Metrics Matter

Calculating the Recycled Content of Rolled Aluminum

Novelis

Purpose

Novelis is advocating for the harmonization of the recycled content calculation for rolled aluminum products—a key metric to transparently report the environmental attributes of aluminum.

Increasing the percentage of recycled material in rolled aluminum products is the most impactful step Novelis and our fellow downstream producers can take to reduce the carbon footprint of our products – not only in the immediate timeframe, but over the longer-term horizon as well.

Developing universally accepted methods and standards for tracking and reporting recycling's contribution to carbon emissions reduction is key to that endeavor, and requires transparency, accuracy and accountability from all participants in the aluminum industry value chain.

Executive Summary

Increasing the percentage of recycled material used to manufacture rolled aluminum products is the most impactful step Novelis and our fellow downstream producers can take to reduce the carbon footprint of our products – not only in the immediate timeframe, but over the longer-term horizon as well.

The challenge for the aluminum industry today is that protocols for determining recycled content leave a considerable amount of room for interpretation for what counts as recycled content in aluminum products. We recognized this and embarked on a concerted effort to drive alignment within multiple industry groups. As these various working groups contemplate this topic, it's important we raise our voice.

Product Recycled Content Formula

Net Primary: sheet ingot, coil, prime, alloys and hardeners (after melt loss)
Adjustment: coated scrap, runaround melt loss

$$RC\% = \frac{\textit{Customer Shipments - Net Primary + Adjustment}}{\textit{Customer Shipments}}$$

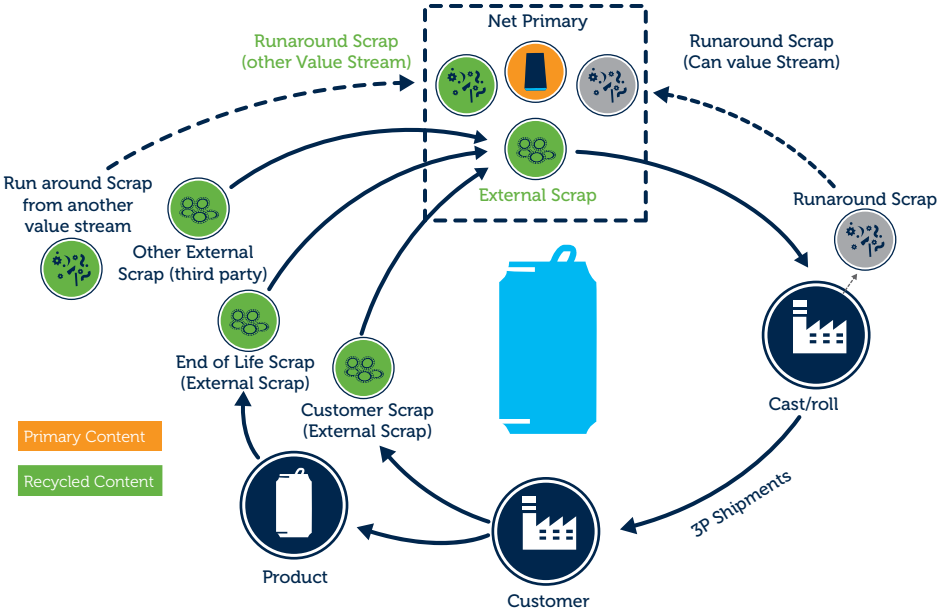
As the leader in aluminum recycling and the company with the highest amount of recycled aluminum in our products, Novelis calculates the effective recycled content of a given coil shipped to a customer by subtracting the percentage of primary in the coil we roll from a baseline of 1.00 and then adjusting for handling painted or coated scrap and metal loss from "run-around" scrap generated in our rolling operations. We believe this calculation, **Effective Recycled Content = (1.00 minus prime content) + adjustment**, should be the industry standard.

We use this approach for our internal reporting and have subjected this international standards-based methodology to review and approval by a respected third party, TrueNorth Collective, a sustainability consulting group with metals manufacturing and environmental reporting expertise. The high level of transparency and objectivity embedded in this approach allows us to share our estimated recycled content metrics externally with confidence.

We encourage our fellow producers and supply chain partners to adopt this methodology to measure and report recycled content.

The standards-based methods we use to calculate and communicate the benefits of aluminum recycling are critical metrics we all need to employ in support of our goal of driving down carbon emissions.

Only when we all come together to collaboratively assess, report and promote the tremendous benefits of aluminum recycling will our collective claims of carbon reduction be recognized and appreciated.



As the largest purchaser and recycler of aluminum in the world, Novelis is contributing its expertise to develop recycled content standards for aluminum.

This approach offers a roadmap for the creation of a single, universally accepted methodology for measuring the recycled content in aluminum products.

The End Goal – Carbon Reduction

High-recycled content is a core attribute that rolled aluminum customers care about – in large part because **their customers** value the **sustainability outcomes** that result from increasing the recycled content of the products they choose to buy.

Increasing the recycled content of our aluminum products is a critical component of Novelis' commitment to **reducing the carbon footprint** of our products as well as those of the major brands around the world who rely on us to help drive their sustainability performance.

Aluminum can be recycled over and over again without losing its properties. Recycling aluminum uses only 5% of the energy it takes to produce primary aluminum, lowering carbon emissions by as much as 95%. This means that there is a direct link between increasing recycled content and a reduction in carbon emissions.

To put it simply, the more recycled content we use in our products, the less carbon we emit.

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The Current Landscape

The biggest carbon impact we, as an industry, generate comes from primary aluminum production – plain and simple.

While "green prime" – aluminum mined, smelted and cast using environmentally friendly power sources and other processes that lower greenhouse gas emissions – is on the rise, there is currently a shortage of supply and efforts to produce significantly more green prime aluminum will take considerable time.

It follows, then, that increasing the amount of recycled inputs used to make our aluminum products should be the overarching focus of Novelis' decarbonization efforts.

Increasing the percentage of both pre- and post-consumer aluminum scrap in the products Novelis manufactures is critical to the success of those efforts.

Collaboration is Key

Leveraging the power of recycling to lower carbon emissions industry-wide requires **all participants** in the vast aluminum supply chain – from bauxite miners, smelters, casters, and tollers to rollers, extruders, recyclers and scrap houses – to work together in new ways. As the Mission Possible Partnership (MPP), an alliance of fellow climate leaders focused on decarbonizing some of the world's highest-emitting industries notes: "Delivering net zero emissions will require different forms of coordination across the value chain and with policymakers and regulators across the energy system."

Only through a heightened focus on driving collaboration and cooperation across the global aluminum industry will we succeed in reaching net carbon zero status.

MISSION POSSIBLE PARTNERSHIP

"Delivering net zero emissions will require different forms of coordination across the value chain and with policymakers and regulators across the energy system."

The Green Power Challenge

The critical role of recycling does not diminish the importance of energy consumption when it comes to carbon reduction across the aluminum industry. Mining, smelting and casting operators are working to decarbonize their power sources and lower the greenhouse gas emissions inherent in producing primary metal – a critical component to decarbonize industry-wide, to be sure.

These upstream efforts will take time, especially when green electricity is not yet widely available where it is needed most. As MPP notes, "Location matters for how smelters and refineries decarbonize. There is significant variation in availability of local low-carbon power and in how quickly the local grids can decarbonize.

Novelis will focus what we can do in our own operations to increase renewable energy sourcing, but the greatest opportunity to reduce our total footprint is through increasing the amount of recycled inputs used to make our aluminum products.

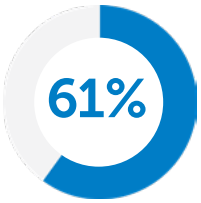
Leadership Counts – A Lot

When it comes to recycling – be it for plastics, paper or in our case, aluminum – the 'proof of the pudding is in the eating.' According to the Cambridge Dictionary, this axiom means you can't judge the quality of something without having "tried, used and experienced it."

No rolled aluminum provider incorporates a higher percentage of recycled content into its products company-wide than Novelis – 61% as of the end of our last fiscal year. The recycled content of our can sheet – our largest product line – exceeds 80%.

As the world's largest recycler of aluminum, *we've tried, used, and experienced* just about everything possible when it comes to increasing the recycled content of our products.

Percentage of recycled content in Novelis company-wide products



+80%

Percentage of recycled content in Novelis can sheet

Bottom line? The broad portfolio of world class aluminum recycling assets, expertise, and experience Novelis brings to the table gives us a unique perspective. Novelis' view – inclusive of guidelines set forth by leading standards-setting organizations – is gaining momentum in the creation of a single, universally accepted methodology for measuring recycled content in aluminum products.

Defining Recycled Content

Accountability of Recycled Content Metrics

The standards for calculating recycled content must hold entities accountable for their roles in making the most efficient and sustainable use of all materials that go into aluminum products. This accountability requires a higher level of transparency and accuracy regarding how recycled content is calculated.

The Transparency Factor

Transparency matters when defining, reporting and promoting industry standard recycled content metrics for aluminum products. Clarity and agreement from both upstream and downstream providers in terms of **what is** recycled content and **what isn't** is critical to assuring the validity of aluminum industry assertions regarding the value of recycling in generating sustainable outcomes. Without industry agreement, this powerful benefit will fall to the wayside – or worse – may be labeled as 'greenwashing'.

Clarity and agreement from both upstream and downstream providers in terms of what is recycled content and what isn't is critical

This hampers the adoption and expansion of aluminum as the sustainable material of choice for a wide range of consumer and commercial applications and products.

Accurate

The calculation of recycled content must be as all-encompassing and as accurate as feasibly possible. Recycled content is a mass balance formula, meaning it's a measure of raw materials brought into the system vs. volume that leaves the system. For this calculation to work, outputs must equal inputs.

Some may argue that the lack of specificity in terms of calculating the impact of certain alloys, coatings and other materials used in rolling and recycling aluminum on generating sustainable outcomes limits the veracity of our industry's recycled content claims. But a closer look reveals that we need to take a more thoughtful approach to calculating recycled content in the face of this relatively small level of uncertainty.

The perfect is the enemy of the good. – *Voltaire*

A Thoughtful Approach

Any effort to define broadly acceptable metrics for what qualifies as recycled aluminum content has to start with ISO 14021 – Section 7.8 – and Novelis embraces this international standard.

It is important to note, however, that ISO 14021 Section 7.8 outlines general guidelines for determining the recycled content of a variety of products and doesn't go as far as to specify in detail what counts as recycled content as it applies to aluminum. Instead, it falls upon recognized aluminum manufacturing and recycling leaders and organizations such as the Aluminum Association, MPP, the Can Manufacturing Institute (CMI), and others to define and adopt aluminum-specific recycled content metrics for our industry, with ISO and UL Environment as the starting point.

In addition to embracing ISO 14021 and the Aluminum Association guidelines, Novelis applauds UL's approach to determining recycled content as it applies to aluminum.

Reducing our collective carbon footprint requires a diligent commitment to eliminating as much waste as possible from our manufacturing and recycling processes. This is achieved by reducing internal runaround through process design and then by reutilizing as much material as possible through the reduction of unnecessary steps in the scrap collection and reclamation processes. Our primary mechanism for doing so is through closed-loop-recycling partnerships with our customers.

We are also encouraged by the CMI's efforts to define recycled aluminum content for beverage containers and are contributing our learnings to this organization's evolving definition of recycled content for the beverage packaging industry.

While producing rolled aluminum for beverage containers is one of our industry's largest markets, standards for determining recycled content must apply to other markets, such as automotive, equally well. The metrics we as an industry come to agree upon for defining recycled aluminum content should apply across all customer applications.

Eliminating Waste is Paramount

UL Environment (UL), a leader in setting standards for measuring recycled content based on the general guidelines spelled out in ISO 14021, is clear in highlighting the role of reducing waste as the driving force behind their recycled content metrics recommendations:

"The primary motivation behind most recycling programs is to **keep material from becoming waste**, and subsequently entering landfills or being incinerated. When interpreting the definition for pre-consumer recycled content, UL Environment is guided by a holistic philosophy of industrial ecology which **seeks to encourage the minimization of all waste."** This view moves past the debate about definitions toward creating a more sustainable world.

We couldn't agree more and therefore ground our approach with UL's standard-defining goals and objectives. Aligning Novelis with UL's own standards-defining goals and objectives.

The Novelis Recycled Content Solution

Novelis defines the Effective Recycled Content (ERC) of our rolled aluminum products as the total percentage of pre- and post-consumer recycled content of the coils we manufacture from internally and externally produced sheet ingots as well as other metal inputs purchased externally.

In simple terms, we calculate the ERC of a given coil shipped to a customer by subtracting the percentage of primary in the coil we roll from a baseline of 1.00 and then adjusting for handling painted or coated scrap and metal loss from "run-around" scrap generated in our rolling operations.

Effective Recycled Content Formula

Net Primary: sheet ingot, coil, prime, alloys and hardeners (after melt loss)
Adjustment: coated scrap, runaround melt loss

$$RC\% = \frac{\textit{Customer Shipments - Net Primary + Adjustment}}{\textit{Customer Shipments}}$$

We don't always have as much detail about the recycled content of all of our inputs for every product line as we'd like, and when we don't know for sure, we don't claim it as recycled content. We aim to improve the traceability of the materials in our manufacturing processes over time to close this gap.

Pre-consumer vs Post-consumer Scrap

An important component of our recycled content metrics is pre-consumer scrap – scrap resulting from our customers' operations, such as producing beverage cans from our can sheet coils or stamping out vehicle doors and other body parts from our auto sheet coils. This pre-consumer scrap can come directly from our downstream customers in the form of closed-loop scrap or mixed with market scrap.

We count this pre-consumer scrap the same as post-consumer scrap – used beverage cans (UBCs), for example – when calculating recycled content.

Why? Primarily because increasing the amount of each type of scrap we use in our rolled aluminum products reduces waste and hence lowers both our own carbon footprint and the carbon footprint of our customers.

This approach is aligned with UL's metrics:

"A waste or recovered material that has been reprocessed by means of a manufacturing process, either by the same or an independent manufacturer, and made into the same or a different product or into a component for incorporation into the same or a different product, shall be considered pre-consumer recycled content.

A waste or recovered material provided, sold or donated by a manufacturer to an independent manufacturer and either reprocessed or used in its original condition to manufacture a product, shall be considered pre-consumer recycled content."

Another reason we don't differentiate between pre- and post-consumer scrap is because we often purchase "market scrap," which is a mix of pre- and post-consumer recovered material. Currently, it is almost impossible to identify what is pre- and post-consumer material in a mixed bale of scrap from a scrap house or trader. More can be done to increase our visibility into this input material, and we are exploring ways to address this need going forward.

Run-around Scrap

One example of what we do not typically count as recycled content is run-around (RAR) scrap – internally generated scrap from our rolling processes. While we collect and re-use most of this material, we consider the amount of RAR scrap resulting from rolling a sheet ingot into a coil to be an inefficiency – **waste**, in effect. The more waste generated, the more carbon emissions we produce.

If we were to count all RAR scrap as recycled content, we would be rewarding ourselves for actions that actually **increase** our carbon footprint rather than **reduce** it. Not only would this be disingenuous, but it would also disincentivize our plant operators and impede our manufacturing efficiency objectives. In short, it would reward wasteful behavior and skew our sustainability metrics in a more favorable direction than is warranted.

As UL stipulates:

"A recovered material that is directly fed back into and reused in a closed-loop manufacturing process without any further processing before reuse, would not be considered pre-consumer recycled content."

"A waste or recovered material used in its original condition ***by the same manufacturer to produce a different product*** shall be considered pre-consumer recycled content."

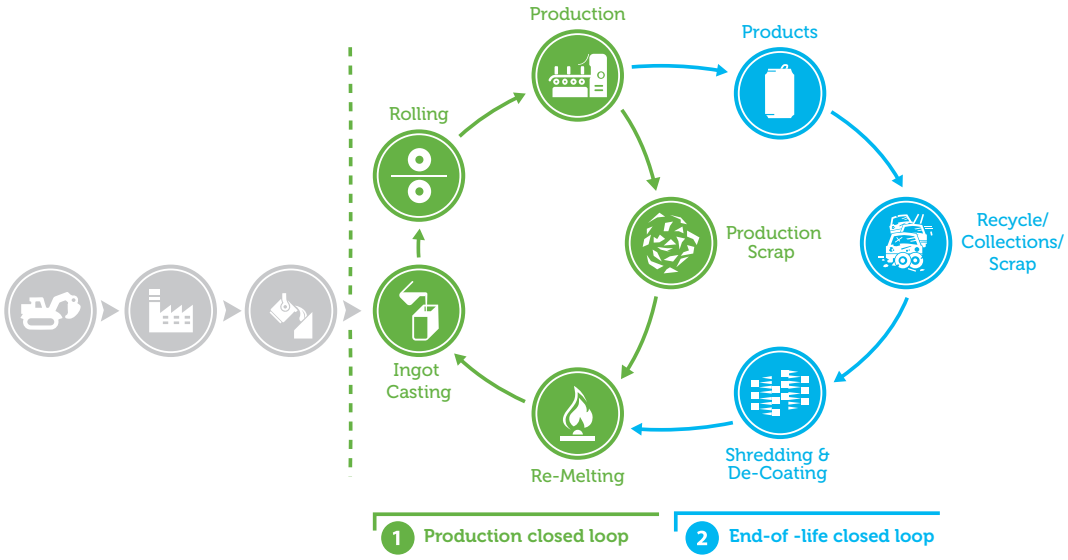
It is important to note that our approach to tracking RAR scrap is consistent with recommendations for how other sectors and materials treat reducing this kind of waste – including recycled content guidelines spelled out by UL for steel.

Major Market Applications

Can Sheet Recycling

When it comes to can sheet – our single largest market – the benefits of recycled content are clear. From the high-recycled-content composition of the coils we send to packaging makers to the billions of UBCs we collect and recycle each year, the beverage market represents the most efficient closed-loop-recycling system in the world.

The scrap that results is a physically unavoidable by-product of the can making process and should be treated as recycled content according to ISO, UL, MPP, aluminum industry organizations and eventually – we envision – the entire aluminum industry.



The Automotive Challenge – Closing The Loop

The unique characteristics of the automotive market – our second largest – challenges automakers and aluminum producers to create new design, production and procurement models that leverage the value of recycling.

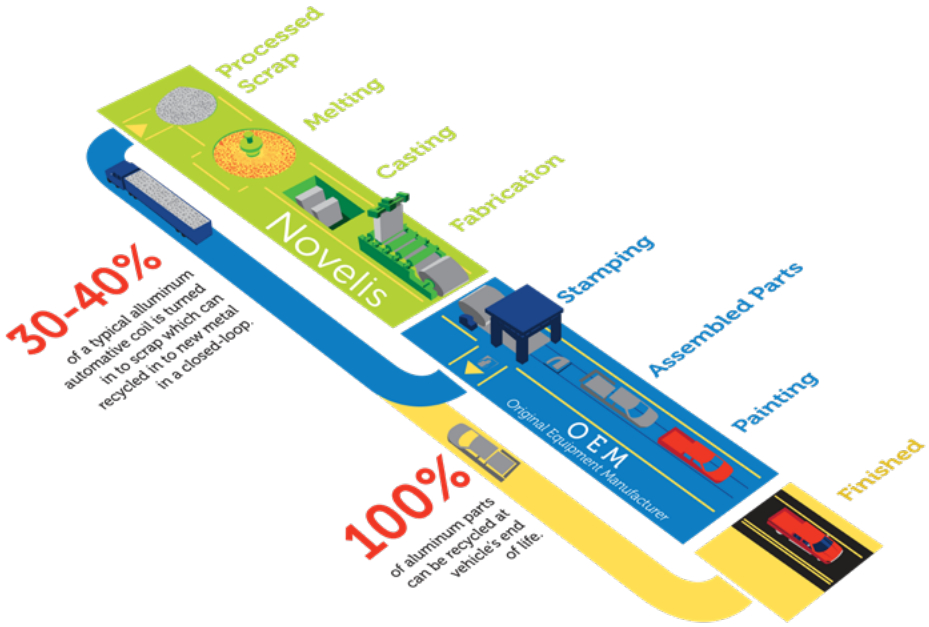
In the past, automakers typically sold their production aluminum scrap to recyclers who mixed this high-value aluminum with aluminum scrap from UBCs and other sources who in turn sold that co-mingled scrap to ingot casters. This approach was inefficient from several perspectives:

1. It added unnecessary energy, transportation, and handling costs to the process of transporting scrap from the auto manufacturer to the scrap yard and to the recycler. Carbon emissions unnecessarily added to the process.
2. It reduced the value of this application-specific aluminum alloy to the lowest common denominator. The automaker received only bottom-dollar payment for material they paid top dollar .
3. This downgrading of scrap from automakers' production processes – estimated to be as much as 40% of the coils they buy – kept this material from efficiently being used to make a new automotive coil of the same alloy. Again, inefficiency creating unnecessary higher carbon emissions.

Opportunities Abound

Novelis saw tremendous opportunities to remedy this inefficiency and reduce carbon-producing waste by creating innovative, win-win closed-loop partnerships with automotive manufacturers.

The systems are designed to make the most efficient use possible of the aluminum scrap generated from automakers' stamping operations while helping to maintain the integrity of the high-value aluminum sheet used to produce lightweight vehicles. They also help eliminate wasteful and energy-inefficient steps in the scrap reclamation process.



A good example is our flagship partnership with Ford. Novelis delivers auto sheet coils to Ford's F-150 production facilities using custom-designed trucks that drop off coils to the front end of their F-150 production lines. That same truck goes around to the back end of that line to collect the production scrap generated from Ford's process of stamping out automotive body parts from the previous delivery's aluminum coils.

The automotive scrap we collect through this partnership is segregated from other aluminum scrap, enabling Novelis to reduce the energy used to make the next coil of auto sheet. By isolating specific auto sheet alloys when we collect this scrap from Ford and other automakers, we avoid the additional carbon emissions that would be generated by sending this high-value sheet to third-party recyclers. The sustainability benefits from these partnerships are shared between Ford and Novelis. This allows us as a system to keep materials in flow at its highest value- the definition of circularity.

Traditionally, auto sheet alloys incorporated only a small amount of recycled material due to the unique demands of automotive applications, such as strength, formability, and other specific requirements. Novelis is developing new automotive sheet alloys that can accommodate higher percentages of recycled material. We continue to work with our customers to innovate high recycled content alloys so we can reduce impact over time.

Going back to the overarching goal of recycling – reducing waste and resource use from nature and thereby lowering carbon output, the carbon reduction benefits generated by these closed loop relationships stand on their own.

Recycling is above all a carbon-reduction strategy

That's what we mean when we say that, at Novelis, recycling is above all a carbon-reduction strategy. And that's also the thought process behind treating the production scrap we collect from our automotive customers as recycled content.

Aligned Approach in Recycled Content Metrics

We believe that the approach to calculate recycled content and reporting outlined here is the gold standard. We use this approach for our internal reporting and have subjected this international standards-based methodology to review and approval by a respected third party, TrueNorth Collective, a sustainability consulting group with metals manufacturing and environmental reporting expertise. The high level of transparency and objectivity embedded in this approach allows us to share our estimated recycled content metrics externally with confidence.

We encourage our fellow producers and supply chain partners to adopt this methodology to measure and report recycled content.

In the end, it all comes down to carbon reduction – our overarching objective. The standards-based methods we use to calculate and communicate the benefits of aluminum recycling are critical metrics we all need to employ in support of our goal of driving down carbon emissions.

Only when we all come together to collaboratively assess, report and promote the tremendous benefits of aluminum recycling will our collective claims of carbon reduction be recognized and appreciated

Our collective focus on recycling represents a robust return on investment – environmentally, socially, and financially.

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Novelis