ILZSG Insight

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An Analysis of Used Lead Acid Battery (ULAB) Trade and Related Regulations in North America

Introduction

This insight paper has been developed to assist readers in understanding ULAB trade and relevant regulations in North America.

To contextualize the situation within North America, the paper starts with a brief overview the ways in which ULABs are currently collected and recycled in a number of major markets including the US, EU, China, India and Africa. It then discusses the Basel Convention for the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. Resource links are provided to allow readers to reference adequate information about the details of the Convention and also regulations in the North America.

Prior to the analysis of the North American market, a global market snapshot is provided to show the dynamics of world ULAB trade.

The detailed probe into the North American ULAB market begins with relevant legislation and regulations regarding the collection, storage, transportation, recycling and trade of ULABs. The paper then moves on to discuss the US ULAB export and import market. The US has been for years the world's largest ULAB exporting country, however, its ULAB imports have declined in recent years. Based on available statistics, the paper delves into ULAB trade flows between the US, Mexico, Canada and their main trade partners outside North America. Correlation between ULAB trade, lead waste and scrap trade, and refined lead metal trade are also discussed. Sometimes ULABs are registered and traded under the category of lead waste and scrap. This misregistration has led to discrepancies between the reported export data and reported import data by trade partners, thus making the analysis of the lead waste and scrap flows important when attempting to gain an understanding of the full picture of ULAB trade. At the same time, it is important to acknowledge that most lead waste and scrap are the product of ULAB treatment.

This Insight examines the trade flows of ULABs within, to and out of the North American market and the current regulations and international efforts that police the ULAB value chain. Data quoted in this paper is sourced from the UN COMTRADE Database and ILZSG Statistics. Due to inconsistencies detected in the reporting of tonnages, trade values have been used in the analysis. All information is based on data availability at the time of editing and is solely for reference by the Group's members.

Comments or Questions

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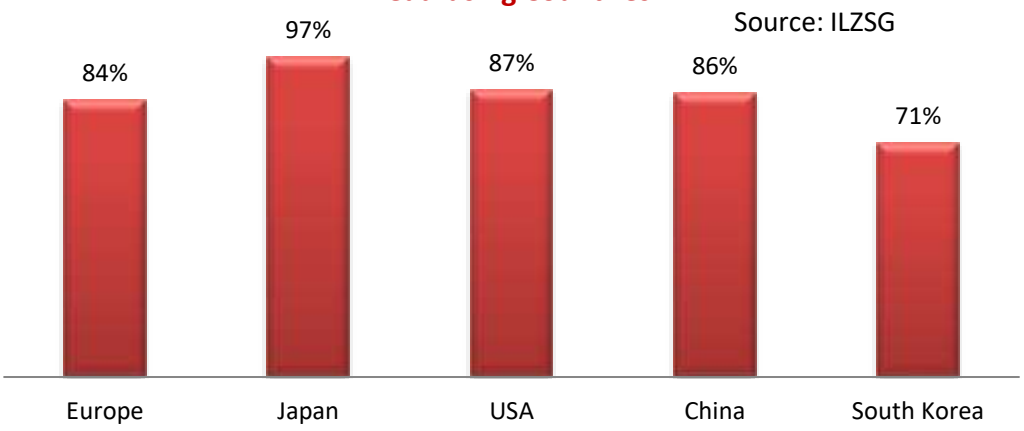
The Status Quo of ULAB Recycling in Major Markets

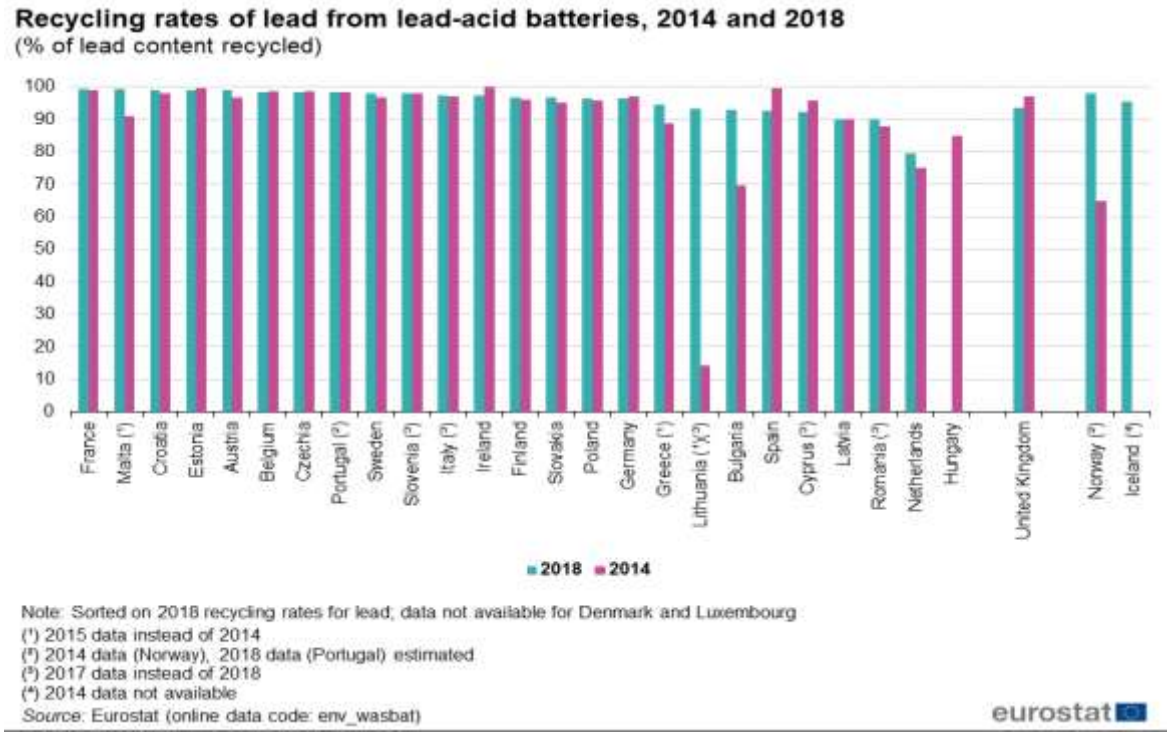
The Lead Acid Battery (LAB) is a proven cost-effective, reliable, efficient, and sustainable technology that propels social and economic development. LABs are widely used for energy storage, motive power, and vehicle starting/lighting/ignition (SLI). Nearly all ULABs can be collected, sorted and recycled as a consequence of their economic value, high recyclability, and the various regulations in existence regarding compulsory recycling.

ILZSG´s recent statistics show that 86% of the world´s refined lead metal is used for LAB production. This figure is even higher in the main lead-using countries with Japan and United States of America at 97% and 87% respectively.

% of Lead Usage Accounted by LAB Production in the Main Lead-using Countries



According to a report released by the Battery Council International (BCI), 98.7% to 99.3% of lead contained in ULABs in the US over the period 2014-2018 were recycled. In the EU market, 99% of used lead acid batteries are collected and recycled with over 90% of the contained lead recovered in most of its member countries in 2018 as shown in the chart below.



In China, the world's largest lead acid battery market, a large portion of ULABs have been recycled in an unorganized way. This has posed a threat to the environment and created a grey zone for illegal ULAB trade. In a draft regulation circulated for comment by the National Development and Reform Commission (NDRC), China set a target of 70% or above for organized ULAB collection and recycling by the end of 2025.The new regulation is expected to take effect in early 2021. Informal ULAB recycling is also widespread in India. The paper "Current trends and future perspectives in the recycling of spent lead acid batteries in India" published by "Materials Today: Proceedings" revealed that there are only 33 authorized battery recyclers in India and that about 60-80% of India´s ULABs are recycled informally. Illegal collection and recycling of ULABs in Africa is also high due to the lack of a solid legal framework, weak institutions, a fragmented market, and low public awareness of potential health threats. A study conducted by the Oeko-Institute, a German NGO, found that more than 1.2 million tonnes of ULABs in Africa need improvement in the way in which they are managed.

The market value of ULABs, on one hand makes it plausible that every ULAB could be recycled in an informal or formal way. On the other hand, there is the possibility that the environment can be compromised in the pursuit of higher margins as traders of ULABs tend to ship them to markets where they are paid premium prices.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention)

The Basel Convention is a legally binding instrument governing the transboundary movement of hazardous wastes and their disposal, the convention entered into force in 1992. Although cross-border shipment of ULABs is not banned, the Basel Convention advocates the principle of treating these types of end-of-life product as closely as possible to where they are generated since, in the case of ULABs, leakage or spillage of acidic

electrolyte is possible at any stage prior to the organized breaking process.

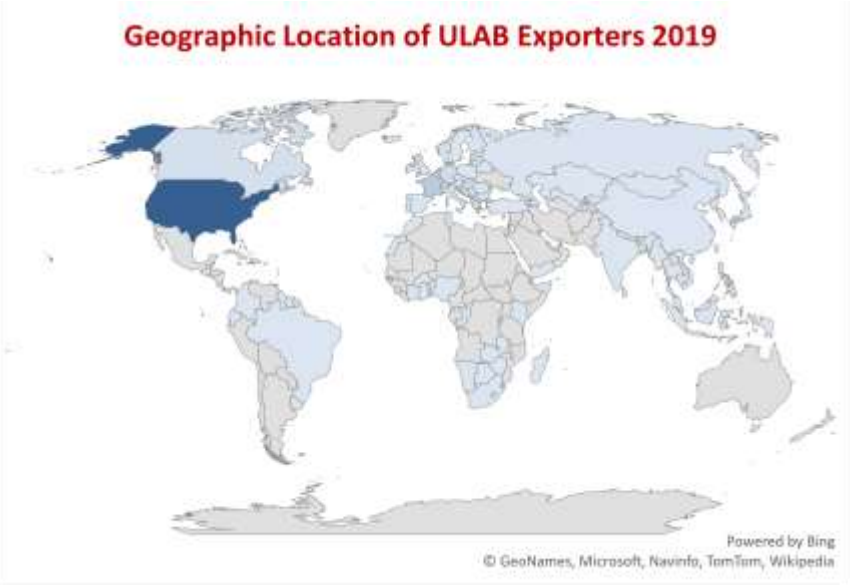
Moving ULABs which are generated where there aren´t any downstream sectors and/or at a volume which is too low to cannot support an economically and environmentally viable treatment process to a regional facility in a nearby country is logical. In recent years the Basel Convention has set up regional centers across the globe to facilitate capacity building and technology transfers and that has helped to reduce the informal ULAB processing sector, shorten the travel footprint of ULABs, and prompt the sound management of ULABs in many developing and least developed countries.

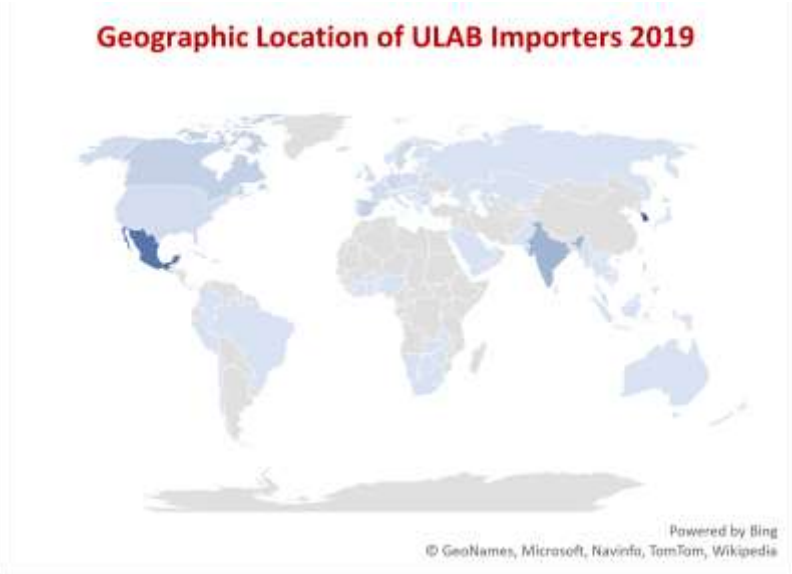
In the process of implementing and complying with the Basel Convention, different governments may have different interpretations and that has led to banning the export and import of ULABs by some countries which in turn has resulted in illegal circumvention or smuggling.

The Secretariat of Basel Convention has developed two technical guidelines related to ULABs; the Technical Guidelines for the Environmentally Sound Management of Waste Lead-acid Batteries elucidated every aspect of ULAB treatment and the Technical Guidelines on the Environmentally Sound Recycling/Reclamation of Metals and Metal Compounds provides guidance for related health, safety, environment issues from recycling facilities setup to post-life shutdown of the facilities. The two documents along with a training manual can found at:
http://www.basel.int/Implementation/TechnicalMatters
http://archive.basel.int/meetings/sbc/workdoc/tm-ulab/tm_ulab.pdf

World ULAB Trade

The transboundary trade of ULABs is a vibrant business thanks to the dynamic demand for refined lead metal. In 2019, 103 countries and regions reported export activities of ULABs with a combined value of more than USD1.2 billion. For the same year, 93 countries and regions reported imports of ULABs with a combined value of more than USD1.6 billion which infers that over USD400 million was spent on freight, insurance and tariffs. Over a dozen of the 93 importing countries re-exported ULABs and that conforms to ILZSG´s reporting of close to 80 countries and regions with lead smelting and refining facilities for the same year. At the same time, some ULAB trading activities were reported and registered under the category of scrap to circumvent trade restrictions. When compounded with the hard-to-track smuggling of ULABs, it is possible to come to the conclusion that the actual transboundary flow of ULABs was significantly higher than official figures indicate.





In terms of value, the US was the single largest ULAB exporting country in 2019 followed by France, the Netherlands, the United Arab Emirates and Germany. For the same year, the Republic of Korea was the largest ULAB importing country followed by Mexico, India, Canada and Belgium.

ULAB Trade in North America

In the United States of America, the Environment Protection Agency (EPA) is the official department responsible for the rules governing ULAB exports and imports. ULAB importers and exporters in the US are obliged to comply with the Resource Conservation and Recovery Act (RCRA) which establishes special requirements for ULAB trade. State authorities can develop respective laws based on the federal RCRA under the condition that the State law cannot be less stringent than RCRA. Detailed requirements are listed for both exporters and importers including pre-notification, compliance with the regulations of US treaty partners, annual reporting and traceability in RCRA. The United States is party to major international waste agreements with Canada, Mexico, and the Organization for Economic Cooperation and Development (OECD) and is a signatory to the Basel Convention, although it has not ratified the Convention. It also has in place with Costa Rica, Malaysia, and the Philippines bi-lateral waste management agreements or treaties. The text of the RCRA and relevant compliance resources can be found at:

https://www.bordercenter.org/hazardouswaste.php

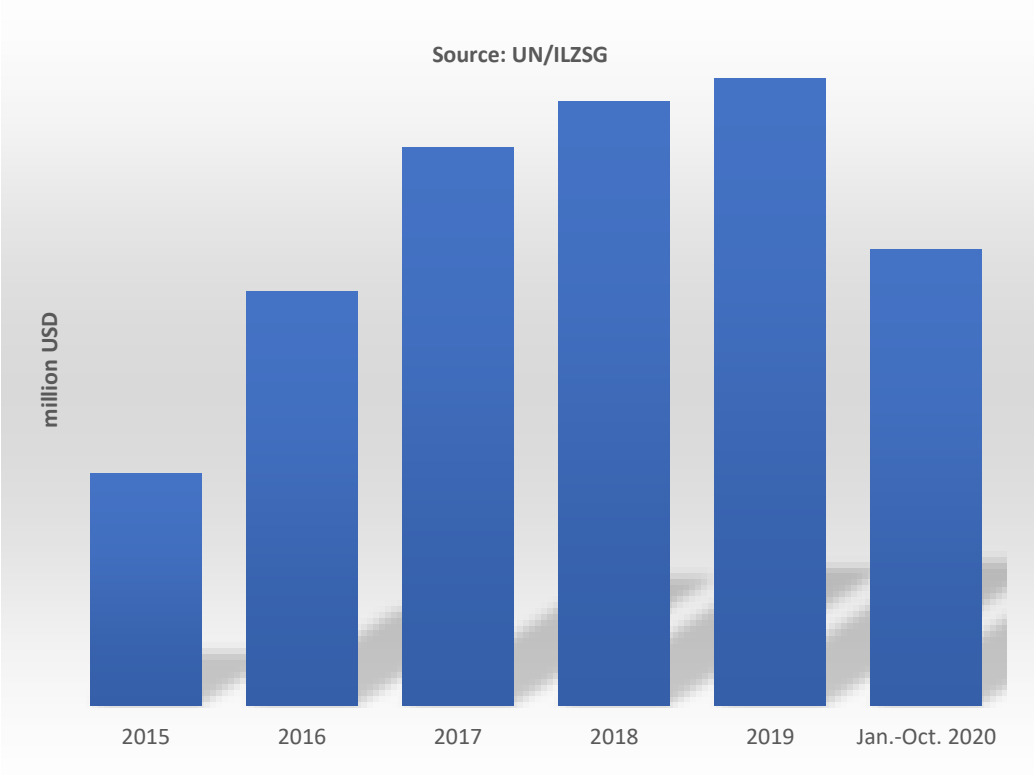
In Canada, government at different levels, such as the federal, provincial and municipal agencies have their corresponding responsibilities in managing the recycling of ULABs. The federal government regulates transboundary movements of ULABs via various international agreements. Currently, Canada is a party to the Basel Convention, the OECD Decision on the Control of Transboundary Movements of Wastes Destined for Recovery Operations, and the Canada-USA Agreement Concerning the Transboundary Movement of Hazardous Wastes. The export and import of hazardous waste and hazardous recyclable materials regulation is the overarching regulation in managing the cross-border flow of ULABs in Canada. The User's Guide for this regulation can be found at:
https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/publications/export-import-hazardous-waste-guide.html

Mexico is a party to the Basel Convention while its ULAB trade with US is regulated by the US-Mexico bi-lateral agreement since the US is not a party to the Basel Convention. The agreement can be found at:
https://www.epa.gov/hwgenerators/agreement-between-mexico-and-united-states-regarding-transboundary-shipments-hazardous
Compared with the US and Canada, the environment control measures in reclaiming lead from ULABs are more lenient and the implementation and enforcement mechanisms are less strict. This has resulted in high levels of ULABs being exported from the US to Mexico.

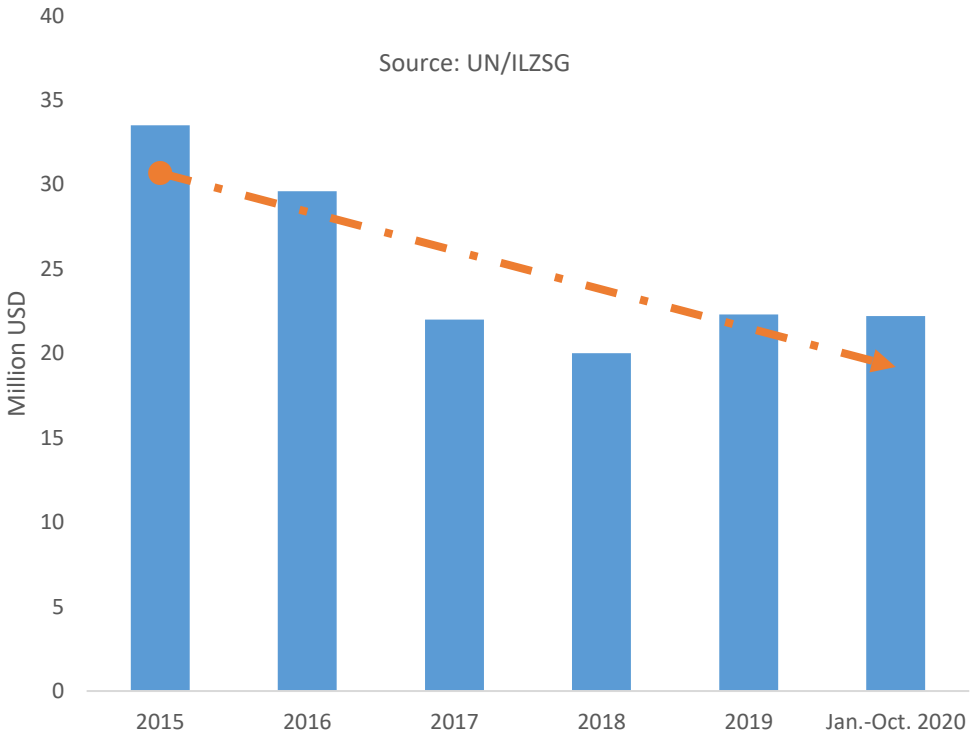
US ULAB Exports and Imports

As the largest ULAB exporting country, the US shipped USD407 million worth of ULABs to the world over the period January to October 2020. The export value almost tripled from USD207 million in 2015 to USD559 in 2019. In contrast, the value of ULAB imports into the US over the same period dropped by 32% from close to USD34 million to slightly above USD22 million. The import of ULABs for the first ten months of 2020 reached USD22.2 million which indicated a possible short-term trend of recovery.

US ULAB Exports 2015-2020



US ULAB Imports 2015-2020

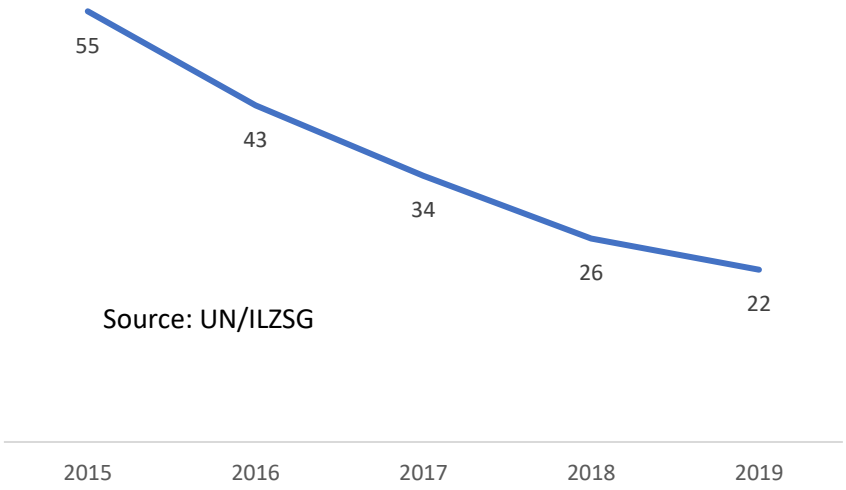


The high growth in exports and the big drop in imports reflect the strict environmental control measures and related administrative costs that need to be absorbed by the ULAB recycling industry in the US.

Although ULAB exports from the US have nearly tripled in recent years, its export destinations (the countries receiving US exports) declined significantly from 55 to 22 over

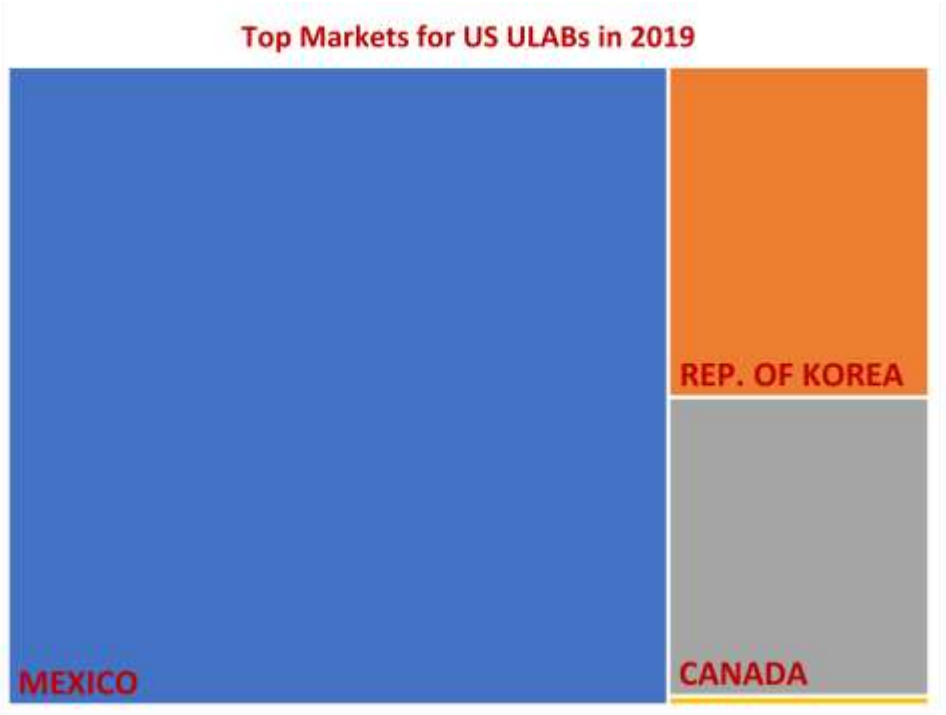
the period 2015 to 2019 This reduction can be attributed to a variety of factors including buoyant demand from regional markets particularly that of Mexico and Canada, growing environment awareness and compliance regarding the shortening of the travel footprint of ULABs as advocated by Basel Convention.

Number of Destinations for US ULAB Exports



Source: UN/ILZSG

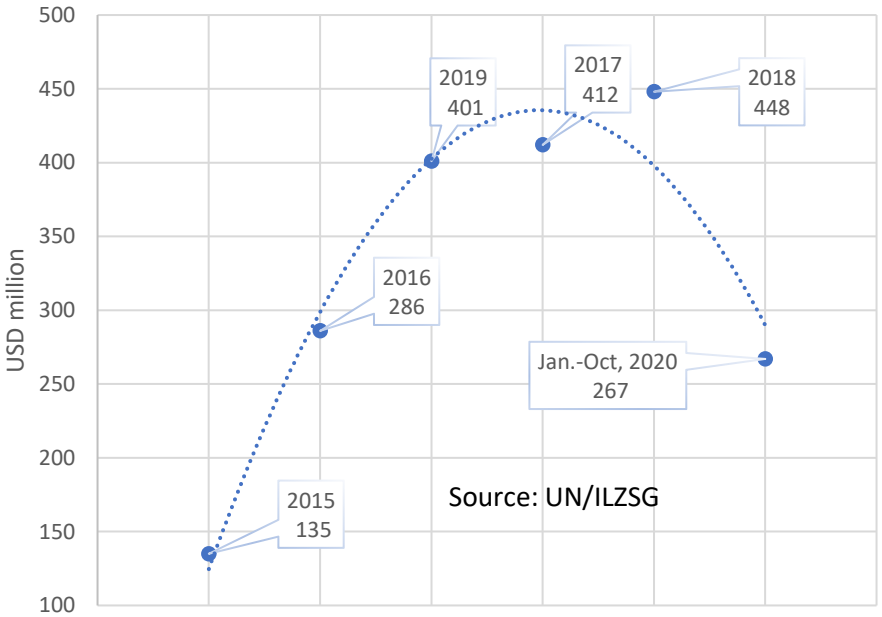
Traditionally US exports of ULABs have been shipped to a wide range of countries, however, the principal destinations for a number of years have been Mexico, the Republic of Korea and Canada. In 2019, the three countries accounted for 99% of US total exports with Mexico alone accounting for USD400 million worth of the total US exports of USD559 million. The Republic of Korea came second at USD82.1 million and Canada third at USD74.1 million. The combined export value to the other markets including Malaysia, Japan, Brazil, Italy, Sweden, Netherlands, India, Iraq, China, Ecuador, Germany, Australia, Hong Kong SAR, Panama, United Kingdom, Oman, United Arab Emirates and Thailand amounted to only USD2.3 million.



US ULAB Exports to Mexico

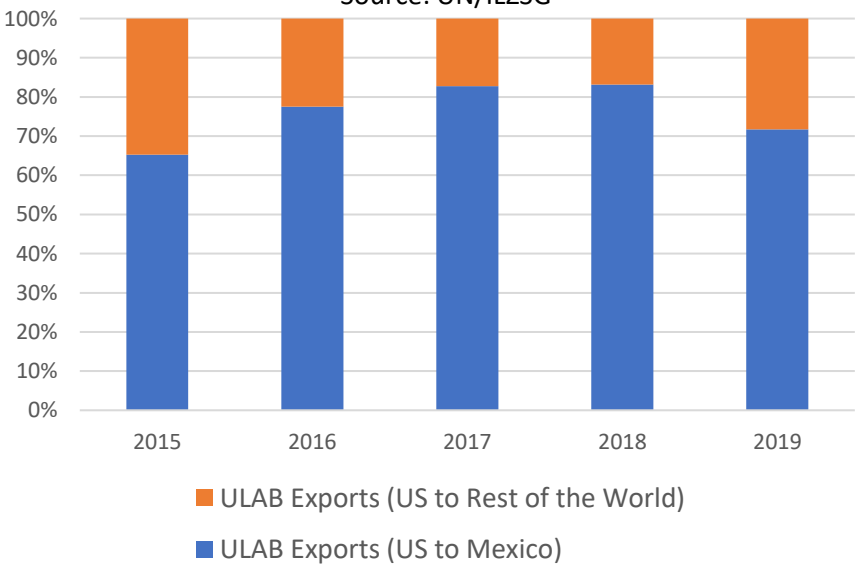
Thanks to its geographic proximity and the free trade agreement in North America (now the USMCA which replaced NAFTA), Mexico´s ULABs imports from the US have been growing steadily in recent years. The United States exported USD135 million worth of ULABs to Mexico in 2015, this figure more than doubled to USD286 million the following year and surpassed the threshold of USD400 million in 2017 and has remained at that level thereafter. Despite being disrupted by the lockdown measures resulting from the COVID-19 pandemic, Mexico imported USD267 million worth of ULABs from the United States over the period January to October 2020.

US ULAB Exports to Mexico 2015-2020



Mexico has been the single largest export market for US ULABs in terms of value in recent years and imported more than 65% of the US ULABs exported in each of the recorded years between 2015 and 2019. It is also important to note that, for the same period, Mexico didn´t import any ULABs from countries other than the US.

US ULAB Exports 2015-2019
Source: UN/ILZSG

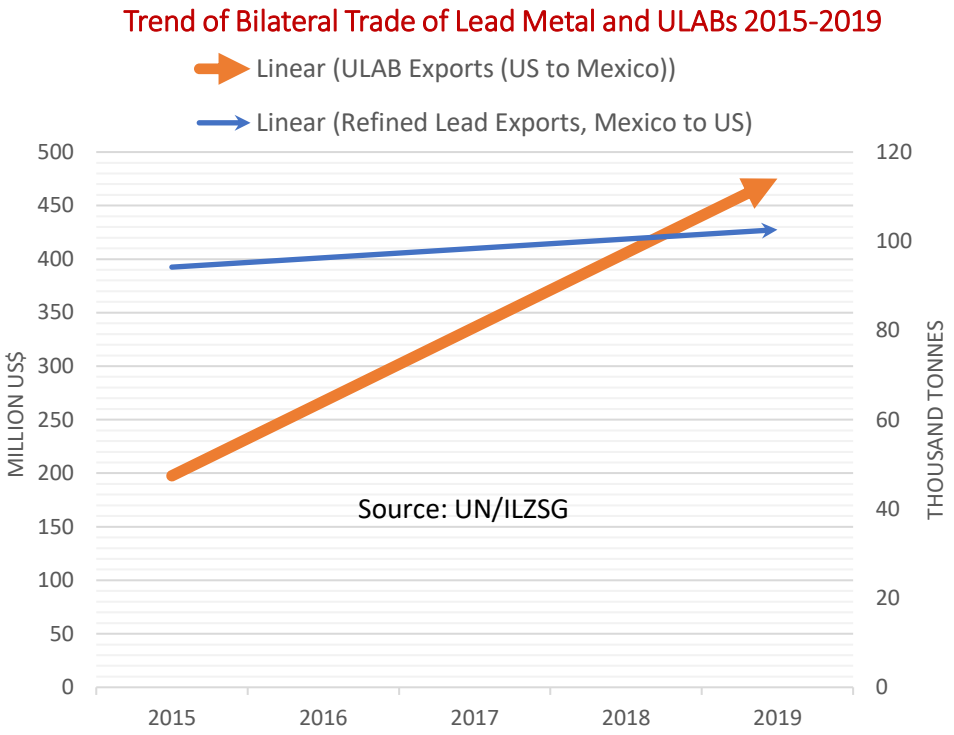


Correlation between US ULAB Exports to Mexico and Mexico´s Refined Lead Metal Exports to the US

Conversely, the US is the single largest export market in terms of quantity for Mexico´s refined lead metal and from 2015 to 2019 it bought more than 80% of the total refined lead metal exported by Mexico in every year aside from 2016.

Source: ILZSG

As trade in ULABs is recorded in terms of value as opposed to volume, it is hard to correlate the tonnage of refined lead exported from Mexico with the weight of ULABs exported from US. However, the chart below shows that the strong growth in US ULAB exports to Mexico supported the relatively stable refined lead metal exports from Mexico to the US over the period 2015-2019.

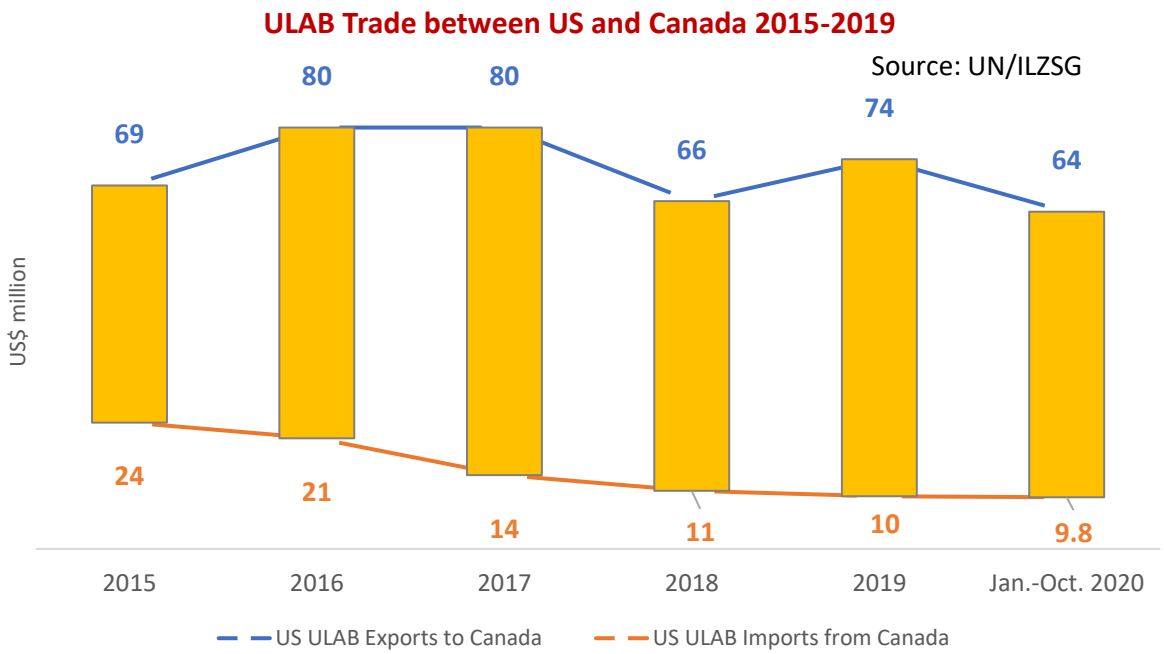


Although trade in ULABs has not been recorded by quantity in a consistent manner, the anecdotal volume reported in 2017 gives us some insight into the relation between US ULAB exports to Mexico, Mexico´s secondary lead metal production and Mexico´s refined lead metal exports to the US. In 2017, the UN Comtrade Database reported a weight of 390 thousand metric tonnes of ULAB exports from the US to Mexico. Assuming that 60% of this weight was lead metal, it would be possible to generate 233 thousand metric tonnes of refined lead metal output. In the same year, Mexico actually reported a secondary lead output of 310 thousand metric tonnes and exported 101 thousand metric tonnes of refined lead metal to the US. The preliminary conclusion we can draw from the assumption and the reported figures is that lead recovered from the ULABs from the US contributed to over 75% of Mexico´s secondary lead metal output and that Mexico exported nearly half of the refined metal extracted from US ULABs back to the US market in the form of refined lead metal.

If reverse trade flows are examined, over the period 2015-2019, there were only two years, 2015 and 2018, in which exports of ULABs from Mexico to the US were recorded. The total values reported were only USD3.6 million and USD4.4 million respectively. These figures represent the only ULABs exports from Mexico during that period. Export activity resumed in 2020 when Mexico shipped 748 metric tonnes of ULABs valued at USD620 thousand over the period January to October 2020. This upturn was in line with the ULAB import growth reported for the USA over the same period.

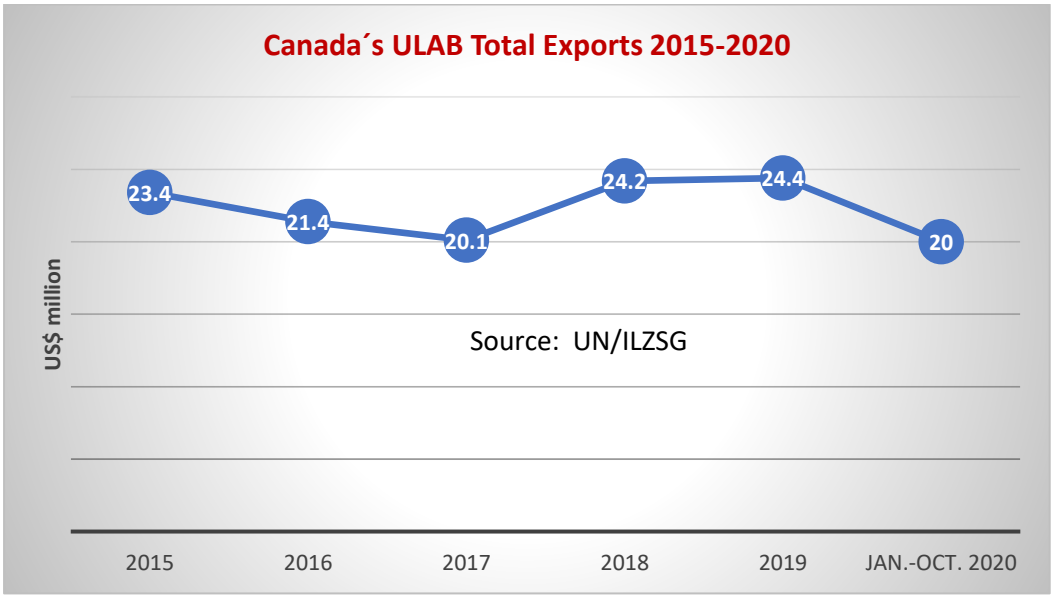
ULAB Trade between Canada and the US

In this section of the Insight ULAB trade between the US and Canada, the third largest market for US ULAB exports and the second largest market for US ULABs in North America, is examined. The US exported USD64 million worth of ULABs to Canada in the first ten months of 2020, whilst, over the same period, it only imported USD9.8 million worth ULABs from Canada thus generating a trade surplus of nearly USD54 million. In contrast to the growth pattern witnessed for Mexico, the ULAB trade between US and Canada has been relatively stable in recent years.



Unlike Mexico, Canada has diversified import sources for ULABs. It imported ULABs from around 20 countries and regions in each of the years 2015-2020. However, despite this, US ULABs dominated the import market and accounted for over 99% of the total import value. For example, Canada bought USD67 million worth of ULABs from around 20 countries and regions in 2019, all the exporting countries and regions excluding the US only contributed a trivial value of USD162 thousand, accounting for only 0.24% of the total.

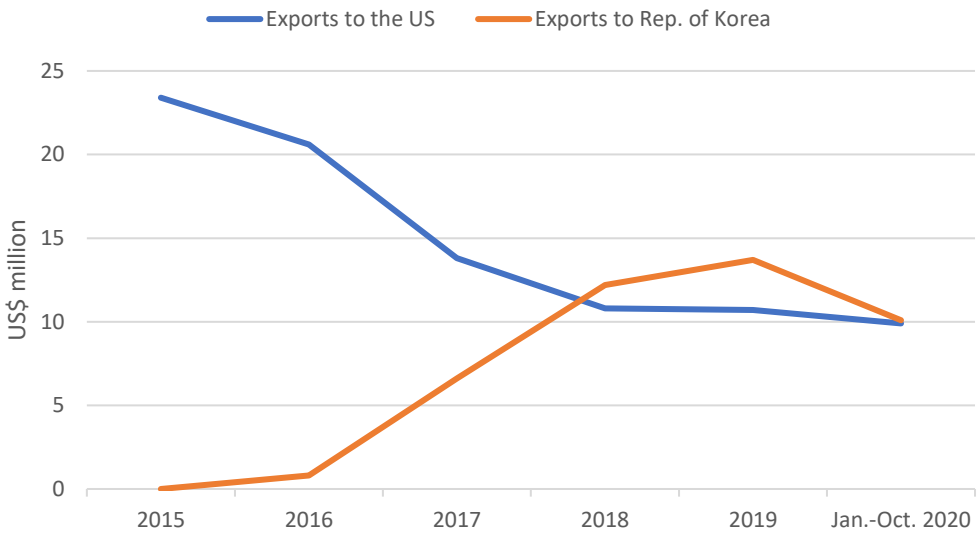
For the observed period of 2015-2020, Canada exported between USD20 and 25 million of ULABs to a dozen countries and regions. Exports of USD20 million for the period January to October 2020 confirmed the resilience of this business despite of the COVID-induced lockdowns and disruptions.



Among all its export markets in 2019, the US and the Republic of Korea contributed a significant market share of 99.6%. Even though the US and Republic of Korea currently account for a similar value of Canadian exports, the trend since 2015 has been markedly

different with exports to the US falling sharply whilst exports to the Republic of Korea have risen significantly.

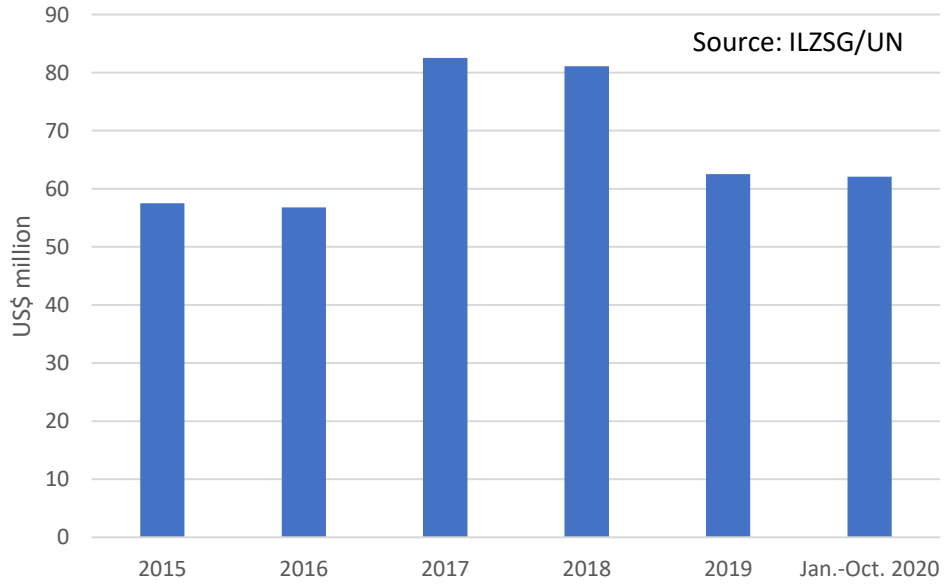
Canada ULABs Exports to the US & Rep. of Korea 2015-2020



US Lead Waste and Scrap Exports

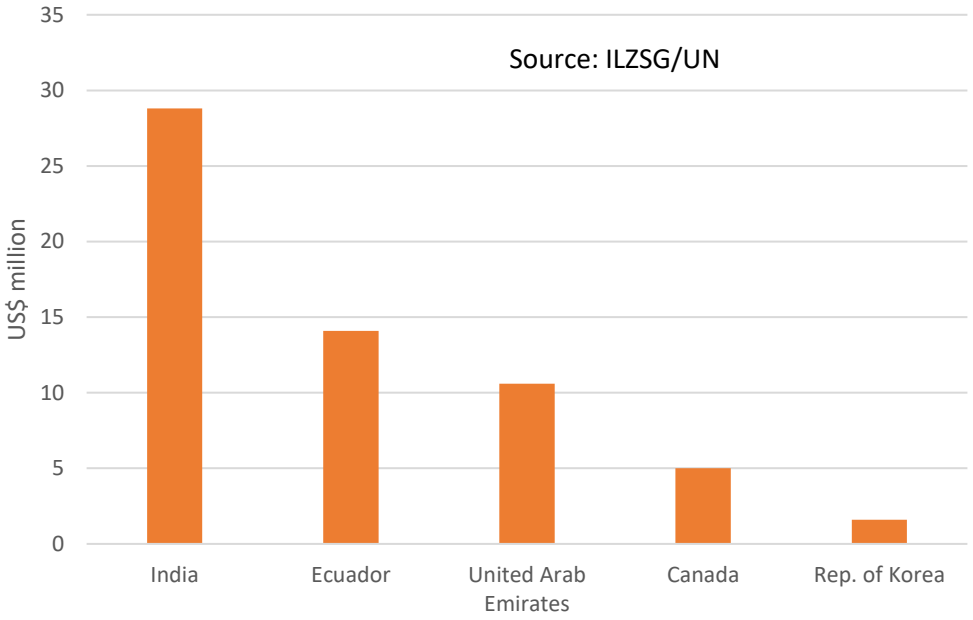
ULABs are sometimes registered as lead waste and scrap for export and import. The US has been one of the major lead waste and scrap exporting countries for many years. For the observed period, the US was the third largest lead waste and scrap exporting country in 2015 and 2016 behind the United Kingdom and France, and it became the second largest exporting country in 2017, 2018 and 2019 behind the United Kingdom. After a moderate drop in 2019, its exports witnessed a rapid recovery in 2020 with a January to October export value of USD22.2 million. This was equal to that of the whole of 2019.

US Lead Waste & Scrap Exports 2015-2020



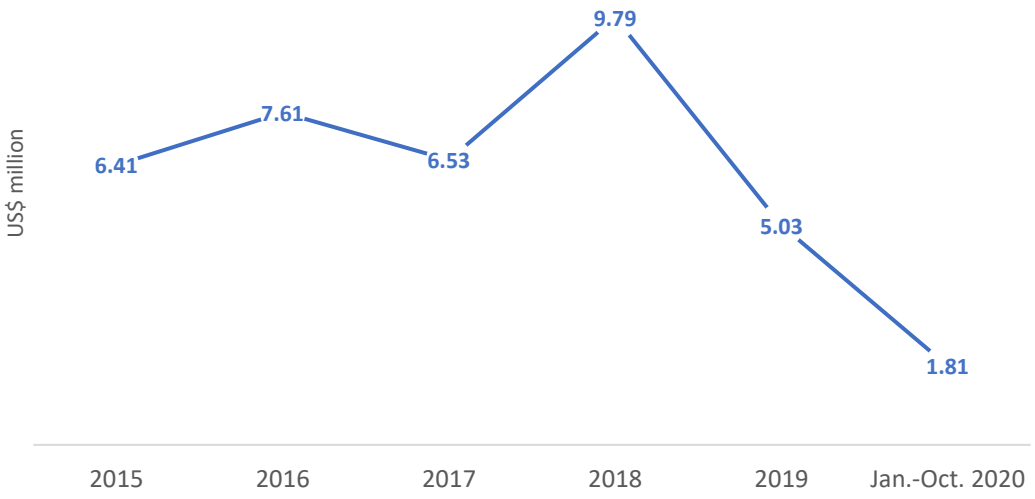
In 2019, the US shipped its lead waste and scrap to around 20 countries and regions with India the largest receiver followed by Ecuador, the United Arab Emirates, Canada and the Republic of Korea.

Top 5 destinations for US Lead Waste & Scrap Exports 2019

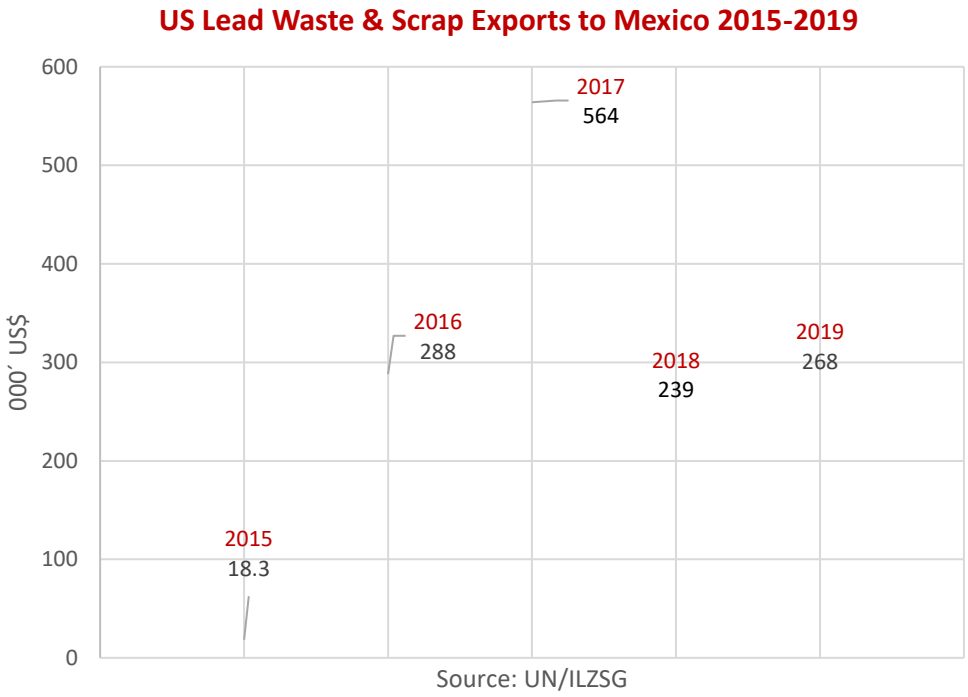


Over the period January to October 2020, the US exported USD1.8 million worth of lead waste and scrap to Canada, which is far below the levels recorded over the past several years. Besides the disruptions wrought by the COVID-19 pandemic, this export decline coincided with growing imports of ULABs over the first ten months of the year compared to the corresponding period in 2019.

Lead Waste and Scrap Exports 2015-2020 (US to Canada)



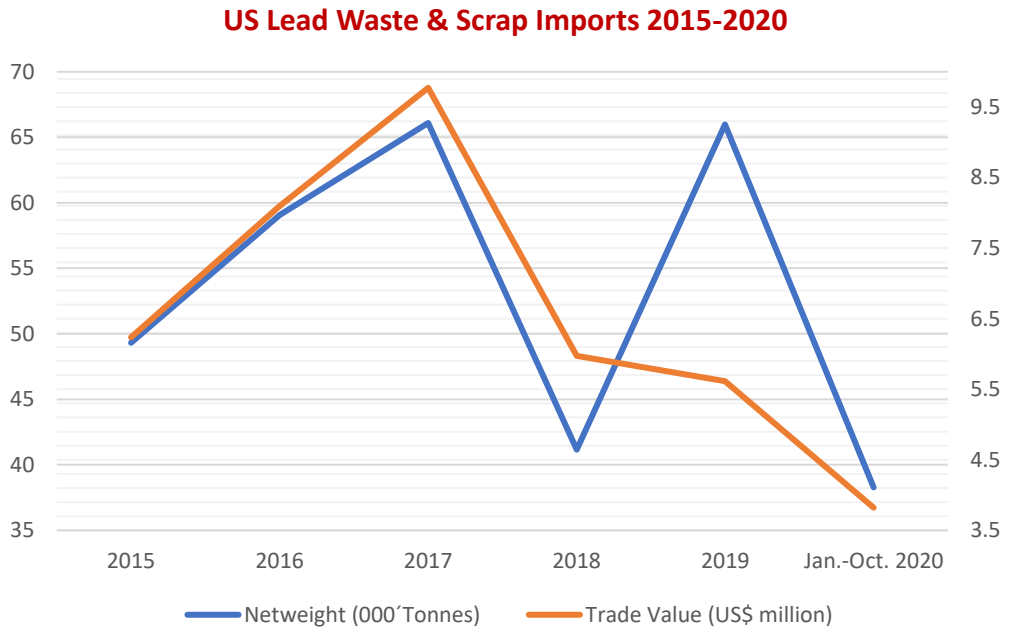
The US also reported a small amount of lead waste and scrap exported to Mexico over the period 2015-2019. The chart below shows that after two sharp rises in 2016 and 2017, the export value remained roughly stable. For example, the US exported 161 metric tonnes of lead waste and scrap at a value of USD268 thousand to Mexico in 2019.



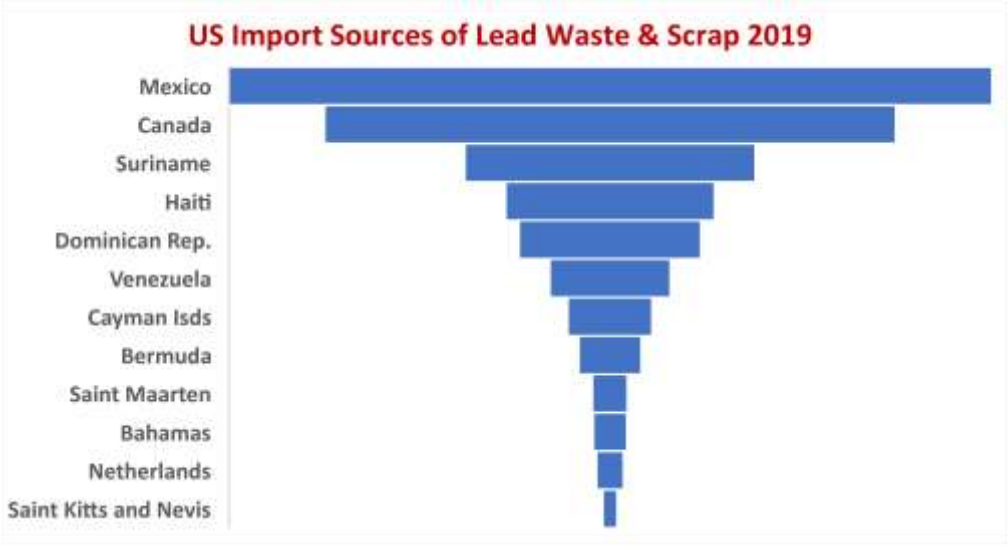
US Lead Waste and Scrap Imports

Among the 59 countries recorded as importing lead waste and scrap in 2019, the US, perhaps surprisingly, was ranked in 16th place with imports valued at USD5.6 million. This was significantly lower than those of Greece (USD14.3 million), its closest neighbor on the list. In the same year, Canada reported an import value of USD4.6 million, however, Mexico didn´t report any lead waste or scrap imports. Please note that the difference between the figures appearing in this paragraph and the previous one can be attributed to different reporting standards in the US, Canada and Mexico.

During most of the period 2015-2020, import values and import quantities followed the same trend apart from in 2019 when a sharp recovery in quantity didn´t result in a corresponding increase in value. A possible explanation for this is that quality of material comprising the 2019 imports was lower than in previous years.



According to data reported by UN Comtrade, the US only had 12 trading partners for lead waste and scrap imports in 2019, a reduction from around 20 witnessed for every year between 2015-2018.

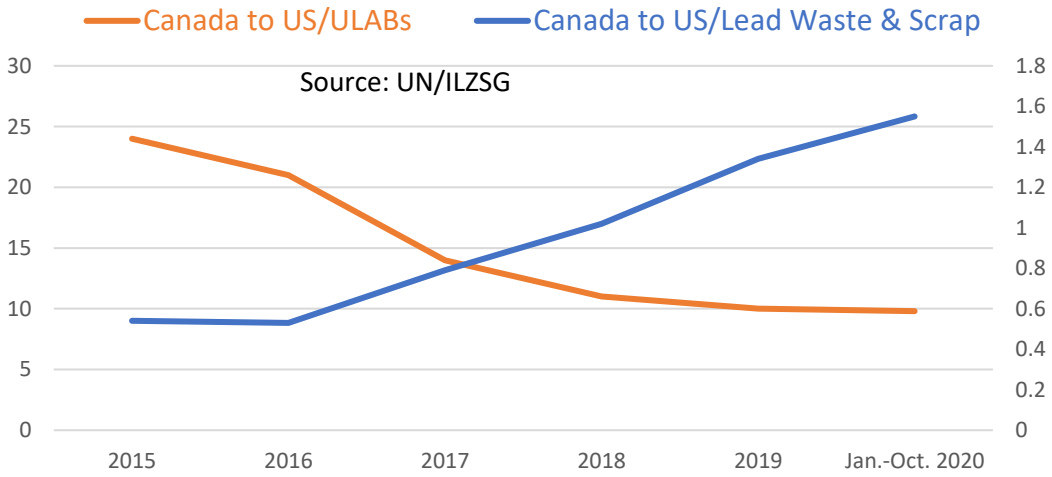


Mexico and Canada have been for many years the top 2 lead waste and scrap exporters to the US. During the period 2015-2019, all of Mexico´s lead waste and scrap exports went to the US market. It is likely that some ULABs were broken down in Mexico and the contained lead exported to the US for refining.

Canada´s Lead Waste and Scrap Exports

Canada has a much more diversified export market with more than a dozen countries and regions buying its lead waste and scrap over the period 2015-2020. India and the US were the two largest buyers with their combined import value accounting for over 75% of Canada´s exports in each of the years 2015-2020. Its exports to the US market have increased consistently over the same period, and an apparent growth can be seen for the year 2020 with the exports over January to October already surpassing the level attained during the whole of 2019. It is worth noting that, when comparing trends in lead waste and scrap exports to the US to that of ULABs, ULABs exports from Canada have been declining

whereas lead waste and scrap exports have been rising. A possible explanation for this is that more ULABs are being drained and broken down domestically in Canada. It is also possible that some ULAB exports from the US to Canada were incorrectly classified as lead waste and scrap.



Canada´s lead waste and scrap exports to India were quite volatile and resulted in significant fluctuations in the value of total exports of these materials over 2015-2020. Only sporadic ULABs exports to India were recorded for the same period. There were also some inconsistencies between Canada´s reported ULABs exports to India and India´s reported ULABs imported from Canada.

Although Canada reported lead waste and scrap imports from over a dozen countries during the period 2015-2020, its imports from the US contributed more than 95% of the total. It is therefore logical to conclude that scrap availability in the US is decisive in determining trends in Canada´s total scrap imports.

Acknowledgement

We are grateful for the contributions made to this Insight Paper by Mr. Brian Wilson, MRSC and consultant to the International Lead Association (ILA).