

# AUTO LOOP

HOW TO CLOSE THE AUTOMOTIVE LOOP?

13

An aerial photograph of a city street. Two cars are parked at the curb, and a bench is visible. The image is overlaid with a semi-transparent blue filter. The word "INTRODUCTION" is written in large, white, bold, sans-serif capital letters across the middle of the image.

# INTRODUCTION

As part of Novelis' ongoing partnership with Forum for the Future, we undertook an investigation to understand how the automotive industry is exploring closed loop models, where are the opportunities, barriers and recommendations for a more sustainable automotive industry. To ensure we provided a well-rounded picture, Forum researched this challenge from a [value network perspective](#), focusing on the current automotive industry landscape, sustainability opportunity and growth areas.

Forum interviewed several industry leaders including executives from Toyota, Audi and EMR (global leader in vehicle recycling), and drew on our network knowledge such as insights from Jaguar Land Rover and our bank of circular economy work, and desk research combined, which allowed us to tease out the barriers and opportunities in creating a closed loop system in the automotive sector.

This report explores current context for closed-loop demand, case studies, as well as looking to the future, and finally making recommendations for action in the automotive industry.

(1) <http://www.sustainabilitydictionary.com/closed-loop-supply-chain/>

# CLOSED LOOP DEFINITION AND MODELS

A closed-loop supply chain is when recycling of a material can be done without degradation of properties. For example, sheet to sheet, glass to glass, pet to pet, etc.

According to the dictionary of sustainable management (1) a closed-loop supply chain is one that is ideally, a zero-waste supply chain that completely reuses, recycles, or transforms all materials. However, the term can also be used to refer to diverse take-back programs, where companies that produce a good are also responsible for its recovery, transformation and disposal. They contrast with the currently more common open loop systems that might successfully recover one hundred per cent of the material but do so at a quality level that is only acceptable for alternative end uses e.g. sheet to extrusion, glass to aggregate, PETs to fibre board or insulation.

We identified with our key partners different closed loop models. The following is a brief list of some of the models we see and we will refer later during this document:

**MODEL 1 - PRODUCTION** - Short-term recovery model. The material is recovered quickly, the recycling can be done without degradation of properties. E.g. packaging or scrap from production processes.

**MODEL 2 - SERVICE** - Mid-term service model. The business owns the material and has multiple touch points with more than one user across the whole life span of a product. E.g. transport, mobility, etc.

**MODEL 3 - END OF LIFE** - Long-term recovery model. Diverse products and services might have a longer life-span (15 years +) with user or multiple users, this option creates the conditions for value to keep being created. (2)

(2) [https://www.accenture.com/t20160802T065645\\_w\\_us-en\\_acnmedia/PDF-27/Accenture-POV-CE-Automotive.pdf](https://www.accenture.com/t20160802T065645_w_us-en_acnmedia/PDF-27/Accenture-POV-CE-Automotive.pdf)

What is a value network? A network of relationships, which creates both tangible and intangible value through a complicated dynamic exchange between individuals, groups and organisations

Before we begin looking at the barriers and opportunities for closed loop, it is central to understand the current operating context and the drivers that we have today. These drivers range from global economic to industry specific constraints and behaviours. We have selected the most relevant drivers to explore below.

## **[1] THE GLOBAL NATURE, COMPLEXITY AND INTERCONNECTEDNESS OF THE VALUE NETWORK**

“The rise of globalization and product modulation has created global economic growth by maximizing the economic arbitrage of materials and production costs e.g. an electric toothbrush contains around 40 small components produced using multi-tier supplier networks, with dozens of sites spanning the entire globe.” (3)

Across sectors, value chains continue to become more complex and interconnected, which has resulted in less joined up thinking, tough competition for acquisition of materials, and a deferral of responsibility for product’s end of life reclamation, reuse, and recycling. The complexity and global nature of the supply chain also means transparency is increasingly difficult to achieve and therefore it is sometimes problematic to unpick exactly which components make up an end product and where they originate.

<https://www.ecd.com.au/resources/publications/industry-views-of-sustainable-materials-with-both-eye.pdf>

# CURRENT INDUSTRY DRIVERS

## [2] CONSUMER ATTITUDES AND BEHAVIOUR TOWARDS CAR OWNERSHIP, ORIGIN, AND MOBILITY

*“Average lifetime of a vehicle is 13 years, most people keep it for 6”<sup>(4)</sup>*

*“Governmental purchasing schemes and open tender fleet operators are starting to ask questions about the provenance of the vehicles, but not individual consumers. This (government and open tender) is only 40% of customers.”<sup>(5)</sup>*

Until recently the conversation regarding the auto industry’s purpose was centred on car ownership, with new car ownership and short term leasing models being the main source of revenue for the industry.

However, this is changing, particularly following the auto bailouts during the global financial crisis when companies like Ford have turned to producing more and more E-vehicles and others are expanding in other ways such as BMW taking part in the sharing economy through their DriveNow programme. Whilst innovation is happening within the industry, there is still a stigma against recycled content in vehicles. There is a perception by automakers that individual consumers are still not bought into having recycled content in their new vehicle. This perception creates a lack of motivation to transition to more recycled content in new vehicles.

<sup>(4)</sup> Forum anonymised interview

<sup>(5)</sup> Forum anonymised interview

### [3] DRIVE TOWARD REDUCTION IN AUTOMOTIVE WEIGHT

*“There are so many specialist materials being used now. By reducing weight you have difficulty in bringing materials back into the system. Carbon fibre is difficult to separate.” (6)*

*“Reducing automotive weight, aluminium helps to save 65 litres of fuel per car per year.” (7)*

*“At this moment, the car of the future is only becoming less circular! The quest for light weighting is detrimental for circularity. New reinforced plastic composite materials and increased usage of glue for fixation create new barriers for recycling, repair and disassembly.” (8)*

In an effort towards weight reduction, new combined materials (which are harder or nearly impossible to separate) and more expensive materials have been incorporated into larger portions of cars to allow for lighter weight and improved safety. In addition new innovative materials have been developed such as plastic composites. Whilst often this drive for lighter weight materials results in environmental benefit (in the form of fuel reduction) and automotive safety, there is a need to ensure these materials are considered through the lens of a whole life assessment, which includes their end of life properties.

Complicating this trend is the fact that in some cases, the same manufacturers who are light weighting automobile chassis, due consumers to demand, are also adding new features (and therefore added weight) inside the vehicle, such as screens, electronic controls and even massage functions.

(6) Forum anonymised interview

(7) Report shared by AUDI, slide 12

(8) <http://www.circle-economy.com/wp-content/uploads/2016/08/abn-amro-the-circular-car-report-EN-20160803-light.pdf?submission=99465003>



## LIGHTWEIGHTING IS HAPPENING, EXAMPLES OF VEHICLES IN PRODUCTION

Vehicle make	Model year	Weight reduction (kg)*	Weight reduction (%)*	Designed market
<b>Ford F150</b>	2015	318	14%	US
<b>Acura MDX</b>	2014	111	5%	US
<b>GM Cadillac CTS</b>	2014	111	6%	US
<b>Peugeot 308 SW Blue Hdi</b>	2014	140	9%	EU
<b>VW Golf TDI</b>	2015	49	4%	EU
<b>Audi Q7</b>	2014	363	15%	US, EU
<b>BMW i3 EV</b>	2014	249	17%	US, EU
<b>Land Rover Range Rover</b>	2014	350	14%	US, EU
<b>Porsche Cayenne</b>	2012	181	8%	US, EU
<b>Audi A8</b>	2014	145	7%	US, EU
<b>Audi A3</b>	2014	80	6%	US, EU
<b>Nissan Leaf</b>	2012	80	5%	US, EU
<b>Lamborghini Huracan</b>	2015	78	5%	US, EU
<b>Audi TT 3rd gen 2.0 TDI</b>	2015	50	4%	US, EU

\* The weight of new models are compared to its predecessors, except for BMW i3 EV, which is compared to the conventional steel structure.

## REDUCTION IN AUTOMOTIVE WEIGHT

According to the European Commission: by midcentury, greenhouse gas emissions from transport will need to be at least 60% lower than in 1990 and be firmly on the path towards zero.

The European commission is seeking to decarbonise transport. The community identifies three priority areas for action:

1. Increasing the efficiency of the transport system (ITS, logistics etc.)
2. Speeding up the deployment of low-emission alternative energy for transport (alternative fuels etc.)
3. Moving towards zero-emission vehicles.
  - a) further improvements to the internal combustion engine will be needed
  - b) accelerate the transition towards low- and zero-emission vehicles
  - c) improving the efficiency of all vehicles



## [4] HIGH DEMAND FOR ALUMINIUM AND LACK OF VIRGIN MATERIAL IN COUNTRIES THAT MANUFACTURE CARS

*“These minerals are mined from several regions, including Australia, Jamaica, Brazil, Guinea and India.” (9)*

*“Europe relies on imports for around half of aluminium used at a time when global demand is growing.” (10)*

Aluminium is in high demand, partly because of its recyclable properties. However, the mining of virgin material from countries far from automotive manufacturing means there can be issues with security of supply and price volatility. As we are seeing increasing signals of protectionism from several world powers, it begs the question of whether resources will be as readily available in the future, and whether the price will be somewhat stable.

A system level response to these challenges is led by the Aluminium Stewardship Institute to define globally applicable standards for sustainability performance and material chain-of-custody for the aluminium value chain.

(9) Forum anonymised interview

(10) [http://greenbuilding.world-aluminium.org/uploads/media/1256563914European\\_Recycling\\_Brochure-1.pdf](http://greenbuilding.world-aluminium.org/uploads/media/1256563914European_Recycling_Brochure-1.pdf)



## [5] URBAN MOBILITY

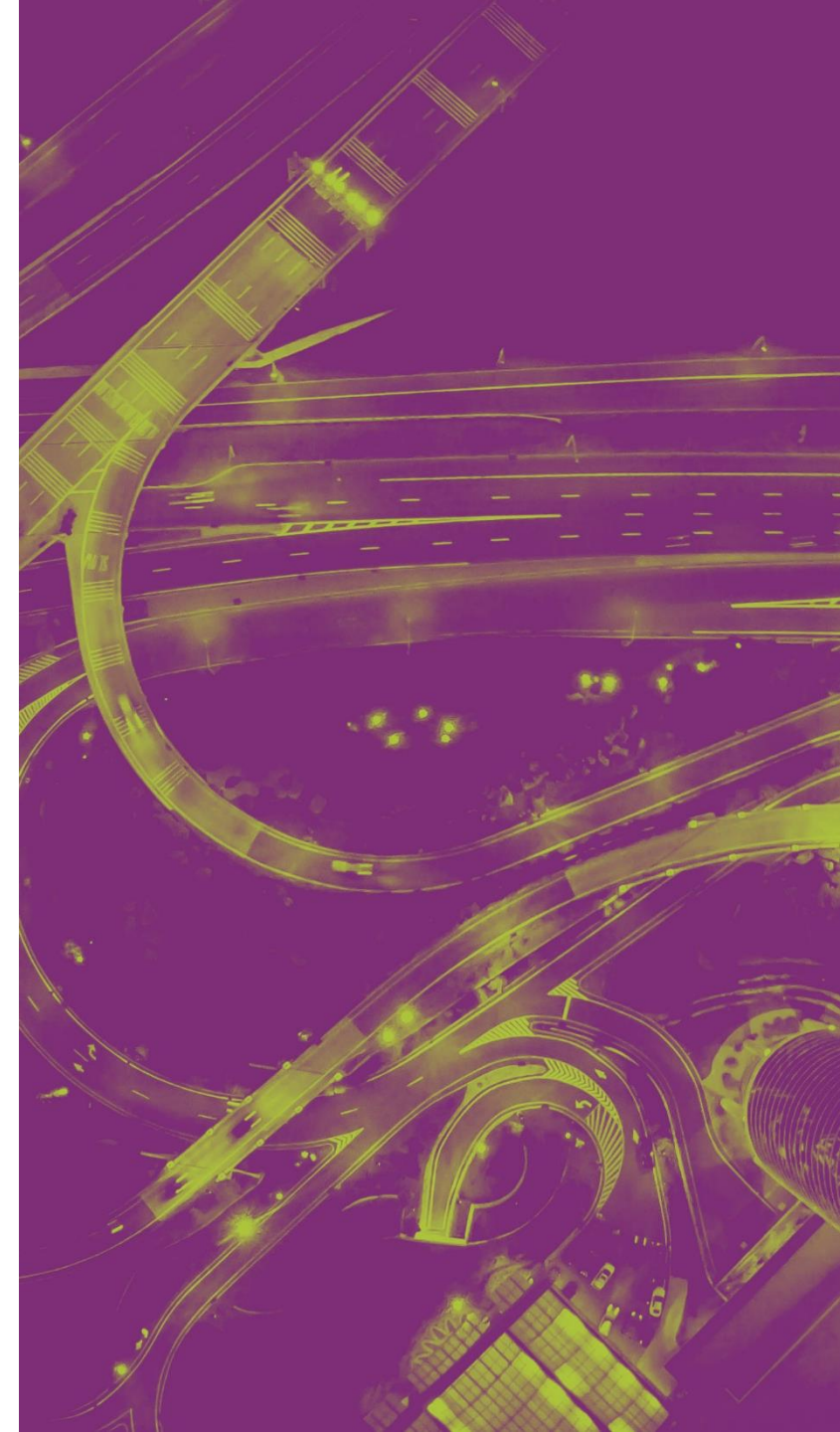
*“Urban mobility accounts for 40 % of all CO2 emissions of road transport and up to 70 % of other pollutants from transport.” (11)*

Cities all over the world increasingly face problems caused by transport and traffic. The question of how to enhance mobility whilst at the same time reducing congestion, accidents and pollution is a common challenge to all major cities. Congestion is often located in and around urban areas and the costs in Europe are nearly EUR 100 billion, or 1 % of the EU's GDP, annually. Cities themselves are usually in the best position to find the right responses to these challenges, taking their specific circumstances into account. (12)

The challenge of urban mobility combined with the millennial generation's preference for car sharing models, could mean that cities will eventually optimise the vehicles used on the streets while partnering with automotive industries and new players? With the consequential impact on the number of vehicles that are sold, used and produced.

[11] [https://ec.europa.eu/transport/themes/urban/urban\\_mobility\\_en](https://ec.europa.eu/transport/themes/urban/urban_mobility_en)

[12] [https://ec.europa.eu/transport/themes/urban/urban\\_mobility\\_en](https://ec.europa.eu/transport/themes/urban/urban_mobility_en)



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# OPPORTUNITIES & BARRIERS FOR CLOSED LOOP IN THE AUTOMOTIVE SECTOR

## ALREADY RECOVERING AUTO-ALUMINIUM

The current landscape for automotive recycling is fairly saturated. Because of the relatively high value of the metal and scrap parts, automobiles have a high recovery rate from end of life vehicles. Unfortunately, at present much of this is down cycled and the integrity of the product is compromised. Therefore, there is still a lot of room for closed loop principles and models to be incorporated, which results in a more efficient use of materials. (13)

Collecting end of life vehicles directly from end customers, or through an intermediary company such as Indra, (14) which allows for more information about the materials contained in the vehicle to be passed on to the recycler can result in more efficient recycling. In addition, the materials from this process would be purer when used in remanufacturing and mean less contamination in the remanufacture.

Example: BMW –has established a service based sharing model and is incorporating e-vehicles more and more into their mix. This gives BMW more information and control over their vehicles and allows them to incorporate end of life recovery simply. (15)

(13) Forum anonymised interview

(14) [http://www.indra.fr/en/re-source\\_engineering\\_solutions.html](http://www.indra.fr/en/re-source_engineering_solutions.html)

(15) <https://de.drive-now.com/en/>



# OPPORTUNITIES

## MOVING TOWARDS LONG TERM LEASES

Automakers could move to a long term lease model and away from the traditional shorter lease arrangements to enable more control over the whole life of the vehicle. This is a shift towards a more flexible service oriented model and away from the short term lease and retail models of today which relegate carmakers to the least profitable part of the value equation. Transforming operations to take advantage of circular principles means gaining a direct connection to the customer as well as more profitable sources of revenue –ongoing service over one-off sales.<sup>(16)</sup> By moving to long term leases automakers can make themselves more competitive whilst remaining close to the customer throughout the life of the vehicle. In addition, as we see more self-drive and electric vehicles this may also increase the attractiveness of Long Term Lease models (LTL).

In this sort of LTL model, the automaker retains legal vehicle ownership, but in turn provides a lifetime warranty for the vehicle. During the lifetime of the vehicle (e.g. 13 years), the automaker covers all warranty-eligible repairs and maintenance at no extra charge.

The benefits of this model go beyond the automaker and extend to the consumer, with 40% lower payments when compared to traditional financing methods, upgrades, and a lifetime warranty. So, alongside the recovery benefits this could also cement brand loyalty in the customers mind.

<sup>(16)</sup> [https://www.accenture.com/t20160802T065645\\_w\\_/us-en/\\_acnmedia/PDF-27/Accenture-POV-CE-Automotive.pdf](https://www.accenture.com/t20160802T065645_w_/us-en/_acnmedia/PDF-27/Accenture-POV-CE-Automotive.pdf)

## THE RECYCLABILITY OF AUTO MATERIALS

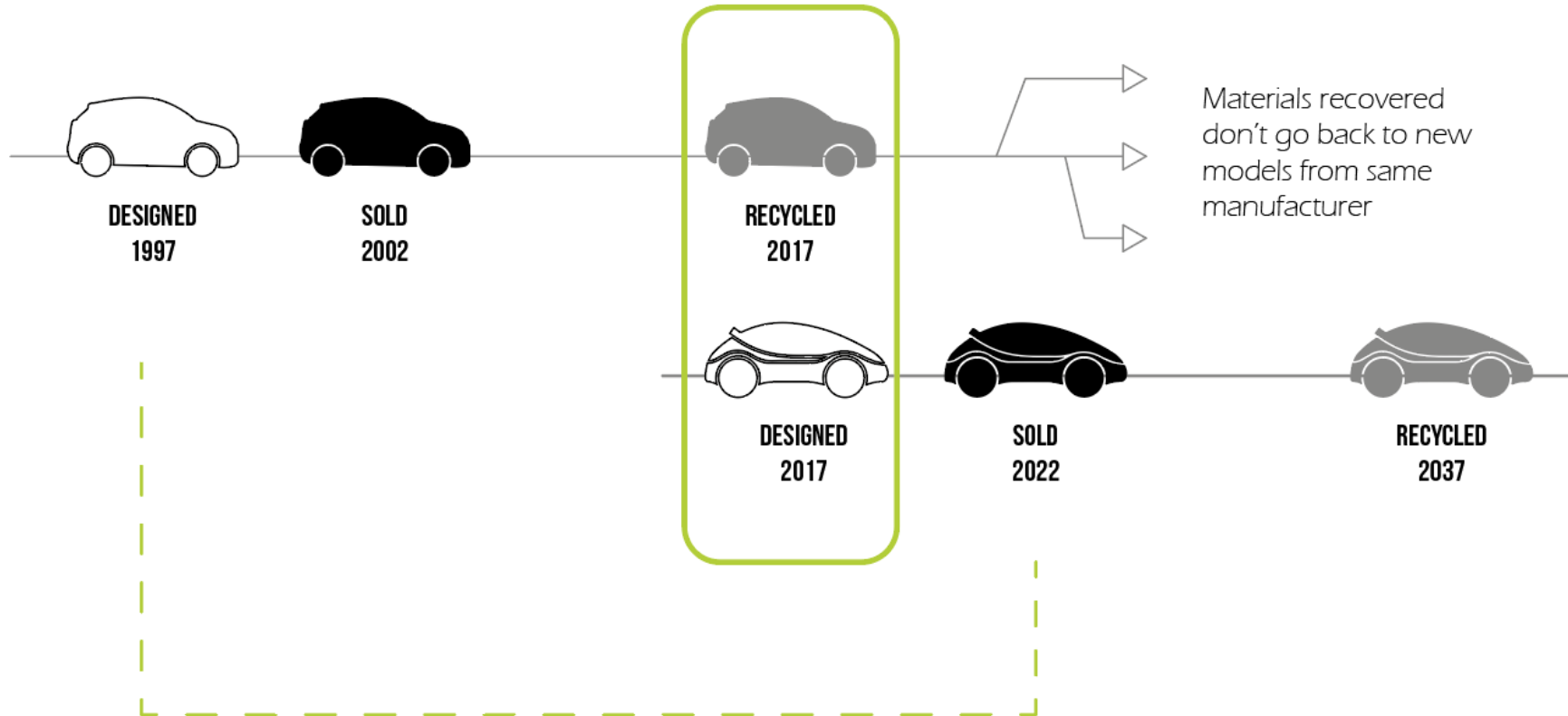
A key issue when many industries (i.e. Cotton, FMCGs, plastics) look to close the loop is the technical challenge around recycling without losing the integrity of the material. Today, 95% of a car's materials could be recycled, in some cases without needing to 'downcycle' or lose value through the recycling process. But the majority of these vehicles were designed 20 years ago and sold 15 years ago. Vehicle design and technological sophistication is increasing, creating a more complex puzzle when thinking to separate parts and recover materials. The organisation that starts to anticipate and create technology to ease and accelerate disassembling and separate commonly used materials from more contemporary cars would have a competitive advantage.

However, it is crucial to enable a different type of collaboration with the rest of the value chain, one that sees materials as flows and not only as a commodity sold from one entity to a customer as EMR (global leader in metal recycling) group points out. Many of the technical challenges of recycling aluminium, steel and plastic from vehicles have been overcome, though some new material combinations and assembly techniques are raising different questions.

The materials themselves provide a huge opportunity for recycling and also provides new challenge as the auto industry will be one of the first to have to look beyond recycling to truly closed loop principles, necessitating innovation in business models and recovery in the process.

## A LONG-TERM LOOP - WHAT IF WE RECYCLE DIFFERENTLY?

What if designers and material engineers aiming for circular models while designing new cars consider materials that are recovered in recycling scrap plants today in their designs?



- current model
- circular model

Potentially a car that was designed in 1997 and sold to the public in 2002 could in some way end up in a car that will be sold in 2022, recycled in 2037 and continuing a loop.

# BARRIERS

## CURRENT LACK OF CONTINUITY OF CAR OWNERSHIP

Currently, automobiles change hands 6-8 times through the life of the vehicle. (17) This results in automakers being less able to take responsibility for the end of life for their vehicles because they are not connected to the end user. It also means owners at end of life don't always know how to responsibly 'dispose' of the car, and communicating with these end owners is difficult.

## LIGHT WEIGHT MATERIAL INNOVATION

Already discussed in the previous section, in the endeavour to make cars lighter, we have also created some materials for use that currently don't have clear end of life recyclability or usability. New reinforced plastic composite materials and increased usage of glue for fixation create new barriers for recycling, repair and disassembly. (18)

(17) Anonymised Forum interview

(18) <http://www.circle-economy.com/wp-content/uploads/2016/08/abn-amr-the-circular-car-report-EN-20160803-light.pdf?submission=73465803>



## MATERIAL PURITY

There are many big players in the recycling industry, they are very powerful. And a shredder will mix auto waste with white good waste, making it difficult to see how the product is behaving. (19) It is increasingly challenging to uphold material integrity and key principles after many cycles, especially when products from different industries are collected and processed as one stream, as additives used by one industry can be contaminants in others.

The trouble is, most manufacturers don't make their products easily transferrable or understandable by outside technicians, especially when it comes to reuse. Reusing and repurposing devices may require technicians to reverse engineer them, to hack them, and to digitally unlock them. Repairing modern machinery requires access to diagnostic codes, circuit schematics, and replacement parts that manufacturers zealously protect. And refurbishing can require access to proprietary tools that manufacturers have been historically reticent to share. (20)

(19) Forum anonymised interview

(20) <https://www.theguardian.com/sustainable-business/intellectual-property-circular-economy-bmw-apple>

## PERCEPTION OF RECYCLED CONTENT

Somehow society has to be encouraged to value recycled material at a higher value than we currently do. Currently we see low cost as having less value and reused materials as not having the same integrity, durability, and “shininess” as new materials. People won't pay a premium for a product that has more recycled content, even though it has the same properties as new material use. (21)

(21) Forum anonymised interview

## LACK OF PRE-COMPETITIVE COLLABORATION

Intellectual property can slow down the pace of solutions needed. In one case study at the BMW recycling centre, technicians had a tool they had developed to drain oil from the shock absorber, so the oil could be reused. A useful innovation. BMW doesn't sell it to other refurbishers, because they hold the patent and it's perhaps what they see as competitive advantage.

That tool was their intellectual property; it was developed by BMW for BMW and the patent they filed for the tool ensures that no-one else can invent something similar.

That's how intellectual property can stop a variety of circular economy solutions, and the reason why open innovation is needed with standards for pre competitive solutions. Information and innovation are the currency of circularity, but sharing either with independent businesses is not something that manufacturers have been willing to do.

A silver sedan is shown from a rear three-quarter view on a test track. The track is filled with numerous orange traffic cones arranged in a grid pattern. In the background, there are several multi-story brick buildings with lit windows, suggesting an urban or industrial setting. The overall scene is dimly lit, possibly at dusk or dawn.

# CASE STUDIES



# GLOBAL 100 DISMANTLERS

## WHAT IT IS

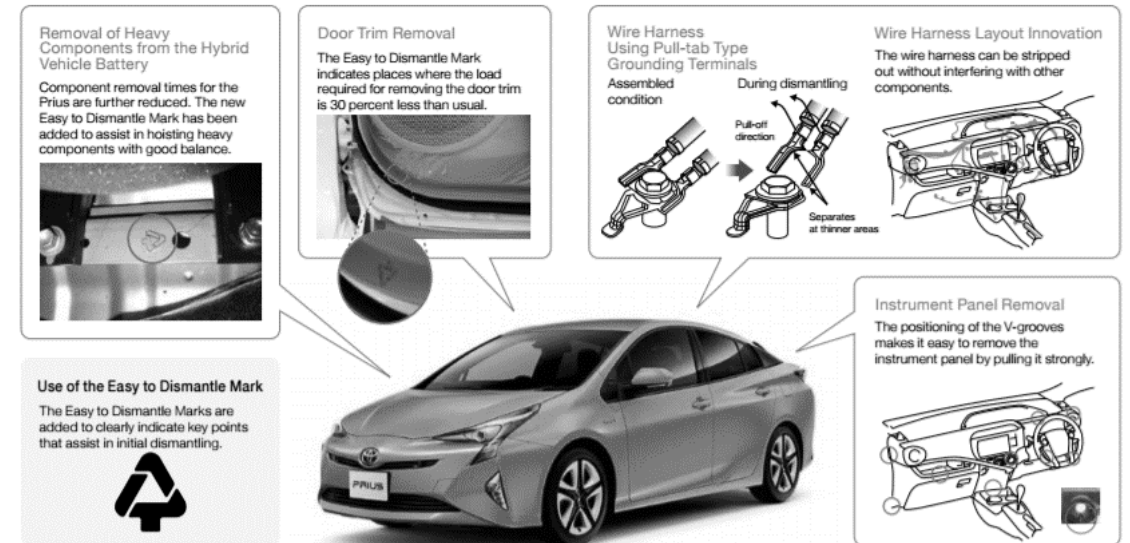
Toyota Global 100 Dismantlers project aims to establish automobile dismantling facilities around the world and develop a scheme that optimises collection and processing of resources from end-of-life vehicles in an environment-friendly way.

Toyota aims to establish the ultimate recycling-based society and will promote the Toyota Global Car-to-Car Recycle Project globally, turning end-of-life vehicles back into useful resources for the production of vehicles.

“In order to improve resource efficiency toward an ideal resource-recycling based society (circular economy), initiatives are needed in four key areas: (1) utilizing eco-friendly materials, (2) making use of parts for longer, (3) developing recycling technologies, and (4) manufacturing vehicles from end-of-life vehicles.”

## KEY LEARNINGS

This initiative is targeting a longer term closed-loop (model 3) and is developing a network to support and build the capacity of the supply chain to meet anticipated demand. Toyota has analysed the future of the value chain and identified a leverage point for better efficiency and environmental performance. Building capacity across the value chain to improve performance will be fundamental for organisations that want to be more resilient to an uncertain future.



# CLAUT

## WHAT IT IS

CLAUT is a circular automotive platform launched in the summer of 2015 in Limburg by Polyscope, and has now grown to include a number of companies. The platform enables cooperation between suppliers, car manufacturers and leasing companies. Using funding from an innovation fund and subsidies from the Province of Limburg,

It organises a car sharing programme with 250-500 cars that enables 2nd and 3rd lifetimes for the vehicles and also ensures proper end-of-use treatment. CLAUT focuses on material innovation and modular manufacturing during the design phase, new business models during the use phase, and remanufacturing and proper material recycling of the car when it reaches end of use.

The initiative was a result of the complexity of the current automotive supply chain which is highly regulated and also dominated by top-down car manufacturer specifications. CLAUT is exploring partnerships with education institutions and Open Labs to spread knowledge. It is looking to include leading companies that bridge the entire value chain from the chemical industry to automotive industry to leasing / sharing programmes.

## KEY LEARNINGS

A multifaceted innovative responses like CLAUT are creating a collaborative ecosystem to catalyse, mobilise, plan, and innovate to address wider automotive barriers. A collaboration with 'unusual suspects' who can contribute their capabilities and resources, creates new institutions that act as intermediaries, address barriers and accelerate market transformation. CLAUT addresses and combines the service and end-of-life closed loop models (2 and 3).



# REALCAR

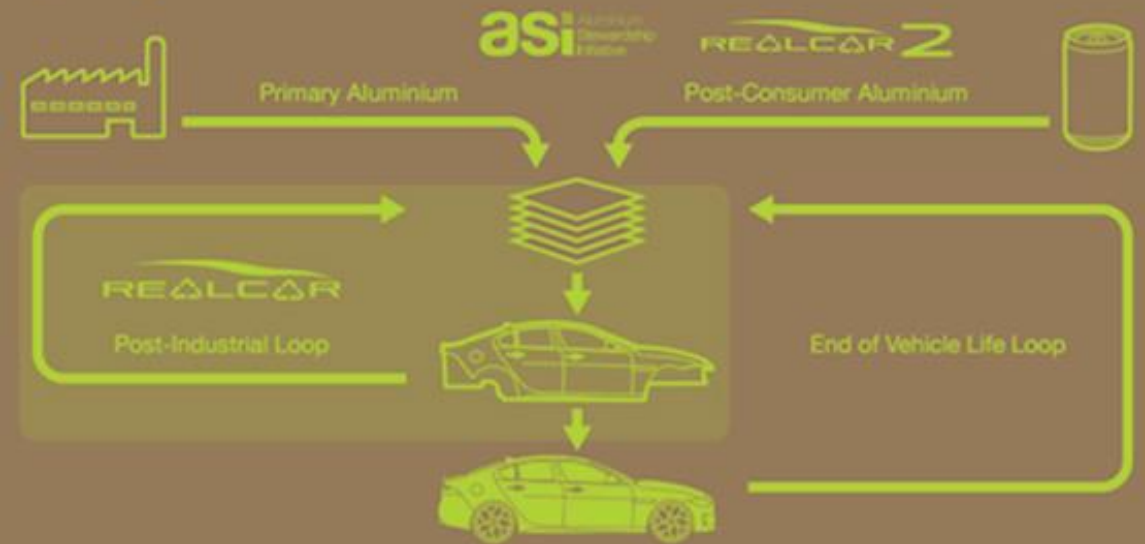
## WHAT IT IS

REALCAR is a closed loop value chain that minimised the use of primary material and maximised the use of recycled aluminium during manufacturing. To do this Jaguar Land Rover worked collaboratively with its material supplier Novelis, Innovate UK, the UK's innovation agency, and other partners. This is the first stage of the Jaguar Land Rover and Novelis vision for a sustainable value chain which ultimately includes a post-consumer loop, a post-industrial loop, the end of vehicle life loop and material stewardship across the entire value chain.

Incorporating aluminium would lower the vehicle body mass, improve fuel efficiency and, as a result, reduce the environmental footprint and running costs for customers. REALCAR took the post-industrial waste from aluminium body panel stamping and recycled it back to the supplier (Novelis) to be incorporated into new body panels (see figure, right).

This involved technical innovations, such as the creation of a new aluminium grade that would be best suited to the closed-loop process, and business culture innovations amongst key stakeholders, most notably the principle partners.

Figure 1: Jaguar Land Rover / Novelis' vision for a sustainable aluminium value chain



## KEY LEARNINGS

A combination of different loops interacting, partially open loop, production and end of life closed loops makes this case study very versatile and provides a basis for further experimentation and learning. REALCAR found technical manufacturing innovations that redesign the manufacturing and supply possibilities, whilst directly addressing development and sustainability challenges.

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# LOOKING TO THE FUTURE

Now that we've seen the current context through the current drivers for the industry, opportunities, barriers and case studies we will share some future trends, not only how the industry is changing, but how the wider context is shifting for automotive manufacturing and re-manufacturing.

## REACHING PEAK CAR

Projections for 2030 state that car ownership will rise and peak somewhere around 120-125 million cars per year. (22) Even if the timescale is questionable, signs are emerging that we will see peak car in the next few decades. This is due to several factors, including rapid rates of urbanisation, advances in public transport access and ease of use, and shifts especially in millennials and Gen Z towards sharing models rather than ownership.

## DRIVE TOWARDS EFFICIENCY

There will be an increasing drive towards efficiency because of increased demand for materials and a growing need to move away from raw material extraction due to environmental concerns. In addition, companies that harness closed loop and efficiency should be more profitable.

## PROFITABILITY THROUGH CIRCULARITY

According to Accenture Strategy research, the potential revenue of selected circular economy business models for automotive companies could more than double by 2030, growing by \$400-600 billion. (23)

In a disruptive scenario, circular models would outpace revenue growth generated through new passenger car sales. And profitability could be more than three times higher than traditional new vehicle sales—making circular economy business models a major profit pool in the automotive industry.

[22] ABN

[23] [https://www.accenture.com/t20160802T065645\\_w\\_us-en\\_acnmedia/PDF-27/Accenture-POV-CE-Automotive.pdf](https://www.accenture.com/t20160802T065645_w_us-en_acnmedia/PDF-27/Accenture-POV-CE-Automotive.pdf)

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# LOOKING TO THE FUTURE

## **MOVE FROM SUPPLIER/CUSTOMER MODEL TO A VALUE NETWORK SOLUTION**

As we saw in the barriers section and with the REALCAR and CLAUT case studies is clear that more pre-competitive and open collaboration is needed. Many value chains are going through this type of transformation, moving from less customer/supplier model to a greater need to form relationships and create value networks to uphold standards and enable transparency. It remains to be seen who can be the first large manufacturer that combines all three closed loop models in any of their vehicles produced.

This recasting of value chains also prepares them to take greater responsibility for products, innovate simultaneously with well-known and unusual partners to incorporate end of life processes that are no longer end of life but extended material recovery flows that feed new business models.

'At the moment, supply chain companies largely listen to rules of the manufacturer, but this will need to shift towards more collaboration with manufacturers to co-develop and co-innovate new solutions. Thijs Jasink COO Actronics Group

## **NEW ENTRANTS WILL PROVIDE CHALLENGE AND RESHAPE THE INDUSTRY**

As we have seen in other industries the rapid development of digital technology and disruptive companies is reshaping the business landscape. In the near future we may see a shift from car ownership to 'mobility access' from customers and disruptive new entrants like Google, NVidia and Faraday Future. (ABN)

This can often feel threatening to companies grappling with changes in the competitive landscape, and the threat that fewer cars are likely to be needed as sharing models accelerate. But the landscape is still shifting and there is time for companies to shape the environment through innovation. It is very likely private car ownership will reduce, and sharing models will increase. This will result in fewer cars, though cars will be more heavily utilised through sharing. Thijs Jasink – COO, ACtronics

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# KEY INSIGHTS AND RECOMMENDATIONS

When automotive players decide to engage with larger budget and teams in the circular economy, in whatever configuration of models and approaches, it's likely they'll need to partner to gain the horsepower to realise circular advantages.

## 1 COLLECTION MUST INCREASE

This could be aided by new business models and more sustainable design strategies, such as consumer education from a systems perspective, consequently including, infrastructure, technology developments and incentives. Therefore, open collaboration needs to increase to accelerate new technologies for material recovery. The original equipment manufacturer (OEM) of vehicles that starts to increase collection to reinsert it on its own production would be tackling possibly the largest challenge on increasing collection.

## 2 CHANGE THE COMPANY FROM THE INSIDE OUT

This is perhaps one of the most threatening ways that closed loop can have an impact on a business, in that uptake of closed loop principles likely means a reorganisation of the company, questioning how the organisation should approach these issues, attitudes to intellectual property, and its ability to collaborate with competitors. This could also affect the value creation and value flow within business and the value chain. How does a supplier to OEMs future proof itself in case of changed cashflow models?



WHAT NEEDS TO HAPPEN NEXT?



## WHAT NEEDS TO HAPPEN NEXT?


### **3 FRAME THE BUSINESS CASE MORE STRONGLY**

Closed loop provides many benefits to automakers, including increased customer loyalty and touchpoints, more efficient use of materials due to a joined up design to end of life system, and giving access to them for the most lucrative part of the value chain, repair and use.

### **4 DIVERSIFICATION**

Automotive companies might not be able to bring all material back to create the same vehicle. For instance, if they partner with other organisations to design new vehicles using materials recovered from other models, these companies could create new business models, and extra revenue flows. From a motorcycle to a SUV to a tractor. New vehicles designed don't need to be the same type of vehicles, a visionary automobile company could partner with a tractor company and use current material flows from both organisations to their benefit.





## HOW MIGHT NOVELIS GO ABOUT PREPARING TO TAKE ADVANTAGE OF THE SHIFT TO CIRCULARITY?

We've explored what can be done by Novelis to take advantage of circularity as part of the business model, it is also worth considering how Novelis can continue to prepare internally as an organisation to be prepared to take advantage of many of the activities outlined above. In our experience working with organisations, we would suggest a couple of areas for activity:

### **INCREASING THE ORGANISATIONAL "FUTURES IQ"**

The first step to encouraging circularity is ensuring the organisation continuously explores the future context and business development opportunities for Novelis. As the world changes, so too, does the context in which Novelis operates and the opportunities on the horizon. Consistently raising the organisation's attention to the horizon is critical in being ready for future opportunities such as circularity. This could take the form of ongoing light futures scanning, yearly "how the future is changing" sessions, or using future scenarios with teams to help prepare them.

### **EMBEDDING IN THE ORGANISATION**

Inspiring colleagues to solve emerging problems as change agents, and equip people with the skills they need to approach these problems. These skills could relate to futures, innovation, business development, analysis of risk and opportunity, and exploring what leadership for sustainability looks like.

# ABOUT FORUM & NOVELIS

Forum for the Future is an independent non-profit that works globally with business, government and others to solve complex sustainability challenges.

Novelis Inc. is the global leader in aluminium rolled products and the world's largest recycler of aluminium, delivering unique solutions for the most demanding global applications, such as beverage cans, automobiles, architecture and consumer electronics.

Since 2014 Forum for the Future has worked with Novelis Inc. to accelerate the advancement to a circular economy in a range of industries including packaging, beverage, recycling infrastructure, consumer behaviour, and product design. Forum explored [consumer behaviour towards](#) sustainable packaging, supported the launch of [the largest aluminium recycling plant](#) in the world publishing Circular Futures, and created a [tool for designers and product developers](#) to support design demand for circular products.

## Contact

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