POSITION OF THE ALUMINIUM ASSOCIATION OF CANADA AS PART OF CANADA’S TRANSITION TO A LOW-CARBON ECONOMY

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The Aluminium Association of Canada (AAC) would like to thank the Senate Standing Committee on Energy, the Environment and Natural Resources for considering the information and opinion provided by the AAC in this consultation aimed at developing the framework of a transition to a low-carbon economy.

The AAC and the industry

The Aluminium Association of Canada (AAC) is a non-profit organization that represents the Canadian aluminium industry vis-à-vis the population, public authorities, current and future aluminium users, and economic and environmental stakeholders.

It groups together all three Canadian primary aluminium producers: Alcoa, Aluminerie Alouette and Rio Tinto Aluminium. **Our industry is present in three Canadian provinces: British Columbia, Alberta, and Quebec, where 90% of Canadian aluminium is produced.**

The Canadian aluminium industry is the fourth largest in the world with an annual production of close to 3 million tons of primary aluminium. Canadian production sites **support more than 9,000 of the highest-paid jobs in the manufacturing industry.** The aluminium industry also provides work for more than 4,000 processors and goods and services suppliers, each contributing in turn to the economic health of Canada and its regions. The aluminium industry alone represents 8% of Quebec manufacturing exports, in addition to the Kitimat smelter (B.C.), which makes a significant contribution on a national level.
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1. BACKGROUND

As part of Canada’s involvement in the global response to climate change, the country wants to move toward a low-carbon economy that would help limit global temperature rise to no more than two degrees while maintaining a high employment rate and strong economic growth. Even more ambitious objectives aim to keep global warming within 1.5 degrees. Climate change is one of Canada’s priority issues. The country has set itself an emissions reduction target of 30% below 2005 levels by 2030. Several initiatives are currently underway to assess and implement measures to achieve these objectives. The federal government of Canada, the provinces and territories, and certain emitters are making efforts to curb increasing GHG emissions.

As part of this work, the Senate Standing Committee on Energy, the Environment and Natural Resources has undertaken consultations with various stakeholders, including the primary aluminium production sector.

This document reviews and follows up on the positions stated by our industry in the AAC’s discussion paper filed in July 2016 during the consultations conducted by Environment and Climate Change Canada (ECCC). The information provided in this document is meant to facilitate understanding of the current and future context in which Canadian aluminium producers must operate.

The AAC would like to thank you for this opportunity. This document includes information to be considered for the future development framework of a transition to a low-carbon economy, as well as the aluminium industry’s position on some aspects that we feel are important for our sector.
2. GLOBAL ECONOMIC SITUATION OF ALUMINIUM MARKET

A fixed global price

Aluminium is a raw material commonly known as a “commodity”. The price of aluminium is set according to the supply and demand of the global market based on a stock exchange: the London Metal Exchange (LME) or, in Asia, the Shanghai Futures Exchange (SHFE). Regional premiums were introduced to complement the LME. They reflect the specific particularities of regional markets, such as Midwest Premium. Both the LME and the regional premiums make up the benchmark price of primary aluminium on these markets.

In the last few years, however, circumstances related to speculation have emerged, altering the usual equilibrium of this market. The market was and continues to be disrupted by the excessive production capacity of China, which enjoys low production costs, extremely low energy costs and no price on GHG emissions. Increased Chinese production has generated global inventories that are equal to 16 weeks of production, while the normal level is more around eight weeks.
Since the sharp decline in LME prices triggered during the crisis of 2008, Chinese production has kept prices particularly low. Although aluminium prices were above US$3,000 per ton before the onset of the 2008 crisis, they hovered around US$1,500 per ton in early 2016 and were at US$1,600 per ton 12 months later. The current price, expected to remain stable for two to three years, affects 40% of global capacity – currently running at a loss – and limits investment opportunities.

*Figure 2: LME aluminium price and projections*

![LME Aluminium price and projections](image)

Source: HARBOR Aluminum 2016

*The data referenced in this document reflects the situation at the end of 2016. Since that time, speculative movements on the aluminum market have increased prices to US$1900/Mt with no indication that this price level will be maintained.

**Global context of primary aluminium production**

More than ever, our smelters are being subjected to international competition as the global industry continues its restructuring.

The Middle East, which was producing only 120,000 tons of aluminium in the early 1970s, is now producing 5.7 million tons thanks to a portfolio of modern smelters. That is one and a half times more than Canada and more than twice as much as Quebec. From a climate change perspective, it should be noted that primary aluminium production in the Middle East uses energy derived from fossil fuels, primarily natural gas. The Middle East therefore has a carbon footprint that is seven times higher than Canada and its GHG emissions are not subject to carbon pricing.
Russia is just ahead of Canada in the rankings of primary aluminium-producing regions with an output of 3.8 million metric tons per year. A single producer produces Russian aluminium, Rusal, which operates 11 smelters across the country. Russia produces aluminium using mainly hydropower, which allows for a low carbon footprint. It does not, however, have a carbon pricing system, meaning the cost on the emissions that this industry generates is nil.

Europe has had a cap-and-trade system in place since 2005, and the aluminium industry has been subjected to it since 2013. In the past few years, European aluminium production has been reduced significantly with the closure of 21 smelters since 1990 and a 31% drop in production over the last decade. With a carbon footprint similar to Russia's, aluminium production in Europe is now concentrated in a few countries including Norway and Iceland.

For several years now, China has been the major player in our industry. It produces 33 million tons of aluminium (more than 50% of global production) with more than 180 smelters, and continues to add capacity at prices that defy all competition. The electricity used in China is generated from coal, meaning that the country has a GHG emissions intensity up to seven times higher than Canadian smelters. To date, carbon pricing systems are embryonic and only apply to a minor part of Chinese production (less than 0.1%) with no economic impact. A national system is expected in 2017, but its outlines and the impacts on the aluminium industry (direct or indirect via electricity producers) are yet to be defined.

Figure 3: Global aluminium production

China now has the most cutting-edge technology (its own in most cases), and its smelter construction and production costs are much lower than ours. The new Chinese smelters are very big, modern, productive and increasingly integrated (from the coal mine to the foundry), with an annual average capacity of 850,000 tons of primary aluminium.

With its critical mass, wealth and resources, both human and material, China sets the tone for the rest of the global industry. In this context, we cannot take anything for granted in terms of production.
An even greater concern is the business climate. Until recently, the Chinese industry has targeted its own domestic market, but it is gradually turning toward the global market to compensate the slowdown in domestic demand. With a competitive smelter portfolio operating at overcapacity and with limited production costs, China is now a direct competitor on world markets - a major issue for Canada, which also exports most of its production.

**A critical situation cost-wise**

The increase in the costs of certain raw materials and the non-competitive price of energy in some production regions have caused several producers (outside of China) to review their production capacities. Consequently, numerous sites have had to face closures. This situation persists and is creating a climate of serious competition for primary aluminium producers.

The figure below, created by HARBOR Aluminum, shows production costs for the global industry. Between 2010 and 2016, the cost curve dropped due to strong global competition related in part to the commissioning of new Chinese capacities that are much greater and more effective in terms of costs. To avoid closures and allow an investment policy that will ensure growth, smelters should target the 1st quartile and the beginning of the 2nd quartile.

Every primary aluminium smelters around the world is trying to reduce costs and ensure their production’s long-term sustainability. As the curve levels off, the slightest additional cost can push sites to the right of the curve, proportionately weakening their competitiveness.

**Figure 4: Global cost curve of primary aluminium production**

*Electrolysis without casting (in US$/Mt)*

Even though the commodity price is the same for everyone, the costs are not, which can compromise industry sustainability in certain regions. In addition, many fell victim to the arid business climate that started in 2008 with the onset of the economic crisis. And more will continue to fall.
Closer to home in the United States, primary production has returned to what it was in 1950, declining from 14 plants three years ago to five today, with only one operating at full capacity.

Our primary industry, our smelters, our employees and our communities have all made sacrifices and must keep doing so to survive the coming years, which will be just as challenging.

With its low carbon footprint, our aluminium still has a bright future ahead. It is increasingly and more efficiently meeting our planet’s GHG reduction needs. But this is not enough to protect the industry.

The AAC has invested considerably over the past year in protecting our international value chain by working with our American and European colleagues and our Canadian and Quebec governments.

Three world regions have combined their efforts despite their differences. This unprecedented joining of forces is now essential for us to deal with the magnitude of our challenges.
**Fast growing demand driven by climate change**

Significant growth in global demand for primary aluminium is ensured over the medium and long term. According to projections, global demand should grow 15% between 2015 and 2020 (HARBOR Aluminum, 2015).

Closer to home in the United States, 2016 ended with an aluminium production deficit of around 3 million tons, which is expected to expand over the next few years (HARBOR Aluminum, 2016).

**In this context, the Canadian industry must position itself to benefit from this increase in demand.**

One of the main drivers behind the growing demand is the fight against climate change. Industries facing major challenges are increasingly seeking out aluminium because of its intrinsic qualities. For example, the transportation industry is using our metal to make their vehicles lighter and reduce emissions or allow additional weight from batteries. In construction, buildings are being renovated with aluminium to improve energy performance. Other industries (packaging and electronics) are also increasing their use of aluminium.

Beyond demand for aluminium, there will be more free-trade agreements, which will open the door to new markets while giving access to our own. This is an excellent opportunity for Canadian aluminium and its low carbon footprint, but we need to protect our industry from aluminium produced by electricity derived from fossil fuels. As shown in Figure 6, Canadian aluminium, having the same carbon footprint as aluminium produced in Quebec thanks to the investment made to modernize the Kitimat site, is very favourably positioned in terms of carbon advantage in comparison to other high-production regions.

**The issue of climate change must therefore be included in the discussions leading up to free-trade agreements.**

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**Figure 6: Carbon advantage of Quebec aluminium**

![Carbon advantage of Quebec aluminium](image)

In the same period, global production will increase by 21%, with the key drivers being China, the Middle East and Asia. According to the International Energy Agency, these regions use energy produced 95% from fossil fuels, especially coal, and have a carbon footprint that is seven times higher than Canada’s. Protecting Canada’s aluminium industry is of paramount importance for our national economy, for that of our aluminium-producing provinces, and for the planet. With its low carbon footprint, our aluminium will be increasingly used in vehicles to reduce their weight and carbon footprint during their useful life.

**Carbon leakage: a real risk**

Carbon leakage is more than likely in the current conditions, which is the result of aluminium prices being maintained at historically low levels for several years to come, increased global demand and fierce competition on production costs. In addition, carbon leakage will be further intensified by the gap between the emissions intensity of Canada and that of developing regions. These regions would act as substitutes for our production and push us even further away from the objectives set in Paris to limit global warming should the 3.2 million tons of aluminium produced in Canada be relocated in China, more than 44 million additional tons of emissions would be released. This would be the equivalent of more than seven years of emissions from our sector, or nearly a third of Canada’s 2020 reduction target.

This situation would work against sustainable development in Canada, and against global concerns as well. To avoid it, the government should develop policies and mechanisms to transition to a low-carbon economy that consider the fragile economic context that our industry - highly exposed to global markets - must face.

The same reasoning applies to growth projects that should logically be carried out in regions with low carbon footprints, such as Canada. This would place the economy at the centre of a winning long-term strategy for reducing global GHG emissions and contribute to the fight against climate change, while strengthening Canada’s socio-economic fabric.
3. A LONG TRACK RECORD OF GHG EMISSIONS REDUCTION

The AAC and its members have been committed to reducing GHG emissions for more than two decades. The aluminium industry is invested and involved in climate change issues, and takes them very seriously. For example, it has entered into two voluntary agreements with Quebec and adheres to the carbon pricing systems in effect in the provinces where it operates. Through its investments and efforts, it has reduced emissions by more than 3.7 million tons of carbon dioxide equivalent (CO$_2$e).

Figure 7: CO$_2$e emissions and primary aluminium production in Canada

The aluminium industry has expanded production through major investments in the country (increased capacity, modernization of existing sites, implementation of new smelters), while significantly reducing GHG emissions by deploying innovative technology. Since 1990 (the reference year used as the benchmark for most targets), considerable effort has been made: -38% in tons of CO$_2$e, or -66% in intensity. We achieved this virtuously and without any detriment to our sector’s development. We must maintain this momentum, especially during this critical time for our industry when our competitiveness is under threat.
4. ADDITIONAL POTENTIAL REDUCTION LEVERS

**Combustion**

Energy substitution is a valid option for reducing GHGs, and the AAC’s members are studying it. Some perspective, however, is needed regarding expectations for our industry: combustion emissions represent only 7% of total emissions.

It is important to know that this kind of short-term energy substitution is possible for a very limited number of sites. They cannot always consider this option seriously because there is no supply network for alternative fuel in their region. If a supply of natural gas became available on the North Shore (Côte-Nord) at competitive prices, the substitutions would allow only limited or marginal reductions, i.e., less than 1% for the sector.

Before we can consider widespread use of any alternative fuel in an industrial process, studies must be carried out on multiple issues (equipment changes, resulting costs, reliability of supply, impact on the process, etc.), and technologies must be pre-tested.

**Technological advances**

For more than 100 years, all primary aluminium has been produced using the Hall-Héroult process – the only known process for transforming alumina into aluminium using electrolysis.

With the accelerated deployment of the global smelter portfolio in the past fifteen years, the search for efficiency and process improvements made for better performance have led us to make the following conclusion: with the modernization of Canadian smelters during this period, we have reached our technological limits in terms of GHG emissions, particularly for fixed
processes. As we have said many times in various discussions relating to climate change, we have already largely contributed to the overall Canadian effort.

The AAC supports GHG management by considering three distinct types of GHG emissions:

- Fixed process emissions
- Combustion emissions
- Other emissions

This distinction reflects the realities of the different emitters and allows for the development of more detailed emissions profiles. The categories make it easier to analyze and manage GHGs based on the specific operating contexts.

Figure 9: Evolution of intensity | AAC 2008-2015

![Figure 9: Evolution of intensity | AAC 2008-2015](image)

Source: AAC, 2015 Sustainable Development Report

Pursuing R&D on technological advances is a very strategic competitive factor for the global primary aluminium industry. We must continue the research to make a revolutionary process breakthrough. Developing a process on a commercial scale that would replace the current one would give us an advantage in several ways: reduced carbon footprint and production costs, sale and export of expertise, as well as other benefits still unknown, guaranteeing an advantage on the global market compared to our peers. **Today, the global industry is in a crisis that appears to have no visible short-term end. This also means that our capacity to pursue such intense research efforts on our own has been reduced.**
Carbon capture and sequestration

The aluminium industry is always on the lookout for levers and ways to further reduce the GHG emissions from its production. Carbon capture and sequestration is one of the avenues being studied to confine a portion of emissions contributing to climate change. The AAC and its members are involved in different research and development activities, however, several steps must be completed before it can be confirmed whether capturing CO₂ is accessible, or even applicable at reasonable costs, to the aluminium industry.

As for technological advances, however, the particularities of our sector require research adapted to the types of operations and geographical situations of Canadian facilities. One of the pitfalls of CO₂ sequestration for smelters is the low concentration of CO₂ (about 1%) in very high volumes of gas released and the presence of perfluorocarbons (PFCs) that can block certain uses. Although well explored in the past, the existing possibilities in this field are inadequate for our sector today.

In addition to theoretical research, all potential means for reducing emissions should be analyzed so that we can perfect and validate knowledge on expected performance, costs required and resulting effects on the processes in place.

### 5. SUMMARY OF ISSUES FOR THE PRIMARY ALUMINIUM PRODUCTION INDUSTRY TO CONSIDER IN TRANSITIONING TO A LOW-CARBON ECONOMY

**Vision adapted based on reduction potential**

Requesting that all GHG-generating industries make a similar reduction effort would be particularly penalizing for sectors that, like our own, acted swiftly. The primary aluminium production industry wishes to avoid a situation where the significant reductions it has already made become a disadvantage, even a handicap, for the period to come.

As outlined in 2015 in Quebec’s consultation document on Quebec’s GHG emissions reduction target for 2030: “Each industry has its own dynamic, challenges and reduction potential. GHG emissions reduction measures must be adapted to the realities of each one.” In the same vein, the AAC supports the approach where all emitters must participate in the effort to reduce GHG emissions. It firmly believes, however, that certain considerations must be adapted, especially regarding fixed process emissions, which, in our case, represent more than 80% of emissions. These adaptations will allow certain industrial sectors in the country to continue growing and developing their economic activity.

The current levels of these fixed process emissions cannot be lowered. As shown in the figure on emissions intensity (Figure 9), they have been stable for several years. Fixed process emissions are inevitable as long as science does not make a breakthrough in the electrolysis process.
Technological breakthroughs, however, take time. No commitments to reduce emissions can rely on these changes, which are still being tested and whose widespread industrial deployment will take more than a decade. Therefore, the federal government cannot rely on process emissions reductions resulting from future technological developments that are scarcely in the conceptual stage at this time.

The AAC maintains that it is crucial to consider the efforts already made and the remaining possibilities for the period in question. The majority of the GHG reductions have already been made by our industry, and production has doubled. These sustained, voluntary efforts made over the years mean that the Canadian aluminium production industry is now advantageously positioned on the global market. For the industry, maintaining current GHG emission performance levels is a challenge in itself.

Figure 10: Carbon footprint – 2015 emissions intensity

Direct and indirect emissions (t CO₂e/t Al)

Ref.: AAC et IAI 2017

**Competitiveness**

One aspect, however, always raises concerns for the Canadian industry: the cost of GHG emissions related to the production of primary aluminium. For a material with a fixed price based on a global commodity market, this cost cannot be written off by a transfer to a third party in a sale, as is the case for other products, such as fuels. Putting a price on carbon in Canada directly increases the production costs of Canadian facilities. In addition, the majority of our competition does not yet have to pay carbon prices. If our position on the cost curve deteriorates, our competitiveness will be seriously compromised, resulting in gradual divestment and potential closures.

The provincial measures currently in place and the industry’s exposure to global competition should be taken into account in the implementation of carbon-pricing mechanisms. In the AAC’s opinion, this consideration is an important part of reducing the precariousness of competitive
positioning and thereby protecting the competitiveness of commodity sectors exposed to global markets and trade.

All measures selected and applied by the federal government to make the transition to a low-carbon economy must be analyzed from both a specific and global perspective, taking into consideration current and future economic conditions to avoid the antagonistic effects that they may have on the Canadian economy. We must do everything we can to counter the risks of carbon leakage to regions with higher emissions levels than Canada, while getting Canada into a good position to meet the growing demand for aluminium, the material of the future.
6. CONCLUSION AND RECOMMENDATIONS

Considering that:

- The industry has demonstrated leadership by making a voluntary commitment to reduction targets, well before any other sector made a commitment in this regard. Penalizing our industry for this leadership would be damaging;
- The industry has invested massively, and continues to do so, in technological upgrades and R&D;
- The primary aluminium production industry has taken on its responsibilities and done its duty by reducing GHG emissions by more than 38% or 3.7 million tons of CO$_2$e since 1990, while still increasing production;
- The primary aluminium production industry has pushed its process technology to its limits, lowering the potential of future reductions and significantly increasing the costs required to break these limits;
- In the coming years, the industry will maintain its commitment to the fight against climate change through indirect involvement:
  - R&D to drive innovation and achieve an unrivalled level of performance,
  - Promotion of the use of aluminium in the manufacturing of lighter vehicles to reduce fossil fuel consumption and even facilitate electrification,
  - Active monitoring of opportunities and innovations applicable to its value chain;
- The industry is exposed to a commodities market beyond our control and is facing fierce global competition in the long term, which qualifies it as an energy-intensive trade-exposed (EITE) industry;
- The prospective GHG emission reduction and carbon pricing measures will inevitably have repercussions on production costs, thus affecting profitability (the key element of any business dynamic), jeopardizing the sustainability of our Canadian operations, and limiting our capabilities for growth - which have true potential;
- One ton of aluminium produced in Canada has the lowest carbon footprint in the world. This is an additional opportunity for our sector, especially in a context of international competition;
The AAC would like to make the following three recommendations to the Senate Standing Committee on Energy, the Environment and Natural Resources:

1. Recognize the importance of integrating global economic issues faced by emitters, including the aluminium industry – one of most highly exposed industries to international trade. This could be done by integrating mechanisms and measures that will maintain the competitiveness of businesses subjected to national and international competition and therefore prevent carbon leakage.

2. Integrate the principle of “capacity to reduce emissions” into the GHG reduction approach by considering the specific limitations of each sector and their potential reduction levers, notwithstanding technological advances not yet achieved.

3. Recognize all reductions made by aluminium industry investments since 1990 so that the principle of equity is applied to the GHG reduction effort requirement.

The aluminium industry has taken risks and had to make difficult decisions regarding site closures (particularly for sites using obsolete technologies or with high levels of GHG emissions), convinced that its investments and efforts would allow it to achieve a favourable position on the global market. Today, we have made it: Canadian aluminium production has the lowest carbon footprint on the planet. While this advantage brings us no financial benefits on the markets, it should not mean additional costs. Our future depends on our ability to stay in the game by reducing our costs, innovating, and continuously improving operational efficiency.

The primary aluminium production industry supports carbon pricing that considers competition issues and enables the execution of pivotal projects for the future of our economy, environment and society. Our industry will continue providing the same support. The AAC and its members hope that this information will serve in developing a framework for transition to a low-carbon economy that will achieve Canada’s environmental and economic objectives.

Canada’s greatest contribution to the global fight against climate change should be creating favourable conditions to maintaining and expanding its low carbon footprint aluminium production.