



# ECSC HIVALUE PROJECT

CONTENTO TRADE SRL

Technological innovation for the environment

7220 - PR145  
01.11.2001 – 30.06.2005

The project aims to the treatment of gasification by-products,  
so that the waste-dump could be avoided.



## BRIEF DESCRIPTION:

### Partners:

ELCOGAS, S.A., Spain  
FeyeCon, Netherlands  
Contento Trade Srl, Italy  
University of Creta, Greece  
Asociación de Investigación y Cooperación Industrial de Andalucía, Spain  
Tu-Delft University, Netherlands  
Universidad de Castilla, La Mancha, Spain  
Consejo Superior de Investigaciones Científicas, Spain  
Universidad de Barcelona, Spain

### Objectives:

The project activities aim to the reutilization of the residues of electric energy production systems (which are based on the process IGCC) through two technologies:

- ✓ the extraction of high worth metals (Ni,V,Ge and Ga) from light cinders;
- ✓ the production of vitreous fibres, light aggregates, hydraulic ligands and aggregates from waste.

### It includes:

The reutilization of by-products of gasification as raw materials secondary in building field, instead of having recourse to the waste dump.

## OBJECTIVES:

European electricity producing plants are based on the IGCC process (Integrated gasification combined cycle) even in the case of coal guarantee reaching three EU determined goals for the combustible fuels used in the energy production:

- ✓ security of supply;
- ✓ environmental improvement;
- ✓ high efficiency.



The project's activities aim for the valorisation of the waste this type of plant produce with the help of two technologies:

- ✓ high value metals extraction (Ni, V, Ge and Ga) from the light cinders;
- ✓ glass fibers production, light aggregates, hydraulic legants and aggregates from the wastes.

## STATE OF THE ART:

This project ("Hivalue": treatment of the waste obtained in a process of the coal clear gasification and production of a high value materials) allowed the gasification sub products reuse as secondary raw material in the construction field instead of discharging it to a landfill.

Also some interesting properties makes these sub products suitable for the farther processing to obtain other high value products.

The most interesting characteristic of the light cinders that are coming from the plants of integrated combined cycle is a high percentage of the valuable metals and the fine granulation of the cinders themselves.

These two characteristics make possible the metals such as Zn, Mo, V, Ni, Ga and Ge recovery and cinders valorization for the reinforcing glass fibers production.

## RESULTS OBTAINED:

The project has reached two fundamental results:

**The light cinders use.** Thanks to a particular characteristics of the light IGCC cinders it was possible to create the new process of the valuable metals extraction trough an environmentally friendly and financially efficient method. The traditional hydro-metallurgic methods were combined with the supercritical fluids extraction methods.

The experiments on the final products purification and the resulting waters treatment were performed at the laboratory level. The evaluation of the final product potential application was also made.



**Heavy wastes exploitation.** The IGCC waste is vitrified and characterized by the low absorption and high pozzolanic activity. These simple properties allow its valorization in 4 different fields: the light aggregates production similar to expanded clay; the reinforcing glass fibres production – quite valid alternative to the E fibres, the materials similar the high quality ceramic tiles production, the hydraulic binders for the road beds, construction blocks and, finally, the bituminous conglomerates for the use in road construction.

In some of these applications it will be possible to valorise even other wastes produced by the IGCC plants (like mud from the water purification) and use the final leftovers of the hydro-metallurgical treatments of the light IGCC cinders.

## MARKET PERSPECTIVES:

This technology developed by Contento Trade for this project allows significant valorization in three different sectors for the waste of the IGCC process:

- ✓ Innovative binders production;
- ✓ Light aggregates production;
- ✓ Reinforcing fibers production.

From the financial point of view the most interesting application concerns the vitreous fibers production as it produced with the higher added value among all tested products.

The market of reinforcing fibres is extremely selective but it is the large producers who decide the prices in this sector: the commercializing of this type of fibres could be started in collaboration with big scale European producers of the vitreous or basalt fibres.

The expanded ceramic granulates appear to be an evident technological solution even if it requests investing in the plants. It could introduce on the light aggregates' market a totally new element (split light aggregates) that is potentially interesting for some particular use like bituminous conglomerates made with light aggregates (novelty in this field).

The productive process require the maturation process that could be complex and costly. It is justified only in cases of the construction of the edifices made from the prefabricated concrete.



On the contrary, the prefabricated concrete sector is usually reluctant to adopt radical innovations and need long periods for the verification of the new solutions durability. Special features of the innovative binders developed during this project (high chemical resistance, fast accomplishment of the maximum resistance, big variety of use) are quite attractive for the end user even if it will take some time to introduce such technology on the market.