# *Rebooting Australian Aluminium:*

## *The Economic, Social and Environmental Potential of the Portland Smelter*

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## Introduction and Main Findings

Since 1986, Alcoa has operated a major aluminium smelter in Portland, in the southwest region of Victoria. The plant employs hundreds of workers in a less developed region of the state, generates billions of dollars of export revenue, and contributes significantly to the revenues of all levels of government. But for over a decade the smelter's future has been in question, threatened by corporate restructuring, global market changes, and energy and environmental concerns. Once again the plant's continued operation is in jeopardy.

Alcoa has undertaken major restructuring of its operations in recent years, including spinning off its "value-added" manufacturing operations into a separate company, and divesting some other assets entirely. Continued uncertainty surrounding Alcoa's strategic direction (including a recent pledge by management for more cost-cutting and divestment) is creating intense uncertainty for the Portland smelter, its employees, and the entire community.

Additional questions have been raised about the facility's future as a result of its ageing and unreliable power supply. Reliable and competitive electricity is a crucial input to aluminium smelting: power accounts for around one-third of total production costs, and extended power interruptions can cause hundreds of millions of dollars of damage to capital equipment. Fortunately, the accelerating transformation of Australia's electricity system, with expanding capacity and falling costs for renewable power, holds great promise for addressing that aspect of Portland's challenge.

This is a moment for all of the stakeholders who benefit from the plant's continued operation to collaborate around a vision of technological and environmental renewal for the facility. The Portland smelter can continue to make an outsized contribution to Australia's employment, productivity, and exports for decades to come. This report summarises the economic, social, fiscal and environmental benefits of advanced, sustainable aluminium manufacturing in Portland:

- Australia is the world's leading producer of bauxite, the best raw material for producing aluminium. But as has so often been the case with Australian mineral production, our role in this valuable industry has been focused narrowly and unduly on pure resource extraction.
- By concentrating our activity at the lower-value end of the aluminium industry's supply chain, Australia foregoes enormous economic and employment opportunities.
- Australian aluminium manufacturing has declined by almost 20% since 2010 (due to closures and reduced utilisation), even as bauxite extraction sets new records. Without a pro-active strategy to maximise value-added opportunities arising from our resource wealth, Australia will be increasingly consigned to pure extraction, rather than manufacturing. The potential closure of Portland would represent another major blow in this negative trend.
- The Portland smelter supports a far-reaching web of business and employment, that reaches into all states in Australia. This includes "upstream" industries: the huge array of firms which supply hundreds of different goods and services to the Portland operation. It also includes "downstream" businesses, which depend on the spending power of Portland workers for their own viability.
- Economic simulations indicate the closure of Portland would reduce Australian national GDP by $800 million, exports by $840 million, household incomes by $250 million, Commonwealth government revenues by $192 million, and Victoria state government revenues by $50 million. (All figures annual.)
- A total of 3600 direct and indirect jobs would be lost as a result of the facility's closure – with the economy of southwestern Victoria suffering the worst blow.
- Rapid developments in renewable energy technology could significantly improve both the cost and the reliability of electricity supply to the Portland smelter. Already renewable energy enjoys a 30% saving in levelised costs compared to coal (which currently powers the majority of Portland's consumption). That advantage will widen in future years, driven by falling costs for both renewable generation and storage.
- Global businesses, including top-tier manufacturers which purchase aluminium and aluminium components, are increasingly demanding high sustainable production standards from all of their suppliers – including aluminium ingots and components. Australia's endowment of renewable energy resources gives us a major head start in responding to this trend.
- Reinvesting in the Portland facility, including in a secure and sustainable electricity supply, holds the potential to lead a broader revitalisation of aluminium manufacturing in Australia. All stakeholders – Alcoa, its suppliers, the state and Commonwealth governments, the community, the workers and their union – can come together to support a plan for the plant's reinvestment and modernisation.

### Profile of the Portland Aluminium Smelter

Alcoa's aluminium smelter in Portland, Victoria is a vital economic anchor for the entire region. It makes a significant contribution to Australia's national industrial and export performance.

**Key facts (2019 or most recent):**

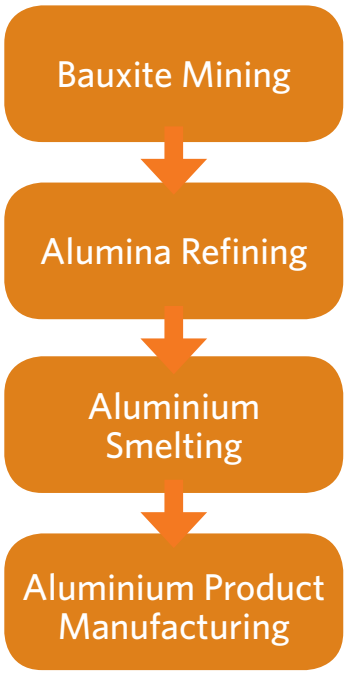
- Capacity to produce 358,000 tonnes of aluminium ingots per year.
- Generates total revenues of approximately $800 million per year.
- Effectively all production is exported – making the smelter Victoria's largest single exporter.
- Employs 630 direct workers and contractors, generating close to $100 million per year in wages, salaries, and benefits.
- Supports almost $200 million per year in direct and indirect regional, state, and national tax revenues.

## Aluminium: A Metal with a Bright Future

Australia has been a major global producer and exporter of aluminium for the past half-century. This success stemmed partly from our rich domestic deposits of bauxite ore, the primary ingredient in aluminium. But it also reflected decades of pro-active policy efforts by state and Commonwealth governments, determined that Australia would play a significant and fulsome role in this growing, global, high-technology industry. Without that deliberate effort to build an Australian aluminium smelting and manufacturing capacity (invoking various policy levers including trade measures, subsidies, regional development plans, and energy planning), this valuable sector would not exist here today.

Aluminium is an essential material in modern industrial society. It has many favourable properties: including light weight, malleability, conductability, and recyclability. Those features underpin long-run growth in global demand for aluminium. Environmental concerns are accentuating the use of aluminium: including for lightweight components which improve fuel efficiency in motor vehicles, and energy-efficient building materials. Of course, those same environmental concerns require that aluminium itself be produced in an environmentally sustainable manner.

***Figure 1: The Aluminium Value Chain***




Australia is well-positioned to benefit from the growing global demand for aluminium. Australia possesses enormous reserves of bauxite (the best raw material for aluminium), and has long ranked as the world's largest bauxite producer. Bauxite must first be refined into alumina, which is then smelted into aluminium. Aluminium is then used in a wide range of manufacturing applications[1]:

- 28% of world demand is for transportation equipment manufacturing (motor vehicles, aerospace, public transit).
- 23% is for construction and building materials.
- 13% is used for electrical applications.
- 12% is used for packaging.

However, Australia's foothold in the value-added segments of aluminium production has been shrinking in recent years. Extraction of raw bauxite has grown, setting a new record in 2018 of over 100 million tonnes (see Table 1). Alumina refining has been stagnant – in fact, one major refinery (in Gove) closed in 2014. As a result, a growing share of Australian bauxite (about one-third) is now exported in bulk, without even this most minimal of processing. Meanwhile, aluminium smelting has declined by about one-fifth, with two smelters closed: in Kurri Kurri in 2012, and Port Henry in 2014. Australian production of value-added aluminium products (such as automotive components) has also declined, in line with the general downturn in Australian manufacturing after 2008 (including the total shutdown of mass automotive assembly).

Table 1 — **More Mining, Less Value Add**

| *Product* | *Australia Global Rank: 2010* | *Change in Production 2010-19* | *Australia Global Rank: 2018* | *2019 Production (000 tonnes)* |
|---|---|---|---|---|
| **Bauxite** | 1 | +54% | 1 | 105,500 |
| **Alumina** | 2 | -0.3% | 2 | 19,925 |
| **Aluminium** | 4 | -19% | 6 | 1,570 |

*Source: Author's calculations from Dept. of Industry (2019) and US Geological Survey Mineral Commodity Summaries (2020).*

## Sliding Down the Value Chain

Because of this increasingly narrow focus on extraction and export of raw bauxite, Australia's position in the global aluminium value chain has become stunted, undervalued and precarious. We are forgoing the jobs, incomes, exports, and productivity that would be generated by adding more value to our bauxite resources. Instead, those jobs are "exported" — right along with millions of tonnes of raw material.

Because of the decline of domestic aluminium smelting capacity, almost 90% of our refined alumina is now sent to export markets for further processing. And huge quantities of bulk bauxite (some 37 million tonnes in 2019) are now exported, because our extraction has outstripped our capacity even for basic refining — let alone value-added manufacturing.

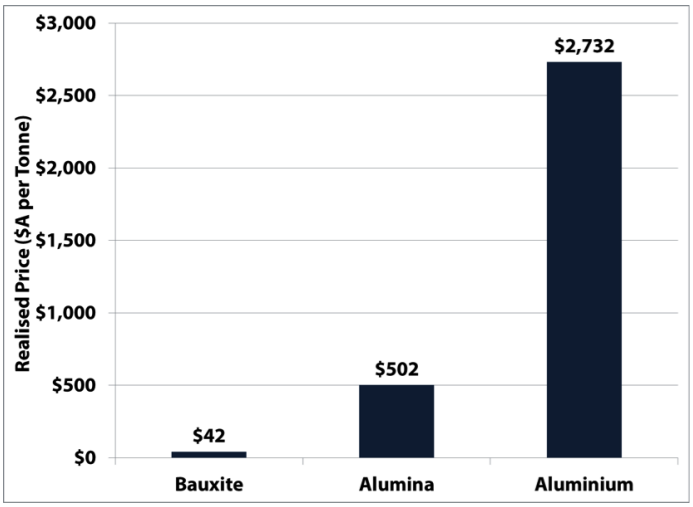
Our narrow concentration in extraction, and shrinking presence in value-added manufacturing, results in enormous economic and employment losses. Figure 2 illustrates the unit prices (in Australian dollars) received for our production at various stages of the aluminium value chain in 2019. Our bauxite exports presently sell for just over $40 per tonne. So those massive shipments of bulk bauxite exports in 2019 translated into total revenues of only $1.5 billion: equal to just 0.3% of Australia's total exports last year, and one-tenth the combined worth of our alumina and aluminium exports. Exporting bulk unrefined bauxite is wasteful and short-sighted.

Meanwhile, exports of smelted aluminium ingots sell for 65 times as much: averaging over $2700 (Aus.) per tonne in 2019. Declines in the U.S.-dollar price of aluminium in recent years have been largely offset by the depreciation of the Australian dollar, so received prices for our smelted aluminium have been relatively stable despite fluctuations in global market prices. Australian exports of aluminium (including semi-fabricated products) are worth $5 billion per year, while our alumina exports generate another $10 billion.

*Australia produced 27% of the world's bauxite in 2019 – but just 2% of the world's smelted aluminium.*

Despite the higher unit values of smelted aluminium (let alone even more valuable manufactured aluminium products and components), Australia's industry continues to concentrate on the least lucrative segments of production. This reflects a combination of corporate greed and policy failures by Australian governments. Left entirely to their own devices, global corporations will naturally locate smelting and manufacturing operations in lowest-cost jurisdictions: taking advantage of ultra-low labour costs (suppressed in part through violations of basic labour and human rights), government subsidies, and lax regulations in other jurisdictions. Meanwhile, Australian governments have abandoned the tools of active industrial policy, allowing these private business decisions to shape the future of our industry without constraint. If we want Australia to be more than a supplier of raw resources, we need to actively shape and direct private business decisions, in order to maximise the domestic benefits from our own resources.

***Figure 2: Unit Revenues for Aluminium Components***




*Source: Calculations from Dept. of Industry (2019) data; first 9 months of 2019.*

By allowing our value-added capabilities in aluminium manufacturing to atrophy (including alumina refining, aluminium smelting, and secondary fabrication and manufacturing), Australia is shipping billions of dollars in value-added, and many thousands of well-paying jobs, to offshore jurisdictions.

If all of Australia's bauxite exports were refined into alumina at home (rather than in other countries), that would generate an additional $5 billion in annual revenues and support an additional 4000 jobs. Meanwhile, if all of Australia's current alumina exports were used in the smelting of aluminium here (instead of overseas), domestic smelting output would quadruple — generating an additional $20 billion in annual revenues, and 20,000 new jobs.

Such a dramatic transformation of Australia's current lopsided industrial structure would take many years and would require powerful policy interventions to achieve. At a bare minimum, however, we must ensure the existing over-emphasis on raw extraction does not become even worse — as a result of yet another smelter closure.

## A Long and Sophisticated Supply Chain

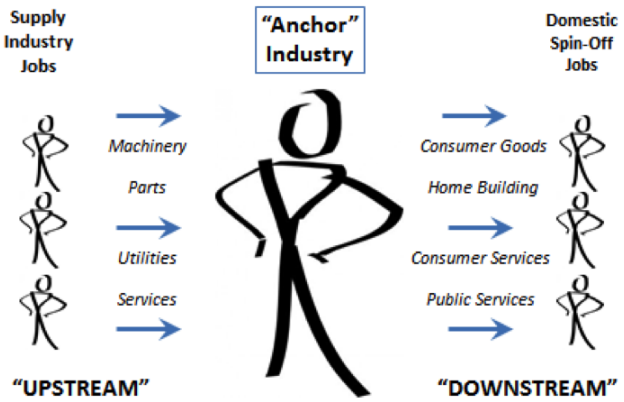
A major, capital-intensive manufacturing facility like an aluminium smelter plays a crucial role in "anchoring" a broad range of economic activity in its host region, and in the country as a whole. These facilities secure many jobs in related sectors — in addition to the high-quality jobs directly created within the "anchor" facility itself.

Figure 3 illustrates the linkages between an anchor facility and the various indirect jobs which depend on that facility for their own survival. One category of indirect jobs includes those located "upstream" from the anchor industry: in the numerous supply and service sectors which sell inputs (including raw materials, parts, machinery, utilities, and services) to the anchor facility. Another set of indirect jobs is found "downstream": in the various consumer goods and services industries which require an initial population of employed workers nearby to serve as their own market. When those workers subsequently spend their earnings — on everything from homes to consumer goods to private services (like restaurants and dry cleaners), and even financing public services from their tax payments — they create the economic foundation for thousands of downstream jobs.

The economic impact of aluminium production thus extends far beyond the confines of a smelter. Because this industry purchases a rich and diverse portfolio of inputs from dozens of different supply industries, Australians in all broad segments of the economy, and all states in the federation, receive incremental business and income from the industry's presence and activity.

Table 2 summarises the main "upstream" industries which supply non-ferrous primary metal production, including aluminium, nickel and zinc.[2] For each major supply industry, Table 2 reports the total business generated by sales to aluminium production, and the number of jobs that are supported by those sales in each sector.

*Figure 3. "Anchor" Industries and their Linkages*




Of course, the biggest single input is bauxite (initially refined into alumina). Electricity is another major purchase. But in total there are 68 different goods and services industries (as defined by the Australian Bureau of Statistics) that supplied at least $1 million in the 2016-17 financial year to the smelting industry. Total supply chain purchases by non-ferrous primary metal firms in 2016-17 (most recent year available) equaled almost $30 billion. And in turn, an estimated 27,000 jobs depend on those input purchases — twice as many as the 13,000 direct jobs present in basic non-ferrous metal production itself.

Meanwhile, the "downstream" spending of workers employed in aluminium production — as well as all the industries which supply aluminium production — in turn supports employment in all the consumer goods and services industries which depend on the purchasing power of average Australians. That includes private consumer goods and services businesses, as well as the public service activities financed with tax revenues collected from those workers and industries.

Table 2 — **Non-Ferrous Metal Manufacturing, Output and Key Inputs**

| *Industry* | *Sales/Purchases ($m)* | *Supported Employment** |
|---|---|---|
| **Non-Ferrous Metal Manufacturing** | **39,888** | **13,277** |
| **Major Input Purchases** | | |
| Mining & Refining | 23,430 | 17,075 |
| Other Manufacturing | 214 | 490 |
| Electricity Generation and Transmission | 1,676 | 904 |
| Other Energy | 1,791 | 680 |
| Transportation | 1,330 | 4,841 |
| Other Services & Suppliers | 823 | 2,891 |
| **Total Domestic Supply Chain Purchases** | **29,264** | **26,881** |
| **Imported Supplies** | **7,048** | |
| **Domestic Value-Added** | **3,459** | |

*Source: Compilation from Australian Bureau of Statistics Catalogue 5209.0.555.001, 2016-17, and 8155.0.*
** Includes direct inputs only (excluding employment associated with indirect linkages to higher-order suppliers). Estimated based on average sales/employment ratios for each supply industry.*

Combined, these "upstream" and "downstream" linkages generate a multiplied overall impact from aluminium production equal to 4 or more jobs in total, for each direct job in an aluminium smelter. Of course, some argue that if aluminium smelters closed, displaced workers would be automatically reabsorbed into other positions. But given the regional location of facilities (such as Portland) and the currently depressed state of the overall labour market, this will not happen smoothly or quickly.

## The Regional and National Significance of the Portland Smelter

Because of its diverse and far-reaching supply chain, its significant contribution to national export performance, and the wages and salaries that depend directly and indirectly on Portland's continued production (and its supply chain), this smelter makes a measurable contribution to Australian macroeconomic performance. Hence the closure of that facility would constitute a significant economic blow to the entire country — at a time when Australia's overall economy is already staggering in the face of weak growth and capital investment, the impacts of the bushfires, and now the coronavirus.

Table 3 — **Estimated Economic Effects of Portland Smelter Closure**

| | *Victoria* | *Western Australia* | *Other States* | *Australia* |
|---|---|---|---|---|
| **GDP ($m)** | -$558.5 | -$130.0 | -$121.3 | -$809.8 |
| **Household Disposable Income ($m)** | -$118.6 | -$79.2 | -$53.4 | -$251.2 |
| **Employment (Number)** | -2257 | -716 | -668 | -3640 |
| **Exports ($m)** | | | | -$840.0 |
| **Direct Tax Revenue ($m)[1]** | -$50.3 | -$11.7 | -$10.9 | -$191.8 |

*Source: Economic simulations as explained in text.*

*1. Estimated by application of aggregate tax ratios to GDP changes in first row. Australia column for tax revenue refers to the Commonwealth level of government only, and does not include revenue losses for state governments.*

We have simulated the likely aggregate effects of the closure of Portland on the basis of a macroeconomic input-output model constructed and operated by the National Institute for Economic and Industry Research, based in Victoria. We contracted the NIEIR to simulate the direct, indirect, and induced economic effects resulting from the hypothetical closure of the Portland smelter. The results should be interpreted in a medium-run time frame: that is, once supply industries and downstream industries have felt the shock of the loss of business associated with the Portland facility, but before broader macroeconomic variables (including outmigration, wage changes, other price changes, and possible exchange rate and interest rate adjustments) have adjusted to the new situation. Even if and when those broader adjustments occur (a process that would take several years), huge economic and social costs will have been incurred in the meantime — felt particularly acutely, of course, in the Portland region.[3]

The main simulation results presented below assume the closure of the Portland smelter, and then a corresponding proportional decline in output and employment in the various supply industries which service that smelter. Chief among those is the Kwinana alumina refinery in Western Australia (also operated by Alcoa), which sells some $325 million per year worth of alumina to the Portland smelter (transported by ship); the simulation assumes a proportional reduction in output and employment at the Kwinana refinery (and similar changes at other facilities and industries which supply the Portland operation). The results of the simulation are summarized in Table 3. They include expected linkage effects, both upstream and downstream, resulting from the Portland closure.[4]

National GDP is expected to decline by over $800 million, and national employment shrinks by 3640 positions. Note that the loss in total employment is 5 times as large as the number of direct jobs that would be lost in Portland — indicating an ultimate "multiplier effect" of some 5 jobs lost in total, for every direct job lost in the smelter (even larger than implied by the analysis on p.5).

About two-thirds of the job losses, not surprisingly, are concentrated in Victoria. However, because of the spillover impact on demand for alumina produced in Western Australia, that state also experiences significant negative impacts from the Portland closure (including over 600 direct, indirect, and induced job losses, and over $100 million in lost GDP). Household disposable income declines by $251 million across Australia.

Governments also experience a significant revenue hit from the Portland closure: direct state revenues in Victoria fall by over $50 million, and the Commonwealth government (which collects a much larger share of total GDP in various taxes) loses $192 million.[5] National exports decline by $840 million — a major reduction that reflects the fact that the Portland smelter exports effectively all of its output.

## Jobs and Communities at Stake

The Portland region, of course, would experience the worst impacts from the closure of the smelter. The results of the simulation reported above suggest that over 1500 jobs, and over $70 million in household disposable income, would be lost from the Glenelg local government area alone. Local small businesses, which depend completely on the purchasing power of the regional population, would be devastated.

Meanwhile, local and regional government would lose a crucial source of revenues. The smelter is the largest ratepayer to local government in the region (Glenelg Shire), accounting single-handedly for about one-fifth of all rate revenue expected to be received (Glenelg Shire Council, 2016). The loss of revenues resulting from the smelter's closure would immediately cause a trickle-down impact on funding for public services, and hence on local public sector employment and activity.

Since the regional economy in southwest Victoria is already relatively depressed, the continued operation of the Portland smelter takes on added importance. Its closure would cause a dramatic decline in incomes and tax revenues; an acceleration of outmigration and population decline; and a likely collapse in the value of property (destroying much of the accumulated household wealth of Portland residents). It would also throw into question the viability of many other local businesses – including those which supply the smelter itself with goods and services, those which depend on the smelter's presence to justify and fund core infrastructure (including energy and transportation services), and those which depend on the consumer spending power of smelter workers and suppliers.

In practice it is possible that the consequences of the closure of Portland could be even worse than indicated above. The Kwinana alumina refinery in WA is the oldest and smallest in Australia; about one-quarter of its output is delivered to the Portland facility. It is not far-fetched that the closure of the Portland smelter could have a domino effect on the Kwinana refinery, which could conceivably close entirely – rather than trying to survive a major decline in sales (with concomitant impacts on efficiency and unit cost).

If the Kwinana refinery were also to close, then the overall impacts on Australia's economy (and WA in particular) would be much worse. Our simulations suggest the total loss of national GDP would reach $1.75 billion, with over 8000 jobs lost in total. The loss of government revenues, in aggregate, would more than double.

*The closure of the Portland smelter could have a domino effect on other smelters across the country.*

Perhaps most worryingly, the loss of another aluminium smelter (the third in less than a decade) and another alumina refinery would confirm and accelerate Australia's dramatic and ongoing retreat from value-added aluminium manufacturing. And the spillover impact of these closures on the remaining alumiunium operations in Australia should also be considered carefully. In addition to Portland, there are three other operating aluminium smelters in Australia – all owned wholly or partly by Rio Tinto. Reports indicate that the future of those operations is also in question for a range of reasons, including Rio Tinto's corporate restructuring strategy, uncertainty over energy policy, and global competitive pressures (Thompson, 2019).

Manufacturing industries experience well-known "cluster" effects, whereby the success of one producer can encourage and support the expansion of others (through various channels, including the impact of one facility's demand on the efficiency of the associated supply chain). By the same token, failure and contraction can also be echoed across the whole sector. This relationship was demonstrated painfully with the consecutive announcements in recent years by all three major automotive manufacturers to exit Australian manufacturing.

In short, with the critical mass of value-added aluminium manufacturing in jeopardy, and other aluminium facilities also facing financial challenges, the closure of the Portland facility could be catastrophic for the whole sector.

## Australia's Energy Opportunity

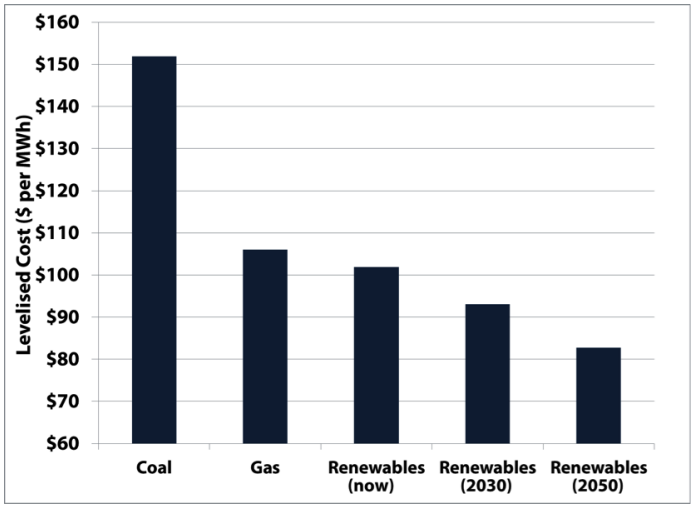
Electricity is a crucial input to aluminium smelting. And problems with electricity supply have posed a major threat to the viability of the Portland facility. Until now, Portland has depended mostly on coal-fired generation from within Victoria (primarily from ageing plants in the Latrobe Valley). That is no longer reliable, competitive, or sustainable. That's why a lasting solution to the power challenge will be central to any plan to successfully secure and revitalise the Portland smelter.

Portland's existing electricity supply has been bedeviled by:

- ***Poor reliability.*** The plant has experienced many interruptions in supply, some lasting hours, as a result of unreliable coal-fired generation and transmission. Most recently power was lost for several hours on January 31, 2020 (Lovell, 2020); that was the second major interruption in just three months.[6] Power interruptions are catastrophic for smelters if molten metal solidifies inside machinery, requiring hundreds of millions of dollars in repairs.
- ***Rising costs.*** Coal-fired power was once considered a cheap energy source (indeed, the Portland smelter was located in southern Victoria as part of a broader plan to develop and extend coal-fired electricity transmission to the region), but this is no longer the case. Combined with other problems in Australia's electricity system,[7] electricity prices have soared in recent years. This imposed a huge cost penalty on major Australian users.
- ***Pollution.*** The necessity of reducing carbon pollution is now critical to future aluminium investment decisions. Regulatory changes and consumer demands are pushing the industry to quickly reduce carbon emissions (primarily arising from electricity generation). Leading manufacturing firms (like Volkswagen, Apple, and Toyota) now require suppliers to meet stringent emission-reduction targets (Lord, 2019); aluminium suppliers which can comply with these demands command premium prices in international markets. Its past reliance on coal-fired power means Portland has relatively high carbon emissions (Toscano and Preiss, 2019), and this must urgently be addressed as part of any plan to secure the plant's future.

Luckily, the parameters of Australia's electricity system are being fundamentally and rapidly transformed. And this shift will have positive implications for the future of major industries, including aluminium.

***Figure 4: Electricity Costs by Generation Mode***




*Source: Author's calculations from Graham et al. (2018). Includes levelised capital costs, costs of 6 hours storage for renewables, and 5% risk premium on fossil fuels. Figure presents averages of low and high cases for each fuel, and average of solar and wind for renewables.*

The cost of installing new renewable energy generation facilities is declining rapidly as a result of technological advances, production efficiencies, and economies of scale in manufacturing and installation. There is now widespread agreement that renewable energy offers the lowest-cost alternative for generation (Graham et al. 2018, Garnaut 2019, and Ellsmoor 2019). Electricity prices in Australia are now declining because of the lower cost and growing penetration of renewables (Karp, 2020).

While the inconsistency and uncertainty of energy policy-making in Australia has slowed down this transformation, creating frustrating and unnecessary uncertainty among investors, the growing economic advantage of renewable energy sources is proving dominant. Thus the role of renewables is growing rapidly despite policy confusion and backflips. From around one-fifth of total electricity generation at present, the share of renewables is projected by government forecasts to reach 50% by 2030 (Department of the Environment and Energy, 2019, p.15)[8]. This is ironic, given the current government's heated rejection of a 50% renewables target for 2030 — and confirms that the economic advantages of renewables are now overcoming ideological debates and policy confusion.

## Making it Happen

The Portland smelter is too important to the regional, state and national economies for its future to be kept in limbo, as has been the case for several years. Workers at the facility, and residents of southwest Victoria, deserve more certainty and hope.

Moreover, the structural regression of Australia's aluminium industry is a telling, painful parable for the broader deinudstrialisation of the national economy. Our rich endowment of natural resource wealth will continue to be squandered, if we allow ourselves to be pigeon-holed primarily as a raw resource supplier – foregoing the economic and employment benefits generated by adding value to our own resources. The further loss of value-added aluminium manufacturing, and still more reliance on raw extraction, is unacceptable and risky.

World demand for aluminium will continue to increase, in part to meet environmental improvements in transportation equipment and building materials. So the world will need Australia's bauxite. The question for Australia is: do we want to continue extracting and exporting massive quantities of raw or barely refined resource? Or do we want to generate more value and jobs from those resources?

There is now a solid expectation that all industries — including aluminium — must contribute fully to the imperative of reducing carbon emissions. Fortunately, Australia is poised to make such a contribution — and in a way that preserves and expands Australian manufacturing. Overall electricity generation will come half from renewables by 2030, if not sooner, and the shift to renewables is accelerating despite confusion and backtracking at the political level.

Even by simply buying power from the integrated statewide grid, therefore, half of Portland's power needs would effectively come from renewables by 2030. But targeted investments could do better than that, accessing bigger power savings faster. Other major industrial investments in Australia (such as the renewed Whyalla steelworks in SA, and the Sun Metals facility in Queensland) are investing in directly-connected custom-built renewable energy facilities, in order to lock-in reliable, affordable, zero-carbon power.[9] Improvements in storage capacity, combined with effective integration with the overall grid, allow renewables to provide reliable power even for very large industrial users.

Some initial proposals have been advanced to provide the Portland smelter with more reliable, low- or zero-carbon electricity as part of a broader reinvestment in the facility. These proposals will require more discussion and development. But the experience of other investments has already proven it is both technologically feasible and financially profitable to strengthen and expand Australia's industrial capacity on the strength of its unmatched endowment of renewable energy.

### Frequent Demand Response Service

A particularly exciting development in the technology of aluminium smelting holds additional potential for reducing energy costs for the Portland smelter — and even generating an alternative revenue source for the operation.

Australia's electricity system is now adopting measures to facilitate demand-side response to variable power use. The goal is to smooth daily peaks in demand, reducing consumption in key periods, and thus conserving both overall capital costs and emissions. New technology allows heavy industrial users — like aluminium smelters, the biggest electricity consumers in the economy — to play a major role in demand response mechanisms, and even to generate new revenues from it.

A new technique called 'EnPot' technology allows aluminium potlines to operate with significantly lower power inputs for several hours at a time, on relatively frequent occasions, without damaging capital equipment (see Holmes à Court, 2019, and Noble, 2014). This 'frequent demand response' effectively allows the smelter to act as a huge battery for the electricity system, much cheaper than conventional batteries or even pumped hydro energy storage. In return for tolerating repeated partial reductions in energy supply, the smelter would receive significant compensation from the electricity system. This revenue flow would then supplement sales from aluminium production, reinforcing the business case for keeping the smelter going. Indeed, by stabilising electricity flows and reducing storage costs, the smelter would generate benefits for all electricity consumers.

This is the moment for all stakeholders to jointly undertake concerted, forward-thinking interventions to preserve Australia's value-added capacity in aluminium production and manufacturing. Australia became a leading aluminium producer not due to luck or to the operation of market forces. That past success was due to pro-active efforts by previous governments to attract investment, develop technology and skills, and diversify our footprint beyond resource extraction. Rejuvenating that spirit of determined industrial activism will be essential to saving and revitalising the Portland smelter — and the hundreds of businesses, and thousands of jobs, which ultimately depend on it.

The Portland smelter can continue to make its outsized contribution to Australian output, incomes, exports, and jobs for decades to come. Changes in both the technology and the policy framework for electricity now make Portland's prospects brighter. By tapping into Australia's unmatched endowment of renewable energy, and leveraging related technologies (like frequent demand response — see box), there is a better case than ever for manufacturing aluminium in Portland. Even better, reinvestment and modernisation of that facility would send a powerful signal that Australian manufacturing has a dynamic future in the era of sustainable energy.

## Conclusions and Policy Action

The Portland facility has dodged closure several times in the past decade. Its closest near-death experience was after the disastrous power interruption of 2016 — requiring emergency aid from government and major capital injections. But neither the Portland region, the workers in that facility, nor the national economy can continue this game of 'chicken.' Eventually Alcoa's directors will give up on the plant, despite its proven record of productivity and quality. The existing patchwork of stop-gap government measures, in the absence of a stable and powerful strategy for promoting aluminium manufacturing, is inadequate. So too is the continued reliance on coal-fired electricity that is now more costly, less reliable, and much more polluting than the alternatives.

Policy-makers should take note of the dangerous erosion of Australia's value-added industrial footprint in the aluminium sector — which will continue to be a pillar of industrial society into the foreseeable future. They should acknowledge the downsides of our country being increasingly locked into narrow reliance on the extraction and export of bulk raw resources. They should also take stock of the revolutionary transformation occurring in the technology and economics of electricity generation. And instead of trying to prevent change (pushed by narrow sectional interests), they should seize the opportunities presented by this change.

For decades aluminium smelters have been located to take advantage of competitive electricity — not surprisingly, given the importance of electricity in the industry's total cost structure. The importance of reliable, competitive power will continue, now supplemented by the requirement (by aluminium customers, as well as governments) for sustainability. In that world, Australia has an enormous advantage resulting from its unmatched capacity for renewable electricity generation (including solar, wind, and geothermal). Aluminium will continue to chase cheap power: but the best sources of cheap power are now very different.

Australia can fulfil the promise of its natural resource base, but only by deliberately structuring investment, production and trade decisions to ensure that we don't just extract resources — and instead capture their full value. Revitalising the Portland aluminium smelter, as a first step in a broader strategy to rebuild value-added manufacturing and integrate the potential of renewable energy sources, would be a major step in that direction.

## An Action Plan to Revitalise the Portland Smelter

- Establish a joint state-Commonwealth task force to facilitate discussions with Alcoa, electricity suppliers, potential equity investors, Portland workers and their union, suppliers, regional government, and other relevant stakeholders around a new investment plan for the Portland smelter.
- Engage the Clean Energy Finance Corporation, the Australian Renewable Energy Agency, the federal government's Next Generation Manufacturing Investment Programme, Victoria's Investment Attraction and Assistance Program, and other government co-investment programs to support a major recapitalisation of the Portland facility.
- Negotiate a commitment from Alcoa to long-term operation of the Portland facility, in conjunction with support for new capital investment and a new electricity supply strategy.
- Work with electricity suppliers and the overall Victorian electricity system to develop an innovative and sustainable energy supply package for Portland. This would rely on the growing penetration of renewable sources into the state's overall network, dedicated renewable investments directly linked to the smelter, and mobilising savings from a frequent demand response system.
- Confirm Australia's national commitment to clear targets and expectations regarding emissions reduction, including 50% penetration of renewable energy in electricity supply by 2030, meeting Paris Agreement targets (without use of so-called 'Kyoto credits'), and attaining net-zero emissions by 2050. These targets are already in place in most states, and have been endorsed by many business bodies. Confirming them will underline the necessity for both the Portland smelter, and its competitors, to move ahead with investments and innovations in sustainable energy.
- Implement a policy vision for the broader aluminium sector which makes it both more attractive and compulsory that producers refine and smelt a larger share of Australian bauxite and alumina output into finished aluminium and (even better) manufactured aluminium products. This would prevent global corporations from assuming they can continue to downsize Australian manufacturing, while still enjoying unfettered access to Australian natural resources. Potential levers in this vision could include fiscal incentives for refining and smelting investments, restrictions on the export of unrefined bauxite, conditions attached to development permits for mining, and the use of government procurement as a lever to enhance domestic aluminium manufacturing.

## Notes

[1] Market segments as reported by Dept. of Industry (2019).

[2] Australia's input-output statistics group all these non-ferrous primary metal industries into a single category, making it impossible to differentiate aluminium smelting from the other metal groups. See ABS Catalogue 5209.0.55.001.

[3] More details of the methodology used in the simulation exercise are provided in the appendix to our original 2016 report, The Economic, Fiscal, and Social Importance of Aluminium Manufacturing.

[4] In the parlance of the NIEIR modelers, these upstream and downstream linkages correspond to "Type I" and "Type II" multiplier effects, respectively.

[5] Revenue losses are calculated on the basis of average revenue shares for each level of government in total GDP.

[6] An even more disastrous power failure in 2016 required a $240 million rescue package, partly financed by government, to keep the plant in operation; see Judd (2017).

[7] The multiple failures of Australian electricity policy are compiled and analysed by Richardson (2019).

[8] Other forecasts have come to similar conclusions; see, for example, Richard (2019).

[9] For an overview of these and similar developments, see Garnaut (2019) and Nahum (2020).

## References

Department of the Environment and Energy (2019). *Australia's Emissions Projections, 2019* (Canberra: Commonwealth of Australia).

Department of Industry, Science, Energy and Resources (2019). *Resources and Energy Quarterly, Historical Data, December 2019* (Canberra: Commonwealth of Australia).

Ellsmoor, James (2019). "Renewable Energy Is Now the Cheapest Option - Even Without Subsidies," *Forbes*, 15 June.

Garnaut, Ross (2019). *Superpower: Australia's Low-Carbon Opportunity* (Melbourne: LaTrobe University Press).

Glenelg Shire Council (2016). *Budget and Strategic Resource Plan, 2016/2017,* Glenelg Shire Council.

Graham, P. W., Hayward, J, Foster, J., Story, O., & Havas, L. (2018). *GenCost 2018: Updated Projections of Electricity Generation Technology Costs* (Canberra: Commonwealth Scientific and Industrial Research Organisation).

Holmes à Court, Simon (2019). "Australia's Aluminium Sector is on Life Support. It Can and Should be Saved," *The Guardian*, 31 October.

Judd, Bridget (2017). "Alcoa's Portland Smelter Rebuilding after Unprecedented Power Failure," *ABC News Online*, 8 June.

Karp, Paul (2020). "Australian Power Prices Forecast to Fall by 7% by 2022 as Cost of Renewables Drops," *The Guardian*, 24 February.

Lord, Michael (2019). *From Mining to Making: Australia's Future in Zero-Emissions Metal* (Melbourne: University of Melbourne Energy Transition Hub).

Lovell, Katrina (2020). "Portland Smelter Hit with Second Outage in Three Months as Storm Cell Tears Down Towers," *The Standard*, 1 February.

Nahum, Dan (2020). *Powering Onwards: Australia's Opportunity to Reinvigorate Manufacturing through Renewable Energy* (Sydney: Centre for Future Work).

Noble, James (2014). "Aluminum Smelters Could Act as Enormous Batteries," *Centre for Social Innovation and Impact Investing* (Vancouver: University of British Columbia), December.

Richard, Craig (2019). "Australia to Reach 50% Renewables Generation by 2030," *Wind Power Monthly*, 29 May.

Richardson, David (2019). *The Costs of Market Experiments: Electricity Consumers Pay the Price for Competition, Privatisation, Corporatisation and Marketization* (Canberra: The Australia Institute).

Stanford, Jim (2016). *The Economic, Fiscal, and Social Importance of Aluminium Manufacturing in Portland, Victoria* (Sydney: Centre for Future Work).

Thompson, Brad (2019). "Rio Sharpens Axe as Energy Costs hit Aluminium Smelters," *Australian Financial Review*, 23 October.

Toscano, Nick, and Benjamin Preiss (2019). "'This Thing is in Trouble': Future of Alcoa's Energy-Hungry Smelter Looks Bleak," *The Sydney Morning Herald*, 17 October.

U.S. Geological Survey (2020). *Mineral Commodity Summaries* (Reston, VA: U.S. Geological Survey).

*This report draws on more detailed analysis contained in our previous 2016 report, "The Economic, Fiscal, and Social Importance of Aluminium Manufacturing," available at https://www.futurework.org.au/portland_closure_would_have_national_implications.*

*This report was prepared for the Australian Workers' Union. The views expressed are those of the author.*

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