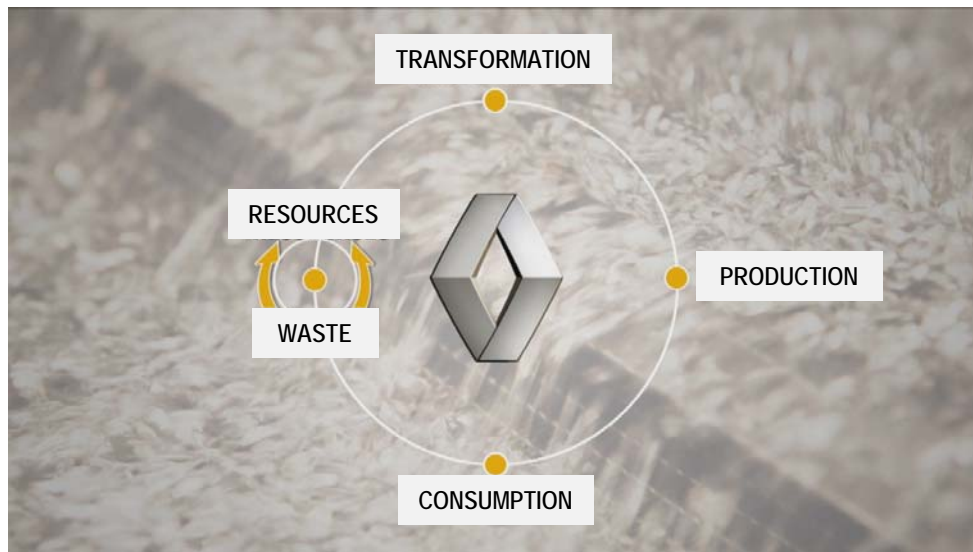


RENAULT, A COMMITTED PLAYER IN THE CIRCULAR ECONOMY



The era of cheap and plentiful fossil fuels and other essential materials is drawing to an end. That reality, combined with demographic pressure and the limited availability of resources and foodstuffs, underscores the need to revise our current production and consumption model, a linear model that consists in extracting raw materials, using them to produce goods, consuming those goods and then throwing them away.

The new approach of the circular economy

The circular economy is based on a systemic vision inspired by the workings of nature. Nature does not produce waste; everything is reused, composted and digested. Manufactured products themselves can be produced using less energy and reintegrated in the production process without generating waste, by reusing, repairing or remanufacturing them.

The Renault group is playing an active and pioneering role in the circular economy because its issues are both environmental and economic.

Extracting and transforming raw materials can harm the environment and reduce their availability for future generations. In parallel, the rise in and volatility of commodities prices have a negative effect on the current and future profitability of companies around the world.

As a major economic player, Renault seeks to ensure the long-term future of its businesses by taking account of environmental and social challenges. Renault is also convinced that automobiles, through their intrinsic characteristics, can tie in favorably with a circular economic approach. Vehicle production costs are sensitive to commodities prices because commodities account for roughly 20% of the total cost price.

Commenting, Jean-Philippe Hermine, Head of the Environmental Plan of the Renault group, said: “*Detecting potential resources in end-of-life products and safeguarding their technical and economic value is a new, and virtuous, way of sharpening your competitive edge. Who is better able than the producer of the goods and corresponding services to control these resources, ensure their quality and traceability, and make optimum use of them?*”

Renault is playing a hands-on role in the transition to the circular economy through its involvement in the creation of the Ellen MacArthur Foundation, working as part of the structure and together with other players. The Group has also structured its commitment to the circular economy by setting up a subsidiary, Renault Environment, in 2008. The Renault group funds Renault Environment to develop partnerships and shareholdings in the circular economy sector.

Renault’s circular economy plan starts with the careful eco-design of its vehicles.

To cut down on the use of natural resources, the Group favors the use of recycled materials in manufacturing. And to generate less waste, it designs vehicles that can be recovered and recycled at end of life.

Renault organizes the end-of-life process of its products so that parts and materials can enter a new life cycle.

The Group develops technical, logistics and economic solutions for collecting end-of-life vehicles, parts and materials, reusing and remanufacturing used parts, and transforming used materials to give them a second life. Renault makes a real-life contribution to these sectors to keep them profitable and improve the availability and quality of parts and materials.

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COMMITMENT – RENAULT IS ACTIVELY CONTRIBUTING TO THE CIRCULAR ECONOMY IN RESPONSE TO ENVIRONMENTAL AND ECONOMIC ISSUES

Renault, a founding member of the Ellen MacArthur Foundation to promote the circular economy

Renault's work with the Ellen MacArthur Foundation is informed by a shared observation: the time has come to switch from a linear economic model to a circular one, both to safeguard natural resources and ecosystems and to ensure the long-term future of the activities of a company such as Renault.

A shared observation and a shared commitment

The circular economy proposes a new **"regenerative economic model"** that helps companies to create more value. According to the "Remaking the industrial economy" report published in February 2014 by McKinsey Quarterly in collaboration with the Ellen MacArthur Foundation and the Renault group, "Unprecedented prices and volatility in natural-resource markets are pressuring the traditional 'take, make, and dispose' approach to manufacturing. Creating an industrial system that restores material, energy, and labor inputs would benefit business and society alike. The savings in materials alone could top \$1 trillion a year".

Renault's partnership with Ellen MacArthur, formed in 2007, confirms the Group's commitment to reducing its environmental footprint across all life-cycle phases through the increased use of the circular economy. When the yachtswoman decided to set up the Foundation in 2010 to foster the transition to a circular economy in the manufacturing industry, it was a natural move for Renault to back her initiative by becoming **one of the five founding members**.



Renault and Ellen MacArthur, a key partnership

Renault and the British yachtswoman Ellen MacArthur joined forces in 2007 on the issue of the environment. At that time, Renault was readying to set up its Renault Environment subsidiary focused on the circular economy, while Ellen MacArthur was leading discussions on the finiteness of natural resources, which she had observed first-hand on her travels, and on the pollution of ecosystems, notably in the Atlantic.

In 2008, Renault asked the yachtswoman to help it launch a dialogue with its customers to guide them in the purchase of more "eco-logical" and "eco-nomical" vehicles carrying the "Renault eco²" signature. The creation of the Ellen MacArthur Foundation in 2010, with Renault as a founding member, was a logical continuation of the collaborative effort and gave the partnership a new dimension.

Extensive dialogue was carried out between **experts** from Renault and the Ellen MacArthur Foundation to **stimulate research** into new technical solutions, processes and circular economy models at Renault. On behalf of her Foundation, Ellen MacArthur works to support change in Group mindsets and practices. She works with Renault's senior **managers**, helping them to enhance their strategic thinking. She also provides guidance for the **members of the Group's Environment network** in the rollout of its "Competitive Circular Economy" plan and takes part in conferences and assemblies to raise the awareness of **employees and shareholders**. Renault brings the Foundation its **experience in manufacturing** and case studies focused on the automobile, the aim being to **promote the circular economy with economic decision-makers**. The Group contributes to the **macro-economic studies** produced by the Ellen MacArthur Foundation. These reports, supplemented by economic analysis from the McKinsey & Company consultancy firm, quantify the potential benefits of the transition to a circular economy and underline the model's ability to adapt to the requirements of a globalized economy.

Renault, the first carmaker to make a capital-based commitment to the recycling economy, through its Renault Environment subsidiary


In 2008 Renault set up Renault Environment, a wholly-owned subsidiary that coordinates a large share of the Group's circular economy activities and makes a positive contribution to Group results.

Investing in the operational development of the circular economy

Renault Environment joined forces in 2008 with Sita/Suez Environnement by taking a 50% stake in **Indra, a French specialist in end-of-life vehicle dismantling and the recovery of the resulting parts and materials**.

The partnership between Sita/Suez Environnement and Renault Environment is also illustrated through a joint subsidiary, **Boone Comenor**, which manages **ferrous and non-ferrous metallic waste** at Renault sites.

Renault Environment also works on the **recovery of end-of-series vehicles at plants and after-sales warehouses** with **Gaia**, a wholly-owned subsidiary of Renault Environment that is gradually becoming the principal manager of the flows involved in the Renault group's circular economy model.



indra
AUTOMOBILE RECYCLING

A network of nearly 400 dismantling centers in France

With 30 years' experience in automotive dismantling, Indra brings together a network of 396 approved dismantling centers across France.

Indra and its network dismantled and helped to recover around 300,000 end-of-life vehicles (ELVs) in 2012, or a quarter of all ELVs, all brands combined, in France.

ECO-DESIGN – RENAULT VEHICLES CONTAIN 30% OF RECYCLED MATERIALS AND ARE 95% RECOVERABLE AT END OF LIFE

Renault, on the cutting edge of the integration of recycled materials, notably plastics

Renault makes a priority of replacing raw materials, based on natural resources, by “secondary” materials, made from recycling. Because the approach is subject to the availability and quality of recycled materials, Renault also works to create “recycling loops” (see page 11) that, consistent with the principles of the circular economy, bring secondary materials into conformity with the specifications of the automotive industry.

Renault’s objective is to achieve a ratio of 33% of recycled materials in the total mass of its new vehicles produced in Europe by 2016.

This ratio stood at an estimated 29.7% in 2013.

Of the materials used at the plants in the Europe and Euromed Regions (around 70% of the Group total), the share of recycled materials in steel is estimated at between **15% for flat steel and up to 100% for long steel.**

The proportion of recycled material totals up to **95% for cast iron** and **100% for foundry-produced aluminum parts.**

Recycled plastic rate of 11% and continuing to grow

As early as the 1990s, **Renault led the way on the use of recycled plastics** on its vehicles. And the Group retains its leadership position in the field today. The share of recycled plastics used in the production of Renault and Dacia vehicles is estimated at **an average 11%.**

The use of recycled plastics improves with each new generation at Renault, notably owing to the increasing availability of the material. In 2013 the ratio rose to **16% on Captur.** The Group aims to achieve a recycled plastic rate of 20% on new vehicles produced in Europe in 2015.

And Renault is on track to meet that objective. For example, it added **two new plastic references from short-loop recycling** to its plastic materials catalogue (Renault Materials Panel) in 2014.



Renault Mégane – Parts in recyclable and renewable plastic material

Renault vehicles are almost entirely recyclable and recoverable at end of life

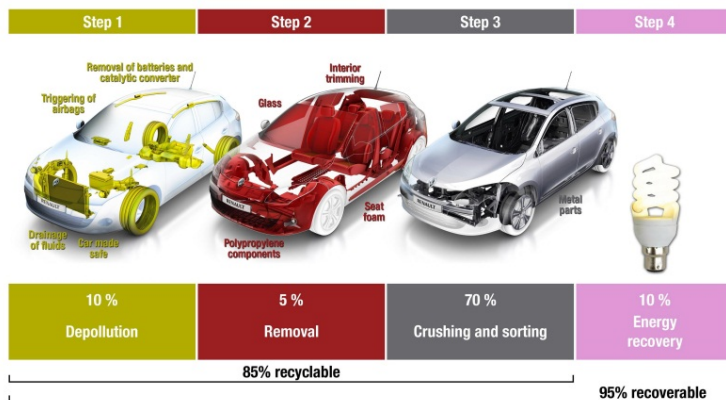
Manufacturing vehicles while using a minimum of natural resources hinges above all on making a maximum amount of the material contained in the vehicle reusable at end of life, and ideally in the production of a new vehicle. That's why Renault's eco-design policy is aimed first and foremost at creating repairable vehicles that are easy to dismantle and contain recyclable or recoverable materials.

Renault and Dacia vehicles have been designed to be 85% recyclable and 95% recoverable since the 1990s and have been homologated as such since 2008.

Integrating dismantling- and recycling-linked constraints from the design phase

In the design phase, each vehicle is monitored by a **recycling specialist**. Since the starts of the 2000s, the design of Renault vehicles includes constraints linked to **dismantling** and **recycling**.

For example, dismantling is made easier by **reducing the number of attachments**. Similarly, engineering **favors the use of recyclable materials** for which recycling industries exist, avoids using on the same part materials that cannot be recycled together, and designs tanks so that the **fluids** (fuel and oil) **can be fully extracted**.



Renault Mégane –
Diagram of end of life
cycle

LOOPING THE LOOP – RENAULT ORGANIZES THE SECOND LIFE OF VEHICLES AND COMPONENTS

Renault contributes to the collection and processing of ELVs, including 25% of the total in France through Indra

Renault contributes to the organization and collection of end-of-life vehicles (ELVs) wherever necessary and in a range of forms, either by organizing a proprietary network of approved collection and processing centers for Renault vehicles or by contributing to a collective approach (involving carmakers, dismantlers and public authorities) on the structuring of ELV recycling industries.

Direct contribution in France

Above and beyond its regulatory obligations, Renault in France makes a **direct contribution** to collection and dismantling activities with a view to **maintaining economic and technical control over the flow of materials**.

Indra, the joint French subsidiary of Renault Environment and Sita/Suez Environnement, and its network of dismantlers, processed 300,000 ELVs in 2012.

As part of a policy on continuous improvement, Indra is developing a real **engineering structure for dismantling**. It works on the design and improvement of new tools and processes in ELV dismantling at its **Romorantin development center** and tests them at its dismantling sites.



Collection and dismantling of end-of-life vehicles at Indra's Romorantin site

Depending on their condition, the **parts collected from ELVs** in the Indra network are sent on for **reuse or to the relevant recycling channel**.

The subsidiary Gaia does the same thing for **unused parts** in the sales network and at plants and suppliers.

Renault reuses parts from its ELVs

Reusing used parts

Relying on the **pooled parts stock at dismantlers in the Indra network**, Renault is experimenting with a **repair offering featuring “reused” used parts**.

Renault’s primary sales network in France has since 2012 offered customers vehicle body parts (hoods, wings, lights, etc.) collected in the Indra network at attractive prices. The offering is available for **customers with old or economically unrepairable vehicles**.



Sorting light units from ELVs for reuse at Indra’s Romorantin site

Reconditioning used powertrain components

Reconditioning used powertrain components uses 80% less energy, water and chemicals than producing a new part.

Renault **reconditions, or re-manufactures, powertrain parts**, and has done so since 1949, at its **Choisy-le-Roi plant** and at some suppliers. The used parts collected in the sales network are sorted and reconditioned.

Sold to Renault vehicle owners under the name **“standard replacement”**, reconditioned parts cost a full 30% to 50% less than new parts while complying with the same safety standards. Far from a marginal business, the standard replacement offering **accounts for a major share of the spare parts range**, from 70% of powertrain components to 90% of suspension parts.

USINE RENAULT CHOISY-LE-ROI



Every year, the Choisy-le-Roi plant reconditions nearly **30,000 engines, 20,000 gearboxes and 16,000 injection systems**. The activity is carried out according to a strict industrial process, consisting of the complete dismantling, sorting, reconditioning and replacement of wear or faulty parts, followed by cleaning, reassembly and inspection.



Reconditioning powertrain components from ELVs at Renault’s Choisy-le-Roi plant.

Renault recovers materials from its ELVs and sites

Consistent with the principles of the circular economy, Renault's objective is to recycle materials from the automotive industry as much as possible within the automotive industry. This "looping the loop" approach to recycling can be done on an almost infinite basis since it preserves the material capital of all the parts of a vehicle. And the shorter the "loop", the more Renault reduces its environmental footprint and logistics costs.

Renault Environment **has set up material loops from ELV processing centers in the Indra network**, to Renault copper and aluminum foundries, to the group's polypropylene and noryl suppliers, and to other industries for materials from catalytic converters.

Co-building material loops within the automotive industry

Renault is introducing a growing number of recovery loops, including the following:

The **wiring harnesses** purchased from ELV dismantlers by the Gaia subsidiary have been processed by the MTB company since 2011 to extract the **copper**. The copper is sold to the Renault group's Fonderie de Bretagne foundry for the production of pearlitic cast iron or to automotive industry suppliers for the refining of aluminum. The high-quality recycled copper complies with demanding technical specifications.



Recovering copper from ELV wiring harnesses at MTB

The **engines and gearboxes** coming from vehicle maintenance and repair have been recycled in short loops since 2012. In reconditioning at the Choisy-le-Roi plant, 48% of the components cannot be recovered as standard replacement parts because they are too used. These components are recycled at Renault group foundries to make new components. The **used brake discs** collected in the sales network have been part of the same loop since 2013.

Gaia collects **polypropylene bumpers** from dismantlers and garages and organizes their reprocessing in line with the technical specifications of the Renault-Nissan Alliance. Gaia has been listed on the Renault Materials Panel since 2014, which authorizes suppliers of plastic parts to work with Gaia.

Noryl plastic parts from manufacturing cast-offs at the Flins, Douai and Revoz plants are used to the rate of 6% in the production of new wings at Flins and Douai.

Developing material loops together with manufacturers in other sectors

Renault works in partnership with various stakeholders (the French Environment and Energy Management Agency, local authorities, academics and scientists, companies and suppliers) to develop short loops for, among other materials, polyamide, textiles and critical materials in electric batteries.

Renault is contributing to the **ValTex research project on the recovery of professional textiles**, in partnership with SNCF and several manufacturing companies. The aim is to develop a profitable and sustainable recycling and recovery industry for a number of end-of-life parts in the automotive and rail sectors, including foams and textiles from vehicles and trains and professional clothing (uniforms, corporate outfits and protective apparel). The waste collected will be recycled to create new acoustic and thermal insulation parts for manufacturers and qualifying for the “Ecocert Environnement” label.

By retaining the **ownership of the batteries on its electric vehicles** in almost all sales countries, Renault has launched an original business model that is faithful to the principles of the circular economy and which consists in replacing the sale of a product by the sale of its use. The Group controls all the end-of-use flows and takes maximum advantage, by giving the battery a **second life** through other, stationary uses, by **regenerating** the battery through the selective replacement of faulty modules, or by sending it on to **critical material reuse** channels for the production of new batteries.

To meet the recycling needs for the initial batteries, Renault has made contractual agreements with Li-ion battery recyclers. But the Group is also working with partners to develop **new, adapted recycling processes**. This project, recognized by the French Environment and Energy Management Agency, optimizes the recovery of materials from electric vehicle batteries both ecologically and economically.

Looking beyond economic considerations, Renault uses the circular economy to shrink the environmental footprint of its products and activities.

Working on the entire life cycle of its vehicles – and in particular by reducing CO₂ emissions – the Renault group leads an ambitious policy on the reduction of its carbon footprint, the main component of the environmental footprint. Renault met its objective to reduce its carbon footprint by 10% between 2010 and 2013. Pursuing its efforts, the Group is aiming for a 3% reduction per year on average between 2010 and 2016.

Renault's driving role in meeting a collective regulatory objective

Renault is contributing to the European Commission's objective on the rate of re-use and recovery for ELVs, set for 2015 at 95% of average weight per vehicle, all brands combined. The Group is playing an active part in the combined efforts of the automotive manufacturing and recycling industries in Europe. Renault has established itself as a leading figure in recycling in France, the company's biggest sales market and historical manufacturing base. The Group's efforts enabled France to reach an 87% re-use and recovery rate, all brands combined, by end-2012, according to figures from the French Environment and Energy Management Agency, ADEME.



Renault lent new momentum to its policy on the development of the recycling sector in 2011 with the launch of the ICARRE 95 project (short for Innovative CAR REcycling 95%), part of the **European Commission's LIFE+ program**.

The ICARRE 95 project involves a number of partners and subcontractors and relies on the functions of the Renault group and the subsidiaries of Renault Environment. The project, subsidized by the EC, has a budget of several million euros.

The aim of ICARRE 95 is to create a model that **recovers 95% of the weight of ELVs** in economic conditions that are profitable for all the players involved. To that end, **short loops for reused parts and materials are being set up in the automotive sector**.

The model is to be applicable in all European countries. To meet the objectives, the project is aimed at developing the second life of automotive components and/or materials by focusing on the **recovery of re-used parts, plastics, aluminum and copper, textiles, and the platinumoids in catalytic converters**. Success hinges on the more effective dismantling and sorting of car parts and on short-loop supply to all players, in line with the principles of the circular economy. These processes must be economically viable in the industrial phase and ensure, as part of a continuous cycle, the technical quality required to supply the subcontractor chain. In 2013 the project also focused on the **economic viability of the collection of ELV materials**, which are dispersed throughout the automotive dismantling network, and the introduction of **collection service contracts** to guarantee performance in this area.

As part of the ICARRE 95 project, Renault is working with **Synova**, a plastics specialist, **Duesmann**, a platinumoids specialist, **Indra**, a vehicle dismantler, as well as **Institut supérieur de plasturgie d'Alençon** (ISPA) and **Institut textile et chimique** (ITECH), which are developing new technological solutions and the corresponding skills.

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