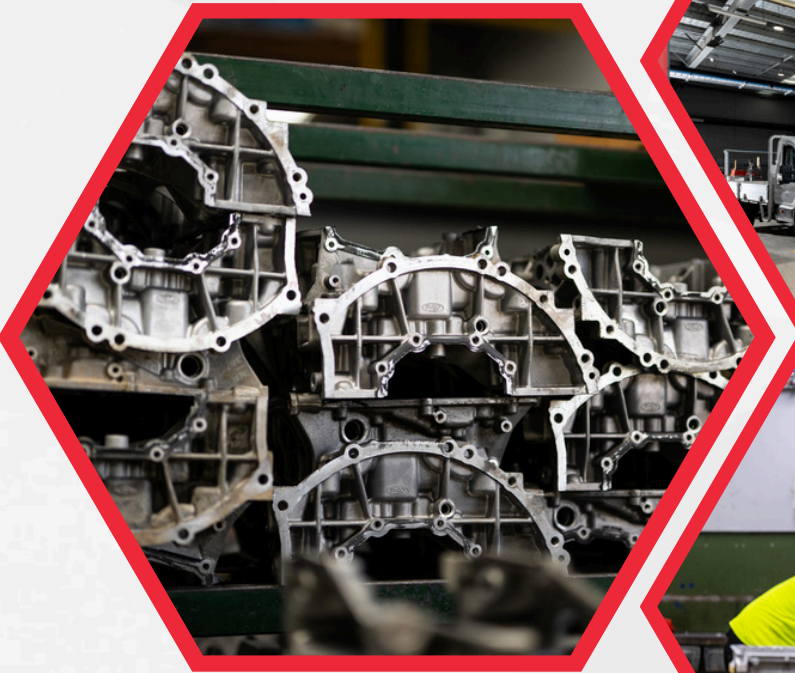


THE CIRCULAR ECONOMY

ECONOMY

AND HOW WE FIT IN



PRESENTED BY



ENGINE REMANUFACTURING

"A few years ago, when the engine in my trusty ute died, the options were to trade the vehicle and move on, buy a new engine, or get my original engine remanufactured. I chose the latter and have felt good about that decision ever since. I applaud the work of Original Engine Co, for keeping these amazing engines in service to a circular economy.

With so much great design, and embodied energy in every component of these amazing engines, it makes my heart sing to find a company dedicated to their longevity and circularity."

Steve Morriss, Founder, Close The Loop Australia



ENGINE REMANUFACTURING

Table of Contents

Introduction..... 4

About Original Engines Co 5

What is a circular economy?..... 6

The car industry - early days..... 8

Where did our linear economy come from?..... 8

Automotive OEMs and the circular business model..... 9

Australian automotive aftermarket and the circular economy..... 10

The importance of change. Why should we care..... 11

Reducing greenhouse gas emissions..... 12

Avoiding waste and extraction of materials..... 13

The National Waste Policy and targets..... 14

Battery electric vehicles vs. internal combustion engines..... 15

Decarbonisation goals underpinning the Paris Agreement's net-zero target..... 16

Introduction to remanufacturing..... 17

Engine remanufacturing: aligning with a circular economy mindset..... 18

Remanufacturing vs. reconditioning: What's the difference?..... 19

Environmental benefits of remanufacturing..... 20

Remanufacturing vs. recycling: What's the difference?..... 21

Original Engines Co's commitment to circularity..... 22

Being part of the solution: 10 ways businesses can be more circular..... 23

Summary..... 24

A circular economy is a must..... 24



Introduction

Over the past century, the automotive industry has completely revolutionised how humanity lives across the globe.

The ability to cover long distances in short periods – and in relative comfort – means we can now move around with significant ease, staying connected with the ones we love and consider work and leisure opportunities much further afield. The knock-on effect that can be seen through countless other industries is immeasurable, with automotive technologies enabling the growth of every business.

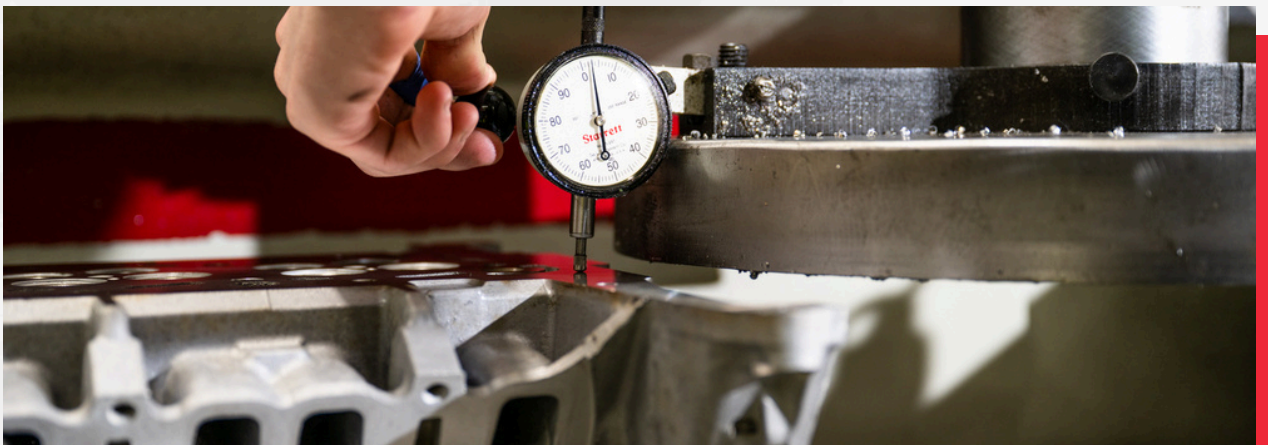
Looking closer to home, the automotive industry is a significant part of Australia's economy both past and present. Multiple original equipment manufacturer (OEM) brands with locally and internationally owned marques have chosen Australia's rich resources and skilled workforce to build vehicles on our soil.

Naturally, with large-scale manufacturing and a healthy demand in the local marketplace for new vehicles (which is still the case today), this bred a diverse and thriving automotive-focused industry to support Australian manufacturing efforts.

Although local OEM vehicle manufacturing ceased in Australia in October 2017 (officially marked by GM Holden's plant closure), Australia's automotive industry continues to thrive through traditional and innovative services which include basic vehicle servicing, parts manufacturing and distribution, global R&D efforts, and supporting categories such as the remanufacturing space at Original Engines Co.

With the significant growth and ongoing activities required to service such a thriving industry, we've seen a mentality where we "take-make-waste" our products or consumables, in what is known as a linear economy.

As we progress as a consumer-driven society and continue to utilise our earth's valuable resources, it is now an incredibly relevant time to highlight the automotive industry's broader impact on the environment, and how the industry needs to embrace a circular economy to succeed in the future.



About Original Engines Co

As Australia's leading engine remanufacturer. Our mission is clear: to redefine the engine remanufacturing landscape by delivering superior quality, performance, and reliability while minimising environmental impact.



Leading automotive brands partner with Original Engines Co to provide dealerships across Australia with fast, reliable, and high-quality service for engine remanufacture. Our clients utilise our expertise to access remanufactured engines that exceed the performance and reliability standards of brand-new OEM engines.

Our passion for remanufacturing engines to exceed OE standards drives our overall business vision. Our purpose is to deliver services and products that meet our clients' needs and surpass their expectations.

Original Engines Co is founded on a passion for automotive and is committed to tackling intricate engine challenges with precision and ingenuity. Backed by decades of mechanical engineering expertise and cutting-edge technology, we proudly craft innovative solutions. Our mission is to contribute significantly to the evolution of the automotive industry, ensuring its seamless progression through our purpose of solving complex engineering challenges.

Our vision is to be global leaders in engine remanufacturing. Investment in our skilled team, state-of-the-art facilities, innovative equipment, efficient processes, and quality accreditation ensures the best possible outcomes for our clients and our business.

"As an engine remanufacturing company, we strive to provide our customers with a product and service that exceeds expectations. Our experienced team of quality technicians and the supply network we have developed over the past 30 years place us at a high level within the industry and we are driven to being the best in the business."

Strategies with overall business improvements are continually moving us forward. The passion and desire are strong with everyone involved in achieving the result as a leading OEM engine remanufacturing company."

– Colin Doherty, Managing Director, Original Engines Co

What is a circular economy?

The circular economy aims to 'close the loop' - not just with recycling but with design, logistics, and the entire value chain. A circular economy values waste as a resource so it makes the products we use today into the resources we use tomorrow with materials that flow in continuous cycles.

The circular economy can help governments and businesses achieve their climate goals, contribute to climate resilience, and deliver broader societal benefits.

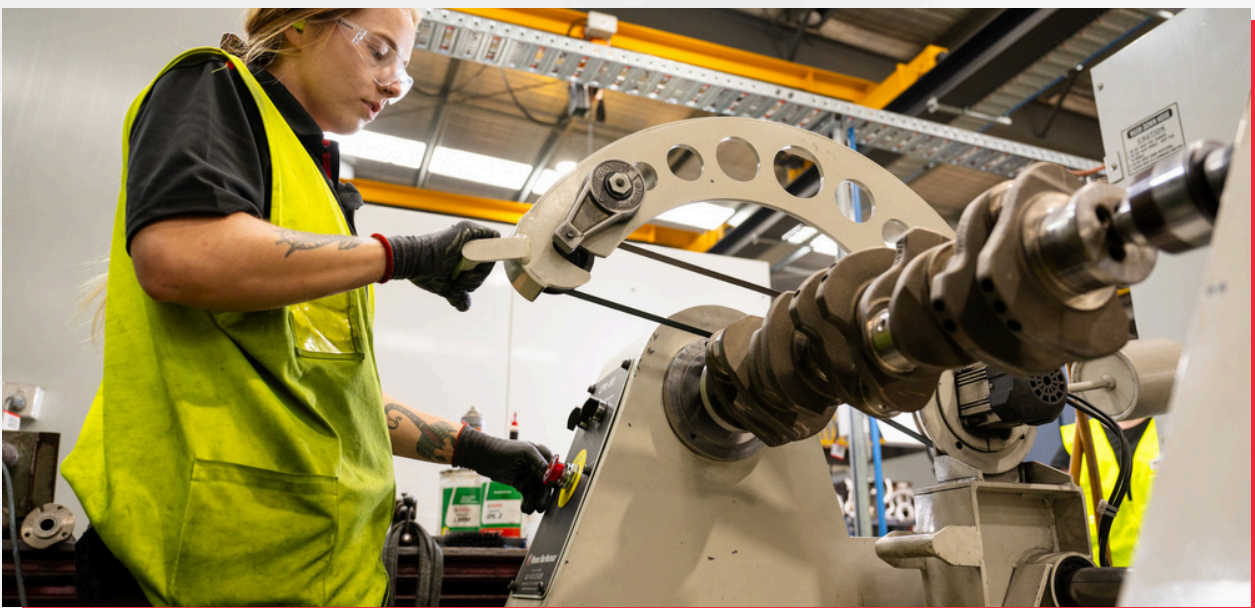
We can't get to zero carbon without a circular economy. The transition to renewable energy can cut about 55% of the Paris Agreement carbon reductions needed and the remaining 45% are locked in products and food. A circular economy will address 45% of global greenhouse gas emissions according to a report by the Ellen MacArthur Foundation and Material Economics. (1)

The circular economy is based on three principles:

Eliminating waste and pollution, circulating products and materials for as long as possible and at their highest value, and regenerating natural systems.

To understand how this differs from today's way of doing business, we can pull a quote from The Ellen MacArthur Foundation - the UK-based not-for-profit organisation that framed the concept of the circular economy for organisations worldwide.

"In our current economy, we take materials from the Earth, make products from them, and eventually throw them away as waste - the process is linear. In a circular economy, by contrast, we stop waste being produced in the first place."

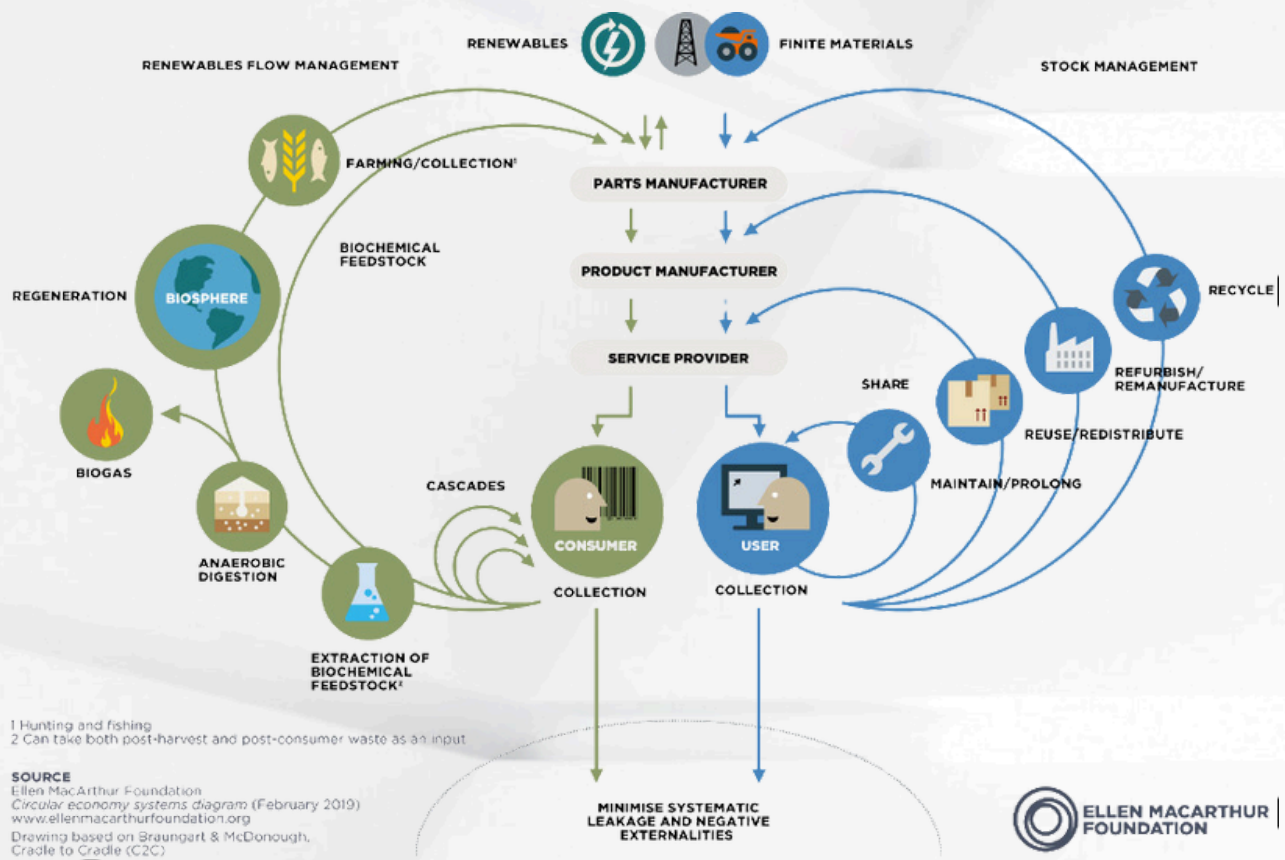


The Butterfly Diagram

The Ellen Macarthur Foundation depicts the circular economy with its “Butterfly Diagram” which shows the two distinct cycles of biological and technical nutrients.

Biological cycles regenerate living systems, like soil, and provide renewable resources for the economy. Technical cycles recover and restore products and materials through strategies like reuse, repair, and remanufacture - or (in the last resort) recycling. In a circular economy, everything produced can be reused endlessly and everything becomes ‘food for the system’.

The bigger the loop in the diagram, the more resource and energy-intensive the process. Recycling sits on the largest, outer loop and remanufacturing is shown on a smaller loop.



The car industry - early days

Where did our linear economy come from?

In the early years of the automotive industry globally, vehicles, engines and componentry were developed on a small scale as humanity embraced motorised transportation. Typically, it was coach builders who would develop custom automobiles in small volumes, usually built-to-order for the world's upper classes.

Due to the smaller production numbers, resources to create automobiles were likely sourced with one goal in mind – to have the vehicle produced as cheaply and as quickly as possible. It was rare to see a consideration for the types of woods, metals, fabrics or chemicals to be used for the betterment of the environment or its ability to be re-used again.

As demand increased for motorised transport for the masses, we saw the famous manufacturing revolution adopted by Henry Ford with the Model T. Over the Model T's lifespan there was 15 million produced in the early 20th century – a feat that could only be achieved due to Ford's way of producing a car for the people at an excellent price.

Ford's processes and innovative production line allowed for more vehicles to be built in a smaller time frame and for a significantly reduced cost, but it did not necessarily change how the materials were sourced for vehicles.



The main concern for Ford (and other vehicle manufacturers adopting the production line model) was to source enough metals, woods, fabrics, and chemicals to meet demand, rather than considering the knock-on effects of the linear economy they found themselves in.

As other vehicle manufacturers surfaced and started to develop larger numbers of cars by adopting the production line model, they simply copied how resources were acquired for this type of business model.

It's worth noting that the automotive industry's ways of creating and sourcing resources for the transportation boom were very reminiscent of the time they started.

The Industrial Revolution is still in living memory and is considered the most significant period in human history for transforming society as we know it. The demand placed on the manufacturing industry meant resources were acquired and discarded in the cheapest and easiest possible way.

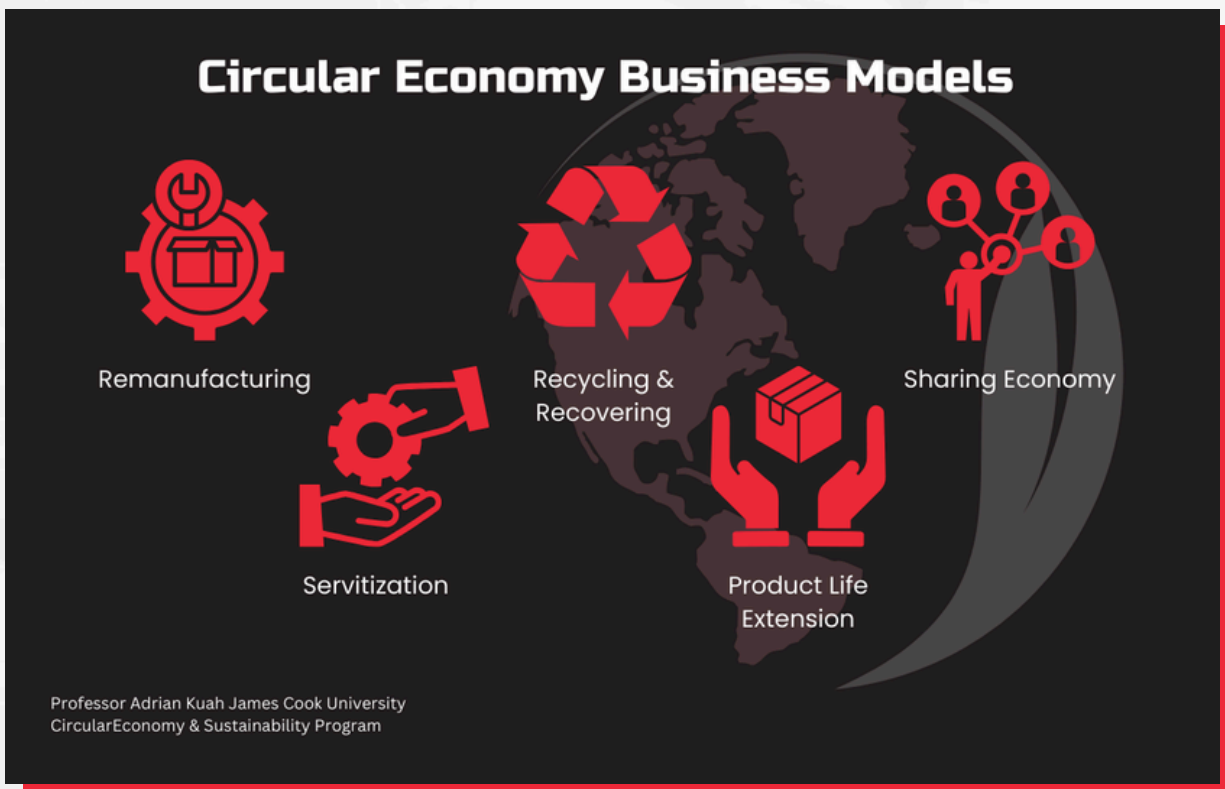
As we've continued on our journey in the automotive industry for the past 100+ years, the vehicles and the technology within them have advanced, but how we built and produced our vehicles has fundamentally stayed the same – until recently.

Automotive OEMs and the circular economy business models

Car manufacturers implementing circular business strategies understand circularity is not just part of waste management. It's a holistic approach that encompasses the entire span of a vehicle's lifecycle, from design to disposal of the product. They start the lifecycle by designing products with sustainability in mind.

During the manufacturing phase, they use an increasing number of eco-friendly and recycled materials and manufacturing facilities that run on renewable energy. It is no longer seen as a novelty to have recycled or re-purposed materials in new vehicles, rather, a necessity.

Five circular economy business models are key to creating systems change. Remanufacturing is the first of five models depicted here by The Cairns Institute at James Cook University.



Australian automotive aftermarket and the circular economy

There is an opportunity for all stakeholders in the Australian automotive aftermarket industry to rethink how linear processes could be improved with circular business models.

Many businesses in the automotive aftermarket are still part of the linear economy the automotive industry was founded on. An example is spare parts companies selling brand new products (either genuine or aftermarket offerings) that are bolted onto vehicles and sending the entire 'end of first life' parts they're replacing to scrap yards. Another example is car workshops not properly disposing of oils, tyres, batteries, drivetrain, and braking components out of convenience or for financial reasons.

Some businesses simply do not have the resources or manpower to even consider "doing what's right" for the bigger picture as they cannot keep up with demand. While these businesses do exist within the circular economy's "Butterfly Diagram" to maintain and pro-long vehicles – the processes that are followed as a cost of doing business go against the fundamentals of a circular economy.

There are, of course, many businesses that sit within the automotive industry that are actively working on "doing the right thing" through initiatives such as aligning to global ISO standards. Some businesses acknowledge a circular economy and work within it like our team at Original Engines Co – more on that later.



The importance of change. Why should we care?

About the Australian Circular Economy



No. 3

Highest rate of materials consumption globally



\$1.28 usd

Economic output per kilogram of materials consumed, lower than the global average



500kg

Municipal waste per capita in 2018-19, down 20% from 2006-07

Sourced OECD MSW Recycling National Waste Report 2020

CommBank Consumer Insights research shows significant room for businesses to adopt or advance circular practices and that most consumers expect it.

- 31% of consumers surveyed said they often or always choose brands with waste reduction policies and initiatives, and a further 44% said they sometimes do.
- 64% of consumers said businesses need to do more to embrace the principles and benefits of the circular economy.
- 57% of consumers said businesses would be more credible partnered with others that specialise in the circular economy/waste reduction.
- 57% of consumers want to learn more about businesses' circular initiatives.

"Many consumers want businesses to embrace the circular economy, are receptive to education and will pay more to support credible brands.

There's an opportunity to communicate with consumers about circular initiatives and partner with experts or introduce new practices that align with consumers' emerging expectations." (2)

The automotive industry is an ideal place to implement circular strategies because it can reduce emissions from the production lifecycle to disposal.

Reducing greenhouse gas emissions

There are many significant reasons why a circular economy is beneficial and should be implemented across the automotive industry, with one of the biggest reasons being its ability to reduce CO₂ emissions. The circular business models decrease the demand for raw materials and the production of new products which reduces greenhouse gas emissions.

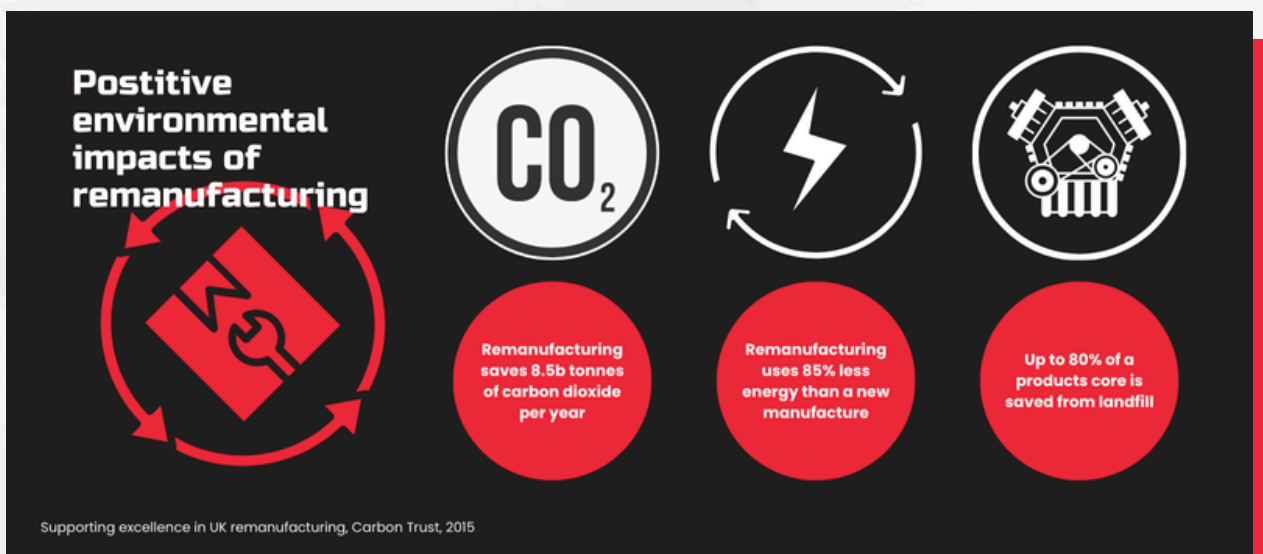
Remanufacturing typically uses 85% less energy than manufacturing and offsets over 800,000 tonnes of carbon dioxide emissions a year compared to new manufacturing. (3)

While remanufacturing or recycling at the end of a product's lifecycle is an excellent part of a circular economy, designing products that use energy-efficient materials and modifying production processes at the beginning has a strong potential to reduce CO₂ emissions. When properly implemented, a circular economy approach can also reduce the number of materials needing to be sourced to produce new products.

To enable the utilisation and circulation of products, materials, and components, the key principles of the circular economy should be embedded at the design stage. This means products must be designed for longevity, reparability and remanufacturing for future use.

The correct design is also crucial for eliminating waste, which can be achieved by considering material efficiency and supply optimisation as key factors in designing products. While it may seem like more effort and resources are spent at the beginning, this strategy will decrease the volume of energy and materials used, ultimately reducing carbon footprint.

Reusing products is an optimal measure to conserve the energy and other vital resources necessary to create products and components. Keeping products in use for as long as possible decreases the greenhouse gas emissions associated with new production and 'end of first life' treatment.



Avoiding waste and extraction of materials

Getting higher value from materials and avoiding extraction of materials is another key reason to adopt circular economy business models.

The global depletion of the earth's finite resources is happening at an alarming pace with around 100 billion tonnes of materials extracted each year. And more than 90% of what we take from the earth is wasted.(4)

From July 2020 to June 2021, Australia generated 75.8 mega tonnes (millions of tonnes) of waste. (5)

That's the equivalent weight of 471 Sydney Opera Houses. (6)

This waste includes municipal (households and council operations), commercial and industrial, and construction and demolition waste, including ash generated from coal-powered electricity.

To address this burgeoning problem with waste, the Australian government published the first National Waste Policy in 2009 as a central framework to implement waste and recycling initiatives in the country.

In a nutshell, the policy underpins five overarching principles of waste management, which in turn steers Australia down the path to a circular economy.

These principles are:

- 1. Avoid waste.*
- 2. Improve resource recovery.*
- 3. Increase the use of recycled material and build demand and markets for recycled products.*
- 4. Better manage material flows to benefit human health, the environment, and the economy.*
- 5. Improve information to support innovation, guide investment and enable informed consumer decisions.*



The National Waste Policy and targets

The 2018 National Waste Policy: Less Waste, More Resources was the latest version published, serving as the foundation to accomplish the seven ambitious targets outlined in the 2019 National Waste Policy Action Plan. (7) The targets outlined in the plan include:

1. *Regulate waste exports.*
2. *Reduce total waste by 10% per person by 2030.*
3. *Recover 80% of all waste by 2030.*
4. *Significantly increase the use of recycled content by governments and industry.*
5. *Phase out problematic and unnecessary plastics by 2025*
6. *Halve the amount of organic waste sent to landfill by 2030.*
7. *Provide data to support better decisions.*

This action plan will be updated in the coming years to set a clear direction in bolstering Australia's national efforts towards its targets for 2030 and beyond.

Over 700,000 vehicles reach their "end of first life" and are "discarded" by means of wrecking, crushing or scrapping as waste in Australia every year. (8)

When not sufficiently managed, these end-of-life vehicles (ELVs) can create environmental issues and wasted materials.



Battery electric vehicles vs. internal combustion engines

The race to a cleaner carbon footprint

Decarbonisation is a significant part of our world now in the automotive industry. There have been countless conversations about the negative impact the transport sector has on greenhouse gases, and the “low hanging fruit” has always seemed to be a reduction of traditional fuel-powered vehicles – instead moving towards battery-powered vehicles or “electric cars”.

As we know, the automotive industry has widely adopted creating vehicles with internal combustion engines (ICE) since its inception 100+ years ago. ICEs use fossil fuels such as petrol, diesel, and compressed gases (such as LPG) and combust (or burn) them to create the energy required to move the vehicle. However, these fossil fuels are non-renewable, meaning they will soon run out in the future and will not be replenished.

ICE-powered vehicles are well-known for emitting pollutants in the air which poses environmental challenges for everyone. This is the reason vehicle manufacturers have been feeling the pressure to move to alternative energies that do not depend on fossil fuels.

One such alternative is the battery electric vehicle (BEV). These all-electric vehicles are powered by rechargeable batteries charged via a power grid. They do not have an internal combustion engine, so they are perceived as “zero-emission” vehicles since they do not produce tailpipe emissions when running.

While it may not be obvious at first, the production of batteries for electric vehicles is carbon-intensive, accounting for roughly 40-60% of the overall production emissions. (9)

Raw materials of lithium-ion batteries such as lithium, nickel, manganese, graphite, and cobalt release a massive amount of greenhouse gases during the extraction and refining processes. Additionally, processing the cathode and anode active materials needs high-energy temperatures to carry out some processes.

A vehicle’s overall carbon footprint needs to be measured from the sourcing and production of its components. For example, if the energy and resources required to create electric batteries are reduced, then BEV will have a competitive advantage in the market. Similarly, if fuel efficiencies in internal combustion engines are implemented, or its componentry is sourced via a circular economy model (through processes such as remanufacturing) then this will lower an ICE vehicle’s carbon profile and the difference in carbon footprint among all vehicle types can be minimised.

This scenario emphasises the need for more in-depth research and development on vehicle technology and adopting a circular business model. By prioritising sustainability in every stage of the vehicle lifecycle, automakers can help the industry meet the emission reduction targets stated in the Paris Agreement.

Decarbonisation goals underpinning the Paris Agreement's net-zero target.

The Australian government published its Long-Term Emission Reduction Plan to achieve its net-zero emission goals by 2050. It prioritises technology as the cornerstone of the plan to cut Australia's carbon emissions without jeopardising the economy and job prospects for Australians.

As a party to the Paris Agreement, Australia submitted its international commitment to creating substantial steps in reaching its emission reduction targets. The Paris Agreement is a legally binding international treaty with aims to strengthen the global response to climate change. In June 2022, Australia pledged its newly enhanced Nationally Determined Contributions (NDCs) under the Paris Agreement to reduce its greenhouse gas emissions to 43% by 2030 below its 2005 level.

Most conversation around reducing Australia's CO2 emissions from an automotive sense usually comes down to electromobility. However, electrifying vehicles is not the only way to address emissions. It could be argued that electric vehicles take quite a long time to be net-zero themselves. From a circular economy perspective, the automotive industry can also consider the emissions coming from vehicle materials. It needs to look for other options besides battery-electric vehicles (BEVs) to reduce carbon emissions from vehicles.



Introduction to remanufacturing

We're fortunate at Original Engines Co to be able to directly contribute to a circular economy in the core function of our business. Remanufacturing is seen as one of the best-case scenarios for products that have reached the 'end of first life'.

In a book published by the Ellen MacArthur Foundation by authors including Ken Webster, Nabil Nasr describes remanufacturing as:

"A truly closed-loop industrial process that intentionally recaptures the value-added component of a product so that it may lead additional useful lives rather than being landfilled or recycled.

"The cornerstone of remanufacturing is full restoration – a high-quality process through which products are systematically disassembled, cleaned, and inspected for wear and/or degradation. Any substandard or degraded components are replaced, feature upgrades can be incorporated, and the product is reassembled.

"Quality testing is typically performed to ensure performance meets original specifications. At the end of the process, the remanufactured item emerges functionally equivalent to new production and often is supported post-sale with the same kind and length of warranty coverage as a newly manufactured product."

"Remanufacturing is often compared with recycling even though the two processes differ significantly. Recycling reduces products into raw material, which can then be used again. "

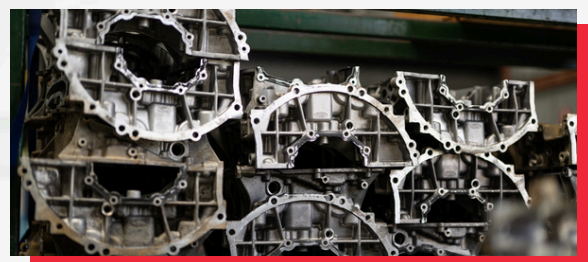
"In contrast, remanufacturing retains the geometrical shape of the product and is therefore able to capture both the materials and the value added (the labour, energy, and manufacturing processes) which were embodied in the original product during initial manufacturing."

"In many cases, the ratio of the total energy required for new production compared to that required for remanufacturing is approximately 6:1." (10)

In his book 'The Circular Economy A User's Guide', Walter R. Stahel explains the benefits of remanufacturing engines. In the book's foreword, Dame Ellen MacArthur said, "No one has done more to make the case for the transition to a circular economy than my friend Walter Stahel."

"The quality of remanufactured objects can be 'better than new' for a number of reasons, such as material improvements through metallurgy factors inherent in use (engine block stability) or superior process technology."

"Remanufacture of custom-made objects is economically vastly superior to 'new', in addition to saving most of the resources that went into manufacturing." (11)



Engine remanufacturing: aligning with a circular economy mindset.

“The circular economy includes remanufacturing as an integral approach to keep materials in use for longer at their highest utility. Onshore remanufacturing ensures that we localise and maintain materials in Australia, with the associated socio-economic benefits. From an environmental perspective, fewer materials need to be extracted to manufacture new engines; less energy is required as compared to the recycling and smelting process and fewer vehicles or parts are exported for use or processing elsewhere.

“Original Engines demonstrate circularity in their business and should continue to innovate and experiment with additional business model offerings into the future.” -

Circular-Vision Director Sally-Anne Kasner

Engine remanufacturing is the process of returning an internal combustion engine to its original manufacturer’s specification using genuine OEM factory processes and componentry.

When we carry out our remanufacturing process at Original Engines Co, we take existing engines that have an issue or concern, completely strip down the engine to determine the root cause of the problem and determine if the engine is suitable for remanufacturing.

We then follow a strict process of remanufacturing the engine using state-of-the-art equipment and tooling, as well as genuine OEM parts. We use the same (or better) engine tolerances that were used during the original manufacturing process, which in-turn produces an engine that is equivalent to (or in most cases, more superior than) its condition when it was first manufactured.

The engines that Original Engines Co remanufactures for OEMs meet or exceed the OEM standards, therefore they come with a 2-year or 50,000km warranty.

The remanufacturing process requires less energy and produces fewer greenhouse gas emissions than if that engine were to be produced new to the same specification.

Recapturing (and retaining) the value-added component of the original engine is both environmentally and economically beneficial. Also, by implementing our remanufacturing strategy, OEM’s disposal costs (both financial and environmental) can be avoided, the value embodied in the engine can be recouped, and resources can be used more efficiently.



Remanufacturing vs. reconditioning: What's the difference?

While remanufacturing and reconditioning might seem similar on the surface, they are not the same. Reconditioning is a recovery process that entails disassembling the engine (whether completely or partially) then cleaning and replacing broken components before rebuilding them. Since reconditioning is an unregulated process, the quality of aftermarket parts may not be up to par with OEM industry specifications. This means that it is not covered by warranty and the parts are not guaranteed as genuine or to last for a long time. While reconditioning may be beneficial from a financial perspective, it does not provide customers with the assurance of the products' and the parts' quality and authenticity.

Both remanufacturing and reconditioning involve the replacement of damaged components, but the difference lies in the meticulousness of the process. Remanufacturing is more thorough because it returns the engine to its original manufacturer specifications, through the original manufacturer's standard processes.

On the other hand, reconditioned products do not follow established industry standards so they cannot use the original warranty. Furthermore, prices of remanufactured components are more expensive than reconditioned components since the latter are exempt from strict quality regulations.



Environmental benefits of remanufacturing

The remanufacturing process starts with retrieving used, broken down, or 'end of first life' products or parts known as cores. These core engines are brought to Original Engines Co using our custom-made engine crates, where they are disassembled and subsequently cleaned, inspected, repaired, or replaced, and tested to confirm if they meet the OEM's standards. The re-manufactured parts along with some new ones are combined to reassemble the core engine based on its original characteristics or to create a new product.

In essence, remanufacturing supports the principles of the circular economy as most of the 'end of first life' products are given a new lease on life – where little to nothing goes to waste. The little componentry that cannot be saved during the tear-down and inspection process at Original Engines Co is recycled in accordance with our strict environmental and recycling practices through our vetted recycling partners.

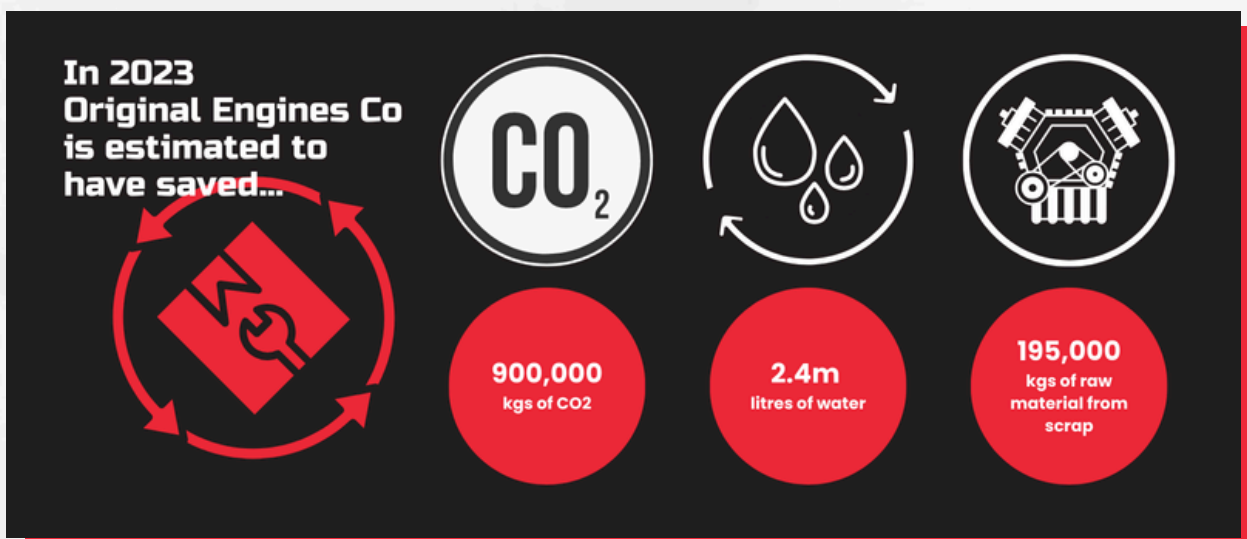
Reman offers plenty of advantages to consumers and it also champions a cleaner, more sustainable environment. The defective engines are no longer considered as inferior and sent to recyclers to be torn down to raw metals. Instead, these engines add many more years of usability to the vehicle it is re-installed into.

The estimated savings of materials and CO₂e due to automotive remanufacturing in Europe was estimated to be 902,000 tonnes of materials and 3,298,000 tonnes of CO₂e. (12)

Original Engines Co estimates that for each remanufactured engine, we can save approximately 65% of the original engine cores in the remanufacturing process.

In 2023 we remanufactured 1503 engines resulting in an estimated total of:

- 195,390 kgs of materials saved from scrap,
- 901,800kg of CO₂ saved, and
- 2,404,800L of water saved.



Remanufacturing vs. recycling: What's the difference?

Recycling breaks the engines down, smelts or shreds them, and reprocesses them into a new form. In other words, it processes materials that would have been thrown away and converts them into new products.

Recycling minimises the need to consume more natural resources. The use of recycled materials in the manufacturing process consumes less energy than producing new products from virgin materials. Since the recycling process cuts down energy consumption, this results in a significant reduction in greenhouse gas emissions which will help to mitigate climate change.

Recycling supports environmental sustainability by reducing material input and managing waste output effectively in the economic system. Once recycled materials are reprocessed into new products, this results in a decrease in the number of materials sent to landfills. Recycling fits into the circular economy model as the 'loop of last resort' when remanufacturing is not an option for a particular product – for example when an engine block is no longer structurally sound.



Original Engines Co's commitment to a clean, safe, and sustainable environment

The circular economy model parallels our business since the foundation of engine remanufacturing is based on designing out waste and pollution and keeping products and materials in use for as long as possible and at their highest value.

Our circular approach in remanufacturing creates a second life for old, failed, worn out, and 'end of first life' engines and components and returns them to their original OEM form, ready for reuse.

In addition to operating a circular economy business model, we also ensure the environment is at the forefront of our manufacturing procedures, so we acquired ISO14001:2015 Environmental as part of our Integrated Management system.

We also invited GreenCap, an offshoot of the Environmental Protection Agency (EPA), to carry out an environmental audit of our Melbourne factory to ensure our environmental practices were up to date and to receive feedback in areas of improvements that could be made. The EPA Auditor was extremely impressed and we passed with flying colours.

Every day we are continuing to decrease our environmental impact in many ways. These are some of our other practices:

Replacing caustic harsh chemicals, petrochemicals, diesel and kerosene with 'soft' environmental chemicals that are kind to the environment.

Capturing waste contaminants and recycling water via our unique triple Interceptor system to comply with the Trade Waste Community, ensuring our sewer system and waterways remain clean.

Collecting waste oils for recycling via an internal facility.

Newly implementing hot component wash systems and state-of-the-art ultrasonic cleaners that use biodegradable and environmentally friendly chemicals.

Recycling all cardboard, paper, plastic and partnering with Infrabuild to recycle scrap metal/alloy.

Washing, reusing and recycling oil rags weekly.

Using a new Australian-first innovative technology with a positive filtered air system producing air flow through the main manufacturing facility. This normalises climate stability and filters the air, improving occupational health and safety for our staff.

Working with an in-house quality consultant to maintain ISO certifications for environmental management systems, quality control and occupational health and safety.

Being part of the solution

10 ways businesses can be more circular.

A circular economy approach doesn't happen overnight in any business. It takes planning and careful consideration to multiple facets of your business, both internally and externally. And while it may seem like a business approach for larger organisations and OEMs, there are quite a few easy changes that any sized business can look to implement for the long-term prospects of the automotive industry. Some suggestions are:

1. Audit your recycling means.

Especially with products that can be harmful for the environment. If your business regularly encounters waste oils, for example, through routine maintenance on vehicles or the replacement of consumable items on a vehicle, it would be worth considering your current process for handling these waste oils. How are they collected, how are they stored, and how do you dispose of them? There are many businesses that offer collection of waste oils, but it is worth considering their methods of recycling or treatment to know if you're choosing the right business partner for your circular economy approach.

2. Consider recycling partners.

Batteries and electronics are becoming an increasingly larger issue for the automotive industry when it comes to recycling. Unfortunately, there is no "one size fits all" electrical recycling process in Australia, so most goods need to be separated and multiple recycling partners may be needed. Again, choose the right businesses when it comes to recycling technology and electrical items to ensure they can be repurposed, remanufactured or recycled accordingly.

Lithium-Ion batteries, in particular, are going to be a large issue for Australians when it comes time to remanufacture them or recycle them – with a high chance of these batteries having to be sent off-shore for recycling or repurposing. While this ensures that they do not reach landfill, it will mean there is an added CO2 toll on the lifecycle of a BEV which has not yet been realised.

3. Identify potential 'cores'

When you consider disposing of products that are faulty or have reached end of first life, take a circular economy approach and see if your warranty-returns, offcuts or obsolete products can be remanufactured or repurposed. This is a massive step forward compared to your products ending up in scrap yards or landfills.

4. Audit your suppliers.

Consider your choice of product suppliers for either the core product offering or how they conduct themselves in a circular economy. A great way to introduce a circular economy into your business quickly is to purchase products from suppliers that are producing their products from recycled materials, for example. Or they could be a business like ours which exists to re-manufacture products back to an OEM spec.

If the products you need to purchase simply cannot be made by recycled or remanufactured means, consider the supplier's approach to manufacturing their products. Do they use green energy or have lower CO2 focuses in their supply chain?

5. Look inwards at your business practices

There are numerous costs of doing business that are outside of the core offering of selling or providing a service. These are the low hanging fruit that you can implement quickly. One example is your choice of office consumables. Most, if not all, office supply companies will have recycled paper available to purchase, pens that are made from recycled materials and even printer ink that is recycled or carbon neutral.

In Australia, there are a number of companies that have adopted the 'Product as a Service' circular business model, such as [HP Instant Ink](#) which uses connected HP printers to monitor how much ink and toner a business uses and sends replacement cartridges before they run out. Instead of paying for individual replacement cartridges, businesses are charged a flexible monthly rate that is based on the number of pages they print.

6. Seek renewable energy sources

Just like your home, there are many energy options available to power, heat, and cool your workplace through carbon neutral or green means. A typical commercial building in the automotive industry will have a large roof and this is a perfect place to put solar panels and subsidise the amount of energy you pull in from the grid. As a bonus, the return-on-investment is realised quite quickly, and this is an area of circular economy where you will see an added economic benefit. If you do not have the means to go solar, most energy companies now offer carbon-neutral or carbon-offset energy plans.

7. Employee mobility

Transportation of your staff and your products can also be a hidden opportunity to align your business with a circular economy. The types of vehicles purchased to carry out business tasks could be considered by their recycled material use, their energy use or their ability to be used for longer periods of time. Or perhaps it is worth considering repairing or remanufacturing existing fleet vehicles before replacing them.

8. Measure your impact

If you find yourself as a business within a supply chain, it would be a great initiative to consider its overall carbon footprint and look to ways to have a carbon-offset, or carbon-neutral, offering for your customers.

9. Engage your team

Run a circular ideas competition among your team members to create conversations within your organisation to inspire new ideas and introduce new practices.

10. Gain accreditation

Look to the new [ISO/FDIS 5901](#) for guidance on the transition of business models and value networks from linear to circular. This new international standard released in 2024 applies to any organisation dealing with products or services regardless of its size, sector or region.



Summary

A circular economy is a must...

Especially if we are to continue to thrive as an industry and consider what future lies ahead for our loved ones. A circular economy sees us prosper financially and also ensures we consider the wider world around us and the legacy we leave behind.

While a good portion of the automotive industry still follows the traditional “take-make-waste” linear model, the number of OEMs and businesses within the automotive industry switching to the circular model has gradually increased.

This could be partly due to the ongoing pressures to reduce greenhouse gas emissions for upcoming deadlines such as the Paris Agreement, or due to business owners becoming more conscious of their overall impact. Either way, we’re on the right path but we need to continue our push for awareness when it comes to the circular economy transition.

Original Engines Co is an innovator of the remanufacturing circular economy business model in Australia. Reman allows for a product to be rebuilt back to the original manufacturer’s specification, ensuring its performance meets original specifications.

At the end of the process, the remanufactured item emerges functionally equivalent to new production. It is a part of our core business offering – supplying engines to an Australian dealer network that meet or exceed OEM specifications. But this isn’t the only part of the circular economy that we practice.

Our business practices many circular economy principles and we believe that any business within the automotive industry (or any other industry) can transition to working with a circular mindset by making a few easy decisions.

“In embracing the principles of the circular economy, we’ve elevated our commitment to sustainability and environmental stewardship. Our remanufacturing processes stand as a testament to our dedication to reuse and resource efficiency, particularly within the automotive industry,” Colin Doherty says.

“As leaders, we recognise our responsibility to champion remanufacturing, fostering awareness and support for its vital role in achieving a sustainable future. By holding ourselves accountable for our environmental practices and prioritising the wellbeing of our people and planet, we reaffirm our commitment to building a more circular and resilient industry.”

“Moving forward, we remain steadfast in our pursuit of circularity, driving positive change and sustainable practices within our industry and beyond.”

- Colin Doherty, Managing Director, Original Engines Co

References

1. The Ellen MacArthur Foundation 2019, [“Completing the Picture - How the Circular Economy Tackles Climate Change”](#).
2. CommBank Consumer Insights 2022, [“Circular Economy - The impact of business-led action on future consumers”](#).
3. Steinhilper 2006. Remanufacturing: The ultimate form of recycling. Fraunhofer IRB Verlag
4. Circle Economy Foundation 2023, The Circularity Gap Report.
5. Australian Government Department of Climate Change, Energy, the Environment and Water 2022, The National Waste Report
6. Planet Ark Environmental Foundation 2023, [“How much waste do Aussies generate and where does it all go?”](#), viewed 26 March 2024.
7. Australian Government Department of Climate Change, Energy, the Environment and Water 2019. National Waste Policy Action Plan
8. Australian Government Department of Climate Change, Energy, the Environment and Water 2003.
9. McKinsey & Company 2023, [“The race to decarbonize electric-vehicle batteries”](#), viewed 26 March 2024.
10. Webster K, H Lovins & E Franconi, A New Dynamic 2: Effective Systems In a Circular Economy, Ellen MacArthur Foundation, London, 2016.
11. Stahel, W. R, The Circular Economy A User's Guide, Routledge, New York, 2019.
12. European Remanufacturing Network 2015, [“Remanufacturing Market Study”](#)



Thank You

Telephone

+61 3 9729 9677

Address

Factory 13/209
Liverpool Road
Kilsyth VIC 3137

Website

www.originalengines.co



ENGINE REMANUFACTURING