

10

circular investment opportunities

for a low-carbon and prosperous recovery

Many voices from governments, businesses, and civil society have been calling for a response to the devastating impacts of the Covid-19 pandemic that does not turn attention away from other global challenges such as climate change, biodiversity loss, and plastic pollution. Yet, solutions from the past will not be up to the problems we face today, as the multifaceted nature of the crisis we are experiencing requires new thinking and the redesign of our current economic model.

In an unprecedented response to the Covid-19 crisis, trillions in economic stimulus are being unveiled all around the world. In the next stage of their recovery plans, governments will have to decide where these funds will be allocated. The circular economy, as an instrument to decouple economic growth from resource use and environmental impact, opens up the way for a resilient recovery and a next wave of economic prosperity. By fostering innovation and competitiveness, reducing resource dependency and environmental impact, and creating new jobs, the circular economy presents a promising way forward.

Building on the past ten years of research carried out on the circular economy, the Ellen MacArthur Foundation highlights in this paper how policymakers can pave the way towards a resilient recovery. As part of this, ten attractive circular investment opportunities that spread across five key sectors of the built environment, mobility, plastic packaging, fashion, and food, have been identified. Each sector is independently explored in a series of Insight papers, along with a piece offering perspectives on policy outlook. These individual papers, as well as the full combined paper, can be found at the Ellen MacArthur Foundation page: [Covid-19: The economic recovery](#).



Mobility

Two circular investment opportunities for a low-carbon and prosperous recovery



While the onset of the pandemic may have brought mobility to a near standstill, it has offered an opportunity to reignite a journey towards interconnectedness, value creation, and healthier environments. Multimodal transport systems—supported by vehicles designed for durability—contribute to this journey by enhancing connectivity and accessibility between different forms of transport, while also ensuring a cleaner, safer, and seamless experience. Supported by physical and digital infrastructure, citizens can be better connected to travel options, while vehicle parts and materials are kept in circulation, shaping a more competitive and resilient future.

The transport sectorⁱ has been one of the hardest hit by the pandemic and finds itself in a critical economic situation. The introduction of lockdown measures, travel restrictions, the closure of schools and non-essential businesses, and social distancing, have collectively had a significant impact.¹ From local transport to global supply chains, nothing has been spared, hampering not only the flow of people, but also that of goods.

In fact, global trade demand (in volume terms) is now forecasted to drop by as much as 13–32% in 2020; a striking amount when compared to the 9% decline experienced in 2009 after the financial crisis.² It is impacting freight logistics, as well as related industries, markets, and supply chains with consequences on the economic activity of cities and regions. This is putting millions of people out of work.

Lockdown measures, coupled with travel restrictions, have forced many to stay at home, and, up until May, caused public transport ridership to fall 70–90% in major

cities across the world.³ These measures have also caused the demand for cars to drop sharply with original equipment manufacturer (OEM) and supplier factories expected to produce 7.5 million fewer vehicles in 2020.⁴ While lockdown measures have, at the time of writing, eased in many places, social distancing measures are still impacting mass transit significantly.

Active forms of mobility, such as walking and cycling, have since become more widely adopted, being seen as healthier and safer than taking public transport. These radical shifts have been one of the key contributors to the observed 17% drop in global carbon emissions seen around the world (by early April).⁵ People living in cities are seeing clearer skies and are benefitting from breathing in cleaner air and being more physically active. This has made investing in air pollution reduction measures, active mobility infrastructure and electric vehicles (EVs) to have earned support.⁶

17% drop in global carbon emissions seen around the world (by early April)

ⁱ The transportation sector, as addressed in this section, focuses specifically on land transport (such as passenger cars, logistics, public transport, cycling, and walking), and not aviation and shipping.

As we look into the future, a number of trends are expected to persist and further shape the world of mobility. Physical distancing requirements, in particular, will change the mobility mix, consumer behaviour, and transportation demands, perhaps permanently.⁷ Remote working and online retail is predicted to stay with us, decreasing the need for commuting, increasing the demand for home delivery, and stimulating rural relocation for some.⁸ This is expected to come with an increased reliance on e-commerce, a megatrend that already predated the Covid-19 crisis. Other megatrends that pre-existed the crisis—such as the growth in car-sharing services, electric and alternative forms of transport, innovative lightweight materials, and autonomous vehicles—will stay relevant. Moreover, megatrends such as e-commerce, direct sales, and electric vehicles are currently disrupting conventional pricing, and the accelerated transformation is expected to bring massive changes to both price models and price setting for cars.⁹ The future state of such trends, however, will depend on how the pandemic evolves, how society responds, and how the recovery plans are shaped.¹⁰

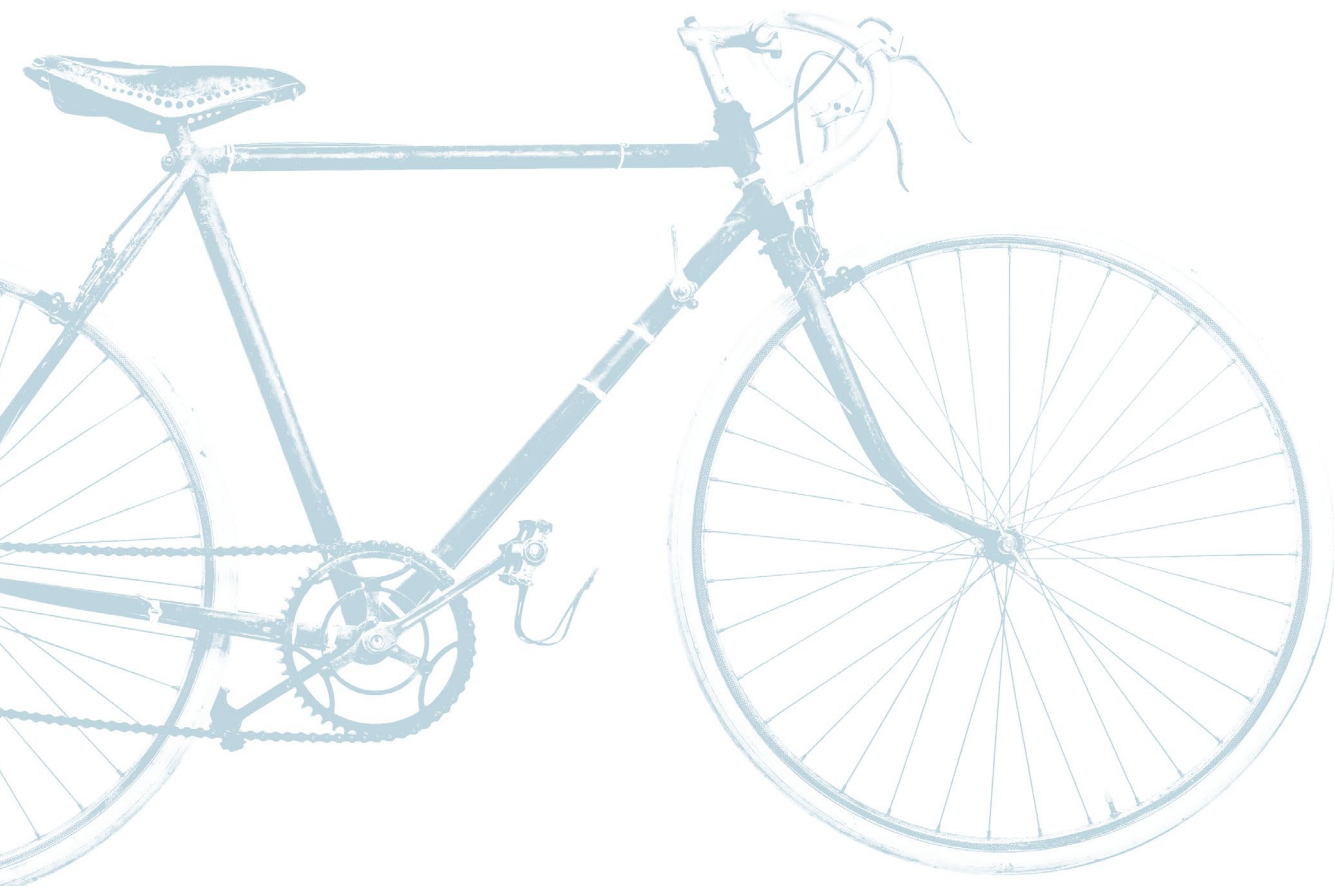
A circular economy approach to the recovery offers the opportunity to leverage these trends to tackle key challenges and shape a more resilient mobility system that is clean, adaptable, and interconnected, and that also meets climate targets. In a circular mobility system, this vision is realised through designing out waste, keeping materials in use at their highest value for as long as possible, while also regenerating natural systems.

A number of attractive circular investment areas could help attain this vision, including: multimodal mobility infrastructure to ensure seamless interconnectivity, lower congestion, and zero-emission transport systems; product-as-a-service models to provide access to, rather than sell ownership of, vehicles; designing and producing more circular cars to increase durability and make them fit for shared multimodal systems; refurbishment, remanufacturing, and recycling infrastructure to deliver a more competitive and resilient recovery; zero-emission forms of transport to decouple the reliance on fossil fuels and ensure climate targets are met.

Though all of these investment areas can help contribute to the creation of a better and more resilient mobility system, two especially attractive circular investment opportunities in the current scenario emerge in:

- 3 Multimodal mobility infrastructure
- 4 Automotive refurbishment, remanufacturing, and repair infrastructure

These selected opportunities highlight especially attractive areas that can help address both the short- and long-term goals of the public and private sectors. Together they provide solutions to key challenges created by the pandemic; meet governmental priorities for economic recovery; offer economic growth potential; and help reduce the risk of future shocks.





Multimodal mobility infrastructure

for a more interconnected, less congested, and cleaner transport system

The past couple of years have seen a rapid growth and integration of shared multimodal mobility solutions—a trend set to disrupt the transport industry. The pandemic has now severely impacted this sector, but some changes are believed to be temporary. Multimodal integration of active, shared, electric, and autonomous (micro)mobility could rebound post-Covid-19, as the crisis fades and sanitation practices are implemented.

Multimodal mobility systems bring attractive economic benefits through the increased use of assets and the optimisation of transport systems. Investments directed towards multimodal mobility infrastructure offer the opportunity for the system-level integration of different modes of transport—such as cycling, public transport, ride-sharing, and car-sharing—that would let people seamlessly shift between personal, shared, and public transportation. The benefits of such systems were discussed in the Ellen MacArthur Foundation’s 2015 study, *Growth Within: a circular economy vision for a competitive Europe*. The impact of shared multimodal systems within Europe that made use of autonomous cars and vehicles—designed to be silent, durable, non-polluting, and renewable energy-powered—was explored. The findings showed that such systems could reduce household costs by 70% within Europe by 2050, while offering cost-effective solutions to low-income groups. When applied in a country such as China, as much as USD 1.6 trillion in benefits in 2030 was estimated, i.e. assuming 42% of all car kilometres were made by shared vehicles.¹¹

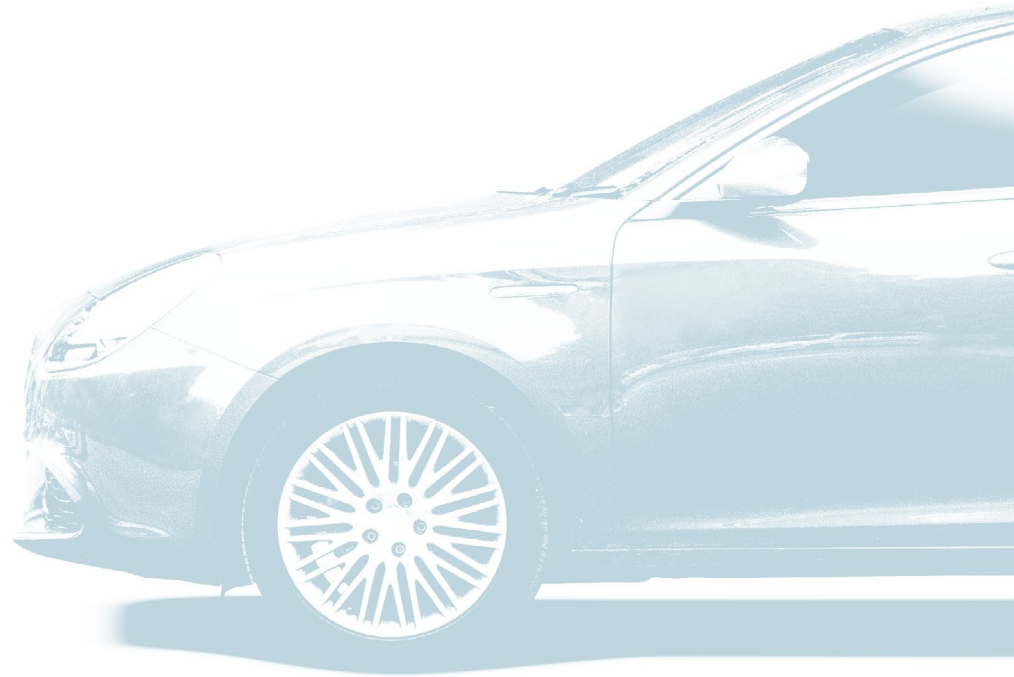
From an environmental perspective, multimodal systems can also play a pivotal role in lowering GHG emissions and meeting climate targets. With tailpipe emissions contributing 65–80% of emissions in passenger cars, much of the attention has understandably been

focused on zero-carbon energy, e.g. electrification. This can play a central role in helping meet climate targets by integrating zero carbon (micro) mobility within multimodal transport systems. However, to reach the full decarbonisation potential of, for example, automotive vehicles, not only tailpipe emissions should be tackled, but also material emissions that arise during production. If left unaddressed, material production may reach 60% of life-cycle emissions by 2040.¹² Integrating circular economy principles in the design and use of passenger cars has the potential to address these emissions. A shared multimodal system in particular—where passenger cars are increasingly shared, while designed for durability and reuse—offers the opportunity to reduce global CO₂ emissions from materials by 70% or 0.4 billion tonnes of CO₂ in 2040.¹³ For citizens, this means cities would also become healthier places in which to live.¹⁴

When active mobility is integrated within multimodal systems, it has the potential to stimulate the economy, boost physical activity, and limit air pollution. Since the start of the pandemic, active mobility—such as cycling and walking—has increased. Investments in shared multimodal infrastructure can help reap the benefits of people being more active by ensuring the integration of cycle lanes and other infrastructure to support the use of bikes (e.g. more parking spots, and electric bike charging

Multimodal mobility systems could reduce household costs by **70%** within Europe by **2050**, and reduce global CO₂ emissions by **70%** in **2040**

ii Data includes the impact of employing vehicles in multimodal systems that are designed for durability and reuse.

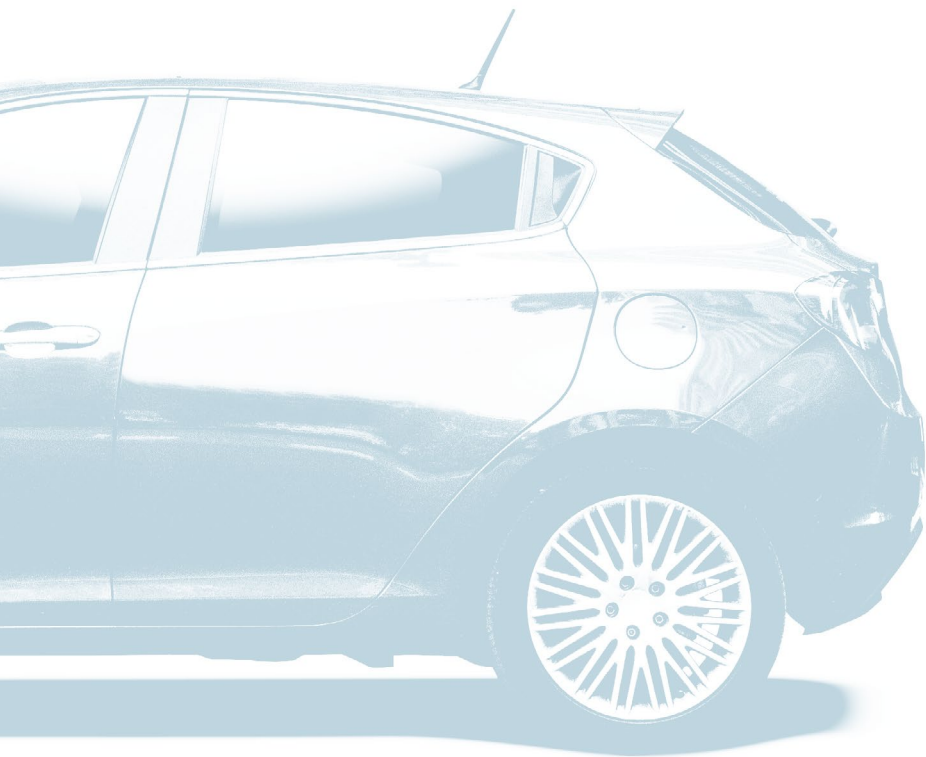


stations). Active mobility has seen an increase in bike sharing in China—the country first hit by Covid-19—rising by 150% immediately post lockdown.¹⁵ Governments are acknowledging the need for increasing funding for active mobility infrastructure. Europe is already seeing a rise in schemes and investments to support cycling and walking, as governments look to protect their transport systems, boost public health, and capitalise on clean-air gains.¹⁶ Cycling, in fact, offers the best return on investment of all transport, e.g. GBP 5.50 per GBP 1 spent within the UK.¹⁷ As such, a golden age of cycling may be upon us.

Despite the effect of Covid-19 on the sale of cars, the popularity of EVs continues to grow. According to the International Energy Agency, the global number of EVs on the road is expected to reach almost 10 million this year, as sales of electric cars continue to increase, counteracting the declining trend in sales of combustion engine cars.¹⁸ When zooming in on Europe, as registrations of petrol and diesel cars fell one-third year-on-year in June 2020, EV sales were up almost two-thirds over the same period.¹⁹ According to Forbes, these trends are expected to stay post-pandemic since the need to tackle climate change and local air quality will keep the EV market on course for growth.²⁰ As such, maintaining long-term low-carbon policies would help ensure that by 2040, over half of passenger cars sold worldwide will be electric (representing 31% of cars on the road).²¹ China has in fact already started strengthening their EV market during the pandemic, while many European countries are launching stimulus packages that offer incentives and subsidies for the purchase of EVs²² i.e. with

regulations and incentives likely to propel EV market share in China to roughly 35% to 50% and in Europe to 35% to 45% by 2030, according to a McKinsey study.²³ To support the wider adoption of EV, others are pushing for a coordinated private-public partnership: the Green-Car New Deal.²⁴ This investment fund would aim to accelerate the shift towards large-scale EV use by, for example, investing in the rollout of EV charging infrastructure (alongside other infrastructure), while saving existing jobs and creating new ones. Such trends would ensure that electric mobility emerges from the Covid-19 crisis in an even stronger position than pre-crisis estimates had predicted.²⁵

It is expected that the pre-Covid-19 increase in car sharing will pick up again after the crisis, shaping a mobility future that is cost-effective and accessible. In a circular economy, multimodal mobility systems embrace car sharing to enable maximum vehicle usage and occupancy rates. They leverage circular design to help keep materials in use by ensuring cars are designed for durability, modularity, and reuse. These opportunities pre-existed the pandemic and were on track to disrupt and transform the automotive industry. As customer preferences started shifting towards service-based solutions, a global car sharing market size exceeding USD 2.5 billion was established in 2019.²⁶ It was estimated to grow at 24% annually between 2020 and 2026. In countries such as China, the central government and local municipalities have issued multiple policies to encourage the growth of car sharing²⁷



However, the car sharing sector has been severely hit by the pandemic with some businesses possibly not surviving the upheaval. Nevertheless, studies and surveys have pointed out that “many of the changes in the modal mix experienced today are temporary and that shared-mobility solutions, including public transit, will rebound and continue to capture increased market share”.²⁸ In fact, in the short-term, a survey by the Boston Consulting Group has shown that between 67% and 76% of heavy usersⁱⁱⁱ of shared mobility pre-Covid plan to continue using (or to increase their use of) those modes after the pandemic—which include solo or pooled ride hailing, taxis, car sharing, and bike and e-scooter sharing.²⁹

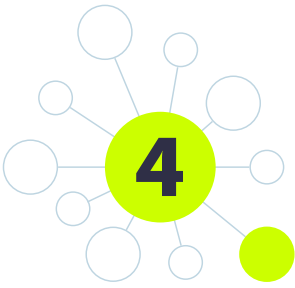
In the meantime, car sharing businesses such as Zipcar are finding creative solutions by, for example, offering exclusive vehicle use for several days at a time, which has since the summer experienced a sharp increase in demand.³⁰ In Japan, the largest ‘used’ car dealer, Idom, launched a USD 280 monthly subscription service from February this year, and orders have doubled in just two months.³¹ This is a relatively new trend in Japan that has been gaining traction since the start of the pandemic, possibly indicating a shift within society increasingly opting for access-over-ownership. Similarly, German start-up Cluno, termed the ‘Netflix of car subscriptions’ has seen a 53% rise to its service, despite massive economic uncertainty.³² Subscription

services have therefore been said to be currently filling the needs that fall between car ownership and car rental or sharing. In addition, it is also being seen by many customers as a transparent and reliable alternative to riskier and negotiation-intensive cash buying or leasing.³³ Momentum also continues to be generated through different means as the forthcoming Comprehensive European Strategy on Sustainable and Smart Mobility looks into enhancing synergies with the circular economy transition—with a key focus on stimulating the use of product-as-a-service solutions within transport systems.³⁴

Multimodal shared transport will also require investment within digital infrastructure to help integrate all modes of transport, as well as help citizens navigate the options. Digital user apps—when fully integrated—could, for example, help citizens to better connect seamlessly to multimodal transport, to better plan and optimise their journeys, and to avoid congestion. As remote working, e-commerce, and home delivery have become trends that may stay with us post pandemic, digital solutions could further help reduce physical touchpoints, accelerate the digitisation of service offerings (e.g. ticket payment), improve operational resilience (e.g. allowing for flexible planning), optimise logistics and support the consolidation of freight services and reverse logistics.³⁵

Japan’s largest ‘used’ car dealer, Idom, launched a subscription service this February and orders have **doubled** in just **two months**

iii Boston Consulting Group conducted a survey of 5,000 residents of major cities in the US, China, and Western Europe (France, Germany, Italy, Spain, and the UK).



Automotive refurbishment, remanufacturing, and recycling infrastructure

for material circulation and effective use of resources

By enabling the circulation of high-value components and materials, investments in refurbishment, remanufacturing, and recycling infrastructure offer attractive economic opportunities that not only help deliver a competitive and resilient economic recovery from the Covid-19 crisis, but also help tackle global environmental challenges.

An attractive, yet still under-valued, investment opportunity exists in facilities that refurbish, remanufacture, and recycle car parts. Investing in such facilities plays a critical role in ensuring that cars—designed for durability and reuse and often used within service-business models—can be disassembled and repaired e.g. multimodal shared mobility systems employing cars that are easy to maintain and reuse to maximise their returns. Such investments have to be done in parallel with the creation of markets for end-of-life parts (based on standardised quality measures for parts). This is an essential step in ensuring that demand is created for high-quality refurbished, remanufactured, and repaired car parts.

Refurbishment, remanufacturing, and recycling activities offer a strong economic case and job creation potential, when cars are designed for disassembly and reuse. In a post-pandemic world, with a possible rebound in car sharing services, such reuse activities can present a strong economic case for companies working in this space. Remanufactured car parts are, for example, cheaper than newly manufactured parts. The process allows the total value of the materials to be recovered, while reducing the need for virgin, non-renewable resources, and energy. In the United States, such remanufacturing activities have already been passed into law through, for example, the implementation of the *Federal Vehicle Repair Cost Savings Act*

of 2015, where all federal vehicles in the United States are encouraged to make use of remanufactured parts during their use phase.³⁶

The remanufacturing of vehicle parts can also create high quality jobs. It can, for example, increase skilled labour requirements by up to 120%.³⁷ For the remanufacturing industry as a whole, conservative estimates show that with reduced input costs and increased labour spend, there can still be up to a 50% increase in gross profit, offering a competitive advantage.³⁸

Remanufacturing activities can also bring substantial environmental benefits and opportunities to increase resilience. Renault has, for example, demonstrated that vehicles can be designed to be 85% recyclable and 95% recoverable,³⁹ while 43% of its engines can be remanufactured.⁴⁰ The remanufacturing process has led to savings of at least 80% in energy, water, and chemicals.⁴¹ Customers benefit from all of these advances by being offered a 'good-as-new' warranty for a 30–50% lower price compared to new replacement parts.⁴² Furthermore, with increased localised refurbishment and remanufacturing activities, supply chains are shortened. Flexibility is being generated as components and parts can also be obtained from customers and reintroduced in production. This offers the potential to increase the resilience of supply chains to external shocks—a topic that has now become more critical than ever.

The remanufacturing of vehicle parts could increase skilled labour requirements by up to **120%**

Investment opportunities also exist in the setting-up of recycling facilities that keep high-value materials in circulation—a shift that is increasingly being supported by policy. Such infrastructure can help ensure that cars designed for disassembly and recyclability can, in fact, be recycled and treated with minimal material and quality loss. Such investments will be needed, considering the way in which policies in Europe are heading. The European End-of-Life Vehicles Directive, for example, has already set a target of 95% recyclability per vehicle per year.⁴³ Rules are also being considered around mandatory recycled content and improving recycling efficiency. The aim is to ensure that upstream designs and downstream end-of-life processes are better aligned, strengthening the market for secondary materials and components.

As the shift towards EVs picks up speed, investing in remanufacturing and recycling infrastructure will also play a critical role in ensuring the longevity and reuse of EVs and their respective batteries. As an example, used EV batteries, whose charge capacity has become too low for automotive use, can be given a second life for approximately ten more years in mobile applications or stationary energy battery storage systems.⁴⁴ When it comes to battery recycling, the current recycling rates are around 50%, but with a new process by Fortum and Crisolteq they reach up to 80%, and metals are kept in circulation.⁴⁵ Advances in repurposing, remanufacturing, and recycling are being made offering clear benefits, with a report showing that when fully implemented these could lead “to a 25% reduction in demand for new batteries”.⁴⁶ Increasing regulation on this subject can already be seen. The European Circular Economy Action Plan is, for example, aiming to establish a new regulatory framework around batteries that facilitates the increased: reuse (rechargeability) of batteries, recovery of valuable materials, recycling of batteries, and use of recycled content.⁴⁷ This builds on the strategic action plan for the European Battery Alliance that was launched in 2017 and which had the ambition to establish a competitive and sustainable battery manufacturing industry in Europe that operates within the context of a circular economy.⁴⁸

The European Circular Economy Action Plan is establishing a **new regulatory framework** around batteries to boost circularity

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