

EDITOR'S PAGE

There is forest behind the trees

OIL SHALE CEMENT – ECOLOGY AND ECONOMY

The most common understanding about oil shale processing is transforming complex molecules of solid kerogen into more simple and “well-known” molecules of oil products, gas and coke. Processing itself can be performed in various ways, mostly still via thermal treatment of oil shale rock in different types of equipment. Obtaining oily substances from oil shale on a small scale has centuries of history, and even commercial large-scale processing started



already more than 150 years ago. Such kind of processing concentrates only on kerogen and leaves the mineral part of the oil shale with no attention – it moves through the process as ballast, and so called “spent shale” is finally removed from the process and disposed as waste material.

Although direct combustion of oil shale means wasting of a valuable resource and is economically questionable, it also has almost a century of commercial history. Like oil production, direct combustion also takes advantage from the organic part of oil shale. Combustion waste – shale ash – has found only a limited usage.

Using of oil shale rock as a building material has probably the longest history – but it is not documented very well. It is likely that nice colored shale rock has attracted the attention of ancient people in different parts of the world and everything was fine until they lighted a fire on the rocks...

In many cases chemical composition of oil shale minerals allows its utilization in clinker manufacturing as a raw material and as a fuel. Waste materials from oil shale processing plants and from oil shale fired power plants – spent shale and shale ash – can also be used as a raw material in the clinker process, as components of cement or concrete, or used in the building



Holcim cement plant in Dotternhausen, Germany

materials industry. In such a way oil shale is totally converted into products leaving no waste.

Unfortunately the reality shows that any significant shale oil production leaves more spent shale and/or shale ash than required for cement or other building materials industry within a reasonable area around the oil shale plant, due to high transportation cost of construction materials. It may be the main reason why until now there are only very few industries around the world who are taking advantage of using the mineral part of oil shale.

There are a few good examples. Holcim cement plant in Dotternhausen, Germany, and Pan-Malaysia Cement are using oil shale with low oil yield directly in the clinker manufacturing process as a raw material and as a secondary fuel. Kunda Nordic Cement in Kunda, Estonia, and Holcim Dotternhausen cement plant are using burnt shale as a cement component.

High energy prices have forced technology suppliers for cement plants to adopt their processes for any kind of alternative fuels. This is an economically and environmentally sound and essential way on the fuel side of the process. On the raw material side, pure limestone, clay and other minerals are still mainly used, and major leading suppliers are usually not so keen to modify their process for alternative good raw materials, such as oil shale, spent shale and shale ash that will be widely available when shale oil production increases worldwide. And it is already happening.

Innovative technology suppliers – such as FL Smidth from Denmark and KHD from Germany – have already recognized that opportunity and are working hard to develop processes of the future, state-of-the-art BAT processes for oil shale clinker manufacturing.

Early in 2008 the construction of an oil shale-based cement plant was started near Slantsy, Russia. In Estonia Viru Keemia Grupp has been developing a cement production project based on spent shale, shale gas and shale ash since 2005, the construction of the tailor made state-of-the-art plant for production of high-quality cement is scheduled for 2009–2011.

Natural resources of the planet are limited. Any new green field oil shale processing project should consider integration of a cement plant into the scope. And opposite – any new cement plant should avoid opening of new pits and usage of pure minerals as much as possible and should focus on alternative materials, such as oil shale and its processing products. It may not be easy to achieve at first, but will be well awarded when finally developed.

There is no way back – this is the future of the oil shale and cement industry.

On behalf of Editorial Board of OS, Jaanus Purga welcomes any activities around the world where full utilization of oil shale – organic and mineral part together – has been taken into serious consideration.

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