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**AUSTRALIA'S ACTIONS TO MEET ENERGY AND
ENVIRONMENTAL CHALLENGES FOR THE ALUMINIUM
INDUSTRY**

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Abstract

The Australian aluminium industry has grown rapidly over the past 20 years. This paper briefly discusses the reasons for that growth, which are mainly associated with Australia as a world competitive energy supplier.

Some projections are presented showing that the alumina and aluminium industries have the potential for substantial further growth of at least 30% over the next ten years. It is indicated that the main factors likely to influence the investment needed to underpin this growth are environmental factors such as climate change and Australia's response in terms of energy prices and sustainable development.

It is shown that Australia must find a greenhouse response that encourages the aluminium industry to make an effective contribution while preserving the international competitiveness of the industry. This is a challenging task that will involve maintaining Australia's real energy prices at levels in line with those in countries competing for investment in this industry.

The Light Metals Action Agenda is seen as the appropriate mechanism to set up a long term vision by the Government and the industry to achieve the potential growth. This Action Agenda will be anchored on a sustainable development framework and will seek to establish a sectoral agreement on greenhouse for the industry. Such an agreement will require significant progress in improving energy efficiency in the industry, possibly of the order of 25% over the next 10 to 20 years. The further development of technology roadmaps, including one for the smelting sector, is seen as a key component of the overall response.

INTRODUCTION

It is timely to have this important technical conference for the aluminium industry. There are major changes happening in the global economy of both a

short and long term nature that have large potential implications for the industry. Technology development will be called upon to lead the way in meeting the challenges that the industry will face over the next ten to twenty years. These challenges are largely linked to energy and the environment in one way or another.

I want to spend the next half hour giving you my assessment of where the industry is at the moment and my interpretation of the vision that industry needs to embrace if it is to realise its potential in the medium to long term future. The energy and environmental challenges are central to that vision.

THE PRESENT SITUATION

I don't want to linger on the past but some reference to where we have come from and where we are is essential to firm up the future vision.

Aluminium is a relatively new material. The period since about 1960 has seen very rapid growth in aluminium production around the world, although the global players and the perceptions of the industry and aluminium as a material have changed over this period. These changes have been particularly rapid and significant in the last ten years for several reasons.

The industry grew initially in Europe, North America and Japan as these economies developed after the second world war. That was where the markets were and where the capital investment, technology capability and energy were available. Aluminium as a material moved from a new product to one with many accepted applications and by the nineties could be classed as a relatively mature industry. At the same time the technology for producing the metal and the products developed rapidly, although the underlying processes have remained essentially the same through the Hall-Heroult technology.

The production and consumption of aluminium has grown steadily over the long term, at an annual rate of about 2.5% per year. The location of production facilities has changed quite dramatically however, with a particularly significant change being the decline of the industry in Japan in the early eighties in response to the oil shocks. This was Australasia's opportunity, by the way (not forgetting New Zealand), and our industry grew rapidly from that time to move us from a relatively small player to a global force, especially in alumina. Further changes in the location of production have been occurring in the nineties and if anything accelerating as the millennium closed. The industry is declining in Europe and the USA and new production is centred more and more on developing countries, including China. Russia is an interesting special case, with the industry growing strongly under the Soviet regime as a supplier to the military. To the surprise of many the Russian industry has maintained its

production capacity after the collapse of the Soviets and is now a major player in the world export market.

At the present time the likely locations for future investment are mainly developing countries in Africa, Asia and Latin America. This is driven largely by considerations of energy and environmental requirements. The exceptions to this trend may be Australia, Canada and Iceland, wherever there have been recent increases in capacity and which may remain competitive for investment, depending on the energy and environmental equation. However Canada is facing pressure on energy costs due to its links to the USA electricity market and Iceland's capacity for further expansion is probably limited to no more than one medium size smelter.

There is general agreement that there will be continued growth in global demand for aluminium, and that growth is likely to be no less than the historical average of about 2.5%. Some of this will be filled by increased recycling and production of secondary metal but most will have to come from expansions in primary metal capacity for the foreseeable future. Growth may even be higher than in the past if aluminium succeeds in fulfilling its potential to help society meet the environmental challenges in transport, building and construction, packaging and other applications.

If demand for primary aluminium grows by about 2.5% per year over the next 20 years then that means an increase in global capacity of around 12m tonnes. That's a lot of new potlines and the question for Australia is whether some of that capacity can be built here. If we are to see that investment we have to be able to offer what is needed in terms of energy and environmental standards. Technology is a key part of that and Australia has to be part of the global advances in technology that will be needed.

ENERGY AND THE ENVIRONMENT : THE CHALLENGES

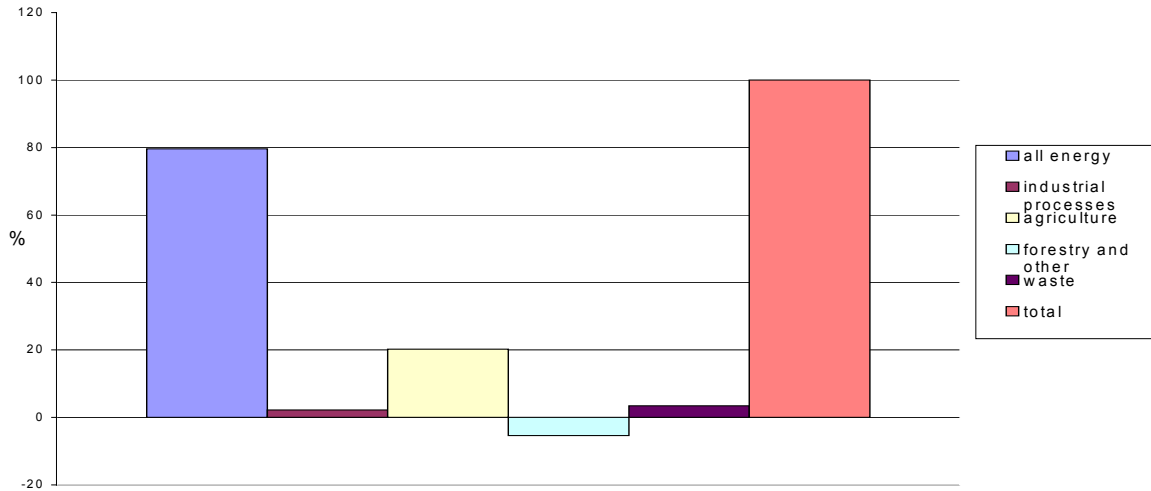
These key parameters are intertwined these days, in that one of the main environmental challenges is critically energy related. That challenge is climate change. For that reason I want to talk briefly about energy globally and in Australia and its relationship to the aluminium industry and climate change.

Climate change is a major global issue and the world is moving towards a response to the challenge of rising atmospheric global warming gases. The aluminium industry is directly involved in the response in two ways : there are direct process emissions (mainly PFCs from smelting) and there are emissions from the energy used in the process or to make the electricity.

In Australia over 70% of our emissions are from energy when all sources are included. The rest is mainly from agriculture. What that means is that

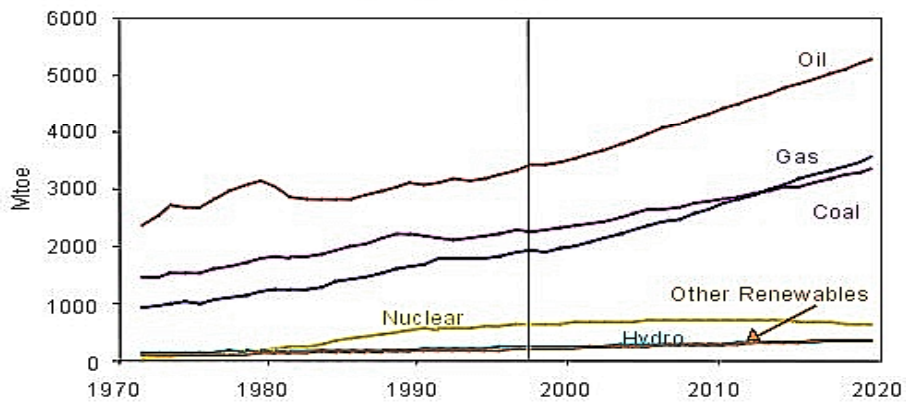
Australia's response to climate change has to focus largely on the energy sector. At the same time Australia has an energy intensive economy partly because we are successful suppliers of energy intensive products such as aluminium to world markets.

Australian emissions by sector in CO2 eq 1998

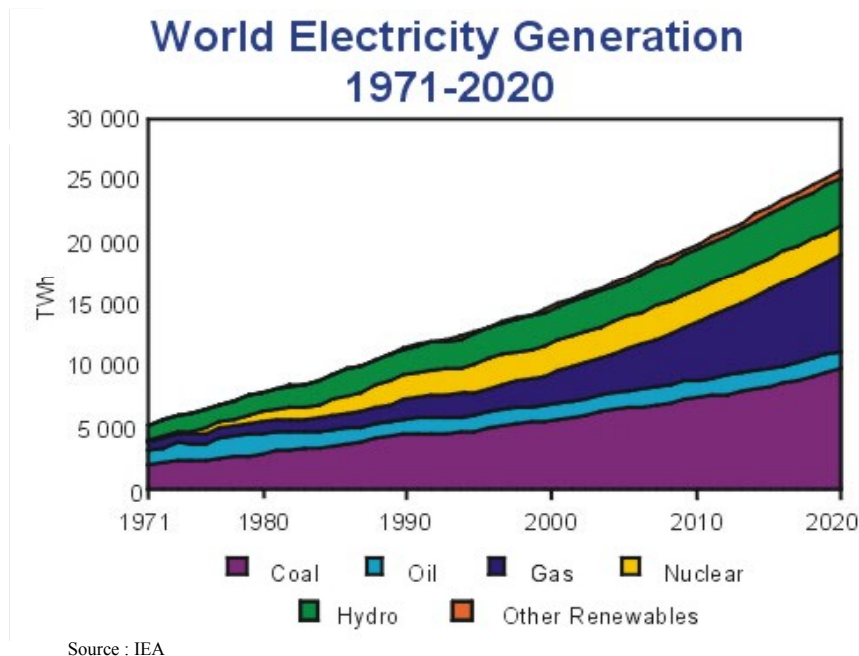


There is a lot of unrealistic talk when it comes to energy and climate change. The fact of the matter is that over the next twenty years it will not be possible to move significantly away from fossil fuel as the major energy source, in Australia and around the world. The projections released recently by the International Energy Agency show this starkly, with gas and coal growing, liquids remaining fairly static, hydro and nuclear falling slightly and other renewables growing but from such a low base it will have little overall impact.

World Primary Energy Supply by Fuel 1971-2020



Source : IEA



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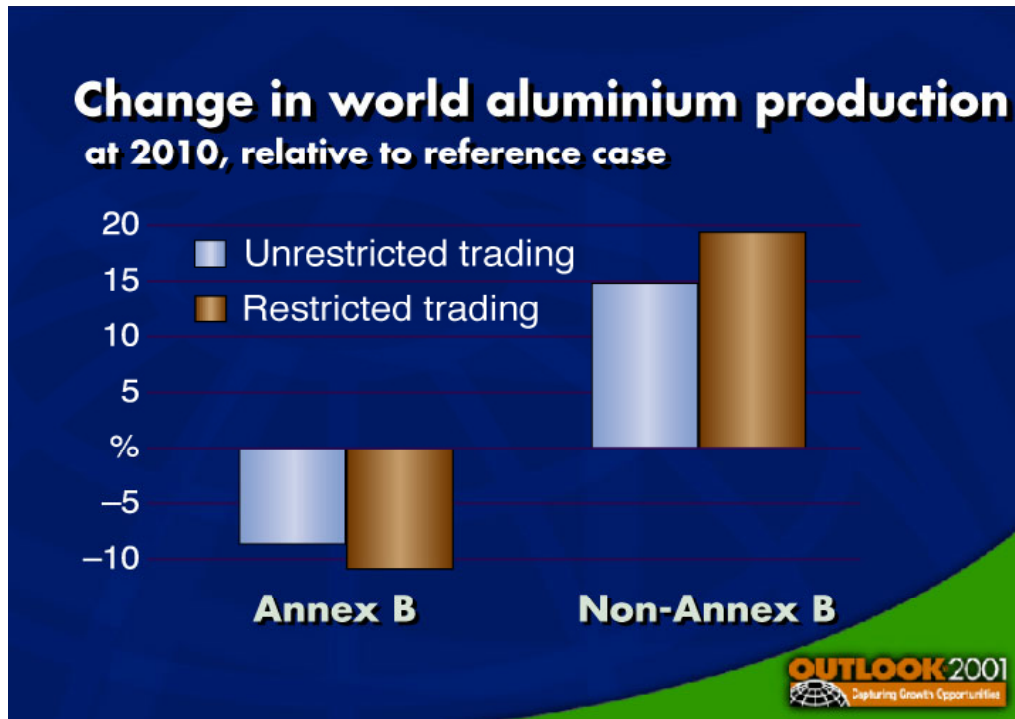
Australia has a leading aluminium industry mainly because it has been able to deliver energy at world competitive prices and with a high level of reliability. The question we have to ask is can that competitive edge be maintained in the world of the next twenty years. What factors are going to be decisive as companies contemplate their investment decisions.

The response to climate change is clearly going to be one of the key parameters. Some key points in this regard are:

- Climate change is a global issue
 - The current framework that is emerging (the Kyoto protocol) has many flaws and these flaws are particularly difficult for Australia
 - If it comes into force it will not include about 80% of the emitters (no USA, probably no Canada and no developing countries or China)
 - An international emissions trading system may emerge but it will be severely limited in effectiveness due to the small participation and the onerous restrictions being placed on it under the Protocol
- Australia's overall task may be manageable at some cost under the elements agreed at the recent Bonn COP6 meeting
 - But the implications for the aluminium industry and similar trade exposed energy intensive industries could still be very difficult

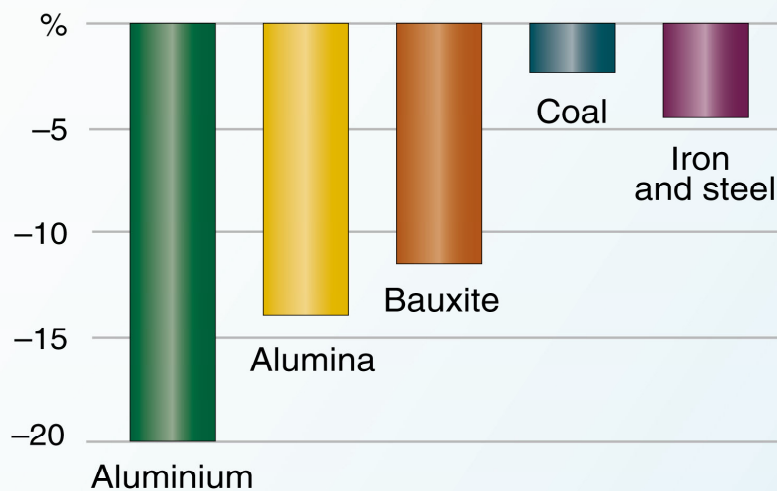
- Once there is a price for carbon it will raise the cost of Australian aluminium production relative to competitors for investment in the industry
 - Unless Governments think laterally about the issues
- The issue for the aluminium metal industry is the emissions involved in electricity production
 - Some gains can be made in energy use efficiency but these are limited except in the long term
 - Australia is already at the leading edge of efficiency in electricity use.

Some ABARE analysis shows the potential costs for the Australian aluminium industry if we don't get the right response. The issue is whether this is the future or whether there are alternative paths.



Change in sectoral outputs in Australia under the Kyoto Protocol

at 2010, relative to the reference case



The aluminium industry is responding to greenhouse and has reduced its direct emissions dramatically over the past ten years. In the longer term there may be significant step changes in technology that reduce electricity usage but this cannot occur in a short time frame.

The Government is currently looking at a national energy strategy. It is high time that such a strategy was in place, given the importance of energy to the Australian economy. It is essential that any national energy strategy recognises the needs of energy users for continuing world competitive supplies of energy in a reliable framework. I would suggest this means energy prices must be maintained at least at current real levels and certainly must not move out of line with our competitors. At the same time I suggest the emission intensity of our electricity needs to drop. This is a tall order but it has to happen if we want to retain our competitive energy intensive industries.

There are other features of a national energy strategy that need to be addressed, especially the completion of effective market reforms in electricity and gas. We are still a long way from that and the model that seems to be emerging is making it very hard to achieve the sort of long term contractual arrangements needed to underpin the capital invested in aluminium production facilities.

SUSTAINABLE DEVELOPMENT

I have lingered on the energy issue because it is the most critical for the future of the aluminium industry in Australia. There are other environmental pressure that also have to be dealt with. In general terms these can be linked under the heading of sustainable development and this expresses the growing need for the industry to deliver world's best practice in terms of the resources it uses, the impact on the overall environment and the social impacts it has.

These sustainable development issues focus on two areas in particular. The first is the impact the industry has on its direct environment, through its emissions to land air and water. To fulfil its future charter the industry will have to significantly reduce these impacts, well below the already good level it has reached.

The second area concerns what I call material selection issues. These are being driven more and more on environmental performance and aluminium has much to offer but challenges to overcome to achieve its potential. Sustainable development is an essential concept in this regard and requires proper life cycle analysis to fully assess the impacts of various materials. Unfortunately the correct approach is not always followed and the easy road of partial indicators, like embodied energy, are all too often used.

One of the key points for aluminium in the sustainable development context is its low energy recyclability and this is not always properly appreciated when the material selection decisions are being made.

THE WAY FORWARD

The Australian industry has been giving close consideration to the best way to chart the appropriate course for the future. This will need to help the industry meet the challenges mentioned above and some others.

Some key factors have been considered in deciding on the course to follow:

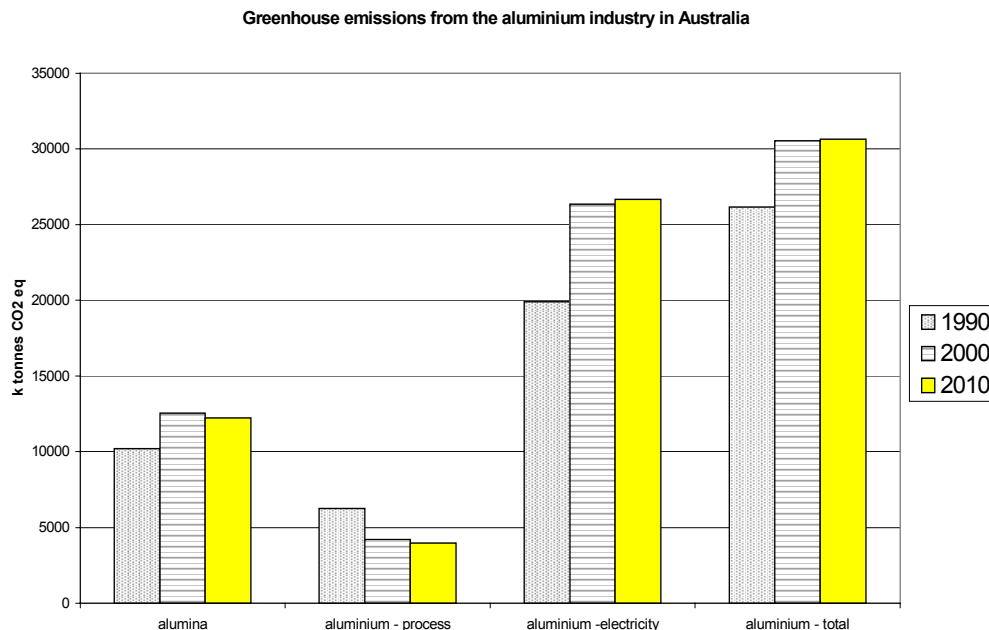
- There must be a shared long term vision for the industry and the Governments in Australia
- This vision must establish some demanding but achievable targets in terms of industry growth and environmental performance
- The vision must give certainty in regard to energy supplies and prices
- The vision must lead to a workable framework for the industry's greenhouse response
- There must be a clear and central sustainable development framework as an anchor point for the long term vision
- Technology and Research and Development will be central to responding to the challenges being faced by the industry.

Let me take one of these issues in more detail, that of greenhouse gas emissions. The chart below shows the historical, current and projected emissions for the industry in Australia through to 2010 at least. The figures to 2000 are fact and have recently been tabled in the industry report under the

Greenhouse Challenge Program. The figures in 2010 rest on the following assumptions:

For alumina a 30% increase in production between 2000 and 2010 and an energy efficiency gain of 25%. The production projection has recently been updated by the Aluminium council. The energy efficiency improvement is the goal of the Alumina Technology roadmap that is just being released (although to be truthful the period in that roadmap is 10 to 15 years).

For aluminium an increase in production of 35% between 2000 and 2010. In relation to process emission the assumption is a reduction in emissions of 25% over the same period. I regard that as conservative, given the further gains possible in reducing PFC emissions and the imminent arrival of inert anodes on the scene. In relation to electricity, the assumption is a reduction in emission intensity of 25%, partly through gains in use efficiency in the potlines and partly through a reduction in emission intensity of electricity generation, through a combination of fuel switching (to gas), more efficient generation technology and, possibly, some small contribution from CO2 sequestration (reinjection etc).



These are only my projections but they show clearly that the industry can hold its direct and indirect greenhouse emissions at the current level even while expanding quite rapidly over the next ten years. This would be a major contribution to Australia's economy and to the overall greenhouse task. To

achieve this outcome there needs to be put in place a sectoral agreement with the Government that defines the agreed task of the aluminium industry and creates the environment where the best decisions can be made by the industry to deliver on the commitments under that agreement.

One way to ensure this industry growth does not occur would be to try to introduce an all embracing domestic emissions trading system. At a cost of A\$30/tonne of CO₂ eq the added cost of producing one tonne of metal in Australia would be A\$900. The current price is about A\$2650/tonne so the end result for the industry would be at least as bad as the results modelled in the ABARE graphs shown above.

While the industry has known for some time that it is necessary to deal with these challenges it has searched for the right way to bring the necessary forces to bear. The way that has been chosen is explained briefly below.

LIGHT METALS ACTION AGENDA

The Government has a broad policy called 'Investing for the Future'. A key component of that policy is the establishment of Action Agendas for key sectors. These Action Agendas develop the shared vision, analyse the business case for that vision and, if justified, set out the actions that it is felt will help achieve the vision.

The Light Metals Action Agenda should be released by the Government in October 2001. It covers aluminium, magnesium and titanium and was essentially launched by the approach to the Government of the aluminium industry about 18 months ago on the need for a long term vision and an investment climate conducive to the industry growth mentioned above.

This action agenda underlines the objective of industry growth and sets up some priorities to help achieve that vision.

It is interesting to look at the framework developed by the aluminium industry to focus its thinking as the action agenda was developed. This has evolved over the last year or so but is broadly what was on the table at the start of the process. It gives the anchor point of sustainable development and priority to the importance of technology if the vision is to be achieved.



It is pertinent to note that the mechanism to be used to facilitate technology development is the technology roadmap. There is another paper at this conference dealing with the first of these roadmaps, the alumina technology roadmap, so I won't cover that here. I would add, however, that it is intended to give consideration to a roadmap for smelter technology that would link with some efforts already completed in North America. That roadmap should be under active development at the time of this conference.

Many of the action items in the action agenda and on the chart shown above are under way in any case. It is hoped that this initiative will link them together more effectively and give a focus that has not really existed in the past.

CONCLUSION

I am convinced that Australia has a great future as an aluminium producer. I think that production capacity can increase by at least 30% by 2010 and probably by as much again by 2020.

For this to happen Australia needs to have a clear appreciation of where its competitive advantage lies. That is largely with its ability to produce world cost competitive energy. The continuation of this energy competitiveness needs to be the central plank of a national energy strategy. The market reforms for electricity and gas and the infrastructure developments needed must be brought to a successful conclusion. This must be done at the same time as the greenhouse emission intensity of Australia's electricity is reduced.

There are significant uncertainties remaining in relation to the greenhouse task and the aluminium industry needs to play its part. However, what is expected of the industry must also give heed to the maintenance of its competitiveness and the potential for future growth. The best way to do that is currently being discussed with the Commonwealth government on the basis of a sectoral agreement for the industry.

The aluminium industry will have to move strongly in terms of energy efficiency and environmental performance if it wants to attract the investment indicated above. That means that the role of R & D and technology is absolutely critical. The concept of industry technology roadmaps to help focus those efforts is being actively pursued.