



European Commission supports chemical recycling of PVC waste

The Danish company RGS 90 has received financial support from the LIFE programme. The financial support makes it possible to carry out a full-scale industrial demonstration project for chemical recycling of PVC waste by a process developed by RGS 90.

- **The design of the plant has been initiated.**

Introduction

Two of the major challenges to waste management in industrialised countries are the handling of polluted sludge from waste water treatment plants and the handling of PVC waste. Until recently, no recycling alternative existed for waste water sludge besides the present application on farmland, just as there was no chemical recycling of PVC waste to industrial scale. RGS 90 has made a dedicated effort to create a concept for industrial recycling of PVC waste as well as of waste water sludge in an industrial symbiosis. The symbiosis solves two challenges for the waste handling sector and produces products that can be sold as merchantable goods. The result is an unusually perfect example of successful recycling of problematic waste types.

Through EU's LIFE programme, RGS90 has received co-financing to carry out an industrial demonstration project for chemical recycling of PVC waste. One of the aims of the LIFE programme in 2002 was to support new methods to handle PVC waste. The European PVC industry also supports the project. By the direct support, the European Union and the PVC industry show their interest in using the results.

Development of new methods

The development of the chemical recycling of PVC waste began in 1998. The process has been tested in laboratory scale and partly in a full-scale plant. The result of this development work is that a full-scale plant will be designed and erected in the period 2002/2004 for chemical recycling of PVC into oil, salt and minerals.

The oil will be sold to the chemical industry, while the salt fraction can be reused by the PVC industry or as salt for roads. Finally, RGS 90 itself will make use of the mineral fraction as raw material for the production of Carbo-grit, as the composition of minerals fits into that production and the energy from the coke will be utilized. The annual handling capacity is approx. 100,000 tons of PVC waste, resulting in 25,000 tons of oil and 42,000 tons of salt.

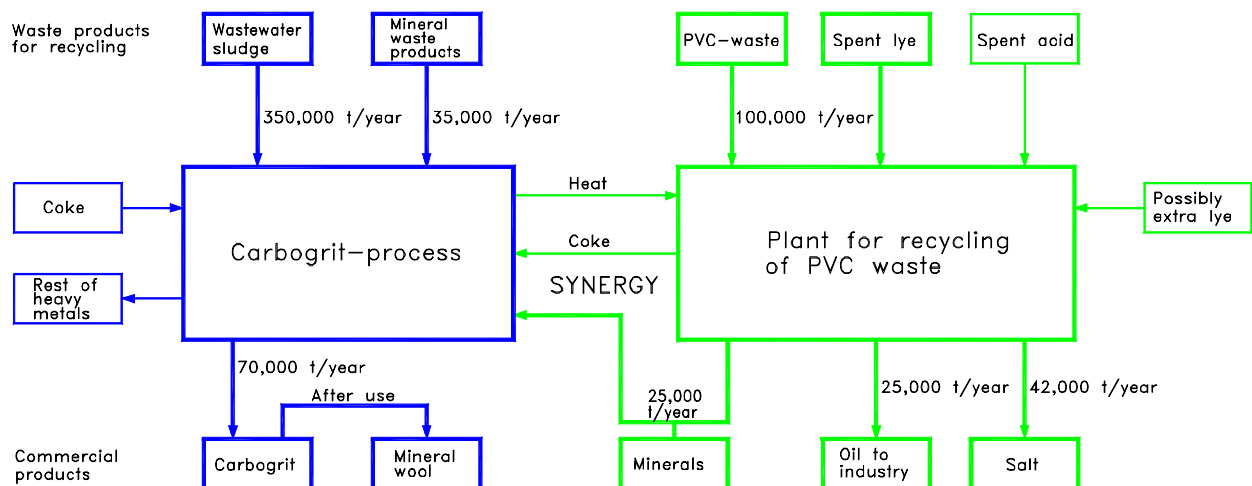
The development of the concept for industrial usage of waste water sludge began in 1996. The work has resulted in completion of a large production plant in the spring of 2003. The plant processes waste water sludge and other mineral waste products into a glass silicate, to be marketed under the name Carbogrit. Carbogrit will be used as sandblasting material or as aggregate material in the production of asphalt and concrete. The annual handling capacity is approx. 350,000 tons of sludge and approx. 35,000 tons of mineral waste products, resulting in 70,000 tons of Carbogrit. The spent sandblasting material will be returned and utilized as raw material in the production of mineral wool, among others.

Location of the plants - Industrial symbiosis

The process plants with pre-treatment facilities will be built within an industrial site near Skælskør in Denmark. Material will be collected from all parts of Denmark as well as from the other countries in the Baltic Region.

The two process plants will be the first of their type in the world, and the processes can be implemented separately or combined in industrial symbiosis in other parts of Europe, subject to suitable commercial conditions.

Locating the two process plants within the same industrial site in Denmark has generated industrial symbiosis, whereby the product from one waste treatment process (PVC) is utilized as raw material for the other (Carbogrit), while at the same time excess heat and coke from the Carbogrit factory provides process heat to the PVC-process.



The heavy metals present in the PVC waste will, moreover, be concentrated in the filter dust from the Carbogrit factory. Positive tests indicate that these metals can subsequently be recovered from the filter dust.

Chemical recycling of PVC waste

PVC waste is a priority waste stream in the European environmental strategy. The special attention is, among other things, due to the fact that incineration of PVC generates flue gas cleaning residues that require depositing, and that

depositing of PVC waste in landfills may result in environmentally harmful substances in the water environment. As is the case for all waste, the treatment shall maximise recycling with utilization of the materials.

In the absence of the necessary recycling solutions for PVC waste, the European PVC industry has entered into a voluntary agreement to provide adequate treatment technologies, emphasising in recent years the development of new treatment technologies. One of these projects has been developed in co-operation with RGS 90, and involves removal of the chlorine from the PVC waste in order to recycle and utilize the resulting oil, salt, and coke/mineral fractions.

This newly developed treatment process ensures an optimal solution both in terms of materials recycling and of environmental protection.

The processes comprise two patented key treatment steps – first hydrolysis and second a post-heating process. The technology has been developed in a long series of laboratory experiments, which by the end of 2001 have been scaled up to full-scale demonstration tests of short duration.

The hydrolysis reaction can take place in an existing tubular reactor facility at Stignæs Industripark (Denmark) after few modifications to the existing reactor:



Existing reactor housing at Stignæs Industripark; Denmark

Annual treatment capacity will be about 100,000 t of PVC waste

The result is a process with utilization and recycling of all the components in any type of PVC waste. The salt can be recycled to the PVC industry, or alternatively utilized as road salt. The oil fraction can be used in various industrial processes. The mineral residue consisting of mineral and coke can be recycled as raw material for the industrial production of the sandblasting material Carbogrit.

Partners of the PVC plant project

The concept has been developed in close dialogue with the Danish Environmental Protection Agency and the European PVC industry, and a range of specialist consultants have contributed throughout the process.

The PVC project has been fine-tuned to central EU stances in the environmental field. The project receives financial support from the LIFE-programme under the European Commission.

Support from the LIFE-programme

The support from the LIFE-programme consists of a technical part:

- Development of a detailed concept for the full-scale plant
- Erecting of the full-scale plant
- Demonstration of continuous long-run operation to verify successful interaction between the many new process functions without any adverse long-time effect,

and an informative part:

- Financial evaluation of the hydrolysis concept including treatment costs
- Dissemination of the PVC project and results from the full-scale demonstration tests to interested parties within EU: Environmental authorities, NGOs, the waste handling sector and the PVC industry.

Further information about the project can be obtained from:

- Director Jan Procida
RGS 90 A/S Selinevej 4,
DK 2300 København S,
Denmark
Phone: +45 32 48 90 90
E-mail: jprocida@rgs90.dk.

A home page will be established at: <http://www.rgs90.dk/>

END