7 ENERGY SUPPLY AND PLANT SITE LOCATION

7.1 Energy Requirements

7.1.1 Electrical Power

Dependent on location, electrical power can represent 25% to 35% of direct cash operating costs for the production of magnesium metal. At a production rate of 90,000tpa, the Project will consume approximately 200 MW of base load power.

South-eastern Australia is fortunate to have several low cost power sources fuelled by black coal in NSW and brown coal in Victoria. Direct cash operating costs for the Victorian brown coal generators are reported to be around A$10 / MWhr and NSW black coal generators around A$20 / MWhr. In addition to the supply charges from the generators, there is a transmission charge over the national grid which can add between A$3 to A$8 / MWhr.

Both the NSW and Victorian power industries have been deregulated and linked in a common grid so that competitive pricing is available from any generator within the grid. South-eastern Australia has surplus generation capacity. Tasmania will soon be connected to this common grid by the construction of a 250km high voltage direct current (HVDC) sub-sea cable (commonly referred to as Basslink).

Tasmania also has a large hydro-electric resource although this is almost fully committed. The State Government has engaged Duke Energy to conduct a feasibility study to bring off-shore gas to Tasmania for development of new industry. Duke has now completed that study and proposes to bring Victorian Gippsland Basin gas ashore at Bell Bay in north-eastern Tasmania. The existing 200 MW oil-fired power station at Bell Bay will be converted to gas firing.

7.1.2 Natural Gas

A magnesium plant utilising the UTI process also requires a large supply of natural gas for preparation of the dehydrated carnallite feed. At a production rate of 90,000tpa, the Project will consume approximately 5.2 petajoules per annum which accounts for 7-10% of direct operating cost for magnesium metal.

Indicative budget gas prices of A$3 GJ in Victoria and around A$4 GJ in NSW are relatively low by world standards and give the Project a comparative advantage.

7.1.3 Steam

The third component of the energy package is steam.

The UTI process is a relatively large consumer of low grade steam at around 1.3Mt per annum, or around 70MW. Co-location with steam turbine generating stations can lead to lower priced steam. Dependent on location, indicative steam prices range from A$2 to A$11 per tonne.

7.2 Preliminary Feasibility Study Estimates

As part of the Preliminary Feasibility Study BHPE compared twelve potential plant sites in Tasmania and south-eastern Australia against criteria of low cost energy and amenity to transportation of magnesite ore.

BHPE's review of energy supply and operating costs generally as part of the Preliminary Feasibility Study indicates that the total energy package budget price for most sites reviewed has been remarkably uniform and represents about 45% of direct operating cost.

It was therefore recognised at the outset of Indcor's involvement with the Project that a low cost energy supply was essential if the Project is to be in the lower cost quartile of world magnesium producers.

After analysis of other world producers, a target maximum cost was set at:

7 electrical power US$20 / MWhr (A$33.33 @ A$1:US$0.60)

8 natural gas US$2.50 / GJ (A$4.17 @ A$1:US$0.60)

7.3 Site Selection

7.3.1 Assessment

Site selection incorporates a number of factors, including:

9 cheap electricity and steam available directly from a power station;

10 availability and cost of gas;

11 ease and cost of transportation;

12 water and land availability; and

13 waste disposal, environmental and industrial issues.

Several sites have been assessed, as briefly summarised in Table 17 below.

Table 17: Site Assessments

Site	Assessment
Port Latta, Tasmania	Unlikely that a power station will be located adjacent to the plant.
Bell Bay, Tasmania	All required resources will be available.
Geelong, Victoria	Land is available, although limited. There is no power station. A new cogeneration station would be required.
Western Port, Victoria	There is no power station for direct supply of steam and a new entrant co-generation station would be required.
Portland, Victoria	There is no power station for direct supply of steam and a new entrant co-generation station would be required.
Latrobe Valley, Victoria	All required resources are available. Industrial issues require further review.
Lithgow, NSW	All required resources are available.
Newcastle, NSW	There is no power station for direct supply of steam and a new entrant co-generation station would be required.
Hunter Valley, NSW	All required resources are available.

The Hunter Valley (Bayswater Power Station), Latrobe Valley (Loy Yang Power Station), Lithgow (Wallerawang Power Station) and Bell Bay (Figure 9) sites offer the best advantages, as all of the proposed inputs and resources are relatively easily obtained.

Port Latta, Geelong, Western Port and Kooragang (Newcastle) are possible sites. These latter sites all suffer the disadvantage of not being able to obtain steam directly from a power station, thus increasing both the capital and plant operating costs.

7.3.2 Ore Transportation Costs

As only 410,000tpa magnesite ore is required to produce 90,000tpa magnesium metal, the cost of transporting ore is minor when compared with the cost savings from locating the plant alongside an existing power station.

BHPE estimated ore transportation costs at approximately A$20/T for a site in Tasmania, approximately A$40/T into Victoria and approximately A$50/T into NSW. On this basis, an additional operating cost of up to A$12 million would arise. However, an electricity cost saving of A$0.006 / kWhr would make such transportation economically advantageous.

7.4 Status of Power Supply Arrangements

Indicative budget prices within the target range (US$20/MWhr for electrical power and US$2.50/hr for natural gas) were obtained as part of the Preliminary Feasibility Study and three sites were short listed for further investigation. These were:

7 Bell Bay, Tasmania;

8 Latrobe Valley (Loy Yang Power Station), Victoria; and

9 Hunter Valley (Bayswater Power Station), New South Wales.

7.4.1 Loy Yang Power Station - Latrobe Valley, Victoria

The Loy Yang A power station (4x500 MW first commissioned 1985/87) is owned and operated by Loy Yang Power. The proposed site for the smelter is approximately 500 metres east of the power station at the so-called 3-4 Bench - a prepared site, intended for another power station before it was cancelled.

Loy Yang Power's basic proposition to Indcor has been to supply power and steam for 20 years at A$28 / MWhr (US$16.80 at A$1:US$0.60) and A$8.00 / tonne (US$4.80 at A$1:US$0.60) respectively, both indexed to CPI.

However, due to spare boiler capacity at Loy Yang A, additional coal can be injected into the system to generate incremental power from each of the four units as well as additional steam which can be converted into power with the installation of an auxiliary turbo generator (TG 5). The 70 MW of incremental capacity would come at a cost of approximately A$40 million in capital (which Loy Yang Power has not been willing to fund) and an additional annual operating charge of $3.6 million.

With capital recovery and the incremental operating charge, power can be produced from TG 5 for A$14.80 / MWhr. This allows the weighted average price of the power to be lowered to A$23.50 / MWhr (US$14.10 at A$1:US$0.60) when combined with the headline power price of A$28 / MWhr.

Natural gas supply to the site can be accessed for slightly less than A$3.00 / GJ.

7.4.2 Bayswater Power Station - Hunter Valley, NSW

The Bayswater power station (4x660 MW first commissioned 1985/86) is located in the upper reaches of the Hunter Valley in NSW. The power station is owned and operated by Macquarie Generation, a corporatised State Government entity. The proposed site is located about 1 km from the power station and ash ponds.

Macquarie Generation's basic proposition to Indcor has been to supply power and steam for 15 years at A$26.00 / MWhr (US$15.60 at A$1:US$0.60) and A$6.50 / tonne (US$3.90 at A$1:US$0.60) respectively. Their proposed indexation is largely based on wage rises that have traditionally moved faster than CPI.

Natural gas supply to the site can be accessed for an indicative cost of A$3.00 / GJ.

All other costs such as water, solid waste handling and transport of magnesite to the site are assumed to be the same as the Loy Yang site.

7.4.3 Bell Bay Power Station - Bell Bay, Tasmania

The Bell Bay power station, which is currently fuelled by oil, has a nominal capacity of 240 MW with a sent out capacity of 218 MW. The power station has only played a back up role since it was commissioned and has been rarely used due to the high availability of hydro capacity in Tasmania.

Duke Energy is in the process of constructing a 305km sub-sea pipeline which will cross the Bass Strait from Longford, Victoria to George Town, Tasmania and will stretch for a further 403km across Tasmania. Duke proposes to convert the Government owned Bell Bay power station to natural gas under a 25 year leasing agreement. The natural gas will be piped across the Bass Strait from the BHP / Esso gas fields off the coast of Victoria.

Duke Energy's initial proposition to Indcor was to supply energy over a 15 year contract at a power price of A$34 / MWhr (US$20.40 at A$1:US$0.60), a steam price of A$9.00 / tonne (US$5.40 at A$1:US$0.60) and a natural gas price of A$3.05 / GJ. All prices are indexed to CPI.

Subsequent discussions with Duke and a proposed revision to the upgrade of the Bell Bay Power Station (which would see nominal capacity rise to 360 MW with the addition of a new gas turbine) have indicated that a power price of around A$26 / MWhr (US$15.60 at A$1:US$0.60) is achievable.

Figure 10 – Power Supply/Site Location Options