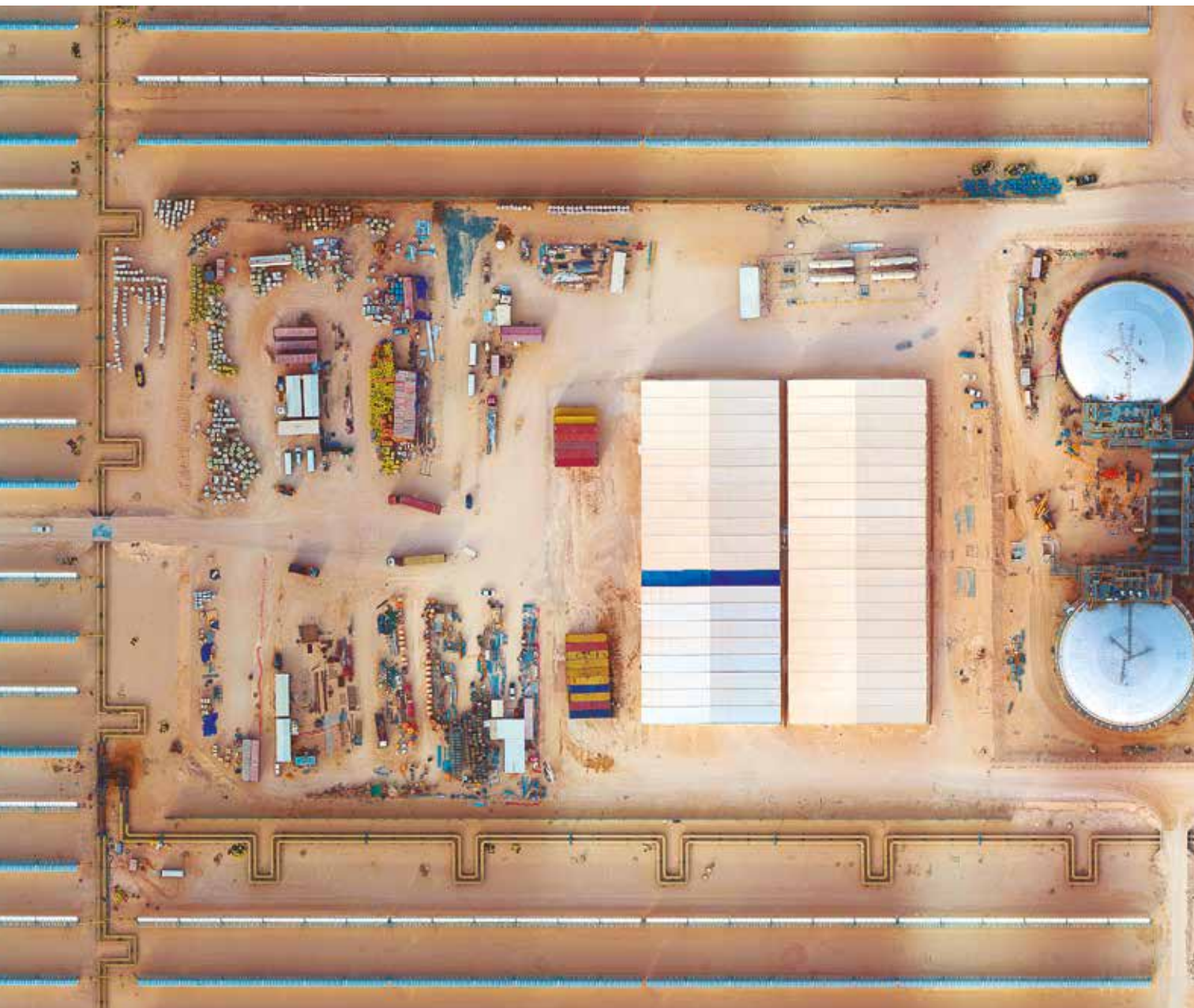


Annual Report
2017

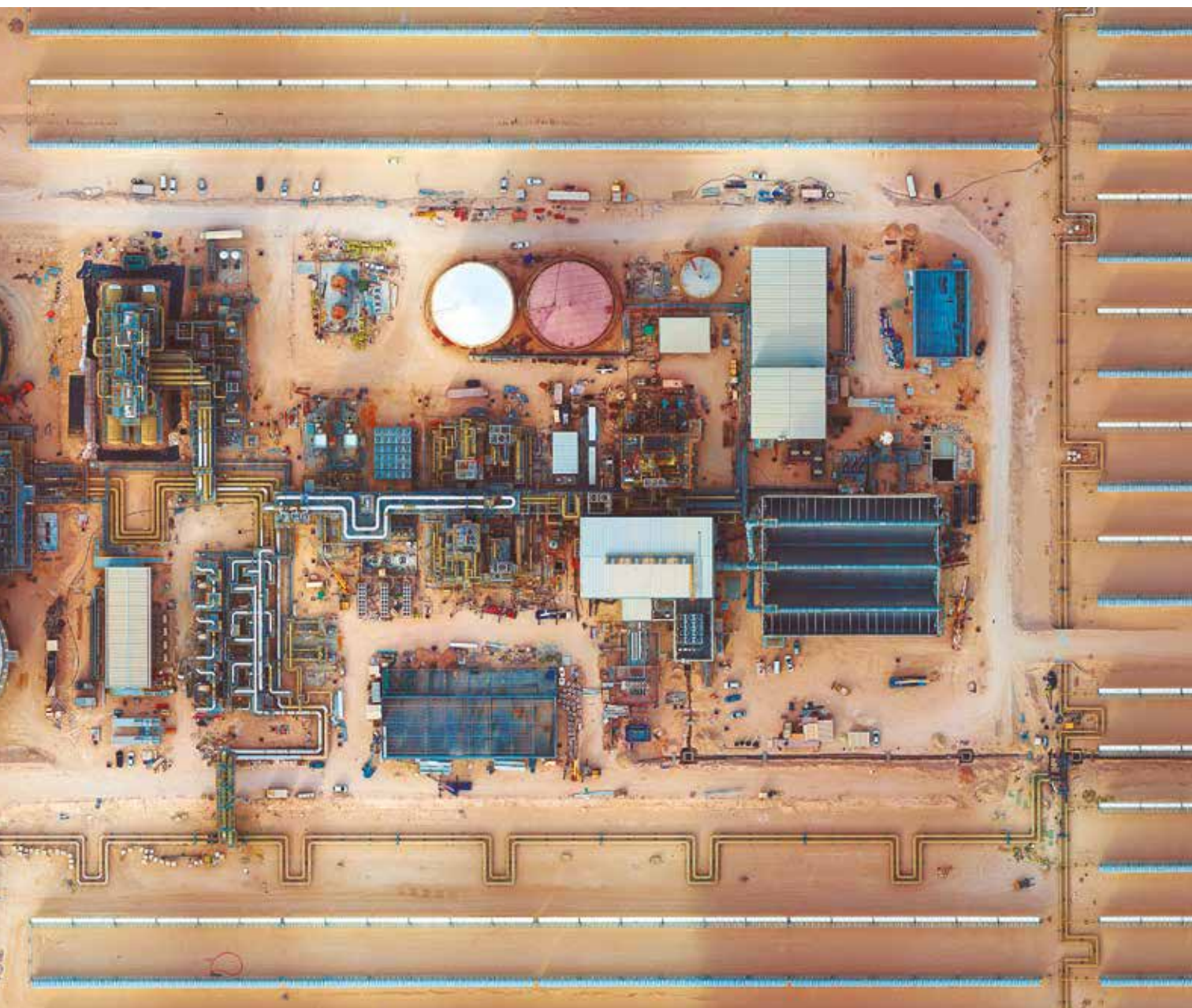


 **TSK**

Growth through innovation



Shagaya Renewable Energy Park (Kuwait). 50 MW CSP Plant with TES



Where people, knowledge and experience form a perfect combination



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Letter from the Chairman

As Chairman of TSK, it is my pleasure to present you with the 2017 annual report which includes the summary of our activities, business, strategies and cooperative policies during the year, I am once again grateful for the recognition and trust from our clients, suppliers, partners and collaborators.

I would also like to initiate this year's cover letter congratulating the team that makes up TSK for the goals reached and to thank them for their commitment, effort and dedication which has allowed us to be recognized as a reference in the sector.

In a complex and demanding environment, especially in our sector, TSK has once more shown its capability of adaptation and growth. We closed 2017 with a very positive balance, based on the good progress of all our lines of business. We reached sales of EUR 966 million, slightly higher than the ones in 2016, with an EBITDA of EUR 114 million, 56% higher than last year, which shows our capacity of generating value by managing our technological strength.

Despite these excellent results, in 2017 we have suffered in an exceptional, but non-recurring manner, the strong devaluation of the Dollar against the Euro, this penalized

us significantly, by having a cash position of more than USD 400 million which makes our results before taxes go down to EUR 33 million, a consequence mainly to losses because of the depreciation of foreign currency, not materialized but for accounting purposes they must be reflected.

However, the evolution of the dollar the first semester of 2018 along with the hedging instruments and exchange insurance contracted make it possible that we are recovering part of that potential loss.

Everyone is inevitably immersed and influenced by our surroundings, but when referring to TSK we finished the year with a historical figure in contracting which places us with a backlog higher than EUR 2,000 million and with a visibility of more than 2 years of activity.

I am especially proud to point out that during 2017 our professional staff increased in our company and that we obtained the best occupational safety rates and were once more congratulated by our management systems.

As a consequence of the increase of our employees this year we have initiated the construction of another office building

(from left to right.):

Carlos Ruíz, Ricardo González, Raúl Nodal,
Miguel Ángel Fuentes, Alfonso Targhetta,
José María González, Sara Fernández-Ahuja,
Joaquín García, Sabino García,
Beatriz García, Arturo Betegón,
Santiago del Valle, Francisco Martín,
y Javier García.



to our actual building in the the Parque Científico y Tecnológico of Gijón that will have the capacity for 230 people.

This enlargement highlights our bet for the long term, where the economic crises must not make a difference in our strategy, along with our opening the new offices or extensions in other countries.

On the other hand, TSK has continued reinforcing its strategy of sustainability by different practices related to the corporate responsibility in its three aspects: economic, social and environmental. Among the most important initiatives carried out at the end of 2017 are the substantial increase of investment in research and development, mainly on projects aimed at promoting tangible improvements in productivity, quality and safety; the significant increase of female staff, as well as several undertakings in different countries where we are present, aiming to improve life conditions of their inhabitants.

Ten years after the publication of the first activity report of our company, we can make a very positive balance of TSK's value generating capacity, based on its record of fulfilling its commitments, business objectives and profitability.



Ultimately, I believe we are very well positioned to continue creating value in a sustainable manner for our customers. We wish to grow and we believe that we are able to do so despite the economic uncertainties, we have excellent technical resources to achieve this, a solid financial structure and above all, more than 1,050 professionals that work each day with hope to achieve any challenge in any part of the world, working for a company with an innovative, global and responsible profile.

Sabino García Vallina

Chairman



Management Committee

Sabino García Vallina

Chairman

Joaquín García Rico

TSK CEO

Francisco Martín Morales

Managing Director - Power and Industrial Plants

Carlos Ruiz Manso

Production Manager-Electrical Infrastructures

Arturo Betegón Biempica

PHB Weserhütte CEO

Miguel Ángel Fuentes

Managing Director - Handling

Beatriz García Rico

Managing Director - Finance

Santiago del Valle

Managing Director - Corporate Business Development

Alfonso Targhetta Codes

Managing Director - Purchasing and Subcontracting

José María González Fernández

Managing Director - Chairman's Office

Sara Fernández - Ahuja

Managing Director-RRHH and Management Systems

Raúl Nodal Monar

Managing Director- Legal Services

Ricardo González Martínez

Managing Director- IT

Javier García García

Financial Director



Corporate Strategy

As it can be seen in this Report, in 2017 we achieved our objective of strengthening our volume of activity at around EUR 1,000 million in sales.

After a decade of growth to double digits, where we have multiplied our volume of business by 10, now our strategy will be to continue growing, but at a more moderate pace and above all our priority objective will be to maintain our diversified backlog of projects, where we do not depend on any type of activity or any territory in particular.

In our sector reaching sales of EUR 1,000 million with our own capital of more than EUR 300 million, this means that we have the sufficient size to execute the majority of the projects being bid on in our areas of activity, this allows us to select the project that we consider the most appropriate at any time.

Nowadays we have projects being executed in 33 countries in the power sector, where we execute all types of plants, from conventional energy, as well as renewable energy. Gas combined cycles, engine plants, coal-fired plants, Biomass-fueled power plants, hydraulic, photovoltaic solar, thermosolar, geothermal, or wind, are examples

of different types of technology that we have currently under construction.

At the same time we are increasing our industrial activity, with projects in the sectors of cement, sugar, steelmaking or mining and after the integration of Intecsa Oil&Gas, today called TSK Oil&Gas Engineering, we now have presence in the field of oil and gas.

During 2017 we also increased our activity in the sector of infrastructures with projects in water treatment plants as well as electric substations.

This diversification not only on markets but in technology as well has converted our main strength and competitive advantage regarding our competitors.

We closed 2017 with a new record in sales figures and operating results, which shows once again our capacity as an engineering and industrial construction company capable of executing complex projects successfully, having obtained in these 32 years of experience that TSK become a brand name of prestige, associated to values such as reliability, excellence, commitment, innovation and competitiveness.



Last year very important awards were obtained due to their relevance of geographical, economic or technological points of view.

In the Power sector we must highlight our return to Chile where we are constructing 3 motor engine plants with a total power of 500 MW for the same client, or the awards in the photovoltaic sector that add up to 1,000 MW with projects in Mexico, Egypt, Jordan and Bolivia.

In electric infrastructures we continue with the activity in traditional countries such as Brazil, Honduras and Bolivia, and Ecuador, a country with great opportunities, has joined.

When referring to Handling and Mining, our subsidiary PHB Weserhütte continues executing projects of international reference like the installations of the largest biomass plant in the world located in the United Kingdom working with material handling.

From the corporate point of view in 2017 we potentiated our technological and engineering profiles once more with the integration of a new company, in this case, the specialized subsidiary in the power sector of Ingeteam Holding with proven experience and reference in biomass plants.

I would also like to emphasize our determined commitment with digital transformation, which makes us a reference in our sector within the fourth industrial revolution (Industry 4.0).

Our clear bet for all the enabling technologies such as internet of things, big data, cybersecurity, artificial intelligence or simulation that we are already integrating into all our projects from the design phase allows us to offer more intelligent, cybersafe and flexible facilities, achieving that our clients are able to optimize their processes, reduce costs and take decisions more quickly and with the maximum efficiency.

Due to our knowledge and experience in all of this technology, our plants are 4.0, which provides our customers with a differential value in the critical infrastructure sector as well as in industrial plants.

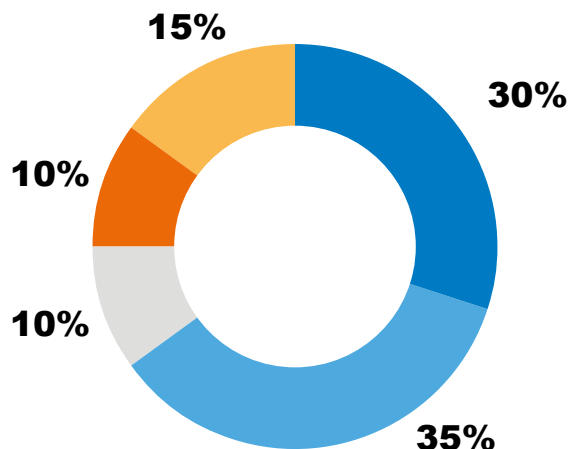
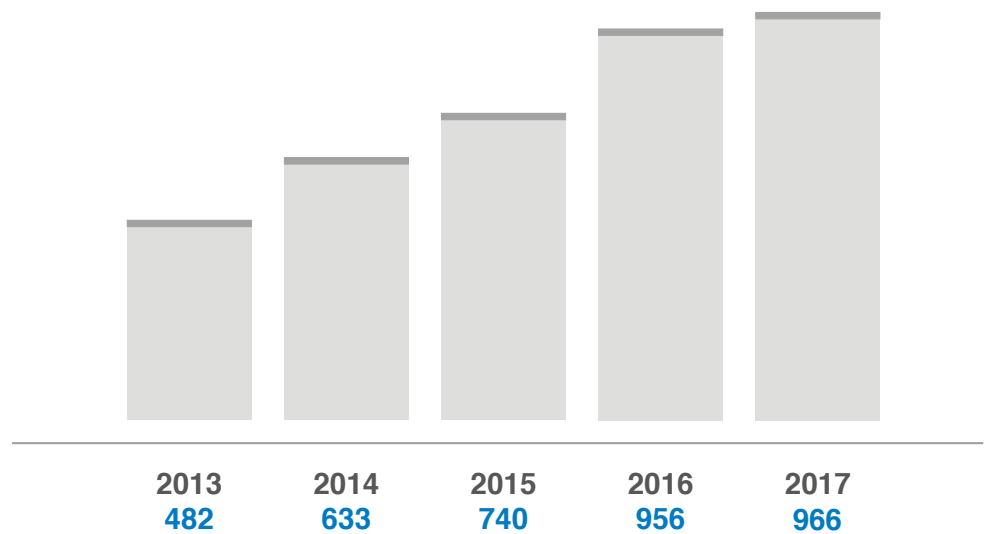
Finally, I would like to express gratitude and acknowledgement to our customers for their support and also congratulate the excellent team that makes up TSK, to whom I would once again like to thank for their commitment and dedication.

Joaquín García Rico

Chief Executive Officer

Main Figures

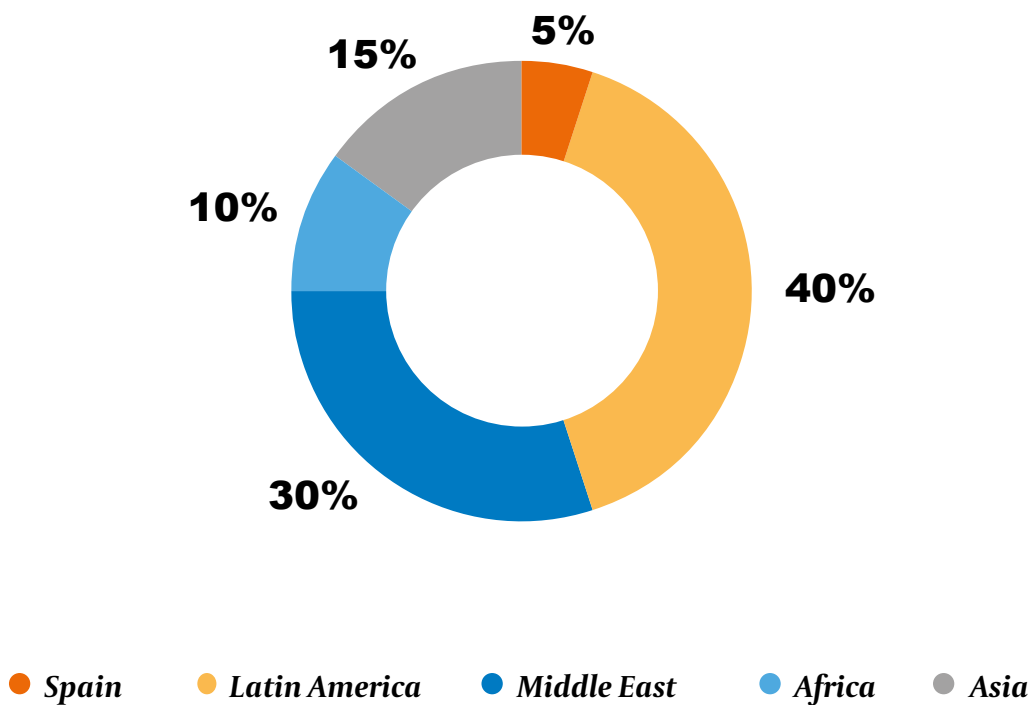
Turnover (million Euros)



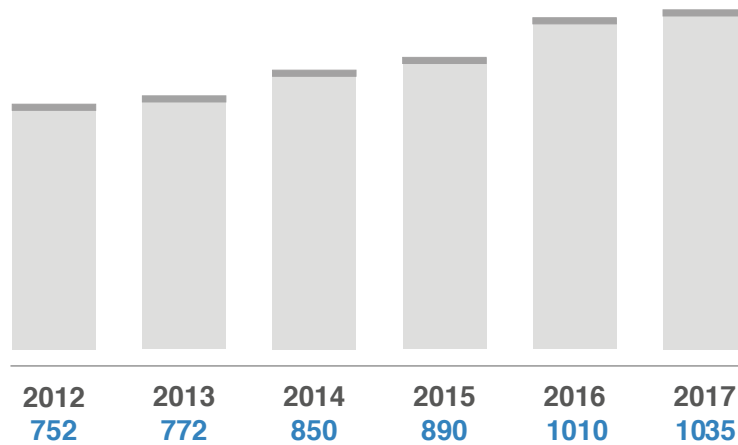
Sales by Sectors

- Conventional Power
- Renewable Energy
- Handling & Mining
- Electrical Infrastructures
- Industry

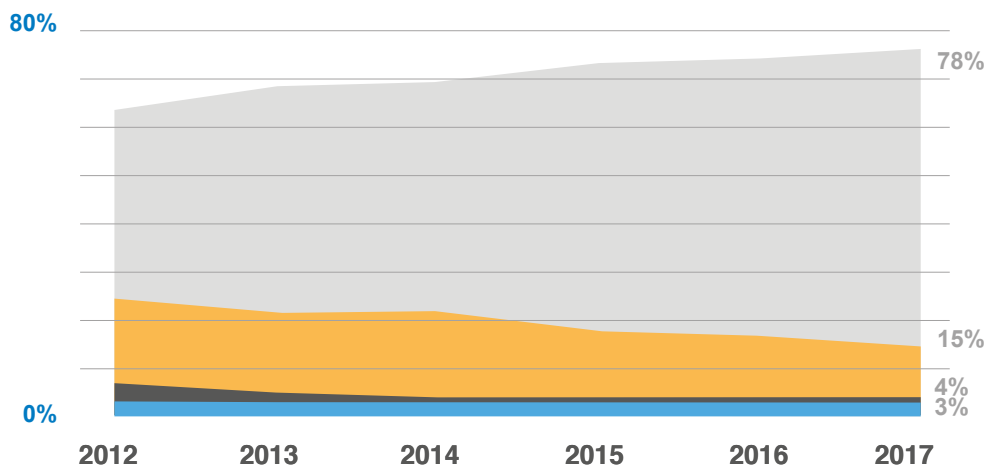
Sales by Markets



Number of Employees



Distribution of Personnel

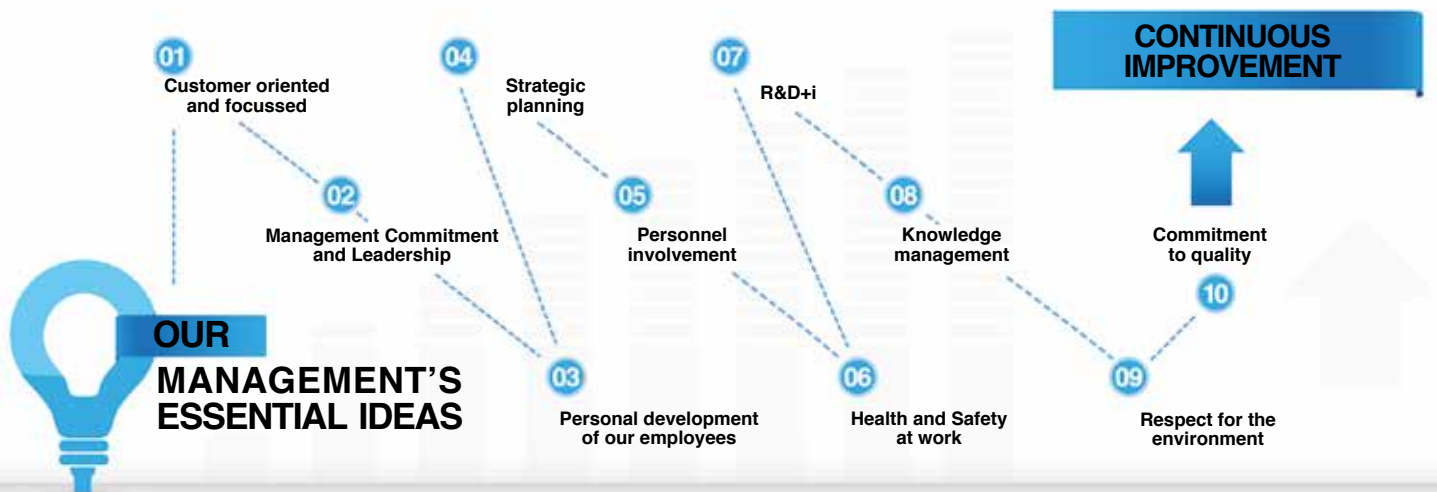


● *Engineering & Project Management*
 ● *Erection & Maintenance*

● *Corporate Services*
 ● *Electrical Workshop*

Key features

- Over 30 years of experience in the industrial and energy sector.
- One of the Spanish companies with more references in EPC projects in energy, industrial, handling and environment sectors.
- One of the top 5 national companies in Engineering and Industrial Construction (EPC).
- Greater control and guarantee of deadlines by using own personnel to carry out engineering activities (civil, mechanical, electrical, automation and control), manufacture of electrical switchboards, electrical assembly and commissioning of the installations.
- Adequate financial capacity to handle large EPC projects.
- Proven technical capacity and highly qualified personnel.
- Proven experience in O & M. (Operations and Maintenance) of industrial and energy plants.
- Balanced growth and compensation between business lines.
- Agreements with the leading industrial technologists.
- Own technology in various fields.



Most significant milestones

1986

TSK starts as a Company when the electric departments of Erpo Holding merged.

1995

PHB Weserhütte, a Company specialised in Handling and Mining was acquired.

2003

The first international subsidiaries were established in Morocco and Venezuela and the ones in Brazil, Chile and Nicaragua followed.

2006

The activity in the Solar Photovoltaic field begins.

2007

The engineering firms Ingemas and Irelsa were acquired.

2008

The activity in the Thermosolar sector begins

2010

Expansion to Middle East and Asia began. Projects in Saudi Arabia, India and Bangladesh

2013

Flagsol, a German Company specialised in Thermosolar sector was acquired.

2015

Omega Engineering, a Company specialised in Sugar and Ethanol sector was acquired.

2016

Intecsa Oil&Gas, a Company specialised in the Gas sector was acquired.

2017

Ingeteam's Group Power Engineering subsidiary, was acquired.





Sulfur, potash and Fertilizer handling system. Aqaba Port (Jordan)

Green and calcined coke complete handling system	Samsung.....	Abu Dhabi
Iron Ore handling system	ArcelorMittal.....	Germany
Complete Green Coke handling system	Khusheim - Aramco	Saudi Arabia
Sugar Refinery	Durrah Advanced Development Company Co.....	Saudi Arabia
Sulfur handling system.	Hanwha	Saudi Arabia
400 / 220 kV Substation.....	Sonelgaz.....	Algeria
Coke handling system.....	Fluor.....	Belgium
50 MW Oruro PV Plant.....	ENDE	Bolivia
298 MW Combined cycle power plant	ENDE Andina.....	Bolivia
295 MW Combined cycle power plant	ENDE Andina.....	Bolivia
445 MW Combined cycle power plant	ENDE Andina.....	Bolivia
127 MW Wind farm	EDP Renováveis	Brazil
82 MW Wind farm	Gestamp	Brazil
San Andrés sanitation project	Fiduciaria Bogotá	Colombia
138 kV Substations.....	CELEC	Ecuador
230 kV Transmission line.....	CELEC	Ecuador
200 MW Benban PV Plant	Alcazar Energy	Egypt
100 MW Benban PV Plant	Access Power.....	Egypt
BOG Compressor	Enagás.....	Spain
Coal handling system.....	ArcelorMittal.....	Spain

Main projects in progress

Fuel management system	Técnicas Reunidas	Finland
138 kV Substation.....	ENEE.....	Honduras
250 MW Gas Engine Power Plant	PT PLN (Persero)	Indonesia
130 MW Combined cycle power plant.....	EDK (off-taker PLN)	Indonesia
190 MW Combined cycle power plant.....	JPS.....	Jamaica
50 MW Al Safawi PV Plant	FRV	Jordan
Aqaba Port expansion.....	JIPCO & Arab Potash	Jordan
50 MW CSP Plant	KISR.....	Kuwait
Phosphates handling system	OCP	Morocco
Phosphates handling system	OCP	Morocco
Coke handling system.....	Ica Fluor.....	Mexico
300 MW Potosí PV Plant	FRV	Mexico
100 MW La Trinidad PV Plant.....	EOSOL.....	Mexico
25 MW Geothermal Power Plant.....	CFE.....	Mexico
Wastewater treatment plant.....	Enacal.....	Nicaragua
50 MW Wind farm	Masdar.....	Oman
Copper concentrate handling system.....	First Quantum Minerals.....	Panama
Biomass handling system	Técnicas Reunidas – Samsung C&T	UK
Coke handling system.....	CBI - NIS.....	Serbia

Corporate structure



○ Corporate services

Finance

Human Resources and Management Systems

Legal Services

Information Technology

Sales

R&D+i

Purchasing and Subcontracting

Corporate Development

○ Handling



○ Power and Industrial Plants



○ Oil&Gas



○ Electrical Infrastructures



Business lines description

ELECTRICAL INFRASTRUCTURES

With an experience of over 30 years, TSK has become a leading company in the engineering and electrical equipment sector.

We develop power and control projects associated to new industrial facilities, as well as innovations for already existing installations.

Throughout these years we have acquired proven experience in the development of "turn-key" electrical projects in energy, telecommunication, steelworks, metallurgy, food, paper, petrochemical, cement, environment, fertilizers, industrial ports and industrial plant sectors.

We have been able to reach a leading position in all of the sectors in which we are present due to the combination of quality, technical capacity and dedication to our clients. We have a great number of highly qualified professionals who have the most advanced technical means available for the design, calculation, assembly, and commissioning of all kinds of electrical installations.

INTEGRATED MANAGEMENT OF ELECTRICAL PROJECTS

Design and engineering, planning, purchasing management, manufacturing and equipment supply, installation and assembly, quality control, training, commissioning and operations and maintenance.

- Transformer substations up to 500 kV.
- Electrical installations for thermal power plants, solar plants, wind farms, cogeneration and industrial plants in general.
- Automation of industrial installations, control and regulation of processes.
- Environment and waste treatment installations.
- Infrastructure and construction.

E N G I N E E R I N G

- H.V., M.V., and L.V. electrical engineering.
- Automation, control and regulation of processes.

A S S E M B L Y

- H.V., M.V., and L.V electrical assemblies.
- Instrumentation.
- Assembly supervision.
- Testing and commissioning.

M A N U F A C T U R I N G

- M.V. cells.
- L.V. distribution panels.





El Inga Substation, Riobamba (Ecuador)

- Motor control centers.
- Automation and control panels.

OPERATIONS AND MAINTENANCE

- Predictive, preventive and corrective maintenance.
- Plant Optimization.
- Personnel training.
- Technical assistance.
- Operation

DIGITAL TRANSFORMATION AND INDUSTRY 4.0

The progressive incorporation of the digitalization to industries (Industry 4.0/ Digital transformation), the usage of common infrastructures for management (IT) as well as operation (OT), the fast development of the internet of things (IoT or IIoT in its industrial version), cybersecurity, the analysis of data, etc. have obligated engineering (EPCs) to incorporate profiles and services of high value added to be able to equip projects of all these demands/needs. TSK has been working and researching all these new challenges for years and from TSK

Information Technology we are more than prepared to face security and solvency.

IP INFRASTRUCTURES

From TSK IT, we continue to design and implant the most traditional solutions like: Telephone systems, P.A. Systems and interphone systems, solutions of IP video in real time to monitor the production processes, access control systems for people or vehicles, acoustic warning systems to communities in order to publicly address areas about disasters, etc. Moreover and as part of the set of IP services we design, install and maintain security systems monitoring perimeter based on a thermal analysis and/or thermographics.

CYBER SECURITY

All these new challenges that were mentioned imply new functional, regulatory, protective (physical and cyber) or technological requirements, but the new challenges in cyber security can be emphasized as all this IT/OT convergence implies new risks and given the context where they are pro-

duced (industry) concrete and different ways to tackle them are needed.

For several years TSK IT has participated actively in work groups and in related entities, carrying out assessments of cyber security of infrastructures and of course meeting our own demands, but at this moment industrial cyber security has become a part of the core of business, by conviction and obligation, to be able to continue executing our projects with the objective of excellence.

We have begun to inject cyber security from the gestation phase of projects, including and/or responding to their requirements from the basic design, detail, purchasing process, tests, etc...; Moreover, we are reevaluating the state of the existing plants regarding cyber security, auditing them and applying measures and protocols aligned with our processes of continued improvement.

DATA ANALYTICS

We cannot ignore the need to work with heterogeneous data sources, such as the integration of processing and business information that amongst others allow for the optimization of costs, process improvement, to extend the service life of plants, and even make them safer. By using all the enabling technologies that we know for that purpose, we are able to execute projects of data analytics through technology or concepts, such as: big data, machine learning, edge computing, virtual reality, augmented reality or digital twin, which all together offer our customers dashboards and solutions that accompany them during the whole life cycle.

POWER AND INDUSTRIAL PLANTS

As an engineering and industrial construction company, TSK offers an integrated technical service which ranges from the design and consulting activity to the construction and commissioning of turnkey installations for different sectors such as:

POWER

The experience acquired in the course of the projects in which TSK has participated, as a main contractor or in a consortium with the world's most prestigious technologists, allows us to



135 MW GT Power Plant. Valle de Mexico (Mexico)

offer the most adequate technical, economic and financial solution for each client.

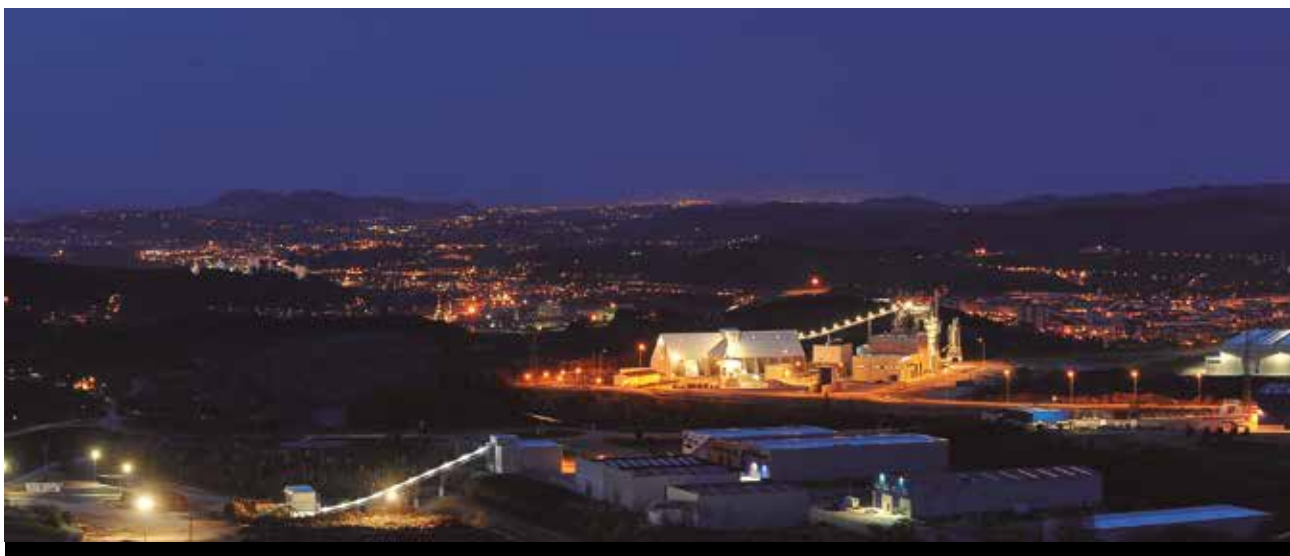
- Coal-fired power stations.
- Gas-fired power stations (simple or combined cycle).
- Cogeneration plants
- Incineration plants
- Biomass
- Waste
- Wind energy
- Solar energy
- Biofuels
- Hydraulic energy

INDUSTRIAL PLANTS

The experience and knowledge accumulated over the years in a wide variety of technical disciplines (civil works, structure, mechanical, electrical, instrumentation, etc.), together with the use of the most advanced IT systems, allows TSK to take on industrial projects ranging from process engineering to the construction and commissioning of different processing plants.

F O O D , P A P E R , M I N I N G ,
S T E E L W O R K S , A N D C E M E N T

From equipment, storage installations and transport to the execution of complete turnkey plant projects in collaboration



Biomass 10 MW Power Plant, Reocín (Spain)

with the main technologists of the world, TSK has been providing innovative industry solutions for over 30 years.

OIL&GAS

After the purchase of the Intecsa Oil&Gas, an engineering company with more than 50 years of experience, TSK has acquired the necessary experience and references in the Oil & Gas sector in order to execute projects from conceptual engineering to the construction and commissioning of entire plants.

OIL AND GAS TRANSPORTATION

- Oil Pipelines and gas Pipelines.
- Gas and oil gathering systems and distribution networks.
- Oil pumping stations.
- Gas compression stations.
- Metering Stations (Oil & Gas).

The most significant references are the compression stations, in Spain, it has participated in more than 70% of the stations that are currently in operation and in more than 4,000 km of gas pipelines and oil pipelines.

REGASIFICATION AND STORAGE TERMINALS

TSK develops complete hydrocarbon storage terminals projects, in addition to its corresponding oil tanker mooring terminals and the port-refinery interconnection. It also provides knowledge and experience necessary to design the LNG tanks as well as regasification terminals.

Amongst TSK's references are the port installations for methane carrier mooring of the LNG plant at the Port of Barcelona, the expansion of the LNG Quintero regasification plant in Chile, the storage tank for SKANGAS in Finland or the Yela underground gas storage in Guadalajara.

- Oil & Gas Receiving and loading terminals
- Underground Gas storage
- LNG regasification plants and tanks
- Hydrocarbon storage plants



Caparrosa Biofuel Plant, Navarra (Spain)



Belt conveying system. Fertilizers Plant MA'ADEN (Saudi Arabia)

With the objective of unifying our brands, from 2017 Intecsa Oil&Gas is known as TSK Oil&Gas Engineering.

HANDLING & MINING

In 1980 PHB, A.G. and Weserhütte A.G. reach a merger agreement in Germany, forming the group called PHB Weserhütte A.G. or PWH. In that same year, PHB, S.A and Weserhütte S.A merged in Spain to form PHB Weserhütte, S.A.

In 1988 the parent company was acquired by another German industrial group which modified the structure of PHB Weserhütte A.G. This led to the independence of the Spanish subsidiary, which has kept all the technology, the references and the brand of the German group, becoming a Spanish-German company with majority Spanish capital.

In 1995, TSK acquired all the shares of PHB Weserhütte, S.A, and the latter was integrated into this group.

PORT SYSTEMS

Our company's port systems operate with the highest degree of efficiency in many ports around the world, handling all kinds of bulk solids, such as coal, iron ore, bauxite, fertil-

izers, clinker, cement and cereals, offering different solutions for sea or river ports.

- Terminals for storage and handling of bulk solids
- Unloaders
- Loaders
- Cranes
- Ecological hoppers

STORAGE AND BLENDING YARDS

At PHB Weserhütte we design circular or longitudinal stockyards with a wide range of reclaimers and combined machines which can achieve a high degree of blending in any type of bulk solids.

- Longitudinal Stockyards
- Circular Stockyards
- Stackers
- Scrapers
- Blenders
- Stacker-reclaimers
- Conveyors

ENVIRONMENT

TSK is aware that society demands, more insistently with every passing moment, a better quality of life and therefore, the

conservation and preservation of the multiple and valuable natural resources of our planet.

At TSK we are convinced that the protection of, and investment in the environment, water, air, and soil, is not an obstacle for development, but the best strategy to reach economic and social growth in a sustainable way guaranteeing the conservation of the most valuable human heritage: planet Earth. For different reasons (lack of economic resources, shortage of water, catastrophes, etc.) there are populations that do not have drinking water to cover their basic needs, this has severe repercussions on the population's health. Being aware of this problem, TSK has a line of own products that, based on different treatment technologies, allows them to cover drinking water supply needs to such populations.

- Containerized DWTPs (Drinking Water Treatment Plants)

With a flow rate of up to 200m³/h and in a surface area of 200 m², they are able to supply populations of more than 25,000 inhabitants. Their design in containerized structures allows the installation of several DWTPs together. They are easy to transport, install and operate and they are the ideal solution for an urgent supply, or for the provision of drinking water to populations with diverse difficulties.

- Modular DWTPs

For a flow rate of up to 10,000 m³/h. Designed for minimum requirements of civil works, they are suitable for the supply of drinking water to medium and large-sized population centers, which for a variety of circumstances cannot carry out civil works.

- Conventional DWTPs

Designed as civil works, these are the water treatment plants which have been implemented most to date, given the lack of other satisfactory technical alternatives.

- DWTPs Upgrade

These are re-designed existing water treatment plants, in which minimum modifications make it possible to increase

the treatment flow rates or improve the quality of the water treated if necessary.

- TSK Containerized WWTPs (Waste Water Treatment Plants)

These are included in containerized structures, designed for the treatment of domestic or urban waste waters from population centers of up to approximately 5,000 inhabitants or equivalent waste water flow rates.

- Modular WWTPs

These are designed with prefabricated tanks and minimum civil works requirements, suitable for population centers of up to 100,000 inhabitants or equivalent industrial waste water flow rates.

- Conventional WWTPs

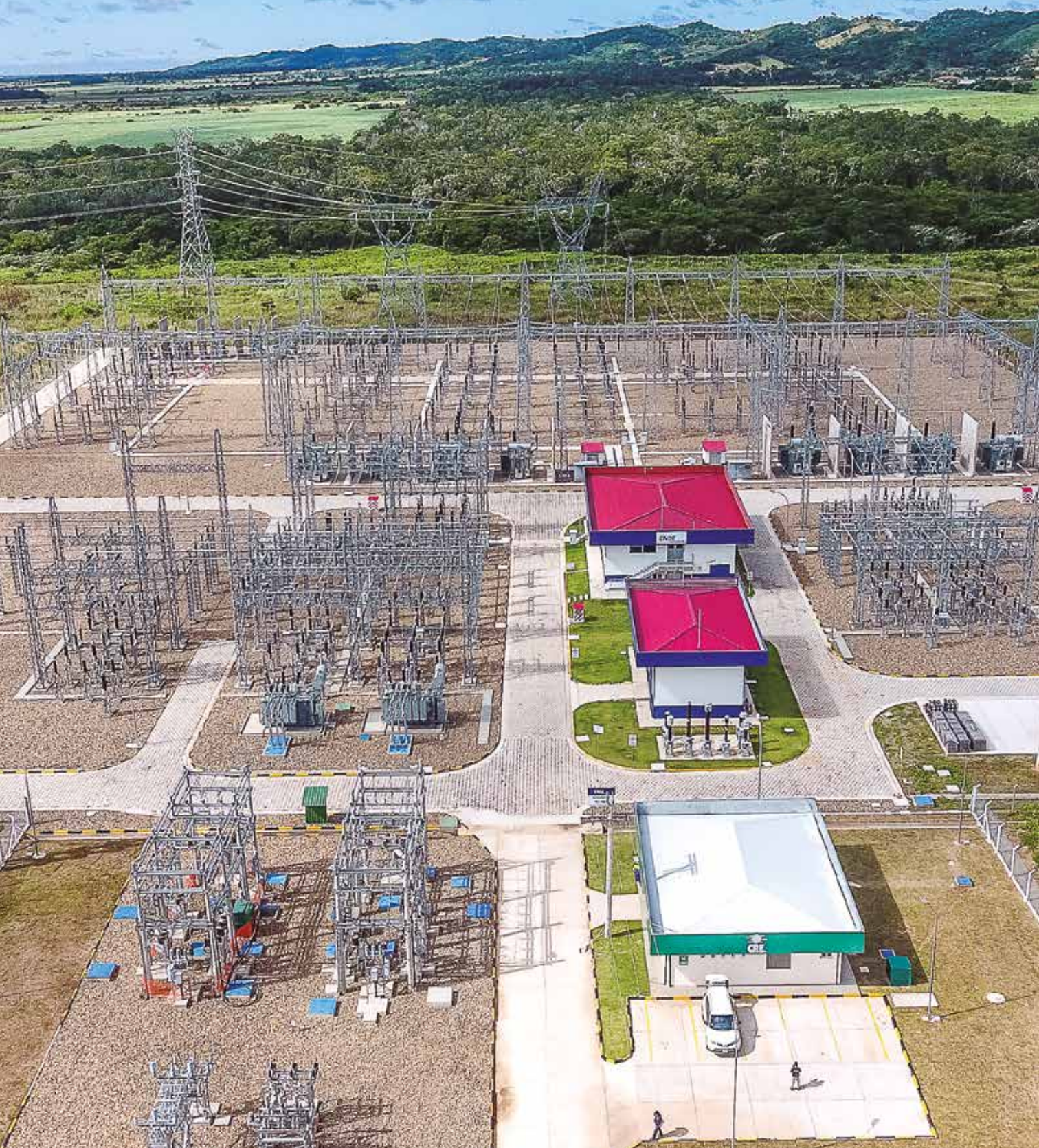
These are designed as civil works for the treatment of waste water for large population centers.

- WWTPs Upgrade

This is an application of considerable interest for existing WWTPs which, for a variety of reasons, function incorrectly, not reaching the results in treated water quality for which they were designed (increase in flow rate, increase in polluting waters, etc.).

With moving bed technology and the introduction of small modifications, the operation of these WWTPs can be set up correctly.

Water supply installations and purification installations are common elements in any production process. This is why the sludges generated in these processes are nothing more than subproducts of these production cycles. The sludges are not, however, a subproduct without value. On the contrary, if treated appropriately, and with application of the well-known current policy of 3Rs in waste treatment (Reduction, Recycling and Reuse), the sludges are a sub-product of value in today's society.



230/115 kV Substation, Las Brechas (Bolivia)

Activities by Business Lines

INDUSTRY

In the last year an important business line in the Industry sector was developed. In addition to the traditional one that surrounded works and services in steelmaking, new projects in the food sector were initiated. In February 2017 the order to start from Durrah Advanced Development Co. was received, of an important sugar refinery, in the Kingdom of Saudi Arabia, whose contract was signed in 2016 and in which TSK was the awarded company of the EPC of the plant.

The refinery, with a production capacity of 750 t/h of white sugar, is located in an important industrial area annex to the King Fahad industrial port, related to loading crude oil and refined products and petrochemicals in the Red Sea.

The plant will have a linear storage yard for 390,000 t of raw sugar, being considered one of the storage facilities of reference of its kind. In addition to the refining process, the plant will include an ageing dome of 40,000 tons of capacity, the infrastructure necessary for handling different materials, including the crane for unloading the ships in the port, the packing plants, storage and dispatch, in addition to all the administrative and auxiliary buildings; the necessary electri-

cal and control installations are also included in the project. The installation will be completed with a 12 MW steam turbine to ensure the energy self-sufficiency of the installation regarding the network.

In the first months of 2017 the final design of the plant was finalized to continue with the development of the detailed engineering, which allowed for the starting of the field work of the civil works for half of 2017. At the same time the development of the design progressed remarkably in the supply process.

The forecast for 2018 consists in the start and finish of the mechanical and electrical assembly of the works with the objective to start commissioning at the end of the year, which will be prolonged to the first semester of 2019, as the first step to obtaining the first sugar.

OIL&GAS

Within this sector, in 2017 TSK and Enagas signed a contract to renew the treatment of BOG (BOIL OFF GAS) of the Enagas



Shagaya Renewable Energy Project. 10 MW Photovoltaic Plant + 50 MW CAP Plant with TES (Kuwait)

Regasification Plant in Barcelona. The project is developed in the EPC modality, where TSK carries out the engineering, purchasing and construction related to the substitution of a non-cryogenic compressor for a new cryogenic compressor from the supplier HTC (Howden Thomassen Compressors) along with all the equipment and auxiliary components. With the modification to be carried out, a savings of energy of 535,500 KWh/year and a reduction of natural gas consumption of 171,500 m³/year will be produced.

POWER

The current construction progress where TSK is responsible for all the basic and detailed engineering, for the supply of all the balance equipment of the plant (including water plants, electrical substations, refrigeration systems, gas systems, electrical equipment, etc.), the execution of civil works, the electromechanical assembly and the commissioning, will allow the first units to be turned over to ENDE Andina in 2018.

The completion of two works of reference in Spain were part of 2017. These works, of great strategic importance for the

coal sector and for Asturias, with the objective of complying with the national and European level emission regulations, are the installation of denitrification units in Group 2 of the Power Station in Aboño and in Group 3 of the Power Station in Soto de Ribera, both installations are property of EDP. The two projects, in turn-key modality, were developed in a consortium with one of the leading companies worldwide in the Power sector, Mitsubishi Hitachi Power Systems.

This year was key for the guarantee testing of the Aboño Power Station project, they were finalized in February. Later, mid-year, between March and April, the scheduled shutdown was carried out in Group 3 of the Soto Station where they executed the works of dismantling and assembling the gas transport ducts from the boiler to the bypass point and the connection to reactor which at the end of the shutdown allowed, the start-up of the boiler and later the carrying out of the guarantee testing, finishing the period of 720 hours of continuous operation on July 21st.

In March 2017 works for the execution of Project Renaissance, 190 MW in Old Harbour Bay, Jamaica started. The project consists of the execution in EPC modality of a combined cycle thermal power plant, located in the south



Los Azufres III. 25 MW Geothermal Power Plant (Mexico)

of Jamaica for the Company SJPC, subsidiary of Jamaican Utility JPS.

The installation consists of 3 General Electric (GE) gas turbines of 42 MW each, 3 steam recovery boilers of Vogt Power Inc. (VPI) with the capacity of dual functioning (Natural Gas and ADO), 1 GE steam turbine of 80 MW of 2 levels of pressure (high and low). The net power to be produced by the station is 190 MW and the COD of the project is planned for May 2019.

The auxiliary installations consist of: Gas control unit, compressed air, system of water storage and distribution, water and effluent treatment plant. The steam turbine is refrigerated by sea water that passes through a condenser connected to the steam turbine. Water catchment is carried out on the shore of the beach, pumping 8 m³/h. Other installations that the station consists of are the administration and control buildings, electrical and water treatment building and storage building.

In June 2017 the works for the execution of the 250 MW gas engine station Sumbagut II Peaker started, first project for TSK in Indonesia. It deals with an EPC contract signed with

PLN PT Persero, main generating company and distributor of the country.

The Project is developed in the north of the island of Sumatra, in the Aceh region and will serve as network support for the whole northern area of the island, the largest, in Indonesia. It is a plant generated by natural gas combustion with 13 Wartsila engines W18V50SG with an individual production of 18.9 MW. TSK's scope includes the design, assembly and commissioning of the generation and auxiliary systems, including one of the first substations of 270 KV of the country.

In the field of renewable energy, TSK has proceeded this year in the progress of the Project named 327 CG Los Azufres III Phase II, with the objective of installing a geothermal electric plant with a net guaranteed capacity of 25 MW, and that executes for the Comisión Federal de Electricidad (CFE) in the Mexican state of Michoacán. The Plant will be integrated by a unit of electric energy generation of 25 MW (Unit 18), installed in its powerhouse and all the equipment necessary to integrate a geothermal steam cycle. In turn, the plant will include a booster substation, whose main transformer will have a relation of 13.8-115 kV.



Sugar Refinery. Manama (Kingdom of Bahrain)

The electric energy generated by the plant will be received in the Substation Azufres Switchero Sur through a line of 115 kV, where it will be connected to the National Electric System.

As development of the EPC works in this Azufres III Project, in 2017 the detailed engineering and the completion of the awarding of equipment of the plant have been worked with, reception on site of an important amount of the main equipment (turbogenerator, main transformer, hot springs pumps, condenser). Moreover, the civil works work has continued being done, complying with the critical event established by contract within 2017 of finishing the foundation for the turbo generator table, and starting the erection of the structure, mechanical assembly of equipment and pipelines and electrical assembly.

In the area of Solar thermal Energy, we are pleased to highlight the fact that the 50 MW Solar Thermal Power Plant, La Africana, with a solar field of 168 loops with parabolic trough collectors, a system of thermal storage of 7.5 hours and a maximum electric power production capacity without the use of natural gas of 152 GWh per year; once again this year exceeded the predictions of the performance model, reaching a production of 156,00 GWh-year. A fact that is a complete success in the very unfavorable weather conditions of 2017 during its summer period.

Regarding the operational strategy followed in the thermosolar power station La Africana during the year 2017, we can state that one more year it was satisfactory, since it made it possible to obtain the maximum economic yield for the sale of energy under the very restrictive new regulatory framework, which does not incentivize production from fossil fuel power and that substantially reduces production premiums. From this strategy of operation, it should be emphasized that there were 97 days of uninterrupted daily operation during an unfavorable summer period that contributed significantly to the annual production achieved.

Also to be highlighted is that the operational and maintenance philosophies implemented since the end of 2013 and during the first quarter of 2014 continue to work very well in



128 MW Wind Farm. Río Grande do Norte (Brazil)



100 MW PV Plant. Quweira (Jordan)

view of the availability, reliability and performance demonstrated by La Africana thermosolar power station and also given the production results obtained during the year 2017. Lastly, we can highlight that by prioritizing the maximum daily uninterrupted operation, this has contributed to reducing significantly the need to carry out unscheduled maintenance on the majority of the equipment at the power station.

In 2017 the construction of the Shagaya (Kuwait) power station has proceeded by having reached really good rates of execution which have allowed it to reach an accumulated global progress of the project of 86.7%. These rates of execution added to the very good progress of the commissioning works will allow completion in a record time of 33 months for the Kuwait Institute of Scientific Research (KISR). It is a 50 MW Solar Thermal Power Plant, with a solar field of 206 loops with parabolic trough collectors, a system of thermal storage of 9.0 hours and a maximum electric power production capacity of 180 GWh-year. It is a Solar Thermal Power Plant with 100% of TSK technology.

In the photovoltaic field various plants were constructed and put into service, including the transfer of power and the connection to the national grid, highlighting the following due to their size:

- Photovoltaic plant Dewa for Shuaa Energy in Dubai, with a peak power of 268 MWp installed. This plant was executed in a period of 12 months with an average of 600 operators in different fields.
- Photovoltaic plant Quweira for MEMR of Jordan, with a capacity of 100 MWp installed
- Photovoltaic Plants Antares and Spica for Providencia Solar (Neoen) in El Salvador, with 100MWp installed. European and Salvadoran companies participated in their construction, with an average of 400 workers for 6 months.
- Photovoltaic Plant Cohauila for Macquaire in Torreón (Mexico), with a peak power of 24 MWp installed.



Providencia Solar. 100 MW PV Plant. (El Salvador)

In turn it is worthy to mention that TSK has been awarded and recently begun the construction of the following photovoltaic projects:

- Photovoltaic plant Al Safawi for Al Safawi for Green Energy PSC (FRV), made up of more than 205,000 photovoltaic modules, totaling up to 66.8 MWp installed power. The plant that must comply with the complex grid code of Jordan, has an execution timeframe of 12 months. Within the scope, the execution of the transformer substation with capacity 50 MW installed, and the interconnection of this with the NEPCO grid, Jordan utility are included.
- Photovoltaic Plant Potosí for Fotowatio Renewable VentureS, with a peak power of 342 MWp installed and an export capacity of 300 MW. The project is located in the Mexican area of San Luis de Potosí. In the scope of this EPC the construction of all the interconnection installations, which make up the boosting substation of the plant 33/400 kV, the line of transfer with a longitude of 21 km and the enlargement of the substation which is property of CFE, are included. For the execution of this project, local and European companies will participate and up to 900 operators during its construction are estimated to be needed.
- Photovoltaic Plants Benban in the photovoltaic complex Benban PV Solar Park 1.8 GW, in which TSK is undertaking the execution in EPC format of 6 projects with a total ca-

capacity of 382 MWp installed for Alcazar Energy and Access Power customers. In these projects TSK, supporting itself on the previous experience of other divisions of the company in Egypt, is starting the execution taking advantage of the synergies existing between them and mitigating the potential risks of the construction in an Energy Complex of that size.

In addition, in the activity of photovoltaic plants, operation and maintenance of photovoltaic plants in Spain, Italy, France, Puerto Rico and Kuwait took place, with a total power around 100 MW.

In terms of wind power, our activity took place mainly in the northeast of Brazil, specifically in the state of Rio Grande do Norte, with BoP (excluding the supply and assembly of wind turbines) of the following farms:

Wind farm Macambira I and II for Gestamp Eólica, consisting of 21 wind turbines of 2.8 MW, with a total installed of 60 MW and with connection to networks by Serra Santana. The BoP carried out includes engineering, civil works for access and conditioning of site, construction of bases for the wind turbines, switchgear and transfer of energy to the Serra III substation.

- Cabeço Preto wind farm for Gestamp Eólica, composed of 42 3.8 MW wind turbines with a total installed capacity of 160 MW. In this project, in addition to the BoP of the farm, the



Termoeléctrica del Sur. 295 MW CCGT + 80 MW Steam Tailing. (Bolivia)

EPC corresponding to the 33/138 kV 200 MW electric booster substation was carried out for transfer to the ETN grids.

- Jaú Wind Farm, consisting of 42 wind turbines of 3 MW with a total power of 125 MW. Customer: EDP.
- Pedra Rajada Wind Farm, with 21 wind turbines of 3.8 MW and power of 80 MW installed. Customer: Gestamp Wind.
- Cabeço Vermelho Wind Farm, consisting of 21 wind turbines of 3.8 MW and a total power of 80 MW. Customer: Gestamp Wind.
- Ventura I Wind Farm, consisting of 12 wind turbines of 2.8 MW with a total power of 40 MW. Customer: EDP

Out of Brazil it is necessary to mention two outstanding references: On the one hand, an important step has been taken for Corani (ENDE Corporation) in Bolivia, the Wind Farm Qollpana placed under EPC, including the supply of 8 Enercon 3 MW wind turbines, engineering, civil works and transfer of power and on the other hand the awarding of Masdar in consortium GE-TSK of the turn-key project Wind Farm of Dhofar (Oman), including supply, assembly and commissioning of 13 GE 3.8 MW wind turbines, a substation type GIS of 132 kV and an overhead double circuit line.

ELECTRICAL INFRASTRUCTURES

The high voltage and electrical substations division developed projects from two points of view: for external customers in the form of EPC and for internal energy projects of the company as an integral part thereof for transmission.

The most significant external EPC projects refer to the following:

- Electrical substation Las Brechas in Warnes (Bolivia) of 230/115/69 kV, construction and commissioning. Customer: ENDE Transmisión
- Substation Aih Fateh (Algeria) of 400/220 kV which is being commissioned. Customer: Sonelgaz

- Expansion 3 substations, El Inga, Yanacocha and Riobamba (Ecuador) of 230/115 kV with 300, 200 and 200 MW respectively. Customer: CELEC.
- Refurbishment of the Cañaveral and Río Lindo Substations (Honduras) of 138 kV, with the installation of 2 transformers of 20 MV and other two 30 MV, respectively. Customer: ENEE.
- Enlargement of the Milagro and Babahoyo Substations (Ecuador) of 230 kV, with the construction of 40 km of overhead double circuit line between both. Customer: CELEC.
- Project Kangan (Iran), which consists of the supply and supervision of the erection of the substation type GIS 400 kV, with four Transformers 33/400 kV 90/150 MV, sixty four cabins of 33 kV and the corresponding control and protection system.
- Salar substation (Bolivia) of 115 kV, in GIS technology, with two Transformers 115/24,9 kV 50 MV and four compensation reactors in 115kV. Customer: ENDE Transmisión.

ENVIRONMENT

In the Environment area, in 2017 TSK continued dividing its efforts between projects with external customers and the development of specific installations that are included in great energy projects that it executes, such as the feed water treatment plants and the effluent treatment plants for the new combined-cycle projects in Bolivia. 2017 was a year of great progress in the execution of the water treatment plants, closing the year with 90% of the supplies completed and received on site. The progress of the erection works will make the start-up possible of the first of the water treatment plants located in the South, during the first quarter of 2018.

TSK is executing, at the same time, two pre-treatment plants in Warnes and Entre Ríos. The plants' objective is to reduce the concentration of suspended solids in the intake flow of the water treatment plants during the rainy season in both locations.



400 kV Substation Aih Fateh (Algeria)

Within the area of Environment, the Project to execute the sewage network system of District 4 on the island of San Andrés (Colombia), for Fiduciaria Bogotá, where TSK is the main contractor for the execution of the works. From the beginning of this contract the collection of waste water from close to 3,500 homes and the rainwater encompassing the known area like District 4 was executed.

The problem with water, waste water as well as rain water, is urgent in the neighborhoods of this small island (12 km long by 3 km wide), which suffer frequent floods in the rainy periods and sewage water infiltrates in the water table, the only resource on the island to obtain water for human consumption, along with the direct use of rain water.

2017 completed the components of the underground networks and piping, awaiting their final completion for mid-2018 with the full implementation of one of the pumping stations and the connection of the discharge drive pipeline to the already existing outfall. Once this project is complete, District 4 will reach a coverage of a sewage network of virtually 100%, this constitutes a long time desire of the island population, thus showing the importance of this project.

In the first trimester of 2017, TSK signed the EPC contract for the construction of a waste water treatment plant and a pumping station, subsidized by AECID (Agencia Española de Cooperación Internacional para el Desarrollo) and whose final customer is ENACAL (Empresa Nicaragüense de Acueductos y Alcantarillados). This project makes up part of the improvement and extension of the sewage system of the city of Masaya (20 km from Managua, the capital).

This plant will have a hydraulic and organic capacity of 36,000 m³/day and an organic load of 7,4t of DBO₅/day, treatment necessary for a town of approximately 160,000 inhabitants. TSK has improved the design for more efficiency in the purification, performance and operation of the plant. This project is complex, due to the massive growth of the population and construction of housing, it was necessary to move the project to an area near Masaya lagoon, an area which was declared a natural reserve in 1991 by the Ministry of Environment and Natural Resources (MARENA).

At the end of the year the earth moving operation was completed and it is estimated that in mid-2018 the UASB reactors will start to operate, a key element for this anaerobic purification treatment.



Complete handling system for coke and asphaltene. KILPILAHTI Power Plant (Finland)

HANDLING AND MINING

One of the most traditional business lines of TSK is materials handling which is developed by PHB Weserhütte, a company with more than 50 years of experience in these facilities and its own technology which is known internationally.

In 2017, PHB exceeded the sales figures of EUR 80 million which means a new growth regarding previous years. The results obtained also maintain the level, and PHB continues as a reference in such a specialized sector of material handling.

Production activity has been very diverse in terms of countries, customers and projects, the main ones are as follows:

The ship loader for Minera Panamá has been completely manufactured and is in the assembly phase in the Musel port, from which it will be sent in a special ship to the place of installation in Panama, reducing the time of assembly in this way. It is a ship loader for copper ore with a capacity of 2,500 t/h.

In Saudi Arabia the assembly and installation of two very important projects, in Jazan and in Maaden, have progressed, for sulfur and fertilizers respectively, they consist of handling, collecting and stacking systems and three loaders of 1,000 and 2,000 t/h.

A high percentage of completion of the Project in Antwerp for Fluor has also been made, whose final customer is Exxon Mobil consisting of a crusher and barge loader for coke, with a capacity of 850 t/h.

For ArcelorMittal in Asturias a barrel type reclaimer of 1,100 t/h was supplied and commissioned for coal. For the plant in Bremen a contract for a bridge type bucket-wheel reclaimer was received.

In Jordan the Aqaba project is still underway. The new wharf was completed and the two fertilizer ship loaders of 2,000 t/h for ships of 100,000 tm, the loader of 2,000 t/h for ships of up to 70,000 tm and the unloader of Sulphur of 1,200t/h were supplied. All this equipment was shipped in specially mounted and tested ships. The supply of all the equipment for con-



Ship loader MINERA PANAMA, Punta Rincón (Panama)

veyor belts were supplied and the erection has progressed. The installation will be started up in phases in 2018 in accordance with the plans.

Morocco is still one of the most important countries. In the OCP projects operational start-up of Beni Amir and Jorf Lasfar installations are still underway and considerable progress on the new project of infrastructure rehabilitation on the Jorf Lasfar port has been made. The project for the new coal yard for ONEE has not been able to be started, but it is expected to definitely start development in 2018.

The Kilpilahti Project for coal handling and asphaltene that we have in Finland in a petrochemical complex has also progressed considerably, the mechanical assembly is very advanced. Commissioning will be carried out in 2018.

The Project for the biomass thermal power plant of Tees-side, in United Kingdom, is progressing according to the schedule. This year we completed the engineering and the supply procedures have begun. The high safety regulations that we are applying to avoid problems with fire and

explosions is worthy of note. It will be the biggest plant of this type in the world.

In Serbia the Project of an installation for coke handling has begun, for the local company NIS, of the Gazprom group.

In Mexico the equipment for the Tula Project, which had been stopped, was supplied and in Vietnam the assembly was completed and the testing for the NSRP project that we are carrying out for Korean engineering GS has begun.



**Sulfur handling system and ship loading facility
Jazan Refinery (Saudi Arabia)**

TSK's commitment

THE TSK MISSION

To be a competitive organization carrying out engineering and equipment projects in the industrial, energy, environmental and infrastructures sectors, achieving at all times the satisfaction of customers and of the people who form TSK, in a commitment to their personal and professional development.

TSK'S VISION

To be a cutting edge company and leader in terms of human and technological resources and profitability, to offer efficient solutions in the field of engineering and equipment which contribute to sustainable development, both nationally and internationally, ensuring the satisfaction and trust of our customers.

TSK VALUES

COMPETITIVENESS: A value inherent in the company for the successful achievement of our vision.

INNOVATION: TSK places a stake on innovation in its processes and the way it works, offering the customer the most innovative services on the market. We remain alert and proactive to any opportunities, in a process of ongoing development.

EXCELLENCE: Quality is a value inherent to the company and our aim is always to offer products and services which aspire to excellence. Our companies must be considered by the customer as companies offering solutions and installations of the highest quality.

FLEXIBILITY: Our companies' activity forms part of services to industry, which means that flexibility is essential if we are to compete with larger companies with more resources. We must transmit this flexibility in all our companies, and be ready to adapt to any changes which might arise.

COOPERATION: This is a value which is very present in the organization and the culture of TSK, as can be seen in our daily relations with customers, suppliers, employees and society in general. Our spirit of cooperation must be reflected in our daily actions.

COMMITMENT AND RESPECT: These are deeply held in our organization. Commitment must be a trademark of all our actions, as well as respect towards all the groups we relate with.

EXCITEMENT AND PASSION: We must transmit excitement and passion in our projects, attitude and actions; only by doing this will we achieve the common goal of making TSK a benchmark company that leads the way in the market.

Human Resources and Management Systems



HUMAN RESOURCES, KEY TO OUR GROWTH

The most important thing for a company with our history is the people that form it, and for this reason, people management has been, and always will be, a key aspect of our business strategy.

TSK considers people as the fundamental pillar of its development and applies policies to promote stability in employ-

ment, promotion of equality policies, career plans and social benefits.

DIVERSITY AND EQUAL OPPORTUNITIES

TSK provides a safe, wholesome atmosphere for personal and professional development, in an environment of respect for diversity and equal opportunities for all the professionals performing their work, in which the effort of its employees is recognized and rewarded. To ensure respect for diversity

and equality, TSK has established an equality committee, which holds quarterly meetings to analyze the current situation and possible conflicts and, if so, take appropriate action.

TSK has the best professionals in the sector, with levels of qualification and specialization of recognized prestige. At the end of 2017, TSK had over 1000 employees. An important group within this workforce is the expatriate professionals involved in projects. Securing their commitment and maintaining a sense of belonging is a key aspect for TSK. The company extends to these professionals all the measures it implements in the matter of human resources.

The average age of the workforce is 42, with an average seniority in the company of around 10 years. 58% of our employees have an indefinite contract, of which 83% are men and 17% are women.

TALENT MANAGEMENT AND RETENTION

In the current context, it is crucial for human resources management to be flexible, adaptable and capable of driving change and, in addition, to respond quickly and efficiently to business needs and priorities.

In TSK we promote the professional and human development of our personnel and we favor the exchange of ideas world-wide; this is how new concepts are created, especially when colleagues with different disciplines and different backgrounds meet together. Together we guarantee long-term success as the best team, relying on the potential of each of the different team members.

Another key aspect to preserve and improve the company's human capital is to provide professionals with the necessary training resources and knowledge.

MANAGEMENT AND DISSEMINATION OF KNOWLEDGE

TSK has different tools for the management of information that enables internal communication and the exchange of knowledge and experiences:

- A Project database, which provides employees with information and documents on TSK projects.
- Document management tools that allow the coordination of independent working groups for projects. Thanks to these tools it is possible to store and manage documentation, set permissions, control the versions of the documents and allow the use or immediate consultation of these, in the appropriate security conditions.
- Request for services through the intranet. This tool allows requests to be made regardless of the physical location where people are, such as: vacation requests, permits, advances, computer equipment and incidents and other general services.
- Internal Training School (ITS).

With regard to training, TSK has training programs to cover the needs of its employees:

- Technical training, given by external suppliers or by in company specialists who transmit knowledge and experience to the team.
- Language training - English, French, German and Italian - through free programs.
- Training in managerial skills.
- Training in information technologies with the aim of improving the knowledge of computer tools, both generic and company-specific.

ATTRACTION AND SELECTION OF TALENT

The objective in attracting talent and selecting personnel is to identify and incorporate the best talent available, both established professionals committed to the TSK project who have the necessary skills, as well as young talent with development potential. We aspire to be an attractive company for our employees and compete for the best qualified, offering a wide range of incentives. The key to success lies in at-



tractive benefits, performance-related pay and international development opportunities. We attach special importance to a business culture oriented to dialogue and teamwork.

Our selection processes are carried out according to the following criteria: Equality of opportunity and non-discrimination, respect for the person, honesty, professional ethics and confidentiality.

The TSK salary system includes fixed and variable components. Additionally, we favor mobility and promote the coverage of vacancies through internal promotion, facilitating the voluntary movement of personnel in order to enhance the development of their professional careers, talent management and the best adaptation of people to positions. This process allows employees to choose those places that they consider to be in their interest, by advising and supporting the candidates who show their interest in a specific position.

In relation to social benefits, TSK maintains a commitment to continuous improvement of the quality of life of its employees and makes a special effort to ensure and guarantee their

lives, support the integration of the disabled and implement best practices - to facilitate work-life balance - such as flexible scheduling, split vacation periods and reduced working hours, among others.

INTERNAL TRAINING SCHOOL

In order to train, develop and improve the skills of its employees, through interaction with their work environment, TSK periodically launches a Master in Project Management, with the firm conviction that knowledge and training are part of its key strategies.

TSK values the need to incorporate young talent, hence training is aimed mainly at recent graduates with no professional experience, with the aim of attracting people with greater talent and maintaining growth of the human team; TSK considers it essential to collaborate with different universities and educational institutions.

The objectives of the school are:



- Develop training programs commensurate with TSK's real needs.
- Train new employees, and already active staff, through specific programs.
- Foster employee loyalty.
- Boost the image of TSK through the enhancement of internal and external communication.

The subjects included in the Master are:

- Corporate culture and strategy.
- Commercial management.
- Project management.
- Financial management.
- Management skills and techniques.
- Information technology and ERP.

It consists of a total of 270 sessions involving some 300 hours of dedication, plus another 100 of teamwork. Approximately 34 instructors have taken part - basically TSK managers and man-

agers from different departments - and have conducted the sessions based on actual experiences of executed projects.

The total number of students who participated in the three editions reach 100, and all of them, after completing the course, have subsequently joined TSK, being assigned to different areas and departments according to their abilities and the assessment of teachers and tutors, who have followed their progress in the sessions given. In 2018 a new edition is planned with the same methodology, now that the success of the previous editions has been verified.

MANAGEMENT SYSTEMS

At TSK we define ourselves as a company committed to quality, safety and health at work and the environment and, in accordance with our strategic framework, we have evolved based on a process of continuous improvement in all areas

of our activity, paying special attention to personal safety, the quality of our work and the protection and conservation of the environment; in this manner, we apply the policies of quality, safety, health and environment in all the activities that we carry out.

This commitment has been materialized in our integral management system, guaranteeing customer satisfaction, risk prevention, continuous training of our staff, respect for the environment and the development of projects based on ISO 9001, ISO 14001, OHSAS 18001, UNE 166002 and ISO / IEC 27001. These standards are a key element to meet legal requirements and better manage risks. The certifications cover 100% of the management system.

Regarding the current structure and organization of management, TSK has a management systems department that designs, measures and evaluates the different indicators of the processes; it manages an integrated system of quality, environmental, safety and occupational health, information security and R&D+i; maintains and complies with the legal and regulatory requirements of each project.

OUR PRIORITY: HEALTH AND SAFETY MANAGEMENT

TSK understands that health and safety are a fundamental issue and a priority because of the nature of the activity we carry out. Our objective is always "zero accidents" and action guidelines are transmitted from the highest levels of the organization. This objective is applicable to all people involved in our projects (employees and subcontractors), collaborators, suppliers and visitors to our facilities and projects.

TSK has a preventive organization based on a joint prevention service - made up of professionals that include the preventive specialties of safety in the workplace, industrial hygiene and ergonomics and applied psycho-sociology - complemented by an external prevention service that covers health surveillance. Workers who travel from Spain to international projects receive the necessary medical examinations checkups and treatment. This organization includes, in representation of the

workers, the effective participation of the prevention delegates of the different companies of the group and a safety and health committee has been established in which information, participation and consultation are given on all matters relating to safety and health.

As part of our management system, TSK develops specific safety and health plans that define the scope of work and the necessary preventive measures in the projects.

In order for safety to be fully implemented in all our projects, TSK works to standardize safety and health procedures with the aim of increasing efficiency in the dissemination and assimilation of corporate policies.

During the year 2017, internal safety and health audits were continued. Ten internal audits were carried out in the construction phase of projects, two internal audits of the Management System and two external audits of the Management System. The results are discussed on site with the client and subcontractor, which increases the effectiveness of the actions taken to correct deviations.

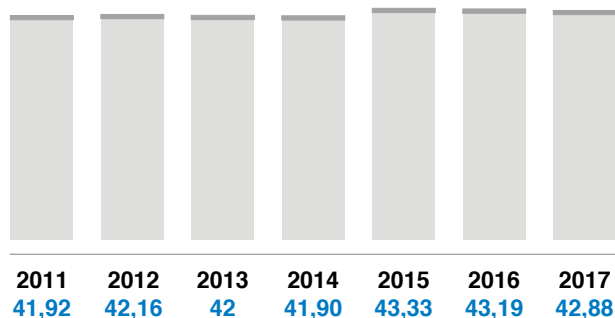
As for the external audits, the result was 0 Nonconformities and 0 Observations.

In TSK, we are aware of our responsibility to the environment and contribute to sustainable development through the rational use of natural and energy resources, minimizing environmental impact, promoting innovation and using the best available technologies.

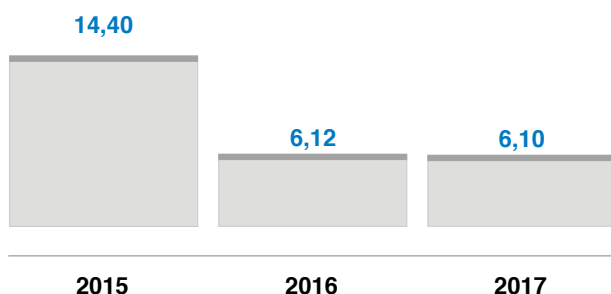
All TSK projects comply with the applicable environmental legislation, both in the country where the project is located and the contractual requirements with our clients. For each project TSK draws up an environmental management plan that responds to and allows the monitoring of compliance with environmental requirements.

Likewise, TSK accepts its commitment and responsibility to the clients, and takes care to develop and offer products and services that meet their expectations while maintaining a constant flow of communication with them as well as our suppliers and subcontractors.

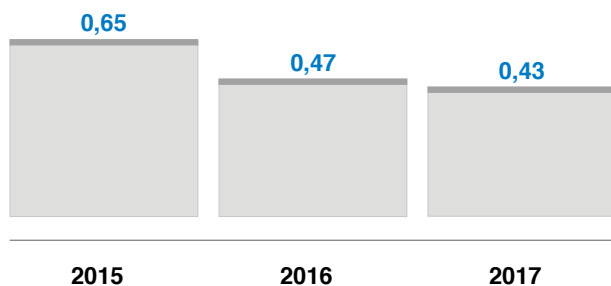
Average age (years)



Severity Rate (Lost days / Worked hours) x 200.000



Lost Time Incident Frequency Rate (LTIFR) (LTI / Worked hours) x 200.000



For TSK it is important to know the opinions of our customers in order to be able to improve, that is why we periodically measure customer satisfaction. This constitutes valuable information for the improvement of our performance.

Through its R&D+i management system, TSK promotes the development of innovative solutions focused on the efficiency and improvement of the processes we offer, as well as obtaining new products and services that can generate value for customers and other stakeholders.

Regarding the information security management system, it is maintained by the information technology department and is directly dependent on the systems administration management. TSK is fully aware of the need for security of information and is concerned with applying the necessary procedures to ensure the confidentiality, availability and integrity of the information handled in all its projects.

R&D+i

For TSK, the need to innovate in its products, processes and services is beyond doubt, and for this reason we are constantly challenged to improve through innovation and applied research as one of our development opportunities, in the search for greater competitiveness both at national level and in the global market, where innovation is the differentiating factor that allows us to provide greater added value to everything we do.

This is reflected in the main investment R&D+I figures:

Thermosolar energy: 11,427,000 €

Industrial plants: 7,734,000 €

Material handling: 6,031,000 €

Information Technology: 5,923,000 €

In total we are talking about ongoing projects for more than 31 M€.

The evolution for that last years of our investments in R+D+i has been the following:

2014: 5,302,000 €

2015: 7,709,000 €

2016: 12,218,000 €

2017: 13,640,000 €

This adds up to a total of approximately 40,000,000 € in the last 4 years.

Our deep-rooted identification with innovation is part of our long-term strategy, embodied in strong investments in R&D+i, in collaboration with technology centers, universities and companies within the framework of local, national and European programs. The great diversity of projects and technological areas in which TSK participates forces us to be continuously innovating and developing in the daily performance of all our activities, since a very significant part of our innovations is produced as a result of the multidisciplinary nature of our projects.

As a result of this intense R&D+i activity, during 2017 the following projects were implemented:

PROJECTS FINANCED BY THE EU IN THE
FRAMEWORK OF THE LIFE+ PROGRAM



EUCALYPTUS WOOD PROCESSING PROJECT_LIFE12 ENV/
ES/000913

LIFE EUCALYPTUS ENERGY is an R&D+i project, framed within the LIFE+ policies and program with the objective that

demonstrates and innovates the design and construction of a pilot plant for energy recovery of forest biomass. The waste of *Eucalyptus globulus* forest use will be shredded and pyrolyzed to obtain electric energy. As a sub-product of the process biochar is obtained, with an elevated capacity of improving the ground and atmospheric carbon fixation, contributing to the fight against climate change.

Besides the electric generation (100kW), the project has as an objective, the improvement of the ground after the application of biochar; to do this applied tests will be developed on *Eucalyptus globulus* saplings (due to their fast growth) with regular measurements to check growth, analysis of the ground before and after application with indicators such as pH, conductivity, organic carbon and the presence of nutrients (N, P, K).

The plant, located in Tineo, first in Europe and pioneer in pyrolysis of forest waste, will pose as a clear reference in the sector of biomass as well as a perfect example of small scale and semiportable energy production with negative emissions, with a great potential to provide energy for example to developing communities.



HYDRAULIC CO-GENERATION SYSTEM IN WATER ABDUCTION AND DISTRIBUTION NETWORK (HYGENET) _LIFE12 ENV/ES/000695

The overall aim of the project is to generate clean electric energy from the utilization of the kinetic and potential energy currently wasted in the drinking water distribution and supply networks. This will be achieved through a modular electric power generator system built at pilot plant level,

in which pressure reduction is carried out by means of a hydraulic turbine.

This system will generate 700,000 kWh of electrical energy, a savings of 188.3 t of CO₂ and the non-emission of 403.2 kg of SO₂ and 284.9 kg of NO_x and will contribute to compliance with the agreements of the European Commission as regards the increase in the use of renewable energy sources, thereby contributing to the reduction of greenhouse gas emissions and, therefore, in compliance with the Kyoto Protocol and the Government of Spain's Renewable Energies Plan (PER 2011- 2020) which sets the target of reaching 268 MW in facilities of less than 1 MW.



PROJECTS CO-FINANCED BY THE
MINISTRY OF ECONOMY, INDUSTRY
AND COMPETITIVITY AND THE EU-
ROPEAN UNION WITH FEDER FUNDS



RECOVERY OF CO₂ FROM WASTE INCINERATOR EMISSIONS AND USE FOR THE PRODUCTION OF MICROALGAE (ReCO₂very) _RTC-2014-2109-5

The ReCO₂very project proposes the use of CO₂ emissions from a waste incineration plant and contaminated water to grow microalgae suitable for later use as raw material for the production of biofuels and / or biogas production. It poses the challenge of integrating a real incineration system with a microalgae culture system through a CO₂ separation and concentration system of the flue gases. In addition, the culture system will receive residual effluents from waste treatment

facilities (leachate, permeate, drained) as a feed source for microalgae.

ENERGY EFFICIENCY THROUGH REHABILITATION, SUN AND GEOTHERMAL (REHABILITAGEOSOL)_RTC-2016-5004-3

Started in 2016, this project arises from the need to have effective, easy to access and use design tools, that enable the implementation of energy saving measures, the use of renewable energy sources and clean, safe and efficient sources of heat and cold in the different autonomous Regions of Spain and the companies that constitute this "RehabilitaGeoSol". By obtaining a "marketable end product" that can be exported to other Autonomous Regions, as well as to different countries, this will make the internationalization of the companies and the organizations involved possible, thus allowing considerable technological and business development for this Consortium, and consequently for the economy of the regions and the country. The Project "REHABILITAGEOSOL. Energy efficiency through rehabilitation, sun and geothermal" (RTC-2016-5004-3) is a Project financed by the State Program of Research, Development and Innovation oriented to the Challenges of Society, in the Framework of State Plan of Scientific and Technological Research and Innovation 2013-2016 of the State Agency of Research (Ministry of Economy, Industry and Competitivity) co-financed with FEDER Funds.

PROJECTS CO-FINANCED BY THE CDTI AND THE EUROPEAN UNION THROUGH FEDER FUNDS



NEW THERMOSOLAR TOWER CONCEPT WITH OPEN RECEIVER (TERRA) _ITC-20151145

The aim of this project is the development of a thermosolar tower plant with an open receiver, where air is heated as a heat transfer fluid, allowing electricity to be obtained by means of a combined cycle. With this new plant design it will be possible to obtain temperatures much higher than in current plants, allowing the use of a gas turbine, which at these temperatures is more efficient.

This project also studies and reassesses all elements of the plant: heat storage, heliostats, central tower or receiver and gas turbine, studying and overcoming the current limitations of solar tower technology to achieve a new optimized concept of central receiver thermosolar plant.

EARLY DETECTION OF WATER EROSION THROUGH AUTOMATIC GENERATION OF INDICATORS (DETER) _IDI-20150519

The aim of this project has consisted in designing and developing an intelligent, autonomous system for the supervision of oil pipelines and gas pipelines that allows the early detection of possible erosion problems that endanger the stability of the conduit causing its failure. An implementation of the system was carried out in pilot sites in areas of special risk of water erosion in order to validate it, obtaining promising results.

SUPERVISION OF INDUSTRIAL AND ENERGY SYSTEMS BASED ON CLOUD COMPUTING (SISCLOUD) _IDI-20160691

SISCLOUD is a project the aim of which is the development of a unified monitoring and analysis tool that allows the remote monitoring of renewable energy sources. This tool will be designed and developed based on independent modular components built on cloud technologies, facilitating integration with third parties and ensuring flexibility and adaptability. The solution will incorporate real-time data processing (CEP system) combined with advanced machine-learning techniques and historical data processing. The solution will have interactive visualization and analysis utilities such as dashboards in real time.

Last but not least, all services of the solution (intake, storage, processing, visualization, etc.) are individually secured and monitored, ensuring traceability of data and service level agreement (SLA). The inclusion of Information technologies within the industrial world involves the development and application of new functionalities at various levels.

AUTOMATION PLATFORM FOR SOLAR COLLECTOR ASSEMBLY LINES IN REAL TIME AND REJECTION ESTIMATE (SIGMA) _ IDI-20170751

The SIGMA Project aims to develop an IT platform that allows to automate the treatment and interpretation of large volumes of information during the process of assembly of collectors (SCE) for thermosolar parabolic trough plants, so that it allows for the correct estimate of rejections beforehand in the assembly line as well as facilitate efficient decision making during the assembly phase of the SCE assembly that makes up the solar field from the monitoring of the information as well as afterwards obtaining the conclusions about the level of efficiency reached and the deviations regarding the initial planning.

NEW DESIGN OF SUPPORTS OF THE HCE IN PARABOLIC TROUGH THERMOSOLAR PLANTS (DAHCE) _ IDI-20171059

In the DAHCE Project a new model support of HCE (Heat Collector Element) is being developed on the parabolic trough collectors of thermosolar plants, which will include a new concept of support tube clamp that prevents breakage of the metallic tube during installation as well as its lifespan. This new support will allow for the use of thinner HCE tubes with the corresponding increase in heat transmission.

INDUSTRIAL INSPECTION AND MAINTENANCE OF COMPLEX OR UNATTENDED FACILITIES (INSPECTOR) _ IDI-20170947

The objective of this Project, approved by the CDTI within the CIEN Strategic Program calling, is the research on technologies to carry out inspection and maintenance on extreme surroundings in an unassisted manner. Through this project the aim is to push the competitiveness of the companies through fomenting business innovation in the industrial engineering area of extreme, complex and offshore installations, in design, manufacturing and commissioning as well as operation and maintenance. In addition, the costs associated to the interventions of extreme operation will be reduced and this will contribute to strengthening the capabilities of the business network that supports the industrial sector.

PROJECTS FINANCED BY MINETUR
AND THE EU



MONITORING AND PERFORMANCE SYSTEM FOR THE OPERATION AND MAINTENANCE OF INDUSTRIAL PLANTS (SISPLANT) _TSI-100804-2016-1

Since September 2016 TSK has been implementing the SISPLANT project, the main aim of which is to develop a system based on the IIoT concept for the monitoring of industrial plants with the possibility of acting on the plant elements. To this end, the adoption of standards that allow an interaction with the plant elements (monitoring and actuation) will be carried out. In addition, Big Data technologies will be adopted to allow the processing of all plant information, guaranteeing the integrity and security of the processed data. The SISPLANT solution is intended as a generic display platform, "adaptable" to different industrial processes.

This project is financed by the European Regional Development Fund (ERDF) through the Pluri-regional Operational Program for Intelligent Growth 2014-2020 and the Ministry of Energy, Tourism and Digital Agenda, within the Scientific and Technical Research and Innovation Plan 2013-2016 in the framework of the Strategic Economy and Digital Society Action (AEESD).

RESEARCH AND DEVELOPMENT OF ADVANCED COMPUTER TECHNOLOGIES DESTINED FOR CYBER SECURITY IN INDUSTRY 4.0 (CS4) _TSI-100200-2017-9

CS4 has the ambitious objective to develop a tool that allows for centralizing and improving cyber security in Industry 4.0, allowing the incorporation and Access in real time and in a simple manner. To do this an ecosystem/architecture of Cyber security will be created that allows to take on all sources of possible vulnerability to those that are exposed to the digital developments of Industry 4.0 and that are being unattended to at present. The new model of cyber security that is intended to be developed during execution of this project will be based on technologies for security of technologies enabling Big Data and IoT, as well as to microservice structures and infrastructures DevOps, from design and construction of flexible, modular and extendible hardware and software that allows for adaptation to possible technological changes and that increases the levels of efficiency and performance of security of Industry 4.0 in a substantial way. This project

counts on the funding of the European Regional Development Fund (ERDF) through the "Multiregional Operational Program of Intelligent Growth 2014-2020" and the Ministry of Energy, Tourism and Digital Agenda, within the Scientific and Technical and Innovation Research Plan 2013-2016 in the framework of Strategic Action of Economy and Digital Society (AEESD).

PROJECTS COFINANCED BY THE GOVERNMENT OF THE PRINCIPALITY OF ASTURIAS THROUGH IDEPA AND THE SCIENCE, TECHNOLOGY AND INNOVATION PLAN (PCTI) 2013-2017, AND THE EUROPEAN UNION THROUGH ERDF FUNDS



NEW WATER TREATMENT SYSTEM BASED ON DIRECT OSMOSIS_IDE-2015-000719

This project aims to develop a pilot plant using Direct Osmosis (OD) technology, which will allow filtering of a feed solution to obtain purified water on the one hand and a concentrated feed solution on the other. The OD process offers a number of advantages: it does not require external hydraulic pressures, produces almost complete rejection of a wide range of contaminants, and there is less membrane fouling. This opens up a new development path for water treatment systems, as a substitute or complement to reverse osmosis. Direct osmosis (DO) is a "green" technology, capable of solving many of the problems associated with water filtration and recycling.

STUDY OF A SYSTEM FOR AUTOMATED REMOTE MANAGEMENT OF OPERATIONAL AND INDUSTRIAL MAINTENANCE TASKS THROUGH THE AUTOMATIC GENERATION OF AERIAL MISSIONS (UAVInspection)_IDE-2016-000184

This project aims to integrate the aerial data obtained by the UAV into the Big Data platform, along with the data obtained via other sensors, with the aim of improving the results ob-

tained with regard to the detection of incidents and the visualization of the state of photovoltaic plants, as well as the automatic generation of new flight missions and monitoring. In this way it is intended to achieve an autonomous, intelligent use of UAV technology, adapted in real time to the specific needs of each installation, with minimal need for operator intervention.

METHODOLOGY FOR PREDICTION OF RISK EVENTS IN INDUSTRIAL ENVIRONMENTS (EventRisk)_IDE-2016-000181

The general aim of the project is the design of a methodology that allows the prediction of risk events in industrial environments through the incorporation of sensors at critical points, with the support of the Emergencies Service of the Principality of Asturias (SEPA) who will take an active part in the project. To achieve this, the construction is proposed of a comprehensive system of analysis of dispersion of pollutants by combining off-line models to create patterns and sensors installed in the field for real time monitoring supported by Big Data technologies and mass data analysis techniques.

RESEARCH AND DESIGN OF INTEGRAL MANAGEMENT IN THE INDUSTRIAL INTERNET OF THINGS ECOSYSTEM (GestorIIoT)_IDE-2016-000178

Through this project, research is centered on a comprehensive system for the management of IoT architectures deployed in industrial systems, which will serve as a fundamental architectural element to take advantage of the new possibilities of interconnection and exploitation of information generated in 4.0 industries. Organized as a modular solution, the IIoT Manager system will be stratified into 5 large functional groups, with which it is intended to solve the complexity and lack of robustness of current systems (acquisition framework, remote management, ecosystem monitoring, simulation and cybersecurity).

SUPERVISION SYSTEM FOR ELECTRICAL SUBSTATION BUSBARS BASED ON AUTOMATIC THERMOGRAPHIC ANALYSIS (SISTER)_IDE-2016-000652

This project aims to address preventive maintenance of the busbars in electrical substations via the automatic analysis of thermographic images. To achieve this, the system will

use, on the one hand, image processing algorithms for the detection of hot spots and, on the other hand, it will communicate with the SCADA to obtain the control system data in order to characterize the process and subsequently send the analysis results. In addition, the images will be sent to a remote monitoring system, thus creating a historical knowledge base.

4.0 TECHNICIAN IN THE FOURTH INDUSTRIAL REVOLUTION: AN AUGMENTED, VIRTUAL, SECURE ENVIRONMENT _IDE-2016-000834

The overall objective of the project is the use of new technologies to improve the work of the 4.0 technician. Research will center on the development of innovative support and help tools that make it possible to improve the execution of the technicians' work while guaranteeing their safety. Research will explore the creation of an augmented, virtual, secure environment throughout the entire value chain of industry.

STUDY OF WIND-DERIVED PROBLEMS AND METHODS FOR MITIGATION IN THERMOSOLAR PLANTS LOCATED IN DESERT AREAS (EOLO) _IDE-2016-000179

The overall aim of the EOLO project is the development of an expert system to optimize the design, efficiency, performance and durability of a solar thermal plant in desert environments, where solar radiation in these areas is optimal for the location of this type of plants, but where sand, dust and high wind speeds cause the components to fail.

SIMULATOR OF WORKING MODES OF THERMOSOLAR PLANTS (TOPSOL) _IDE-2016-000637

The TOPSOL project proposes to develop a software tool that allows a simple visualization of the different modes of operation of thermosolar plants, in order to detect errors or propose new modes by adding connections or equipment. The goal is to be able to do everything in a fast and intuitive fashion that serves to facilitate plant control.

NEW MATERIALS FOR THERMOSOLAR PLANTS WITH SALTS AS HEAT TRANSFER FLUID (MATSAL) _IDE-2016-000650

This project proposes to study a mixture of ternary salts known as HITEC, which has a freezing temperature of 142° C. This low temperature would facilitate the operation of the plant, and drastically reduce the costs of solar field tracing. However, the thermal stability of this salt mixture at an elevated temperature and the corrosive effect of these salts are unclear. It is proposed to test these salts for 6 months in order to compare the results with binary salts and the HITEC XL ternary salt mixture. The behavior and resistance to corrosion of two types of coatings in contact with HITEC salts will also be tested in this project.

NEW SYSTEM OF STORAGE AND INTELLIGENT ANALYSIS OF CONTROL VALUES FOR BULK HANDLING MACHINES (REHANDA) _IDE-2016-000635

The main objective of this project is to address the development of a new generation of bulk handling machines, incorporating a system of data capture and storage, which, through Big Data technologies and data analysis, makes it possible to boost the competitiveness of a subsector that so far has had a low rate of implementation of these technologies. This means developing a database in the electronic control of each machine, thus enabling the option of storing performance data periodically as from the moment of commissioning.

This database must be unalterable by the client in order to ensure the traceability and usefulness of the data captured. Once this database is created, it will be necessary to develop a virtual platform for access to it, from which intelligent analysis of the data will be possible and its application to the development of new technologies that improve the equipment manufactured by PHB.

NEW ENVIRONMENTALLY SUSTAINABLE SYSTEM FOR THE TREATMENT OF VINASSE BY DIRECT OSMOSIS IN THE SUGAR-ALCOHOL INDUSTRY (BIOETHANOL) _IDE-2016-000182

The general objective of the BIOETHANOL project is the development of technological solutions capable of industrial scaling for the treatment of the vinasses generated in the sugar-alcohol industry by concentration, as well as the rest of the waste generated in the treatment, via an innovative process based on the complementarity of direct osmosis with other treatment

alternatives, such as reverse osmosis, forced evaporation and dumping diluted brine into the sea in coastal areas.

AUTOMATIC HYDRAULIC EMERGENCY SYSTEM FOR THERMOSOLAR PLANTS (HIDRA)_IDE/2017/000705

HIDRA project's aim is the development of an automatic hydraulic emergency system that carries out the unfocusing of the collectors of a thermosolar plant. HIDRA system will allow the elimination of the SAI of the thermosolar plant, with the consequent cost savings.

RESEARCH FOR THE USAGE OF A WASTE TREATMENT COMPLEX FOR THE PRODUCTION OF MICRO-ALGAE WITH PHARMACEUTICAL AND FARM USES (LandFill4Health) _IDE/2017/000700

The global objective of the Landfill4Health Project is to research and demonstrate the usage of a non-hazardous waste disposal site and its auxiliary installations to house industrial cultivation of micro-algae intended to produce high-valued active ingredients in the field of nutraceuticals, health and cosmetics. To do this, INGEMAS will be in charge of the design and development of the pilot plant.



RESEARCH AND DESIGN OF A NEW METHODOLOGY FOR THE DESIGN, DEVELOPMENT AND DISPLAY OF ANALYSIS TECHNIQUES OF BIG DATA INFORMATION ORIENTED TO PHOTOVOLTAIC PLANTS (PHOTOANALYTICS) _IDE/2017/709

For the last few years, TSK has worked on the monitoring of photovoltaic plants through the use of technologies characteristic of the Internet paradigms of things and Big Data. This bet, aligned with the 4.0 Industry initiative, allows TSK to currently have a vast and diverse amount of "plant" information that is being used for remote supervision and monitoring of the installations.

The PhotoAnalytics project comes with the objective to delve into this information, investigating the applicability of advanced modern analytical techniques about extensive IoT/BigData/I4.0 data sets.

PROJECTS FINANCED BY THE GERMAN MINISTRY OF ECONOMY AND ENERGY (BMW I)



SILICONE TEST FACILITY (SITEF)

In the SITEF project, a new heat transfer fluid will be tested for solar thermal power plants using parabolic-cylinder technology. This new fluid is based on silicon, as opposed to that which is currently employed with a carbon base. The introduction of this innovative fluid would allow a higher operating temperature (up to 450 °C) which would lead to an improvement in plant performance. In addition, it would reduce the environmental damage and the risk to health, by not producing benzene. The project will consist of a trial to study its long-term behavior in a test loop at the Almeria Solar Platform, as well as laboratory analysis.

DEMONSTRATION OF A SOLAR THERMAL PARABOLIC TROUGH POWER PLANT AND STEAM GENERATION SYSTEM USING MOLTEN SALT AS THE HEAT TRANSFER FLUID (HPS-2)

The use of molten salts as a heat transfer fluid has important advantages. The operating temperature can be increased substantially to 500 °C, and the plant is considerably simplified by

using the same fluid for storage and as heat transfer fluid. To validate the technology and identify possible problems during the operation, a test loop will be built in Évora (Portugal), where the TSK-FLAGSOL Heliotrough 2.0 collector will be installed.

OPERATING STRATEGIES BASED ON CLOUD CAMERAS FOR THERMOSOLAR PLANTS (WOBAS)

The aim of the Wobas project is to develop a tool which, using cloud cameras, can predict the direct radiation that a solar thermal plant will receive in a very short term. Cameras record the sky and detect the presence of clouds and their movement to determine when and to what extent they will reach the plant. This very short term prediction will optimize the operation strategy at any given time. During the project, a prototype will be installed in the "La Africana" solar thermal plant to test the system in a real plant.

SILICONE FLUID MAINTENANCE AND OPERATION (SIMON)

The purpose of SIMON is to test the applicability of new heat transfer silicon based fluids to higher temperatures with which are being operated with at present in parabolic trough thermosolar plants and with a faster market introduction by reducing all the obstacles that have been identified. The Project will consist of laboratory testing, fire assessment and testing phases in the loop of the PROMETEO test refurbished in the SITEF project at the Solar Platform in Almería. Also a viscosity sensor appropriate for these applications and temperatures will be developed, as well as an efficient maintenance concept for separating compounds such as hydrogen, methane and silanes.

PROJECT FINANCED BY THE EUROPEAN AEROSPACE AGENCY (ESA)



CONCENTRATING SOLAR POWER FORECAST SYSTEM FOR PARTICIPATION IN THE SPANISH ELECTRICITY MARKET USING EO AND COM TECHNOLOGIES (CSP-FOSYS)

In the CSP-FoSYS project, a new meteorological prediction system based on satellite images is developed. The system consists of software that receives the images obtained by orbital satellites and predicts the direct radiation that the plant will receive in the medium term, for the next hours and days.

PROJECT FINANCED BY THE EUROPEAN UNION (H2020)



COMPETITIVE SOLAR POWER TOWERS (CAPTURE)

The main objective of the CAPTURE project is to reduce the costs of solar thermal plants by implementing an innovative plant configuration. The configuration is based on several independent towers operating with air at 1100 ° C, each coupled to a Brayton cycle. The residual heat of these cycles is used to store thermal energy, which will feed a Rankine cycle.

A prototype will be built at the Almería Solar Platform to test the validity of the system. Throughout the project, all the necessary components for the operation of the plant will be developed: receiver, regenerators and heliostat.

PROJECT FINANCED BY SOLAR-ERA.NET



OPTIMAL HELIOSTAT FIELDS FOR SOLAR TOWER POWER PLANTS (SOLFIEOPT)

The SolFieOpt project proposes to develop software to design the layout of heliostats in the solar field for a tower plant. The optimization of the layout of all the heliostats will save costs in the solar field and increase the efficiency of the plant. The tool will take into account the configuration of the plant and the mirror cleaning strategy to optimize the route of cleaning trucks.



MBR Al Maktoum Solar Park. 260 MW PV Plant. Dubai (UAE)



International Experience

The knowledge acquired in the wide variety of projects carried out in more than 50 countries allows us to adapt to the technical and cultural features of each country and successfully complete our international projects.

Our international strategy is based on close cooperation with local companies, enabling us to add value for all the countries in which we work, combining technology, experience and resources.



A M E R I C A MEXICO, CUBA, VENEZUELA, ARGENTINA, CHILE, COLOMBIA, BRAZIL
PERU, HONDURAS, NICARAGUA, PANAMA, U. S. A, BOLIVIA, ECUADOR, JAMAICA
GUATEMALA **E U R O P E** SPAIN, FRANCE, ITALY, PORTUGAL, GREECE, POLAND
ROMANIA, NETHERLANDS, FINLAND, UK **A F R I C A** MOROCCO, ALGERIA, TUNISIA,
EGYPT, SENEGAL, ANGOLA, LIBYA, SUDAN, SOUTH AFRICA, MOZAMBIQUE
UGANDA **A S I A** JORDAN, TURKEY, INDIA, IRAN, SAUDI ARABIA, SYRIA, BANGLADESH, UAE

Corporate Social Responsibility

At TSK, we are convinced that social commitment is inherent in business activity, to which the growing level of prosperity and well-being of society can largely be attributed. Our main responsibility is to be able to give a better service to our customers every day. This is what allows us to create value, generate quality jobs, invest in research and development and engage in activities that benefit the society where we carry out our projects.

At TSK we believe that it is also our responsibility to support organizations that work for the improvement of society. In this sense, we support those working in the cultural and scientific sphere, in international cooperation and solidarity and in the promotion of business and entrepreneurship.

- Sponsorship of sports organizations.
- Preparation and editing of books.
- Sponsorship of cultural exhibitions.
- Co-operation with the University of Oviedo.
- Co-operation with charities and NGOs.
- Commitment to Asturian industry and the development of the region.
- Co-operation with the Asturian Quality Club, Asturian Innovation Club, Femetal, Asturian Family Business Association, Ademi, Sercobe and Prodintec.

At TSK we consider corporate social responsibility as part of our overall strategy with the objective and commitment to improve the well-being of the societies where we are present.

At TSK, we manage the social implications of projects. Although most of these implications are positive (mainly job creation and revitalization of the local economy) we always super-





vise the development and implementation of projects in order to identify negative social impacts and establish measures that can mitigate them.

Within this social management, the following activities can be highlighted:

- Relationship with the Community. The Project Manager is responsible for maintaining a constant dialogue with authorities and community representatives during the execution.
- Social impact. Although the company's impacts are mostly positive, TSK analyzes the local regulations in order to provide mechanisms for information, claims and restoration of negative social impacts.
- Implementation of projects. Depending on the needs and expectations of the community where we are, we offer the possibility of carrying out projects to support the community.

In 2017 the development of the rehabilitation of the Community Center in the small fishing village, Old Harbour Bay, in Ja-

maica started. We are carrying out a 190 MW combined-cycle plant there. This complete renovation project of the community center has made it possible for a sociocultural meeting point where a great number of activities that are beneficial to the community take place. This first intervention, which came up from communicating with the community, has been a starting point for this project that is also undertaking the refurbishment of the surroundings, improving sports areas, where the basketball court and football field have been completely renovated.

Similarly, projects from solidarity proposals were developed which were presented by TSK's own professionals that work in different places around the world, taking into account the basic needs of a community. In 2017 the following cases were developed:

- Preventive HIV talks and campaigns in countries with the highest incidence.
- Immunization days and medication donations
- Donations for the people affected by the earthquakes that occurred in Mexico in September.



Growth through innovation

Parque Científico Tecnológico

Ada Byron, 220

33202 Gijón, Spain

Tel. +34 984 495 500

grupotsk.com