BONO Strengthen Presence in China and Indonesia

Efficient Degassing Technologies

Energy Efficiency Projects

New Solutions for Biomass

Industry 4.0 Cannon is Ready

Energy & Water for Food & Beverage

Efficiency 4.0: Facing the Challenge
A growing environmental problem – created by the effect of human activities on the quality of our atmosphere – and the increasing scarcity of non-renewable resources are heavily modifying our habits. "Energy efficiency" , "optimisation of natural resources" and "reduction of carbon emissions" have become mantras for any type of industry.

The Cannon staff – more than 1,000 people around the World, for a turnover in excess of 230 Million € – feel deeply and daily committed in being part of the solutions, rather than contributing to compound these problems.

For more than 50 years the Plastics Business Unit has preached and put in action the concepts of weight reduction, smart design of parts, and more economic production methods. These have been perceived as the easiest solution of a widespread environmental problem and are today applied successfully on a global scale.

Fossil fuel saving, use of renewable resources, more efficient methods of combustion have kept the BONO companies well awake and busy in the past 50+ years, providing valuable solutions to numerous industries and communities. Thanks to this vision and to the availability of effective technologies the Energy and Water Business Units of Cannon play today a fundamental role for the success of the Group: 300 people in 4 Companies generate a turnover of 90 Million €, working in a modern industrial structure which is the most vertically integrated in its sector, in Italy.

Efficiency and environmental consciousness are the driving forces behind any recent success of BONO: read more about the intense efforts made to enter the huge Chinese market (page 2-3) and to conquer a leading position in Far East (page 23-25). These bold actions are made possible by an intense R&D activity, which generates more efficient boilers (page 10 & 22) and efficient water degassing (page 5-7).

Human’s basic needs – affordable food for a fast-growing planet, clean water for everyone – are at the core of this Group’s activities: read about the importance of steam, heat and clean water in the rising Food & Beverage industry (page 18-20).

Playing by themselves in such a wide playground would not have generated the positive results that Cannon obtained in the past decades in the environment-related business. Other entities (industry members, authorities, associations) must cooperate on international and institutional levels to achieve true, measurable results: read how BONO actively participates in international Energy forums to promote energy-efficient technologies and renewable resources (page 27).

Talk to Cannon, for energy efficiency and environment-conscious methods of production: a good solution could be closer than you think!
Editorial

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Cover page picture: Modern electronic controls are available at Cannon for the management of individual boilers and complex thermal plants. Read more at page 14 - 15.

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A CONTINUING COMMITMENT TO THE CHINESE MARKET IS GENERATING FIRST SIGNIFICANT RESULTS FOR BONO ENERGIA. TIGHTER LIMITATIONS FOR GAS EMISSIONS, CONCERNS ABOUT LOCAL PRODUCTS QUALITY, DEMAND FOR HIGH RELIABILITY: ALL THESE FACTORS PUT BONO IN AN IDEAL POSITION FOR AN EXPANSION OF THEIR ACTIVITY IN CHINA.
WE DISCUSS THE LATEST DEVELOPMENTS OF THIS HUGE AND STRATEGIC MARKET WITH LEONARDO VOLPATO.

Leonardo Volpato is in charge of the "Internationalisation Project" of BONO Energia, where he operates since 2011. His international team is spending considerable efforts to expand the export share of the turnover, concentrating on rising markets where an established Cannon presence can help optimising the results.

Educational because, in spite of our experience in thermal plants, we never end to learn. Expectations from Chinese customers towards commodity equipment, as thermal plants are perceived, often exceed our best possibilities and require the mediation of our local colleagues to find a compromise acceptable by both parties. Rewarding because, at the end of all these efforts, the first promising results are coming.

CN: Where are you trying to position BONO Energia in China, where the construction of a good boiler is not anymore a secret?
LV: The Chinese market for boilers and thermal fluid heaters is clearly segmented in four layers. There are imported machines, made in EU and in the US, that are perceived as the best available choice. Their quality, reliability, efficiency and cost are higher than the local ones, and this is known and accepted by the clients.
Then there are machines manufactured locally upon European design, through a Joint Venture or a manufacturing licence, but these boilers have poor quality and the Chinese customer do not want to pay for low standards. The third level includes the equipment made by few local manufacturers working at a high level of technology for a medium-high price. The last layer includes the production of maybe 1,000 local boiler makers, working at the lowest level of prices – and of quality.
We aim at the top of the pyramid, for contracts requiring medium-large machines destined to sophisticated public or private projects. These can be the supply of heat to an airport or for a District Heating network, or for a special oil heater needed by a delicate chemical process.

CN: How do you approach such an ambitious target?
LV: The answer here comes from the learning curve that we have had to climb in these years: you need reliable local partners for the distribution and service; you need, to be approved as constructor, a manufacturing licence, that is at the same time expensive and long to obtain, and must be renewed every four years; you need for each boiler sold in China an import approval: you need an installation approval for every equipment you start up. These documents are issued by a Chinese technical authority, upon a more or less complex visit of their inspectors. And you need to comply with stringent local requests concerning the delivery time, the reliability and the price.
The last point is not, amazingly, the most important: the clients dealing with us know by experience that from Europe they get a better product and, therefore, are ready to spend more for it. But not really very much more...and Chinese businessmen are known for their bargaining skills!
Chinese project manager based in our Italian headquarters.
The language and cultural barrier has been efficiently taken care of, their integration with the rest of the organisation is very good.

CN: What is the Chinese market mostly looking for, today?
LV: Low emissions and higher efficiency. The environmental conscience is growing quickly, they can’t stand anymore the painful quality of their atmosphere. And they have few local oil or gas to burn instead of their abundant – and polluting – coal.
China now aims at the American levels of gas emissions and at the European levels of efficiency. Only as an example, they have defined three different levels of NOx in the combustion gases generated in their towns. In Beijing the target for 2020 is to reduce it from 80 to 30 mg/Nm³. All new boilers and heaters must burn gas only, and also the existing ones will be converted, according to the recent Environmental Protection Law enforced this year, with very severe fines, not only monetary, for the transgressors. BONO Energia combustion technologies fit perfectly within this new scenario: we are proposing the new HE-Smart boilers and OMP oil heaters for an increased energy efficiency. Our whole combustion concept provides lower NOx and CO emissions, with a wide list of consolidated references in several difficult environments.
We offer reliable solutions, with a low maintenance and reduced running costs, very safe to operate. We back up all this with more than 50 years of innovation and proven results in efficient and clean combustion solutions: nobody has more than half century of experience in boiler construction in China!

CN: Any recent result worth being mentioned, at this respect?
LV: We are glad to announce that BONO Energia was awarded with an order for a complex project: five oil heaters, rated 6 MW each, will be supplied to a major producer of Lithium batteries, mostly destined to electric cars, tablets and smartphones.

CN: And your reply to these needs was…?
LV: We selected three partners, one for oil heaters, one handling a local stock of standard instant steam boilers, one targeting large public contracts. The country is immense, we need a parallel attack strategy on different fronts and geographic areas. They are coordinated locally by a new Chinese specialist working in our Shanghai office, who works in strict cooperation with another Chinese project manager based in our Italian headquarters.
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These heaters will melt the resin used to seal and coat the batteries, produced in a highly automated environment. A very delicate process; to be kept under the strictest control of parameters to avoid any trouble with the finished products.
The compact footprint of our multi-tubular OMP 5000 heaters was extremely appreciated by the customer: they were ready to build a much wider boiler room for their new equipment, and now gladly can save at least 20% of the space dedicated to the boiler room thanks to the reduced dimensions of our machines. On top of that, they will considerably save running costs during the normal operations, thanks to the limited thermal stress imparted by the OMP on the thermal fluid: the life span of their oil will be significantly longer, minimising the refills. Also the environmental performances of our equipment made them very happy: thanks to a wider combustion chamber the gas emissions have been reduced, in spite of having used a pre-heating system on the intake air, which normally would increase them.

CN: Are you also approaching the O&G sector and the large EPC market?
LV: We are currently starting our cooperation with some EPC Contractors that operate outside China for large chemical and petrochemical plants. They need a supplier already qualified with the largest western and Asiatic EPC’s with fluent written and spoken Chinese: BONO Energia and ARTES Ingegneria comply with these characteristics.

CN: Any news on the Marketing side?
LV: We will actively promote these activities with a booth and a technical paper at HEATEC 2016, as we did in 2015, with an advertising campaign and the publication of technical articles on the trade press. The Chinese section of our local website (www.cannonfareast.com) is dedicated to BONO Energia and gets daily a very high number of visitors! We are getting ready for more work, let me tell you!

Visit us at
HEATEC 上海国际供热展
11 - 13 October, Shanghai, China
SIGNIFICANT CONTRACTS FOR WATER TREATMENT PLANTS HAVE BEEN ACHIEVED IN THE PAST 18 MONTHS BY ARTES INGEGNERIA IN THE US FROM END USERS THAT ARE ADDING A VALUE TO THE NATURAL GAS COMING EITHER FROM CONVENTIONAL GAS FIELDS OR FROM SHALE DEPOSITS.

Exploiting natural gas deposits only to sell gas does not bring much profit to their owners. All the major gas producers try to maximise the rentability of their fields either by liquefying it and selling overseas or implementing industrial processes aimed at the production of more complex – and rich – chemicals, easier to transport than natural gas and more profitable at the end of the chain. Ammonia-based fertilisers and polyolefin plastics are only two examples of commodities produced starting from natural gas, through a complex series of chemical reactions. ARTES has matured significant experiences supplying water treatment plants to giant chemical companies that process natural gas in their petrochemical plants around the world.

Three major contracts have been awarded to ARTES in the USA in the past 12 months:

- CB&I, one of the major engineering and construction Company in the world, ordered a 300 m³/h Demineralisation plant based on Ion Exchange technology and a 375 m³/h Condensate Polishing Unit for an Ethylene cracking plant at Lake Charles, Louisiana. A similar package, although based on membrane technology, was delivered in 2015 through Linde to the another Ethylene plant at Baytown in Texas.
- CB&I again commissioned a 280 m³/day demineralisation plant with double-pass reverse osmosis technology, installed in a HVAC container, for the gas liquefaction facility in Freeport, Texas. Extremely compact and easy to transfer this solution allows for prompt installation in a new or existing processing plant, with a Plug-in concept.
- For installation in Texas again, an Hydraback® filtration plant for the cooling water has been commissioned for Corpus Christi’s PET (Polyethyleneterephthalate) plant. Fitted with self-backwashing, valve-less, automatic gravity filters, this plant treats 500 m³/h of cooling water.

These references confirm once more the capacity of ARTES Ingegneria to supply complex water treatment solutions to sophisticated Oil&Gas clients on the most demanding markets.

ARTES Goes with Major EPCs

SEVERAL WATER TREATMENT CONTRACTS HAVE BEEN AWARDED IN 2015 TO ARTES FROM PRIMARY EPC CONTRACTORS, IN CENTRAL ASIA AND NORTH AFRICA. TWO SIGNIFICANT EXAMPLES ARE DESCRIBED.

With Mitsubishi, in Turkmenistan

Mitsubishi Heavy Industries, a major Japanese EPC specialising in large Chemicals & Petrochemicals projects, committed to ARTES Ingegneria the delivery of a large integrated water & waste water treatment plant for the major fertilizer plant of Garabogaz, in Turkmenistan. A complete line of treatment was supplied, including a 450 m³/h of sea water pre-treatment and desalination on double-pass reverse osmosis and a 315 m³/h ion-exchange unit for demineralisation and condensate polishing unit. This is one of the largest desalination and demineralization project executed by ARTES: the incoming sea water contains 15,000 mg/l of TDS (Total Dissolved Salts). The final purified water contains only 0.01 mg/l of TDS, with an electric conductivity of less than 0.2 Microm Siemens!

The supply was integrated with an effluent water treatment system to handle 100 m³/h of waste waters, which includes deoiling and neutralisation sections. The delivery and installation of this huge plant – the footprint covers 0.6 hectares of a covered and thermally-conditioned building – required a special effort by the whole organisation of ARTES Ingegneria. Supplied in two lots in only 14 months, the plant is catering the needs of a fertiliser complex which is converting natural gas, abundant in Turkmenistan, to more valuable nitrogen fertilisers.

Water for Power, with Techint in Egypt

Two waste water treatment plants able to purify 40 m³/h of water from various streams have been delivered to Egypt during 2015 through Techint. Destined to the extension phase of two large Combined Cycle Power Plants in West Damietta and Al Shabab, these plants include the treatment of oily water, contaminated drains, sewage and the dehydration of the residual sludge.
Three different degassing technologies are available from ARTES Ingegneria: thermo-physical degaeration, vacuum degassing and membrane degassing.

Numerous industrial processes utilise huge amounts of water for various reasons: steam production, dilution of solutions, chemical reactions, heating, cooling, etc. Most of the times a residual content of oxygen (coming from air) creates problems in the process. Boilers that supply pressurized steam for turbine feeding require oxygen-free water to avoid corrosion of the generator circuit and damages to the turbine blades. Use of oxygen-free water is mandatory in “water-flooding” applications in oil wells, because the presence of oxygen in the injection water may accelerate corrosion and bacteria proliferation.

ARTES INGEGNERIA has mastered, in nearly half century of activity, the manufacture of different types of degassers, providing a dedicated solution for each specific need.

Water, when in equilibrium with the atmosphere, contains significant levels of gases, mainly Carbon Dioxide and Oxygen. In several industrial applications the concentration of these gases must be reduced to negligible levels, either for process purposes or to prevent boilers and pipelines from severe corrosion. With its own proprietary ZeroGas® technology ARTES has inherited the experience in the design of Deaerators that originated within BONO in 1958.

Three different degassing technologies are today used by ARTES Ingegneria: thermo-physical deaeration, vacuum degassing and membrane degassing. Hundreds of machines built in accordance with these solutions, some of them with a potential output of well over 1,000 t/h of deaerated water, are installed on steam generators, electric power plants, water treatment units and dedicated special equipment, on a worldwide basis.

Two ranges of deaerators are available, for the above mentioned technologies, supplied by the two Divisions (Industrial and Engineering) of ARTES:

- **Standard Models**, supplied in five sizes from 5,000 to 25,000 kg/h of degassed water, adapt for the most conventional applications
- **Customised Machines**, designed upon the specifications of the client.

**Thermo-physical Deaerators**

In the thermophysical deaeration dissolved gases are removed by reducing their partial pressure over the liquid surface by replacing air with steam. In order to establish the equilibrium for Oxygen and Carbon Dioxide between the liquid and vapour phases, the contact area is increased by spraying the liquid and making it fall on metallic trays or structured packing. Steam is employed as stripping and heating medium because of the reduced
solubility of gases at higher temperature. Therefore, operation at pressures higher than the atmosphere enables the establishing of more favourable equilibrium conditions because of the decreasing solubility of gases at increasing temperature. The ARTES proprietary ZeroGas® degassing process is achieved in the degaerating tower where make-up water is atomised on a set of special “structured packing” that increases the contact surface between water and steam. Oxygen and Carbon Dioxide are stripped by the steam flow and vented through a calibrated orifice or a throttling valve. Deaerated water is collected into the storage tank. The operating pressure in the Deaerator is maintained by a self-actuated valve, or by a control valve on the steam line, regulated by a pressure transmitter. The standard degassers built by the Industrial Division of ARTES Ingegneria typically work at 1.1 bar, while the larger, special models made by the Engineering Division can reach a pressure of several bars. According to the design capacity and steam flow, the degaerating tower may be arranged on a vertical or horizontal geometry so that a larger mass and heat transfer surface is implemented.

A new line of products has recently been developed by ARTES Ingegneria: Integral Degassers, designed for power generation with combined cycle. The degasser is integrated within the low pressure drum of a HRSG (Heat Recovery Steam Generator) which produces the steam required for the degassing of the BFW (Boiler Feed Water). Due to the lack of an external control of steam production, the system works within a very narrow range of pressure and temperature parameters, requiring therefore a very accurate and sturdy construction. The thermo-physical deaeration process is by far the most applied technology in the Boiler Feed Water (BFW) degassing when a reduction of oxygen to only a few parts per billion is required. Dissolved gases are removed by steam stripping, and the steam is moreover employed as heating medium because of the reduced solubility of gases at higher temperature.

Numerous degassers of this type have been recently commissioned to ARTES Ingegneria in various countries: a 490 ton/h unit will be installed later this year for a Urea fertiliser plant in Iran. Featuring an horizontal-tower design, this thermal physical deaerator has been included in a major contract handled by one of the major Chinese EPC contractors operating for the chemical and petrochemical industry.

For another fertiliser project, an Ammonia plant in Russia, two large horizontal-tower degassers of 450 and 185 t/h capacity—able to guarantee a 7 ppb O2 degassing level—have been supplied through the Italian Tecimont. A large vertical tower model will be installed this year for a large chemical plant in Antwerp, Belgium.

Two Integral Thermophysical ZeroGas® deaerators rated 540 t/h have been integrated in the low pressure drum of the HRSG of a power generation plant in Turkey. The same solution has been selected by the same EPC contractor for another major power plant contract in Iraq, with four units able to supply 470 t/h of degassed water. During 2015 a large contract was obtained in Turkmenistan, for a gas-to-gasoline project of the State Oil Company assigned to Kawasaki Heavy Industries. Over 1180 t/h of degassed water are provided by two ZeroGas® Thermophysical Deaerators with horizontal tower.

Vacuum Degassing (ZeroGas®)

Vacuum degassing is employed all times when either heating up of water is not allowed or when steam is not available as the degassing media. Oxygen and Carbon Dioxide are removed from the liquid phase by creating vacuum conditions. The reduction of the partial pressure in the gas phase is in fact the driving force that moves dissolved oxygen into the gasphase. ARTES ZeroGas® Vacuum Deaerator is arranged on a Degassing Tower and a Storage Tank. Vacuum is created into the Degassing Tower through the action of liquid-ring pumps with or without the assistance of additional air-driven ejectors. The water is fed to the top of the Degassing Tower and falls across metallic or plastic rings down to the storage tank which is designed against a specified “hold-up” time according to the request of the users downstream. When stringent limitations apply to the residual Oxygen in deaerated water, a double stage Degassing Tower may be implemented and operated at two different vacuum levels.

A common application of Vacuum Degassing is in the Injection Water Treatment, upstream in the Oil sector. In most fields to keep crude oil flowing through the wells, sea water or river water must be pumped into the oil basin as “flooding water”. In order to prevent any bacteria proliferation in the oil basin, vacuum degassers are used to reduce the concentration of Oxygen down to negligible levels.

Recent achievements

ARTES has a wide experience in supplying and commissioning vacuum Degassers in the most demanding applications. In the last two years the company has been awarded important contracts for ZeroGas® vacuum degassing packages by prestigious clients.

A complete water injection plant supplied to the largest Polish oil Company for one of their offshore extraction sites in the Baltic Sea. It’s a modular solution built within a 4-storey 25-meter-high tower structure, with a very compact footprint.

The customer needed the complete treatment cycle for injection water, the one which is pumped under high pressure in...
The new ARTES Integral Degassers are designed for power generation with combined cycle. The degasser is integrated within the low pressure drum of a HRSG (Heat Recovery Steam Generator) which produces the steam required for the degassing of the BFW (Boiler Feed Water).

The undersea oil reserve to fully exploit its precious content. This sea water undergoes a double filtration, for the separation of coarse and fine solids, then it is degassed under vacuum with proprietary ZeroGas technology to eliminate the Oxygen: this gas can cause corrosion of metal equipment and, even worse, it would nurture the growth of Sulphate Reducing Bacteria (SRB) within the oil, generating a corrosive and acidic media which would spoil its quality. Water is also chemically treated with antiscaling agents, Oxygen scavengers and corrosion inhibitors, to avoid undesired reactions when different types of water mix in the deep reserve.

The advantages of ARTES deaerating processes can be summarised as follows:

- An extremely efficient Mass-Transfer rate leads to reduction of dissolved gases (Oxygen, Carbon Dioxide, volatile compounds) in water to meet the most stringent specifications.
- Significant savings are obtained avoiding the use of de-oxygenating.
- Efficient heating of the BFW to the required boiler temperature with a significant saving of the required steam.
- A very compact deaerating tower is obtained thanks to the efficient packing with a high "active area / installed volume" ratio.
- High reliability and low maintenance due to the implementation of 50+ years of design and manufacturing experience in deaeration technology.

Membrane Degassing

Also called Membrane Contacting, this method is often used in combination with other membrane processes for the removal of Carbon Dioxide (CO₂) and Oxygen (O₂) from water.

CO₂ is a common issue in a large number of deionisation and demineralisation plants: it is in chemical equilibrium with hydro-carbonates and carbonates that are contributing to the overall anionic load. In an ion exchange process, reducing the anionic load implies a reduction of the operating costs because of the higher consumption of caustic in the regeneration of the anionic resins. On the other side a not-negligible CO₂ content in a Reverse Osmosis permeate is resulting in higher dissolved solids content (when in equilibrium with the atmosphere) and specific conductivity sometimes trespassing the required figures. Further, residual CO₂ must be strictly limited when deionised water is going to be further polished on EDI units. In a membrane contactor the process water is put in contact through a semi-permeable membrane with a purge gas stream. Membrane degassing can also be applied to sea water to obtain suitable injection water for “water flooding” applications, in particular in off-shore environment when dimensions and weights are absolutely critical. The necessity to reduce O₂ content to 20 ppb or less requires an extremely accurate design considering the need to combine vacuum conditions with Nitrogen purging on the gas phase. Whilst water is not able to permeate through the membrane, the dissolved gases are forced to flow through it with the driving force being the low partial pressure in the gas phase.

The purge gas stream could be compressed air laminated to mild overpressure with respect to the atmosphere as well as, in case of tight requirements on residual CO₂ and O₂, air in vacuum conditions or Nitrogen, thus providing the lowest partial pressure in the gas phase. A combination of the two is anyway possible to meet the required results.

ARTES Ingegneria has a wide experience in supplying and commissioning Membrane Contactors providing a clean, maintenance-free method to remove O₂ and CO₂ from water.
A multinational company, world leader in the chemical industry, identified in BONO Energia the appropriate partner to pursue their energy efficiency goals. BONO installed in one client’s production plant, located in northeast Italy, a HE Smart steam generator with a 15 t/h capacity (9 thermal MW). This equipment is used to produce steam for the client’s process, aimed at the production of special resins.

A special burner has been installed, able to simultaneously use Methan gas and liquid Methanol, a by-product of the local industrial activity, in proportions from 0 to 100% for each fuel: a closed-loop metering control system reads the stored quantity of Methanol and decides what is the best stoichiometric ratio to be used. Due to the peculiar characteristics of the fuels, the whole steam generator has been designed in ATEX explosion-proof configuration.

The client also entrusted BONO Energia for the revamping activity of one of their existing oil boilers, a 20-years-old OMP 6000 model. The generator has been customised to allow the use of a Methanol stream, installing a new burner as the one above described, a new electronic control for the gas feed and upgrading the existing machine to comply with ATEX directive.

The jobs resulted in huge cost savings, in at least three separate areas: the complex disposal of a technical-grade Methanol, the reduced consumption of Methane and the increased efficiency of the thermal plant, measured in about 6-7% of higher yield.

Thanks to the solution developed by BONO Energia this chemical company won’t have to worry about the disposing of Methanol anymore and, at the same time, will save hundreds of thousands of cubic metres of Methane gas, valued up to 300,000 € per year.

The investment led to a positive effect on the balance sheet of the company and to an improvement of the environmental impact, thanks to technological solutions which ensure to respect the very low limits of NOx and CO emissions imposed by the Italian law.
Energy Efficiency for Tomato Canning

The energy demand of tomato canning industry, although mainly concentrated in little more than two months, represents a very substantial share of the production cost. The consumption of methane gas can be sometimes as expensive as the raw material! BONO Energia leads food processing companies on the path towards energy efficiency.

Increasing competition has made cost saving imperative: one of the largest leading European canning companies operates a huge factory in Foggia, southern Italy, specialised in tomato processing. During the two-month canning season the plant can reach a peak consumption of 15 million m³ of Methane; any percentage point of increased thermal efficiency is worth real money!

The company has chosen BONO Energia’s advanced technologies for the improvement of the energy performances of two, among their numerous, existing steam generators.

A turn-key package has been supplied, including all the required equipment, the fitting manpower and the start-up assistance.

Working with an extremely tight deadline, dictated by the impelling seasonal tomato campaign, four specialists worked for ten days at the installation of six inverters, mounted on all the existing motors for pumps and fans, of two heat recovery systems, of two OptiSpark controls with Cannon PLC (Programmable Logic Controller).

The revamping solution of two boilers, featuring 20 t/h steam capacity, allows for the achievement of very good results:

- The installation of BONO OptiSpark GARC BCU, the automatic system for monitoring and control, has led to a 1-2% gas saving.

The data recorded by BONO OptiSpark shows the energy recovery resulting from the implementation of the system: during the production period the company has benefited of an overall Methane gas saving equal to 100,000 m³.

This saving could allow to obtain energy efficiency titles (TEE, or White Certificates) through the submission of the project by an Energy Service Company and approved by the GSE (Gestore Servizi Energetici, the Italian Authority for Energy Services).
Nowadays, biomass is a popular and ongoing generation plants starting from the “green field”. Complete turnkey solutions for thermal and co-

The waste of production, transforming them in a precious free-of-charge energy source. Their installations can be used for two purposes: cogeneration of electric power and heat, or production of steam for process.

In particular, BONO Sistemi design and deliver complete turnkey solutions for thermal and cogeneration plants starting from the “green field”. Nowadays, biomass is a popular and ongoing subject, both for energy saving and respect of the environment. This is a market in continuous evolution: there is a growing demand of renewable energy coming from small industries, for their production processes, and from small communities and villages for district heating circuits. BONO Sistemi, that has long perceived the potential and the problems related with the use of renewable sources of energy on a small scale, has now expanded its range of production, introducing low-power biomass boilers.

The BONO low-power biomass boilers can produce hot water, superheated water or saturated steam from 1,000 kW up to 6,000 kW. The boilers are equipped with the most recent technologies available in the biomass world: mobile or fixed grate in accordance with the different types of available biomass, combustion chamber with refractory walls to guarantee emissions level in compliance with the most restrictive rules, fired tubes boiler design, boiler cleaning system by compressed air, PLC for automatic management and control of the boiler, automatic ash extraction system. A package configuration allows for a short delivery time, fast set-up and commissioning.

This new offer extends the range of BONO Sistemi biomass boilers, confirming their continuing effort to meet their customer needs while maintaining the highest quality level of construction and service for any size of industrial project.
Nowadays, biomass is a popular and ongoing generation plants starting from the "green field" communities and villages for district heating for their production processes, and from small renewable energy coming from small industries, environment. This is a market in continuous complete turnkey solutions for thermal and co-renewable sources of energy on a small scale, has introducing low-power biomass boilers. In particular, BONO Sistemi design and deliver production of steam for process.

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The uniqueness of the Salon Bois Energie is expressed in its coverage of the complete wood energy chain, from forestry management through the production and supply of all the different types of wood fuels, to energy production by co-generation and direct heating appliances. An activity that characterised this edition in Nancy was represented by the study tours offered by Salon Bois Energie, in co-operation with BONO Sistemi, in parallel with the exhibition. This year 20 selected professionals had the opportunity to visit one of the latest BONO Sistemi installation, the Delipapier paper mill in Frouard. The paper industry, notoriously energy demanding, continuously needs medium pressure steam, about 18 barg, to feed the machineries producing the "tissue", with an almost constant thermal performance, 24 hours a day, about 340 days a year. Therefore, the thermal plant has been designed to meet these requirements of high reliability and operation capacity. In order to replace the existing gas-fuelled plant, this biomass installation is a 13 MW thermal plant fed with wood chips, collected by the Delipapier manufacturing plant from the farmers of the region. BONO Sistemi has made available its experts for the whole period of the visit. In particular, the key advantages of the biomass technology, compared to the previous gas-fuelled plant, have been illustrated. The structural aspects of the steam boiler, that can operate without the constant presence of supervisors up to 72 hours, the complete fumes treatment up to the flue, the ash discharge and handling system, the biomass storage and feeding system, consisting of a 1,000 m³ silo with forklifts, have been explained in every detail to the tour's participants.

Hosting a visit for professionals coming from all over the world is one of the activities that allow BONO to stay always closer to its customers, available to share experiences and know-how. This is a key factor to guarantee the complete success of a project, starting from the design phase to the start-up of the equipment, for dozens of years of efficient use and of effective after sales service.
Cannon, Only Energy-Conscious Solutions

DIFFERENT “SOULS” CO-EXIST WITHIN THE CANNON COMPANIES, ALL SHARING A COMMON FACTOR – PROPOSING ENGINEERED SOLUTIONS – AND A COMMON STRATEGY, THAT CAN BE RESUMED IN “ENERGY EFFICIENCY, ENERGY SAVING AND CLEAN MANUFACTURING”.

As of today Cannon deals with Polyurethanes, Composites, Thermoforming, Aluminium Die-casting, Industrial Electronics, Thermal Energy Plants and Water Treatments. Each of these activities could generate a long article describing how its technology provides Energy-conscious solutions to their customers.

The implementation of the Montreal Protocol, agreed in Canada on 16 September 1987 and entered into force on 1 January 1989, and of the Kyoto Protocol, adopted in Japan on 11 December 1997 and enforced on 16 February 2005, heavily influenced the history of the Cannon Group. The first Protocol restricted the emissions of Ozone-layer depleting gases and the second aimed to reduce the emissions of gases that generate the Greenhouse Effect. Both ambitious projects had to be implemented on a global scale. Cannon immediately responded to the technical needs originated by major changes in processing technologies. Other articles in this Cannon News contain all sort of details regarding Thermal Energy production or Water Treatment activities: the savings in fuel, the reduction of gas emissions, the optimisation of water use in numerous applications are visible everywhere in this magazine. It might be interesting for you to discover where else and how the Cannon Group decline this “Energy Efficiency” mantra with other technologies.

Polyurethane Insulation
Rigid Polyurethane (PUR) foams constitute, as of today, the most efficient barrier against the dispersion of heat. Only vacuum works better when thermal transmission must be reduced, and today both systems – vacuum and PUR – can be used together to improve the performances of domestic and commercial refrigerators.

Class A+++ models from the World leader in refrigerator production, Haier, manufactured in China using Cannon technology, offer the highest insulation performances and the lowest yearly consumption of electricity.

More efficient insulation panels are used today for refrigerated storages, cold stores and reefers, the insulated 12-meter-long containers that transport meat, grocery and other perishable food across the world. Cannon is currently supplying sophisticated forming technologies to the most important manufacturers of these fundamental components of the food’s Cold Chain.

Dedicated solutions for Composites.
Lighter vehicles contribute to the achievement of two fundamental targets – limit gas emissions and save non-renewable fuels – and these results can be attained by replacing heavier metals with lighter Carbon-fibre based Composites.

Cannon deliver dedicated solutions for the automated mass production of composites. Utilizing both Polyurethane and Epoxy formulations, by leveraging on consolidated and industrially proven technologies Cannon propose turn-key packages for different moulding methods:

- Use of reactive formulations, that are blended in the mould with a reinforcement
  - HP-RTM (High Pressure RTM): a resin matrix is mixed and injected in a preformed fibrous layer,
  - InterWet: a PUR blend is efficiently mixed with a stream of chopped glass fibre and open-mould applied,
  - Spray Impregnation: a PUR blend is sprayed in open mould over a layer of ready fibrous reinforcement.

- Use of compression moulding, forming different reinforcements pre-impregnated with:
  - Thermosetting matrix: Prepreg, SMC & Carbon Fibre
  - Thermoplastic matrix: LWRT (Light Weight Reinforced Thermoplastic) & GMT (Glass Mat Thermoplastic), pre-heated.

These available solutions provide viable methods for Composites mass production, addressing several problems:

- A reduced cycle time,
- The quality of the moulded part,
- The economy of the whole process,
- A clean working environment,
- The industrial recovery of an expensive raw material, carbon fibre.

Cannon, being able to supply all the required technologies and equipment with a “single responsibility” contract, provides a One-Stop-Shop approach to the Companies that decide to invest in complete manufacturing solutions. This is a unique offer, in a competitive field populated by producers of single pieces of equipment unable to guarantee the final result when a complex plant has to be put together!
Discover a world of solutions for NVH
- Noise, Vibrations and Harshness -
reduction in cars and trucks.

The Polyurethane chemistry provides today sophisticated formulations, designed to protect efficiently the passengers of a vehicle from noise and vibrations.

Cannon supplies the dedicated foaming equipment required to utilise these new materials for:

- Sound deadening carpets and mats
- Car body cavity filling
- Insulated roof liners
- Engine shields
- Wheel covers

www.cannon.com
ENVIRONMENTAL CONSERVATION AND AWARENESS, CONSUMPTION REDUCTION, SUSTAINABILITY ACTIONS AND INDUSTRY 4.0 HAVE BECOME TODAY CORE TOPICS. TO SAFEGUARD AND PROTECT THE PLANET IT IS URGENT TO FOCUS ON ENERGY EFFICIENCY IN INDUSTRIAL AND CIVIL ACTIVITIES.

The International Energy Agency (IEA) predicts that by 2040 there will be a worldwide increase in demand for electricity by more than 70%. Much of this demand will come from non-OECD countries, with China in the lead (33%), followed by India (15%), Southeast Asia (9%) and Middle East (6%).

The increase in consumption, as a result, generates a high increase in CO₂ emissions, a tangible risk that could jeopardise the recent agreements reached in the environmental protection field. The only way to avoid all this happening is to focus on policies and energy efficiency technologies, to reduce waste and consumption in compliance with the economic and environmental growth.

The currently available technologies have enabled in 2014 to save over 520 million tons of oil avoiding the emission of 1.5 billion tons of CO₂.

On this, Europe remains a model according to an EU Commission study, should the world apply the requirements implemented in the old continent, the worldwide energy consumption could be reduced by 9%.

**Fieldbus Networks: strategic elements for energy area**

For an efficient communication of energy parameters, the key word to use is "Fieldbus". In recent years, this market has grown and increased its installed base. Fieldbus networks have recorded fast-rising values, with annual growth of around 7%, accounting for 66% of the networks market, thanks to their simplicity, reliability and effectiveness.

**The Green Economy: strong growth in Italy**

With the introduction of Green Economy – an "economic development model that takes into account also the sustainability, or the potential damage to the ecosystem created by the entire cycle of transformation", many Italian companies have changed their policy by adopting models of production with low environmental impact, far more attentive to the new provisions on environmental policies. Approximately 24.5% of Italian business, especially industry and services, has invested in products and technologies linked to the Green Economy.

At the base of the growth of Green Companies, in addition to an obvious environmental advantage, there is also a considerable economic return. Many Italian companies have decided, in recent years, to adopt alternative energy systems, choosing innovative solutions that also generate savings.

**Efficiency Starts by Checking**
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Cannon Automata & EDEA

Anticipating the evolution of the market and abiding to domestic and international laws regulating energy matters, Cannon Automata, a subsidiary of Cannon providing solutions for industrial and process automation for over 35 years, has developed EDEA for the diagnosis of industrial energy use. EDEA is a non-invasive solution, created to meet the needs of energy diagnosis and energy analysis (ISO 50001), which allows to know in detail the consumption of energy, gas and water.

A modular kit, EDEA is suitable to be integrated in buildings and industrial facilities. The solution for energy analysis, that uses RS485 Modbus communication protocol, includes:

- **Energy Analyzer**: in conjunction with the F3 Datalogger allows for precise monitoring of consumption of each plant or production area. The measured quantities of energy are: active, reactive and apparent energy and power, voltage, current, Power Factor, harmonic distortion.

- **Remote Access & Data Gateway Manager**: managing in the same time Energy Analyzer devices installed on site, collects, records and makes data available on EDEA Client Software to enable the analysis by the users.

- **Application Software** allows for an intuitive and easy view of recorded values, consumption graphs and trends.

In the last year this solution has been integrated into different systems operating in the food and pharmaceutical industries, located in northern Italy. The results of the first period are as follows:

- Highlight energy inefficiencies.
- Allows precise allocation of the cost centers on a daily, weekly, monthly and yearly time span.
- Monitoring malfunctions, it allows for predictive maintenance.
- Remote monitoring and data management.
- Consistent with the concept of Green Economy, Green Plant and Smart Factory.
Recalcitrant Pollutants from Refinery Waste Water: Advanced Oxidation Processes (AOP) Tuned by ARTES Ingegneria

Recalcitrant compounds are organic molecules very difficult to be degraded through a biological process. Phenols in particular are the organic constituents in effluents of coal conversion processes, coke ovens, petroleum refineries, phenolic resin manufacturing, plastics, adhesives, steel, aluminium, leather, pulp & paper and petrochemicals.

In particular many refinery processes produce Phenol-rich water as an effluent: catalytic cracking, crude desalting, thermal cracking and catalytic hydro treating.

When Phenols are incorporated in the food chain, they cause relevant environmental troubles since they are toxic, recalcitrant and bio accumulating in organisms. Phenols accumulation in water proved to be toxic for both the flora and fauna, mortal for fishes for concentrations higher than 5 mg/l.

Due to the high toxicity, Phenols are subjected to specific regulations. The European Union considers Phenol a priority substance (EC 1179/94, OJ L131, 26.5.94) under Regulation 793/93 on the evaluation and control of the risks of existing substances.

According to the Italian Law (D.L. 152/99) Phenols shall be limited to less than 0.5 mg/l in treated effluent disposed into surface water. According to the “German Framework Administrative Guideline for Minimum Requirements on the Discharge of Waste Water into Water Bodies” (Rahmen-AbwasserVwV of 1.6.2000) a Phenol index value of ≤0.15 mg/l is set for waste water before mixture with other waste water for the production of hydrocarbons and oil processing.

Phenol ranked 11st place under 129 specific priority chemicals that are considered toxic under the 1977 Amendments to the Clean Water Act and for which the US Environmental Protection Agency (EPA) has issued water quality criteria. In USA the discharge limit is fixed to less than 1 mg/l in the treated effluent.

It is clear that the wastewaters containing Phenols require careful treatment before release into the receiving water sources.

In 2014 ARTES Ingegneria has been awarded the engineering, procurement, shop construction and supervision contract for the effluent treatment and water re-use plant of a refinery on the Caspian Sea.
The overall Refinery Effluent Treatment Plant, whose capacity is higher than 300 m³/h, includes:

- a primary treatment focusing on the removal of free and emulsified oil. The treatment is realized through Corrugated Plates Interceptors (CPs) and Dissolved Air Flotation (DAF);
- the secondary treatment, targeted to re-using the largest share of treated water, implements a biological oxidation unit through Membrane Bioreactor (MBR);
- a tertiary treatment is needed to remove organic residues that resulted efficient in the Phenol compounds removal.

The request of very long times for Phenols degradation by conventional treatments affects the adoption of huge reactor volumes, having a negative impact on capital (CAPEX) and operative (OPEX) processing related costs. For this reason the application of an Advanced Oxidation Process has been developed to comply with the strict request of Phenols removal till less than 1 ppb by the Caspian Refinery.

**Advanced Oxidation Process (AOP)***

AOPs treatments – a promising technology for the degradation of refractory chemical pollutants – are based on a pollutants degradation mechanism which consists in the production of intermediate hydroxyl radicals. These are very reactive species that are continuously generated and able to react in a quick and non-selective manner with the most part of water chemical pollutants.

The organic compounds are transformed by the hydroxyl radical in the right moment in which it is produced and, consequently, the effluent is degraded to other intermediate products.

**Major AOP processes are:** UV irradiation, Ozone, Ozone in combination with UV or with Hydrogen Peroxide, Hydrogen Peroxide in combination with UV, Fenton and Fenton-like reactions.

AOP process have two main advantages:

- **efficient destruction of pollutants, in particular those recalcitrant to conventional treatments (pesticides, chlorinated solvents)**
- **alternative process to mass-transfer treatments** where pollutant is transferred from liquid phase to solid (like adsorption on activated carbons) or liquid one (stripping).

Among the Advanced Oxidation Processes (AOP), ARTES decided to investigate two treatments:

- the use of **Hydrogen Peroxide with UV light**
- the use of **Hydrogen Peroxide with a liquid catalyst**

The other AOP treatments were not eligible: with UV irradiation alone is not possible to reach the 1 ppb limit requested by the customer, the Ozone-based technology is very energy-consuming and critical for safety issues, Fenton reaction produces sewage sludge to be disposed of.

In the first case the ultraviolet radiation is used to cleave the O–O bond in Hydrogen Peroxide and generate the hydroxyl radical.

In the second case a mixture of Ferrous catalyst and Hydrogen Peroxide (oxidizing agent), can be considered as a powerful oxidant for organic contaminants. The two treatments were first analysed in terms of degradation kinetics: the first at different H₂O₂/catalyst concentrations and the second considering the ratio reactions time/UV radiation energy.

In addition, the treatments were compared in terms of both CAPEX and OPEX costs. Even though shorter reaction times are requested by applying H₂O₂ + UV light (some seconds) than by applying H₂O₂ + Catalyst (some minutes), the latter allows both lower CAPEX and OPEX.

The results showed that the reaction time necessary for the degradation of Phenols below 1 ppb in the case of H₂O₂ + UV light is lower than in the case of treatment using liquid catalyst at parity of Hydrogen Peroxide concentration. On the other side the process implying UV light is much more expensive because of the high energy costs associated with the UV light and the need of frequent replacement of UV lamps.

For this reason, the treatment with Hydrogen Peroxide and liquid catalyst was implemented in the industrial scale up to the Caspian project conditions: once selected the best AOP treatment and optimized in terms of operative conditions, the Advanced Oxidation Process basin was adopted as tertiary treatment in the integrated wastewater treatment.

Lower treatment times were requested at the highest concentration of both the reagents (H₂O₂ = 100 ppm, liquid catalyst = 1.7 mLSM/l) but in order to reduce Hydrogen Peroxide consumption, the condition of 50 ppm of H₂O₂ and 1.7 mLSM/l of catalyst were used as optimum.

The scale-up to the real waste water flow of the Caspian Refinery drove to the design and construction of a 600 m³ AOP basin capable to guarantee the respect of the 1 ppb Phenols limitation with a 300m³/h flow rate and a residence time of 120 minutes.

An atmospheric cylindrical, continuously-stirred reactor hosts the reaction.

ARTES Ingegneria solution was really appreciated by the customer that, thanks to the optimized kinetics and a shorter degradation time, benefited from a significant reduction of the investment and operating costs in comparison to a conventional treatment complying the same limitations.
Food for the World: BONO Contributes with Efficient Solutions

ENERGY AND WATER ARE TWO MAJOR COMPONENTS IN ANY KIND OF FOOD PROCESSING ACTIVITY. OPTIMISING THEIR UTILISATION ALLOWS FOR A SUBSTANTIAL REDUCTION OF THE ENVIRONMENTAL IMPACT OF THIS INDUSTRY AND CONTRIBUTES TO A COST REDUCTION WELCOMED BY THE FINAL USERS.

THE CANNON COMPANIES ACTIVE IN ENERGY PRODUCTION AND WATER TREATMENT TECHNOLOGIES ARE SIGNIFICANTLY GROWING THEIR PRESENCE IN THIS FUNDAMENTAL SECTOR OF THE INDUSTRY, WITH NEW PRESTIGIOUS REFERENCES ACHIEVED AROUND THE WORLD.

BONO Energia and ARTES Ingegneria, the two Cannon Companies dealing with thermal energy production and water treatment technologies, have been deeply involved in food and beverage production processes since the very early years of their activity, more than half a century ago. A great deal of experience has been accumulated and the needs of the food processing industry are well known and shared by the specialists dealing with thermal energy production and water purification. The growing environmental problems related with gas emissions, use of non-renewable fossil fuels and water scarcity have in the meantime compounded the activities of food and drinks, all over the world. BONO Energia and ARTES Ingegneria have defined a number of efficient technologies to help the food industry in this challenging environment, and more significant references have been recently collected in various countries.

**HE-SMART® the new frontier of Energy Efficiency**

An innovative fire-tube boiler, the new HE-SMART® steam generator by BONO ENERGIA, brings triple innovation to the world of industrial boilers, offering a new series oriented to saving energy, simplifying process control and maintaining safety of the plant.

This innovative steam boiler guarantees:
- Thermal efficiency up to 98%
- Reduction of NOx emissions
- Reduction up to 13% in fuel consumption
- Reduction up to 40% in electric consumption
- More safety
- Easy management of a “not supervised” plant

Several customers of the food and beverage sector have already chosen this new solution and are fully satisfied with it. On one hand, they have been able to verify a real saving on their bills, and on the other hand they have obtained significant funding (“White Certificates” in Italy) granted against proven efficiency only.

**Sugar, a speciality of Cristal Union in France**

Cristal Union, a cooperative representing about 40% of beet production in France (www.cristal-union.fr), average today an annual production of 1,500,000 tonnes of sugar, 550 million litres of alcohol/ethanol and 190,000 tonnes of pellets from beet and alfalfa pulp. For one of their sugar factories in Erstein, near Colmar in Alsace, they recently replaced an old water tube steam generator with a new BONO SG 2200 fire tube boiler.

Designed by the Industrial Division of BONO Energia in HE-SMART configuration, this natural-gas boiler features a 20 t/h steam production (at 12 bar pressure) capacity, with a certified 97% (+/- 0.5%) efficiency and very low emissions.

A special burner, inserted in an efficient BONO combustion solution and combined with an OptiSpark electronic control, guarantee a level of emitted NOx of 70 mg/Nm³. A double heat recovery system and an inverter control on the fan contribute to increase the efficiency and decrease the electric consumption of this boiler, which is used as hot back-up machine for a large water tube boiler.

Some larger BONO boilers have been sold to sugar production factories in France.
Large co-generation thermal plants have been supplied by BONO Energia to the major French sugar processors.

These huge machines are designed for the same end use: production of electricity (through a turbine fed by the first pressurised steam) and of heat for sugar process (with the steam leaving the turbines). Featuring a steam output capacity up to 90 t/h, these large CTD-type water tube boilers are rated for a maximum operating pressure 75 bars, generating superheated steam at temperatures up to 490 °C. Their huge size (up to 6 by 13 by 12 meters) involved the erection-on-site working method, fully executed by the Engineering Division of BONO Energia.

The most recent installations have been made in southern Italy. Princes in Foggia

Featuring one large pre-heater for the feed water, two energy recovery banks on the exhaust fumes and four natural gas burners, the newest CTD boiler guarantees an efficiency of 97% and NOx emissions of less than 50 mg/Nm³

A special feeling for tomatoes!
Tomato processing, in recent decades, has been a speciality of the Mediterranean basin. Canned as peeled fruit – the famous Pelato San Marzano – or concentrated, in purée and in sauce, tomato as a food originated in Mexico, and spread throughout the world following the Spanish colonization of Americas in the 16th century. Now extensively cultivated in Italy, Spain, North Africa and – where else? – in China, tomato requires highly automated processing plants to assure high output during the short production campaign.
A lot of steam is requested to initially peel the fruits, to cook them and, later, to sterilise the canned product: the cost of Methane used for the steam generators sometimes equals that of the raw material!
BONO Energia is an historical supplier of steam boilers dedicated to this industry, with hundreds of machines installed in several countries.
Also for this process the HE-SMART® machine has proven to be the most affordable steam generator of its category.

Pedrignano plant near Parma the second steam generator from BONO Energia.

Perfect temperature control must be assured to the large equipment that extrudes their 1,000 tons of pasta daily! The technical management of Barilla were satisfied by the performances of the first BONO boiler, installed in 2013: the thermal efficiency, that had been targeted at 94.5%, was easily increased beyond 96%. Emissions into the atmosphere, set to stay within 100 mg/Nm³, are confirmed to stay constantly way below that threshold, which allows them to look with confidence to future possible tighter limits.

When an older water-tube steam boiler reached
Pasta, an Italian speciality
Traditional Italian pasta is made with coarsely ground semolina flour, which is milled from durum wheat, a hard wheat that is high in the protein gluten, which gives this flour more elasticity and strength.

A world leader in pasta production, Barilla (www.barilla.com) will soon install in their Pedrignano plant near Parma the second steam generator from BONO Energia.

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When an older water-tube steam boiler reached its end of life, the decision was easy: a second BONO Energia high efficiency SG 2500 unit was the best candidate for its replacement. Ordered in spring 2016, it will be installed during summer holidays this year. As the first, it will be an earthquake-proof boiler, totally covered by PED Certificate. Its fumes recirculation system, the large air pre-heater, the Low-NOx burner and the OptiSpark electronic system are perfectly interacting to ensure brilliant results.

Energy Efficiency for Climatisation of Huge Volumes
ENERGY EFFICIENCY HAS BECOME A PRIORITY ALSO FOR THE TERTIARY SECTOR OF THE ECONOMY.
THE MANAGEMENT OF A MAJOR ITALIAN FAIRGROUND DECIDED TO Rely ON BONO ENERGIA FOR THE HEATING SYSTEM OF THEIR VAST EXHIBITION HALLS, CHOOSING A WELL-BALANCED COMBINATION OF NEW GENERATORS AND REVAMPED EXISTING ONES.

Two BONO CT17 water tube boilers will be added to two existing ones, which have been refurbished and modernised, to supply the thermal energy required to temperature-condition the large exhibition halls of a major fairground located in Emilia, Italy.

The new boilers, rated 12 thermal MW, have a potential of 17 t/h of saturated steam and will burn Methane. As well as the two revamped existing ones they have been fitted with energy-saving devices to increase efficiency:

- An economiser installed on the stack exploits the heat of exhaust fumes, preheating the feed water.
- Electronic inverters installed on all motors adapt the speed of fans and pumps to the actual workload, limiting the energy consumption to the real needs.
- The OptiSpark F3 control systems manage the boilers, allowing for the optimisation of their use through a steam loading sharing control system.

The four units can be safely ran without the supervision of an operator for a time period of up to 72 hours, contributing to the reduction of running costs.

The proposed solution will lead to a reduced energy consumption and to lower emissions of Nitrogen oxides (NOx), and also permits the awarding of energy-efficiency titles (TEE, the Italian White Certificates).

Wine and Essences, proudly made in Italy
The Cusumano brothers (www.cusumano.it) own several wineries in Sicily, home of a very peculiar breed of superior wines. For one of their plants they have commissioned to BONO Energia the supply of an HE-SMART® generator with a steam capacity of 8 t/h, used for process and bottler sterilisation.

Simone Gatto, (www.simonegatto.it) a well-known manufacturers of natural essential oils near Messina, Sicily, recently purchased a HE-SMART® for their distillation plant, where the precious Calabrian bergamots’ essence is produced together with Sicilian mandarin’s, sweet blond orange’s and lemon’s essential oils.

Cargill, since 150 years provides food, agriculture, financial and industrial products and services to the world. With 149,000 employees in 70 countries they are committed to feeding the world in a responsible way, reducing environmental impact and improving the communities where they live and work. For the Milazzo plant, in Sicily, where they produce Pectine from local citrus fruits, Cargill Italia replaced an obsolete oil heater with a modern HE-SMART® 1500, which guarantees efficient production of steam with a very limited footprint and gas emissions.
A new CEO for BONO Energia

VLADIMIRO LURAGHI HAS BEEN APPOINTED CEO OF BONO ENERGIA ON MAY 18, 2016.

Vladimiro Lunaghi, 65 years, holds a Degree in Chemical Engineering obtained in 1975 from the Politecnico of Milano. After having matured a significant professional experience with Breda Termomeccanica and Ansaldo as designer of large thermal plants, he joined BONO in 1990. Working as Technical Director of BONO Energia since 1994 he significantly contributed to the definition of the new product range that allowed the company to reach a leading position in the European market of medium-large steam generators and thermal fluid heaters.

Marco Volpato, CEO of the Cannon Group, announced this appointment commenting: “Vladimiro Luraghi has a profound knowledge of the product, of the market and of his people. He is estimated by the clients for its technical capabilities and is able to motivate his employees very effectively. He is the ideal leader for BONO Energia, for a growth that, in the years to come, is more and more linked to increasingly stringent market requests of energy efficiency and respect for the environment.”

Vladimiro Luraghi commented his appointment stating: “I do not hide my satisfaction for this new assignment and for the opportunity that I have been given to continue to contribute, from a different perspective, to the construction of the future success of BONO Energia. The company has a solid base and unique strengths that make it well-equipped to face the challenges coming from an increasingly competitive and globalised market: a long recognized experience in the field, a great ability to compete and to innovate, an enviable human capital of dedication and professionalism. Not forgetting that it belongs to an international Group that can facilitate our access to foreign markets. Of course we still have some weak points to be corrected, and I think that our priorities are clear: continuity in innovation, a quality mind, a method, growth. We’ll be able to attain these targets only with a strong, determined personal commitment, each of us in his own role, and with the consciousness that the achievement of any goal is possible if you pursue collaboration and unity of purpose.”

Energy Efficient Electric Cars “Made in China”

CANNON IS PROUD TO ANNOUNCE THAT IT HAS BEEN AWARDED OF A VERY SIGNIFICANT ORDER FROM THE CHINESE COMPANY KANDE COMPOSITES CO. LTD. FOR HIGH VOLUME PRODUCTION OF CARBON FIBER BASED COMPOSITE PARTS MADE WITH HP-RTM (HIGH PRESSURE RESIN TRANSFER MOLDING) TECHNOLOGY.

The project is finalized to the production of lightweight Composite parts for new electric cars to be made in China. A government plan, aimed at the reduction of emissions from the transportation sector, foresee the manufacture of five million electric cars by 2020.

Kangde Composites Co. Ltd., a member of the Kangde Investment Group – producers of film laminates for packaging, optical industry and decorations – is going to invest in technology and equipment to manufacture the wide range of CFRC (Carbon Fiber Reinforced Composites) parts required to provide the necessary energy efficiency to these cars.

The contract is covering a whole range of technologies and equipment:
- Carbon fiber stacks production (with dedicated nesting software to optimize Carbon fiber yield and minimize handling),
- Carbon fiber stacks preforming system,
- HP-RTM (High Pressure Resin Transfer Molding) and LLD (Liquid Lay Down) production cells.

Delivery and installation of the large Cannon HP-RTM molding plants is foreseen within 2016.
The New Competitive BONO Boiler: an International Success!

THE NEW FT STEAM-MATIC, A MID-RANGE FIRE TUBE BOILER, HAS ALREADY FOUND ITS PLACE IN HIGHLY DEMANDING AND COMPETITIVE INTERNATIONAL MARKETS.

Finding the right compromise between price and quality has always been the real issue of customers. Moreover, talking about highly competitive markets, this issue becomes a nightmare. In these markets, price is king; competition is only about how much it can be saved, taking quality and performance for granted.

BONO Energia has always been attentive to market needs: marketing studies highlight the necessity of having new products that can fulfill customer needs of a good balance between economic value and boiler performance, especially in new markets. For example, Asia Pacific markets—such as Indonesia—have experienced growth in industrial boilers demand, but are characterised by high competitiveness and low price. Following a new strategy fostered by a strong attitude to internationalisation, BONO Energia has launched in late 2015 a new fire-tube steam boiler: the FT Steam-Matic.

The newest member of BONO Energia boilers is a fire tube steam boiler: two-pass dry back type, horizontal design, fully packaged and complete with all the necessary control and safety devices. The FT boilers are available from 1 t/h to 6 t/h steam capacity, with a design pressure of 12 bar (maximum operating pressure 10 bar) and an efficiency level range up to 93%.

FT Steam-Matic - Significant Advantages
The FT Steam-Matic is the result of a consistent engineering design offering a competitive price and a high-quality product.

The two-passes design ensures greater reliability, a longer lifespan, as well as higher real returns, than the current reverse flame technology offered by competitors in the same market segment. Compared with other mid-range competing models that offer an aluminium casing, the FT boasts a stainless steel cladding and high-level accessories, especially concerning safety and controls. Moreover the FT is compatible with all the burners available on the market.

Targeting international markets, high care was given to the ease of transport: the FT design allows containerised transportation in most cases, making it time and cost effective.

A commercial success
In 2016 many customers have already trusted the new FT boilers: more than 26 boilers have been sold all around the world! Among them: 6 in Indonesia and 3 in Pakistan; 4 in the USA and 2 in Colombia; 4 in South Africa and 2 in France.

The FT boiler has found its application mainly in the Food & Beverage and in the Textile industry: among them two important food processing manufacturer have chosen the FT (one for the production of yeast and the other for beverage), a leading pharma-chemical/chemical company and two renowned textile manufacturers.

The FT boilers are available from 1 t/h to 6 t/h steam capacity, with a design pressure of 12 bar (maximum operating pressure 10 bar) and an efficiency level range up to 93%.
Cannon Opens in Indonesia with Success for BONO Boilers

Indonesia is rich in natural resources: forestry products, rubber, coffee, tea, tin, nickel, copper, bauxite, gold, palm products and fish make important contributions to export earnings. Approximately 90% of the population is engaged in agriculture. In recent years a number of steps have been taken to promote and stimulate non-oil exports, which include handicrafts, textiles, precious metals, tea, tobacco, cement, fertilizers as well as manufactured goods. To attract foreign capital, certain incentives are provided, especially in the less developed regions of the country, and new employment opportunities are created for the country’s growing labour force. Tourism is steadily gaining ground and is emerging as major foreign exchange earner for the country.

Welcome to Cannon Far East Indonesia!
The growth of business and the need to stay as close as possible to such a vast and expanding market convinced the Cannon management to invest resources in a local office, which has been opened in spring 2016. Based in Jakarta, the country capital, the Cannon Far East Indonesia office is under the responsibility of Chandra Prawira who reports to his Singapore-based management. The office is in charge of marketing and servicing all the Cannon Group lines of products in Indonesia. Several contracts have been recently awarded to Cannon, directly or through the local Agent TWA for thermal plants as well as for water treatment applications, from large multinational and domestic corporations.

Heinz ABC
Since 1999 PT Heinz ABC is the largest Heinz business in Asia and one of the largest globally, with over 3,000 employees, three factories (for sauces, condiments, juices and syrups), eight contract packers and an extensive distribution network. For one of their processing plants they awarded BONO Energia with the supply of a Steam-Matic heat recovery boiler for the production of 700 kg/h of steam at 10 bar rated pressure. The boiler recovers the latent heat from available hot fumes: it is one of the first examples of a new line of small BONO HRSG (Heat Recovery Steam Generators).

Orang Tua Group
One brewery belonging to the large Indonesian OT Group – whose products, ranging from food and beverages to personal care products, have since long been part of life for Indonesian consumers – recently ordered to BONO Energia’s local Agent TWA two Steam-Matic 500 units, able to burn natural gas or diesel fuel. These boilers produce 5 t/h of steam at 10 bar, with the help of a heat recovery system mounted on the exhaust fumes circuit. An OptiSpark electronic control drives the combustion system, self-adjusting the burner in accordance with the requested load and of the measured emissions.
Pirelli
The fifth world producer of tires has recently ordered to ARTES Ingegneria a large Waste Water Treatment Plant for their new motorcycle tires factory in Bali. Read more in the next page!

Inti Everspring
Established in 1990, PT Inti Everspring Indonesia (IEI) is a pioneer in crop protection products and one of the major players in agro-chemical industry in Indonesia. Their manufacturing facility has been awarded to comply with world standard and credited with ISO 9001:2008. The business currently involves herbicides, fungicides, insecticides, and fertilizers and their corporate target is to be the leader of agrochemical industry in Indonesia.

For one of their chemical reactors IEI required high-temperature fluid, that will be now supplied by one OMV 1000, a multi-tubular oil heater rated one Million Kcalories/h, supplied and customised by TWA.

Waskita Karya
Founded in 1961, Waskita Karya is an Indonesian development company located in Cawang, Jakarta, specialised in commercial and residential building contracts. A major constructor working in environments that are sometimes critical for the correct curing of concrete, they have recently awarded TWA with a contract for two complete packages for the maturation of concrete in the formwork, the temporary or permanent moulds into which concrete, reinforced with steel bars, is poured. BONO Energia supplied two Steam-Matic fire tube boilers, with a rated output of 3 and 5 tons/h of steam, that have been customised by TWA for this very specific process.

Amcor Tobacco
Amcor, a global leader in packaging solutions, supply a broad range of rigid and flexible packaging products to food, beverage, healthcare, home and personal care and tobacco packaging industries. Its 29,000 employees work in more than 180 sites in 40 countries, generating sales for US$ 10 billion. Their business produces a wide range of packaging for consumer products, including carbonated soft drinks, water, juices, sports drinks, spirits, wine and beer, sauces, dressings, spreads, pharmaceuticals and plastic caps for beverage applications. For one of their cigarette packing plants in Indonesia Amcor have recently commanded one containerised OMV 1250 oil heater to BONO Energia. Characterised by a thermal capacity of 1.25 Million Kcal/h this oil oven provides the heat required by the coupling process of the shrinkable plastic foil with the cigarette carton box. A very compact, handy solution, this OMV machine can be easily transported throughout various production halls without wasting time in installation and pipe-fitting work.

Sandrafine Garments
Headquartered in Jakarta, Sandrafine Garment is a leading manufacturer of woven shirts for men and women. Grown from a small garment factory established in 1978 to a factory of 13,500 square meters of manufacturing space, with 1,200 sets of sewing machines and 2,000 highly trained production employees, Sandrafine Garment produces middle to high-end international branded apparel to customers worldwide including USA and Europe.

Their large ironing system requires a lot of steam on a constant basis, since their production cycle is continuous. A new Steam-Matic 100 will soon supply 1 t/h of steam for the process, providing significant savings in running costs, due to the high thermal efficiency guaranteed, and a low level of emissions in the atmosphere, a very touchy argument in a country where the quality of air is often jeopardised by large forest fires and the fumes of the growing industry.

CANNON ARTES Facing Major Water Problems in Indonesia

Even though Indonesian water resources account for almost 6% of the world water resources or about 21% total water resources in the Asia Pacific region, clean water is becoming a serious problem in Indonesia. According to an ongoing study by the World Bank, water consumption in Indonesia has increased significantly, starting from 156,000 million m³ per annum in 2000 to 356,575 million m³ per annum in 2015 and the availability of clean water in term of quantity tends to decrease due to environmental degradation and pollution.

While Indonesia expects to benefit from China’s shift away from low-cost manufacturing and to expand the internal value-added industrial sector, water availability will continue to be an underlying constraint that must be overcome. Indonesia is not a water-scarce nation: having more than 2 trillion cubic meters of internal natural renewable water resources per year it would be able to assure roughly 8,000 cubic meters to every person annually. However, the nature of the island nation does not allow for an equable distribution of the resource. Water is not evenly distributed between all of the islands, and its availability does not
correspond with population distribution. Failure to expand and modernise the water distribution infrastructure will prevent Indonesia’s potential for future economic growth. In addition to water scarcity, the pollution of the available resource compounds the problem. More than from domestic use, water pollution derives from industrial activities such as small scale industries, agriculture, textile, pulp and paper, petrochemical, mining, oil and gas. The metal smelting process – one of the industries that Indonesia, rich in Nickel, Bauxite, Tin, Copper and Gold, seeks to develop – consumes and pollutes large amounts of water. For these reasons the Indonesian government is using educational campaigns to raise awareness of the dangers of unsafe water and to change the way of using industrial water. ARTES Ingegneria has developed specific technologies for the process and purification of primary water required for the process and for contaminated water treatment before reuse or discharge. Industrial and Food & Beverage sectors played an important role to expand ARTES Ingegneria in the Asian country.

Pirelli

Pirelli, fifth world producer of tires, has recently decided to expand their market share in a number of countries, including Indonesia, a nation characterised by a steady market growth for cars and motorcycles. Through PT Evoluzione Tyres (a Joint Venture between Pirelli and Astra Otoparts, national leader in the automotive sector) a new factory specialised in motorcycle tires has been created in Subang. ARTES Ingegneria know-how and expertise in industrial water treatment for both feed and discharge flows appealed and convinced Pirelli’s management to “Go Green” in their new Indonesian factory, where a waste water treatment plant (WWTP) is a central element to avoid water pollution, a very sensitive problem for the country.

ARTES Ingegneria focused on the technological part while providing the overall process design and the detailed engineering of the mounted units: prefabrication of the critical equipment is made at ARTES factory near Salerno, Italy. The WWTP is designed to treat all the liquid streams coming from the tires production plant, rainwater included. The goal of supply, on a turn-key basis, includes civil work, delivery of mechanical and electrical components, assembly on site and commissioning. Two different lifting pits have been realized, one for the domestic wastewater and one for the industrial. The second stream is treated with an oil skimmer for oil removal and it’s mixed later in one equalization pit with the domestic effluent. The equalized flow goes to the heart of the treatment, the Biological Activated Sludge process, carried out into two modular Biodar units. The two-modules design guarantees to the plant an high flexibility. The effluent coming from the biological step is disinfected with Sodium Hypochlorite in a dedicated tank and reaches later the final polishing through sand and activated carbon filters. The sludge produced during the biological process is treated in a dedicated line, composed of a stabilization pit, chemical conditioning and final sludge dewatering. The WWTP has an overall capacity of 20 m³/h, but capacity is not the only requirement to achieve the stringent limitations on the effluent characteristics: after the treatment, water irrigates crop fields around the factory or is re-utilised for industrial application. Due to the high quality standard achieved in this WWTP in Subang, Indonesian authorities asked Pirelli the authorisation to invite several local entrepreneurs to show them how to implement a WWT system in their factories.

Diageo

Due to the unbalanced availability and to a diffused high level of pollution, the issue of water treatment becomes more significant day by day also for the food and beverage sector in Indonesia. ARTES Ingegneria has challenged its own limits in order to realize a new WWTP for the Indonesian factory of Diageo, a global leader in alcohol beverage. Holding iconic brands in the food and beverage sector in Indonesia, ARTES Ingegneria offered a 100% tailored solution: the footprint of the plant has been optimised to the tight area available in the factory. The inlet wastewater pass through a rotary screen and it is stored in an equalization pit. From this pit it feeds a dissolved air flotation system for the removal of a part of the pollutant and then it reaches the Biological Activated Sludge system (the final step of treatment) based on MBR technology. This technology (one of the most recent in the biological treatment) guarantees very high performance and small footprint of the plant. The scope of supply also includes the sludge treatment with a stabilization and a dewatering unit. To reduce its footprint the plant is built on two levels. All the largest concrete pits are partially located underground and all the processing equipment is positioned on their covers. Managed by a dedicated PLC the plant is fully automatic.

The advantages offered by ARTES Ingegneria solutions are mainly represented by the space optimisation and customisation to high standards that have completely satisfied the customer.
SINCE 2010 MORE THAN 800 T/H OF CANNON BONO ENERGIA’S STEAM HAS BEEN AWARDED BY TWO MAJOR EPC CONTRACTORS FOR RELEVANT PROJECTS IN MIDDLE EAST.

Kuwait
Kuwait’s Lower Fars Heavy Crude Oil Scheme is expected to be one of the largest and most ambitious upstream projects of the Middle East, contributing to the 2020 Kuwait crude oil production goal of 4 million barrels per day. PETROFAC has been appointed, in consortium with CCC (Consolidated Contractors Company), by the Kuwait Oil Company as the EPC contractor for the Lower Fars Heavy Oil Development Program Phase I, that comprises of two well blocks designed to process 60,000 BOPD of heavy oil. For this project Petrofac has been recognised as the “EPC contractor of the year” in Kuwait.

The central processing facility of the oil field will host two 90 t/h water tube boilers designed and manufactured by BONO Energia in Peschiera Borromeo’s (Milan) premises. BONO Energia collaborated with PETROFAC in other projects supplying:
- two 40 t/h water tube boilers for Badra Oilfield–Iraq
- three 70 t/h water tube boilers for Turkmengas, the state-owned gas company in Turkmenistan
- three 45 t/h water tube boilers for the acid gas removal and sulphur recovery plant in Mesaieed run by Qatar Petroleum.

UAE
The first oil from Al Nasr oil field, located at 130 km northwest of Abu Dhabi, was produced in January 2015 concluding the Phase I development.

The Nasr Phase II Full Field Development Project, aimed at increasing the field’s oil production capacity to 65,000 barrels per day from the existing capacity of 22,000, is underway and the commissioning phase is foreseen in 2019.

The crude oil will be stored in Das Island for next oversea shipment; as a consequence the storage capacity of the hub is going to be increased: for this reason CCC – Consolidated Contractors Company – has awarded BONO Energia a superheated 68 t/h steam generator that will work in parallel to the twin boiler already in operation, to supply the crude oil storage plant with heat. The two boilers fully comply with the strict sour service requirements, since the combustion system is fed by high rate of sulphur process gasses. CCC, key EPC contractor operating in the Persian Gulf, trusts BONO Energia since the development of the sulphur station they carried out at Shah Gas Field, within that project three 20 t/h superheated steam boilers had been supplied.
### District Heating Projects in China: Italian Technology Lead the Way

**A SINO-ITALIAN ENERGY FORUM FOCUSED ON DISTRICT HEATING TECHNOLOGIES HAS BEEN HELD IN BEIJING ON APRIL 8, 2016.**

**THE CANNON GROUP’S COMPANIES ACTIVE IN THE FIELD OF ENERGY PRODUCTION WERE INVITED TO PRESENT THEIR LATEST EXPERIENCES AND ACHIEVEMENTS IN THIS HIGHLY TOPICAL THEME.**

Organised by a group of Italian multi-utility companies – IREN, UTILITALIA, A2A and HERA – in cooperation with the Chinese District Heating Association (CDHA) and under the patronage of the Italian and the Chinese ministries of the environment, the Italian foreign minister and the Italian embassy in Beijing, the forum conveyed to a panel of Chinese municipal multi-utility companies the Italian state-of-the-art solutions and technologies for the centralised production of heat and its capillary distribution in highly-populated urban areas.

The meeting, held with a full-day program in the Chinese District Heating Association’s main offices, has been attended by more than 200 local specialists and administrators managing the environmental and economic aspects of the Chinese town’s heating systems. After a formal and diplomatic morning session, during which the political and environmental matters have been detailed and discussed among the participants, the meeting has dealt in the afternoon with the technical aspects of the problem. The environmental challenge posed by the current and future Chinese Five-Years Plans, the commitments made by the Chinese government at the recent Paris Climate Change Forum and the positive contribution that district heating and cogeneration can provide have been analysed.

The Italian and Chinese District Heating systems currently in operation have been illustrated by the multi-utility companies invited to the meeting, presenting advantages and problems encountered during more than 20 years of operations. During the focus session dedicated to the Italian technologies in district heating and environmental sectors, BONO Energia and BONO Sistemi – the Cannon Group’s Companies dedicated to the production of Energy and the use of renewable fuels – have illustrated a number of experiences acquired in the past 25 years of activity in this strategic niche of the Energy business.

Backed by prestigious references in Italy, France, Russia and other European countries, the two Cannon Companies have presented the technical solutions able to provide the best balance between operating costs and user’s comfort in a distributed-heating urban network.

A round-table panel among the representatives of local authorities, associations and suppliers of technologies allowed the participants to interact with the speakers and to better understand options and problems linked with the use of district heating systems in Chinese urban configurations with specific living habits.

The meeting gave the opportunity to **sign a co-operation protocol** between the Italian and Chinese District Heating Associations, to promote at competitive conditions the use of Italian technologies for the implementation of municipal district heating networks in China.
LEARNING TO SKIP THE SNOOZE BUTTON AND BECOME A MORNING PERSON IS A TOUGH TASK ALL OVER THE WORLD. FOR MOST NIGHT OWLS THE THOUGHT OF BEING A MORNING RUNNER SOUNDS LIKE A NIGHTMARE, BUT NOT FOR THE CANNON RUNNING GROUP, THAT TAKES ACTIVE PART EVERY YEAR TO THE “5.30 RUN” IN MILAN!

Yawns, dreams and fluffy blankets were blown far away by smiles, running shoes, GPS watches and bib numbers at 5.30 am.

Also this year 18 morning runners from Cannon BONO have challenged the 2016 World Tour 5.30 Run (www.run530.com), a 5 Km run which took place in the heart of Milan, Italy, on Friday May 20, a normal day week. These short-distance runners joined this special charitable event in order to promote the importance of active living and healthy eating within the daily rush routine. Part of the inscription fees went to local charity associations and to projects promoting citizen’s sport activities.

Following the post-race, where fresh fruits were delivered to the athletes, Cannon running group backed to work, after a restoring shower!
Stay tuned for other special events!

Meet Us @...

POWER GEN Europe - Milan, Italy
21-23 June, 2016 - Energy

MC4 - Bologna, Italy
23 June, 2016 - Electronic Controls

UTECH ASIA-PU CHINA - Shanghai, China
2-4 August, 2016 - Polyurethanes

CPI Conference - Baltimore, MD, USA
26-28 September, 2016 - Polyurethanes

KIOGE - Almaty, Kazakhstan
4-7 October, 2016 - Energy & Water for Oil&Gas

AGRO PROD MASH - Moscow, Russia
10-14 October, 2016 - Energy for Agriculture

HEATEC/BOILERS - Shanghai, China
11-13 October, 2016 - Energy for Heating

K 2016 - Duesseldorf, Germany
19-26 October, 2016 - Plastics Technologies

ADIPEC - Abu Dhabi, UAE
7-10 November, 2016 - Energy & Water for Oil&Gas

YUGAGRO - Krasnodar, Russia
22-25 November, 2016 - Energy & Water for Agriculture

COMPOSITES EUROPE - Duesseldorf, Germany
29/11-1/12, 2016 - Composites

POLLUTEC - Lyon, France
29/11-2/12, 2016 - Water & Environmental Technologies

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Stay tuned for other special events!
Cannon BONO Energia since 1958 designs, manufactures and installs industrial boilers for standard and special applications.

Its innovative combustion systems provide high thermal efficiency and reduced NOx emissions, lowering the environmental footprint of thermal plants.

Validated by the World's most important certification bodies, BONO Energia steam generators and thermal fluid heaters are designed and built for a long-lasting, resource efficient and simplified operation.

Choose BONO: Innovative Boilers for a Better Environment!

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