2007 SOUTH WEST FOCUS CONFERENCE

BUILDING ON THE BOOM

ENVIRONMENT & NEW INDUSTRIES

New Industries: a Case Study of the Silicon Industry

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SIMCOA Operations is a silicon producer located in the Kemerton Industrial Park just north of Bunbury. The company is a wholly owned subsidiary of ShinEtsu, a Japanese chemical company.

Arial Views of Kemerton and Simcoa's Plant

Silicon is very much a material of our modern times. There are two main areas in which silicon is used, the first is what is referred to as metallurgical applications and is the alloying of silicon with aluminium to produce high strength, lightweight alloys, used largely in the car industry. Aluminium / silicon alloys are significantly lighter than steel (hence less fuel consumption), do not rust and are recyclable.

The other applications for silicon are in the chemical industry and the uses here are diverse, ranging from silicone rubbers, silicone sealants and optical fibre through to silicon chips, silicon wafers and solar cells.

Simcoa operates two 27 MVA silicon furnaces, which were commissioned in 1989/90, with a nominal capacity of around 25,000 tpa but which currently produce almost 34,000 tpa.

Submerged Arc Silicon Furnace

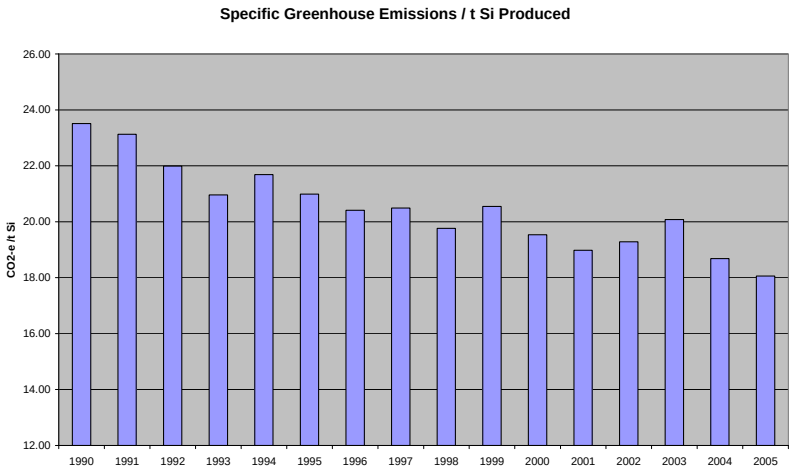
It is a vertically integrated operation including Simcoa's own quartz mine at Moora about 400 km north of the plant, from which all quartz requirements are sourced.

The principle reductant used in the operation is low ash charcoal and the location of the plant was chosen based on its proximity to the extensive native forests in the South West of WA.

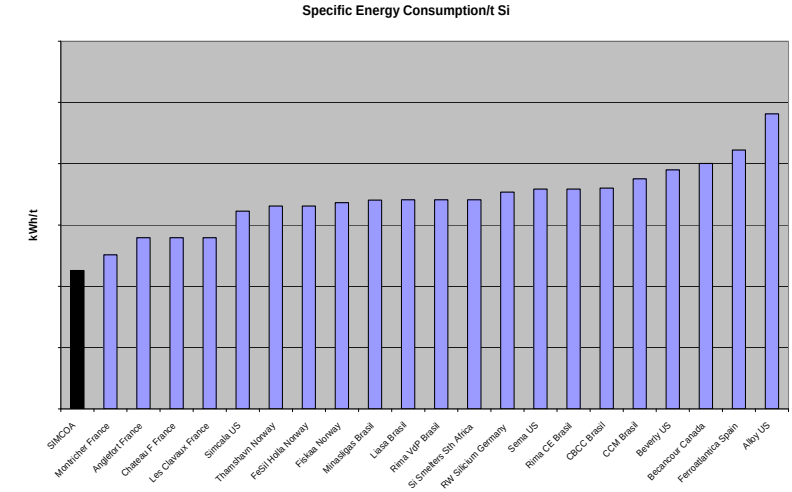
Charcoal Plant at Kemerton

Over the years mainly residue grade logs and sawmill waste, sourced from local sawmills, have been processed for the production of charcoal. This is produced in two vertical gas rinsing charcoal retorts. In recent years, Simcoa has moved to the use of land clearing waste from the Alcoa bauxite mining operations for charcoal production. Simcoa is also fortunate in that there are extensive reserves of relatively low ash coal only about 50 km from the plant at Collie.

It is generally accepted in the international silicon industry that Simcoa is the world's most energy efficient silicon smelter, which in turn means that, in an extremely energy and carbon intensive industry, Simcoa has the smallest greenhouse footprint per tonne of silicon produced.



Reduction in Simcoa Emissions 1990 – 2005



Energy Consumption at Simcoa Compared to Other Si Producers

What Brought Simcoa to the South West

In considering what industries might be attracted to the South West in general and Kemerton in particular, it is relevant to consider how Simcoa came to be at Kemerton. It was not because of a particularly low power tariff, in fact for most of the last 18 years Simcoa has had possibly the highest power tariff in the international silicon industry. The main driver at that time was the availability of highly suitable quartz at Moora and the opportunity for synergy with the logging industry in the South West. The concept was for Simcoa to utilise low grade or char grade logs which were a by-product of logging operations, supplemented by millends from South West sawmills. As quartz is easier to transport than wood or charcoal, a South West location was preferred over locating at Moora.

Initially the Simcoa silicon smelter was to be located at Picton but the Government of the day rightly decided that Kemerton was the most appropriate location and gave the company no choice but to establish the plant at Kemerton. In hindsight it was a sound decision and a key factor was that Simcoa was guaranteed access to the infrastructure which the project required.

Land Clearing Residue for Charcoal Production

Times have changed. Thanks to gas and coal reserves in WA and the disaggregation of Western Power, Simcoa's power tariffs are not increasing as rapidly as is the case in many countries. This has meant that Simcoa now has a power tariff, which is at least competitive with tariffs elsewhere. On the other hand, with changing community expectations, logging has reduced in the South West, thereby reducing the availability of residue logs. Simcoa has taken a proactive role in this change by developing technology to utilise the waste, predominantly roots and stumps, from land clearing operations for charcoal production. The main source of this material has been the material previously burnt as waste on the Alcoa minesites.

There is a clear message here and that is if anything is certain it is that there will be change. No industry should establish without ensuring that the business will be robust enough to survive significant change in the future.

There should also be an expectation of any company looking to establish in the South West that they have a commitment to sustainability. Simcoa has always had a philosophy of minimising waste.

- Silica fume (the dust collected in the furnace baghouse) is sold as an additive to high strength cement.
- Undersize quartz from the mine is sold as flux to the Kalgoorlie Nickel Smelter and as decorative stone.
- Charcoal fines are used for barbecue briquettes.
- Sawdust and bark are sold as mulch and
- Silicon dross is shipped to Norway for the production of silicon manganese.

Inefficient use of resources increases operating costs and waste costs money to dispose of.

Potential Impact of an Energy & Carbon Constrained Future

The fact that everyone is facing a carbon & energy constrained future also raises issues for Simcoa but as long as Government policies are based on sound economic and environmental principles, there should be nothing for local companies to fear.

Greenhouse affects much bigger industries than Simcoa but potential issues with respect to Simcoa are an indication of general issues to be taken into consideration when government policies are being formulated.

Simcoa has a greenhouse footprint, through both energy and carbon usage, of around 600,000 tonnes CO_2 equivalent per year or just under 20 tonnes per tonne of Si produced. A carbon tax or carbon trading using a carbon value of $25/t carbon would therefore increase the production cost of silicon by approximately $500 per tonne. As the price of silicon is of the order of $2,000/t, and nearly 90% of Simcoa's product is exported, competing against producers primarily in China and Brasil, it is obvious that Simcoa could not survive without special consideration for energy intensive, trade exposed industries.

The question could then be asked – should Simcoa survive? Silicon is required for photovoltaic cells for solar energy and the production of light weight aluminium silicon alloys, which underpin reduction in fuel usage in the transport industry as well as being recyclable. Simcoa is the most energy and carbon efficient silicon producer in the world – of the order of 30% more efficient than Chinese producers and nearly 10% more efficient than the next best operation, which is in France. There is therefore no global benefit in shutting down or not permitting the establishment of energy efficient operations in Australia, in order to meet arbitrary greenhouse targets. The alternative is less efficient operations being established overseas. This applies, of course, only if the Australian industries in question operate at world best practice levels.

There is a strong case to be argued for Western Australia and the South West working to attract more downstream industry to the region using the natural advantages, which the region has to offer, as long as the efficiencies of these plants meets or improves on international best practice. This not only has the potential to have a positive environmental outcome directly but is also more sustainable with respect to not shipping raw materials around the world to be processed less efficiently than might be possible here. Greenhouse is an international and not a domestic or local issue.

Such a vision, however, is incompatible with having domestic caps on emissions without considering the broader issues. The end result of simplistic solutions is neither environmentally nor economically sustainable.

Challenges & Opportunities for the South West

Considering the theme of this Conference, an obvious question is whether Simcoa would still choose to establish its operation in the South West today.

There are a number of conflicting issues but despite the challenges which one faces at times, the South West of WA certainly provides numerous advantages for industry. In terms of power, there is a much better future for industry establishing here than in most other locations around the world. One opportunity, which Simcoa takes advantage of but which also has the potential to attract specific industries here, is the power usage profile in the South West Integrated System. According to Western Power, 15% of the cost of maintaining their network is for peak capacity, required not more than 60 hrs/yr. Abundant coal reserves, suitable for base load power generation, make the South West a perfect location for energy intensive industries, which are prepared to accept an interruptible power supply. This is the basis of power supply to most ferroalloy operations overseas. Simcoa's competitors in Brasil shut down for 3 hours per day, when power demand is at its maximum, in Spain they switch off the furnaces 6 hours per day Monday to Friday.

A stable, well educated workforce as well as a region which cannot be considered a hardship location. It is close to Perth – it takes longer to get to Tullamarine Airport from Melbourne's southern suburbs than it takes to get from Bunbury to Perth Airport and, whether through Fremantle or the Regional ports, there is better access to Middle Eastern, European and many Asian markets than there is from the east coast of Australia. In the world today another advantage, not to be underestimated, is a stable political climate and a relatively low risk of terrorism. Apart from economical base load power from coal, there is also no reason why the South West cannot become a region which sets an example in terms of renewable energy projects. The region has an appropriate climate, an abundance of land and waste from the plantation industry to underpin such projects.

The mineral wealth of the region means that downstream processing opportunities are numerous, whether it be mineral sands processing, aluminium smelting or the downstream processing of silicon.

These natural advantages have been offset by the apparent reluctance of governments of either political persuasion to focus on development south of Perth and Kwinana. There has been and continues to be a reluctance to put infrastructure in place in the South West until projects are committed rather than using the availability of infrastructure to attract new projects.

When representatives of overseas companies looking to establish locally come to the South West, they like the concept of Kemerton but when they ask about the availability of water for their project, the answer will generally be "tell us how much you want and we will commission a study". Apparently all water from the Yaragadee aquifer at Kemerton is already allocated, surprising considering the fact that Kemerton is virtually unoccupied. It would seem that accessing the proposed Yaragadee pipeline to Perth is also out of the question. On the other hand, if a company wants to establish an operation at Kwinana, there is access to mains water – potentially supplied from the Yaragadee pipeline!

Waste water disposal is another core infrastructure issue for new projects – sometime in the future a common user facility / ocean outfall may be developed for Kemerton but for the time being new projects have no choice apart from evaporation ponds, to establish plantations or for each to apply to put in their own ocean outfall.

Environmental clearances are another hurdle which is likely to be of concern to offshore project proponents. Currently, even in an area designated as a heavy industry park, the onus is on the proponent to take care of rare flora and rare fauna surveys, search for culturally significant sites and then obtain permission to remove any plants from the site.

A recent poll of several thousand mining companies carried out by the Fraser Institute in Canada ranked WA as the worst place in Australia to do business – one issue cited being a lack of regulatory consistency.

These issues must be addressed to ensure future sustainable growth for the South West.

Realising the Potential of the South West

What needs to happen to realise this future? It will not come about by just sitting back and waiting on it. The Government should be lobbied to ensure that key infrastructure is put into place at Kemerton and other proposed industrial areas in the region. Without the basic infrastructure in place, the South West will remain at a disadvantage in terms of attracting significant new projects, particularly downstream processing. This is not referring to needs, important but not essential, such as a rail link for Kemerton or container exports from Bunbury but absolute show stopping issues. Water supply, gas supply, power supply and waste water disposal. Add to this an urgent need for areas of land where flora, fauna, plant removal and cultural issues have already been addressed.

The responsibility for bringing growth and development to the South West should not rest with the Department of Industry and Resources or LandCorp. By definition these organisations have conflicting interests as their responsibilities include promoting Kwinana, Mid West, North West etc.

The responsibility for promoting and driving development in the South West rests with those based in the region.

There is a great deal of potential to attract new industries to the South West but networking contacts need to be used to find these opportunities and to convince the Government to take the development of Kemerton for example to the next level i.e. to be able to offer proponents a water supply, waste water disposal and access to gas and electricity. If this is not possible at Kemerton, more time should not be wasted on it and an alternative location for a heavy industry park should be identified in the South West where water is available, waste can be managed and which will not have an unacceptable impact on the community. Collie perhaps?

The natural advantages of the region must be utilised:

- Abundant coal reserves – potential for base load power generation, production of high purity coal.
- Alumina, silicon, mineral sands – potential for downstream processing.
- A port with potential for expansion.
- Highly skilled workforce, regional university – potential for R&D centre for mining or other regional industries.

The potential for new industries in the region is enormous, required is the will to make it happen.