

**DEPARTMENT OF COMMERCE****Bureau of Industry and Security**

RIN 0694–XC060

**Publication of a Report on the Effect of Imports of Aluminum on the National Security: An Investigation Conducted Under Section 232 of the Trade Expansion Act of 1962, as Amended****AGENCY:** Bureau of Industry and Security, Commerce.**ACTION:** Publication of a report.

**SUMMARY:** The Bureau of Industry and Security (BIS) in this notice is publishing a report that summarizes the findings of an investigation conducted by the U.S. Department of Commerce (the “Department”) pursuant to Section 232 of the Trade Expansion Act of 1962, as amended (“Section 232”), into the effect of imports of aluminum on the national security of the United States. This report was completed on January 17, 2018 and posted on the BIS website on February 16, 2018. BIS has not published the appendices to the report in this notification of report findings, but they are available online at the BIS website, along with the rest of the report (see the **ADDRESSES** section).

**DATES:** The report was completed on January 17, 2018. The report was posted on the BIS website on February 16, 2018.

**ADDRESSES:** The full report, including the appendices to the report, are available online: <https://www.commerce.gov/news/press-releases/2018/02/secretary-ross-releases-steel-and-aluminum-232-reports-coordination>.

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**SUPPLEMENTARY INFORMATION:****The Effect of Imports of Aluminum on the National Security an Investigation Conducted Under Section 232 of the Trade Expansion Act of 1962, As Amended**

January 17, 2018

Prepared by U.S. Department of Commerce Bureau of Industry and Security Office of Technology Evaluation

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<sup>1</sup>BIS has not published the appendices, but they are available online at <https://www.commerce.gov/news/press-releases/2018/02/secretary-ross-releases-steel-and-aluminum-232-reports-coordination>, along with the rest of the report.

Appendix A: Public Comments APPENDIX B: Public Hearing Testimony Appendix C: Background on the Aluminum Industry APPENDIX D: Trade Actions Related to Aluminum APPENDIX E: Global Excess Aluminum Production

Prepared by Bureau of Industry and Security <http://www.bis.doc.gov>

**I. Executive Summary****A. Overview**

This report summarizes the findings of an investigation conducted by the U.S. Department of Commerce (the “Department”) pursuant to Section 232 of the Trade Expansion Act of 1962, as amended (19 U.S.C. 1862 (“Section 232”)), into the effect of imports of aluminum on the national security of the United States.

In conducting this investigation, the Secretary of Commerce (the “Secretary”) noted the Department’s prior investigations under Section 232. This report incorporates the statutory analysis from the Department’s 2001 Report<sup>1</sup> with respect to applying the terms “national defense” and “national security” in a manner that is consistent with the statute and legislative intent.<sup>2</sup> As in the 2001 Report, the Secretary in this investigation determined that “national security” for purposes of Section 232 includes the “general security and welfare of certain industries, beyond those necessary to satisfy national defense requirements, which are critical to minimum operations of the economy and government.”<sup>3</sup>

As required by statute, the Secretary considered all factors set forth in Section 232(d). In particular, the Secretary examined the effect of imports on national security requirements, including: domestic production needed for projected national defense requirements; the capacity of domestic industries to meet such requirements; existing and anticipated availabilities of the human resources, products, raw materials, and other supplies and services essential to the national defense; the requirements of growth of such industries and such supplies and services including the investment, exploration, and development necessary to assure such growth; and the importation of goods in terms of their quantities, availabilities, character, and use as those affect such industries; and

<sup>1</sup> U.S. Department of Commerce, Bureau of Export Administration; The Effect of Imports of Iron Ore and Semi-Finished Steel on the National Security; Oct. 2001 (“2001 Report”).

<sup>2</sup> *Id.* at 5.

<sup>3</sup> *Id.*

the capacity of the United States to meet national security requirements.

The Secretary also recognized the close relation of the economic welfare of the United States to its national security; the impact of foreign competition on the economic welfare of individual domestic industries; and any substantial unemployment, decrease in revenues of government, loss of skills, or any other serious effects resulting from the displacement of any domestic products by excessive imports, without excluding other factors, in determining whether a weakening of the U.S. economy by such imports threaten to impair national security. In particular, this report assesses whether aluminum is being imported “in such quantities” and “under such circumstances” as to “threaten to impair the national security.”<sup>4</sup>

### B. Findings

In conducting the investigation, the Secretary found:

(1) Aluminum is essential to U.S. national security. Aluminum is needed to satisfy requirements for:

a. *The U.S. Department of Defense* (“DoD”) for maintaining effective military capabilities including armor plate for armored vehicles, aircraft structural parts and components, naval vessels, space and missile structural components, and propellants; and

b. *Critical Infrastructure Sectors* that are central to the essential operations of the U.S. economy and government, including power transmissions, transportation systems, manufacturing industries, construction, and others.

(2) The U.S. Government does not maintain any strategic stockpile of bauxite, alumina, aluminum ingots, billets or any semi-finished aluminum products such as aluminum plate.

(3) The present quantity of imports adversely impacts the economic welfare of the U.S. aluminum industry.

a. Imports and global aluminum production overcapacity, caused in part by foreign government subsidies—particularly in China, have had a substantial negative impact on the economic welfare and production capacity of the United States primary aluminum industry. The decline in U.S. production has occurred despite growing demand for aluminum both in the U.S. and abroad.

b. In 2016, the United States imported five times as much primary aluminum on a tonnage basis as it produced; the import penetration level was about 90 percent, up from 66 percent in 2012.

c. U.S. primary aluminum production in 2016 was about half of what it was in 2015, and output further declined in 2017. U.S. smelters are now producing at 43 percent of capacity and at annual rate of 785,000 metric tons. As recently as 2013, U.S. production was approximately 2 million metric tons per year.

d. Since 2012, six smelters with a combined 3,500 workers have been permanently shut down, totaling 1.13 million metric tons in lost production capacity per year.

e. The loss of jobs in the primary aluminum sector has been precipitous between 2013 and 2016, falling 58 percent from about 13,000 to 5,000 employees.

f. The U.S. currently has five smelters remaining, only two smelters that are operating at full capacity. Only one of these five smelters produces high-purity aluminum required for critical infrastructure and defense aerospace applications, including types of high performance armor plate and aircraft-grade aluminum products used in upgrading F-18, F-35, and C-17 aircraft. Should this one U.S. smelter close, the U.S. would be left without an adequate domestic supplier for key national security needs. The only other high-volume producers of high-purity aluminum are located in the UAE and China (internal use only).

g. The impact so far has been greatest on the primary (unwrought) aluminum sector. Now, however, the downstream aluminum sector also is threatened by overcapacity and surging imports.

h. Imports accounted for 64 percent of U.S. consumption of aluminum (primary and downstream mill products combined) in 2016.

i. U.S. imports in the aluminum categories subject to this investigation totaled 5.9 million metric tons in 2016, up 34 percent from 4.4 million metric tons in 2013. In the first 10 months of 2017, aluminum imports rose 18 percent above 2016 levels on a tonnage basis.

j. In the downstream aluminum sectors of bars, rods, plates, sheets, foil, wire, tubes and pipes, imports rose 33 percent from 1.2 million metric tons in 2013 to 1.6 million metric tons in 2016.

k. Overall in 2016, for the aluminum product categories covered by this investigation, the United States ran a trade deficit of \$7.2 billion.

(4) Global excess aluminum capacity is a circumstance that contributes to the weakening of the U.S. aluminum industry and the U.S. economy.

a. A major cause of the recent decline in the U.S. aluminum industry is the rapid increase in production in China. Chinese overproduction suppressed

global aluminum prices and flooded into world markets.

b. China’s aluminum production is largely unresponsive to market forces. China produced approximately one million metric tons of excess supply in 2016. This excess alone exceeds the total U.S. 2016 production of primary aluminum of 840,000 metric tons.

c. China’s industrial policies encourage development and domination of the entire aluminum production chain. These policies are further intended to stimulate the export of aluminum processed into sheets, plates, rods, bars, foils and other semi-manufactures and to target development of increasingly sophisticated and high-value product sectors such as automotive and aerospace.

d. China imposes an excise tax that creates a disincentive for the export of primary aluminum ingots and billets. It provides tax rebates on exports of semi-finished or finished aluminum products. Thus, U.S. imports of aluminum from China are not in the form of unwrought aluminum, but primarily semi-finished downstream aluminum products.

e. As imports make further inroads into the higher value-added, more sophisticated downstream sectors, U.S. downstream companies supporting the defense sector will be increasingly impacted.

### C. Conclusion

Based on these findings, the Secretary of Commerce has concluded that the present quantities and circumstance of aluminum imports are “weakening our internal economy” and threaten to impair the national security as defined in Section 232. The Department of Defense and critical domestic industries depend on large quantities of aluminum. But recent import trends have left the U.S. almost totally reliant on foreign producers of primary aluminum. The U.S. is also at risk of becoming completely reliant on foreign producers of high-purity aluminum that is essential for key military and commercial systems. The domestic aluminum industry is at risk of becoming unable to satisfy existing national security needs or respond to a national security emergency that requires a large increase in domestic production. These risks and long-run industry trends “threaten to impair the national security” as defined by Section 232.

The Secretary has determined that to remove the threat of impairment, it is necessary to reduce imports to a level that will provide the opportunity for U.S. primary aluminum producers to

<sup>4</sup> 19 U.S.C. 1862(b)(3)(A).

restart idled capacity. This will increase and stabilize U.S. production of aluminum at the minimal level needed to meet current and future national security needs. If no action is taken, the United States is in danger of losing the capability to smelt primary aluminum altogether.

The imposition of a quota or tariff on downstream products also is necessary because global overcapacity, coupled with industrial policies that promote exports of downstream products, have

had a negative impact on the U.S. primary aluminum industry through reduced demand for inputs from downstream companies, as well as directly on the downstream companies that face increased import penetration in many aluminum product sectors.

*D. Recommendation*

Due to the threat, as defined in Section 232, to national security from the quantities and circumstances of aluminum imports, the Secretary recommends that the President take

immediate action by adjusting the level of these imports. Under alternatives 1 and 2, the quotas or tariffs would be designed, even after any exemptions (if granted), to enable U.S. aluminum production to utilize an average of 80 percent of production capacity. The quotas and tariffs described below should be sufficient to enable U.S. aluminum producers to operate profitably under current market prices for aluminum and will allow them to reopen idled capacity (see Table 1).

<b>Table 1 - Import Levels and U.S. Primary Aluminum Capacity Utilization Rates*</b>		
<b>Primary Aluminum Market Snapshot (thousands of metric tons)</b>	<b>2013-2016 Average</b>	<b>2017 Annualized</b>
Total Demand for Primary Aluminum in U.S. (production+imports-exports)	4,681	5,516
U.S. Annual Capacity	2,195	1,818
U.S. Annual Production (liquid)	1,518	785
Capacity Utilization Rate (percentage)	69%	39%
<b>Imports and Exports (millions of metric tons)</b>		
Imports of Primary Aluminum to U.S.	3,536	5,046
Exports of Primary Aluminum from the U.S.	373	315
Percent Import Penetration	76%	91%
<b>Production at Various Utilization Rates (thousands of metric tons)</b>		
Maximum Capacity	2,195	1,818
Production at 75% Capacity Utilization	1,646	1,364
Production at 80% Capacity Utilization	1,756	1,454
Production at 85% Capacity Utilization	1,866	1,545
<b>Import Levels and Domestic Production Targets Based on 80% Capacity Utilization</b>		
<b>Partial Equilibrium (No Projected Reduction in Exports and Demand)</b>		
Maximum Import Level (mmt)	4,377	
Estimated Import Penetration	79%	
Estimated Production (mmt)	1,454	
<b>Alternative 1: Quota Applied to 2017 Import Levels</b>	<b>86.7%</b>	
<b>Alternative 1: Tariff Rate Applied to All Imports</b>	<b>7.7%</b>	
*Numbers may differ slightly due to rounding.		
Source: United States Department of Commerce, Bureau of the Census. Annualized Data based on 2017 year-to-date figures through October.		

Two alternatives for achieving this object are described. In each alternative, quotas or tariffs would be imposed on imports of: 1) unwrought aluminum (Harmonized Tariff Schedule (HTS) Code 7601); 2) aluminum castings and forgings (HTS Codes 7616.99.51.60 and 7616.99.51.70); 3) aluminum plate, sheet, strip, and foil (flat rolled products) (HTS Codes 7606 and 7607); 4) aluminum wire (HTS Code 7605); 5) aluminum bars, rods and profiles (HTS

Code 7604); and 6) aluminum tubes and pipes (HTS Code 7608); and 7) aluminum tube and pipe fittings (HTS Code 7609) based on 2017 annualized imports in those categories.

In either alternative, the Secretary recommends that the action taken to adjust the level of imports must be in effect for a duration sufficient to allow necessary time and assurances to stabilize the U.S. industry. It takes up to nine months to restart idled smelting

capacity. Market certainty is needed to build cash flow to pay down debt and to raise capital for plant modernization to improve manufacturing efficiency.

The Department of Commerce, in consultation with other appropriate departments and agencies, will monitor the status of the U.S. aluminum industry and the effectiveness of the remedies to determine if the remedies should be terminated, extended, or adjusted as needed.

## Alternative 1—Global Quota or Tariff

*Global Quota*

A worldwide quota of 86.7 percent on imports described above would restrict aluminum imports sufficiently to allow U.S. primary aluminum producers to increase production by about 669,000 metric tons, bringing total production to about 1.45 million metric tons, or about 80 percent of U.S. primary aluminum production capacity. This quota would also be applied to the five other aluminum product categories listed above and would help ensure the viability of those U.S. producers to meet national security needs.

*Global Tariff*

A tariff rate of 7.7 percent on imports of unwrought aluminum and the other aluminum product categories listed above should have the same impact as the 86.7 percent quota. This tariff rate would be in addition to any antidumping or countervailing duty collections applicable to any product.

This tariff rate also will adequately adjust for the price distortions in downstream aluminum product sectors that are caused by global overcapacity and overproduction being exported in the form of downstream products.

## Alternative 2—Tariffs on a Subset of Countries

*Tariffs on a Subset of Countries*

A tariff rate of 23.6 percent on imports of aluminum products from China, Hong Kong, Russia, Venezuela, and Vietnam should also restrict aluminum imports sufficiently to allow U.S. aluminum producers to utilize an average of 80 percent of capacity. These five countries are the source of substantial imports due to significant overcapacity, and/or are potential unreliable suppliers or likely sources of transshipped aluminum from China.

As in Alternative 1 above, this tariff rate would be in addition to any antidumping or countervailing duty collections applicable to any product. (For targeted tariff, all other countries would be limited to 100 percent of their 2017 import volumes.)

*Exemptions*

In selecting an alternative, the President could determine that specific countries should be exempted from the proposed quota (by granting those specific countries 100 percent of their prior imports in 2017 or exempting them entirely), based on an overriding economic or security interest of the United States, which could include their willingness to work with the United States to address global excess

capacity and other challenges facing the U.S. aluminum industry.

The Secretary recommends that any such determination should be made at the outset and a corresponding adjustment be made to the final quota or tariff imposed on the remaining countries. This would ensure that overall imports of aluminum to the United States remain at or below the level needed to enable the domestic aluminum industry to return to 2012 production and import penetration levels.

*Exclusions*

The Secretary recommends an appeal process by which affected U.S. parties could seek an exclusion from the tariff or quota imposed. The Secretary would grant exclusions based on a demonstrated: (1) Lack of sufficient U.S. production capacity of comparable products; or (2) specific national security-based considerations. This appeal process would include a public comment period on each exclusion request, and in general, would be completed within 90 days of a completed application being filed with the Secretary.

An exclusion may be granted for a period to be determined by the Secretary and may be terminated if the conditions that gave rise to the exclusion change. The U.S. Department of Commerce will lead the appeal process in coordination with the Department of Defense and other agencies as appropriate. Should exclusions be granted the Secretary would consider at the time whether the quota or tariff for the remaining products needs to be adjusted to ensure that U.S. aluminum production meets target levels.

**II. Legal Framework***A. Section 232 Requirements*

Section 232 provides the Secretary with the authority to conduct investigations to determine the effect on the national security of the United States of imports of any article. It authorizes the Secretary to conduct an investigation if requested by the head of any department or agency, upon application of an interested party, or upon his own motion. *See* 19 U.S.C. 1862(b)(1)(A).

Section 232 directs the Secretary to submit to the President a report with recommendations for “action or inaction under this section” and requires the Secretary to advise the President if any article “is being imported into the United States in such quantities or under such circumstances

as to threaten to impair the national security.” *See* 19 U.S.C. 1862(b)(3)(A).

Section 232(d) directs the Secretary and the President to, in light of the requirements of national security and without excluding other relevant factors, give consideration to the domestic production needed for projected national defense requirements and the capacity of the United States to meet national security requirements. *See* 19 U.S.C. 1862(d).

Section 232(d) also directs the Secretary and the President to “recognize the close relation of the economic welfare of the Nation to our national security, and

. . . take into consideration the impact of foreign competition on the economic welfare of individual domestic industries” by examining whether any substantial unemployment, decrease in revenues of government, loss of skills or investment, or other serious effects resulting from the displacement of any domestic products by excessive imports,<sup>5</sup> or other factors, result in a “weakening of our internal economy” that threaten to impair the national security. *See* 19 U.S.C. 1862(d).

Once an investigation has been initiated, Section 232 mandates that the Secretary provide notice to the Secretary of Defense that such an investigation has been initiated. Section 232 also requires the Secretary to do the following:

(1) “Consult with the Secretary of Defense regarding the methodological and policy questions raised in [the] investigation;”

(2) “Seek information and advice from, and consult with, appropriate officers of the United States;” and

(3) “If it is appropriate and after reasonable notice, hold public hearings or otherwise afford interested parties an opportunity to present information and advice relevant to such investigation.”<sup>6</sup> *See* 19 U.S.C. 1862(b)(2)(A)(i)-(iii).

As detailed in Parts III and VI of this report, each of the legal requirements set forth above has been satisfied.

In conducting the investigation, Section 232 permits the Secretary to request that the Secretary of Defense provide an assessment of the defense

<sup>5</sup> An investigation under Section 232 looks at excessive imports for their threat to the national security, rather than looking at unfair trade practices as in an antidumping investigation.

<sup>6</sup> Department regulations (i) set forth additional authority and specific procedures for such input from interested parties, see 15 CFR 705.7 and 705.8, and (ii) provide that the Secretary may vary or dispense with those procedures “in emergency situations, or when in the judgment of the Department, national security interests require it.” *Id.*, § 705.9.

requirements of the article that is the subject of the investigation. *See* 19 U.S.C. 1862(b)(2)(B).

Upon completion of a Section 232 investigation, the Secretary is required to submit a report to the President no later than 270 days after the date on which the investigation was initiated. *See* 19 U.S.C. 1862(b)(3)(A). The required report must:

(1) Set forth “the findings of such investigation with respect to the effect of the importation of such article in such quantities or under such circumstances upon the national security;”

(2) Set forth, “based on such findings, the recommendations of the Secretary for action or inaction under this section;” and

(3) “If the Secretary finds that such article is being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security . . . so advise the President.” *See* 19 U.S.C. 1862(b)(3)(A)

All unclassified and non-proprietary portions of the report submitted by the Secretary to the President must be published.

Within 90 days after receiving a report in which the Secretary finds that an article is being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security, the President shall:

(1) “Determine whether the President concurs with the finding of the Secretary”; and

(2) “If the President concurs, determine the nature and duration of the action that, in the judgment of the President, must be taken to adjust the imports of the article and its derivatives so that such imports will not threaten to impair the national security.” *See* 19 U.S.C. 1862(c)(1)(A).

#### B. Discussion

While Section 232 does not contain a definition of “national security,” both Section 232, and its implementing regulations at 15 CFR part 705, contain non-exclusive lists of factors that Commerce must consider in evaluating the effect of imports on national security.

Congress in Section 232 explicitly determined that “national security” includes, but is not limited to, “national defense” requirements. *See* 19 U.S.C. 1862(d). The Department in 2001 determined that “national defense” includes both defense of the United States directly and the “ability to project military capabilities globally.”<sup>7</sup>

The Department also concluded in 2001 that “in addition to the satisfaction of national defense requirements, the term “national security” can be interpreted more broadly to include the general security and welfare of certain industries, beyond those necessary to satisfy national defense requirements, which are critical to the minimum operations of the economy and government.” The Department called these “critical industries.”<sup>8</sup> This report once again uses these reasonable interpretations of “national defense” and “national security.” However, this report uses the more recent 16 critical infrastructure sectors identified in Presidential Policy Directive 21<sup>9</sup> instead of the 28 critical industry sectors used by the Bureau of Export Administration in the 2001 Report.<sup>10</sup>

Section 232 directs the Secretary to determine whether imports of any article are being made “in such quantities” or “under such circumstances” that those imports “threaten to impair the national security.” *See* 19 U.S.C. 1862(b)(3)(A). The statutory construction makes clear that either the quantities or the circumstances, standing alone, may be sufficient to support an affirmative finding. They may also be considered together, particularly where the circumstances act to prolong or magnify the impact of the quantities being imported.

The statute does not define a threshold for when “such quantities” of imports are sufficient to threaten to impair the national security, nor does it define the “circumstances” that might qualify.

Likewise, the statute does not require a finding that the quantities or circumstances are impairing the national security. Instead, the threshold question under Section 232 is whether those quantities or circumstances “threaten to impair the national security.” *See* 19 U.S.C. 1862(b)(3)(A). This formulation leaves the matter to the Secretary’s discretion, and makes evident that Congress expected an affirmative finding under Section 232 would occur before there is actual impairment of the national security.

Section 232(d) contains a considerable list of factors for the Secretary to consider in determining if imports “threaten to impair the national security”<sup>11</sup> of the United States, and this list is mirrored in the implementing

regulations. *See* 19 U.S.C. 1862(d) and 15 CFR 705.4. Congress was careful to note twice in Section 232(d) that the list they provided, while mandatory, is not exclusive.<sup>12</sup> Congress’ illustrative list is focused on the ability of the United States to maintain the domestic capacity to provide the articles in question as needed to maintain the national security of the United States.<sup>13</sup> Congress broke the list of factors into two equal parts using two separate sentences. The first sentence focuses directly on “national defense” requirements, thus making clear that “national defense” is a subset of the broader term “national security.” The second sentence focuses on the broader economy, and expressly directs that the Secretary and the President “shall recognize the close relation of the economic welfare of the Nation to our national security.”<sup>14</sup> *See* 19 U.S.C. 1862(d).

Two of the factors listed in the second sentence of Section 232(d) are most relevant in this investigation. Both are directed at how “such quantities” of imports threaten to impair national security. *See* 19 U.S.C. 1862(b)(3)(A). In administering Section 232, the Secretary and the President are required to “take into consideration the impact of foreign competition on the economic welfare of individual domestic industries” and any “serious effects resulting from the

<sup>12</sup> *See* 19 U.S.C. 1862(d) (“the Secretary and the President shall, in light of the requirements of national security and without excluding other relevant factors. . .” and “serious effects resulting from the displacement of any domestic products by excessive imports shall be considered, without excluding other factors. . .”).

<sup>13</sup> This reading is supported by Congressional findings in other statutes. *See, e.g.*, 15 U.S.C. 271(a)(1) (“The future well-being of the United States economy depends on a strong manufacturing base. . .”) and 50 U.S.C. 4502(a) (“Congress finds that—(1) the security of the United States is dependent on the ability of the domestic industrial base to supply materials and services. . . (2)(C) to provide for the protection and restoration of domestic critical infrastructure operations under emergency conditions. . . (3). . . the national defense preparedness effort of the United States government requires—(C) the development of domestic productive capacity to meet—(ii) unique technological requirements. . . (7) much of the industrial capacity that is relied upon by the United States Government for military production and other national defense purposes is deeply and directly influenced by—(A) the overall competitiveness of the industrial economy of the United States; and (B) the ability of industries in the United States, in general, to produce internationally competitive products and operate profitably while maintaining adequate research and development to preserve competitiveness with respect to military and civilian production; and (8) the inability of industries in the United States, especially smaller subcontractors and suppliers, to provide vital parts and components and other materials would impair the ability to sustain the Armed Forces of the United States in combat for longer than a short period.”).

<sup>14</sup> *Accord* 50 U.S.C. 4502(a).

<sup>8</sup> *Id.*

<sup>9</sup> Presidential Policy Directive 21; *Critical Infrastructure Security and Resilience*; February 12, 2013 (“PPD-21”).

<sup>10</sup> *See Op. Cit.* at 16.

<sup>11</sup> 19 U.S.C. 1862(b)(3)(A).

<sup>7</sup> *Id.*

displacement of any domestic products by excessive imports” in “determining whether such weakening of our internal economy may impair the national security.” See 19 U.S.C. 1862(d).

Another factor, not on the list, that the Secretary found to be a relevant is the presence of massive foreign excess capacity for producing aluminum. This excess capacity results in aluminum imports occurring “under such circumstances” that they threaten to impair the national security. See 19 U.S.C. 1862(b)(3)(A). The circumstance of excess global aluminum production capacity is a factor because, while U.S. production capacity has declined dramatically in recent years, other nations have increased their production capacity, with China alone able to produce as much as the rest of the world combined. This overhang of excess capacity means that U.S. aluminum producers, for the foreseeable future, will face increasing competition from imported aluminum, often subsidized by foreign national governments, as other countries export more downstream products to the United States to bolster their own economic objectives and offset loss of markets to Chinese aluminum exports.

It is these three factors—displacement of domestic aluminum by excessive imports and the consequent adverse impact on the economic welfare of the domestic aluminum industry, along with global (primarily Chinese) excess capacity in aluminum—that the Secretary has concluded are “weakening . . . our internal economy” and therefore “threaten to impair” the national security as defined in Section 232.<sup>15</sup>

The Secretary also considered whether or not the source of the imports affects the analysis under Section 232. The Department has previously determined “imports can threaten to impair U.S. national security if the United States is excessively dependent on imports from unreliable or unsafe sources, and thereby is vulnerable to a supply disruption” for an input or article.<sup>16</sup> Such an analysis is permissible under the statutory command to

<sup>15</sup> The 2001 Report used the phrase “fundamentally threaten to impair” when discussing how imports may threaten to impair national security. See 2001 Report at 7 and 37. Because the term “fundamentally” is not included in the statutory text and could be perceived as establishing a higher threshold, the Secretary expressly does not use the qualifier in this report. The statutory threshold in Section 232(b)(3)(A) is unambiguously “threaten to impair” and the Secretary adopts that threshold without qualification. 19 U.S.C. 1862(b)(3)(A).

<sup>16</sup> 2001 Report at 6. See also, 2001 Report at 7 (describing prior Department reports under Section 232 that considered supply vulnerability.

consider whether articles are “being imported into the United States. . . . under such circumstances as to threaten to impair the national security.” See 19 U.S.C. 1862(b)(3)(A). Such an inquiry would be necessary and appropriate in “such circumstances” where the United States is dependent on imports to meet national security needs, for example when a mineral is not produced in the United States or domestic producers are unable to meet demand but imports from an unreliable source are preventing investment needed to increase domestic production.

The source of imports could also be a “factor” the Secretary considers under the analysis required by Section 232(d). See 19 U.S.C. 1862(d). That is up to the Secretary’s discretion. However, because Congress in Section 232 chose to explicitly direct the Secretary to consider whether the “impact of foreign competition” and “the displacement of any domestic products by excessive imports” are “weakening our internal economy” yet made no reference whatsoever to an assessment of the sources of imports, it is evident that Congress recognized that those adverse impacts might well be caused by imports from allies or other reliable sources.<sup>17</sup> As a result, the fact that some or all of the imports causing the harm are from reliable sources does not compel a finding that those imports do not threaten to impair national security.

The statute allows the Secretary to reasonably conclude that, in the absence of adequate domestic supply, imports from allies should not be relied upon in order to ensure domestic production facilities are sufficient to meet U.S. national security as defined in Section 232. Similarly, the statute also permits the Secretary to consider the availability of reliable imports as a factor that supports a conclusion that imports are not threatening to impair U.S. national security.

### III. Investigation Process

#### A. Initiation of Investigation

On April 26, 2017, U.S. Secretary of Commerce Wilbur Ross initiated an investigation to determine the effect of imported aluminum on national security under Section 232 of the Trade

<sup>17</sup> When Congress adopted the text of section 232(d) in 1962 the immediately preceding section was Section 231, 19 U.S.C. 1861, which required the President, as soon as practicable, to suspend most-favored-nation tariff treatment for imports from communist countries. Given the bipolar nature of the world at the time, the absence of a distinction between communist and non-communist countries in Section 232 suggests that Congress expected Section 232 would be applied to imports from all countries—including allies and other “reliable” sources.

Expansion Act of 1962, as amended (19 U.S.C. 1862).

Pursuant to Section 232, the Department notified the U.S. Department of Defense in an April 26, 2017 letter from Secretary Ross to Secretary James Mattis. On April 27, 2017, President Donald Trump signed a Presidential Memorandum directing Secretary Ross to proceed expeditiously in conducting his investigation and submit a report on his findings to the President.

#### B. Public Comment

On May 3, 2017, the Department invited interested parties to submit written comments, opinions, data, information, or advice relevant to the criteria listed in § 705.4 of the National Security Industrial Base Regulations (15 CFR 705.4) as they affect the requirements of national security, including the following:

(a) Quantity of the articles subject to the investigation and other circumstances related to the importation of such articles;

(b) Domestic production capacity needed for these articles to meet projected national defense requirements;

(c) The capacity of domestic industries to meet projected national defense requirements;

(d) Existing and anticipated availability of human resources, products, raw materials, production equipment, facilities, and other supplies and services essential to the national defense;

(e) Growth requirements of domestic industries needed to meet national defense requirements and the supplies and services including the investment, exploration and development necessary to assure such growth;

(f) The impact of foreign competition on the economic welfare of any domestic industry essential to our national security;

(g) The displacement of any domestic products causing substantial unemployment, decrease in the revenues of government, loss of investment or specialized skills and productive capacity, or other serious effects;

(h) Relevant factors that are causing or will cause a weakening of our national economy; and

(i) Any other relevant factors. (See **Federal Register**, Vol. 82, No. 88, Tuesday, May 9, 2017.)

The public comment period ended on June 23, 2017. The Department received 91 written submissions concerning this investigation. These public comments are set forth in Appendix A.

**C. Public Hearing**

The Department held a public hearing to elicit further information concerning this investigation in Washington, DC on June 22, 2017. The Department heard testimony from 32 witnesses at the hearing. A transcript of the testimonies given at the Public Hearing is included in Appendix B.

**D. Interagency Consultation**

Pursuant to the requirements of Section 232, Commerce Secretary Ross

notified Defense Secretary Mattis of this investigation on April 26, 2017. In addition, Department of Commerce staff consulted with their counterparts in the Department of Defense regarding methodological and policy questions that arose during the investigation.

The Department also consulted with other agencies of the U.S. Government with expertise and information regarding the aluminum industry, including the U.S. Geological Survey of

the Department of the Interior and the U.S. International Trade Commission.<sup>18</sup>

**IV. Product Scope of the Investigation**

For this report, aluminum is defined at the Harmonized Tariff Schedule (HTS) 4-digit level. The HTS codes covered by this report are listed in Table 2. In addition, two HTS codes at the ten digit level are included, covering aluminum castings and forgings.

Table 2 - Harmonized Tariff Schedule For Aluminum Products	
HTS Code	Description
7601	Unwrought aluminum
7604	Aluminum bars, rods and profiles
7605	Aluminum wire
7606	Aluminum plates, sheets, and strip, of a thickness exceeding 0.2mm*
7607	Aluminum foil (whether or not printed, or backed with paper, paperboard, plastics or similar backing materials) of a thickness (excluding any backing) not exceeding 0.2mm
7608	Aluminum tubes and pipes
7609	Aluminum tube and pipe fittings
7616.99.51.60	Other articles of aluminum: castings
7616.99.51.70	Other articles of aluminum: forgings
*Note: This category includes can sheet for aluminum can packaging.	
Source: U.S. International Trade Commission	

The scope of this investigation does not include bauxite or alumina, which are feedstocks for production of primary (unwrought) aluminum. Also excluded from analysis are aluminum waste and scrap (HTS 7602) and aluminum powders and flakes (HTS 7603) as these represent different industrial sectors.

**V. Background on the Aluminum Industry**

Aluminum is the most abundant naturally occurring metal in the earth's crust, and it is an essential element of modern life. Virtually every person in the United States, and indeed most of

the world, uses aluminum every single day. More aluminum is consumed today than at any point in the 125-year history of the metal's commercial production. Lightweight, corrosion resistant, easily formed, highly conductive, highly reflective, durable and recyclable—aluminum is a highly useful material for manufacturers. It offers a wide range of options for product innovation and process improvements. Aluminum is critical to modern mobility, increasing sustainability, and the national economy.

Aluminum is used in a wide variety of applications, and global demand for

it is expected to grow at an annual rate of 3.8 percent.<sup>19</sup> Transportation applications, including aircraft and automobiles, account for 40 percent of domestic consumption, followed by packaging with 20 percent, building construction with 15 percent, electrical with eight percent, and machinery with seven percent.<sup>20</sup> One of the factors driving increasing demand for aluminum is its ability to reduce weight, thereby improving energy efficiency.

Aluminum originates from bauxite, an ore typically found in the topsoil of various tropical and subtropical regions; the United States is not a significant

<sup>18</sup>The U.S. International Trade Commission conducted an investigation at the request of the Committee on Ways and Means of the U.S. House of Representatives entitled "Aluminum: Competitive Conditions Affecting the U.S.

Industry," Publication Number 4703, Investigation Number 332-557, June 2017. This report provided information useful and pertinent to this Section 232 investigation and is cited henceforth as "USITC Report."

<sup>19</sup>The Aluminum Association.

<sup>20</sup>U.S. Geological Survey, Mineral Commodity Series, January 2017.

source of bauxite as it cannot be economically extracted here. Once mined, aluminum within the bauxite ore is chemically extracted in a refinery into alumina, an aluminum oxide compound. In a second step, the alumina is smelted to produce pure aluminum metal.

The industry can be divided into three basic segments: **upstream**, **downstream**, and secondary. The upstream segment includes primary or “unwrought” **aluminum production**, in which aluminum is produced from raw materials. The products of the upstream industry segment are classified within HTS Code 7601.

The majority of U.S. aluminum production today is based on recycled scrap, called secondary production, and is captured within HTS Code 7602. The United States is the world’s leading producer of secondary unwrought aluminum, due to its long established aluminum recycling industry. Secondary production increased from 22 percent of aluminum production in 1980, to 64 percent of domestic production in 2016.<sup>21</sup> While aluminum produced through secondary production is an important feedstock for the U.S. aluminum industry, it is fundamentally a different industry sector and is not the focus of this report.

The processing of aluminum into semi-finished aluminum goods such as rods, bars, sheets, plates, castings, forgings and extrusions is the **downstream segment** of the industry. These aluminum products can be manufactured using primary aluminum, secondary aluminum, or a combination depending on the unique requirements or specifications. Aluminum products manufactured by the downstream segment of the industry are included in HTS Codes 7604, 7605, 7606, 7607, 7608, 7609, 7616.99.51.60 and 7616.99.51.70.

(See Appendix C for a more detailed description of the aluminum industry)

## VI. Findings

### A. Aluminum Is Essential to U.S. National Security

Aluminum products are used widely across U.S. society in a range of consumer products, commercial applications, and industrial products. The supply of aluminum ingot, bar, rod, coils, sheet, cable and wire, and plate products is essential to the functioning of the U.S. economy, critical infrastructure, and the national defense. This lightweight, electrically

conductive, corrosion resistant material has widespread uses in consumer goods, commercial products, and in many industrial applications.

From food packaging to advanced military aircraft, aluminum is a vital material used in industry and in infrastructure critical to U.S. economic growth. These sectors consume large quantities aluminum for new construction, production of aircraft, automobiles, bridges, building materials, heating and cooling systems, housing, power transmission cable, trucks and trailers and other applications.

A predictable supply of this versatile metal is required for the supply of many types of products and systems supporting U.S. government civilian and defense operations. For economic stability and to support national security requirements for U.S. critical infrastructure and the national defense, the United States needs domestic capability to produce both primary aluminum and semi-finished aluminum products.

Specifically, U.S. capability must be maintained for: 1) primary aluminum production, 2) processing of recycled aluminum into products, and 3) making bar and rod, plate and sheet, coils, extrusions, castings, forgings, pigments and powders, and other aluminum products. In 2016, imports of aluminum ingot and semi-finished aluminum products accounted for 64 percent of U.S. aluminum consumption.<sup>22</sup> In 2016, the U.S. imported more than 90 percent of the primary aluminum it consumed.<sup>23</sup>

Total reliance on imports cannot provide an assured supply of aluminum to meet U.S. critical infrastructure and defense needs in a national emergency—as production facilities are vulnerable and supply lines are easily disrupted. A significant shortfall in the flow of imported aluminum to U.S. manufacturers could disrupt essential commercial production in the absence of a domestic supply base for aluminum. Moreover, the aluminum smelting and downstream aluminum products industry are critical to the minimum operations of the economy and government.

Critical infrastructure sectors where there is significant dependence on aluminum content include:

- **Defense Industrial Base:** Design, production, delivery, and maintenance of military weapons systems,

subsystems, and components or parts to meet U.S. military requirements

- **Energy:** Electric power transmission and distribution (over 6,000 power plants)

- **Transportation:** Aircraft, automobiles, railroad freight cars, boats, ships, trains, trucks, trailers, wheels

- **Containers and Packaging:** Cabinets, cans, foils, storage bins, storage tanks

- **Construction:** Bridges, structural supports, conduit, piping, siding, doors, windows, wiring

- **Manufacturing:** Machinery, stampings, castings, forgings, product components, consumer goods, heating and cooling devices, and utility lighting fixtures

### 1. Aluminum Is Required for U.S. National Defense

The U.S. Department of Defense (DoD) and its contractors use a small percentage of U.S. aluminum production. The DoD “Top Down” estimate of average annual demand for aluminum during peacetime is [TEXT REDACTED], or [TEXT REDACTED] percent of total U.S. demand<sup>24</sup> Despite the low percentage of aluminum consumed directly by the DoD, a healthy, vibrant commercial aluminum industry (both primary and downstream) is critical to U.S. national security.

[TEXT REDACTED]<sup>25, 26, 27</sup>

The following sections of the report describe the use of aluminum in U.S. military systems and in critical infrastructure.

### Use of Aluminum in U.S. Military Systems

#### a. Ground Systems/Weapons

In the area of ground weapons, cold-rolled thick aluminum plate is an integral part of the structure of armored vehicles such as tanks, personnel carriers, and amphibious vehicles. Such plate is classified within Harmonized Tariff Schedule (HTS) 7606. In these applications, aluminum provides outstanding ballistic protection and excellent corrosion resistance. Aluminum bar and other extrusions (HTS 7604) are used in cage armor on a number of vehicles. Aluminum cage armor is approximately 50 percent lighter than steel cage armor.

The use of aluminum also allows the design of low-weight, reliable, and cost-efficient components for light-armored

<sup>22</sup> Based on Aluminum Association data.

<sup>23</sup> Based on U.S. Geological Survey data for the U.S. production and on U.S. Census data for exports and imports.

<sup>24</sup> [TEXT REDACTED]

<sup>25</sup> [TEXT REDACTED]

<sup>26</sup> [TEXT REDACTED]

<sup>27</sup> [TEXT REDACTED]

<sup>21</sup> Aluminum: The Element of Sustainability; The Aluminum Association, September 2011 and USGS Mineral Commodity Series.



civilian and tactical vehicles, as well as for heavy constructions like military bridges. Using aluminum plate in place

of steel also improves the agility and transportability of defense and rescue vehicles and systems (by air transport,

for example) into areas of conflict or disaster.

<b>Table 3 - U.S. Defense Ground/Weapon Systems Using Aluminum</b> Systems Requiring Components Made of Plate, Sheet, Piping, Tubing, Castings and/or Forgings	
Armored Multi-Purpose Vehicle (AMPV)	Ground Vehicle Trailers: Aircraft Loading System, 105-mm Howitzer, Minuteman Missile Transporter, Nuclear Ordnance Trailer
Amphibious Assault Vehicle (AAV)	Ground Vehicle Components: Cross Braces, Forged Front Hubs, Gasoline Tanks, Radiators, Transmission Support Brackets, Wheel Discs, Wheels
Bradley Fighting Vehicle (BFV)	Bridges: Improved Float Bridge (Ribbon Bridge); Armored Vehicle Launch Bridge (AVLB); Aluminum Pneumatic Floating Bridge (M4T6)
Bradley M-1 Tank*	Javelin Anti-Tank Missile
Joint Light Tactical Vehicle (JLTV)	Patriot Advanced Capability – 3 (PAC-3)
Expeditionary Fast Transport (EPF)	M224 60 MM Mortar
M109A7 Paladin Artillery Vehicle (M1009)	Small Arms: Pistols, Rifles, Grenade Launchers
*Out of production, but the manufacture of spare parts using aluminum may continue.	
Source: The Aluminum Association, U.S. Dept. of Defense, assorted industrial publications	

b. Aircraft

Aluminum alloys are the predominant choice for the fuselage, wing, and supporting structures of many military aircraft. These types of products are classified within HTS 7606 (aluminum sheet) as well as aluminum casting and forgings classified within HTS 7616.99.51. The use of aluminum has been key to the success of advanced aircraft over the decades, including planes such as the Lockheed SR-71 Blackbird, C-17 Globemaster, Boeing F-18—and today, the F-35 Joint Strike Fighter.

Because of aluminum’s light weight and excellent damage tolerance capability, it is used in a large number of aircraft applications: vertical stabilizers, horizontal stabilizers, plate for trailing edges, spars, ribs, fuselage frames, and air intake shells. A variety of aircraft-related systems, including bombs, decoy systems, and radar also require aluminum. The airframe of a

military aircraft can be as much as 80 percent aluminum by weight. The military aircraft industry also demands high-strength aluminum products that can perform in harsh environments without cracking or outright failure.

Aluminum products used in military aircraft are often highly engineered to meet specific performance attributes to facilitate machining complex aircraft parts. Structural components of U.S. military aircraft may be made of cast or fabricated wrought aluminum (forged, machined and assembled parts) as well as rolled sheet products.

The supply of high-purity aluminum is critical to the production of high-performance aluminum alloys used in military aircraft and other applications. To meet aircraft component performance requirements, “Purity” and “High-purity” grades of aluminum must be used to enable the manufacture of aluminum materials with greater tensile strength, fracture toughness, improved high-temperature operating ability, and

corrosion resistance.<sup>28</sup> These advanced aluminum materials are used not only in aircraft, but in space, naval, and ground vehicles as well. While the industry classifies aluminum by purity, U.S. government trade and industry statistics (such as Harmonized Tariff Schedule (HTS) and North American Industrial Classification (NAICS)) are not differentiated based on purity.

Aircraft deployed by the DoD are expected to continue to use significant amounts of aluminum, even as composite materials replace parts traditionally made of aluminum or titanium. At least 36 types of U.S. military aircraft and related systems that require aluminum parts are in service today. These aircraft are purchased and used by the U.S. Government and foreign governments. In addition, there are 19 other military aircraft systems for which spare aluminum parts continue to be required or may be required (See Table 4).

<sup>28</sup> High-Purity aluminum grades are: P0406, P0405, P0404, P0305, P0304, P0303, and P0202. Source: Arconic, Century Aluminum,

Harbor Aluminum, other industry sources. The average purity level of primary aluminum produced

is 99.9 percent, compared to standard-purity aluminum which is approximately 99.7 percent.

<b>Table 4 - Department of Defense Aircraft Systems Using Aluminum</b>	
<b>Systems Requiring Components Made of Plate, Sheet, Piping, Tubing, Castings and/or Forgings</b>	
A-10/AO-10 Thunderbolt*	Northrop F-5 Fighter*
AE2100 – Engine*	F-100*Super Sabre
AH-1 Super Cobra Helicopter	F-110*
AH-64 Apache Helicopter	F-117*
ALE-50 Towed Decoy System	Grumman F-14 Tomcat*
Air and Missile Defense Radar (AMDR)	Boeing F-15 Eagle*
APS-137 Radar	General Dynamics F-16 Fighting Falcon
B-1 Bomber*	Boeing F/A-18 Super Hornet
B-2 Bomber*	Lockheed Martin F-22 Raptor
B-52 Bomber*	F-24-Ultra Raptor
C-5*	F-35 Joint Strike Fighter
C130J Super Hercules Cargo Plane	Bell UH-1 Iroquois Helicopter*
C-17 Globemaster Cargo Plane*	Bell OH-58 Kiowa Helicopter
C-27J Spartan Cargo Plane*	Sikorsky UH-60 Blackhawk Helicopter
Northrop Grumman E-2 Hawkeye*	S-70 Black Hawk Helicopter
E-2C Hawkeye*	Sikorsky S-92 Helicopter
E-2D Advanced Hawkeye	Sikorsky CH-53E Super Stallion
Boeing E-3A Sentry (AWAC)*	Sikorsky CH-53K King Stallion Helicopter
Boeing KC-46 Fueling Tanker	Boeing Vertol CH-46 Sea Knight
KC-135 Stratotanker*	Boeing Vertol CH-47 Chinook
KC-46A Pegasus Tanker	V-22
P-3 Orion*	MK 84 Bomb
P-8 Poseidon	LM2500 Gas Turbine
Boeing V-22 Osprey	PW200 Helicopter Engine*
Northrop Grumman EA-6B Prowler*	F-135* Afterburner Turbofan Engine
MQ-9 Reaper (Predator B)	F-414 General Electric Engine
Global Hawk	ETF40 Gas Turbine
EPF	Air and Missile Defense Radar (AMDR)
T-38 Trainer Aircraft*	APS-137 Radar
T-45 Goshawk Trainer Aircraft*	Multi-Spectral Targeting System (MTS)
T-45 Goshawk trainers	Long Range Discrimination Radar (LRDR)
TF-50*Trainer Aircraft	Modernized Target Acquisition Designation Sight/Pilot Night Vision Sensor (M-TADS)
<b>*Out of production, but the manufacture of spare parts using aluminum may continue.</b>	
Source: U.S. Department of Commerce/Bureau of Industry and Security, U.S. Department of Defense, industry web sites.	

## BILLING CODE 3510-33-C

The U.S. manufacturers of products based on aluminum require 250,000 metric tons of high-purity aluminum a year. Approximately 90 percent of this is for commercial aerospace and other applications. Ten percent is used to support the manufacture of defense-related products. The United States produced annually, until recently, 125,000 metric tons of high-purity aluminum (Grades P0404, P0303,

P0202). The balance is imported, principally from the UAE, but also small quantities from Canada, New Zealand, and Russia.

Century Aluminum operates the only high-volume, pure aluminum smelter in the United States. Its Hawesville, Kentucky facility has demonstrated capability to produce at least 100,000 metric tons of high-purity aluminum a year (it manufactured 60,000 metric tons high-purity aluminum in 2016). Arconic

currently has an annual capability to produce approximately [TEXT REDACTED] of high-purity aluminum using standard aluminum ingot in a fractionalization crystallization process. All of its production is for internal consumption for the manufacture of company products; it supplements its own production with imported high-purity aluminum (from the UAE).

Aluminum from Century's Hawesville smelter supplies the electrical

conductor, remelt ingot, and high-purity ingot markets, as well as the defense and aerospace industries. A large portion of Hawesville’s specially configured facility provides the high-conductivity metal required by this facility’s largest customer, Southwire. This company is a major manufacturer of electrical wire (including power transmission conductor), cable, and other electrical products.

[TEXT REDACTED]<sup>29</sup>

The actions of Century’s customers are driven in part because of concerns about Century Aluminum’s future financial viability. Century has been

closing smelting facilities in response to reduced orders for aluminum product from traditional customers—a situation attributed to foreign government intervention in the aluminum industry with massive subsidies. This has produced a global aluminum supply glut and a collapse of world aluminum prices. In turn, it has driven up U.S. imports of aluminum, which have drastically reduced company production and income.

[TEXT REDACTED]

c. Space Applications

There is a history of extensive use of aluminum in space applications,

including launch vehicles, space capsules, satellites, and missiles. Aluminum has been a preferred material because of its light weight, able to withstand stress, heat reflectance, and has other properties.

For missile and space applications, aluminum has been the material used across a wide range of structures. Once again, its light weight and its ability to withstand the stresses that occur during launch and operation in space environments are why aluminum has been used on Apollo spacecraft, the Skylab, the space shuttles and the International Space Station, as well as in missiles.

Table 5 - Space Launch Vehicles Using Aluminum	
Systems Requiring Components Made of Plate, Sheet, Piping, Tubing, Castings and/or Forgings	
System	Components
United Launch Alliance - Atlas V [Boeing, Lockheed Martin]	Aluminum Fuel Tanks
United Launch Alliance - Delta IV Heavy [Boeing, Lockheed Martin]	Second Stage – Propellant Tank Dome, Isogrid ring forgings, Tank skirts Booster Tanks – Barrels, domes, skirts
SpaceX - Falcon 9	Capsule Pressure Vessel
SpaceX - Dragon	First Stage – Aluminum Lithium Tanks; Second Stage – Aluminum-Lithium Tube
Orbital Sciences - Minotaur	Interstage Structure
Orion Multi-Purpose Crew Vehicle	Crew Capsule Structure
Space Launch System - NASA Mars Mission	
Rocket Fuel Propellant	Aluminum Powder
Sources: Boeing, Lockheed Martin, Orbital Sciences, SpaceX, <a href="https://biz360tours.com/ula-delta-iv-afspc-6">https://biz360tours.com/ula-delta-iv-afspc-6</a>	

Aluminum alloys consistently exceed other metals in such areas as mechanical stability, dampening, thermal management and reduced weight. Powdered aluminum is also used as the key ingredient in primary propellant for solid rocket booster motors for tactical missiles and space-launch platforms. The reason for this is because it has a high volumetric energy density and is difficult to ignite accidentally.

d. Naval Applications

Military marine designers and naval engineers recognize that aluminum’s low density, high strength, and

corrosion resistance make it an advantageous material for some types of shipbuilding. Use of aluminum enhances ship speeds and enables operation in shallower water because of reduced draft. Increased fuel efficiency and higher cargo carrying capability also are enabled by vessel weight reductions achieved using aluminum.

The greatest use of aluminum in the U.S. Navy is with four classes of ships: Expeditionary Fast Transport, Joint High Speed Vessel, Littoral Combat Ship—Monohull and the Littoral Combat Ship—Tirmarian. Smaller quantities of aluminum will be required for the construction of smaller craft—*e.g.*,

Dauntless Patrol Boats and the High Speed Maneuverable Surface Target (HSMST) boat. The HSMSTs will be used to support weapon systems testing and evaluation, and fleet training exercises.

Although the cost of aluminum material is higher than for steel, and more labor hours are required to build the structure for aluminum ships, for some types of vessels there is an overall cost savings due to the life-cycle benefits of aluminum’s significantly lower weight.<sup>30</sup> The Navy’s future fleet program anticipates the use of aluminum in new vessel platforms that are under development.

<sup>29</sup> [TEXT REDACTED]

<sup>30</sup> Lamb, Thomas, Nathaniel Beavers, Thomas Ingram and Anton Schmieman, “The Benefits and

Costs Impact of Aluminum Naval Ship Structure,” accessed through [sname.org](http://sname.org).

<b>Table 6 - Department of Defense Naval Systems Using Aluminum</b>	
Systems Requiring Components Made of Plate, Sheet, Piping, Tubing, Castings and/or Forgings	
Expeditionary Fast Transport (EPF)	Littoral Combat Ship (LCS) – Monohull
Joint High Speed Vessel (JHSV)	Littoral Combat Ship (LCS) – Trimarian
Dauntless Patrol Boats	High Speed Maneuverable Surface Target (HSMST)
Ship-To-Shore Connector (SSC)	Landing Craft, Air Cushion (LCAC)
Tomahawk Missile	Torpedoes (Mark 37,44,45,46,48)
Sources: U.S. Department of Defense, assorted industrial sources.	

#### e. Future DoD Aluminum Requirements

DoD projects that its requirements for defense products and systems using aluminum will grow in the years ahead. DoD estimates that annual consumption for just wrought aluminum plate used in nine defense systems will climb from [TEXT REDACTED] in 2017 to more than [TEXT REDACTED] tons in 2020.

Much of this increase for wrought aluminum plate is attributed to orders for the Joint Light Tactical Vehicle (JLTV), Armored Multi-Purpose Vehicle (AMPV), M109 Paladin Artillery Vehicle, and the Amphibious Assault Vehicle (AAV), and the Littoral Combat Ship. Aluminum also is required for foreign military sales of Bradley Fighting Vehicles. These DoD aluminum projections do not include aluminum consumed for the production of spare parts for more than 70 Army, Air Force, and Navy systems in use by DoD.

In addition, ongoing research focused on improving sheet aluminum performance characteristics as well as casting and forging technology for aircraft and other defense application could result in greater use in DoD platforms. Indeed, R&D is expected to drive expanded use of the material—raising overall DoD tonnage requirements for production of defense systems.

Yet the pace of expansion of aluminum use in defense and commercial markets may be slower than it might be were it not for the collapse of aluminum prices and loss of revenue at U.S. aluminum producers. At this time most aluminum companies cannot afford to fund research. The importance of research in this industry is clear, however. More than 90 percent of all alloys currently used in the aerospace industry were developed through Alcoa's research.<sup>31</sup>

Retention of domestic capacity to meet DoD production requirements for

conventional aluminum plate, armor plate, and other aluminum production capacity is of concern to DoD. DoD does not keep any type of aluminum product, including armor plate, in the U.S. Government's national stockpile.<sup>32</sup>

With U.S. commercial applications accounting for 90 percent of high performance aluminum consumption, limited commercial stockpiles located in the United States are not likely to be sufficient to support DoD aluminum requirements in a time of a major war. The ability to ship aluminum products across the ocean could be severely restricted, if not impossible.

As of June 2017, there were approximately 295,000 metric tons of primary and alloy aluminum held in U.S. warehouses operated by the London Metals Exchange (LME). Based on 2016 U.S. consumption of 5.1 million metric tons, the amount of aluminum held in LME warehouses in Baltimore, Detroit, and New Orleans represents three weeks of domestic industrial demand.<sup>33</sup>

[TEXT REDACTED]<sup>34</sup>

U.S. national security cannot be assured if the United States becomes entirely dependent on foreign suppliers for primary aluminum and high-purity

<sup>32</sup> In June 1966, the National Defense Stockpile contained 920,000 short tons of aluminum. Over time, the Congress steadily reduced the stockpile's aluminum holding to zero. The purpose of the stockpile is to limit, if not preclude dependence by the United States upon foreign sources in times of a national emergency. U.S. Department of Defense requirements for aluminum in the stockpile have been reduced as a consequence of demand/supply modelling by the Institute for Defense Analysis. The accuracy of the modelling can be affected by assumptions on the duration and intensity of conflicts, capability to import materials in a time of war, expansion and contraction of the supplier base, and other factors. Sources: Congressional Record; Managing Materials for a Twenty-First Century Military (2008), The National Academies Press.

<sup>33</sup> Sources: U.S. Department of Interior/USGS, U.S. Department of Commerce/BIS, and industry data sources.

<sup>34</sup> Kaiser Aluminum.

aluminum. The U.S. in 2016 relied on imports for 89 percent of its primary aluminum requirements, up from 64 percent in 2012.<sup>35</sup> Canada, which is highly integrated with the U.S. defense industrial base and considered a reliable supplier, is the leading source of imports. With Canadian smelters operating at near full capacity and with the vast majority of their production already going to customers in the United States, there is limited ability for Canada to replace other suppliers.

In the future there is no assurance that some non-U.S. suppliers such as Russia (the largest supplier of primary aluminum to the U.S. after Canada) will provide all the necessary aluminum products on a timely basis and in the quantities requested, particularly in a time of war or national emergency. Shifts in the policies of the governments of offshore aluminum suppliers, many of them state-owned, could leave the United States stranded.

#### 2. Aluminum Is Required for U.S. Critical Infrastructure

The Department of Homeland Security has designated 16 critical infrastructure sectors in the United States, which are considered so vital that their incapacitation or destruction would have a debilitating effect on defense capability, national economic security, national public health or safety.<sup>36</sup> Virtually all of these sectors rely on aluminum products as a part of their principal missions.

Specifically, these sectors include chemical production, commercial facilities, communications, critical manufacturing, dams, defense industrial base, emergency services, energy, food and agriculture, government facilities, transportation systems, and water

<sup>35</sup> Calculations were based on U.S. production of 840,000 metric tons, imports of 4.26 million metric tons, and U.S. exports of 303,000 metric tons of primary aluminum (HTS 7601).

<sup>36</sup> <https://www.dhs.gov/critical-infrastructure-sectors>

<sup>31</sup> Alcoa, <http://www.alcoa.com/global/en/home.asp>

management and waste water systems. No significant uses were identified for financial services and nuclear reactors and related waste management. Detailed information on the use and importance of aluminum in the various critical infrastructure sectors is described below.

#### Use of Aluminum in Critical Infrastructure Sectors

Of particular importance to U.S. critical infrastructure are core manufacturing activities such as primary metals manufacturing, including aluminum production and processing.<sup>37</sup> The manufacture and supply of primary aluminum (HTS 7601), secondary production (HTS 7602), bars, rods, (HTS 7604) plate, and sheet material (HTS 7606) are key to the creation of aluminum-based products employed across the U.S. economy (*see* Table 7).

Although aluminum use for electrical applications accounted for approximately seven percent of total U.S. aluminum consumption in 2016 (or about 836,000 metric tons),<sup>38</sup> its importance to critical infrastructure cannot be overstated. Aluminum

transmission cables (contained in HTS classification 7605) power the nation, delivering electricity from power-generation facilities across long-haul transmission grids for distribution at the regional, state, and local level.

The health of the U.S. economy hinges on functioning power transmission systems and the timely supply of reliable, durable aluminum cable for use by electric utilities. Predictable supply is especially important for recovery from storms and other natural disasters. Commercial office buildings also use large amounts of aluminum cable; and it is widely used as the primary service feed to residential power meters and breaker boxes.

The sector consuming the largest amount of aluminum is transportation. The manufacture of aircraft, automobiles, buses, freight and subway cars, boats and ships, tractor trailers, and related components accounted for about 35 percent (about 4.2 million metric tons) of U.S. aluminum consumption in 2016, according to the Aluminum Association.

The ready availability of high quality aluminum bar, rod, coils, plate, sheet, and extrusions is critical to the ability of manufacturers to deliver product to their customers in a timely way and to respond to national emergencies. For

this reason, Boeing purchases [TEXT REDACTED] percent of the aluminum it uses for the manufacture of aircraft from suppliers in the United States.<sup>39</sup>

The agriculture and food supply industries are another of the Department of Homeland Security's (DHS) 16 critical infrastructure sectors. This industry relies heavily on the availability of aluminum packaging, including canning materials and foils (HTS 7607). Aluminum containers and packaging accounted for about 18 percent of U.S. aluminum consumption in 2016 (about 2.2 million metric tons). Aluminum is also widely used in crop irrigation piping in fields.

Building and construction, according to the Aluminum Association, was the third-largest major market for aluminum products in 2016, accounting for about 12 percent of total U.S. consumption (about 1.5 million metric tons). Aluminum is used for structural supports; door, wall, and door framing; roofs and awnings; architectural trim; utility cabinets; air conditioning systems; drawbridges and portable emergency bridges; and many other applications. Many of these applications of aluminum are classified in HTS 7604 and HTS 7608.

<sup>37</sup> <https://www.dhs.gov/critical-manufacturing-sector#>.

<sup>38</sup> Aluminum Association, "Fast Facts at Glance—2016," December 2017

<sup>39</sup> Source: Provided to the U.S. Department of Commerce/BIS by The Boeing Company.

Table 7 - DHS Critical Infrastructure Sectors – Use of Aluminum		
Sectors		Aluminum End Uses
1	Chemicals	Product ingredients (small amounts)
2	Commercial Facilities	Structural Components, Architectural Trim, Doors, Window Frames, Aluminum Wiring
3	Communications	Antenna Towers, Antennas, Electronics Cabinets, Satellites, Circuit Boards, Connectors
4	Critical Manufacturing	Primary Aluminum Production, Semi-Finished: Extrusions, Bars, Rods, Coil, Plate, Sheet, Tube, Pipe Production
5	Dams	Aluminum Water Conduits, Drainage Systems
6	Defense Industrial Base	Aircraft, Ground Vehicles, Boats, Bridges, Ships, Missiles, Assorted Weapons Systems
7	Emergency Services	Portable Bridges, Fire Engines, Ambulances, Gurneys
8	Energy	Power Transmission, Commercial Wiring, Liquid Natural Gas Storage Tanks
9	Financial Services	-----
10	Food and Agriculture	Packaging, Irrigation, Green Houses, Storage Buildings
11	Government Facilities	Federal Research Laboratories, DoD Repair Depots, Y-12
12	Health Care/Public Health	Walkers, Wheel Chairs, Splints, Packaging
13	Information Technology	Electronic Cabinets, Capacitors, Heat Sinks
14	Nuclear Reactors, Materials, and Waste Sector	High voltage Power Transmission Cable
15	Transportation Systems	Aircraft, Automobile, Buses, Engines, Freight Cars, Subway Cars, Tractor Trailers, Trucks, Transmission Housings, Truck Tankers, Boats, Ships
16	Water and Waste Water Systems	Temporary Piping, Cold Water Storage Tanks, Water Tankers
Note: Presidential Policy Directive (PPD-21) on Critical Infrastructure Security and Resilience, issued in February 2016, identified 16 industrial sectors. See: <a href="https://www.dhs.gov/critical-infrastructure-sectors">https://www.dhs.gov/critical-infrastructure-sectors</a> .		
Source: U.S. Department of Commerce/Bureau of Industry and Security, The Aluminum Association, Association of Water Technologies, North American Freight Car Assn., Applied Aerospace Structures Corp., Society of Chemical Manufacturers and Affiliates		

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Excessive reliance on offshore producers as the primary suppliers of aluminum ingot, semi-finished, and finished products to sustain systems for critical infrastructure would pose risks. The ability of the United States to respond to national emergencies could be constrained by a lack of domestic production capability. Domestic inventories of aluminum products are often limited. Dependence on offshore manufacturers can hinder U.S. capabilities to respond to catastrophes and market surges.

*B. Domestic Production of Aluminum is Essential to National Security*

Continued access to U.S.-based aluminum production is important to critical infrastructure and to the nation's overall defense objectives as well as economic security. All segments of the U.S. aluminum industry contribute, directly or indirectly, to the U.S. defense industrial base as aluminum is used in a variety of defense applications. High-strength aluminum alloys have become among the most commonly used materials to make military aircraft; and aluminum armor plate is used to protect against

explosives and other threats. A number of U.S. Navy ships are now made with aluminum.

The U.S. Department of Defense has a large and ongoing need for a range of aluminum products. These include:

- High-purity aluminum for the F-35 Joint Strike Fighter, the F-18, and the C-17.
- High-purity aluminum for the armor plate in military vehicles, littoral combat vessels, and missiles. The percentage of aluminum content in armor plate in military platforms is increasing and may reach as much as 60 percent in the next generation military vehicles.

- The U.S. Coast Guard employs aluminum-intensive 47-foot first-response lifeboats. The craft are self-bailing, self-righting and have a long cruising radius for their size.

Reliance on foreign suppliers for essential aluminum and aluminum products is contrary to U.S. national security. Moreover, overreliance on assumed future U.S. production capacity without adequate analysis given to the financial health and viability of the U.S. aluminum industrial base can lead to shortfalls in needed production, capabilities and related skilled work force when called upon.

To ensure U.S. national security response capability, the nation must have sufficient domestic aluminum production capacity to meet most commercial demand and to fulfill DoD contractor and critical infrastructure requirements. The economic stability of companies manufacturing aluminum in the United States is undermined by growing volumes of imported aluminum in key product sectors.

Although the United States imports large quantities of aluminum products from foreign suppliers, historically U.S. aluminum manufacturers have been industry leaders. Innovation by U.S. aluminum producers has provided technological and cost advantages to many domestic industries that use aluminum, including the aerospace, automotive, and defense sectors.

U.S. manufacturers have produced numerous high performance alloys to increase the strength, durability, performance of aluminum products. The wide-spread adoption of high-strength aluminum structural components and panels in automobiles, trucks, and aircraft are examples.

To maintain the health of advanced aerospace and defense product lines, the domestic industry must have a strong aluminum manufacturing capability and commercial product portfolio (e.g., automotive, industrial, packaging). Without a robust level of commercial business, aluminum manufacturers cannot afford to conduct research and development, make capital investments, nor maintain their production infrastructure, including that needed for making products for critical infrastructure and national defense.

### *C. Domestic Aluminum Production Capacity Is Declining*

#### 1. Primary Aluminum Production Capacity

In 2016, global aluminum smelter capacity totaled 72.5 million metric tons, which was approximately two percent higher than the 2015 level.<sup>40</sup> The top six aluminum-producing countries accounted for nearly 77 percent of the world's total aluminum capacity, with China alone accounting for 55 percent of total global production capacity and 54 percent of global production. The United States' production capacity is ranked 6th in the world in 2016; in 2017 U.S. capacity has dwindled further.

During World War II, aluminum was considered so important to U.S. national security that the U.S. government embarked on a program to expand U.S. production capacity, which in 1940 was limited to one producer (Alcoa). Through the government-owned Defense Plant Corporation, the U.S. expanded primary aluminum production capacity by building new smelters to meet military demands. The government-owned plants were

ultimately sold to U.S. corporations Kaiser Aluminum and Reynolds Aluminum in 1950.<sup>41</sup>

During the Korean War, the U.S. government sought to further expand U.S. primary aluminum capacity to meet military needs. This time, incentives were used including accelerated amortization (reducing or eliminating corporate taxes) and purchase contracts (in which the government purchased all unsold aluminum). Further expansion in U.S. production capacity took place in the 1960's, but during these years it was driven by increasing commercial demand.

U.S. primary aluminum production and capacity was relatively stable at between 3.5 million and 4 million metric tons per year from 1970 to 2000. Since 2000, there has been a steep decline in U.S. production. It corresponds with a large increase in U.S. imports of primary aluminum (see Figures 1 and 2 below).

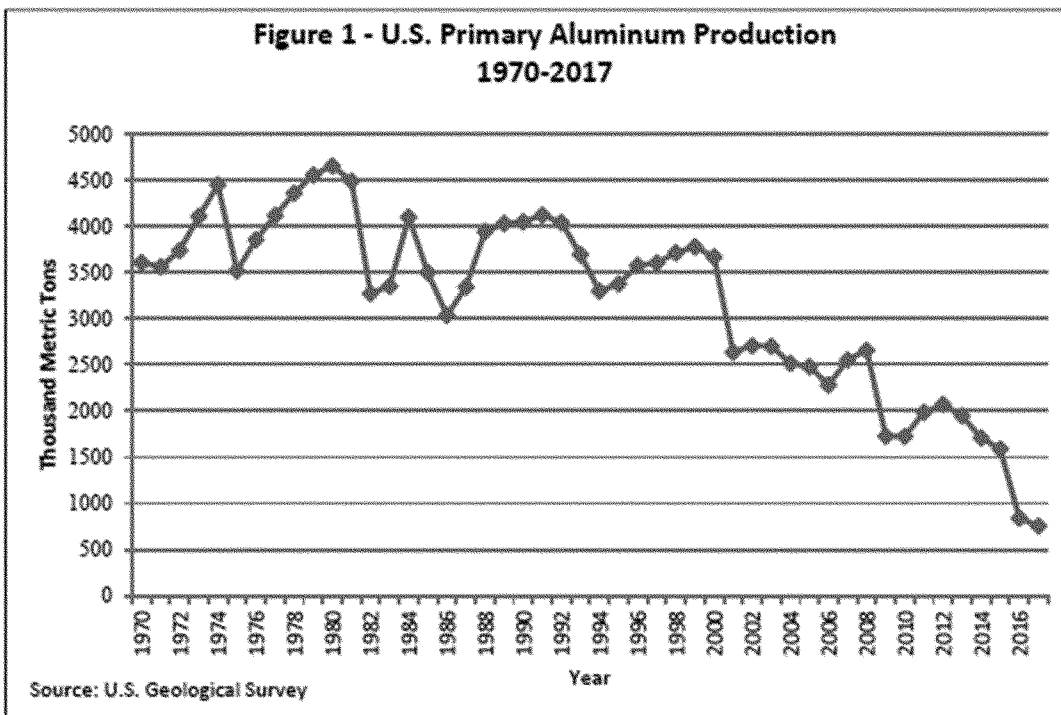
One of the main reasons for the decline in U.S. primary aluminum production capacity is that the United States is a relatively high cost producer. Because aluminum production is highly energy intensive, the world's leading producers are generally the countries with the lowest energy costs (including Canada, Russia, the United Arab Emirates (UAE), and Bahrain). The exception is China, where electricity costs are actually higher than those of the United States (\$614 per metric ton of aluminum produced in China versus \$532 per metric ton in the United States); China's overall production costs were equal to that of U.S. producers.<sup>42</sup>

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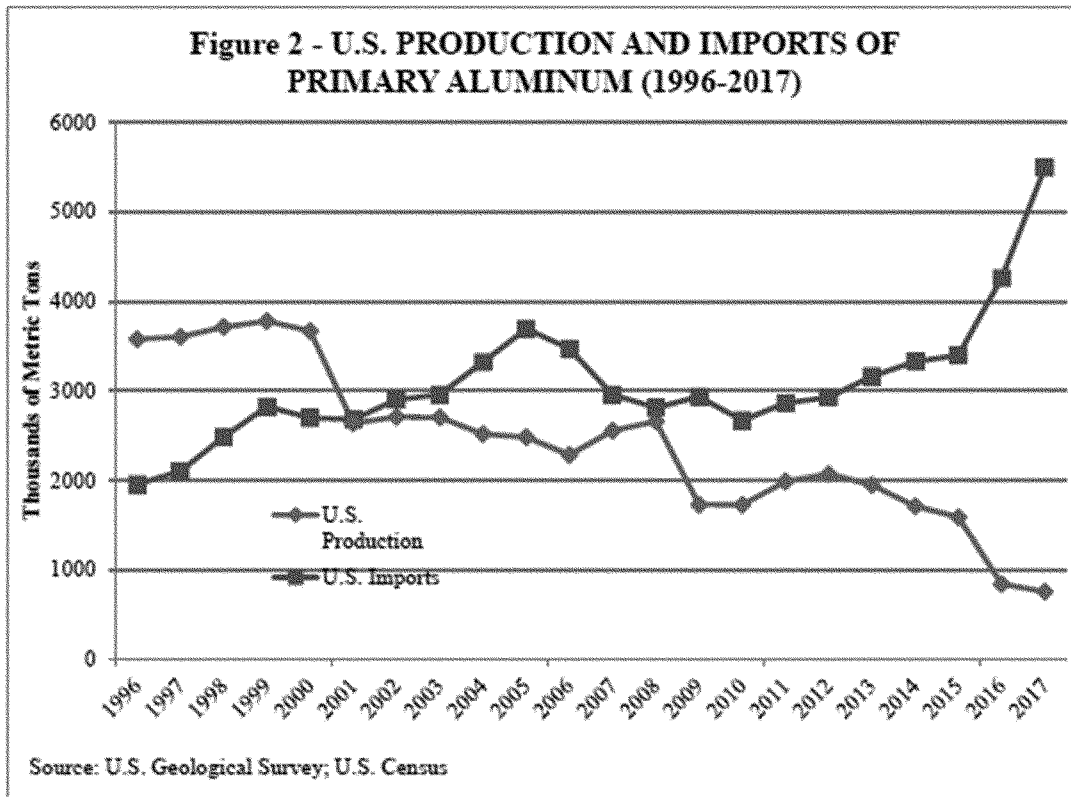
<sup>40</sup> U.S. Geological Survey, Mineral Commodity Summary, January 2017.

<sup>41</sup> Routledge Revivals: The World Aluminum Industry in a Changing Energy Era, edited by Merton J. Peck, 2015.

<sup>42</sup> CRU Group, included US ITC Report, p. 110.







**Table 8 - Global Aluminum Smelter Capacity and Production – 2016**

Country	Production Metric Tons (000)	Capacity Metric Tons (000)	Capacity Utilization Rate
China	31,000	40,100	77%
Russia	3,580	4,180	85%
India	2,750	3,850	71%
Canada	3,250	3,270	99%
UAE	2,400	2,400	100%
United States	840	1,740	48%
All Other	13,780	16,790	82%
<b>Total</b>	<b>57,600</b>	<b>72,500</b>	<b>79% Average</b>

Source: U.S. Geological Survey, Mineral Commodity Summaries, January 2017

Total U.S. primary aluminum production capacity and actual production for the most recent five-year period is shown in Table 9 below. The decline in U.S. production and capacity utilization has been particularly dramatic in just the past two years, during which aluminum prices were at

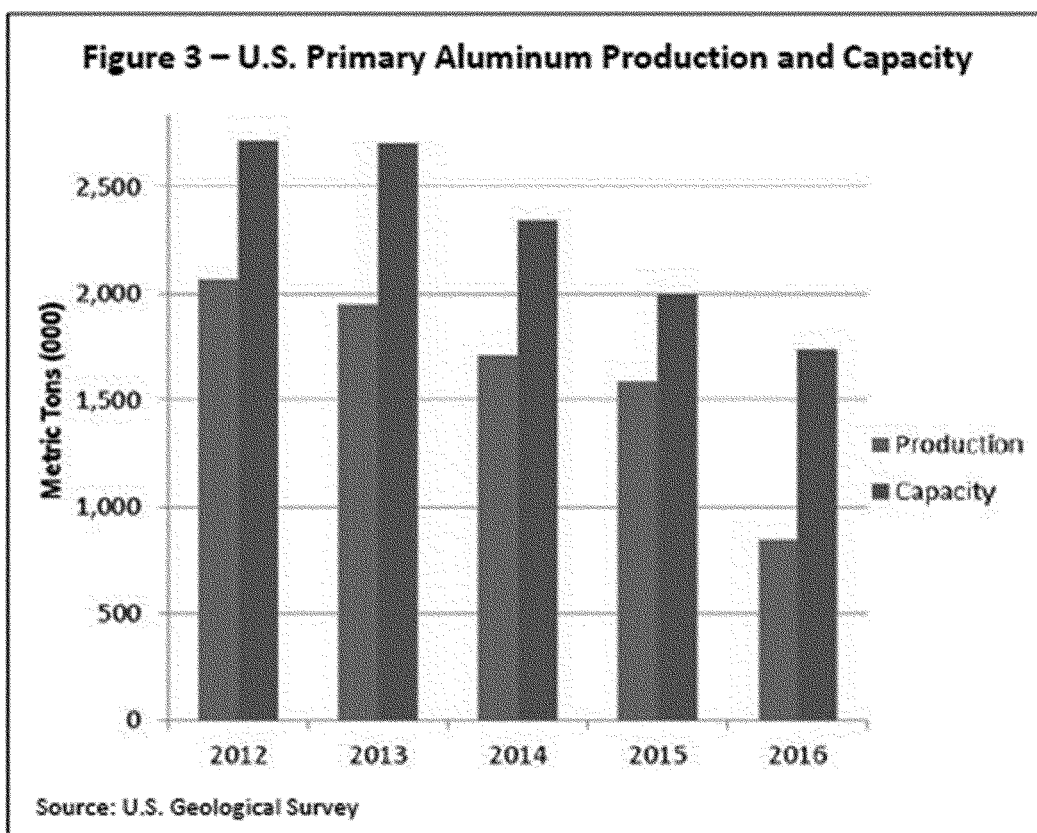
near record lows. The erosion of primary aluminum production capacity in the United States due to falling aluminum prices and subsequent closure of smelters has been precipitous. In 1981, the U.S. produced 30 percent of the world's primary aluminum and it remained the world's largest producer until 2000, when there were 23 smelters

in operation. In 2016, the U.S. accounted for just 1.5 percent of global production.

In the same timeframe, production of primary aluminum in China grew from less than 15 percent of global production in 2000 to about 55 percent in 2016.

<b>Table 9 - U.S. Primary Aluminum Production and Capacity</b>			
<b>Year</b>	<b>Production Metric Tons (000)</b>	<b>Capacity Metric Tons (000)</b>	<b>Capacity Utilization Rate</b>
2012	2,070	2,720	76%
2013	1,946	2,700	72%
2014	1,710	2,340	73%
2015	1,587	2,000	79%
2016	840	1,740	48%
2017 (based on Jan-Nov)	785	1,818*	39%

Source: U.S. Geological Survey Mineral Commodity Series; Mineral Industry Surveys, Companies  
 \*In July, 2017 Alcoa announced that it would partially reopen its Warrick smelter in 2018 with 269,000 metric ton capacity; it had previously announced that this smelter was to be permanently shut down.; In December, 2017 the company announced permanent closure of its Rockdale, TX smelter (idled since 2008)



In 2017, there are only two aluminum (upstream) producers in the United States that operate smelters: Alcoa and Century Aluminum. A third company, Noranda, is in bankruptcy and its idled smelter was sold to ARG International

AG of Switzerland. Table 10 below lists the status of aluminum smelting in the United States. At the beginning of 2016, three companies operated eight primary aluminum smelters in six U.S. states. In November, 2017, domestic smelters

were operating at about 43 percent of capacity of about 1.8 million metric tons per year.<sup>43</sup>

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Company	Location	Capacity (Metric Tons/Year)	Current Operating Level (Metric Tons/Year)	Idle Aluminum Smelter Capacity (Metric Tons/Year)	Comments
Alcoa	Ferndale, WA	279,000	230,000	49,000	Temporary shutdown of 79,000 tons in 3/2016
Alcoa	Wenatchee, WA	184,000	0	184,000	Temporary shutdown in 2/2016
Alcoa	Massena, NY (West)	130,000	130,000	0	Operating at full capacity
Alcoa	Evansville, IN "Warrick"	269,000	0	269,000	Shut down in 03/16; Expects to open 3 of 5 pot lines in 2018
Century	Hawesville, KY†	252,000	100,000	152,000	Pot line operations curtailed to 100,000 tons
Century	Sebree, KY	210,000	210,000	0	Operating at full capacity
Century	Mt. Holly, SC	229,000	115,000	114,000	Temporary shutdown of 114,000 tons in 2/2015
Magnitude 7 Metals (formerly Noranda)	New Madrid, MO	265,000	0	265,000	Temporary shutdown in 3/2016 - bought by ARG Int'l.* of Switzerland
<b>Total</b>		<b>1,818,000</b>	<b>785,000</b>	<b>1,033,000</b>	
<b>Average U.S. Smelter Facility Capacity Utilization in 2017 = 43.2%</b>					
Notes: Although Alcoa announced in 2016 that its Warrick smelting operations in Evansville, Indiana would be permanently closed, in July 2017 it said that three of five pot lines would be restarted by the second quarter of 2018, providing 275 jobs.					
†This smelter is capable of producing high-purity aluminum.					
* ARG International of Switzerland renamed the New Madrid MO smelter Magnitude 7 Metals.					
Source: U.S. Geological Survey; Aluminum Manufacturers					

There are five smelters in the United States currently producing at some level, of which only two are operating at full production capacity. Three others are operating, but have reduced output levels below capacity by shutting down pot lines. During periods of weak demand or low aluminum prices, firms often shut down individual pot lines rather than run them at reduced capacity due to the 24/7 nature of primary smelting operations.

Industry leader Alcoa has just one fully operational smelter in the U.S.: Massena West (NY), with 130,000-ton-per-year capacity. It was saved from closure by \$73 million in aid from New York State.<sup>44</sup> Alcoa's Ferndale, Washington smelter was also set to be temporarily shut down, but in April 2016 the company reached an agreement with the Bonneville Power Administration that enabled it to continue operations at a reduced level until early 2018.<sup>45</sup>

Although Alcoa announced in 2016 that its Warrick smelting operations in Evansville, Indiana would permanently close in July 2017 the company reversed that position announcing that three of five pot lines would be restarted by the second quarter of 2018, providing 275 jobs. Similarly, Century was close to idling one third of its Sebree, Kentucky smelter output in 2015, but made some organizational changes that enabled it to keep operating at full capacity.<sup>46</sup>

<sup>43</sup> <https://minerals.usgs.gov/minerals/pubs/commodity/aluminum/mcs-2017-alumi.pdf>; companies

<sup>44</sup> <https://www.northcountrypublicradio.org/news/story/33518/20170306/massena-hopeful-as-alcoa-deadline-hits-two-year-mark>.

<sup>45</sup> <http://www.bellinghamherald.com/news/local/article75151737.html>

<sup>46</sup> <https://www.platts.com/latest-news/metals/louisville-kentucky/century-aluminum-shelves-plans-to-shut-one-third-21631114>

Two additional smelters are currently shut down, although no formal announcement of their permanent closure has been made: Alcoa's Wenatchee, WA and Magnitude 7 Metals' New Madrid, Missouri smelter (formerly Noranda). On October 28, 2016, ARG International AG of Switzerland completed the purchase of Noranda's idle smelter and renamed it Magnitude 7 Metals; the new owner is attempting to negotiate a power contract that will enable it to restart operations.<sup>47</sup>

Of the five smelters currently in operation at some level, only one is capable of producing high-purity aluminum needed for many advanced aerospace and defense applications: Century Aluminum's Hawesville, KY plant. Century attributes its production decline to Chinese overproduction of high-purity aluminum and associated increases in Chinese exports of aluminum products. This smelter is a

major source of high-purity aluminum to product fabricators, including Constellium, and Kaiser. These companies use high-purity materials to produce aluminum products for DoD, including types of high-performance armor plate and aircraft-grade aluminum products used in upgrading F-18, F-35, and C-17 aircraft.

#### Aluminum Smelters Permanently Shut Down

Since 2012, six aluminum smelters have been permanently shut down, totaling 1.13 million metric tons of annual production capacity,<sup>48</sup> and about 3,500 jobs. Excluded from these statistics is Alcoa's Evansville, IN plant (currently the largest U.S. smelter in existence), which was closed "permanently" in the first quarter of 2016,<sup>49</sup> but which Alcoa later announced would be partially reopening in 2018.

In addition, the reopening of Noranda's Missouri smelter (now Magnitude 7 Metals) is in doubt. If these smelters were to make their closures permanent, total lost U.S. annual smelting capacity since 2012 could reach 1.5 million metric tons, and a loss of over 4,000 jobs.

The closures of these facilities have had a significant impact on the local economies that relied on them for high quality jobs. Even temporary idling of plants threatens the U.S. industry as there are significant financial costs with re-opening an aluminum plant. According to industry experts, it takes six to nine months to restart aluminum production at an idled smelter or pot line. The longer the facility is idled, the more difficult it is to bring back the highly skilled workforce needed to operate the facility, adding additional costs for worker training and production delays.

**Table 11 – U.S. Aluminum Smelters Shut Down Permanently Since 2012**

Company	Location	Capacity (Metric Tons/Year)	Jobs Lost	Comments
Alcoa	Alcoa, TN	215,000	450	Last produced 2009; shutdown made permanent 2012
Alcoa	Massena, NY (East)	125,000	500	Last production 2014; shutdown permanent 2015
Alcoa	Rockdale, TX	191,000	1,000	Last production 2008; shutdown permanent 2017
Century	Ravenswood, WV	170,000	600	Last production 2009; shutdown permanent 2014
Ormet	Hannibal, OH	265,000	700	Last production 2012; shutdown permanent 2014
Columbia Falls/Glencore	Columbia Falls, MT	168,000	200	Last production 2009; shutdown permanent 2015
<b>TOTAL</b>		<b>1,134,000</b>	<b>3,450</b>	
Note: Although Alcoa announced in 2016 that its 269,000 metric ton capacity Warrick smelting operations in Evansville Indiana would be permanently closed, in July 2017 it said that three of five pot lines would be restarted by the second quarter of 2018, providing 275 jobs.				
Source: U.S. Geological Survey				

<sup>47</sup> Testimony of Bob Prusak, CEO of Magnitude 7 Metals, June 22, 2017.

<sup>48</sup> U.S. Geological Survey, companies.

<sup>49</sup> <http://www.businessinsider.com/r-alcoa-plans-to-close-largest-us-aluminum-smelter-amid-tumbling-prices-2016-1>

**Secondary Aluminum Production Capacity**

As has been noted, secondary aluminum production today accounts for a substantial portion of the total supply of aluminum in the United States. According to the Aluminum Association, about 75 percent of all the aluminum ever produced is still in use today. Table 12 below provides statistics on the recovery of aluminum from new and old scrap. In 2016, aluminum recovered from scrap was 3.6 million metric tons, which was over four times primary aluminum production that year (841,000 metric tons). This figure represents secondary production by merchant producers; captive secondary production by downstream aluminum companies is not included.

The USITC study also included an estimate for change in U.S. production and production capacity for secondary unwrought aluminum. The ITC found that U.S. secondary production capacity

increased by 5.6 percent between 2011 and 2015, while actual production increased by 13.4 percent during that timeframe. The USITC report estimates that merchant secondary aluminum producers operated at about 80 percent of capacity in 2015.<sup>50</sup>

Despite its increasing usage, there is insufficient recycled aluminum available to meet growing demand for aluminum. Most of the major downstream aluminum manufacturers rely on a combination of secondary aluminum and primary aluminum in their manufacturing operations. The amount of primary versus recycled aluminum used varies on the specific product and its applications; manufacturers must control the properties of the alloy precisely to meet product specifications, which often requires using primary aluminum.

Moreover, as aluminum is repeatedly recycled, impurities from paint, labels and other metals build up, affecting

product composition and performance. A study by materials scientists at the Massachusetts Institute of Technology<sup>51</sup> found that as more and more aluminum scrap is recycled, there are likely to be more problems caused by impurities.

Specialized applications such as airplane parts and electronics require the cleanest materials, for which recycled aluminum is not suitable. The MIT scientists note that there is a need for more research on ways to reduce accumulated contaminants, and that this is an area in which there has been underinvestment to date. As U.S. aluminum capacity shifts away from primary to secondary production, developing methodologies to increase the usability of ever-decreasing quality scrap is of major importance. Since secondary scrap production in the United States is dominated by numerous smaller operations, their investment in R&D in this area is not likely to be sufficient.

<b>Table 12— U.S. Secondary Recovery of New Aluminum and Old Aluminum Scrap</b>	
Metric Tons (000)	
<b>Year</b>	<b>Scrap Recovery</b>
2011	3,110
2012	3,380
2013	3,420
2014	3,570
2015	3,380
2016	3,610

*Note:* The data presented on secondary recovery of aluminum are different from those reported by The Aluminum Association in its U.S. consumption information.  
*Source:* U.S. Geological Survey: Mineral Industry Surveys

<sup>50</sup> US ITC Report, p. 151.

<sup>51</sup> <http://news.mit.edu/2012/aluminum-recycling-study-0306>.

## 2. Canadian Primary Aluminum Capacity

The U.S. and Canadian defense industrial bases are integrated. This cooperative relationship has existed since 1956 and is codified in a number of bilateral defense agreements. For example in 1987, DoD (all Services), the Defense Logistics Agency (DLA), the Office of the Secretary of Defense (OSD), and the Canadian Department of National Defence (DND) joined together to form a North American Technology and Industrial Base Organization (NATIBO). NATIBO is chartered to promote a cost effective, healthy technology and industrial base that is responsive to the national and economic security needs of the United States and Canada. Current policy calls for a national defense force that derives its strength and technical superiority from a unified commercial- military industrial base.

While small compared to China's production, Canada is the third largest producer of primary aluminum in the world, with an estimated 3.15 million metric tons produced in 2016, up from 2.83 million metric tons in 2015.<sup>52</sup> There are 10 operational smelters in Canada owned by three companies: Alcoa, Rio Tinto Alcan, and Aluminerie Alouette.

In 2016, Canada exported about 2.3 million metric tons of primary aluminum to the United States—which represents over 70 percent of its total production. Canadian primary aluminum production is important to the U.S. aluminum industry.

## 3. Downstream Aluminum Production

There are over a thousand companies in the United States involved in the

production of downstream aluminum products—such as bars, rods, sheet, plate, extrusions, tubes, pipes, forgings and castings. Many of these are small- and medium-sized businesses that serve specialized markets. The downstream industry is the largest segment of the overall aluminum industry in the United States, and is second in size only to that of China.<sup>53</sup>

This industry segment is diverse—from production of large-volume commodity-grade articles such as can sheet for beverage cans, to high value added goods, including specialized products for the defense sector. Overall, downstream production is a capital-intensive process; some products require sophisticated manufacturing techniques. The U.S. industry is widely considered to be one of the world's most technically advanced.

Due to its size and diversity, there is little publicly available information on the production of the downstream aluminum industry as a whole. According to the American Foundry Association, there are 130 U.S. aluminum foundries in the defense casting supplier database maintained by the Defense Logistics Agency.

These firms—many of which are small businesses—have been identified as qualified suppliers available to produce the over 10,000 distinct aluminum cast components procured by the military.<sup>54</sup>

The U.S. International Trade Commission's report contains data from market research firm CRU Group for U.S. production of certain downstream aluminum products—flat rolled, extrusions, and wire and cable.

For flat-rolled aluminum, which includes HTS categories 7606 (plate, sheet and strip) and 7607 (foil), the U.S. is the world's second largest producer, after China. These types of products are used extensively in automobile and aerospace applications. While U.S. production has been essentially flat between 2012 and 2015, China's production has grown from 6.64 million metric tons in 2011 to 9.2 million metric tons in 2015—a 38 percent increase in just four years. According to CRU, the U.S. flat-rolled aluminum sector is operating at about 70 percent of capacity throughout the period.

Extruded aluminum products (including bars, rods and profiles in HTS 7604 as well as pipes and tubes in HTS 7608) are used mainly in building and construction applications. The U.S. produced 1.9 million metric tons of aluminum extrusions in 2015, with the sector showing modest growth in production over the past four years. U.S. production, while second in the world, is small compared to China's production, which topped 17 million metric tons in 2015. China's production of extrusions accounted for nearly two thirds of global production, and has been increasing year over year (due to demand for China's massive infrastructure development).

U.S. production of aluminum wire and cable is small and declining (see Table 13), with just 129,000 metric tons produced in 2015 (ranking fifth in the world after China, India, Canada, and Russia).

For comparison purposes, China produced nearly five million metric tons in 2015 (60 percent of global production). Wire and cable is used in building and construction, and also in electricity transmission and distribution systems.

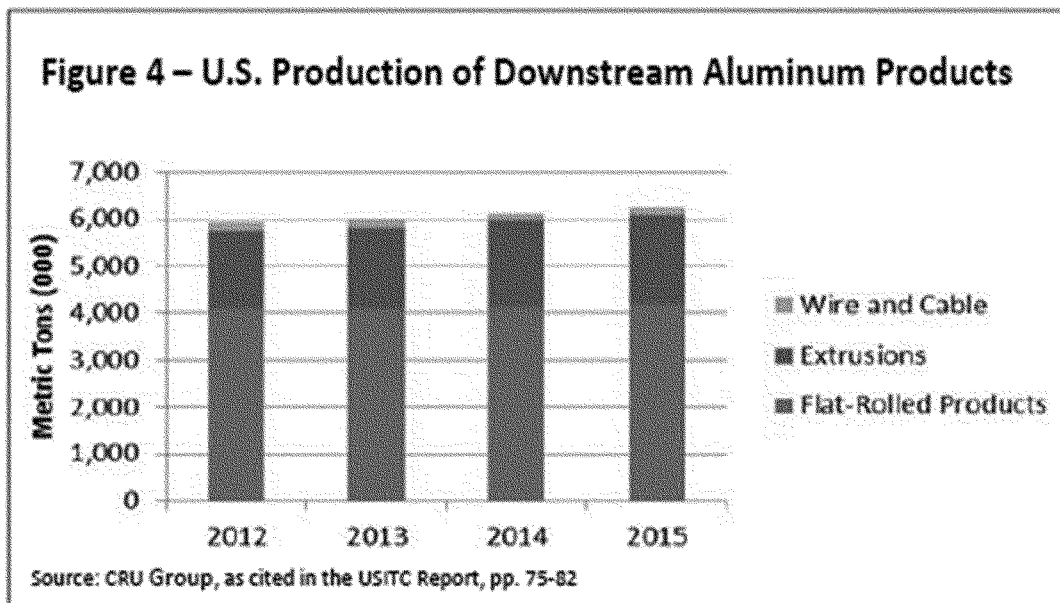
<sup>52</sup> USGS and Aluminum Association of Canada, January, 2017.

<sup>53</sup> USITC Report, page 142.

<sup>54</sup> Written submission of Doug Kurkul, CEO of the American Foundry Society.

Table 13 – U.S. Production of Wrought Aluminum Products					
(000 Metric Tons)					
Product	HTS	2012	2013	2014	2015
<b>Flat-Rolled</b>					
HTS 7606, 7607	Production	4,088	4,070	4,130	4,180
	Capacity	5,752	5,772	5,913	6,094
	Capacity Utilization	71%	71%	70%	69%
Extrusions HTS 7604, 7608	Production	1,673	1,728	1,853	1,908
Wire and Cable HTS 7605	Production	168	177	134	129

Source: CRU Group, as cited in the USITC Report, pp. 75-82



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Additional data on the U.S. downstream aluminum industry are available based on the U.S. International Trade Commission’s survey (which had a 64 percent response rate). While the survey did not capture the entire U.S. industry, the agency estimated total U.S. production based on these responses. The Table below shows data on U.S. production, capacity, and capacity

utilization for downstream aluminum products, based on the responses to the USITC industry survey.

USITC’s survey results indicate that production rose 13 percent between 2011 and 2015. The biggest sector of the downstream industry in the United States is flat rolled products (62 percent), followed by extrusion (32 percent). The USITC study also reported on capacity utilization rates for the

companies responding to their survey: overall, the downstream industry was operating at 78 percent of capacity. However, this figure varied significantly by product sector: 99 percent for aluminum plate manufacturers (benefiting from strong demand from the auto sector); 62 percent for wire and cable; 72 percent for rod, bar and profile; and just 41 percent for tube and pipe producers.<sup>55</sup>

<sup>55</sup> USITC Report, p. 152

Table 14 – U.S. Production, Capacity, and Capacity Utilization – Wrought Aluminum Products (000 Metric Tons)					
Product	HTS	2012	2013	2014	2015
<b>Plate, Sheet, Strip and Foil (Flat Rolled Products)</b>					
HTS 7606, 7607	Production	4,470	4,266	4,361	4,393
	Capacity	4,965	4,684	4,649	4,735
	Capacity Utilization	90.0%	91.1%	93.8%	92.8%*
<b>Wire</b>					
HTS 7605	Production	454	451	422	445
	Capacity	741	745	720	718
	Capacity Utilization	61.3%	60.5%	58.6%	62.1%
<b>Bars, Rods, Profiles</b>					
HTS 7604	Production	1,597	1,682	1,764	1,835
	Capacity	2,328	2,436	2,508	2,566
	Capacity Utilization	68.6%	69.1%	70.3%	71.5%
<b>Tube and Pipe</b>					
HTS 7608	Production	325	356	402	434
	Capacity	959	994	1,049	1,049
	Capacity Utilization	33.9%	35.8%	38.3%	41.4%
<b>TOTAL</b>					
	Production	6,603	6,754	6,948	7,107
	Capacity	8,750	8,858	8,927	9,068
	Capacity Utilization	75.5%	76.3%	77.8%	78.4%
Source: USITC Survey, USITC Report – “Aluminum: Competitive Conditions Affecting U.S. Industry,” Appendix H, p. 518, July 2017.					
*CRU Group reports 69 percent in 2015 for flat rolled aluminum producers					

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While USITC survey respondents reported very high levels of capacity utilization in the plate, sheet and strip sector, this capacity utilization rate was markedly higher than the comparable number reported by CRU Group—69 percent in 2015 for flat rolled aluminum producers.

CRU data, as reported in the USITC report, indicate that Chinese flat rolled products manufacturers are operating at only 62 percent of capacity. Although extruded products account for the highest percentage of Chinese wrought aluminum production, the largest amount of U.S. imports from China are in the flat-rolled product categories—plate, sheet and strip (HTS 7606) and foil (7607). It is likely that excess Chinese capacity and production in this segment, for which internal Chinese demand is insufficient, is being unloaded onto world markets, including the United States.

## Major U.S. Downstream Aluminum Companies

The leading integrated aluminum production companies in the United States making downstream products include Constellium, Novelis, Aleris, Kaiser, Arconic, and Sapa. While commercial/industrial sectors account for most of their sales, these companies are also major suppliers of aluminum products for the defense industry. While the defense-related production of these companies makes up a small portion of their business, the same equipment is used to make military as well as commercial production. It is large-volume standard products that enable the companies to invest in fixed equipment and capacity that support the production of high-value added products, including defense.

With U.S. headquarters in Atlanta, Georgia, *Novelis* operates 24 facilities in 10 countries; it is a subsidiary of Indian aluminum giant Hindalco. The company has 4,000 employees in the United States at seven production facilities and

two research and development/engineering centers. *Novelis* is the world's largest producer of flat-rolled aluminum products (*e.g.*, plate and sheet) that are used to make beverage cans, building and structural products, and components for cars and trucks; it is also a leading recycler of beverage cans. *Novelis* states that unfairly priced imports originating from China and elsewhere are putting its U.S. operations at risk. The company was forced to shutter a facility in Kentucky and exit the aluminum converter foil business in 2008; in 2014, it reduced activities at its Indiana facility, exiting the household aluminum foil market due to unfairly priced imports from China.

*Kaiser Aluminum*, based in California, was founded in 1946 and was once a fully integrated aluminum producer with U.S. smelting operations. Its original smelter was purchased from the United States Government, which built it to satisfy World War II production needs. *Kaiser's* smelters were shut down in 2000, and the company underwent



bankruptcy in 2002. Today, Kaiser operates 11 fabricating facilities in the United States with 2,700 employees and is a leading producer of aluminum products (sheet, plate, extrusions, rod, bar) for defense, aerospace, satellite, automotive and custom industrial applications. The company has invested \$630 million since 2006 to increase capacity, lower costs and improve quality.

*Constellium*, a Netherlands company with U.S. headquarters in Baltimore, Maryland is also a major manufacturer of downstream aluminum products, with 12,000 employees worldwide. The company designs and manufactures aluminum products for the aerospace, automotive, packaging and defense markets. The United States market generates about 40 percent of the company's \$5 billion in revenue. Constellium invested \$1.8 billion in its U.S. plants in the last five years, and opened a new R&D facility in Plymouth, Michigan.

In Muscle Shoals, Alabama, Constellium produces cansheet for the packaging industry at its plant with 1,200 employees. Its Ravenswood, West Virginia facility, with 1,050 employees produces advanced alloyed plates for military aircraft, armored vehicles and U.S. Navy vessels. The company partners with the U.S. Army through the U.S. Army Tank Automotive Research Development and Engineering Center (TARDEC) in developing new aluminum solutions for combat vehicles of the future. Constellium states that it has been negatively affected by imports of low-price aluminum plate from China, which have displaced Constellium's products in the market.

*Arconic*, headquartered in Pittsburgh, Pennsylvania, was created in 2016 when Alcoa split into two companies, manufactures high-value added downstream aluminum products. The company has 22,750 employees in 45 plants in the United States. While part of Alcoa, the company invested over \$3.1 billion to modernize facilities since 2009. Arconic is a leading supplier of aluminum products to the DoD—including armor plate, aluminum bulkheads for aircraft, and marine applications. The company (again, as Alcoa), collaborated on R&D and manufacturing with the DoD to develop special alloys and manufacturing processes. Arconic's Davenport, Iowa rolling mill produces high-purity aluminum products needed for such defense programs as the Joint Strike Fighter and Joint Light Tactical Vehicle using a process called fractional crystallization.

*Aleris*, headquartered in Beachwood, Ohio, is a leading producer of rolled aluminum and extruded aluminum products for the aerospace, automotive, defense, construction and packaging markets. It is also a producer of secondary aluminum made from recycled scrap. The company filed for Chapter 11 bankruptcy in 2009, emerging in 2010 as a privately held company. It has 12 production facilities (nine in the U.S.; two in Europe and one in China) and three "innovation centers" (two in Europe and one in Zhengjiang, China). The Chinese R&D center opened in 2014 to support development of aircraft and commercial plate products for Aleris's Chinese plant. Aleris recently completed an expansion of its rolling mill in Lewisport, Kentucky (capacity 220,000

metric tons per year) and began commercial production of body sheet for the automotive industry. Chinese aluminum extrusion company Zhongwang sought to purchase Aleris, but the transaction was withdrawn in November, 2017 due to concerns of the federal Committee on Foreign Investment in the United States (CFIUS).

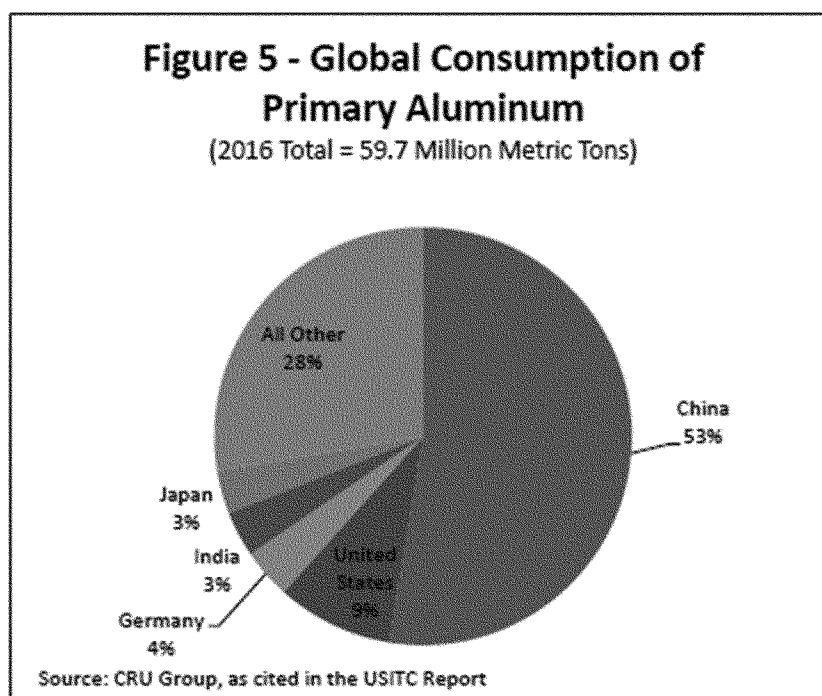
*Sapa Extrusions*, a Norwegian company, is the world's leading producer of aluminum extruded profiles and aluminum tubing. Its products are used in many industry sectors, including automotive, heating and ventilation, and building and construction.

The company has 22,800 employees in 40 countries; in North America there are 6,500 employees in 23 facilities. It has four R&D Centers—three in Europe and one in Troy, MI. According to the company's 2016 annual report, North American sales volume was 585,000 metric tons.

#### *D. Domestic Production Is Well Below Demand*

In 2016, global primary aluminum consumption was 59.7 million metric tons, reflecting a 5.4 percent year-over-year increase. This was the seventh straight year of significant growth for aluminum consumption, and growth is forecast to continue at this rate.

The world's top five leading consuming countries were responsible for more than 72 percent of total aluminum demand in 2016 (see Figure 5). According to CRU International, the leading aluminum consuming markets in 2016 were China, the United States, and Germany.



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Major Market	2015	% of Total	2016	% of Total
Building & Construction	1,421	14	1,468	14
Transportation	4,185	40	4,227	40
Consumer Durables	742	7	795	8
Electrical	799	8	837	8
Machinery & Equipment	768	7	769	7
Containers & Packaging	2,135	21	2,160	20
Other	328	3	312	3
<b>Domestic, total</b>	<b>10,378</b>	<b>100</b>	<b>10,583</b>	<b>100</b>

Source: The Aluminum Association (Converted from Millions of Pounds)

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Combined U.S. and Canadian shipments of all types of aluminum (primary, secondary, as well as downstream production of semi-manufactures) totaled 12.0 million metric tons in 2016, according to the Aluminum Association.<sup>56</sup> The

<sup>56</sup> U.S. Government statistics are not available for U.S. production or consumption of aluminum other

transportation sector is the largest North American market for aluminum, accounting for 4.2 million metric tons or 35 percent of total consumption: this

than for primary aluminum; Aluminum Association figure is based on U.S. and Canadian Producer Shipments plus imports and are included in the "Fact at a Glance-2016," December, 2017 (converted to metric tons from pounds) and includes exports (except exports between the U.S. and Canada).

sector's use of aluminum is expected to continue to grow as automakers strive to make lighter and more fuel-efficient vehicles. Another major factor in demand from the transportation sector is aircraft; the International Aluminum Institute estimates that that 80 percent of an aircraft's weight is aluminum.

U.S. consumption of primary aluminum has steadily increased rising

by 46 percent since 2000, according to the CRU International. In 2016, CRU estimates that the United States consumed nearly 5.4 million metric tons, or about nine percent of the world's total consumption of 60 million metric tons of primary aluminum. While China is by far the leading consumer of primary aluminum, its consumption is well below its production level, whereas the United States production is substantially lower than consumption.

The U.S. Geological Survey (USGS) statistics show increases in U.S. apparent consumption<sup>57</sup> of aluminum from 4.13 million metric tons in 2012 to 5.22 million metric tons in 2015 (a 26 percent increase over the 4-year period).<sup>58</sup> U.S. production in 2015 (primary and secondary) totaled just over three million metric tons; domestic

production fell even further in 2016, while demand for aluminum continued to increase.

Based on USGS production and U.S. Census statistics for U.S. exports and imports of primary aluminum, U.S. import dependence for primary aluminum was nearly 90 percent of apparent consumption in 2016, up from 64 percent in 2012.

U.S. import reliance increased because domestic primary aluminum production decreased, so U.S. manufacturers by necessity filled their materials needs through imports. Since primary aluminum companies are globalized, some of the imported aluminum was from the foreign business units of U.S.-based companies.

The Aluminum Association uses a different methodology to estimate U.S.

consumption<sup>59</sup> of aluminum (including unwrought and mill products). The Association's data show that U.S. aluminum consumption was nearly 10 million metric tons in 2006, before declining during the years of economic crisis that followed and not yet fully recovering. There has been a dramatic increase in the share of U.S. consumption that is satisfied through imports in just the past two years, rising from a stable 51 percent from 2011-2013 to over 64 percent for 2016. This is a direct result of the decline in U.S. primary aluminum production driven by falling prices and expanding non-U.S. production. This increase in imports has occurred in both primary aluminum and downstream products.

**Table 16 - U.S. Aluminum Supply/Aluminum Consumption Balance**  
(Millions of Metric Tons)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Primary	2.28	2.56	2.66	1.73	1.73	1.99	2.07	1.95	1.71	1.59	0.82
Additives	0.05	0.05	0.05	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.02
Melt Loss	-0.02	-0.03	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01
Secondary Recovery	4.09	3.98	3.06	2.54	3.17	3.50	3.73	3.98	3.85	3.87	4.06
Imports (Mill Products)	1.58	1.43	1.25	1.07	1.26	1.23	1.29	1.25	1.42	1.60	1.68
Imports (Ingot)	3.47	2.95	2.81	2.93	2.67	2.86	2.93	3.16	3.33	3.40	4.26
Change in Prod Inv.	-0.01	0.00	-0.17	-0.28	0.08	0.02	0.09	-0.03	0.17	0.08	0.02
<b>Total U.S. Supply*</b>	<b>11.46</b>	<b>10.94</b>	<b>9.98</b>	<b>8.56</b>	<b>8.77</b>	<b>9.57</b>	<b>9.95</b>	<b>10.40</b>	<b>10.16</b>	<b>10.39</b>	<b>10.82</b>
Exports (Mill Products)	1.13	1.09	1.14	0.92	0.98	1.15	1.23	1.29	1.27	1.24	1.22
Exports (Ingot)	0.38	0.37	0.35	0.32	0.38	0.41	0.43	0.42	0.41	0.36	0.30
<b>Total U.S. Consumption</b>	<b>9.95</b>	<b>9.48</b>	<b>8.48</b>	<b>7.32</b>	<b>7.41</b>	<b>8.02</b>	<b>8.29</b>	<b>8.68</b>	<b>8.47</b>	<b>8.78</b>	<b>9.30</b>
Imports as % of Consumption	51%	46%	48%	55%	53%	51%	51%	51%	56%	57%	64%

Source: Aluminum Association

Note: Consumption figures cited in this table are slightly lower than those for Table 14, which reports for North America – including Canada and the United States. Table 15 data reports U.S. production and consumption only.

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*E. U.S. Imports of Aluminum are Increasing*

1. Overview of Aluminum Imports in Aggregate

Overall U.S. imports of the aluminum categories subject to this investigation

combined (HTS #7601, 7604, 7605, 7606, 7607, 7608, 7609. 7616.99.51.60 and 7616.99.51.70) were valued at \$13.0 billion in 2016 – a 15 percent increase over 2013 import levels. For the first ten months of 2017, imports are up 30 percent on a value basis compared to the same period in 2016. These import

figures are heavily influenced by changes in global aluminum prices. While imports on a value basis leveled off between 2014 and 2016, this is largely due to declining aluminum prices.

Imports of aluminum on weight basis are a better indication of true trade

<sup>57</sup> Defined as primary production + secondary production + net import reliance for crude aluminum and aluminum semi-manufactures (excluding imported scrap).

<sup>58</sup> USGS, Mineral Commodity Summaries, January 2017.

<sup>59</sup> U.S. apparent aluminum consumption = primary aluminum production + recovery of

secondary aluminum + imports of unwrought aluminum + imports of mill products – exports of unwrought aluminum – exports of mill products.

flows, because they are unaffected by fluctuations in prices. By weight, U.S. imports in these aluminum categories were 5.9 million metric tons in 2016, up 34 percent from 4.4 million metric tons in 2013. For the first 10 months of 2017, imports are running 18 percent above 2016 levels on a tonnage basis. There is no leveling off in the level of imports on a volume basis; rather, there has been a consistent increase year over year.

Canada is the leading source of aluminum imports into the United States, accounting for about 43 percent of total imports by both value and weight in 2016. Imports from Canada have been at consistent level over the

four-year period at about 2.6 million metric tons per year.

In contrast, imports from the second leading source (by value), China, increased by 70 percent by value and 75 percent by weight between 2013 and 2015. Imports from China by weight were 531,000 metric tons valued at \$1.3 billion in 2016, a slight decline from 2015 levels. However, imports from China in all aluminum categories are up by about 33 percent by value and 25 percent by weight for the first 10 months of 2017 compared with the same period last year.

By product category, unwrought aluminum (primary) makes up by far the

largest portion of imports—63 percent of the total by value. The second largest category – aluminum plates, sheets and strips—accounts for an additional 19 percent of imports.

The following subsections present detailed information on U.S. imports of aluminum in specific product categories, as the source of the imports varies significantly. In general, the import data are provided in metric tons, which allows for a true picture of trends in import levels (versus import data by value, which fluctuate based on aluminum prices).

**Table 17 – U.S. Imports of Aluminum by Country and Value**

(HTS 7601, 7604, 7605, 7606, 7607, 7608, 7609; 7616.99.51.60 & 7616.99.51.70)

Year >>	2013	2014	2015	2016	2016 Jan-Oct	2017 Jan-Oct	% Change YTD 2016 - 2017
<b>Country</b>	<i>Thousands of Dollars (000)</i>						
Canada	6,202,862	6,524,386	6,083,989	5,608,651	4,609,071	5,771,389	25.20%
Russia	525,499	796,395	716,134	1,349,508	1,116,152	1,301,650	16.60%
China	874,443	1,157,244	1,491,461	1,337,719	1,103,326	1,468,632	33.10%
United Arab Emirates	581,412	620,781	661,933	1,029,269	804,818	1,176,366	46.20%
Bahrain	165,496	246,133	282,696	398,164	321,512	498,850	55.20%
Germany	466,761	378,888	397,349	345,715	295,852	232,961	-21.30%
Argentina	229,620	175,859	198,159	330,666	277,140	368,008	32.80%
Qatar	208,908	202,360	224,177	300,731	249,935	269,809	8.00%
France	85,536	160,366	168,485	192,993	164,489	165,625	0.70%
Mexico	186,479	228,357	219,742	189,505	157,617	200,427	27.20%
South Africa	221,733	235,281	178,286	186,206	155,008	322,552	108.10%
Austria	126,088	146,790	158,714	156,761	133,369	131,032	-1.80%
Japan	169,885	187,383	148,852	144,209	120,740	130,365	8.00%
Venezuela	102,845	219,705	126,485	116,038	81,800	159,401	94.90%
India	65,319	87,543	139,038	111,159	91,853	282,515	207.60%
<b>All Other:</b>	<b>1,136,361</b>	<b>1,200,656</b>	<b>1,422,447</b>	<b>1,160,298</b>	<b>965,824</b>	<b>1,417,679</b>	<b>46.80%</b>
<b>Total</b>	<b>11,349,245</b>	<b>12,568,126</b>	<b>12,617,948</b>	<b>12,957,591</b>	<b>10,648,507</b>	<b>13,897,259</b>	<b>30.50%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

**Table 18 - U.S. Imports of Aluminum by Country and Weight**

(HTS 7601, 7604, 7605, 7606, 7607, 7608, 7609; 7616.99.51.60 &amp; 7616.99.51.70)

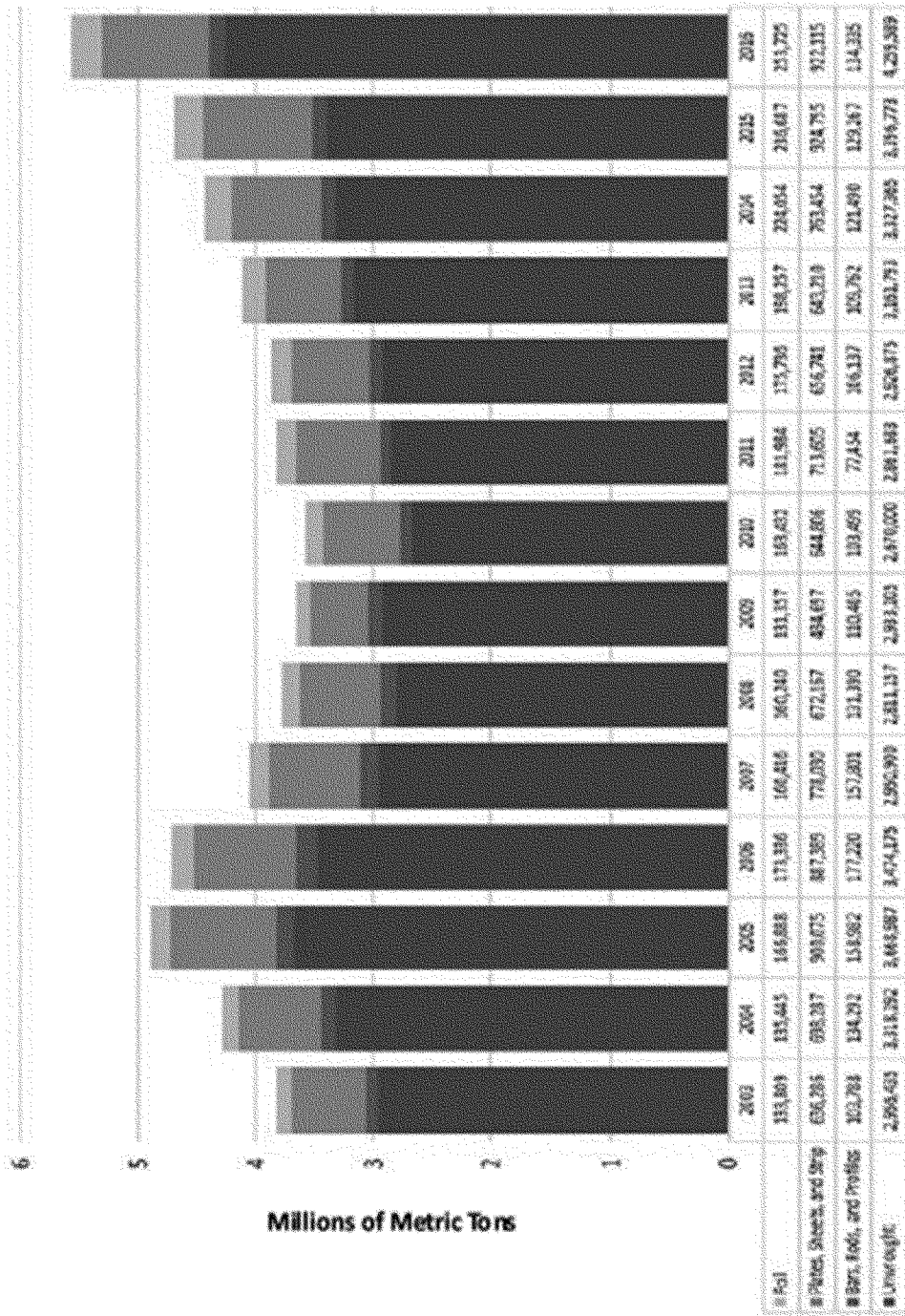
Year >>	2013	2014	2015	2016	2016 Jan-Oct	2017 Jan-Oct	% Change YTD 2016 - 2017
Country	Metric Tons						
Canada	2,677,401	2,631,222	2,661,770	2,759,687	2,274,594	2,478,455	9.0%
Russia	219,256	356,014	309,396	755,487	628,076	625,792	-0.4%
United Arab Emirates	250,852	260,934	292,785	555,857	435,170	569,405	30.8%
China	304,069	410,043	534,940	530,580	438,446	547,127	24.8%
Bahrain	63,522	96,579	114,654	190,042	153,705	213,614	39.0%
Argentina	104,465	79,475	91,182	187,562	157,572	182,004	15.5%
Qatar	94,985	91,731	86,325	115,705	96,155	103,711	7.9%
Germany	96,378	77,074	92,064	85,774	74,418	48,805	-34.4%
South Africa	71,814	83,748	57,037	73,195	60,749	141,600	133.1%
Venezuela	49,999	109,568	67,443	69,526	50,509	82,078	62.5%
India	20,769	31,830	60,041	53,986	45,115	132,014	192.6%
Saudi Arabia	471	14,404	76,132	53,768	44,288	40,620	-8.3%
Mexico	55,320	67,130	62,007	52,852	44,134	56,908	28.9%
Brazil	50,549	37,203	18,748	48,998	35,653	33,010	-7.4%
Indonesia	62,598	60,116	78,013	45,127	34,579	65,007	88.0%
<b>All Other</b>	<b>287,050</b>	<b>335,970</b>	<b>379,703</b>	<b>360,390</b>	<b>309,595</b>	<b>443,793</b>	<b>43.3%</b>
<b>Total</b>	<b>4,409,497</b>	<b>4,743,040</b>	<b>4,982,238</b>	<b>5,938,536</b>	<b>4,882,759</b>	<b>5,763,945</b>	<b>18.0%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

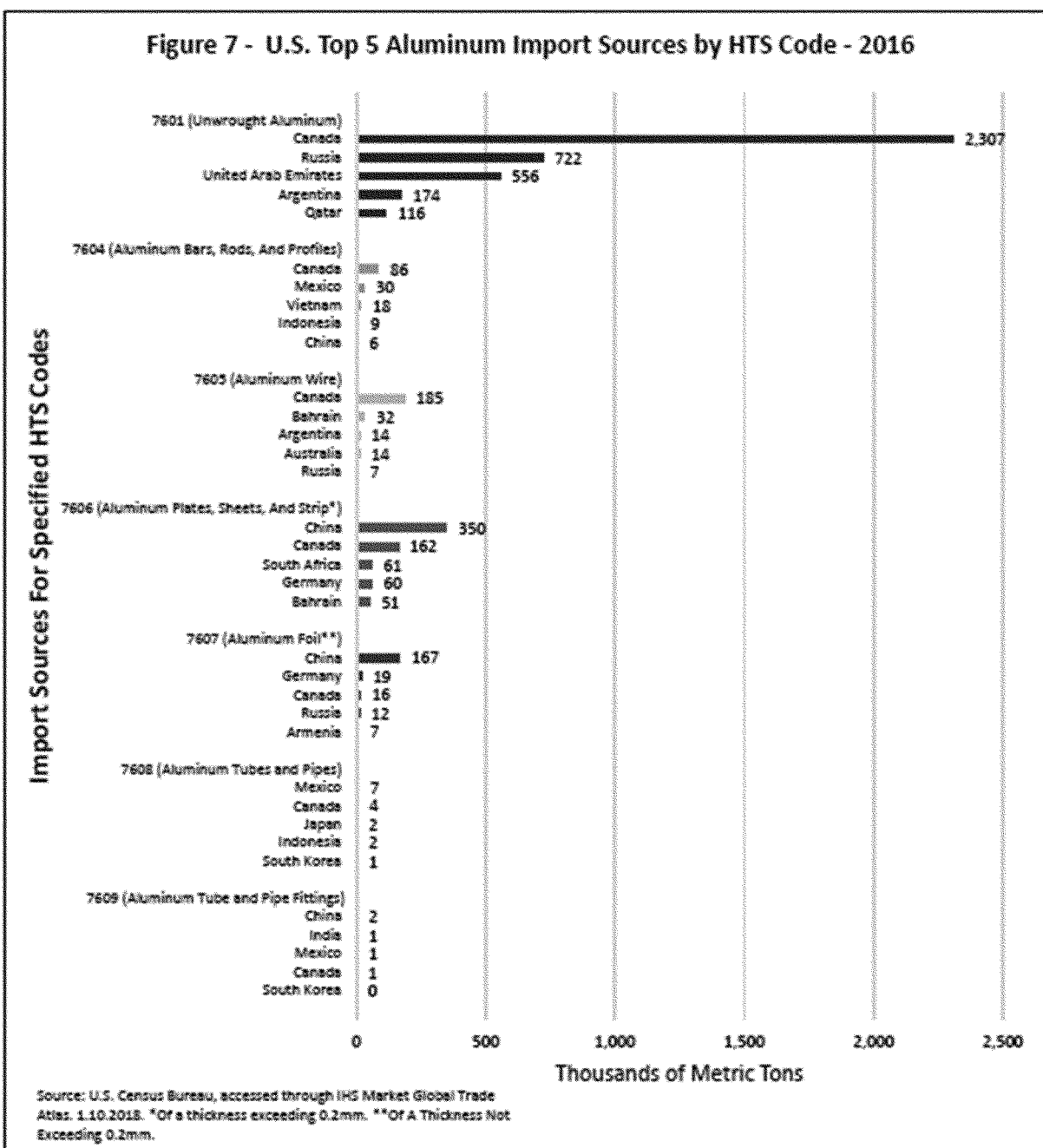
<b>Table 19 – U.S. Imports of Aluminum by Product Category</b> (HTS 7601, 7604, 7605, 7606, 7607, 7608, 7609; 7616.99.51.60 & 7616.99.51.70)							
Year >>	2013	2014	2015	2016	2016 Jan-Oct	2017 Jan-Oct	% Change YTD 2016 - 2017
Type of Aluminum Product By HTS Code	<i>Thousands of Dollars (000)</i>						
7601 ALUMINUM, UNWROUGHT	6,903,314	7,656,615	7,331,489	7,909,651	6,435,919	8,678,149	34.80%
7606 ALUMINUM PLATES, SHEETS AND STRIP, OVER 0.2 MM (0.0079 IN.) THICK	2,079,139	2,355,549	2,800,951	2,522,666	2,103,753	2,633,656	25.20%
7607 ALUMINUM FOIL (WHETHER OR NOT PRINTED OR BACKED WITH PAPER OR OTHER BACKING MATERIALS), NOT OVER 0.2 MM (0.0079 IN.) THICK (EXCLUDING ANY BACKING)	901,904	973,504	933,419	909,127	762,763	877,565	15.10%
7604 ALUMINUM BARS, RODS AND PROFILES	643,543	730,516	804,536	799,818	670,860	840,357	25.30%
7605 ALUMINUM WIRE	583,206	596,571	500,410	589,363	485,734	650,235	33.90%
7608 ALUMINUM TUBES AND PIPES	141,497	151,411	156,545	145,324	121,978	136,488	11.90%
7609 ALUMINUM TUBE OR PIPE FITTINGS (INCLUDING COUPLINGS, ELBOWS, AND SLEEVES)	96,643	103,961	90,598	81,641	67,500	80,808	19.70%
<b>TOTAL</b>	<b>11,349,246</b>	<b>12,568,127</b>	<b>12,617,948</b>	<b>12,957,590</b>	<b>10,648,507</b>	<b>13,897,258</b>	<b>23.00%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

Figure 6 - U.S. Aluminum Imports



Source: U.S. Census Bureau, accessed through Global Trade Atlas.



## 2. Unwrought Aluminum Imports

Of total U.S. aluminum imports, unwrought (primary) aluminum accounted for the bulk by weight (4.3 of 6.5 million metric tons), with a total value of \$7.9 billion. U.S. imports of

unwrought aluminum have increased dramatically in recent years—nearly 40 percent by weight since 2014. In 2016, of the total U.S. imports of 4.3 million metric tons, the majority was from Canada (54 percent), followed by Russia (16 percent), United Arab Emirates (13

percent), Argentina (4 percent), Qatar (3 percent); the rest of the world accounted for 10 percent. While still not among the top sources, imports from Oman, South Africa and Venezuela have shown tremendous growth in the past year.



<b>Table 20 – U.S. Imports of Unwrought (Primary) Aluminum (HTS 7601)</b>							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan- Oct</b>	<b>2017 Jan- Oct</b>	<b>% Change YTD 2016 - 2017</b>
<b>Country</b>	<b>Metric Tons</b>						
Canada	2,273,784	2,215,438	2,235,854	2,306,770	1,890,587	2,097,491	10.90%
Russia	189,599	325,420	279,980	721,614	599,295	581,465	-3.00%
United Arab Emirates	250,432	260,921	292,764	555,824	435,164	567,504	30.40%
Argentina	97,495	72,189	85,944	173,714	145,992	171,162	17.20%
Qatar	94,985	91,731	86,325	115,705	96,155	103,708	7.90%
Bahrain	29,268	53,873	74,423	106,592	91,675	97,582	6.40%
Venezuela	49,997	108,302	66,937	66,895	48,458	78,204	61.40%
Saudi Arabia	469	14,403	76,130	53,082	44,288	30,246	-31.70%
Brazil	33,923	22,372	3,701	28,828	18,912	8,389	-55.60%
India	8	322	38,795	26,497	22,537	91,135	304.40%
South Korea	14,841	15,283	16,364	14,624	12,560	10,951	-12.80%
South Africa	12,434	26,282	9,873	12,006	8,972	99,181	1005.50%
Mexico	25,262	32,485	22,660	11,864	9,619	16,052	66.90%
France	4,259	8,607	10,874	9,994	8,308	7,944	-4.40%
Oman	0	35	0	9,154	9,154	13,564	48.20%
<b>All Other</b>	<b>85,037</b>	<b>79,704</b>	<b>96,186</b>	<b>46,226</b>	<b>41,188</b>	<b>136,705</b>	<b>231.90%</b>
<b>TOTAL</b>	<b>3,161,793</b>	<b>3,327,367</b>	<b>3,396,772</b>	<b>4,259,587</b>	<b>3,482,864</b>	<b>4,111,283</b>	<b>18.04%</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb							

#### Aluminum Bars, Rods and Profiles

For aluminum bars, rods and profiles (HTS 7604) the total value of U.S. imports (from all sources) in this category was \$801 million in 2016, down slightly from \$804 million in 2015. By weight, there was a slight

increase in import levels in 2016 over 2015 levels (200,000 metric tons). Canada and Mexico are major players in this category. Imports from China fell off beginning in 2015 from earlier levels. Imports from Vietnam increased dramatically during the period, rising by

over 800 percent between 2013 and 2016, with the trend continuing in 2017. Some industry analysts have observed that a portion of the imports in this category from Vietnam are likely Chinese products that are being transshipped to avoid duties.

<b>Table 21 - U.S. Imports of Aluminum Bars, Rods &amp; Profiles</b>							
<b>(HTS 7604)</b>							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016</b>	<b>2017</b>	<b>% Change</b>
<b>Country</b>	<b>Metric Tons</b>						<b>YTD 2016 -</b>
					<b>Jan-Oct</b>	<b>Jan-Oct</b>	<b>2017</b>
Canada	78,733	84,031	91,062	85,820	72,619	76,400	5.20%
Mexico	19,377	24,234	26,603	29,992	25,173	27,765	10.30%
Vietnam	1,846	3,706	9,029	17,751	14,965	19,318	29.10%
Indonesia	2,441	6,833	8,872	8,852	7,057	9,309	31.90%
China	9,196	9,700	5,327	5,910	4,842	3,847	-20.50%
Colombia	2,438	2,564	4,107	5,806	4,895	6,404	30.80%
Malaysia	4,799	3,835	5,152	5,380	4,701	5,531	17.70%
Russia	5,445	6,628	6,076	4,715	3,906	5,823	49.10%
Germany	4,088	4,708	4,289	4,154	3,277	3,839	17.10%
Italy	3,307	4,422	4,168	4,093	3,342	5,163	54.50%
Dominican Republic	2,624	3,021	4,325	3,923	3,371	2,433	-27.80%
India	1,770	2,902	2,408	2,559	2,175	2,880	32.40%
Israel	64	1,194	1,394	2,424	2,198	2,154	-2.00%
Slovenia	2,717	2,739	2,424	2,423	2,134	2,028	-5.00%
Belgium	1,685	1,960	2,281	2,319	1,933	1,808	-6.50%
<b>All Other</b>	<b>11,890</b>	<b>11,634</b>	<b>13,571</b>	<b>16,694</b>	<b>13,688</b>	<b>22,248</b>	<b>62.50%</b>
<b>TOTAL</b>	<b>152,421</b>	<b>174,111</b>	<b>191,086</b>	<b>202,815</b>	<b>170,275</b>	<b>196,952</b>	<b>15.67%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

#### Aluminum Plate, Sheet and Strip

Aluminum plates, sheets and strip (HTS 7606) are the second largest category of imports (after unwrought aluminum) with a total value of \$2.5 billion in 2016. On a weight basis,

imports were essentially unchanged in 2016 compared to 2015 levels, but data for the first 10 months of 2017 show a nearly 20 percent increase over the same period in 2017.

Over a third of total imports came from China, and imports from China are

on the rise again (after tapering off in 2016). Canada, South Africa, Bahrain and Germany also supply significant amounts of plates, sheet and strip. Imports from Indonesia are on the rise in this category, double in 2017 over 2016 levels.

Table 22- U.S. Imports of Aluminum Plate, Sheet & Strip (HTS 7606)							
Year >>	2013	2014	2015	2016	2016 Jan- Oct	2017 Jan- Oct	% Change YTD 2016 - 2017
Country	Metric Tons						
China	173,449	264,943	369,291	349,628	289,567	381,705	31.80%
Canada	125,513	133,537	152,560	161,642	138,029	129,739	-6.00%
South Africa	59,304	57,428	47,053	61,160	51,750	42,324	-18.20%
Germany	74,509	53,372	62,240	60,049	52,462	29,772	-43.20%
Bahrain	24,634	30,593	34,966	51,224	41,575	48,260	16.10%
Indonesia	59,409	51,719	66,842	33,614	25,051	53,535	113.70%
Austria	20,063	26,032	28,376	30,878	26,487	25,976	-1.90%
Japan	2,109	10,820	22,657	24,697	20,746	19,589	-5.60%
India	16,826	26,982	16,727	22,825	18,647	35,749	91.70%
Greece	18,426	18,089	21,631	19,938	16,023	16,181	1.00%
France	3,070	10,658	9,454	15,913	13,061	21,175	62.10%
Brazil	8,053	6,943	9,858	14,845	12,015	15,993	33.10%
South Korea	998	22,165	18,973	10,744	9,972	8,785	-11.90%
Russia	8,670	8,785	10,190	10,218	8,480	9,059	6.80%
United Kingdom	13,942	9,615	11,653	9,451	8,485	5,217	-38.50%
<b>All Other</b>	<b>34,236</b>	<b>31,559</b>	<b>41,911</b>	<b>47,194</b>	<b>37,510</b>	<b>71,722</b>	<b>91.20%</b>
<b>TOTAL</b>	<b>643,210</b>	<b>763,239</b>	<b>924,381</b>	<b>924,020</b>	<b>769,860</b>	<b>914,781</b>	<b>18.82%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

### 3. Aluminum Foil

Aluminum foil imports are presented in the table below. The total value of imports in this category was \$910

million in 2016, of which \$475 million was from China.

On a weight basis, China dominates, accounting for two thirds of the total imports to the United States in 2016. (Note: Aluminum foil imports from

China are the subject of an ongoing antidumping/countervailing duty investigation). See Appendix D for more information on trade actions related to aluminum.

<b>Table 23 – U.S. Imports of Aluminum Foil</b>							
<b>(HTS 7607)</b>							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan-Oct</b>	<b>2017 Jan- Oct</b>	<b>% Change YTD 2016 - 2017</b>
<b>Country</b>	<b>Metric Tons</b>						
China	107,130	128,254	151,749	167,464	138,082	152,194	10.20%
Germany	15,380	16,734	17,520	18,705	16,351	12,428	-24.00%
Canada	13,547	13,802	13,521	15,638	13,068	12,635	-3.30%
Russia	126	2,072	7,718	11,803	10,220	13,468	31.80%
Armenia	27,162	26,077	13,787	7,258	6,809	11,647	71.10%
Brazil	8,386	7,778	5,015	5,112	4,513	8,616	90.90%
Austria	3,799	4,136	4,140	3,898	3,385	3,976	17.50%
Sweden	2,326	3,079	3,574	3,505	2,957	2,300	-22.20%
France	3,007	2,969	2,956	2,825	2,372	1,742	-26.50%
South Korea	1,827	1,258	2,279	2,619	2,231	4,039	81.00%
Japan	3,310	3,964	1,275	1,513	1,134	2,158	90.20%
Italy	1,502	1,611	1,425	1,330	1,093	1,007	-7.90%
Turkey	199	290	408	1,021	723	3,512	385.70%
Costa Rica	842	803	999	970	787	2,111	168.30%
Belgium	1,067	555	878	847	740	516	-30.20%
<b>All Other</b>	<b>8,647</b>	<b>10,670</b>	<b>9,370</b>	<b>9,109</b>	<b>7,350</b>	<b>11,913</b>	<b>62.10%</b>
<b>TOTAL</b>	<b>198,257</b>	<b>224,052</b>	<b>236,615</b>	<b>253,617</b>	<b>211,815</b>	<b>244,263</b>	<b>15.32%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

#### 4. Aluminum Pipe and Tubes

The table below presents data on imports of aluminum pipes and tubes

(HTS 7608) as well as pipe and tube fittings (HTS 7609). Unlike the other sectors, imports were down slightly in this category in 2016, but are growing in

2017 due to increases in imports from Mexico. Mexico is the largest supplier in the segment, followed by Canada, China, and Japan.

<b>Table 24— U.S. Imports of Aluminum Pipes and Tubes</b> (HTS 7608-7609)							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan-Oct</b>	<b>2017 Jan-Oct</b>	<b>% Change YTD 2016 - 2017</b>
<b>Country</b>	<b>Metric Tons</b>						
Mexico	7,710	7,418	9,247	7,963	6,639	10,222	54.00%
Canada	6,417	7,862	7,785	4,755	4,076	4,103	0.70%
China	3,289	3,817	2,907	2,618	2,147	2,865	33.50%
Japan	2,605	2,656	2,771	2,587	2,110	1,746	-17.20%
Indonesia	0	849	1,799	1,881	1,691	1,153	-31.80%
India	1,610	968	1,174	1,559	1,342	1,840	37.10%
South Korea	964	1,007	1,035	1,490	1,314	989	-24.80%
Taiwan	1,457	1,510	1,341	1,282	1,074	1,144	6.50%
Germany	832	893	963	998	828	804	-2.90%
Israel	107	314	710	932	779	1,003	28.70%
Russia	798	559	455	535	486	400	-17.60%
Vietnam	360	411	651	388	266	811	205.60%
Switzerland	300	336	305	304	231	249	7.50%
France	220	203	210	299	250	184	-26.20%
Italy	103	149	143	162	135	197	45.70%
<b>All Other</b>	<b>1,615</b>	<b>1,615</b>	<b>1,019</b>	<b>982</b>	<b>767</b>	<b>1,093</b>	<b>42.60%</b>
<b>TOTAL</b>	<b>28,386</b>	<b>30,567</b>	<b>32,515</b>	<b>28,737</b>	<b>24,134</b>	<b>28,804</b>	<b>19.35%</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb							

## 5. Aluminum Castings &amp; Forgings

Aluminum castings and forgings, the final category addressed in the report,

also are an area where imports are on the rise (*see* Table below). Overall, imports are up 11 percent in 2017 (January–October) compared with 2016.

China is the leading source of imports; while imports from China fell in 2016 from 2015 levels, they increased thus far in 2017.

<b>Table 25— U.S. Imports of Aluminum Castings and Forgings</b> (HTS 7616.99.50.60; 7616.99.50.70; 7616.99.51.60; 7616.99.51.70)							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan-Oct</b>	<b>2017 Jan-Oct</b>	<b>% Change YTD 2016 -2017</b>
<b>Country</b>	<b>Metric Tons</b>						
China	7,901	9,493	13,146	11,284	9,209	10,068	9.30%
Mexico	3,629	3,548	3,757	2,759	2,369	2,543	7.40%
Taiwan	2,401	2,184	2,262	2,242	1,889	1,288	-31.80%
Canada	1,831	2,086	1,869	2,196	1,781	2,581	44.90%
India	1,105	1,790	1,370	1,479	1,294	1,469	13.50%
Czech Republic	65	69	259	902	825	1,213	47.10%
Japan	34	41	335	491	393	477	21.60%
France	292	285	456	449	365	845	131.50%
Italy	293	452	469	343	298	220	-26.20%
Greece	214	273	232	263	245	202	-17.40%
Thailand	362	433	194	254	186	260	39.60%
Poland	12	74	269	248	186	372	100.00%
United Kingdom	242	178	405	218	185	74	-60.20%
South Korea	137	109	121	216	177	41	-76.60%
Hong Kong	25	26	139	195	173	71	-59.10%
<b>All Other</b>	<b>1,941</b>	<b>2,843</b>	<b>3,977</b>	<b>778</b>	<b>694</b>	<b>771</b>	<b>11.10%</b>
<b>TOTAL</b>	<b>20,484</b>	<b>23,884</b>	<b>29,261</b>	<b>24,318</b>	<b>20,270</b>	<b>22,497</b>	<b>10.99%</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb							

#### F. United States Aluminum Exports

In 2016, the United States exported a total of \$ 6.4 billion in the aluminum product categories subject to this investigation (HTS 7601, 7604–7609,

7616.99.51.60; 7616.99.51.70). The value of U.S. exports fell each year between 2013 and 2016. Exports for the first ten months of 2017 also show a slight decline from the same period in 2016.

The largest category for U.S. exports is aluminum plates sheets and strip (\$3.4 billion), followed by aluminum bars, rods and profiles (\$1.0 billion) and then unwrought, primary aluminum with \$640 million.

<b>Table 26 – U.S. Domestic Exports of Aluminum by Product Category</b>							
<i>(HTS 7601, 7604, 7605, 7606, 7607, 7608, 7609, 7616.99.51.60 &amp; 7616.99.51.70)</i>							
Year >>	2013	2014	2015	2016	2016 Jan-Oct	2017 Jan-Oct	Change YTD 2016 - 2017
Type of Aluminum Product By HTS Code	<i>Thousands of Dollars (000)</i>						
7606 ALUMINUM PLATES, SHEETS AND STRIP, OVER 0.2 MM (0.0079 IN.) THICK	3,823,936	3,763,076	3,654,514	3,440,770	2,912,946	2,867,475	-1.60%
7604 ALUMINUM BARS, RODS AND PROFILES	877,081	855,962	864,016	1,048,692	927,545	691,283	-25.50%
7601 ALUMINUM, UNWROUGHT	1,017,585	1,027,678	834,703	639,838	543,750	616,819	13.40%
7607 ALUMINUM FOIL (WHETHER OR NOT PRINTED OR BACKED WITH PAPER OR OTHER BACKING MATERIALS), NOT OVER 0.2 MM (0.0079 IN.) THICK (EXCLUDING ANY BACKING)	513,918	503,743	476,236	458,659	392,299	400,432	2.10%
7608 ALUMINUM TUBES AND PIPES	256,168	285,241	268,566	259,486	221,808	249,122	12.30%
7609 ALUMINUM TUBE OR PIPE FITTINGS (INCLUDING COUPLINGS, ELBOWS, AND SLEEVES)	137,945	161,845	162,389	148,146	122,827	130,193	6.00%
7605 ALUMINUM WIRE	158,700	168,242	153,868	125,886	107,228	103,287	-3.70%
7616.99.51.60, 7616.99.51.70 CASTINGS AND FORGINGS	344,326	334,101	323,698	322,074	266,646	291,516	9.30%
<b>TOTAL</b>	<b>7,129,659</b>	<b>7,099,888</b>	<b>6,737,990</b>	<b>6,443,551</b>	<b>5,495,049</b>	<b>5,350,127</b>	<b>-2.64%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

By country, the vast majority of U.S. exports of aluminum products go to neighboring countries and NAFTA partners, Mexico and Canada. By value, these two countries accounted for nearly two thirds of U.S. exports.

U.S. exports to Vietnam had a spike in 2016 that did not occur in any other year (including 2017); a closer look at

these exports shows that they were primarily in HTS category 7604, and in particular, HTS 760421, which is "Aluminum Alloy Hollow Profiles." The U.S. also saw a spike in imports from Vietnam in 2016.

The composition of U.S. aluminum exports varies significantly by product category. For unwrought (primary

aluminum, exports to Mexico and Canada account for 92 percent of total U.S. exports by value and 95 percent by weight. Currently, Mexico does not have a primary aluminum smelter due to its inability to provide reliable, steady energy.

<b>Table 27 – U.S. Domestic Exports of Aluminum Products by Country</b>							
<b>(HTS 7601, 7604, 7605, 7606, 7607, 7608, 7609; 7616.99.51.60 &amp; 7616.99.51.70)</b>							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan-Oct</b>	<b>2017 Jan-Oct</b>	<b>Change YTD 2016- 2017</b>
<b>Country</b>	<b>Thousands of Dollars (000)</b>						
Mexico	2,466,070	2,616,709	2,540,224	2,262,702	1,910,290	2,077,114	8.70%
Canada	2,014,001	2,078,447	1,989,009	1,834,326	1,561,946	1,592,846	2.00%
Japan	230,043	233,545	248,810	291,370	246,276	130,808	-46.90%
China	328,672	306,023	288,155	276,576	230,832	175,285	-24.10%
South Korea	198,976	230,274	270,181	268,555	227,831	207,001	-9.10%
Vietnam	1,756	17,769	31,185	245,575	245,180	1,341	-99.50%
United Kingdom	188,249	216,728	210,718	193,888	167,247	127,559	-23.70%
France	166,581	157,754	154,687	134,378	110,876	89,070	-19.70%
Germany	140,434	150,749	141,555	114,041	93,441	87,323	-6.50%
Guatemala	58,896	63,414	58,220	56,392	46,690	25,173	-46.10%
Brazil	114,821	92,715	60,598	52,613	46,182	37,844	-18.10%
Taiwan	77,091	50,928	54,310	51,983	43,381	45,181	4.10%
Turkey	42,556	29,330	39,549	40,761	35,631	31,397	-11.90%
Israel	54,180	47,801	40,688	40,219	34,895	35,424	1.50%
Singapore	45,086	49,900	44,926	38,011	30,872	28,579	-7.40%
<b>All Other:</b>	<b>1,002,248</b>	<b>757,801</b>	<b>565,173</b>	<b>542,161</b>	<b>463,478</b>	<b>366,666</b>	<b>-20.90%</b>
<b>Total</b>	<b>7,129,659</b>	<b>7,099,887</b>	<b>6,737,989</b>	<b>6,443,550</b>	<b>5,495,049</b>	<b>5,058,610</b>	<b>-7.90%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb



<b>Table 28– U.S. Exports of Unwrought Aluminum by Value</b>							
<b>(HTS 7601)</b>							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan-Oct</b>	<b>2017 Jan-Oct</b>	<b>Change YTD</b>
<b>Country</b>	<b>Thousands of Dollars (000)</b>						<b>2016-2017</b>
Mexico	586,992	616,695	495,876	376,711	323,080	350,472	8.50%
Canada	296,882	315,948	249,336	188,746	159,265	185,749	16.60%
France	28,322	15,874	14,047	19,698	15,793	18,601	17.80%
Taiwan	12,819	11,694	12,474	7,816	6,082	9,352	53.80%
Argentina	8,439	5,121	2,748	6,379	6,339	6	-99.90%
Japan	6,855	7,397	7,433	6,116	5,418	6,190	14.20%
Germany	10,421	12,042	11,141	6,099	5,063	5,967	17.90%
The Netherlands	1,050	609	3,712	3,754	3,633	381	-89.50%
South Korea	6,459	5,422	4,967	3,752	3,421	2,389	-30.20%
United Kingdom	3,838	3,454	3,443	3,313	3,091	3,112	0.70%
China	20,777	5,121	2,482	2,221	1,798	2,877	60.00%
United Arab Emirates	36	44	76	2,208	109	8,780	7926.30%
Costa Rica	2,475	631	728	1,914	1,853	163	-91.20%
Singapore	3,953	5,027	3,943	1,609	1,190	1,605	34.80%
Dominican Republic	2,111	518	1,128	1,183	1,183	2,609	120.40%
<b>All Other:</b>	26,156	22,081	21,169	8,319	6,429	18,568	188.80%
<b>Total</b>	<b>1,017,585</b>	<b>1,027,678</b>	<b>834,703</b>	<b>639,838</b>	<b>543,750</b>	<b>616,819</b>	<b>13.40%</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb							

**Table 29 – U.S. Domestic Exports of Unwrought Aluminum by Weight  
(HTS 7601)**

Year >>	2013	2014	2015	2016	2016 Jan - Oct	2017 Jan - Oct	% Change YTD 2016 - 2017
Country	Metric Tons						
Mexico	248,514	251,702	220,829	185,266	158,856	158,510	-0.20%
Canada	121,130	125,426	109,316	94,004	79,347	84,423	6.40%
France	8,282	4,980	4,443	5,895	4,733	5,094	7.60%
Argentina	3,358	1,891	1,138	3,172	3,152	3	-99.90%
Taiwan	4,896	4,260	4,570	3,138	2,448	3,668	49.80%
Japan	1,517	1,932	1,855	1,706	1,397	1,783	27.60%
Germany	3,608	3,429	3,167	1,475	1,157	1,802	55.80%
The Netherlands	352	64	1,296	1,449	1,435	60	-95.80%
United Kingdom	1,058	890	734	886	840	602	-28.30%
Costa Rica	882	225	258	840	825	59	-92.90%
South Korea	2,520	4,141	5,073	728	638	611	-4.30%
China	7,470	929	532	590	424	602	42.00%
United Arab Emirates	15	26	37	584	46	3,473	7436.20%
Dominican Republic	817	84	373	554	554	1,240	123.60%
Australia	129	361	306	272	231	627	171.10%
<b>ALL OTHER</b>	<b>11,911</b>	<b>9419</b>	<b>7979</b>	<b>1953</b>	<b>1583</b>	<b>6464</b>	<b>308.34%</b>
<b>TOTAL</b>	<b>416,458</b>	<b>409,762</b>	<b>361,906</b>	<b>302,517</b>	<b>257,668</b>	<b>269,012</b>	<b>4.40%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

The aluminum plate, sheet, and strip industry segment (HTS 7606) accounts for the biggest portion of U.S. exports of aluminum products subject to this investigation—nearly 900,000 tons

valued at over \$3.4 billion dollars in 2016. Once again, NAFTA partners Canada and Mexico account for the majority of exports.

Exports in the first 10 months of 2017 are down slightly from 2016 levels,

continuing a declining trend that occurred throughout the 2013–2017 period. Overall, since 2013, U.S. exports are down 10 percent by value and weight.

<b>Table 30 - U.S. Domestic Exports of Aluminum Plate, Sheet and Strip By Value</b>							
<b>(HTS 7606)</b>							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan-Oct</b>	<b>2017 Jan-Oct</b>	<b>Change YTD 2016 - 2017</b>
<b>Country</b>	<b>Thousands of Dollars (000)</b>						
Canada	1,159,462	1,219,151	1,232,554	1,172,381	998,394	1,034,915	3.70%
Mexico	1,075,112	1,191,241	1,230,767	1,099,531	911,712	1,033,508	13.40%
South Korea	132,557	167,065	196,829	190,856	162,533	152,615	-6.10%
Japan	146,345	148,459	165,085	188,718	161,112	89,159	-44.70%
China	225,497	202,777	201,585	187,273	158,502	120,480	-24.00%
United Kingdom	55,513	74,417	76,706	63,860	56,602	42,168	-25.50%
Germany	83,118	80,940	82,282	59,813	49,668	61,757	24.30%
Guatemala	56,272	60,605	55,550	53,835	44,595	19,695	-55.80%
France	75,691	71,386	65,244	44,200	36,929	41,097	11.30%
Turkey	25,353	16,896	22,636	27,405	25,137	24,152	-3.90%
Brazil	69,056	47,690	28,962	25,887	23,901	19,561	-18.20%
Taiwan	42,579	21,598	18,590	25,754	21,680	24,853	14.60%
Thailand	7,486	9,126	24,080	25,158	21,643	19,036	-12.00%
Malaysia	19,228	17,841	17,311	23,193	19,024	25,815	35.70%
United Arab Emirates	35,500	43,300	22,074	22,529	21,653	2,923	-86.50%
<b>All Other:</b>	<b>615,166</b>	<b>390,585</b>	<b>214,259</b>	<b>230,377</b>	<b>199,862</b>	<b>155,740</b>	<b>-22.10%</b>
<b>Total</b>	<b>3,823,936</b>	<b>3,763,076</b>	<b>3,654,514</b>	<b>3,440,770</b>	<b>2,912,946</b>	<b>2,867,475</b>	<b>-1.60%</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb							

**Table 31 – U.S. Domestic Exports of Aluminum Plate, Sheet and Strip  
By Weight  
(HTS 7606)**

Year >>	2013	2014	2015	2016	2016 Jan-Oct	2017 Jan-Oct	Change YTD 2016 - 2017
Country	Metric Tons						
Canada	338,547	345,144	371,547	379,670	326,391	299,878	-8.10%
Mexico	295,073	310,147	338,529	318,309	264,429	272,101	2.90%
China	31,080	34,611	33,166	31,179	26,225	20,216	-22.90%
South Korea	21,431	24,496	27,584	27,246	23,211	22,952	-1.10%
Japan	14,839	15,097	17,861	21,815	19,229	9,964	-48.20%
Guatemala	18,297	18,233	18,670	19,631	16,406	6,121	-62.70%
United Kingdom	7,415	10,460	10,955	8,239	7,158	5,886	-17.80%
Germany	10,657	10,670	10,157	7,558	6,288	11,020	75.30%
United Arab Emirates	10,582	12,497	5,358	6,411	6,251	557	-91.10%
France	10,013	10,096	9,627	6,260	5,229	6,194	18.40%
Panama	4,111	4,296	5,061	6,128	4,917	1,675	-65.90%
Saudi Arabia	67,224	38,958	3,796	6,041	4,997	920	-81.60%
Thailand	1,144	1,242	4,656	4,932	4,251	3,575	-15.90%
Taiwan	4,907	3,528	3,174	3,905	3,322	3,603	8.50%
Brazil	13,640	8,955	4,439	3,895	3,579	2,533	-29.20%
<b>All Other:</b>	87,433	58,152	35,616	40,852	36,283	30,401	-16.20%
<b>Total:</b>	936,392	906,583	900,197	892,071	758,166	697,596	-7.99%

Source: U.S. Census Bureau, accessed through USITC Dataweb

A category of aluminum products that is a significant source of exports for the United States is bars, rods and profiles (HTS 7604) which are most commonly extrusions. Total U.S. exports in these aluminum products were just over one billion dollars in 2016. The export of

82,000 metric tons of these items valued at \$233 million to Vietnam in 2016 appears to have been an anomaly.

After increasing significantly in 2016 over 2015 levels, exports of these items were down by a quarter in value in the first ten months of 2017 compared to the

same period in 2016; the decline in exports on a weight basis is even greater (42 percent), largely due to the return of exports to Vietnam to typical levels in 2017. Canada and Mexico again account for the bulk of U.S. exports.

<b>Table 32 - U.S. Exports of Aluminum Bars, Rods &amp; Profiles By Value</b>							
<b>(HTS 7604)</b>							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan- Oct</b>	<b>2017 Jan- Oct</b>	<b>Change YTD 2016 - 2017</b>
<b>Country</b>	<b>Thousands of Dollars (000)</b>						
Mexico	344,761	323,471	349,301	345,849	299,349	288,552	-3.60%
Vietnam	635	635	21,690	233,561	233,494	213	-99.90%
Canada	237,966	240,556	228,005	195,781	165,399	183,004	10.60%
United Kingdom	51,666	54,652	46,575	50,349	43,412	38,634	-11.00%
Japan	50,603	41,476	37,466	45,316	38,083	19,235	-49.50%
South Korea	36,569	34,179	35,410	44,307	36,851	32,869	-10.80%
China	29,033	33,187	25,761	20,981	17,129	22,055	28.80%
France	18,482	20,028	20,002	20,548	17,263	20,038	16.10%
Israel	27,598	26,277	14,608	20,171	17,299	19,259	11.30%
Germany	10,437	15,852	16,711	13,083	10,938	5,063	-53.70%
Taiwan	5,080	4,360	7,266	5,822	4,741	5,637	18.90%
Brazil	3,992	3,832	3,271	3,945	3,366	2,337	-30.60%
Turkey	6,340	3,645	5,793	3,881	2,997	3,915	30.60%
Italy	4,085	4,656	3,422	3,716	3,095	5,147	66.30%
Singapore	3,621	3,928	3,724	3,264	2,766	4,058	46.70%
<b>All Other:</b>	46,214	45,228	45,013	38,118	31,361	41,264	31.60%
<b>Total</b>	<b>877,081</b>	<b>855,962</b>	<b>864,016</b>	<b>1,048,692</b>	<b>927,545</b>	<b>691,283</b>	<b>-25.50%</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

<b>Table 33 – U.S. Domestic Exports of Aluminum Bars, Rods and Profiles By Weight (HTS 7604)</b>							
<b>Year &gt;&gt;</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2016 Jan- Oct</b>	<b>2017 Jan- Oct</b>	<b>Change YTD 2016 - 2017</b>
<b>Country</b>	<b>Thousands of Dollars (000)</b>						
Mexico	70,194	92,274	95,979	89,245	78,209	63,306	-19.10%
Vietnam	119	137	10,689	82,133	82,123	29	-100.00%
Canada	49,690	49,265	46,744	41,215	35,068	37,032	5.60%
United Kingdom	5,492	5,581	4,735	5,100	4,269	4,994	17.00%
Israel	6,604	6,582	3,647	4,972	4,210	4,860	15.40%
South Korea	3,541	3,445	3,281	3,996	3,275	3,417	4.30%
Japan	3,862	3,432	2,722	3,400	2,849	1,424	-50.00%
France	3,587	3,180	3,178	3,153	2,625	2,592	-1.20%
China	3,330	4,113	3,355	2,427	1,921	2,853	48.50%
Taiwan	480	546	881	733	547	911	66.50%
Germany	880	1,056	1,038	656	560	396	-29.20%
Thailand	29	171	747	584	479	753	57.10%
Australia	343	380	434	468	401	359	-10.50%
Singapore	558	577	540	378	305	437	43.20%
Brazil	455	366	327	331	281	200	-29.00%
<b>All other</b>	<b>7,614</b>	<b>7,396</b>	<b>5,300</b>	<b>3,863</b>	<b>3,154</b>	<b>3,761</b>	<b>19.30%</b>
<b>Total</b>	<b>156,777</b>	<b>178,499</b>	<b>183,597</b>	<b>242,655</b>	<b>220,276</b>	<b>127,323</b>	<b>-42.20%</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb							

U.S. exports of aluminum castings and forgings, a relatively small category, were steady for the period 2013 to 2015,

before rising in 2016 (*see table below*). Again, this increase in exports is attributed to an anomalous surge in

exports to Vietnam. Data for the first ten months of 2017 show increased exports on a weight basis.

<b>Table 34 - U.S. Exports of Aluminum Castings and Forging by Weight</b> (HTS 7616.99.50.60; 7616.99.50.70; 7616.99.51.60; 7616.99.51.70)							
Year >>	2013	2014	2015	2016	2016 Jan-Oct	2017 Jan-Oct	Change YTD 2016 - 2017
Country	Metric Tons						
Mexico	2,294	2,141	2,479	3,386	2,674	6,469	141.90%
Canada	4,850	3,795	3,402	3,016	2,563	569	-77.80%
France	1,614	1,929	1,921	1,720	1,445	1,250	-13.50%
Japan	594	829	1,231	1,363	1,124	1,663	47.90%
China	1,656	1,551	1,217	1,254	998	3,389	239.70%
Italy	1,647	1,686	1,240	1,093	913	805	-11.80%
United Kingdom	770	787	899	1,083	881	1,066	21.00%
Germany	702	500	435	912	659	1,348	104.50%
Brazil	850	790	601	690	550	403	-26.80%
South Korea	922	959	646	578	456	682	49.50%
Turkey	271	191	272	274	192	189	-1.40%
Spain	351	276	269	253	222	142	-36.30%
Singapore	327	264	255	208	175	193	9.90%
Malaysia	472	605	430	170	150	131	-12.50%
Poland	218	203	191	151	138	112	-18.70%
All Other	2,738	2,207	1,652	1,381	1,164	1,799	-18.84%
<b>Total</b>	<b>20,275</b>	<b>18,713</b>	<b>17,140</b>	<b>17,533</b>	<b>14,304</b>	<b>20,209</b>	<b>54.55%</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb							

### G. High Import to Export Ratio

Overall, for the aluminum product categories subject to this investigation (HTS 7601, 7604–7609), 7616.99.51.60; 7616.99.51.70), the United States ran a trade deficit of \$7.1 billion in 2016.

These data suggest that the trade deficit in aluminum will be larger in 2017.

The table below shows the U.S. trade balance by major trading partners. The U.S. runs substantial trade deficits in aluminum products with Canada, China, Russia, the United Arab Emirates and Bahrain, and the deficit is growing.

For the first 10 months of 2017, the total trade deficit is nearly double what it was for the same period in 2016. The U.S. runs a large trade surplus with Mexico in aluminum products—about \$2.1 billion in 2016, and a smaller trade surplus with the United Kingdom, Japan and South Korea.

**Table 35 - U.S. Trade Balance with Selected Countries**  
**All Section 232 Aluminum Categories**  
 (HTS 7616.99.50.60; 7616.99.50.70; 7616.99.51.60; 7616.99.51.70)

Year >>	2013	2014	2015	2016	2016 Jan-Oct	2017 Jan-Oct
<b>Country</b>	<b>Thousands of Dollars (000)</b>					
Mexico	2,371,834	2,455,539	2,387,534	2,173,122	1,826,582	1,942,402
Vietnam	(10,732)	(4,049)	(9,316)	283,067	293,382	(70,256)
Hong Kong	1,313	4,924	(479)	3,678	4,968	(55,437)
South Korea	119,143	79,682	129,516	154,779	128,825	126,470
Japan	50,939	42,402	90,285	135,567	116,124	31,904
United Kingdom	104,149	148,915	141,343	130,094	114,321	101,988
Venezuela	(91,415)	(196,083)	(113,191)	(110,262)	(77,358)	(158,447)
Qatar	(204,933)	(199,549)	(222,726)	(299,067)	(248,714)	(268,725)
Argentina	(210,147)	(166,711)	(191,493)	(320,816)	(268,540)	(365,281)
Bahrain	(163,748)	(245,600)	(282,206)	(397,677)	(321,112)	(496,891)
United Arab Emirates	(537,770)	(569,045)	(631,987)	(996,698)	(775,815)	(1,156,558)
Russia	(526,139)	(796,127)	(713,530)	(1,346,567)	(1,113,618)	(1,298,504)
China	(1,298,588)	(1,480,191)	(1,779,568)	(1,641,203)	(1,358,954)	(1,757,882)
Canada	(4,168,369)	(4,394,953)	(4,029,080)	(3,802,964)	(3,069,832)	(4,189,266)
<b>Overall Total</b>	<b>(5,081,162)</b>	<b>(6,233,445)</b>	<b>(6,589,138)</b>	<b>(7,177,672)</b>	<b>(5,701,277)</b>	<b>(9,268,602)</b>

Source: U.S. Census Bureau, accessed through USITC Dataweb

The U.S. runs a substantial trade deficit with China, totaling \$1.6 billion in 2016; the trade deficit with China in aluminum categories. Unlike the other countries with which the U.S. runs a trade deficit in aluminum (e.g., Canada, Russia, UAE, Bahrain), the imports from China are not in the form of primary

aluminum but rather downstream products.

Included in the table is the U.S. trade balance with Hong Kong and Vietnam; while not large in an absolute sense, the trade balance with these countries is volatile from year to year, reflective in unusual trade patterns that may indicate transshipments.

By industry sector, the U.S. trade balance varies: there is a trade surplus in a number of sectors such as hollow profiles and plate, sheet and strip. However, these surpluses are by far overshadowed by the categories in which the U.S. runs a trade deficit—primary aluminum and aluminum powders, foil, and wire.



<b>Table 36 - U.S. Trade Balance by Aluminum Product Category</b> (HTS 7601; 7604-7609)						
Year >>	2013	2014	2015	2016	2016 YTD Jan-Oct	2017 Jan-Oct
Type of Aluminum Product By HTS Code	Thousands of Dollars (000)					
760110 ALUMINUM, NOT ALLOYED, UNWROUGHT	(3,213,230)	(3,160,851)	(2,809,400)	(3,871,305)	(3,015,136)	(4,649,776)
760120 ALUMINUM ALLOYS, UNWROUGHT	(2,672,499)	(3,468,086)	(3,687,386)	(3,398,508)	(2,877,033)	(3,411,554)
760410 ALUMINUM BARS, RODS AND PROFILES, NOT ALLOYED	2,881	31,375	(11,267)	(12,994)	(10,464)	(20,872)
760421 ALUMINUM ALLOY HOLLOW PROFILES	(72,685)	(136,690)	(152,801)	45,720	78,021	(196,575)
760429 ALUMINUM ALLOY BARS, RODS AND PROFILES, OTHER THAN HOLLOW PROFILES	303,343	230,762	223,547	216,147	189,128	68,372
760511 ALUMINUM WIRE OF NONALLOYED ALUMINUM, WITH A MAXIMUM CROSS SECTIONAL DIMENSION OF OVER 7 MM	(347,680)	(333,949)	(308,439)	(418,253)	(339,598)	(504,712)
760519 ALUMINUM WIRE OF NONALLOYED ALUMINUM, WITH A MAXIMUM CROSS SECTIONAL DIMENSION OF 7 MM OR LESS	17,266	10,905	2,872	(894)	(483)	(2,429)
760521 ALUMINUM ALLOY WIRE, WITH A MAXIMUM CROSS SECTIONAL DIMENSION OF OVER 7 MM	(109,490)	(118,502)	(60,143)	(62,610)	(54,856)	(52,755)
760529 ALUMINUM ALLOY WIRE, WITH A MAXIMUM CROSS SECTIONAL DIMENSION OF 7 MM OR LESS	15,397	13,217	19,168	18,280	16,432	12,948

<b>Table 36 - U.S. Trade Balance by Aluminum Product Category - Continued</b>						
<b>(HTS 7601, 7604-7609)</b>						
760611 ALUMINUM NONALLOYED RECTANGULAR (INCLUDING SQUARE) PLATES, SHEETS AND STRIP, OVER 0.2 MM THICK	(36,164)	(32,713)	(45,728)	43,341	32,500	39,153
760612 ALUMINUM ALLOY RECTANGULAR (INCLUDING SQUARE) PLATES, SHEETS AND STRIP, OVER 0.2 MM THICK	1,694,642	1,369,395	847,662	851,659	754,432	163,165
760691 ALUMINUM NONALLOYED PLATES, SHEETS OR STRIP, OVER 0.2 MM THICK, NESOI (OTHER THAN RECTANGULAR OR SQUARE SHAPES)	18,787	45,760	24,525	33,686	26,153	40,176
760692 ALUMINUM ALLOY PLATES, SHEETS OR STRIP, OVER 0.2 MM THICK, NESOI (OTHER THAN RECTANGULAR SQUARE SHAPES)	67,533	25,085	27,104	(10,582)	(3,891)	(8,675)
760711 ALUMINUM FOIL, NOT OVER 0.2 MM THICK, NOT BACKED, ROLLED BUT NOT FURTHER WORKED	(205,299)	(301,531)	(325,798)	(321,609)	(265,163)	(342,571)
760719 ALUMINUM FOIL, NOT OVER 0.2 MM THICK, NOT BACKED, NESOI	(122,812)	(104,362)	(33,748)	(33,372)	(25,138)	(43,718)
760720 ALUMINUM FOIL, NOT OVER 0.2 MM THICK, BACKED	(59,875)	(63,867)	(97,638)	(95,487)	(80,163)	(90,843)
760810 ALUMINUM TUBES AND PIPES, NOT ALLOYED	37,855	37,627	38,987	35,451	30,480	47,665
760820 ALUMINUM ALLOY TUBES AND PIPES	76,816	96,203	73,034	78,710	69,350	64,968
760900 ALUMINUM TUBE OR PIPE FITTINGS (INCLUDING COUPLINGS, ELBOWS, AND SLEEVES)	41,302	57,883	71,792	66,505	55,327	49,385
<b>OVERALL TOTAL</b>	<b>(4,563,912)</b>	<b>(5,802,340)</b>	<b>(6,203,656)</b>	<b>(6,836,115)</b>	<b>(5,420,104)</b>	<b>(8,838,649)</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb						

The U.S. trade deficit is particularly pronounced in the primary (unwrought) aluminum industry segment. The deficit for this category reached nearly \$7

billion in 2016, and data for the initial six months indicate that it will be even greater in 2017.

The United States exported very little unwrought aluminum, but imported

large amounts from Canada, Russia and other countries. On a weight basis, the U.S. deficit was nearly 4 million metric tons in 2016.

**Table 37 - U.S. Trade Balance with Selected Countries  
Unwrought Aluminum  
(HTS 7601)**

Year >>	2013	2014	2015	2016	2016 Jan-Jun	2017 Jan-Jun
Country	Thousands of Dollars (000)					
Mexico	756,707	791,828	741,779	653,537	337,023	368,797
Saudi Arabia	(548)	(36,695)	(167,235)	(98,931)	(51,604)	(27,031)
Venezuela	(22,768)	(118,071)	(85,208)	(103,022)	(35,662)	(90,060)
Bahrain	(68,317)	(125,142)	(167,568)	(195,003)	(108,432)	(116,343)
Argentina	(195,002)	(152,932)	(184,196)	(297,358)	(128,448)	(165,873)
Qatar	(208,908)	(202,328)	(224,177)	(300,643)	(143,701)	(159,024)
United Arab Emirates	(579,762)	(620,648)	(661,738)	(1,026,925)	(519,748)	(783,000)
Russia	(424,889)	(693,426)	(643,647)	(1,234,395)	(632,628)	(760,662)
Canada	(4,151,656)	(4,408,487)	(4,360,271)	(4,016,914)	(1,931,387)	(2,633,196)
<b>OVERALL TRADE BALANCE</b>	<b>(5,117,050)</b>	<b>(5,876,301)</b>	<b>(6,058,537)</b>	<b>(6,982,268)</b>	<b>(3,374,127)</b>	<b>(4,809,136)</b>
Source: U.S. Census Bureau, accessed through USITC Dataweb						

In the area of semi-finished aluminum products (including bars, rods, plates, sheet and strip), the United States ran a trade surplus in 2016 of \$2.2 billion. However, there are certain countries

with which the U.S. ran a trade deficit, including China, South Africa, Germany and Bahrain.

The trade deficit with China in particular is substantial and growing in

2017 over 2016 levels. Countries with which the United States ran a trade surplus in are NAFTA partners Mexico and Canada, as well as South Korea, Japan and the United Kingdom.

**Table 38- U.S. Trade Balance with Selected Countries Aluminum Semi-Manufactures including Bars, Rods, Plate, Sheet & Tubes**  
(HTS 7604, 7606, 7608, 7609)

Year >>	2013	2014	2015	2016	2016 Jan-Jun	2017 Jan-Jun
<b>Country</b>	<b>U.S. Trade Deficit - Thousands of Dollars</b>					
China	(243,021)	(426,807)	(677,567)	(619,141)	(300,537)	(490,221)
South Africa	(188,017)	(177,448)	(151,889)	(160,615)	(71,559)	(74,333)
Germany	(200,718)	(\$101,437)	(150,262)	(145,658)	(83,399)	(58,513)
Bahrain	(73,247)	(91,167)	(101,627)	(133,653)	(70,843)	(72,741)
Austria	(83,404)	(105,111)	(127,130)	(127,604)	(65,330)	(61,655)
Indonesia	(153,022)	(129,779)	(177,619)	(80,308)	(30,402)	(78,366)
<b>Country</b>	<b>U.S. Trade Surplus - Thousands of Dollars</b>					
Saudi Arabia	226,016	137,777	27,080	28,617	11,847	1,232
United Kingdom	39,260	58,818	62,923	50,344	28,176	20,768
Guatemala	56,712	61,629	56,382	54,149	25,616	11,639
Japan	108,006	85,411	57,297	80,283	38,800	6,402
South Korea	107,709	93,995	142,462	157,350	80,959	85,135
Canada	831,265	812,338	717,708	679,807	346,321	363,464
Vietnam	(3,870)	8,222	6,229	1,182,487	230,308	(19,718)
Mexico	1,272,233	1,346,203	1,440,162	1,343,950	678,883	708,834
<b>OVERALL TRADE BALANCE</b>	<b>2,031,686</b>	<b>1,680,024</b>	<b>1,086,855</b>	<b>2,234,466</b>	<b>783,431</b>	<b>198,001</b>
Source: Source: U.S. Census Bureau, accessed through USITC Dataweb						

## BILLING CODE 3510-33-C

*H. Impact of Imports on the Welfare of the U.S. Aluminum Industry*

1. Declining Employment

The table below presents a snapshot of direct employment in the U.S. aluminum industry, by sector, based on data collected for the Aluminum Association. The loss of jobs in the primary aluminum sector has been precipitous between 2013 and 2016, falling 58 percent as several smelters

were either permanently shut down or temporarily idled.

Other (older) data from the association indicated that in 2010, employment in the Alumina Refining/Primary Aluminum sector totaled 21,600; employment in that sector declined by 75 percent in just six years. Employment in secondary production was 6,400 in 2010, so that segment of the industry has nearly doubled in employment by 2013, but has not increased substantially since then.

Employment in the other segments of industry has seen moderate growth over the past three years as demand for aluminum has grown, with aluminum foundries and manufacturers of semi-finished goods such as plates, sheets, and extrusions showing the strongest growth (and also accounting for the largest level of employment). Data from 2010 found that employment in "semi-fabrication" facilities was 101,000, and in Service Centers, 27,000.

<b>Table 39 – U.S. Aluminum Industry Direct Jobs by Sector</b>			
<b>INDUSTRY SECTOR</b>	<b>2013</b>	<b>2016</b>	<b>% Change 2013-2016</b>
Alumina Refining/Primary Aluminum	12,787	5,379	-58%
Secondary Production/Alloying	11,538	11,747	+2%
Sheet/Plate/Foil/Extrusion/Coatings	62,465	67,155	+8%
Foundries	36,484	41,552	+14%
Forgings	10,328	10,442	+1%
Metal Service Centers	23,142	24,633	+6%
<b>TOTAL</b>	<b>156,744</b>	<b>160,888</b>	<b>+3%</b>
Source: Aluminum Association			

Information on employment in the domestic aluminum industry is also available from the Bureau of the Census' Annual Survey of Manufactures, which includes data on the Alumina and Aluminum Production and Processing industry (North American Industry Classification System (NAICS # 33131)). The table below presents employment data from the Annual Survey of Manufactures for 2013–2015, the latest year for which data are available. The employment data, too, show declining employment in the primary aluminum

sector between 2013 and 2015, but do not reflect the jobs lost in 2016 as additional smelters closed. These data also show relatively stable/slightly growing employment in other industry sectors.

Modern aluminum production—particularly production of high-purity aluminum needed for critical infrastructure and military applications—is a complex and technical process. It requires a trained, skilled workforce that in some cases requires a decade or more of experience.

As smelting facilities close, the loss of this skill-base is eroding and the workforce will become increasingly difficult to bring back.

While the primary aluminum industry sector has seen dramatic job losses in recent years, the downstream industry is likely to suffer as well in the future as foreign aluminum overcapacity drives into the domestic value-added industry sectors. This is already happening as evidenced by growing imports of aluminum semi-manufactured products.

<b>Table 40—Employment in Aluminum Industry, NAICS Based</b>				
<b>NAICS #</b>	<b>Sector Description</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
33131	Alumina & Aluminum Production and Processing (All Subsectors Combined)	56,381	54,953	56,381
331313	Alumina & Primary Aluminum Production	8,652	7,038	7,816
331314	Secondary Smelting & Alloying of Aluminum	5,672	5,560	6,174
331315	Aluminum Sheet, Plate & Foil Manufacturing	17,799	17,936	18,589
331318	Aluminum Rolling, Drawing & Extruding	24,258	24,419	24,900
NAICS = North American Industry Classification System, <a href="http://www.census.gov">www.census.gov</a>				
Source: Bureau of the Census, Annual Survey of Manufactures				

2. Poor Financial Status of the U.S. Aluminum Industry  
Upstream Industry Sector

Low global aluminum prices and soaring imports due to overcapacity in the aluminum sector have damaged U.S. aluminum companies. See Appendix E for more information on global excess aluminum production. High costs for electricity are also a major factor

affecting the U.S. aluminum industry, which is energy- intensive. As a result of adverse market conditions, in 2017, there are only two major players in remaining the domestic primary aluminum industry: Alcoa and Century Aluminum. Three other companies have declared bankruptcy in recent years and no longer have any operating aluminum smelters in the United States.

Noranda Aluminum (a Canadian company with U.S. smelting operations) filed for Chapter 11 bankruptcy in February 2016, citing high power prices and low prices for aluminum and the bauxite from its mine in Jamaica. Its New Madrid, Missouri smelter was shut down in March 2016. The facility was recently purchased by ARG International, a Swiss holding company, but its future as an aluminum smelter

(now known as Magnitude 7 Metals) is uncertain.<sup>60</sup>

Another former participant in the primary U.S. aluminum industry, Ormet, declared bankruptcy and sold its shuttered aluminum plant to a land developer in 2014. Ormet cited lower aluminum prices, Chinese competition, and high energy costs as the reasons for its financial problems.<sup>61</sup> One more casualty of poor market conditions was Columbia Falls Aluminum Company of Montana (owned by Glencore AG of Switzerland), which permanently closed and demolished its plant facilities in 2015; its smelter had been mothballed since 2009.<sup>62</sup>

Financial performance of upstream aluminum companies was particularly poor between 2013 and 2016, when aluminum prices began to fall sharply.

Chinese production of aluminum soared, and imports into the United States surged. The three publicly traded companies posted negative net incomes for much of those years. Alcoa and Noranda operated at a loss in three of the five years, including the two most recent years. Century Aluminum only had positive net income in one of the five years (2014). In 2016, the three remaining primary aluminum companies reported operating losses totaling \$912 million. See the Table below.

While the two smaller aluminum manufacturers posted relatively stable sales/revenue during the period, the

biggest player, Alcoa, saw sales drop drastically between 2014 and 2015. That trend continued in 2016. Over the past several years, Alcoa attempted to adjust to the market realities facing the aluminum sector by shutting down or selling high cost upstream assets and investing in assets that produce value added products. In 2015, Alcoa announced planned production curtailments of 503,000 metric tons of aluminum and 1.2 million metric tons of alumina to ensure continued competitiveness amid deteriorating market conditions.<sup>63</sup>

As part of this strategy, in 2016, after 128 years of operating as a vertically integrated aluminum company, Alcoa split the company into two separate entities. Alcoa Corp. retained the upstream commodity assets including primary aluminum smelters, bauxite mines, alumina refineries, and power plants. Arconic, Inc. owns the downstream, value-added fabrication businesses, including rolling mills and associated secondary aluminum capacity, as well as specialty metal, aerospace and automobile product assets.

Financial analysts are bullish on the restructured Alcoa, predicting its sales revenues to grow by 25 percent in 2017 and by single digits in 2018. This optimism is predicated on improving market conditions in alumina and aluminum sectors based on strong demand and higher aluminum metal prices. However, the majority of Alcoa's production operations are no longer in the United States, and its financial success is based on its global operations

in bauxite, alumina, aluminum smelting, and limited rolling and casting.

The domestic upstream industry showed improved financial performance in the first quarter of 2017, largely due to improved market pricing of aluminum.

Alcoa's First Quarter 2017 results (its first full quarter since spinning off its downstream businesses) showed a positive Net Income of \$225 million (\$1.21/share); Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) was \$533 million, up 59 percent due to higher alumina and aluminum pricing. The company expects its full year 2017 adjusted EBITDA of between \$2.1 and \$2.3 billion.

Century Aluminum Company (CENX), too, reported improved First Quarter 2017 results, although it still posted a net income loss. The company had an Adjusted EBITDA of \$22 million 1Q17 vs. \$12 in 4Q16. The company's net loss in 1Q17 was \$5 million, compared to \$12 million loss in 4Q16. As a whole, the three primary aluminum companies together had EBITDA of \$2.273 billion in 2012, but this figure decreased to \$1.114 billion for 2016, a 50 percent decline.

While the U.S. industry is seeing an uptick in demand and better pricing, it is not clear that this can be maintained given the rise of imported aluminum products, which are steadily eroding the customer base for domestic production. A sustained improvement in profitability over many quarters is needed for companies to stabilize and recover from financial losses suffered over the past 10 years.

<sup>60</sup> <http://www.reuters.com/article/us-bankruptcy-noranda-aluminum-idUSKCN1212T7>.

<sup>61</sup> <http://www.peoplesworld.org/article/shutdown-of-ohio-aluminum-giant-ormet-appears-final/>.

<sup>62</sup> <http://www.dailyinterlake.com/archive/article-a06557e8-c1bc-11e4-ab8c-d7b2b1bc3deb.html>.

<sup>63</sup> <https://www.alcoa.com/global/en/who-we-are/history/default.asp>.

<b>Table 41 – Aluminum Smelter Company Key Financial Statistics</b>						
<b>Trading Symbol</b>	<b>Company</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
<b>Sales Revenue</b>						
AA	ALCOA	\$26.68B	\$23.06B	\$23.88B	\$11.22B	\$9.33B
CENEX	CENTURY	\$1.27B	\$1.45B	\$1.93B	\$1.95B	\$1.32B
NORNQ	NORANDA	\$1.56B	\$1.39B	\$1.34B	\$1.36B	\$1.23B
<b>NET INCOME</b>						
AA	ALCOA	\$191M	(\$2.29)B	\$268M	(\$868)M	(\$400)M
CENX	CENTURY	(\$36.61)M	(\$40.31)M	\$103.28M	(\$47.73)M	(\$252.42)M
NORNQ	NORANDA	\$140.9M	\$49.5M	(\$47.6)M	(\$26.6)M	(\$259.6)M
<b>EBITDA</b>						
AA	ALCOA	\$2.00B	\$2.57B	\$3.53B	\$1.77B	\$1.10B
CENX	CENTURY	\$53.99M	\$37.06M	\$214.92M	\$66.54M	\$29.8M
NORNQ	NORANDA	\$219.6M	\$133.1M	\$83.2M	\$107.4M	(\$15.5)M
B = Billions of Dollars; M = Millions of Dollars						
Source: Company Financial Statements						

### Financial Performance of Downstream Aluminum Companies

The downstream sector as a whole experienced modest job growth across a range of industrial sectors between 2013 and 2016 based on increased demand for their products (such as the growing automotive sector). Downstream manufacturers of aluminum products have made investments in capital equipment to improve their manufacturing capabilities. According to the Aluminum Association, their member companies have invested \$2.3 billion since 2013 in facilities to produce aluminum products—including aluminum sheet for automotive applications.

To date, the downstream sector has largely remained profitable by shifting production to markets not yet affected by imports. Some formerly vertically-integrated companies have shifted to production of higher value-added products (e.g., Arconic, Kaiser). Among the sectors hardest hit by soaring aluminum imports is the U.S. foil industry, which has all but disappeared. Alpha Aluminum closed its North Carolina foil facility in July, 2015 and Novelis idled its Terre Haute, IN foil plant in April, 2014.

While the impact of imports on the downstream industry sector has so far been limited to certain product categories, the USITC noted that Chinese firms are striving to enter the

more profitable automotive and aerospace markets.<sup>64</sup>

### 3. Research and Development (R&D) Expenditures

Research and development in the aluminum sector is important—it has made possible new applications for this material and has enabled more effective manufacturing processes. Because aluminum is lightweight, resistant to corrosion, high strength and recyclable, it is an essential material for modern economies. Exploiting the material's properties required focused R&D.

Some areas of research that are important include reducing the high energy usage in smelting (which accounts for an estimated 30 to 40 percent of the cost of production) and reducing the undesirable by-products of smelting, such as pollution. R&D is also important to meet regulatory requirements; and developing new markets, processes, and products for various market sectors, including automotive, aerospace, packaging, and construction.

Arconic (formerly a part of Alcoa) is a leader in research and development in the aluminum industry. After establishing its first facility dedicated to improving production processes and finding new applications for aluminum in 1930, Alcoa established the Alcoa Technical Center outside of Pittsburgh in 1965 as a center for innovation. A success story of innovation, in 2005 Alcoa (now Arconic) signed a \$1.1

billion, 10-year agreement with jet engine maker Pratt & Whitney to supply key engine parts. This supply pact included forging for the first-ever aluminum fan blades for jet engines.

As recently as 2015, Alcoa undertook a \$60 million expansion of its Technical Center to pursue the development of advanced 3D printing materials and manufacturing processes to meet increasing demand for complex, high-performance 3D-printed parts for aerospace, automotive, medical, building and construction and other high-growth markets.

Of the three remaining companies with U.S. smelting operations in 2016, Alcoa is the only company to report spending on Research and Development over the past five years in its financial statements; Century Aluminum and Noranda reported zero spending on R&D since 2012.

Despite its long history of innovation in the aluminum industry, poor market conditions and financial health have apparently significantly affected both Alcoa's and Arconic's research and development efforts. Alcoa's R&D expenditures plunged from \$95 million in 2014 to \$33 million in 2016.<sup>65</sup> In the first quarter of 2017, Alcoa's R&D spending was \$7 million (an annualized \$28 million), a reduction attributable to the creation of Arconic as a completely separate business, and declining aluminum earnings.

<sup>65</sup> Alcoa Corp., 2016 10-K Securities and Exchange Commission financial report, Statement of Consolidated Operations.

<sup>64</sup> USITC Report, p. 148.

Most of Alcoa's R&D assets went to Arconic in the split. In 2016, Alcoa eliminated 90 positions at its technical center as part of an efficiency initiative; this followed a previous elimination of 50 workers in 2015. Alcoa is leasing a single R&D building at Arconic's New Kensington, PA R&D campus (previously Alcoa's R&D complex) for three years. Arconic reported R&D expenditures of \$100 million for 2015, \$132 million for 2016, and the company projects spending of [TEXT REDACTED] in 2017.<sup>66</sup>

Limitations on the funding of research and development caused by sliding revenues could have serious implications for development of next-generation aluminum-based products, including those required for U.S. national security. U.S. defense programs continue to rely on strong, lightweight aluminum for use in engine parts and structural components for aircraft, military vehicles, equipment, armor and many other applications. Aluminum is a critical part of any armor solution because it has better blast absorption characteristics. More than 90 percent of

all alloys currently used in the aerospace industry were developed through Alcoa's research.

While downstream aluminum companies continue to conduct R&D in specific areas, the absence of fully integrated aluminum companies in the United States may be an inhibiting factor in development of next generation aluminum technologies.

#### 4. Capital Expenditures

According to the Aluminum Association, since 2013 their member companies have invested \$2.3 billion in facilities to produce downstream aluminum products. The USITC's survey of downstream aluminum companies indicated that capital investment was on the increase, rising by 65 percent from 2011 to 2015; much of this investment was by companies involved in the plate, sheet and strip industry segment.<sup>67</sup>

In the secondary aluminum industry, the ITC's survey found an average of \$291 million per year of investments, with merchant producers accounting for 60 percent of the investments. There

was also a significant greenfield construction by a foreign firm (Shandong Nanshan Aluminum Co.), which built a captive secondary aluminum/extrusion mill in Lafayette, IN.<sup>68</sup> Foreign investors that increased capacity through capital investment include Toyota Tsusho America, which purchased U.S.-based merchant producer Bermco in 2015.

In the downstream wrought aluminum industry, the US ITC survey indicated that capital spending rose 65 percent between 2011 and 2015, to \$995.3 million. Two thirds of this investment was by the flat rolled plate sector, which is due to the fact that the sector is experiencing demand growth and the high costs associated with rolling mill equipment compared to extrusion presses.<sup>69</sup>

Information on capital expenditures by the U.S. aluminum industry is available through the Bureau of Census' Annual Survey of Manufactures (NAICS #33131—Alumina and Aluminum Production and Processing) and is presented in the Table below.

Table 42 –Total Capital Expenditures by Aluminum Industry				
(Millions of Dollars)				
NAICS #	Sector Description	2013	2014	2015
33131	Alumina & Aluminum Production and Processing (All Subsectors)	\$1,145	\$1,037	\$1,285
331313	Alumina & Primary Aluminum Production	\$164	\$156	\$166
331314	Secondary Smelting & Alloying of Aluminum	\$110	\$109	\$139
331315	Aluminum Sheet, Plate & Foil Manufacturing	\$615	\$521	\$789
331318	Aluminum Rolling, Drawing & Extruding	\$256	\$251	\$191
NAICS = North American Industry Classification System, <a href="http://www.census.gov">www.census.gov</a>				
Source: Bureau of the Census, Annual Survey of Manufactures				

These data include the total new and used capital expenditures reported by establishments in operation, including any known plants under construction, permanent additions, and major alterations to manufacturing and mining establishments, and new and used machinery and equipment. The table above shows that capital expenditures by the industry as a whole have been largely consistent over the three-year period. Capital investment by the

primary and secondary aluminum smelting sectors account for a relatively small percentage of the total. The majority of capital expenditures are made by establishments in the downstream sector of the industry. As noted previously, 2015 is the most recent year for which this information is available; data for 2016 would likely show a decline in capital expenditures by the primary aluminum sector.

The USITC report on the Competitive Conditions Affecting the U.S. Aluminum Industry noted that several U.S. firms planned upgrades to smelting operations, but did not proceed due to financial considerations and market conditions. For example, in 2012 Alcoa announced plans to replace antiquated pot lines at its Massena East smelter, but cancelled the modernization plan in 2015—and instead shut down the facility. Noranda also planned to

<sup>66</sup> Arconic R&D figures are extrapolated from Alcoa's R&D program prior to Arconic's formation.

Anne McInerney, Director of Federal Affairs, Arconic.

<sup>67</sup> USITC Report, p. 146–147.

<sup>68</sup> USITC Report, p. 141–142.

<sup>69</sup> USITC Report, p. 147.



upgrade its New Madrid, MO smelter, prior to the company declaring bankruptcy in 2016.<sup>70</sup>

5. Aluminum Prices

Aluminum is an exchange-traded commodity and global market prices for aluminum are determined on the basis of global supply and demand. The London Metal Exchange (LME) is the world's largest exchange for base and other metals, including aluminum. In Asia, the Shanghai Futures Exchange (SHFE) is a major commodity exchange for unwrought aluminum contracts. Aluminum contracts for the United States and Europe are traded on the LME. Aluminum prices in China are set on the SHFE. The LME price of aluminum is used as the global reference point both in the metal industry and in the investment community.

The price chart for aluminum on the LME illustrates the price weakness seen over recent years. The fundamental reason for the price drop is chronic

oversupply, despite healthy growth in global demand for aluminum and stable costs of production. In fact, demand has increased by over nine times over the past decade and a half.

The oversupply situation in the global market is primarily caused by developments in the Chinese aluminum industry. Chinese consumption rose from 3.2 million metric tons in 2001 to 29.2 million metric tons in 2015. At the same time, production in the country increased by almost 14 times.

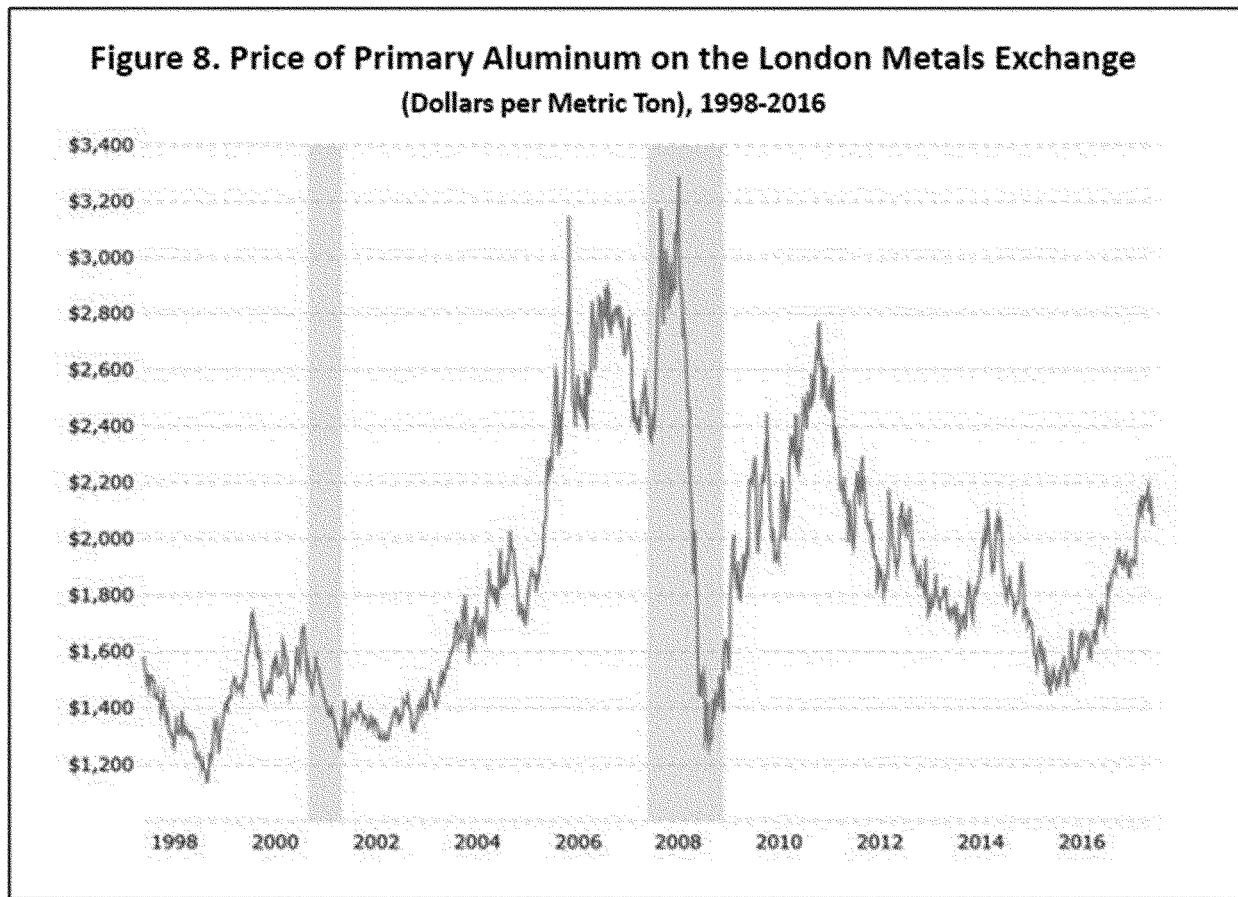
In 2016 the world produced a total of 57.6 million tons of aluminum of which 31 million (54 percent) came from China. The result is that in 2015, there were huge stockpiles of aluminum in the world with nearly 3 million tons on the London Metal Exchange, the world's primary market for trading in nonferrous metals. Since then, there has been a drawdown in global LME warehouse inventories to just over 2 million tons.

The figures below show prices on the London Metals Exchange for aluminum.

First, the recession of 2008 is readily evident in the figure. After bottoming out in 2008–2009, the price of aluminum recovered, only to fall dramatically between 2011 and 2016 in response to global oversupply. The price drop for aluminum was particularly dramatic in 2015. In November, 2014 the LME price for aluminum was as high as \$2,100 per metric ton; one year later the price was less than \$1,500 per metric ton. Aluminum prices on the LME fell 18.6 percent in 2015 reaching a six-year low at \$1,475 per ton, or an average of 75 cents per pound, and less than 73 cents per pound on average for 2016.

The sharp drop in aluminum prices had a devastating effect on the U.S. industry—a number of U.S. smelters were forced to either temporarily or permanently halt operations during 2014–2016; two primary aluminum producers declared bankruptcy.

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<sup>70</sup>USITC Report, p. 137.

**Figure 9 - Price of Primary Aluminum on the London Metals Exchange  
(Dollars per Metric Ton), January 2015-November 27, 2017**



**BILLING CODE 3510-33-C**

In recent months, the LME price for aluminum has rebounded to more typical levels, and reached a five-year high in October, 2017 at nearly \$2,200 per ton. Despite the improvement in the market, U.S. smelter operators have no confidence that prices will remain at or above current levels that are needed in order for them to operate profitably.

Low aluminum prices, rising inventories and continued supply growth in China and other countries have caused many producers to close or curtail their U.S. smelting operations. While aluminum prices are beginning to rise from their historic low, it is not clear how readily the U.S. primary aluminum industry will rebound. Indeed, global aluminum production capacity continues to expand, which may mean that the increase in aluminum prices seen thus far in 2017 may not be sustained. While there has been a modest reduction in Chinese aluminum production in recent months, this trend, too, may be temporary. According to analysts at Bloomberg Intelligence, despite cuts to China's aluminum capacity earlier in 2017, Chinese aluminum makers added 4 million metric tons net capacity in 2017

and may add an additional 3 million metric tons in 2018.<sup>71</sup>

**VII. Conclusion**

Based on these findings, the Secretary of Commerce concludes that the present quantities and circumstance of aluminum imports (wrought and unwrought) are "weakening our internal economy" and threaten to impair the national security as defined in Section 232. The Secretary has determined that to remove the threat of impairment, it is necessary to reduce imports to a level that will provide the opportunity for U.S. primary aluminum producers to restart idled capacity. This will increase and stabilize U.S. production of aluminum at the minimal level needed to meet current and future national security needs. If no action is taken, the United States is in danger of losing the capability to smelt primary aluminum altogether.

A quota or tariff on downstream products is also necessary because global overcapacity, coupled with industrial policies that promote exports of downstream products, have had a

negative impact on the U.S. primary aluminum industry through reduced demand for inputs from downstream companies, as well as directly on the downstream companies which face increased import penetration in many aluminum product sectors.

The continued rise in levels of imports of foreign aluminum threatens to impair the national security by placing the U.S. aluminum industry at substantial risk of losing the capacity to produce aluminum and aluminum products needed to support critical infrastructure and national defense.

A major factor contributing to the decline in domestic aluminum production and loss of domestic production capacity has been excess production and capacity in China, which now accounts for over half of global aluminum production. This is despite the fact that China has no natural competitive advantage for aluminum production. Chinese excess production, unresponsive to market forces, flooded world markets and caused a steep decline in global aluminum prices between 2014 and 2016. During this time of low prices, a number of U.S. aluminum smelters were forced to permanently shut down, while

<sup>71</sup> <https://www.bloomberg.com/professional/blog/aluminum-landscape-may-get-interesting-winter-passed/>

others were temporarily idled or curtailed their production.

Although global aluminum prices have regained lost ground in recent months, the damage to U.S. aluminum production capability was significant and irreversible. U.S. ability to smelt primary aluminum, including high-purity aluminum needed for the most sophisticated commercial and defense applications, has been reduced to minimal levels. Imports of primary aluminum now account for nearly 90 percent of domestic consumption. Imports of downstream aluminum products are surging as well, up 30 percent in 2017 over 2016 levels.

Since defense and critical infrastructure requirements alone are not sufficient to support a robust aluminum industry, U.S. primary and downstream aluminum producers must be financially viable and competitive in commercial markets to be able to produce the needed output. In fact, it is the ability to quickly shift production capacity used for commercial products to defense and critical infrastructure production that provides the United States a surge capability that is vital to national security, especially in an unexpected or extended conflict or national emergency. It is that capability that is now at serious risk.

In addition, it is in the interest of U.S. national security and overall economic welfare that the United States retains an aluminum industry that is financially viable and able to invest in research and development of the latest technologies. This is especially important given the growing role that aluminum plays in both commercial and defense applications.

The Secretary has determined that to remove the threat of impairment, it is necessary to reduce imports to a level that will provide the opportunity for U.S. primary aluminum producers to restart idled capacity. If no action is taken, the United States is in danger of losing the capability to smelt primary aluminum altogether.

Moreover, the Secretary has concluded that action to adjust imports must apply to imported downstream (wrought) aluminum products as well as primary (unwrought) aluminum. The reason for this is threefold. First, the downstream industry has been also adversely affected by surging imports. Foreign industrial policies that promote exports of downstream products while discouraging exports of primary aluminum have resulted in increased import penetration in many aluminum product sectors. Second, reducing imports of downstream products and their replacement by domestic

production will serve to increase domestic demand for primary aluminum. Lastly, import relief to downstream producers is necessary in order to compensate for the increase in primary aluminum prices that they will face. If the raw materials costs are increased for U.S. downstream producers, a tariff on imported downstream products is necessary so as not to adversely affect them vis a vis their foreign competitors.

#### VIII. Recommendation

Due to the threat, as defined in Section 232, to national security from aluminum imports, the Secretary recommends that the President take immediate action by adjusting the level of these imports. There are a few different means by which import restrictions could help address the threat to U.S. national security. Under alternatives 1 and 2, the quotas or tariffs would be designed, even after any exemptions (if granted), to enable U.S. aluminum producers to utilize an average of 80 percent of their production capacity. The quotas and tariffs described below should be sufficient to enable U.S. aluminum producers to operate profitably under current market prices for aluminum and will allow them to reopen idled capacity.

Two alternatives for achieving this objective are described below. In each alternative, quotas or tariffs would be imposed on imports of: 1) unwrought aluminum (Harmonized Tariff Schedule (HTS) Code 7601); 2) aluminum castings and forgings (HTS Codes 7616.99.51.60 and 7616.99.51.70); 3) aluminum plate, sheet, strip, and foil (flat rolled products) (HTS Codes 7606 and 7607); 4) aluminum wire (HTS Code 7605); 5) aluminum bars, rods and profiles (HTS Code 7604); 6) aluminum tubes and pipes (HTS Code 7608); and 7) aluminum tube and pipe fittings (HTS Code 7609) based on 2017 annualized imports in those categories.

In either alternative, the Secretary recommends that the action taken to adjust the level of imports must be in effect for a duration sufficient to allow sufficient time and assurances to stabilize the U.S. industry. It takes up to nine months to restart idled smelting capacity. Market certainty is needed to build case flow to pay down debt and to raise capital for plant modernization to improve manufacturing efficiency.

The Department of Commerce, in consultation with other appropriate departments and agencies, will monitor the status of the U.S. aluminum industry and the effectiveness of the

remedies to determine if the remedies should be terminated or extended.

#### *Alternative 1—Worldwide Quota or Tariff*

##### Quota

A worldwide quota of 86.7 percent on imports described above would restrict aluminum imports sufficiently to allow U.S. primary aluminum producers to increase production by about 669,000 metric tons, bringing total production to about 1.45 million metric tons, or about 80 percent of existing U.S. primary aluminum production capacity. This quota would also be applied to the five other aluminum product categories listed above and would help ensure the viability of those U.S. producers to meet national security needs.

##### Tariff

A tariff rate of 7.7 percent on imports of unwrought aluminum and the other aluminum product categories listed above should have the same impact as the 86.7 percent quota. This tariff rate would be in addition to any antidumping or countervailing duty collections applicable to any product.

This tariff rate also will adequately adjust for the price distortions in downstream aluminum product sectors that are caused by global overcapacity and overproduction being exported in the form of downstream products.

#### *Alternative 2—Tariffs on a Subset of Countries*

##### Tariff

A tariff rate of 23.6 percent on imports of aluminum products from China, Hong Kong, Russia, Venezuela, and Vietnam should also restrict aluminum imports sufficiently to allow U.S. aluminum producers to utilize an average of 80 percent of their capacity. These five countries are the source of substantial imports due to significant overcapacity and potential unreliable suppliers or likely sources of transshipped aluminum from China.

As in Alternative 1 above, this tariff rate would be in addition to any antidumping or countervailing duty collections applicable to any product. For the targeted tariff, all other countries would be limited to 100 percent of their 2017 import volumes.

#### *Exemptions*

In selecting an alternative, the President could determine that specific countries should be exempted from the proposed quota by granting those specific countries 100 percent of their prior imports in 2017 or exempting them entirely, based on an overriding

economic or security interest of the United States, which could include their willingness to work with the United States to address global excess capacity and other challenges facing the U.S. aluminum industry. The Secretary recommends that any such determination should be made at the outset and a corresponding adjustment be made to the final quota or tariff imposed on the remaining countries. This would ensure that overall imports of aluminum to the United States remain at or below the level needed to enable the domestic aluminum industry to return to 2012 production and import penetration levels.

#### *Exclusions*

The Secretary recommends an appeal process by which affected U.S. parties could seek an exclusion from the tariff or quota imposed. The Secretary would grant exclusions based on a demonstrated: (1) Lack of sufficient U.S. production capacity of comparable products; or (2) specific national security based considerations. This appeal process would include a public comment period on each exclusion request, and in general, would be completed within 90 days of a completed application being filed with the Secretary.

An exclusion may be granted for a period to be determined by the

Secretary and may be terminated if the conditions that gave rise to the exclusion change. The U.S. Department of Commerce will lead the appeal process in coordination with the Department of Defense and other agencies as appropriate. Should exclusions be granted the Secretary would consider at the time whether the quota or tariff for the remaining products needs to be adjusted to ensure that U.S. aluminum production meets targeted levels.

**Richard E. Ashooh,**

*Assistant Secretary for Export Administration.*

[FR Doc. 2020-14358 Filed 7-2-20; 8:45 am]

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