Dalmat Carbonization and Energy System

dalmat PROJECTS

GES Energy Management

AUSTRALIAN TORBANITE DEVELOPMENT

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Australian Torbanite Development

Dalmat Carbonization and Energy System (DCES) is a partnership between Dalmat Engineering Projects (**Dalmat**) and General Energy Systems (**GES**) who are embarking on a joint effort to explore possibilities to utilize our advanced retorting technology to extract oil from Australian torbanite.

We are aware that there are substantial deposits of high quality torbanite in Australia and our objectives are to seek an Australian partnership to promote the use of our technology in Australia.

In addition to the extraction of the 'syncrude' oil from the torbanite shale, the residue solid carbon resulting from the process can be used as a clean coal energy source for the generation of electricity.

The torbanite reserves in Australia could go a long way towards reducing its dependence on external sources of automotive fuels.

Dalmat is a leader in coal carbonization and has since 1986 developed successful and cost effective technologies for producing pyrolised coal, wood and other products.

Dalmat has carried out a comprehensive study and testing of torbanite processing and have established that their further-developed vertical retort process is ideal for torbanite processing (carbonization and crude tar/oil collection).

Dalmat designs and manufactures various carbonization plants in their own manufacturing facilities ensuring low cost plants on a turn-key basis.

GES is an energy management company with a significant track record in South Africa focusing in heat energy (fossil, liquid and gas fuels) and process energy transfer (steam).

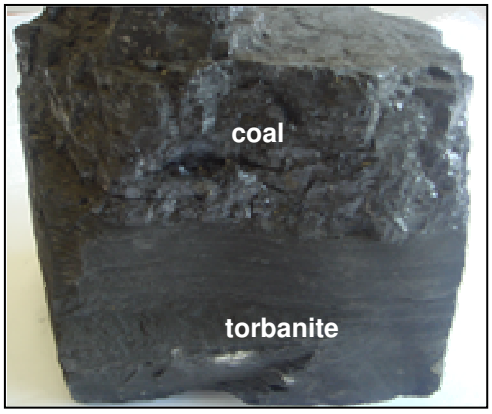
GES installs, owns, operates and manages steam generation plants, hot water boilers, hot gas plants, cogeneration plants, steam, electricity and thermal oil, heat transfer plants and sells 'energy' in a useful form on an 'across the fence' basis.

This joint knowledge and experience enables **DCES** to undertake a complete torbanite processing project including utilization, operation and management of syncrude oil, char and heat.

Currently, **Dalmat** and **GES** are jointly involved in a major torbanite processing project in South Africa.

Torbanite Syncrude

Torbanite syncrude is a rich organic crude 'oil' like product with a high petroleum application and use potential. This syncrude 'oil' is produced by controlled heating of Torbanite 'oil shale' through our advanced retorting process.



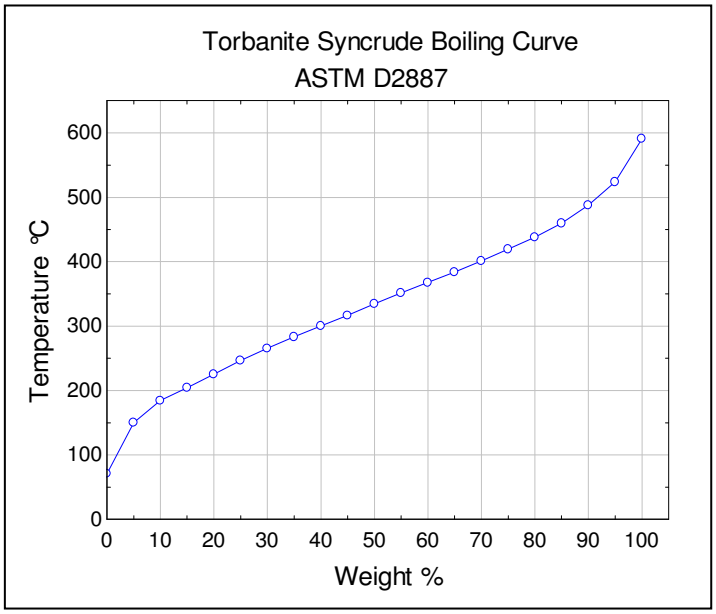
Torbanite shale is a sapropelic coal generally found in association with coal reserves and has a relatively high oil content. Its precursors were algae deposited in shallow lagoon environments during the formation of coal, therefore the oil extracted from Torbanite has a close resemblance to petroleum oil.

Oil from torbanite trials

It should be noted that Torbanite shale is different to 'oil sands' and the process technology required is also completely different.

General specification on Torbanite syncrude which will obviously vary according to the source and analysis of the Torbanite oil shale is given as an indication only:

TORBANITE SYNCRUDE BOILING POINT DISTRIBUTION	
ASTM D2887	
Recovered Mass %	**° C**
IBP	71.0
5	150.0
10	184.5
15	204.5
20	225.5
25	246.5
30	265.5
35	283.5
40	300.5
45	316.5
50	334.5
55	351.5
60	367.5
65	384.0
70	401.0
75	419.5
80	438.0
85	460.0
90	487.5
95	524.0
FBP	591.0
Density kg/m³	930 AT 40°C
MW kg/kgmol	186



Technology Background

The development of Dalmat's retorting technology and similar carbonization plant technologies started in South Africa in 1986 and a brief overview is given as follows:-

Travelling Grate Carbonizers - TGC

This plant technology was developed to produce 'reactive carbon' material specifically for the silicon, ferrochrome, ferro manganese and other smelting industry such as calcium carbide, silicon carbide, silicon metals etc.

Travelling Grate Carbonization Plant

Specialized coal is the feed stock to these plants where the coal is devolatized and carbonized on a traveling grate. By radiating heat from the roof of the furnaces onto the coal in the presence of oxygen the process is continuous and self-sustaining. Excess hot gasses are diverted to waste gas boilers for the generation of steam for direct sale or the generation of electricity.

Plants have been installed and are operating in South Africa, Poland and work on a project for the Arabian Gulf.

Vertical Retort Carbonizers - VRC

This process is an advanced development in the bituminous coal carbonization technology used to obtain harder and larger carbon product sizes to widen the application spectrum, in various chemical and metallurgical industrial processes. The process is continuous and self-sustaining and the coal is carbonized by direct heating in the absence of oxygen.
This process is currently used and produces almost one (1) million tons per annum of retort (active) carbon. The process could also be built to capture coal tar as a by-product.

Vertical Retort Carbonization Plant

Cluster of six VRC Plant units

Vertical Retort Torbanite Processor - VRT

The Vertical Retort torbanite processor is based on a modified standard Dalmat Vertical Retort equipped with gas vapour condensing and separating equipment for effective capturing of products of torbanite distillation (light and heavy oils).

Coal / Torbanite Testing Plant

The torbanite material is heated under a controlled temperature directly in a counter flow system ensuring the most effective heat transfer and that volatiles evolve at temperatures most suited to their evolution and ensures that they do not subsequently come into contact with a temperature higher than that at which they were evolved (i.e. tar and oil cracking do not occur).

The process is continuous and self sustaining utilizing a portion of the gas from the process.

Dalmat's small size commercial (testing) VRT plant is specifically built and equipped for testing a variety of feedstock materials for coal carbonization and torbanite processing. Thus all required data from the actual proposed feedstock are accurately obtained for the feasibility study and to determine the project economics. Numerous tests have been done to date on various coal and torbanite feedstocks.

Torbanite Processing Plant - The Dalmat R35T Retort

The plants are designed and constructed in modules and capacity is increased by progressively adding modules (thus not requiring one big outlay of capital before generating income).

The retorts are arranged in clusters of eight retorts with its own torbanite feedstock and product handling system. Each cluster also has its own oil storage system with tanker loading facilities.

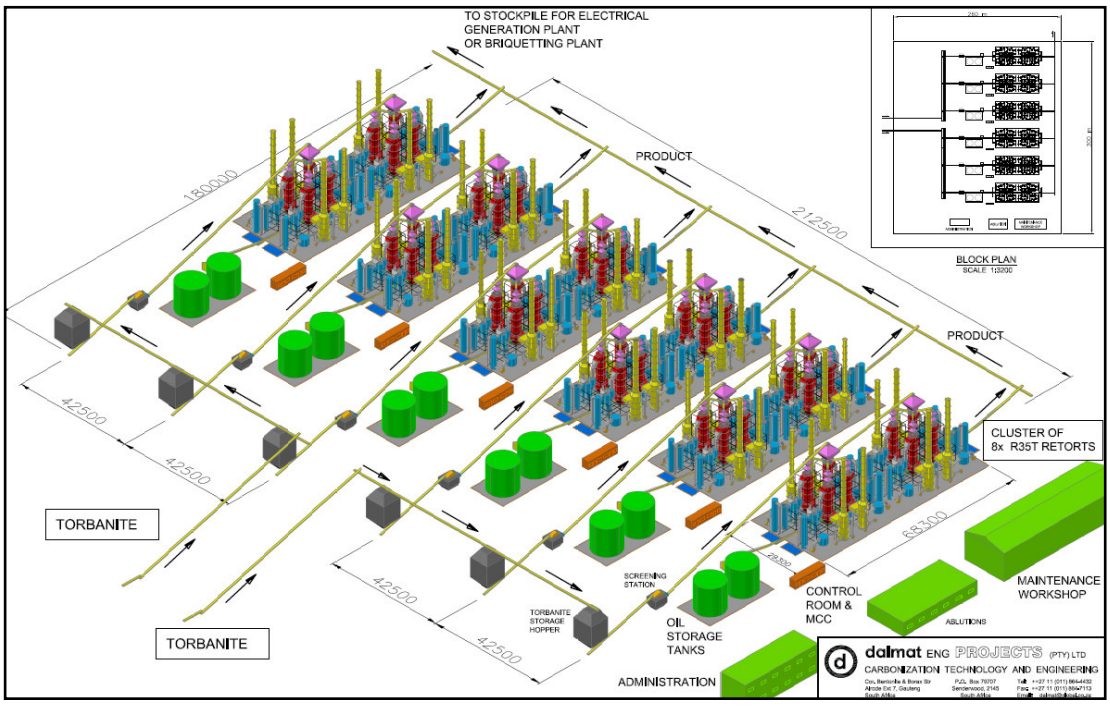
The Dalmat R35T Retort Unit could process ± 62 500 tonnes/annum (8 t/hr) of torbanite feedstock.

One cluster of eight retorts would process 500 000 tonnes/annum of torbanite and depending on the torbanite volatile (oil) content, the oil yield could be from 100 to 500 litres per ton of processed torbanite.

The number of clusters in the plant will depend on the total plant capacity.
(A six cluster torbanite processing plant is shown below).

Our retort plants are simple, economical and inexpensive to operate including labour and maintenance aspects.

The plant is designed and built in such a way that it could be easily relocated if required with minimum cost.

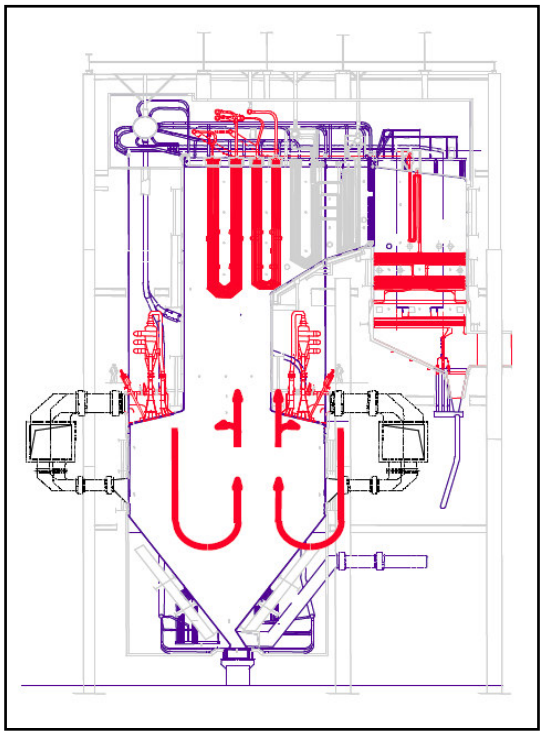


Six cluster Torbanite Processing Plant

Electricity Generation

After processing the Torbanite shale through the retorts the residue carbon is available for use as a very low volatile 'clean coal' energy source for use in a power generation plant.

A downshot firing system for the steam generator is the technology suited to use this carbon and this type of power plant is widely used around the world.



Downshot Boiler