SAICA

PROPOSED PROJECT FOR THE PLANT FOR THE ENERGY-RELATED UTILIZATION OF NONHAZARDOUS INDUSTRIAL WASTES EL BURGO DE EBRO (ZARAGOZA)

NONTECHNICAL SUMMARY

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SAICA

1. Introduction and background

The firm known as Sociedad Anónima Industrias Celulosa Aragonesa (SAICA), CIF number A-50002567, and headquartered on Avenida San Juan de la Peña, 144, 50.015, Zaragoza, intends to construct and operate a plant for the energy-related utilization of nonhazardous wastes generated at its four centres of production, situated in Zaragoza and El Burgo de Ebro. The new facilities will be located in the vicinity of SAICA's production centre in El Burgo de Ebro (Zaragoza).

The proposed plant for the energy-related utilization of nonhazardous industrial wastes, whose construction is planned at the Municipal Terminal of El Burgo de Ebro (Zaragoza), is envisaged (by virtue of its topology) as an operation which should be subject to integrated environmental authorization as established in Law 7/2006 of June 22, 2006, on Environmental Protection for Aragón.

This facility will be capable of developing the wastes generated in the paper manufacturing process, as well as all the wastes generated by the plant for treatment process water from SAICA's four production centres: SAICA 1, SAICA 2, SAICA 3, and SAICA 4.

The fluid bed technology on which this facility is faced is currently the most appropriate technology for the development of wastes from this plant.

This document is being prepared with the aim of summarizing all the processes and installations that are going to form part of the plant in question, and which have already been described in greater detail in the basic project which is attached as a document separate from this summary.

2. Wastes to be processed

To ensure proper management of industrial wastes generated by the paper industry, provision is accordingly being made for this proposal, which entails the “design, construction, and operation of a plant for the energy-related utilization of nonhazardous industrial wastes generated by SAICA.” This proposal encompasses all the steps in the development of the project, ranging from its design and construction through to its management, including an Environmental Surveillance Plan (Plan de Vigilancia Ambiental (PVA)).

Broadly speaking, the wastes generated at the factories of El Burgo and Zaragoza are attributable to impurities in the recovered paper which is used as raw material. The wastes to be processed are classified into the following groups:

- ➔ Rejects from pulping: EWC 030307

These wastes are those separated during the stage at which the recovered paper disintegrates in the pulping and in the subsequent purification equipment for the pulp preparation process. These wastes primarily consist of scraps of fibres, paper, cardboard, plastics, etc. which accompany the recovered paper.

- ➔ Rope residue

Rope residue has the same EWC (030307) as rejects from pulping and its composition is highly similar; it is distinguished from pulping rejects by its appearance.

Rope residue has an appearance similar that of a rope of some 50 cm in diameter and is primarily comprised of scraps of plastics, film, and wire generated from the paper packing process.

- ➔ Sand: EWC 030310

Sands are wastes generated at the pulp purification stages, prior to the stage at which the feedstock is fed into to the paper machines. Sands are comprised of short fibres of cellulose, sand, and a fraction of small inert materials.

- ➔ Sludge: EWC 030311

Sludge is waste generated at the process water treatment plant and consists of a mix of primary and biological sludge. This sludge contains fibres that are by-products of the process.

The energy-related utilization operation is to be regarded as taking precedence over mere dumping, as required by the framework of waste management laws and regulations, inasmuch as simply dumping such wastes into spillways is inefficient, given that the use of energy-related enhancement processes in some cases avoids the consumption of fossil fuels and typically generates fewer greenhouse gas emissions. Furthermore, energy-related utilization using fluid bed technology is envisioned as a Best Available Technology (BAT) for the processing of wastes in the technical documents (BREF) dedicated to the paper and pulp industry.

The wastes that are to be managed using the new facility are the ones indicated below. In classifying these wastes, we have used Royal Decree 952/97 and Ministerial Order MAM/304/2002 updating the European Waste Catalogue (EWC), maintaining nonhazardous status.

EWC Code	Description
03	Wastes from wood processing and the production of paper, cardboard, pulp, panels, and furniture
0303	Wastes from pulp, paper and cardboard production and processing
030307	Mechanically separated rejects from pulping of waste paper and cardboard
030310	Fibre rejects, fibre-, filler- and coating-sludges from mechanical separation
030311	Sludges from on site effluent treatment other than those mentioned in 030310

Table II.1 EWC codes for wastes to be processed

The quantities of wastes generated by SAICA factories, which will be used as feedstock for the energy-related utilization plant, are compiled in the following table

Annual consumption of raw materials

Pulping rejects	t/a	193,200
Sand	t/a	234,410
All	t/a	37,190

Table II.1. Wastes to be processed

3. Project description

3.1. Planned production activities

The installation described below is designed to obtain electric power and thermal power in the form of steam to be derived from the wastes currently generated by SAICA. In this way, the proposed design would substantially reduce the quantity of wastes to be simply dumped, and the plant would only be dumping the ash from the bottom of the boiler generated in the combustion process. There are plans for the nonhazardous wastes generated at the energy-related utilization plant to be dealt with in the spillway which SAICA intends to construct, after the pertinent licences have been obtained.

The activities fall into the four categories described below. For further details, see illustration III.1

- Waste control and analysis. Operation that will be repeated periodically in order to characterize the wastes entering the plant and to monitor the performance of the facilities.
- Area for the acceptance of delivery and storage of wastes.
- Pretreatment unit: process for provisionally treating the wastes in such a way as to ensure that they meet the standards of acceptance required by the thermal processing unit.
- Thermal processing: The proposed treatment is based on the energy-related utilization of wastes based on the thermal conversion of wastes into high-temperature flue gases, used to produce steam and thereby to generate electric power. Part of the steam will be used to feed the plant's own production process. As rejects the plant will obtain bottom ash, which is to be dealt with in the nonhazardous waste spillway which SAICA intends to construct, and fly-ash generated by the scrubbing of gases, which will be handled by the authorized manager, in the event that they fail to meet the required standards for disposal in the nonhazardous waste spillway.

The energy-related utilization plant will be designed to process the wastes specified above. Given the nature of the wastes in question, these activities are to be regarded as joint enhancement processes. However, different pretreatment methods will be used, depending on the type of waste in question.

ILLUSTRATION III.1: Plan of the facility
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Lodos = sludge
Arenas = sand
Pretratamiento de lodos = Pretreatment of sludge
Producto seco = Dry product
Gases a caldera = Gases to boiler
Foso almacenamiento = Storage ditch
Rechazo pulping = Pulping rejects
Cuerda = Rope
Pretratamiento Rechazo Pulping = Pulping reject pretreatment
Metales = Metals
Mat. Pesado = Heavy material
Producto pretratado = Pretreated product
Foso almacenamiento = Storage ditch
Cámara de combustión = Combustion chamber
Reactivos = Reagents
Gas natural = Natural gas
Cenizas de fondo = Bottom ash
Caldera = Boiler
Purga = Bleed
Vapor = Steam
Turbina de vapor = Steam turbine
Energía eléctrica a red = Electric power to the grid
Gases combustión = Combustion gases
Tratamiento de gases = Treatment of gases
Reactivos = Reagents
Cenizas volantes = Fly-ash
Gases depurados = Scrubbed gases

3.2. Laboratory and logistics

All of the wastes to be managed at the Energy-Related Utilization Plant (Planta de Valorización Energética (PVE)), as well as all of the boiler bottom ash and fly-ash generated in the combustion process, will be analyzed regularly for analytical control purposes and in order to be able to adjust the plant's operations to accommodate shifts in normal operating conditions.
For this purpose, the plant will have access to SAICA laboratory facilities and /or the facilities of collaborating firms to which control analysis functions will be fully or partially outsourced.

3.3. Areas for the acceptance of delivery and storage of wastes

At the projected facility, the design has sought to draw a clear distinction between the various zones for the acceptance of delivery and storage of wastes, depending on the type of pretreatment envisaged for each type of waste. Accordingly, two areas will be distinguished:

- Acceptance of delivery of pulping and rope rejects.

  The wastes originating from the pulping and rope will be transported by tub-type lorries to the collection zone reserved for wastes of this type, consisting of a set of collection areas having a total surface area of 800 square meters in plant.
- Acceptance of delivery of sand and sludge.

  Sludge and sand produced in pressure-assisted thermal processes and paper pulp purification systems, respectively, will be transported to a delivery zone, and the specific storage method will be chosen on the basis of the materials in question.
  The capacity of the storage zone will allow for a period of autonomous action lasting for approximately 16 hours.

3.4. Wastes pretreatment unit

The wastes pretreatment unit will be used to obtain homogeneous mixtures of wastes, having physical and chemical characteristics that meet the standards of acceptance required for the wastes to be subsequently processed in the energy-related utilization unit.
In light of the characteristics of the wastes, the wastes pretreatment unit is designed with two treatment lines, reflecting the nature of the waste and the needs associated with each line of treatment. This will serve to draw a distinction between:

3.4.1. Pretreatment of pulping and rope rejects

The purpose of the pretreatment of pulping and rope rejects is to adjust particle size and to endeavour to eliminate the inert metallic elements which the rejects contain, thereby obtaining a mixture that is homogeneous and manageable.

The facility consists of the following systems:

- Coarse grinding
- Fine grinding
- Separation of metallic elements (ferric and nonferric)
- Separation of PCV
- Separation of heavy elements
- Screening

This facility will have two primary grinders. One grinder will be fed with the pulping rejects, consisting of materials of quite heterogeneous sizes, which will sometimes be bulky.

Rope waste will be fed independently into another grinder to carry out a coarse grinding, with the aim of affecting the compacting of the waste and facilitating the withdrawal of the metallic elements that it contains.

This stage will achieve the kind of coarse grinding required for optimal functioning of the fine grinding process, and the elimination of metallic elements.

The product obtained from the primary grinders is transferred to a magnetic separator, where the ferric pieces are separated out, attracted by a magnet standing apart from the ground material. This step successfully separates out the ferric pieces which will be stored with a view to their subsequent recycling.

This pretreatment phase makes provision for a high-efficiency PVC optical separator. The purpose of this device is to separate out the PVC present in the stream of wastes to be developed with the aim of lowering the chlorine content in the combustion gases. This arrangement entails a reduction in the reagents consumed in the treatment of gases, and thereby entails a reduction in the solid wastes generated.

Below, the material is separated out into two fractions in a disk sieve:

- Reject size > 50 mm
- Splinter size > 50 mm

This separates out the fraction of the material that has the required size (less than 50 mm) needed to feed the boiler before secondary grinding, thereby ensuring that the arrival of product into the equipment intended for this purpose is kept down to manageable levels.

The larger-size fraction (> 50 mm) is distributed into two secondary grinders to reduce its size. In emerging from this stage of the process, a conveyor belt transfers the fraction of material having dimensions smaller than 50 mm to the disk sieve and the output product from both grinders to a higher electromagnetic separator, where the remaining ferric metals are withdrawn, and subsequently to a nonferric separator.

Last but not least, two heavy particle separators extract the heavy fraction, consisting of inert matter, glass, stone, etc. This fraction will be dumped in the nonhazardous wastes spillway which SAICA plans to build.

The finings are distributed in four storage containers (*trojes de almacenamiento*) having a capacity of 600 cubic meters apiece, entailing a total capacity of 2,400 cubic meters.

3.4.2. Pretreatment of sludge

The sludges generated at the paper pulp purification stages and in the pressure-assisted thermal processes, respectively, are characterized by a high water content, which is reflected in low calorific value; this is something which can be rectified.

This explains why the pretreatment planned for these wastes is dehydration, until levels are reached which allow for optimal handling of the wastes as well as acceptable lower calorific power allowing them to be properly developed.

We have opted for a drying system that will make it possible to use low-quality steam, originating from the steam turbine, as a heating element. As an auxiliary system, it will be necessary to have a flow of steam (10 bars of pressure) originating from extraction of the turbine.

After drying, the sludge is stored in a ditch having a capacity of 300 cubic meters.

In light of the energy sources used and given the fact that the only residue is water, this system is regarded as a clean and green solution to the problem of the thermal drying of wastes.

The stream originating from the drying of the sludge is condensed and the stream of noncondensable matter is introduced into the combustion chamber mixed with primary air.

3.5. Energy-related utilization

The proposed energy-related utilization unit consists of a condensation steam cycle, the purpose of which will be to generate electric power. This section describes the combustion chamber, the recovery boiler, the electric generator, and the gas scrubbing system.

3.5.1. System for feeding into the combustion chamber

The fuel (previously processed and blended) is stored in a ditch from where it will be fed into a small dispenser located in the upper portion of the boiler and which ensures a constant mass flow.

3.5.2. Combustion equipment

The combustion equipment has been designed in accordance with EU Directive 2000/76/EC on the incineration of waste and in accordance with Royal Decree RD 653/2003 on the incineration of waste.

The proposed technology is based on a fluid bed furnace. In this type of furnace, the mass of sand/ashes from the bed is suspended by the action of a stream of air blown in through the lower portion of the chamber.

Within the furnace, the organic components of the wastes will be transformed into hot gases, while the remaining inorganic materials will form part of the ashes.

The fluid bed boiler entails substantial advantages, such as the diverse range of fuels that it is capable of utilizing, its full and efficient combustion of wastes, and its low emissions, inter alia.

The fuel introduced into the fluid bed furnace is transformed into thermal power by means of combustion. In the boiler, the thermal power of the combustion process will be used to produce steam.

3.5.3. Steam turbine

The steam produced in the boiler will be expanded in a turbo-alternator unit, primarily generating electric energy. This arrangement will cover the electric power consumption of the plant, and the surplus will be sold to the electric power grid.

The turbine is of the condensation type, with two bodies. One high-pressure body and another low-pressure body where, after the steam has been reheated in the boiler, the steam expands until condensation pressure is reached.

This device will be fitted with steam extraction for degasification and drying of sludge.

NO_2 reduction system

The boiler/furnace incorporates two systems to reduce NO_2 content:

- ➔ Partial recirculation of scrubbed combustion gases

➔ Noncatalytic selective reduction of nitrogen oxides (SNRC process)

Auxiliary burners

The furnace will be brought on stream by using the auxiliary burners until such time as the post-combustion chamber achieves the temperature specified by EU regulations, namely 850 Centigrade. These burners will be automatically activated when the temperature of the burner falls below 850 Centigrade.

3.6. Gas scrubbing system

The treatment of combustion gases will consist of various stages, the purpose of which will be to eliminate contaminants present in the stream, ultimately obtaining clean gases that will comply with the maximum emission limits specified by legislation.

Reagents

The reagents used are slaked lime $Ca(OH)_2$ in powdered dry form to neutralize acid components, and activated charcoal to capture dioxins, furans, and heavy metals, such as mercury.

Sleeve filter

The gases containing combustion particles, reaction salts, activated charcoal, and unreacted calcium hydroxide, shall be directed toward the sleeve filter, where they are retained, achieving emission levels lower than those allowed under Royal Decree 653/2003.

3.7 Auxiliary systems

These auxiliary systems and facilities allow the plant to function properly, with particular reference to the following:

- Water supply.
  The designers will trace out a branch for distributing water to the new facility from the water network already in place at SAICA.
- Supply of compressed area.
  The facility in place at SAICA will supply compressed air to the various systems: instrument air, pneumatically operated valves for control purposes.
- Supply of demineralized water.
  SAICA has a water demineralization plant having sufficient capacity to supply the new energy-related utilization plant.
- Cooling system.

The various equipment systems will be cooled by a closed circuit alongside a damp cooling tower. The system will dissipate the heat generated by the various types of equipment and facilities: steam condenser, condensation of the streams of steam in the dryer, sludge cooler screw feeder, cooling of equipment, etc.

- Natural gas.
  Natural gas will be supplied from the regulation and measurement station already in operation at SAICA.

4. General plans: location, siting, and implementation

Annex 1 includes the following plans:

- Plan 010 Siting
- Plan 020 Placement
- Plan 030 Implementation

5. Environmental considerations:

If we independently analyze the foreseeable environmental impact on the various components and factors associated with the receiving environment, we may draw the following conclusions:

- The project does not require the creation of major infrastructures of earth-moving operations: instead, the planned actions emerge naturally from the facilities already in place at SAICA (laboratories, process water treatment plant, etc.).
- The zone in question is characterized by the fact that it lacks vegetation or fauna having scientific or botanical interest, which, at the time this research was conducted, was confined to tree species intended for the paper industry—poplars (various varieties), and widely distributed species used in residential areas.
- There will be a loss in terms of the quality of the air, soil, and water, logically deriving from the actions associated with the adaptation of the zone and the management of the project.
- The impact on water resources is addressed by sealing off the plant, by means of the drainage network, and through other corrective measures that will prevent any possible outflow from having an impact beyond the confines of the project.
- The project's greatest impact is going to occur in the atmosphere, particularly as a result of the emission of particles and gases generated by combustion. Accordingly, the designers have designed and adopted the best available practices for minimizing the various gaseous emissions which are, at all events, beneath the legal limits set by the appropriate sectoral legislation.
- The landscape will incur significant and irreversible damage, due to the fact that a typically rural and seminatural landscape will be making an abrupt transition to a more manmade landscape. However, it is important to bear in mind that the landscape in question is lacking in quality to a large extent, as it is embedded in an industrial polygon.
- With respect to the rural environment, we may speak in terms of an insignificant impact, as there is no loss of productivity in the zone. The changeover, from nonproductive use (for which the area was originally intended) to industrial use, entails no restrictions on or interference with the activities performed in neighbouring areas.
- With reference to rural roads, enclaves of scientific interest or leisure areas, nearby archaeological deposits, etc., we can say that these will not be affected by the project, as the project's impact does not extend far beyond the project's own limits.

In light of the foregoing considerations, it may be considered that the proposed design is viable from the technological standpoint and that it will entail an impact upon the host environment which may broadly speaking be described as a moderate impact. In spite of the

fact that the project is regarded as environmentally viable, it will be necessary to adopt a package of precautionary measures designed to minimize the project's impact on natural and cultural resources, as well as on the public at large.

6. Social and economic considerations

The most favourable repercussions of this project will occur in the social and economic area. Specifically, these facilities will entail an improvement in the management of the byproducts generated by SAICA, in complying with the EU ranking of laws for waste management, by focusing on development technologies rather than simple waste disposal. The commissioning of these facilities will impart value added to a substantial quantity of byproducts generated by SAICA, which would otherwise simply go into the Autonomous Government Register of Nonhazardous Wastes, as is the case at present.

It should be emphasized that the construction of the new project will have beneficial effects on the construction sector as well as on local and regional employment. The positive effects at the operation phase will occur in the following areas: job creation, utilization of machinery, vehicles, local or regional tools, etc. These effects will be temporary and insignificant; however, during the operation stage, new jobs will be created in response to the need to operate the new facilities.

7. Applicable rules and regulations

We now provide a detailed list of the most important legislation consulted and reviewed by SAICA when designing and drafting the project:

➔ EU regulations

- European Parliament and Council Directive 2000/76/EC, of 4 December 2000, on the incineration of waste. Consolidated text as at 28/12/2000.
- European Parliament and Council Directive 2008/1/EC of 15 January 2008, concerning integrated pollution prevention and control.

➔ State regulations

- Law 10/1998 of 21 April 1998, on Wastes, establishing legal arrangements governing the production and management of wastes and thereby promoting their reduction, re-use, recycling, and other methods of utilization.
- Law 16/2002 of 1 July 2002, concerning integrated pollution prevention and control.
- Royal Decree 509/2007 of 20 April 2007, approving the Regulations to govern the development and implementation of Law 16/2002 of 1 July 2002, concerning integrated pollution prevention and control.

- Royal Decree 833/1988 of 20 July 1988, approving the Regulations governing the implementation of Law 20/1986, the Basic Law on Toxic and Hazardous Wastes (now superseded).
- Royal Decree 653/2003 of 30 May 2003, on the incineration of wastes, determining the arrangements to be complied with when engaging in activities involving the incineration or joint incineration of wastes, in order to prevent or minimize risks to health and the environment.

➔ Autonomous government regulations

- Law 7/2006 of 22 June 2006 on environmental protection for Aragón
- Decree 148/2008 of 22 July 2008, of the government of Aragón, approving the Aragonese Catalogue of Wastes.

ANNEX I

PLANS