

**INTEGRATED
PROJECTS**



KNOWLEDGE, EXPERIENCE AND FLEXIBILITY

Since its inception in 1944, Cobra Group has evolved to become a world leader thanks to its ability and determination to develop, build and operate industrial infrastructures requiring a high level of service, based on excellence in integration, technological innovation and financial strength.

01

COBRA GROUP

page 2

02

INDUSTRIAL PLANTS
AND ENERGY

page 12

03

WATER

page 38

04

HYDRAULIC
INFRASTRUCTURES

page 54

05

INNOVATION

page 66

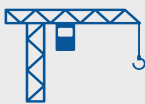
01

**COBRA
GROUP.**



THE ACS GROUP IS A WORLDWIDE REFERENCE IN THE CONSTRUCTION AND SERVICES BUSINESS.

ACS is a worldwide reference group for construction, civil works and related services, developing its activity in over 54 countries in key sectors such as Oil & Gas, Infrastructures, Mining, Power & Heat (CCGT) and Energy (Renewable Energy facilities including onshore & offshore wind, tidal, hydroelectric power plants, solar PV and solar thermal –CSP– plants). Since 2013 the ACS Group leads the ENR ranking of International Contractors.



CONSTRUCTION

Execution of civil works, building and mining projects from project design through financing, construction and start-up to operation.

€24,217 mn



INDUSTRIAL SERVICES

For energy, industrial and mobility infrastructures including development, construction, maintenance and operation.

€6,246 mn



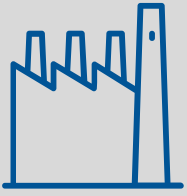
SERVICES

Focus on services for people, for buildings, for the city and the environment.

€1,538 mn

TURNOVER 2016

€ 31,975 mn



ACS INDUSTRIAL SERVICES AREA

The ACS Group's Industrial Services area is one of the main global competitors in the field of applied industrial engineering, with projects in more than 50 countries. The activities carried out by the ACS Group's Industrial Services area grouped into two basic business lines:

INDUSTRY SUPPORT SERVICES

- **Networks:** electricity, gas and water network maintenance services and activities, in which the ACS Group has over 80 years' experience.
- **Specialised Facilities:** covering construction, installation and maintenance activities for high-voltage electricity lines, telecommunications systems, railway installations, electricity facilities, mechanical assemblies and heating and cooling systems.
- **Control Systems:** activities for installing and operating control systems for industrial and municipal services, noteworthy among that are traffic and transport control systems and systems for the comprehensive management of public infrastructures, segments in which ACS has become the leading engineering supplier.

INTEGRATED PROJECTS

The ACS Group's Integrated Projects business is focused on executing "turnkey" or EPC projects in which it designs, constructs and commissions projects related to the energy sector and engineering applied to industry. It is also worth highlighting the ACS Group's experience promoting and participating in concession assets, related mainly to energy, such as wind farms, thermal solar plants, transmission lines, purification plants and desalination plants.

These activities are distributed among the various enterprises that compose the companies that head up the industrial services activity: the **Cobra Group** and **Dragados Industrial**, two sector-leading business groups with more than 50 years of demonstrated experience.



THE MAIN DEVELOPER, EPC AND O&M CONTRACTOR OF ACS GROUP 'S INDUSTRIAL

Cobra Group is the main Developer, EPC and O&M Contractor of ACS group 's Industrial Division. It has an extensive experience in the development of services and maintenance activities to support the industry and engineering in the development of projects. Within the mentioned Industrial Services, Cobra occupies a leading position in activities such as distribution infrastructures for energy and water, telecommunications, railways and energy projects through various enterprises that compose the company.



A major corporate advantage of the Group is its ample experience and leadership in the development, maintenance and operation of infrastructure related to power generation and water sectors. Its subsidiaries, Tedagua, Industrial Plants & Energy and Hydraulic Infrastructures, have become an international leader in the design, construction, operation, maintenance and engineering of industrial facilities, hydropower plants, desalination and water treatment plants.



PROJECT DEVELOPMENT	EPC	O&M
<ul style="list-style-type: none"> ➤ Identification, selection and analysis of business opportunities. ➤ Permitting (international regulatory how). ➤ Layout, Design, Basic Engineering and Plant optimization. 	<ul style="list-style-type: none"> ➤ FEED, Basic & Detailed Engineering ➤ Performance Plant Model ➤ Negotiation with suppliers and subcontractors ➤ Project Management ➤ Commissioning and Start up ➤ EPC Full wrap guarantees 	<ul style="list-style-type: none"> ➤ Health, Safety & Environmental management ➤ Operating optimization process ➤ O&M performance and availability guarantees



SECTORS EXPERIENCING BUSINESS GROWTH



The Cobra Group is a leading contractor with a global presence, mainly in developed countries. It consolidates its leadership position and situation in the countries in which it already has a strong presence, combined with sustainable expansion towards new markets with significant growth potential, taking advantage of the synergies arising from working between subsidiaries of the Group, mainly in the field of energy as well as hydraulic infrastructures and water (desalination, purification and filtering plants).

The business of implementing its integrated projects is flexible and dynamic and is not confined to specific markets. Over the years, the subsidiaries have developed their in-house design, engineering and construction capabilities to bid and execute large and complex EPC projects in over 70 countries. These characteristics, together with its capillary nature and an extensive network of workers, enable subsidiaries to join, identify and take advantage of new opportunities in all types of markets.



INDUSTRIAL PLANTS & ENERGY

Brazil / Chile / Dominican Republic / France / Germany / Guatemala / Honduras
Ireland / Mexico / Peru / Portugal / Saudi Arabia / South Africa / Spain / Uruguay
United States



WATER

Argelia / Australia / Bangladesh / Brazil / Colombia / Djibuti / Georgia / Germany
Ireland / Morocco / Nicaragua / Panama / Peru / Qatar / Romania / Singapore
Spain / Tunisia / United States / United Arab Emirates



HYDRAULIC INFRASTRUCTURES

Georgia / Guatemala / Nicaragua / Panama / Peru / Portugal / Spain

CONCESSIONS BASING ON A HIGH DEGREE OF SPECIALIZATION

The Concessions area benefits of proven experience, backed by a solid track record in creation of value. This makes it an international point of reference in the promotion, financing and construction of new infrastructures.

This service includes the global management of each project through the design, provisioning and installation of equipment, quality control of the works and financing of the total cost through Design Build Operate and Finance or Design Build Finance Operate Transfer.

With the experience accumulated, Cobra Group operates throughout the whole value chain of the concessionaire business through the promotion, financing and construction of concessions.

At present, Industrial Plants & Energy has more than 2,380 MW of solar and wind power capacities developed and it has 1,724 MW of solar power capacity under construction, 1,550 MW of whom were awarded in the second round of the renewable energy auction in Spain in July 2017.



INDUSTRIAL PLANTS & ENERGY

OVER **2,380 MW** OF SOLAR AND WIND PROJECTS DEVELOPED

1,724 MW UNDER CONSTRUCTION IN SOLAR PV



WATER

OVER **1,000,000 M3/DAY** OF DESALINATED WATER PRODUCED



HYDRAULIC INFRASTRUCTURES

OVER **1,000 MW** OF HYDROPOWER PLANTS DEVELOPED





02

Industrial Plants & Energy





INDUSTRIAL PLANTS & ENERGY

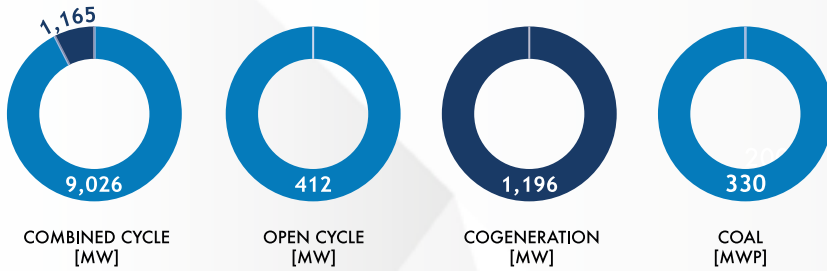
Cobra Industrial Plants & Energy (ACS subsidiary for industrial services) has acquired a strong reputation in the overall market as a strong, reliable and experienced EPC Contractor in a variety of industrial sectors such as oil & gas, LNG and re-gasification, Power Generation and Renewable Energies. It possesses extensive experience in the development, construction, operation and maintenance of off-shore platforms, infrastructure topsides and industrial facilities; it is also known for its strong international presence in all five continents.

Cobra Industrial Plants & Energy is the main EPC contractor for flexible solar and wind energy projects. In CSP parabolic trough technology, it is the world leader in construction and operation of plants, having developed built more than 600 MWe in parabolic trough technology with thermal storage (molten salts) like Extresol, Manchasol and Andasol and Ilanga 100 MWe, located in South Africa. In CSP tower technology it built the first commercial plant to use molten salts as HTF (Gemasolar, 20 MWe). Nowadays, Cobra Industrial Plants & Energy has already built the biggest commercial tower plant, Crescent Dunes Solar Energy Project 110 MWe, in the USA.

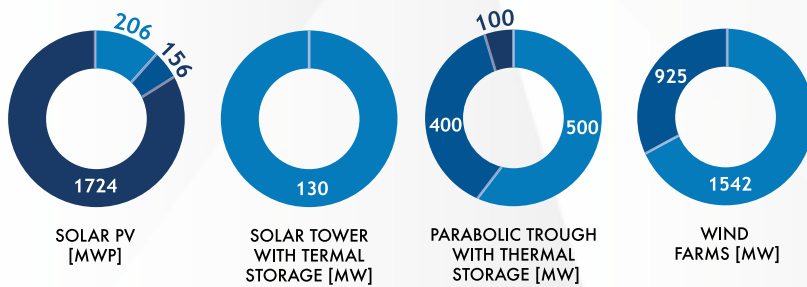


EPC AND O&M CAPACITY INSTALLED IN CONVENTIONAL & RENEWABLE ENERGIES (MW)

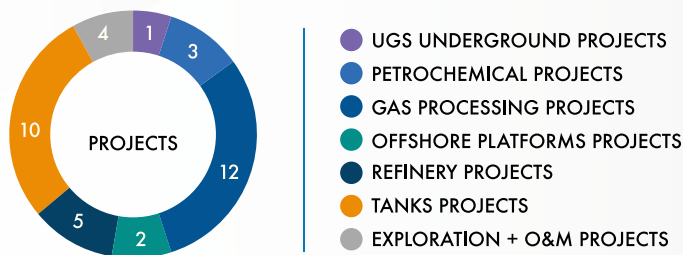
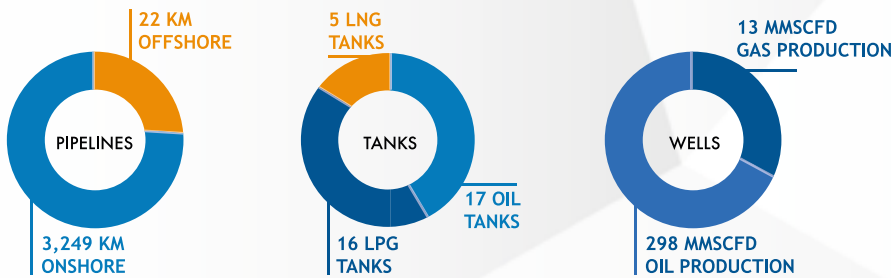
CONVENTIONAL ENERGY TOTAL REFERENCES



RENEWABLE ENERGY TOTAL REFERENCES



OIL & GAS TOTAL REFERENCES



Valle de México II Combined Cycle Power Plant

Turnkey implementation of the engineering, procurement, construction and commissioning of the combined cycle power plant Valle de México II. The project will be developed on the land of existing thermal power plant Valle de México I, located 38 km from the San Bernardino–Tepexpan Guadalupe Victoria transmetropolitan road.

The natural-gas-fired power plant is currently under construction; it will have an installed capacity of 615 megawatts and will be located in the municipality of Acolman.

It consists of the construction of the powerhouse, access roads and other infrastructure related facilities, and installation of transformers and turbines. The power plant itself will contribute to a 4 % increase in available energy to meet the growing energy needs in the centre of the country.





CLIENT

Federal Commission of
Electricity (CFE)



CONTRACT VALUE

386 M€



POWER

615 MW



CONTRACT TYPE

EPC



Eten

Open Cycle Power Plant

Turnkey project for execution of the Eten thermal generation plant of 200 MW in Eten, Peru. The project consists in the installation of a gas turbine for power generation, for net total capacity exceeding 200 MW to be exported to the SEIN electricity network, using a B5 diesel turbine for outdoor operation, fuel storage and distribution systems, and water processing system for the process, as well as the basic structures required for the development and correct operation of the power plant.

The outdoor heavy-duty dual gas turbine will be cutting-edge and high-efficiency, and will have a groundbreaking combustion system, making it possible to achieve low NOx and CO emissions. The turbine generator will supply power to the exterior network through a number of isolated phase bars and a step-up transformer.



CLIENT

Planta de generación de reserva fría de Eten, S.A.



CONTRACT VALUE

116 M€



POWER

220 MW



CONTRACT TYPE

EPC



Altamira Cogeneration Power Plant OCG

Engineering, supply, construction and start-up of the Altamira project, currently under construction. The works involves the construction of a combined-cycle cogeneration plant, located at Near La Colonia, Altamira, Tamaulipas, Mexico. The combined-cycle cogeneration plant uses gas natural; it has the capacity of 348 MW of electricity, with 193 to 211 metric tons per hour of steam for its processes at the installations of Akra Polyester S.A. de C.V. The facility will include extraction condensing steam and gas turbines.



CLIENT
AKRA POLYESTER
S.A DE C.V.



CONTRACT VALUE
289 M€



POWER
348 MW



CONTRACT TYPE
EPC



Mejillones Coal-fired Power Station

Engineering, procurement, construction and start-up of two coal-fired generators of 165 MW in the Mejillones Coal-fired Power Station, located on the Pacific coast near the Mejillones region in Antofagasta Province, Santiago de Chile, Chile. The project was developed using the pressurised fluidised bed combustion technology, whose fuels are coal, petcoke and about ten per cent of biomass.





Lesedi & Letsatsi Solar Photovoltaic Power Plants

Engineering, procurement and construction of the Lesedi and Letsatsi solar photovoltaic power plants, built in the Northern Cape Province near Kimberly, South Africa.

The projects boast 150 MW of installed capacity and are capable of powering more than 130,000 South African homes with clean energy. The electricity generated by the solar power plants are sold to the Botswana National Grid mitigating the emission of Greenhouse Gases (specifically CO₂) by existing coal fired power plants.



CLIENT

Oakleaf Investment
Holdings 79
Proprietary



CONTRACT VALUE

273 M€



POWER

150 MW



CONTRACT TYPE

EPC



Crescent Dunes Solar Thermal Power Plant

Engineering, procurement, construction and commissioning of the Crescent Dunes Solar Energy Facility located in Nevada, Tonopah, about 190 miles (310 km) northwest of Las Vegas. The plant is the first utility-scale facility in the world to feature advanced molten salt power tower energy storage capabilities. With an installed capacity of 110 MW, the project delivers enough firm, reliable electricity from solar energy to power 75,000 homes in Nevada during peak demand periods.

The infrastructure has a 160 metres tall central tower and more than 100,000 m³ of concrete (the world's largest of its kind), where a circular receiver is located. It has more than 10,347 heliostats, reflecting solar energy to the central tower that heats up salt to 1,050 degrees Fahrenheit. It is capable of storing the energy it produces, ten hours of thermal energy storage utilizing molten salts that will allow electricity to be produced during overcast periods and after sunset.





CLIENT
Tonopah Solar
Energy (TSE)



CONTRACT VALUE
720 M€



POWER
110 MW



CONTRACT TYPE
EPC



Ilanga Solar Thermal Power Plant

Turnkey construction of the Ilanga Parabolic Trough Plant, carrying out the engineering work, procurement and operation and maintenance. The plant is currently under construction and it will be 100 MW plant with parabolic trough technology and thermal energy storage capacity of 5 hours thanks to the use of molten salts. The plant is located near the town of Upington in the Northern Cape Province, and once operational it will be able to supply electricity to more than 80,000 homes.



CLIENT
Karoshoek Solar One
Proprietary Limited



CONTRACT VALUE
505 M€



POWER
100 MW



CONTRACT TYPE
EPC



Tres Hermanas Wind Farm

Turnkey implementation of the engineering, procurement, construction and commissioning of 97,15 MW wind farm located close to the town of Marcona, Department of Ica, Peru.

The project includes the supply and installation of 25 Siemens SWT 108 wind turbines of 3,15 MW and 8 Siemens SWT 108 wind turbines of 2,3 MW, all of which with their corresponding transformation centres. The total installed capacity is 90 MW.

Likewise, the scope of the project includes the construction of access roads, interior paths, assembly platforms and foundations for the wind turbines and cable trenches.



CLIENT
Wind farm
Tres Hermanas



CONTRACT VALUE
161 M€



POWER
90 MW



CONTRACT TYPE
EPC





Sagunto Liquefied Natural Gas Import Terminal

Engineering, supply, construction and commissioning for the regasification plant for liquefied natural gas at Sagunto, 50 km north of Valencia, Spain.

The regasification plant has four storage tanks of 150,000 m³ each with an unloading capacity of 47,000 to 140,000 m³. It has all the infrastructure required for unloading methane tankers, storage, regasification of LNG and consignment of natural gas to the network, and has a tanker-truck loading facility.



Duba Cadereyta Refinery

Engineering, supply, construction and commissioning of the Hector R. Lara Sosa refining complex in Cadereyta, Nueva Leon, in northeastern Mexico. The contract involves the installation and engineering of four new regeneration and water treatment plants and the modernization of five large diesel hydrodesulphurisation plants. The project is currently under construction and it is considered one of the five projects of the Clean Fuels Plan (ultra-low-sulphur diesel) in the Hector R. Lara Sosa refining complex.



Castor Offshore Underground Gas Storage Facility

Design and engineering of the offshore underground gas storage facility Castor, located on the highly industrialised eastern Mediterranean coast of Spain, Castellon.

The submarine natural gas storage facility contains 1,3 Billion cubic metres of gas, the UGS facilities consists of an Onshore Operations Plant (OOP), two offshore bridge-linked platforms – Wellhead Platform (WHP) and Process, Utilities and Living Quarters Platform (PUQ) – and an interconnecting gas pipeline approximately 30 km in length.

The project was included in the 2008-2016 Energy Plan of the Ministry of Industry for the regulation of natural gas domestic demand.





La Cangrejera Petrochemical Complex

Engineering, supplying materials, constructing, testing and providing training for the CCR (continuous catalyst regeneration) unit in the La Cangrejera petrochemical complex in Coatzacoalcos, Veracruz, Mexico. This refining unit has a nominal processing capacity of 27,500 BPSD (Barrels Per Stream Day) of desulfurized naphtha, and its main products are 21,254 BPSD of regenerated gas rich in aromatic contents (benzene, toluene, xylenes) and 71,777.10 Nm³/h of net gas.





CLIENT
Petróleos Mexicanos
(PEMEX)



CONTRACT VALUE
232 M€



CAPACITY
27,500 BPSD



CONTRACT TYPE
EPC



03

Water





tedagua



WATER

TEDAGUA, created in the early eighties, belongs to Cobra Group (ACS subsidiary for industrial services) and has become an international leader in the design, engineering, operation and maintenance of drinking water treatment plants, using feed water from rivers, the sea or from salt water sources (DWTP - Drinking Water Treatment Plants, SWRO - Sea Water Treatment Plants and BWRO - Brackish Water Treatment Plants).

It is specialised in the design, construction and operation of urban and industrial wastewater treatment plants (WWTP and IWWTP), no matter which phase might be under consideration (pre-treatment, biological, tertiary, digestion, dehydration and drying of sludge, deodorising, etc.). Offers possible solutions to gain an evolution of water treatment and guarantees the highest quality and service levels in all the processes, from the investigation of new solutions to the making of new projects or the after-sell services.

Tedagua's has grown considerably in recent years and, with water treatment contracts in all five continents; it is now justifiably considered a world leader in the water treatment sector.

01 Seawater and Salt Water Desalination Plant (SWRO-BWRO) [M3/DAY]

02 Drinking Water Treatment Plant (DWTP) [M3/DAY]



MORE THAN **100 PLANTS**
OVER **1,000,000 m³/day** PRODUCED

MORE THAN **26 PLANTS**
OVER **900,000 m³/day** PRODUCED

03 Waste Water Treatment Plant (WWTP) [M3/DAY]



MORE THAN **23 PLANTS**
OVER **1,550,000 m³/day** PRODUCED

04 Waste Water Regeneration Plant [M3/DAY]



MORE THAN **20 PLANTS**
OVER **1,500,000 m³/day** PRODUCED

05 Industrial Process Water Treatment Plant [M3/DAY]



MORE THAN **13 PLANTS**
OVER **160,000 m³/day** PRODUCED

06 Water Networks & Auxiliary Works



OVER **900 KM** OF WATER PIPELINES

Escombreras Seawater Desalination Plant

The Escombreras Seawater Desalination Plant, developed by the Public Agency of the Region of Murcia, was designed for a maximum present production of 63,000 m³/day. However, all of the necessary infrastructure and installations have been put in place to accommodate an enlargement, to achieve a production of 72,000 m³/day at a later date. At that point, the plant located in the Escombreras Valley in the region of Murcia, on Spain's south-eastern coast, will fully meet the demand of its developer, which holds concessions to supply drinking water to most of the municipal areas in the region. The works include 51.3 Km of distribution pipelines with diameters between 700 and 1,000 mm. Its water production is able to supply more than 300,000 inhabitants in 20 municipalities, making it one of the most important water-supply infrastructures in the Murcia Region.

This project was developed by Hydromanagent S.L. Tedagua S.A. designed and constructed the plant and will operate it for a period of 25 years.





CLIENT
Murcia
Regional Water
Authority



TECHNOLOGY
Reverse
Osmosis



AVERAGE FLOW
63,000 m³/day
(ext. to 72,000
m³/day)



WATER SUPPLY
300,000
inhabitants



CURRENT STATUS
In operation

Beni-Saf Seawater Desalination Plant

The Beni Saf Desalination plant went into operation in 2010. The facility is designed to produce 200,000 m³/day of quality water to cover the needs of a population of 750,000 from the region of Oran and neighbouring areas. With a production of 200,000 m³/day, this is considered to be one of the largest seawater desalination plants in the world.

The Beni Saf seawater desalination plant forms part of a large desalination program undertaken by the Algerian government for the purpose of providing the country with a stable quality water resource, whilst at the same time facilitating the recovery of the water table of its natural water sources. Tedagua S.A., as part of the Desaladora Beni Saf Construcción consortium, was the main contractor for the design and construction stages of the plant and subsequently assumed responsibility for its current task of management and maintenance of the facility. Beni Saf Water Company Spa, a company 51%-owned by Spanish consortium Geida (currently comprising ACS Group, Cobra and Tedagua) and 49%-owned by Algerian public company AEC (Algerian Energy Company) was the successful bidder in an international tender held by the Algerian government for the design, construction and management for 25 years of this important infrastructure.



CLIENT
Sonatrach
(Government of
Algeria)



TECHNOLOGY
Reverse
Osmosis



AVERAGE FLOW
200.000 m³/day



WATER SUPPLY
750,000
inhabitants



CURRENT STATUS
In operation

Tuas III Seawater Desalination Plant

Tuas III Desalination Plant (Tuas II), a seawater reverse osmosis desalination plant located in Asia, will have a product water capacity of 136 million litres per day (MLD). Tedagua played a significant role in the success of Singapore contractor, HSL Constructor Pte Ltd being awarded the design and construction contract by Singapore's National Water Agency, PUB.



CLIENT
HSL Constructor
Pte. Ltd.



TECHNOLOGY
Reverse
Osmosis



AVERAGE FLOW
136.000 m3/day



CURRENT STATUS
Under
construction



Taboada Waste Water Treatment Plant

Taboada Waste Water Treatment Plant is the largest water treatment plant built to date in South America. With an average flow rate of 14 cubic metres per second and a maximum flow rate of 20.3 cubic metres per second, it serves a population of more than 4 million inhabitants, from 27 metropolitan districts in Lima, representing 56% of the population of Lima and Callao and 72% of the wastewater in both cities.

The mechanical treatment process employs 22 of the largest screening filters in the world (3,000mm in diameter), rough grates and 1mm fine screening. Integral to the treated effluent discharge system - which disposes of treated waste water almost 4 kilometres out to sea – are the 250 diffusers which allow the effluent to be assimilated into the marine environment in under three hours.

Taboada WWTP has been recognised as the best in the year at the annual Global Water Intelligence (GWI) Awards event held on 7 April in Paris.



**TABOADA WWTP
WAS RECOGNIZED AS THE BEST
OF THE YEAR IN THE ANNUAL
GLOBAL WATER AWARDS 2014**



CLIENT

Proinversión, the
Private Investment
Promotion Agency
of Peru



AVERAGE FLOW

14 m³/s
(Max. 20,3 m³/s)



WATER SUPPLY

4,000,000
inhabitants



CURRENT STATUS

In operation



THE LARGEST WASTE WATER TREATMENT PLANT IN SOUTH AMERICA

Bee Creek Waste Water Treatment Plant

Bee Creek Waste water Treatment Plant is located in the city of Murray, Kentucky (U.S.A). The project consists of expanding the capacity of the Bee Creek WWTP from 19,900 m³/d (5.25 MGD) to an average flow of 33,120 m³/d (8.75 MGD), with estimated production peaks of 90,840 m³/d (24 MGD).

The project includes new pre-treatment facilities featuring bar screens with automatic mechanical selfcleaning and grit removal, a new vertical flow reactor and the modification of the three existing oxidation lines. Three new settling tanks tanks will be built and the five existing settling tanks will be upgraded. A new UV disinfection line will be installed along with three new pumping stations. The dewatering system of the sludge treatment line will be upgraded through the installation of a new centrifugal pump and the remodelling of the pump stations and the backwash tanks. Three new buildings will be constructed to house electrical equipment and new instrumentation and control systems.





CLIENT
City of
Murray



AVERAGE FLOW
19,900 m³/day
(Ext. 33,120 m³/
day)



WATER SUPPLY
300,000
inhabitants



CURRENT STATUS
Under
construction



Puerto Gaitan Oilfield Drilling Water Plant

Puerto Gaitan Oilfield Drilling Water Plant was awarded in August 2012 by Pacific Rubiales Energy Corporation. The project consists of the design, construction and operation for a period of 10 years of a plant to treat underground water brought to the surface as part of oil drilling operation.

The Plant will produce 500,000 barrels/day (79,500 m³/day) of recycled water, which will be utilized for local agricultural and forest irrigation. The treatment process consists of a pre-treatment phase using various filtration systems before the application of reverse osmosis membrane treatment, with a very high recovery rate (90 per cent), and a sludge separation process.



CLIENT
Pacific Rubiales
Energy
Corporation



AVERAGE FLOW
79,500 m³/day



CURRENT STATUS
In operation



Nabeul Waste Water Treatment Station

The Project consists of the construction of the new wastewater treatment station, SE4, in the city of Nabeul, which will have a treatment capacity of 17,000 m³/day, and will service an equivalent population of 173,000. The process designed by Tedagua consists of degreasing, de-silting, primary settling, nitrification-denitrification with phosphorous removal and biological treatment with activated sludge.

The sludge line will consist of mechanical dewatering of the sludge, anaerobic stabilisation by digestion, and cogeneration through energy recovery from the biogas. Odours are treated using photo-ionization.

The tertiary treatment of the treated water will be done by continuous filtering and treatment with UV radiation.



CLIENT

L'Office National
de l'Assainissement
(ONAS)



AVERAGE FLOW

17,000 m³/day



WATER SUPPLY

173,000
inhabitants



CURRENT STATUS

Under
construction



West Werribee Waste Water Reuse Plant

The Project consists of the construction of the new West Werribee Regeneration Plant in the Western Wastewater Treatment Plant and its auxiliary installations (tanks, pumps and regenerated water pipelines).

These are two independent contracts for the auxiliary installations, during the first phase; the plant will have three pressurised and hollow fibre ultrafiltration membrane lines (2+1) and two reverse osmosis lines, with a total regenerated water production capacity of 6,000 m³/day. During the second phase, which is scheduled for the second year of operation, the production capacity will be increased to 9,000 m³/day, ending in a further increase of up to 15,000 m³/day at the end of the five-year term.



Treatment Plant for raw water and Effluent treatment for Solar Thermal Power Plants

The thermal solar fields generate a total power of 410 MW. They use both parabolic cylinder technologies (Extresol, Vallesol and Casablanca in Spain) and central receiver tower technologies in Crescent Dunes Energy, located in Tonopah (Nevada, USA).

Water installations in thermal solar fields collect and treat raw water to supply process water to the cooling towers (pre-treated water), demineralized water for the vapour cycle and drinking water for consumption by the solar field staff. The treatment flows vary, reaching 1,728 m³/day for demineralized water and 21,120 m³/day for service water in the Extresol solar field.



04



Hydraulic Infrastructures



HYDRAULIC INFRASTRUCTURES

Cobra Hydraulic Infrastructure was founded July 14, 1967 under the name of Obras Hidraulicas y Viarias (OHV by its initials in Spanish) being at that time a Spanish subsidiary of the Italian company LODIGIANI, which later became part of IMPREGILO group.

In 2002 Cobra Group took over OHV, and became part of the Spanish group ACS being renamed as Cobra Hydraulic Infrastructure (CIH).

CIH has spent nearly 50 years building water works, including large dams, and specializing mainly in the construction of hydroelectric plants under "EPC" scheme for public and private clients, including large energy companies.

The company has highly qualified and skilled personnel in the construction technology necessary to develop any kind of hydroelectric project and bring them to end in cost and time.



60 Hydropower Plants built



16 Hydraulic Tunnels totalling over 60 km



48 Dams of different types



Over **145** Km of High Voltage Lines



172 Km of Pipelines



18 Km of Penstocks



1,100 MW in Pelton, Kaplan and Francis Turbines

Renace Hydropower Complex

Renace is a hydroelectric complex comprised of five hydro units on the Cahabón and Canlich Rivers, in the Alta Verapaz Department, Guatemala. The owner is Recursos Naturales y Celulosas, S.A. (RENACE, S.A.). The Project consists of the Design, Supply and Construction of the 112 MW HPP Renace II, 66 MW HPP Renace III and 55 MW HPP Renace IV that have been completed. Once awarded the works of the fifth plant, it will be the largest hydro facility in the country with a total installed capacity of approximately 233 MW.









KEY DATA

	RENACE II	RENACE III	RENACE IV	EXECUTED TOTAL
	EPC	EPC	EPC	-
	205 MM\$	135 MM\$	101 MM\$	441 MM\$
	112 MW	66 MW	55 MW	233 MW
	4 Pelton units	3 Francis units	2 Pelton units	-
	153 M	143,1 M	484 M	-
	Tunnel 1: 3,440 M Tunnel 2: 3,900 M	4,592 M	3,400 M	15,332 M
	10,180 M	4,961 M	-	15,141 M

Majes-Siguas (Stage II) Water and Infrastructure Reinforcement for Irrigation

The water project consists of supplying and regulating water by transferring it through tunnels and channels of the Apurimac and Colca rivers to the Majes and Sigwas plains in the region of Arequipa. This result is possible through the Design, Supply and Construction of 90 metre-high dam and two 27 km tunnels overall length and irrigation infrastructure to supply 38,500 hectares.

KEY DATA







	Gobierno regional de Arequipa
	550,5 MM\$
	38,500 Ha of irrigation
	12 km trunk-section with 3 m wide and 4,5 m long
	15 km circular cross-section with an inner diameter of 5 m
	Composed of loose materials with an impervious core (90 m high)



Barro Blanco Hydroelectric Power Plant

The project consist of engineering, Procurement and Construction for Barro Blanco hydropower project located on the Tabasara River in the Chiriqui Province of Panama. The Hydroelectric Power Plant, with a total installed capacity of 29 MW, has a gravity dam, which has a maximum height of 55 meters over the base and 332 metres overall length. It also has two Kaplan turbines with an installed power of 13,43 MW each and a Francis turbine with a horizontal axis and an installed power of 1,98 MW.

KEY DATA

	Generadora del Istmo, S.A.
	89,3 MM\$
	29 MW
	42,9 M
	2 Kaplan and 1 Francis
	55 metres over the base and 332 metres long









El Alto Hydroelectric Power Plant

The project consists in the construction of El Alto thermal electric plant, located on the Chiriquí Viejo River in Western Panama. This is a hydroelectric exploitation, which comprises a 50 metre-high dam with a 3,3 kilometre headrace tunnel, followed by a 480 metre-long pressurised pipe, surge tank, powerhouse and a discharge canal.

The El Alto project's curved gravity dam is made from conventional concrete, is 170 metres long, its normal operating level of 634 metres and the minimum level is 625 m. Headrace tunnel has a 5 metres diameter for a design flow rate of 60 m³/s. A chimney tunnel of the same diameter as headrace tunnel and a forced pipe of 3,8 m diameter, which splits before reaching the powerhouse, which houses three Francis vertical axis units each with an installed power of 25 MW.



KEY DATA

	Panamá Power Holdings, INC
	119,4 MM\$
	75 MW
	122 M
	3 Francis
	50 metres high



Pando & Monte Lirio Hydroelectric Power Plants

The contract consists in engineering, procurement and construction contract for the Electron Investment S.L. The Pando and Monte Lirio Hydroelectric Power Plants are located on the Chiriquí Viejo River in Western Panama. The plants with 83,3 MW in installed capacity (Pando, 33,3 MW and Monte Lirio, 49,95 MW) have a total of 13,1km of main tunnel.

Pando Hydroelectric Power Plant consists of a 34,5 metre-high gravity dam with two Pelton turbines using a 285 m net fall. Monte Lirio Hydroelectric Power Plant consists of a 19,6 metre-high gravity dam, with a powerhouse, three Pelton turbines using 285 m net fall.



KEY DATA



Electron Investment, S.L



138,6 MM\$

KEY DATA HPP PANDO



Gravity dam 34,5 metres high



2 Pelton units



285 m

KEY DATA HPP MONTE LIRIO



Gravity dam 19,6 metres high



3 Pelton units









285 m

Larreynaga Hydroelectric Power Plant



The project comprises the construction of the Larreynaga Hydroelectric Power Plant built for the Nicaragua's state power company ENEL. The Plant is located on the El Cacao River near the town of Jinotega, 161 km north of capital Managua. Components include a 15,5 m-high, 240 m-length dam and a reservoir that will cover 5,4 ha and hold 178,070 m³ with a powerhouse of 8,5 MW each Francis turbines.

KEY DATA

	Nicaraguan Electricity Company (ENEL)
	64,8 MM\$
	17 MW
	89,93 M
	2 Francis units
	240 metres long and 15.50 metres high

Its bypass is an A537 C11 water pipeline of 800 m overall length and 1,400 mm diameter with its respective reinforced concrete anchor blocks that ensures sufficient flow to the Larreynaga Hydroelectric Power Plant.

KEY DATA

	10,91MM\$
	1400 mm diameter and 800 metres long



Maintenance Hangar at Barcelona Airport

The project consists in the turnkey construction of the maintenance hangar at Barcelona's El Prat airport (Spain), built for Iberia Maintenance and the Consortium Zona Franca de Barcelona (CZFB by its initials in Spanish). It is an elliptical dome with an area of 15,000 square metres that accommodates large, wide-bodied aircraft such as the Airbus 380 (the largest commercial airliner in the world) or the Boeing 747 "Jumbo".



High Performance School COAR of Piura

The project consists in the turnkey construction of the High Performance School (COAR by its initials in Spanish), located in the district of Piura, Peru.

The project includes the construction of the residence, administration and welfare academic areas set in an area of 30,000 square metres of which have already been built 17,000 square metres.



05

Innovation

Beyond state of the art.

Innovation is Cobra's main tool to guarantee sustainability, efficiency and competitiveness.

Cobra works to transform ideas into new efficient technological adding value in the processes, products, and highlighting emerging technologies that could transform the world. It is a strategic variable that affects all the businesses of the Group and all research, development and innovation activities related to smart grids, solar energy sources, wind off-shore, energy storage and electric systems, hydraulic infrastructures and future business models.

As leader worldwide in terms of T&I investment, it has a total allocated budget of 38 million euros represented by 15 renewable energy projects aligned with the objectives highlighted by the European Union under Horizon 2020.

SOLAR
(Hybrid Plants)



MOSAIC

GRIDSOL

MSLOOP

TRYSYS

eFeCTO

HYSOL Direct

SKANSOLAR

NOVAFLOAT

FLOCAN2GRID

TELWIND

WIND
(OFF SHORE)



GRIDSOL

MUSTEC

B

CROSSBOW

Vanadium Redox Batteries

ENERGY
STORAGE
& ELECTRIC
SYSTEM



ALLOCATED BUDGET
38M€

HYDRAULIC

RENACE



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