

Following completion of start-up, WorleyParsons was chosen by the owner for the operations and maintenance of the entire facility.
If your primary goal is to significantly increase efficiency and/or expand capacity, while still maintaining a more favorable environmental profile, converting your simple cycle gas turbine to a combined cycle is a practical solution to satisfy your base load requirements. WorleyParsons has successfully performed all phases of major installations, modifications, and conversions, and can provide your project with a seasoned team of experts to deliver exclusive engineering/consulting and project management services for a wide range of power generating plants.
Our Differentiators

Differentiator 1
Combined empowerment and technically capable people

Differentiator 2
Industry leadership in health, safety and environmental performance

Differentiator 3
Economics™ – delivering profitable sustainability

Differentiator 4
Outstanding operational and corporate performance

Differentiator 5
Focus on long term contracts and asset-based services

Differentiator 6
Success in project delivery - large and small

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

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.

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 behaviors 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.
Gas Turbine
Capability & Experience