

2015



Total number of
dismantled vehicles

213,639

2014: 226,103

Via ARN-affiliated
companies

185,110

2014: 188,279



Market
share ARN

86.6%

2014: 83.3%

Recycling cars, is a

Raw materials are becoming increasingly scarce. This of course also applies to the raw materials needed for the production of cars. We need to handle these raw materials with greater care. An even better option is to return as many of these materials as possible to the production chain.

Automotive production deals with mind-boggling numbers. Worldwide, more than 90 million new cars are produced, every year. Of those 90 million, some 500,000 new vehicles reach the market in the Netherlands, each year.

Since 1 January 2015, all Member States of the European Union have been required to ensure recovery of 95% by weight of all end-of-life vehicles, in accordance with the European End-of-Life Vehicles Directive.

ARN has been tasked with ensuring that the Netherlands achieves that 95% target, and that cars are reprocessed for the highest possible value into new raw materials that are returned to the chain.

shared responsibility!

We implement our task by coming up with innovative and circular solutions for the reuse of materials from end-of-life vehicles, and ourselves putting that knowledge into practice.

Our mission is to share our knowledge and experience both inside and outside the mobility sector. After all, without sharing there can be no multiplication. Against that background, we are constantly in discussion with relevant parties on key themes affecting recycling and sustainability. In that way, we can make a contribution to circular awareness, and are open to learning from others.

Over the past twenty years, ARN has developed to become the recycling expert in the automotive sector. This has only been possible thanks to the unabated collaboration with our stakeholders and major parties inside and outside the automotive recycling chain. Over the next few years we aim to continue along this path and to further develop the role of ARN as a centre of expertise. After all, recycling cars is a shared responsibility!

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The road towards a circular economy

It is vital that we make the transition to a circular economy. That is something we are all agreed upon. However, not everyone understands that arriving at a circular economy is a long-term effort. We at ARN work every day to achieve the smart completion of the raw materials cycle. Based on that daily reality, we know that making a circular economy is easier said than done. Sometimes, for example, recycled materials are given a lower-value application than the original product, as is the case for steel from cars that is reused as a raw material for reinforcement bars in concrete structures.

I often hear negative noises about this process of down-cycling. Nonetheless, downcycling is essential to achieve the eventual goal of raising recycling technology to a higher level and developing better techniques that make it possible for recycled materials to be reapplied in ever higher-value applications. Although not a 100% circular process, it is a step towards completing the recycling circle.

In many cases, automotive manufacturers are not interested in purchasing recycled materials since they purchase many automotive parts as complete components, leaving the actual fabrication to their suppliers. Furthermore cars have an average lifecycle of eighteen years before they reach the end-of-life phase. As a consequence, the end-of-life vehicles we recycle date from a completely different period, and are often made from materials no longer suitable for the production of today's cars. In that sense, for now a 100% circular economy in our sector is just a dot on the horizon, towards which we are gradually moving, step by step.

PST plant more sustainable

We are playing our part by ensuring that the final residues from cars are processed in our PST plant as sustainably as possible, into valuable, reusable materials. At the end of 2015, we switched over the power supply for our recycling plants to Dutch wind energy, thereby reducing the CO₂ emission of our energy use by 97%. In 2016, we will carry out another Ecotest, to determine the perfect balance between recycling, costs (economy) and CO₂ footprint (ecology). The answer to the question what price can we still responsibly pay for the recycling of the final residues from used raw materials will prove particularly important.

Extended contract

We will continue to manage the automotive recycling chain for the next five years, in close collaboration with our chain partners: car dismantling, collection and recycling companies, intermediate traders and metal recycling companies. Our client, the RAI Association, the organisation that represents the interests of importers and manufacturers of cars in the Netherlands, and ARN have once again extended their contract for these services. The agreement runs through to 1 January 2021. Part of the latest agreement is the obligation to reduce the dismantling fee, and to cut recycling costs, for example the costs for the activities in the PST plant. The extension of this contract is further evidence for us that past performance has generated sufficient confidence to continue our cooperation.

Developments in the vehicle fleet

In 2015, more than 14% more new passenger cars and light commercial vehicles were sold than in the previous year. This upturn was mainly due to the fiscal advantages offered to business drivers. The numbers of cars recycled in 2015 fell by more than 5%. The ending of the 'Dismantling under own authority scheme' on 1 April 2015 is a special milestone for the further professionalisation of the car dismantling sector. We need a professional dismantling network to adequately fulfil our task. The ending of the scheme has made a direct contribution to tackling the leakage flows and increasing the market share achieved by ARN from 83.3% in 2014 to 86.6% in 2015. There is still however much work to be done in tackling unfair competition and completing the recycling chain. Tackling the illegal dismantling of cars and monitoring the waste substances records of car dismantling companies not



affiliated to ARN will therefore remain high on the agenda, in the frequent consultations with the Ministry of Infrastructure and the Environment, and the Inspectorate.

Electric cars

The sale of hybrid and electric cars has grown enormously. We are working on possibilities for finding a second-life use for end-of-life Li-Ion batteries from these cars.

Extending the life of Li-Ion batteries will be good for the environment and also contributes to a reduction in recycling costs. An experiment on the island of Pampus has already generated promising results for the stationary application of end-of-life Li-Ion batteries. Partly on that basis, the government has removed legal obstacles for second-life battery usage. In 2015, new importers of electric cars joined ARN, with a view to implementing their recycling obligations in respect of batteries. We are able to offer them tailor-made solutions.

Shredder trials demonstrate 97%

In 2015 we carried out three shredder trials, one of the key objectives of which was to demonstrate the contribution made by the PST plant to the compulsory 95% recycling performance. As explained elsewhere in our sustainability report, in 2015, we achieved a score of 97.0%, a performance of which I am extremely proud. And I'm not only proud of ARN, but above all of the combined performance within the entire car recycling chain. The shredder trials also deliver more reliable and accurate reports on the re-usage percentage, so that we comply with the wish of the Human Environment and Transport Inspectorate (ILT).

LIFE+ subsidy

Partly thanks to a European LIFE+ subsidy to the tune of € 1 million, we achieved major progress in the higher-

value processing of a number of material flows. The eventual outcome will be a better recycling performance. This contribution by the PST plant to the recycling performance achieved by ARN has risen from 2.1% material reuse and 4.4% energy recovery in 2014 to 5.1% material reuse and 7.3% energy recovery in 2015; in total more than 12%.

Prospects for 2016

2016 is expected to be yet another busy year. Together with the car dismantling companies, we will be developing a new collaboration model that will have to be futureproof, without relying on a dismantling fee. Recycling, after all, is a shared responsibility. At the PST plant, we aim to continue improving efficiency and cutting costs. We will also continue to search for methods to increase the value of the materials we recover. Via the 'Erkend Duurzaam' sustainability certification programme, we will continue to make an active contribution to the further sustainability of the mobility and recycling sectors. Knowledge and experience acquired by us in the past will be made available to other parties, to be deployed by them in striving to achieve further sustainability and in taking steps towards the circular economy.

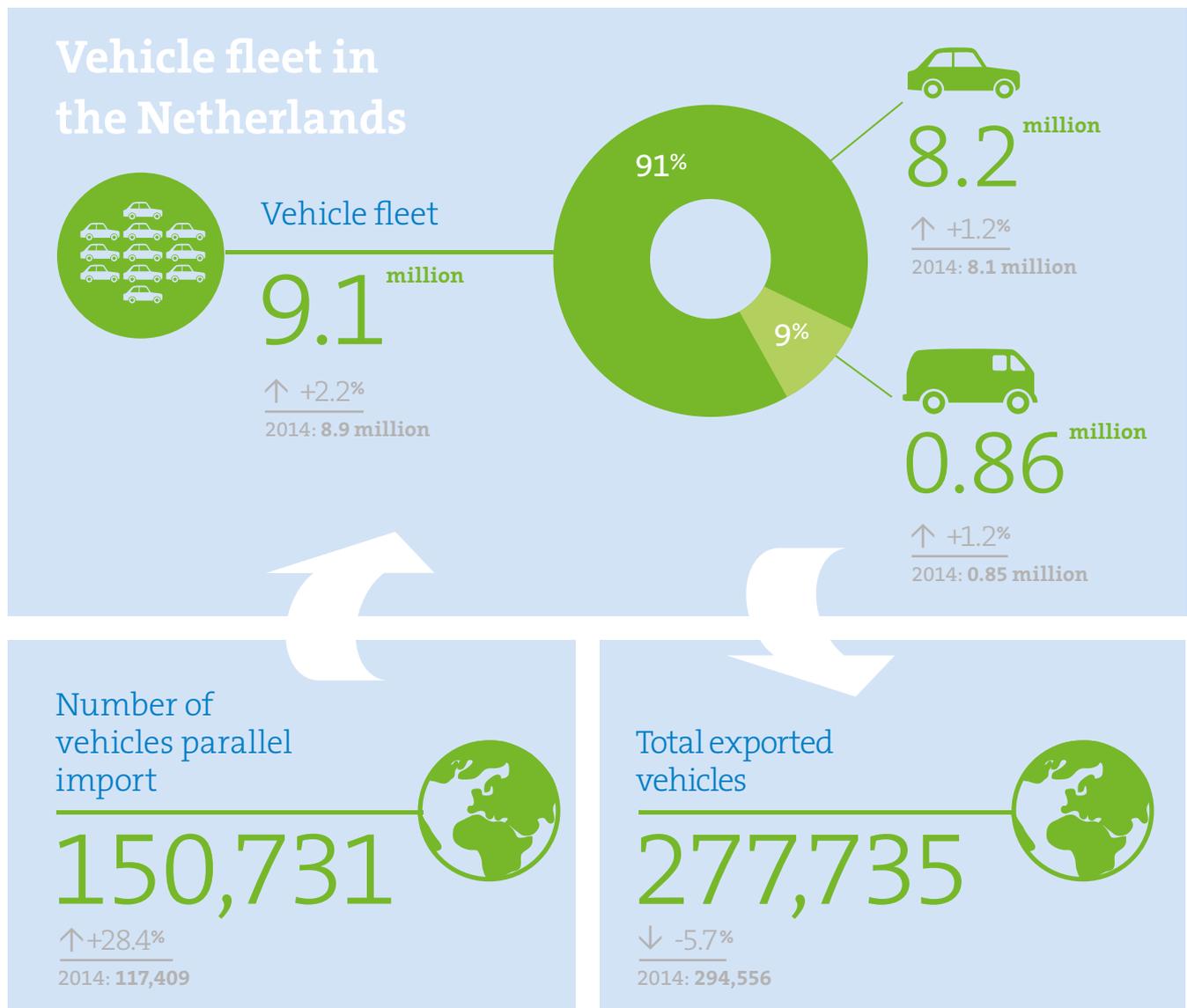
Acknowledgement

I would like to thank everyone active in the car recycling chain and the mobility sector for the successful cooperation in 2015, and all staff of ARN for their enthusiasm and dedication to one another and to our organisation!

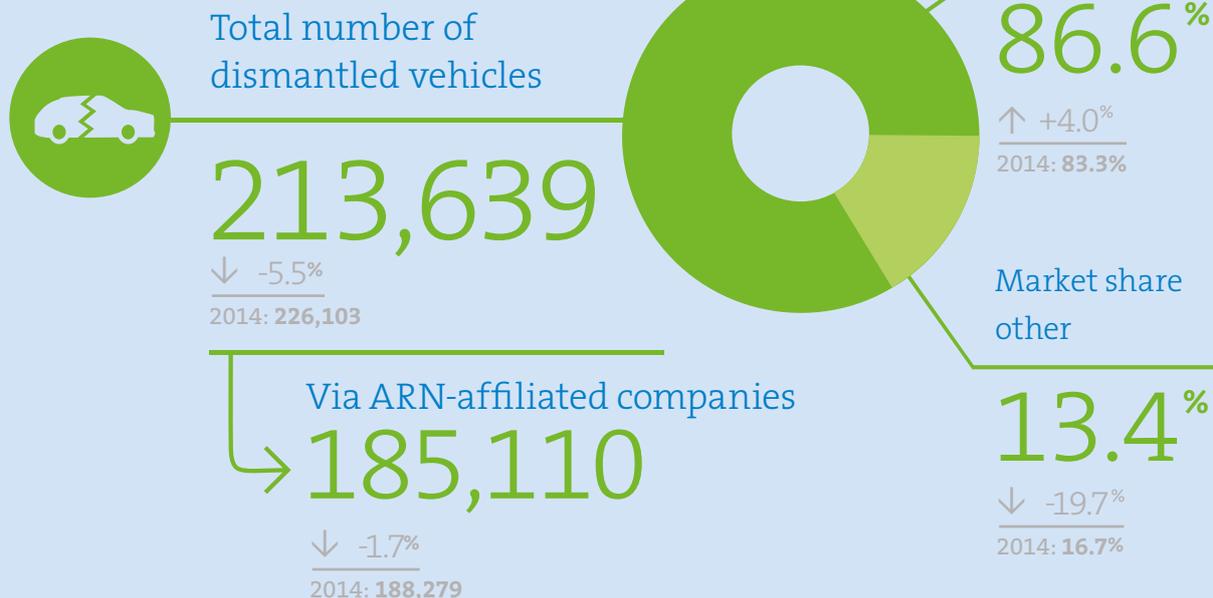
Arie de Jong, Managing Director ARN
Amsterdam-Zuidoost, June 2016

Welcome to Our world!

The Dutch vehicle fleet consists of around 9.1 million vehicles (all four-wheeled vehicles that may be driven by a holder of a B driving licence and which, fully laden, represent a maximum weight of 3,500 kg). The majority (> 91%) are passenger cars. In 2015, the average age at which a car became an end-of-life vehicle was 18.1 years. This means that in 2015, more than 214,000 cars became eligible for dismantling. Almost 87% of these vehicles were collected, dismantled and recycled via the ARN chain. The majority of dismantling costs were paid for from the recycling fee collected for every new vehicle. 500,024 new vehicles were registered in 2015. **Welcome to our world!**



Car dismantling in the Netherlands (our market)



Number of new vehicles for which a recycling fee was collected

500,024

↑ +14.2%
2014: 437,755



Recycling performance

87.7%
recycling

9.3%
recovery

97.0% total

↑ +0.9%
2014: 96.1%
Statutory target 2015: 95%



Key figures age and weight

Average age end-of-life vehicle

18.1^{years}

↑↓ 0%
2014: 18.1 years

Average weight end-of-life vehicle

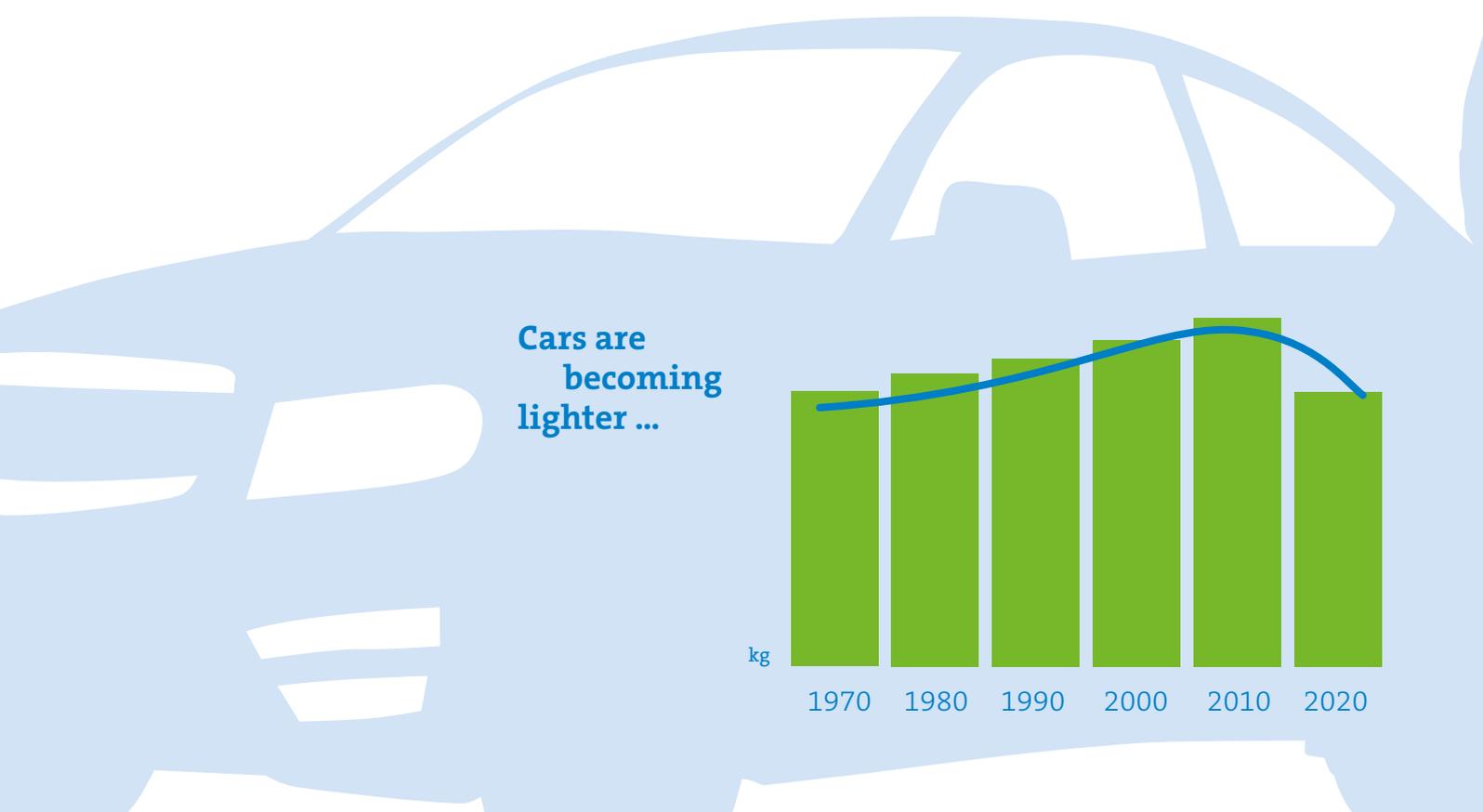
1,038^{kg}

↓ -0.3%
2014: 1,041 kg

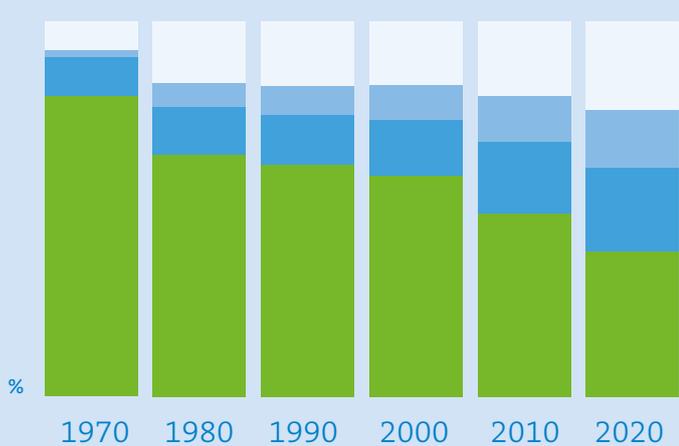
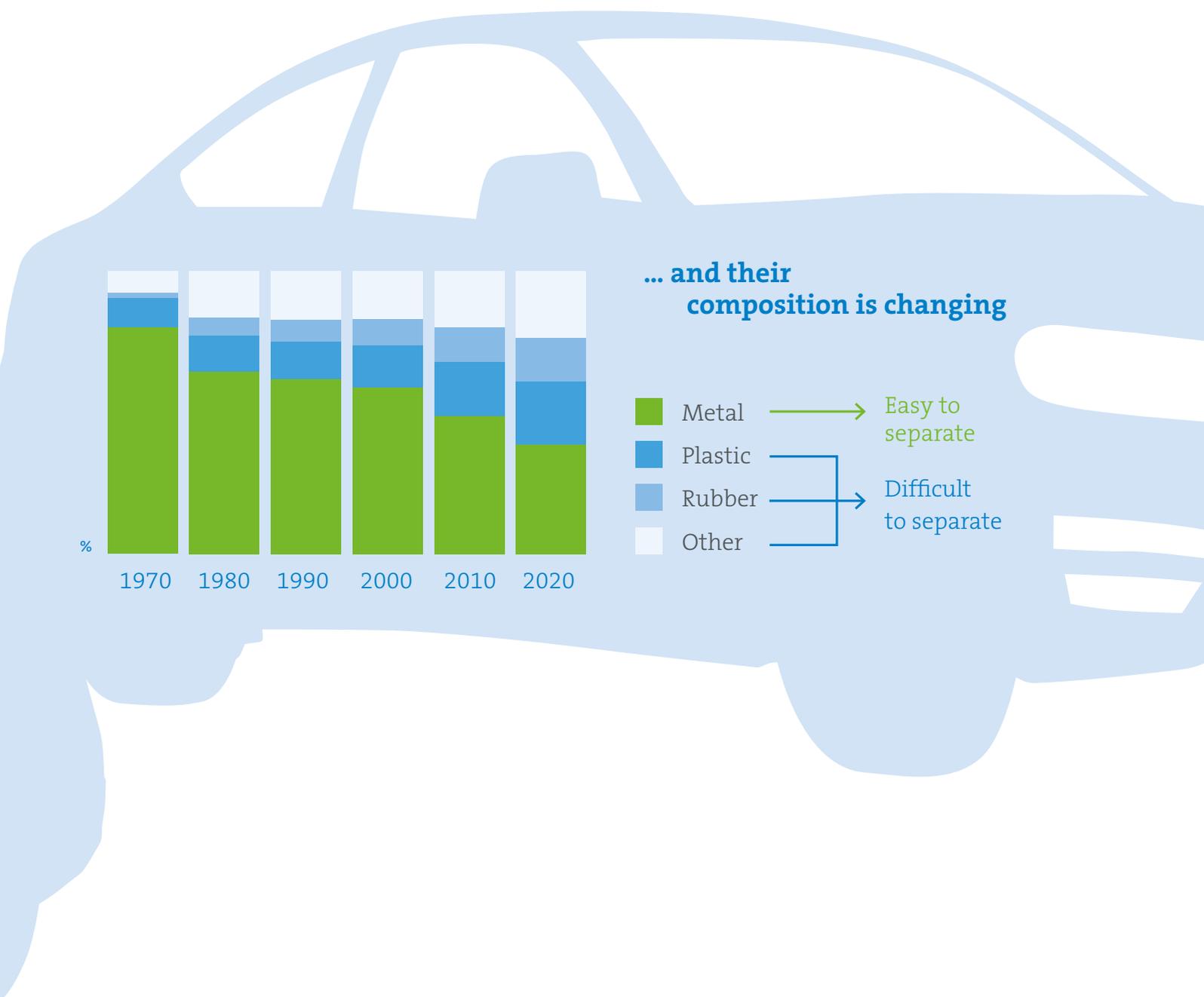


Our world is changing

We at ARN are faced with the challenging task of recycling at least 95% of end-of-life vehicles. Thanks to excellent cooperation with our chain partners, we succeed well in achieving this aim. Cooperation and exchange of knowledge are crucial if we are to achieve this 95% objective now and in the future. We see for instance that cars are getting lighter and their composition is changing. Following these developments and sharing knowledge with each other is of great importance. After all, a car that leaves the showroom today is the 'end-of-life vehicle' of tomorrow. **Our world is changing.**

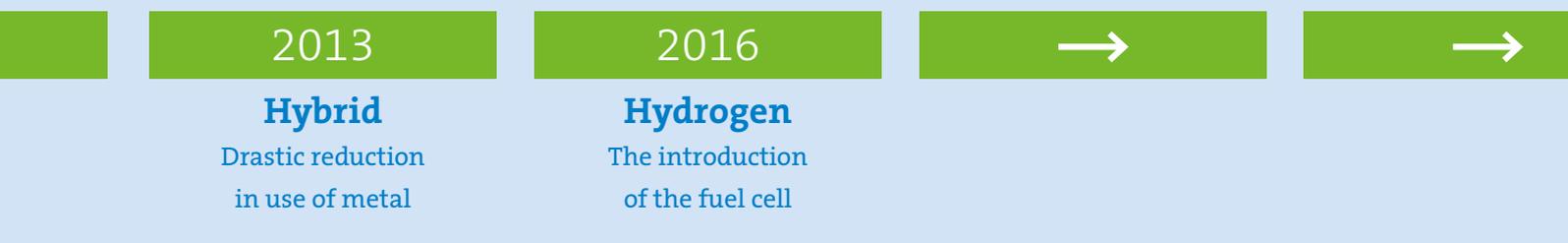


→	1970	1980	1990	→
	Safety requirements More rubber and plastic	Environmental requirements Less metals	Electronics More computers and magnets	



... and their composition is changing

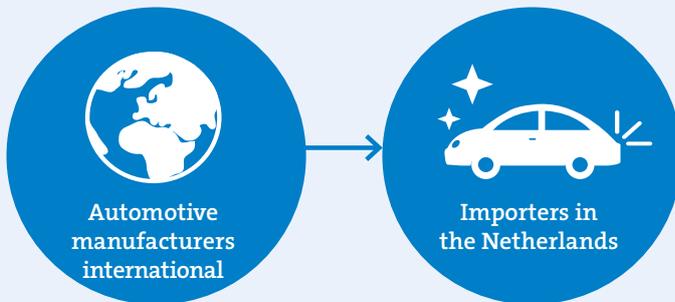
- Metal → Easy to separate
- Plastic → Difficult to separate
- Rubber → Difficult to separate
- Other → Difficult to separate



Our chain partners

ARN operates within the legal framework formed by the End-of-Life Vehicles (Management) Decree (Bba) and the Battery Management Decree (Bbb). These Decrees include stipulations that 95% by weight of an end-of-life vehicle must be recycled and recovered. The result is that raw materials are returned to the chain, thereby allowing the sector to contribute to the transition towards a sustainable and circular economy.

Bba, End-of-Life Vehicles (Management) Decree Bbb, Battery Management Decree

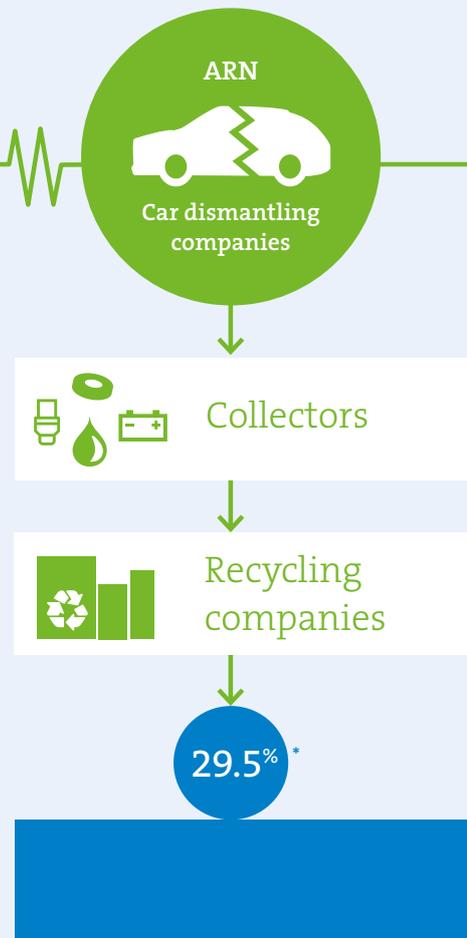


€ 45

Recycling fee
(incl. VAT)

Average useful life
18.1
years

Automotive recycling chain



Management fees for Li-Ion batteries

Battery weight	Fee per battery (including VAT)
≤ 5 kg	€ 15
> 5 kg and ≤ 25 kg	€ 35
> 25 kg and ≤ 100 kg	€ 90
> 100 kg and ≤ 350 kg	€ 180

For batteries > 350 kg, the management fee will be determined according to each individual situation.



Knowledge sharing by ARN

- Waste management
- Erkend Duurzaam programme
- Consultancy

* 29.5% consists of two components: 25.8% parts and material sales, 3.7% collected by collectors and recycling companies.

Naturally, ARN is unable to achieve this performance on its own, and works closely together with more than 300 companies in the automotive recycling chain:

Over the next few chapters, these chain partners and their role in the environmentally responsible processing of end-of-life vehicles will be further explained.



Importers active in the Netherlands



Car dismantling companies



Metal recycling companies



PST plant



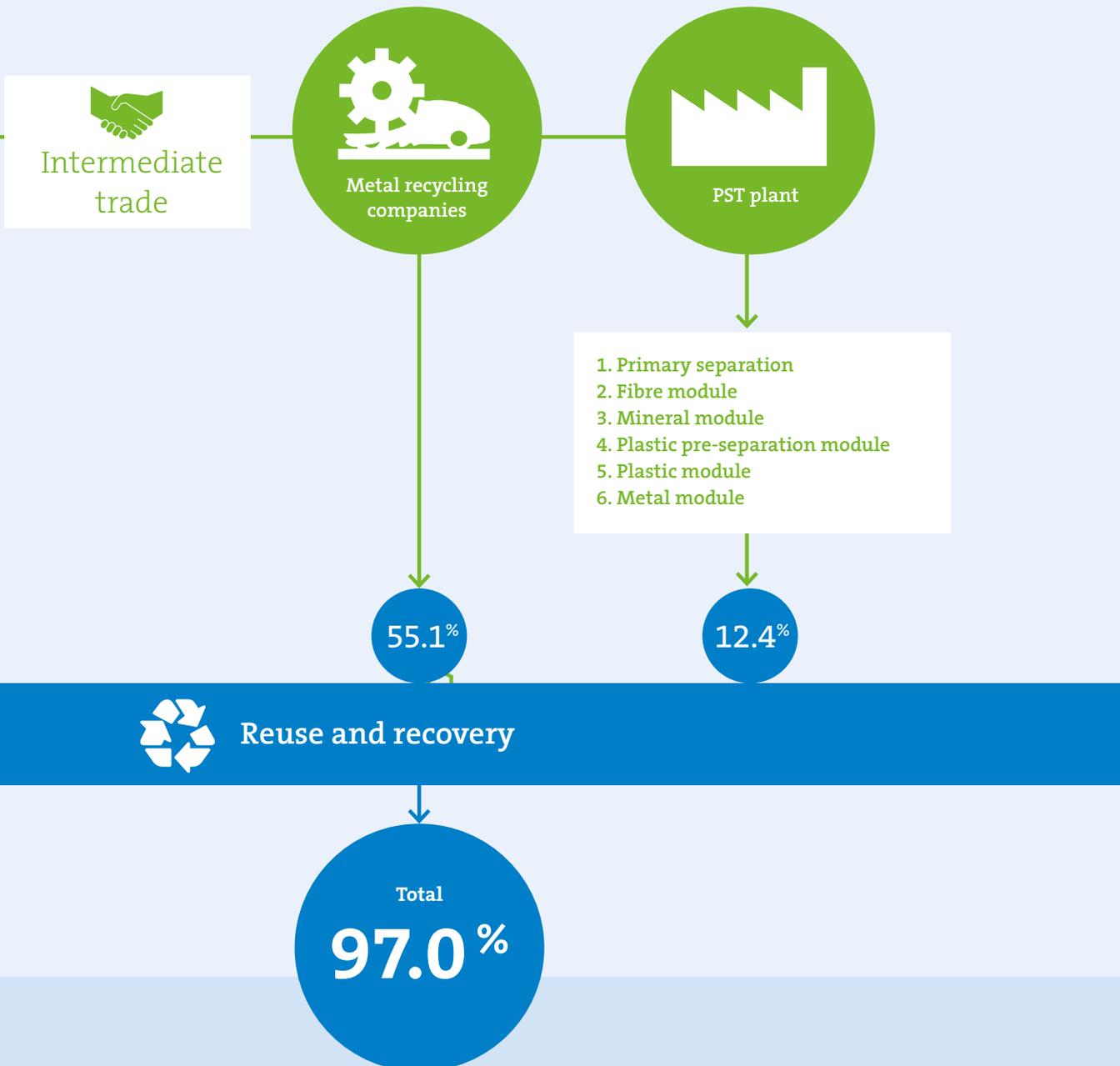
Collection companies



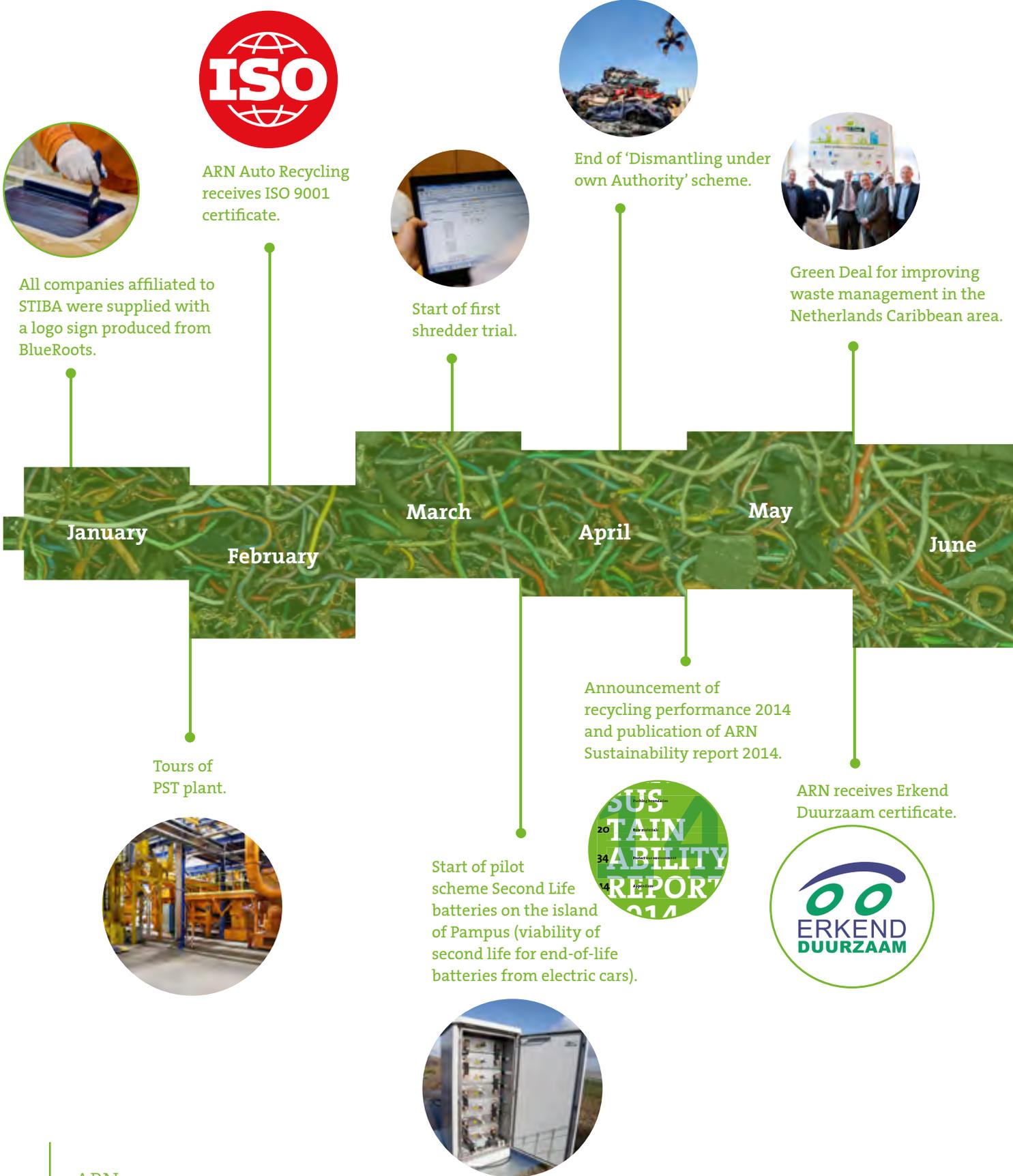
Recycling companies



Intermediate trade



Highpoints





ARN speaks about recycling responsibility throughout the chain at the Driving Business Aftermarket event.



ARN business relations day.



ARN publishes the 95 magazine based on the theme of raw materials.



ARN Recycling (PST plant) successfully passes the ISO 9001 audit and is nominated for certification.

July

August

September

October

November

December

Interviews with car dismantling companies in the framework of the change programme 'Sustainable car recycling: a shared responsibility'.



At the PST plant, the final touches are made to the M-line, the metal recovery line for recovering the copper fraction.



ARN transfers knowledge to the Turkish dismantling sector.



ARN publishes Layman's report LIFE+ subsidy, and also the final report.

ARN and RAI Association extend contract by five years, through to 1 January 2021.



Recycling cars; a joint responsibility!

Raw materials are becoming increasingly scarce. This of course also applies to the raw materials needed for the production of cars. We need to handle these raw materials with greater care. An even better option is to return as many of these materials as possible to the production chain.

Automotive production deals with mind-boggling numbers. Worldwide, more than 90 million new cars are produced, every year. Of those 90 million, some 500,000 new vehicles reach the road in the Netherlands, each year.

95% recovery

Since 1 January 2015, all Member States of the European Union have been required to ensure recovery of 95% by weight of all end-of-life vehicles, in accordance with the European End-of-Life Vehicles Directive. In that total, no less than 85% material reuse must be supplemented to at least 95%, by recovery, for example in the form of energy recovery via incineration. ARN has been tasked with ensuring that the Netherlands achieves that 95% target, and that cars are reprocessed for the highest possible value into new raw materials that in turn are returned to the chain. Crucial in fulfilling that assignment are the relationships and cooperation with our chain partners: the car dismantling, collection and recycling companies, intermediate traders and metal recycling companies.

Innovative circular thinking

We implement our task by coming up with innovative and circular solutions for the reuse of materials from end-of-life vehicles, and ourselves putting that knowledge into practice. The PST plant, built and developed under our own management in Tiel, is an excellent example. At the PST

plant, shredder waste – the final materials left behind from end-of-life vehicles – undergoes mechanical post-separation. In Tiel we are also constantly searching for new applications for materials produced by the plant. By selling those materials to manufacturers, we effectively complete the recycling chain. Our aim is to make the process of recycling end-of-life vehicles itself as efficient and sustainable as possible. We are constantly on the lookout for improvements in the in-plant processes by optimising the processing line, taking energy-saving measures and reducing CO₂ emissions. Our underlying principle is a clear balance between recycling performance, costs and CO₂ footprint.

Sharing knowledge and experience

Our mission is to share our knowledge and experience both inside and outside the mobility sector. After all, without sharing there can be no multiplication. Against that background, we are constantly in discussion with relevant parties on key themes affecting recycling and sustainability. In that way, we can make a contribution to circular awareness, and are open to learning from others.

Our key motive is to provide an active contribution to the further sustainability of the automotive sector and the development of the circular economy. Our eventual goal is to create a full raw materials circle. The greatest challenge



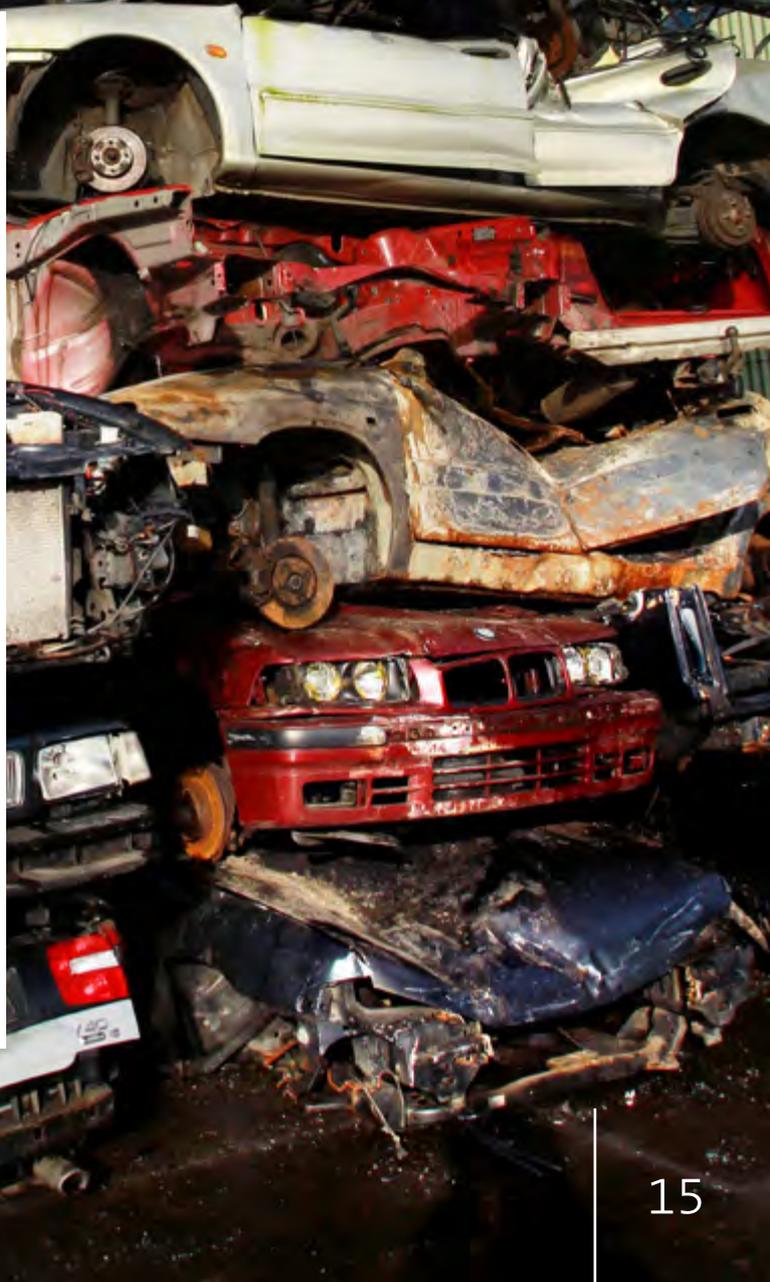
in making the automotive recycling chain truly circular lies in processing the materials from shredder waste at the highest possible value. To succeed in that goal, a number of parameters must be fulfilled.

Chain cooperation

Technology has to be available. Within the chain we must work together and share knowledge. We need the power to invest, since this is not a short-term process. We also have to encourage the market to accept and make use of new materials and secondary raw materials. Last but certainly not least, the government must set a good example and itself purchase products produced from secondary materials. The government as a so-called launching customer can be a vital catalyst for the recycling industry.

The recycling expert

Over the past twenty years, ARN has developed to become the recycling expert in the automotive sector. This has only been possible thanks to the unabated collaboration with our stakeholders and major parties inside and outside the automotive recycling chain. Over the next few years we aim to continue along this path and to further develop the role of ARN as a centre of expertise. After all, recycling cars is a shared responsibility!





Artemis Hatzi-Hull of the DG Environment
of the European Commission:

‘The End-of-Life Vehicles Directive is an excellent example of the circular economy in action’

The results of the European End-of-Life Vehicles Directive introduced in 2002 are cause for satisfaction in Brussels. “The Directive has been successful in preventing waste from end-of-life vehicles and reducing the dumping or incineration of waste residue,” explained Artemis Hatzi-Hull in an interview. She works at the European Commission in the field of waste management, within the Directorate General for the Environment. When the Directive was first drawn up, much of it was based on the Dutch approach.

The End-of-Life Vehicles Directive requires all European Member States to achieve at least 95% reuse and recovery of a car by weight, and of that total, at least 85% must be in the form of material reuse and recycling. For 2015, The Netherlands achieved a recycling performance of 97%, of which 87.7% material reuse.

Although the recycling of cars is broadly speaking a success, Hatzi emphasised that a solution still has to be found for a number of issues. “The illegal processing and illegal export of end-of-life vehicles are two major challenges that demand a specific solution,” explained Hatzi, in identifying the problems at the top of Europe’s list when it comes to automotive recycling. “We have launched a compliance exercise (study) to assess the findings of a previous Commission study showing a high number of ‘ELVs with unknown whereabouts’ and gaps in the implementation of the directive that may contribute to this or best practices in the MS and initiatives on the EU level that tackle the problem. We expect to have the results during the course of 2017.” In more general terms, Hatzi identified two further points. “For a number of Member States it is a challenge to achieve the 95% target,

and in designing new cars, greater attention will have to be focused on the use of electronics and recyclable materials.”

Uniform method for recycling reporting

All EU Member States are required to report on their recycling performance to Brussels, every year. European legislation requires Member States to report on their recycling performance.

In practice, however, it seems that those rules are open to individual interpretation by the Member States.

The European Commission is working on bringing both the reporting system and the calculation method for recycling performance into line. According to Hatzi, the objective is to improve both the informative value and reliability of the statistics. “The European Commission is considering submitting a proposal to amend the legislation on reporting on the ELV targets, to include the goal of laying down a uniform methodology for recycling reporting.”

During the International Automobile Recycling Congress 2016 in Berlin, the Member States were invited to share their visions and information with the European

Commission, especially with regard to knowledge about a reliable information system, and the tracking and tracing of end-of-life vehicles.

Hatzi was positive about the Dutch recycling system. The processing of automotive shredder residue at the PST plant into usable materials serves as a role model for other Member States. As Hatzi suggested, “The Dutch system was already in place before the introduction of the End-of-Life Vehicles Directive. It was a clear role model used in drawing up the Directive. The system established by the Netherlands is viewed as both efficient and delivering high performance. The Member States exchange information about the way in which they put the Directive into practice in their own country. As a result, they can profit from the experiences accrued with the systems that deliver the best performance, including the Dutch system.”

Irreversible movement towards sustainability

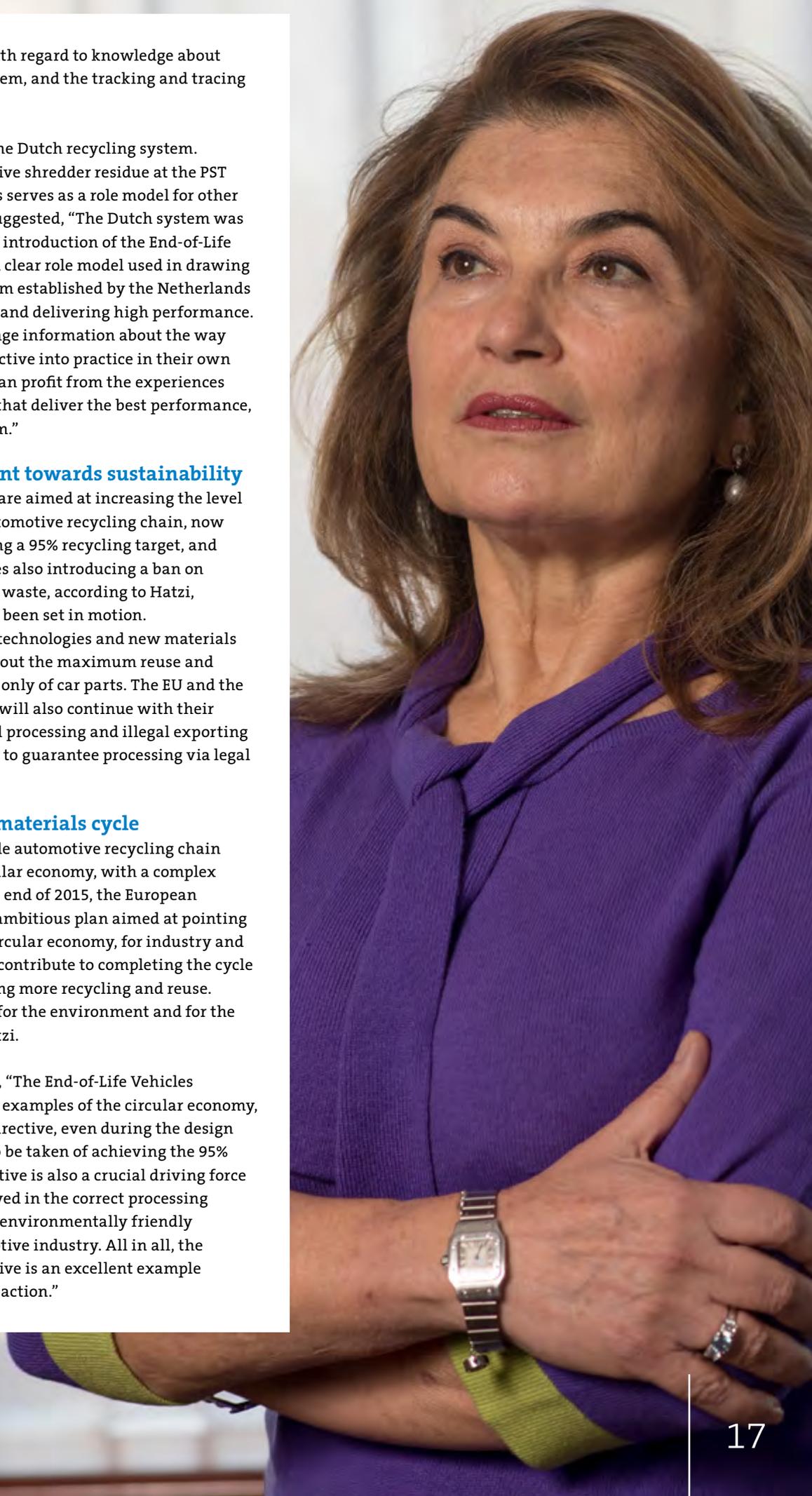
The European regulations are aimed at increasing the level of sustainability in the automotive recycling chain, now and in the future. By setting a 95% recycling target, and in a number of EU countries also introducing a ban on the landfilling of shredder waste, according to Hatzi, an irreversible process has been set in motion.

“The development of new technologies and new materials are guaranteed to bring about the maximum reuse and recycling of materials, not only of car parts. The EU and the individual Member States will also continue with their efforts to reduce the illegal processing and illegal exporting of end-of-life vehicles, and to guarantee processing via legal channels.”

Completing the raw materials cycle

An increasingly sustainable automotive recycling chain will contribute to the circular economy, with a complex raw materials cycle. At the end of 2015, the European Commission launched an ambitious plan aimed at pointing the way towards a more circular economy, for industry and consumers. “Our aim is to contribute to completing the cycle for products, by encouraging more recycling and reuse. Recycling is after all good for the environment and for the economy,” emphasised Hatzi.

In conclusion, Hatzi added, “The End-of-Life Vehicles Directive is one of the best examples of the circular economy, because in line with the Directive, even during the design of new cars, account has to be taken of achieving the 95% recycling target. The Directive is also a crucial driving force behind the progress achieved in the correct processing of end-of-life vehicles and environmentally friendly innovations in the automotive industry. All in all, the End-of-Life Vehicles Directive is an excellent example of the circular economy in action.”





Relationship between ARN and car importers

- On behalf of importers, ARN bears manufacturers' responsibility for cars and car batteries.
- Car importers and manufacturers are, among other things, required by law to recycle and usefully apply 95% of (end-of-life) vehicles, by weight.
- ARN implements this manufacturers' responsibility.



Developments in 2015

- ARN and the RAI Association extended their cooperation through to 1 January 2021.
- First Li-Ion starter batteries placed on the market.
- A national network of delivery points and dismantling companies was also established for end-of-life scooters and mopeds (Scooter Recycling Nederland).



Prospects for 2016

- A project was launched to provide ARN with packaging that meets all the statutory requirements, for the collection of damaged, flammable batteries.
- Every recycling company processing Li-Ion batteries on behalf of ARN must have an Ecotest carried out.

Tempestuous growth in electric cars represents an extra challenge

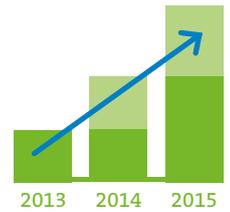
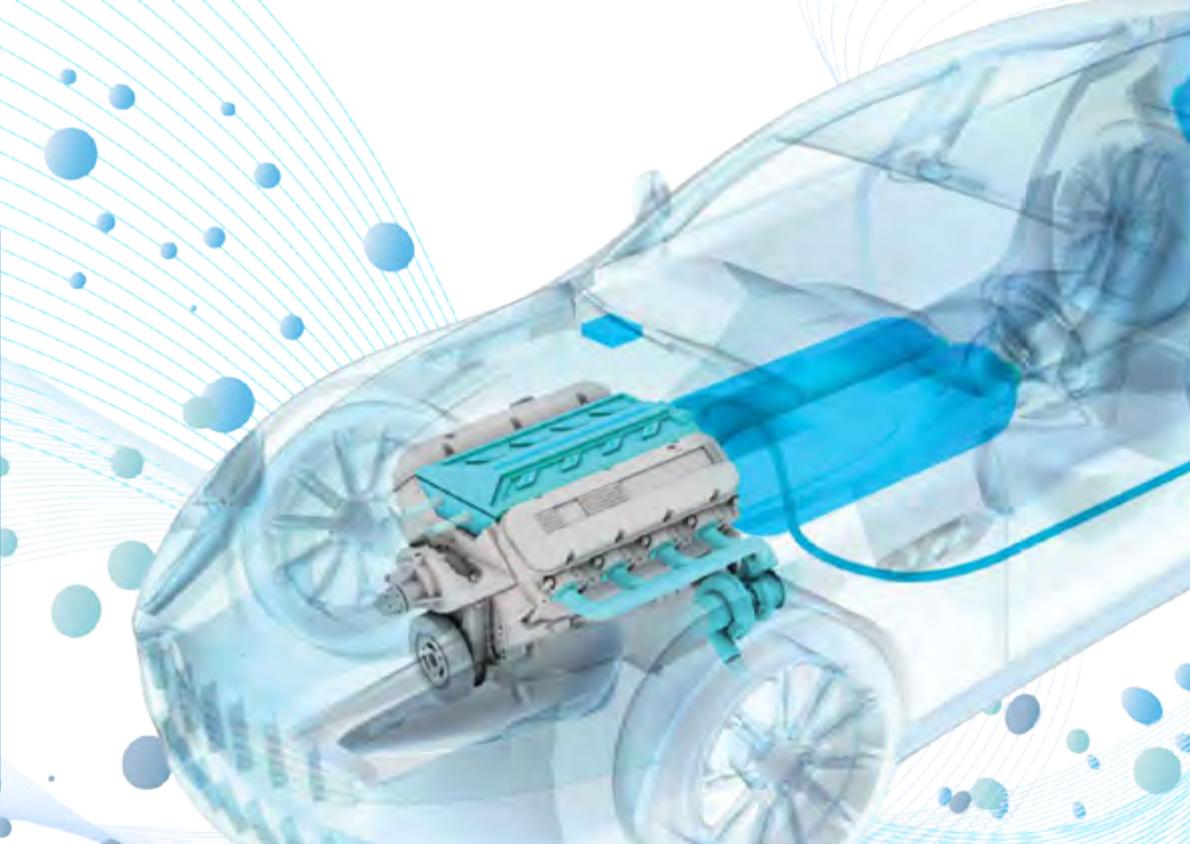
Role in the recycling chain

Car importers place new vehicles on the Dutch market. They have given ARN the responsibility for ensuring that the statutory recycling target for cars is achieved. We are responsible for harmonising the activities by all parties in the recycling chain, from car dismantling companies through to metal recycling companies and the PST plant. Our goal is to deliver the optimum environmental performance and comply with the statutory obligation of 95% recovery of end-of-life vehicles, by weight.

ARN and the RAI Association extend contract by five years

ARN and the RAI Association, the organisation that promotes the interests of importers and manufacturers in the automotive sector, extended their contract at the end of 2015, through to 1 January 2021. Over the next five years, we will continue to implement the End-of-Life Vehicles (Management) Decree and the Battery Management Decree in the Netherlands. It was agreed that during this period, the costs of the recycling system will have to be reduced. To achieve this, the dismantling payment made to car dismantling companies will have to be phased out, so that the recycling fee paid by a consumer when purchasing a new car can be reduced. Furthermore, in its five year plan, the PST plant will have to identify cost savings through further process optimisation and by recycling materials at higher value. Two new independent car importers, that are not linked to a manufacturer, became affiliated to ARN in 2015.

This enables them to fulfil their statutory requirement to provide a national collection system and to achieve the recycling target for end-of-life vehicles.



90,000
electric cars in 2015,
three times as many
as at year-end 2013



2015
first Li-Ion starter batteries
on the market



8 years
average service life
of a Li-Ion battery

Special collection container

At the end of 2015, more than 90,000 electric cars were registered in the Netherlands, three times as many as at the end of 2013. This tempestuous growth in sales of electric cars presents ARN with a huge challenge, to provide responsible collection and processing of the end-of-life batteries. The average useful life of Li-Ion batteries is approximately eight years, but defective batteries are already appearing on the market, together with damaged batteries from vehicles declared total loss. Above all the collection of damaged, flammable batteries requires extra attention. The collection containers for example must comply with stricter requirements. In 2016 we will be launching a project that will provide ARN with packaging that complies with the legal requirements.

Li-Ion starter batteries

In 2015, the first Li-Ion starter batteries were placed on the market. The automotive industry expects that the fitting of lead acid batteries will no longer be permitted in new cars, within the next five years. ARN will also respond to this development. At the request of one importer, in 2015, we recalled around 500 batteries with a total weight of around 66,000 tonnes, for recycling.

Compulsory Ecotest

From 2016 onwards, every recycling company that processes Li-Ion batteries on behalf of ARN must undergo an Ecotest. This test determines the CO₂ footprint of the company, and generates data on their environmental performance. It also offers us the possibility of identifying the most ideal processing method.

In its role as centre of expertise, throughout 2016, ARN will be involved in an innovative project for using end-of-life propulsion batteries for balancing decentralised energy generation at a windfarm.



Trial project

Pampus is the ideal test location because it is not connected to the electricity grid.

Trial project on the island of Pampus

We are participating in a trial project on the island of Pampus, the aim of which is to generate information on the technical viability of a second life for end-of-life batteries from electric cars. After a test period of one year, it already became clear in 2015 that the use of a battery for solar and wind energy storage enables a saving of approximately 20% on diesel consumption by the generator. The experiment is a search to identify the optimum balance between saving on diesel consumption by deep discharge of the batteries, while maintaining the longest possible second life for the battery. Pampus is an ideal test location since it is not connected to the electricity grid. Partly on the basis of the positive experiences on Pampus and preparatory work by the Environment Agency of Rijkswaterstaat, the Human Environment and Transport Inspectorate (ILT) and ARN, it was possible to legalise reuse of end-of-life batteries from electric cars. A first battery converter has been awarded so-called end-of-waste status, thereby releasing second-life batteries from waste disposal legislation.

Practice

In practice, legalisation means that a request can be submitted to Rijkswaterstaat's Environment Agency for application of a so-called end-of-waste judgement, to allow conversion of a battery to another – stationary – application. Preconditions for the judgement are that it relates to a specific flow of batteries, a specific handling process and a specific application. Once awarded end-of-waste status, the converted battery can (once again) be placed on the market, and the manufacturers' responsibility is transferred from the car importer to the party placing the second-life battery on the market.

Second life

A second life for end-of-life batteries appears attractive for locations where electricity is required but a connection to the electricity grid is relatively expensive. Two examples dating from 2015 are:

- An industrial company wishing to use end-of-life batteries for light columns on landing strips. We supported that company in applying for the legal judgement.
- An event caterer who used a self-sufficient unit, a so-called Greentainer, comprising second-life batteries for the storage of solar energy.

National network for scooter dismantling

In 2015, a national network of collection points and dismantling companies was established for end-of-life scooters and mopeds, affiliated to the Stichting Scooter Recycling Nederland Foundation (SRN). The expansion of the network to 35 dismantling companies and 177 collection points was made possible thanks to agreements made with the government one year previously. The idea behind this so-called Green Deal was to make it possible to create a full scale recycling chain including scooter dealers. Scooter dismantling was included in 2014 in the Car Dismantling Activities Decree. Together with the chain, on behalf of the Stichting SRN Foundation, ARN is responsible for the safe and environmentally sound recycling of scooters and mopeds.

Tightened controls

In 2015, a total of 23,700 scooters and mopeds (scooters and mopeds with a cylinder capacity of up to 50 cc) were deregistered; the total in 2014 was 23,785. More than two thirds of the deregistered units were dealt with via Dismantling under own authority (SIEB); the remainder were dismantled by companies with an ORAD certificate. Together with the RAI Association, BOVAG, the Government Road Transport Agency (RDW) and the Ministry of Infrastructure and the Environment, we are investigating the possibilities for restricting the scope of the SIEB scheme. Dismantling under own authority provides no information about how the dismantling work is carried out, and where the waste substances are left. As a result, it is not possible to check whether all the materials and waste substances are dismantled and processed in an environmentally responsible manner.

Scooter dismantling

A national network for end-of-life scooters and mopeds was established in 2015.



Trial project on Pampus

20% saving on diesel consumption by emergency generator, by using battery for storing solar energy



23,700
vehicles deregistered

23,700 mopeds and scooters (up to 50 cc) deregistered in 2014, the total was 23,785



177
collection points

Stichting Scooter Recycling Nederland (SRN): major expansion of the network



Relationship between ARN and the car dismantling companies

- The car dismantling companies are the first and most important link in the recycling chain.
- ARN supports car dismantling companies by providing knowledge and service to facilitate recycling according to the statutory framework.
- ARN advises and assists the companies in disposing of and processing waste materials in a responsible manner.
- By collaborating with these companies, ARN is able to register the numbers of recycled end-of-life vehicles and materials.



Developments in 2015

- Change programme 'car recycling is a joint responsibility' in preparation for new cooperation between ARN and the car dismantling companies.
- Satisfaction survey/stakeholder consultation regarding change process among dismantling companies affiliated to ARN.



Prospects for 2016

- Discussions with the car dismantling companies about the new approach to cooperation.

Transition in full progress

Role in the recycling chain

The 236 car dismantling companies affiliated to ARN represent the first link in the sustainable recycling of cars. The last user of a car hands in his end-of-life vehicle to one of these companies. The materials required by law – oil, brake fluids and coolants, windscreen washer liquid, oil filters, refrigerants, LPG tank, tyres, airbags and seatbelt tensioners, batteries, petrol and diesel – are removed at the car dismantling company. Still usable components and materials are also removed prior to recycling, for sale.

ARN-clean end-of-life vehicle

The car dismantling companies deliver the legally required dismantled ARN materials via a contracted collection company to a recycling company that works together with ARN, which then ensures responsible processing of the materials. The so-called ARN-clean end-of-life vehicle goes to an ARN-approved metal recycling company, either directly or via an intermediate trader.

Monitoring material flows

We monitor the material flows between these companies in the automotive recycling chain. We visit the affiliated car dismantling companies at least once a year, to draw up the materials balance. We receive information about the weight of the vehicles delivered to the metal recycling companies. By comparing these figures with the average vehicle weight, we know precisely that the car dismantling company's contribution in recycling performance to the chain is 29.5%. This figure breaks down into two components:

- product reuse: 25.8%;
- material reuse ARN materials: 3.7%.

Transition

Now that the PST plant is fully up and running, ARN and the car dismantling companies have entered a transition period. This development was certainly expected, because the mechanical post-separation of shredder residue in the plant renders the manual dismantling of a large number of materials unnecessary.

The first step in this transition involved the switch on 1 August 2014 to a payment for the car dismantling companies based on the quality of the legally required removed ARN materials and the delivered end-of-life vehicle, and on the quality of their organisation – instead of a payment based on the volume of submitted material. The next step will be to phase out the dismantling payment.

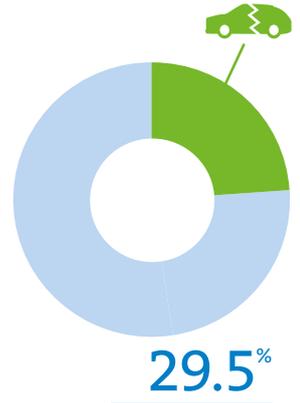
In 2016, we face the task of joining the car dismantling companies in considering how we wish to organise our future strategic cooperation. Together we will have to develop a future-proof business model, which will no longer involve a dismantling payment. To make sure this strategic cooperation gets off the ground, ARN will have to continue to offer added value. In the summer of 2015, an external consultancy firm carried out a study to assess the various issues. We also organised a satisfaction survey among the affiliated car dismantling companies. Both studies will be used in determining the structure of the new collaboration model.

Tackling unfair competition

In the efforts to tackle unfair competition, an important step has been taken. The 'Dismantling under own authority scheme' (SIEB) was scrapped on 1 April 2015. Since that date, end-of-life vehicles can only be deregistered by approved car dismantling companies. As a consequence, more companies have applied for ORAD registration (the online car dismantling registration system) from the RDW. By shutting off this leakage flow, ARN's market share rose in 2015 to 86.6%. In 2014, the market share was 83.3% and in 2013, 82.7%.

Nonetheless, not all leakage flows in the recycling chain have been sealed. Fake export remains a problem. Fake export involves vehicles registered for export but not actually leaving the country. According to our estimates, at least 40,000 vehicles disappear from the environmentally responsible processing chain, each year.

We constantly tell our chain partners that they can best report any unfair practices in the car recycling chain to us. Any information we receive is then passed on to the competent authorities, anonymously, with the urgent request to take measures.

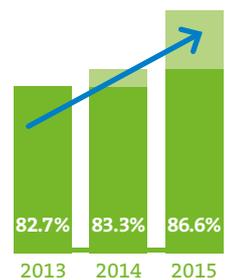


2015
Recycling performance by dismantling companies:
• 25.8% product reuse
• 3.7% materials reuse



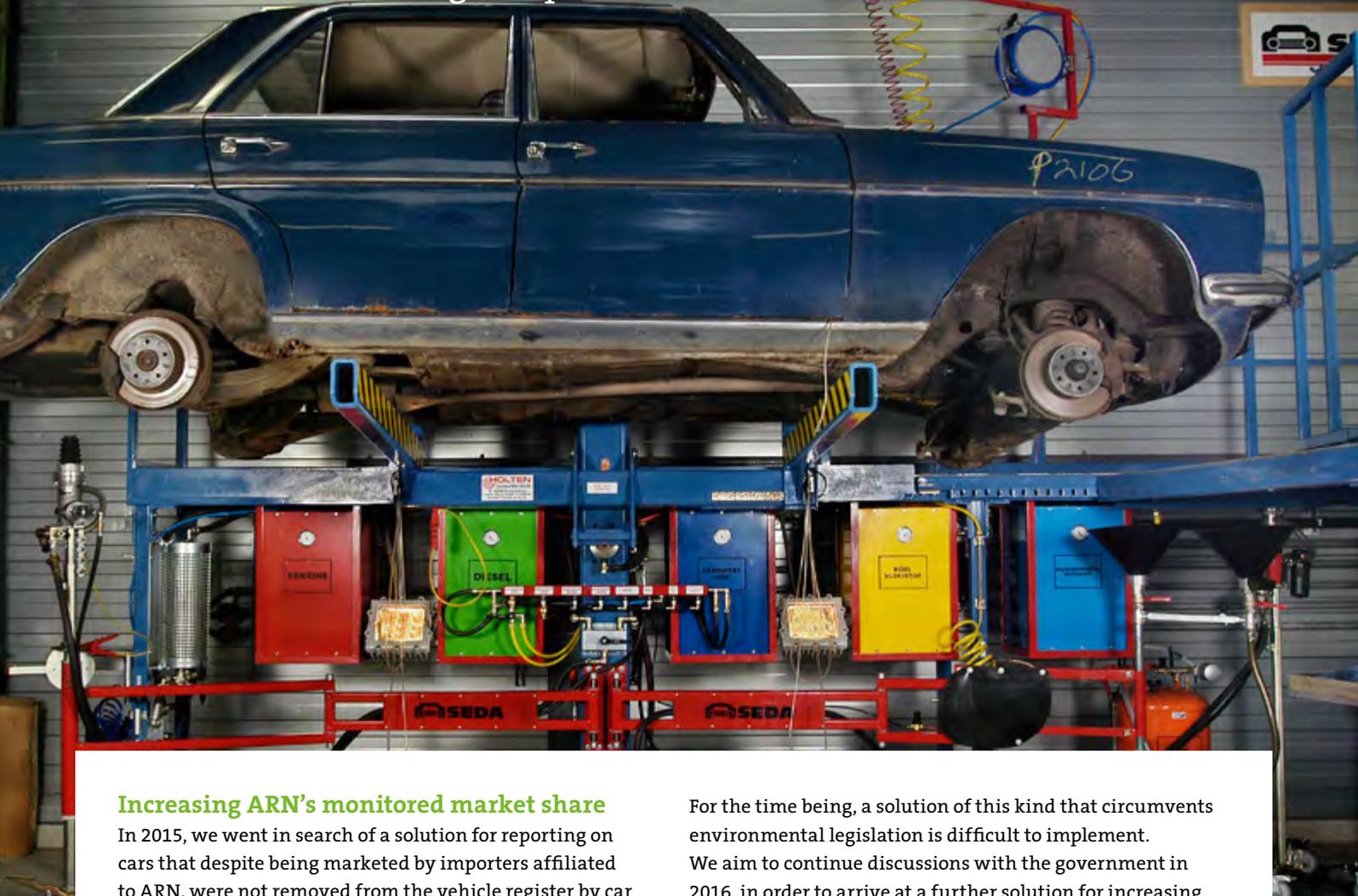
236
car dismantling companies

increase to ARN in 2015



ARN market share
rises to **86.6%**





Increasing ARN's monitored market share

In 2015, we went in search of a solution for reporting on cars that despite being marketed by importers affiliated to ARN, were not removed from the vehicle register by car dismantling companies affiliated to ARN. The investigation focused on whether or not we could use the ORAD waste flow data that have to be reported to the National Waste Material Reporting Point (LMA) by companies not affiliated to ARN, in our reports. The investigation was launched in response to a report by the Human Environment and Transport Inspectorate (ILT), the body responsible for supervising implementation of the End-of-life Vehicles (Management) Decree.

The investigation revealed that we could not make use of the waste flows from car dismantling companies not affiliated to ARN as input for our figures, the reason being that the waste flows of these companies are rarely reported to the LMA. By way of corrective measure, we then suggested to the Ministry of Infrastructure and the Environment that we could make the approval by ORAD of the car dismantling companies in question dependent on the reporting of ORAD waste flows. This way, the circle can be completed.

For the time being, a solution of this kind that circumvents environmental legislation is difficult to implement. We aim to continue discussions with the government in 2016, in order to arrive at a further solution for increasing the market share monitored by ARN.

Countering unlawful trade

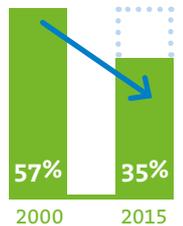
Ever shrinking numbers of stolen cars are retrieved. This is reflected in national theft figures from the Foundation for Tackling Vehicle Crime (AVC). In 2000, 57% of stolen vehicles were retrieved; in 2014, the total was just 35%. One leading cause of this development is the dismantling of stolen vehicles by dishonest companies, and the trading of the spare parts often via the Internet. This is a form of unfair competition for the car dismantling companies affiliated to ARN, who are required to fulfil a whole series of quality requirements, and who must invest in the responsible dismantling of cars.

The process of tackling the trade in stolen car parts was intensified in 2015. The AVC, of which ARN is an associated member, for example launched an experiment in the Province of Gelderland. Supervising organisations such as the RDW and Environmental Services, the sector organisations BOVAG, FOCWA, STIBA and also ARN, have undertaken to supply information about dishonest practices to the National Vehicle Crime Information Centre (LIV). By combining all this information at a central point, the tackling of the unfair traders should become more effective.



> **40,000**
Volume of fake export

> 40,000 vehicles disappear from the environmentally friendly processing chain



Decline in the number of retrieved stolen vehicles

Relevant efficiency and sustainability measures

- When tendering for transport operations, ARN imposes the condition that all trucks must comply with the Euro 6 European emission standard. This is however not tested annually.
- For the collectors of materials and waste substances, a system has been developed for the remote evaluation of the filling level of tanks. This allows the collection companies to plan the most efficient collection route.
- ARN carries out periodic maintenance on drainage installations and other equipment in use by car dismantling companies, so that these installations remain in tiptop condition.
- At companies dismantling a limited number of end-of-life vehicles, ARN installs a smaller type of compressor, with sufficient suction capacity to empty individual vehicles.
- ARN installs time switches on compressors so that they are only switched on when the air drier is operating at optimum capacity. This prevents the build-up of moisture in the compressed air lines, and stops the failure of the membrane pumps in the drainage installations.
- Buying green power is another opportunity for more sustainable business practice, but this is very much an issue for the car dismantling sector itself.



Erik van der Zwet Slotenmaker and Willem Nuiten
of the Field Service:

'We are the connecting link'

The popular name given to this pair is 'the Field Service Men'; Erik van der Zwet Slotenmaker and Willem Nuiten, the ARN account managers for car dismantling companies. "We are the eyes and ears of ARN. We know what is going on in the field and we provide feedback to the office in Amsterdam," explained Van der Zwet, who has been working at ARN since the organisation was founded in 1995. "We are the connecting link between the field and the office, in the car dismantling sector," added Nuiten. He joined ARN in 2004.

Avoiding misunderstandings

The importance of personal contact on the shop floor at the car dismantling companies in the opinion of both, is of inestimable value for a smoothly running ARN system. Van der Zwet explained, "The operators themselves prefer to see us more frequently, than not at all. During our regular visits, we discuss possible points for attention, according to a standard visit report. We are also brought up to speed on the problems facing the dismantlers. A simple visit can help avoid a whole raft of misunderstandings." Both have seen a rise in the regularity with which the car dismantling companies themselves apply for a visit. That is a consequence of developments in the collaboration with ARN. Nuiten explained, "The changes are not always entirely clear. It is easier to clear up misunderstandings face to face than over the telephone. We need to make it clear to them what changes are taking place in our cooperation. That helps keep the companies on side when it comes to the ARN concept."

Added value

To keep the car dismantling companies affiliated to the organisation now and in the future, in their opinion, ARN will have to keep delivering added value to the dismantling

companies, in non-financial terms. They point out to the companies that ARN supplies technical equipment on loan, and continues to collect the waste materials, free of charge. ARN also provides training for the safe dismantling of for example airbags, seatbelt tensioners and HV batteries from hybrid and electric cars.

Making the difference

Van der Zwet continued, "We need to make a difference for businesses. We make things easier for the dismantling companies, we pass on new knowledge to them and keep them up to date on the developments within the sector. Those are the strong points of ARN. Nonetheless, we still need to go one step further, because for businessmen, economic reality is the number one priority. The crisis is not yet over. Metal prices have slumped, and material recycling companies now only pay a few cents per kg for end-of-life vehicles." Nuiten added, "The only thing that counts for the dismantling companies, at the end of the day, is whether ARN adds value. What the car dismantling companies consider most important is quickly putting an end to unfair competition. There are still 'businesses' that try to circumvent the rules. Those 'businesses' steal end-of-life



Erik van der Zwet Slotenmaker (left) and Willem Nuiten (right): 'Removing problems and introducing new knowledge.'

vehicles from under the noses of our contract partners. And that leads to bad blood. ARN itself can do nothing more than simply report illegal practices to the competent authorities but if we hand the authorities an illegal practice on a plate, and still nothing happens, we cop the fall-out when we visit the car dismantling companies, and it creates a negative sentiment towards ARN. We need to focus more attention on enforcement, to tackle illegal activities in the sector."

Promoting the interests of car dismantling companies

The account managers also feel responsibility to promote the interests of the car dismantling companies. Van der Zwet continued, "We are their first point of contact. In principle, all problems are reported first to us. If problems arise at a company, for example because the collection company is too late emptying the tyre container, the dismantler is unhappy with the service and that means problems for ARN. Negative experiences always remain longer in the memory than positive ones. We would like to come up with a solution as quickly as possible."

Annual inspection visit

Each year, every car dismantling company receives at least one inspection visit, to determine material volumes. "We check whether the materials on site match the established material balance. We count the number of end-of-life vehicles on site and check the stock records. In the event of major discrepancies in kg, either upwards or downwards, we try to identify the possible cause. Are there still vehicles on conveyors? Have they forgotten a record in the administration? We are generally able to trace the cause of the discrepancies."

Work gives energy

The two men cover the whole country. They work long hours, and spend much of their time in their cars, but cannot imagine a more appealing job. Van der Zwet explained, "No two days are the same. You are constantly visiting new people, and dealing with different problems. A 9 to 5 job at a desk would make me deeply unhappy." Nuiten added, "The situation is completely different at each of the almost 240 dismantling companies. Constant contact with people gives you energy. The car dismantling companies are mainly extremely professional in their approach and it is a real motivation for me that we at ARN can make a contribution to the process."



Relationship between ARN and the metal recycling companies

- Supplier of shredder residue for processing at the PST plant.
- Accepting dismantled end-of-life vehicles from car dismantling companies.
- Responsible for separation of metals from end-of-life vehicles.
- ARN collaborates with 8 metal recycling companies and 38 intermediate traders.



Developments in 2015

- ARN carried out three shredder trials.
- All metal recycling companies shredding Dutch end-of-life vehicles have delivered their shredder residue to the PST plant.



Prospects for 2016

- Carrying out additional small-scale shredder trial.
- Start of pilot scheme for digital accompanying forms.

Key role in **completing** the automotive recycling chain

Role in the recycling chain

The metal recycling companies play an important role in completing the automotive recycling chain. They take delivery of fully dismantled end-of-life vehicles from the car dismantling companies or via intermediate traders. Metal recycling companies retrieve all the metals that can be reused in the metalworking industry. The material that is left over, the shredder residue, is then passed on for further processing to installations like the PST plant in Tiel. All metal recycling companies that shred Dutch end-of-life vehicles supply their shredder residue to the PST plant. The total volume amounts to around 38,000 tonnes a year.

Carrying out periodic shredder trials

ARN measures recycling performance by carrying out periodic shredder trials. By comparing the receipts for incoming goods from the metal recycling companies with the weight of the shredder residue that is supplied to the PST plant, we can calculate the contribution from the metal recycling companies to the chain. In 2015, the total contribution by the metal recycling companies to the recycling percentage was 53.1%. ARN works alongside all metal recycling companies in the Netherlands and abroad, that take delivery of Dutch end-of-life vehicles. Car dismantling companies are required to submit their

end-of-life vehicles to companies affiliated to ARN-intermediate traders or metal recycling companies. From the dismantled end-of-life vehicles, the metal recycling companies are required to submit a proportional share of shredder waste to the PST plant.

The importance of carrying out shredder trials

One key reason for carrying out shredder trials in 2015 was our wish to measure the precise effect on the recycling performance of the PST plant, which was fully operational for the first time, in 2015. 2015 was also the first year in which we were actually required to achieve the 95% recovery target in accordance with European legislation.

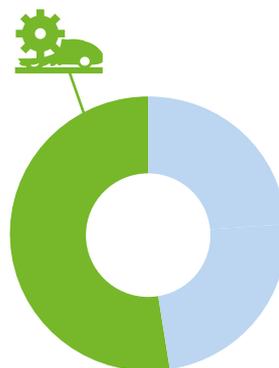
Shredder trials and ILT report

Furthermore, these were the first trials to be carried out since the car dismantling companies stopped dismantling glass and large plastic parts. The last shredder trial that had been undertaken by ARN dated back to 2010. The purpose then was a baseline measurement before the PST plant went into action. The shredder trials are also intended to improve our reporting on the percentage of reuse, and to make the reports more reliable. This was one area for improvement identified in the report by the Human Environment and Transport Inspectorate (ILT), the body responsible for



Why carry out shredder trials?

The European Commission has laid down detailed rules for the way in which EU Member States are required to report on their performance in processing end-of-life vehicles. The European rules specify for example that periodic shredder trials have to be carried out to calculate recycling percentages. The shredder trials are practical tests to produce an accurate picture of the volume of recycling and recovery.



55.1%

2015

Recycling performance for metal recycling companies:

- 53.1% material reuse
- 2.0% recovery



1,200
cars

in shredder trials
in 2015



±39,400 tonnes

of shredder residue
delivered to the PST plant
in 2015



supervising implementation of the End-of-Life Vehicle (Management) Decree. The Inspectorate audited the report published by ARN for 2011 and themselves issued a report on the results, in 2014.

Three shredder trials in 2015

In 2015, we opted to carry out three shredder trials, because in the Netherlands end-of-life vehicles are processed by a large number of car dismantling companies and three metal recycling companies. The metal recycling companies decide on the post-separation process (post-shredder technology) used for the non-metal parts, following shredding. In that sense, all companies in the recycling chain have an effect on the eventual result of the recycling of end-of-life vehicles and the resultant materials. A separate trial was carried out at each of these metal recycling companies, so that we arrived at the most accurate possible, weighted measuring result.

Shredder trial in practice

In a shredder trial, we collaborate with a number of car dismantling companies that submit their processed end-of-life vehicles to a particular metal recycling company. We first assemble a so-called batch of around four hundred dismantled end-of-life vehicles, representative for the entire Dutch vehicle fleet. The metal recycling company then specifically processes this batch separately, for the shredder

trial. No other types of scrap are mixed with the scrap from the batch. At the start of the shredder trial, for each end-of-life vehicle we record the weight according to the vehicle registration, and then measure the precise actual weight. The metal recycling company then shreds the end-of-life vehicles, and separates off the material flows. The remainder, the shredder residue, is then transported to the PST plant in Tiel, for mechanical post-separation.

In every phase of the trial, we precisely measure the weight of each of the material flows generated. At the end of the day, this helps us identify every kg of the end-of-life vehicles. We also assess the possible new application for a material from each material flow, and decide on the official label for the type of reuse, also known as the classification. We then add up all the weights for each classification, and calculate the percentages of material reuse and recovery. The results of the three shredder trials then reveal the effects of the changes over the past six years and create a clear picture of the environmental performance for the year 2015.

Vision introduced to LAP3

The National Waste Management Plan (LAP) is an overview of the policy operated by the Dutch Central Government for the management of all waste substances subject to the Dutch Environmental Management Act. During



8

Number of metal recycling companies with a cooperation agreement with ARN in 2015

the discussion rounds leading up to the preparation of LAP3, we made our vision clear. It is our firm belief that it is the task of government to lay down a minimum standard for the processing of shredder waste. In our vision, that means that if the recycling of residual materials is possible, then the dumping (landfill) or incineration of those materials should be prohibited. The government must ensure a level playing field in Europe, thereby preventing improper flows crossing borders. The Ministry of Infrastructure and the Environment will be publishing a first draft of the LAP3, during the first half of 2016, and there will be an opportunity for all stakeholders to issue their comments. According to the government's plans, LAP3 will become effective in 2017.

Study into digitisation

One method employed by ARN in monitoring material flows is the Extranet. Car dismantling companies, metal recycling companies and intermediate traders are required to submit digital reports of their transport operations via the Extranet. There is also a paper trail made up of the accompanying forms. We are constantly on the lookout for ways to improve this management information system, to enable us to identify leaks more quickly, so that action can be taken. In 2015, for his graduation assignment, a student investigated the possibility of switching to a digital version of the

accompanying forms. This was expected to result in fewer errors. It would also further reduce the administrative burden on the businesses involved. In the second half of 2016 we will be launching a pilot scheme with digital forms. A number of car dismantling companies, a transport operator/intermediate trader and a metal recycling company will take part in the experiment. ARN itself is carrying out further studies into the viability of fitting an RFID chip on end-of-life vehicles, so that information can be stored and read out, remotely. For monitoring the chain, the chip could replace the sticker that is currently used as a means of identification.

Intermediate traders linked to the ARN Extranet

To increase the speed of tracing leakage flows, we added the intermediate traders to the ARN extranet, in 2015. From now on, car dismantling companies receive a payment for the clean end-of-life vehicle, as soon as it is registered on the Extranet by an intermediate trader affiliated to ARN, even if the vehicle has not yet reached a metal recycling company. It was also agreed that intermediate traders are not permitted to keep more than fifty end-of-life vehicles on their premises. If the intermediate trader is based at a waterside location, the maximum number of end-of-life vehicles permitted is four hundred.





Senior Project Manager Pieter Kuiper:

‘Contributing to recycling gives me huge satisfaction’

Senior Project Manager Pieter Kuiper is a raw materials technologist. He has specific knowledge of materials, technology and legislation, and his work often takes him to the interface of these three fields. Project management is a key element of his work at ARN Advisory, the consultancy division of ARN.

Start and finish in a single solution

“My task often looks at the way you approach a project and how to make a solution work as a whole. I am hard at work every day finding sales routes for the materials from the plant in Tiel. I approach market parties who may be able to use our materials in their production process and I visit various companies. To make my work possible, I need knowledge of our own materials as well as basic knowledge of other business processes.

Long haul

In determining whether market parties can use the materials from Tiel, it is often a long-haul process. Together with prospective businesses, we look for possibilities for removing obstacles that prevent the use of our materials. Our own test laboratory plays an important role. By carrying out additional processes ourselves, we can sometimes make the materials suitable for a specific company. As a raw material technologist, you must be able to assess whether a particular process is viable. Plastics that do not melt, for example, cannot easily be made suitable for injection moulding.

Interface between technology and legislation

I was previously involved in ending the manual dismantling of glass, on behalf of ARN Auto Recycling. We provided support to the legislator in formulating the rules that made it possible for dismantling to not be the only option for processing car glass. We also investigated how we could introduce the processing of glass in the production line at the PST plant, in that case. This was a project at the interface between technology and legislation, one of the strengths of ARN Advisory.

Variety of roles

ARN is an organisation of a relatively modest scale, in which you play a very diverse range of roles. I am attracted specifically by the diverse nature of the work, which means you soon acquire a considerable degree of responsibility. There are however also more difficult tasks involved. We have to manufacture and sell good-quality products using the residual waste of a dismantled and shredded end-of-life vehicle. In other words, waste from waste from waste, that we turn into raw materials. The process of selling those materials requires a great deal of energy, time and expertise.



‘Unique route for achieving the 95% target’

Always answering three questions

The fact that ARN has developed a unique route for achieving the 95% target also plays a role. There is no example for us to follow. Every project has to be designed from scratch, and in each case, three questions have to be answered: is it affordable, is it technically possible and is it permitted according to the law? We take delivery of something no one else wants, which has to be processed as smartly as possible to the highest possible value, at the lowest possible cost. Recycling is a worthwhile activity; it gives me a huge sense of satisfaction to make a contribution, every day.”



Relationship between ARN and the PST plant

- Processing shredder waste using post-shredder technology is essential in order to meet the European target of 95% recovery.



Developments in 2015

- 39,400 tonnes of material processed (+ 9.5%).
- LIFE+ project concluded.
- Switch to Dutch wind energy.



Prospects for 2016

- Total capacity to approx. 44,000 tonnes.
- Ecotest to determine CO2 footprint.
- Installation of pelleting line for fibre fraction.

Essential link in completing the cycle

Role in the recycling chain

ARN Recycling concludes the car recycling chain with the processing of shredder residue from old cars at the PST plant in Tiel. The shredder waste is supplied by metal recycling companies in the Netherlands and abroad, where Dutch end-of-life vehicles are processed. By processing this material, we are able to achieve the 95% recovery target laid down in law.

Increased production capacity

Our hard work in 2015 at the PST plant enabled us to successfully increase production capacity. In total, in 2015, we processed more than 39,400 tonnes of shredder waste using post-shredder technology (PST), a rise of 9.5% as compared to the previous year. By adjusting the process for handling plastic, we can now process 150 additional tonnes of plastic waste, every week. That extra capacity means we also have sufficient room to carry out structured preventive maintenance, which in turn has increased productivity at the plant. At the end of 2016, total capacity is expected to have risen to approx. 44,000 tonnes.

LIFE+ final report submitted

The European LIFE+ subsidy to the tune of € 1 million (2011-2015) made a huge contribution to the technical optimisation of the entire process line at the PST plant. The funds also enabled us to develop additional markets for the sale of end fractions and to share our knowledge and experience with other stakeholders and the recycling sector. In November 2015, we submitted the final report on the very successful LIFE+ project to the European Commission. An application for a new LIFE subsidy for further technical optimisations was rejected by Brussels.

Energy-saving measures

The higher capacity means that our machines sometimes run empty, if there is insufficient stock of shredder waste in the bunker. When that situation arises, we deliberately shut down the production line for a number of days, until we have sufficient material to be able to produce at full capacity for a longer uninterrupted period. If the production line is able to operate uninterrupted, at full capacity, average energy consumption falls, because starting up the

production line places particularly high demands on energy. In spite of the fact that we also installed additional machines in 2015, for example for the recovery of copper, total energy costs per tonne remained unchanged, as compared to 2014.

Switch to wind energy

On 1 January 2016, ARN took a major step in increasing the sustainability of production in Tiel. On that date, the PST plant switched to certified Dutch wind energy. As a result, indirect CO₂ emission from energy consumption was reduced by 97.0%.

Ecotest

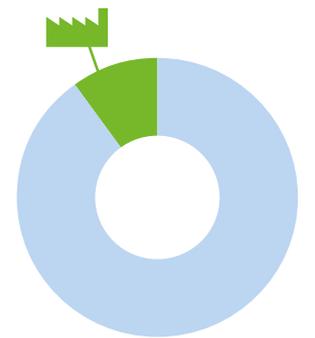
The switch to renewable energy and optimisation of the production line since the commissioning of the plant in 2011 led to the decision to have a new Ecotest carried out, in 2016. This sustainability test developed jointly by ARN helps determine the CO₂ footprint of the plant. By comparing a series of different processing alternatives, the model allows us to calculate where the PST plant can achieve the greatest sustainability gains.

Searching for other residual flows

Improving production efficiency means the PST plant is faced with another important challenge. We need to find sufficient residual material for us to process. All metal recycling companies that process Dutch end-of-life vehicles supply their shredder waste to the PST plant. This amounts to approximately 38,000 tonnes a year. With the expectation of increasing capacity to 44,000 tonnes, we need to go in search of other residual flows, for example from recycling centres. Residual waste from end-of-life electric devices also represents a good external source of material for our production line.

ARN is household name

In our favour, ARN has become a household name on the recycling market, and customers themselves now come to us to have their residual waste processed. In 2015, for example, a whole batch of caps from wine bottles was processed. The problem is that outside the automotive sector, the volumes of waste are often small, so that we will need a relatively large number of clients in order to supply the additional 6,000 tonnes in 2016. A further inherent problem is the large variety of waste flows for which the production line repeatedly has to be reset.

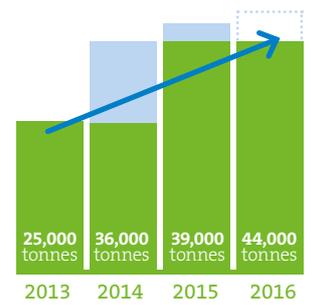


12.4%

2015
Recycling performance PST plant:
5.1% material reuse
7.3% recovery



39,400 tonnes
of material processed
(+ 9.5%)



± 44,000 tonnes
Budgeted production





Competition from low dumping charges

The low charges for dumping at landfill sites represent a further challenge for the PST plant. We must convince other parties that the processing of residual flows at the PST plant generates added value in terms of corporate social responsibility and for the circular economy, through the recovery of materials. The search for innovative methods for converting materials with negative value into a positive source of revenue is another challenge. Take for example chlorine-bearing plastics, and fibres. These fractions are incinerated, a service for which we have to pay. We are already at an advanced stage of creating a usable raw material in the form of pellets, from the fibre fraction, that can then be sold to the plastics industry.

Slump in metal prices

Market developments in 2015 broadened the scale of the challenges facing the PST plant. In the second half of 2015, for example, metal prices slumped. In response, the car dismantling companies started to buffer their stocks of end-of-life vehicles. As a result, metal recycling companies received fewer end-of-life vehicles to process, which in turn meant insufficient shredder waste for the PST plant. Our challenge lies in finding other sources of waste to fill the

gap. At the same time, China is massively overproducing cheap steel, that is then dumped on the European market. As a result, the metal recycling companies are finding it difficult to sell steel scrap to the foundries. Furthermore, the incineration of materials is becoming increasingly costly, partly as a result of the import of material for incineration from the United Kingdom; half of our materials follow the thermal route to incineration installations and cement ovens. To make matters worse, plastic is becoming ever cheaper as a result of the continuous fall in oil prices.

Innovation

One of the consequences of all these challenges is that the costs for the burnable fractions are rising, while revenue from the metal fractions is falling. These are some of the reasons why we are spending so much time and energy on innovation. Innovation is the only possibility for relieving the price pressure. The Advanced Recycling Solutions (ARS) project is an excellent example of the search for processing methods for converting the fibre fraction into reusable material, so that the fibres no longer need to be incinerated. Rather than being a cost item, the resultant material generates positive value.





9.5%

increase in materials processed, for the same energy costs per tonne as in 2014

New mineral application: BlueRoots

ARN Recycling and NPSP (manufacturers of sustainable fibre-reinforced plastics) have together developed a new composite material consisting of materials from recycled cars bound together with a bio based resin. The material with the brand name BlueRoots, is extremely strong, can be cast and is printable. This makes it suitable for a whole range of applications.

The raw materials for the production of the new composite material are produced at the PST plant. Before the production line in Tiel went into operation, those same materials were either incinerated or dumped at landfill sites. Since 2013, a trial has been underway in Rotterdam for street name signs using BlueRoots. At the start of 2015, for the more than 130 car dismantling companies affiliated to the sector association STIBA, company logo signs were replaced with sustainable signs produced from BlueRoots. www.blueroots.nl

Production line optimisation thanks to LIFE+ subsidy

In processing shredder waste at the PST plant, more than 170 different units are operated simultaneously, in perfect harmony. Major changes to the production line made possible by the LIFE+ subsidy include:

- Alteration of the infeed system to the production line to create a constant flow of shredder waste throughout the production line, thereby allowing a higher volume of material to be processed.
- In plastic separation, a switch was made to a different type of pump that is less susceptible to breakdowns.
- Measuring systems were altered to be able to measure materials of constantly changing composition more accurately, often in a dusty environment.
- Water management in the plastic module (float-sink technology) was optimised by installing an additional sieving unit to be able to remove fibre residue.
- Other, more wear-proof materials have been used in the production line, resulting in less downtime.
- Additional installations were fitted for removing wood and rubber from the plastic fractions, thereby reducing the loss of good-quality plastic fractions, based on innovative techniques (a screw sieve and a shaker machine).
- An installation was fitted for retrieving metals from the plastic and fibre fraction to improve the economic performance of the PST plant.



ARS pellets as an alternative to wood

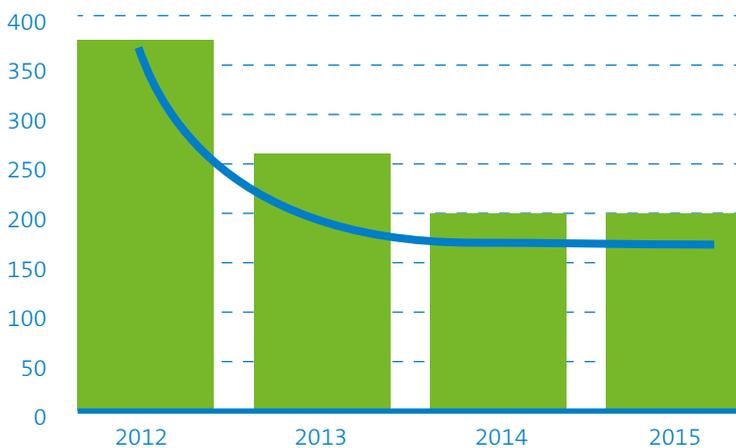
The Advanced Recycling Solutions (ARS) project for identifying processing methods to convert the fibre fraction into reusable material has led to the development of an installation that turns fibres into pellets. The pelletizing line was commissioned at the start of 2016.

Every year, the PST plant recovers 10,000 tonnes of fibres, that traditionally end up in an incinerator. The fibres are the end product of fabric-type products from car interiors, such as seats, headers and dashboards.

ARS pellets can be used in a number of production processes including injection moulding, hot pressing and extrusion, a production technique in which a deformable material is forced through a mould. The composition of the pellets depends on the wishes and specifications of the customer, in terms of strength and flexibility, for example.

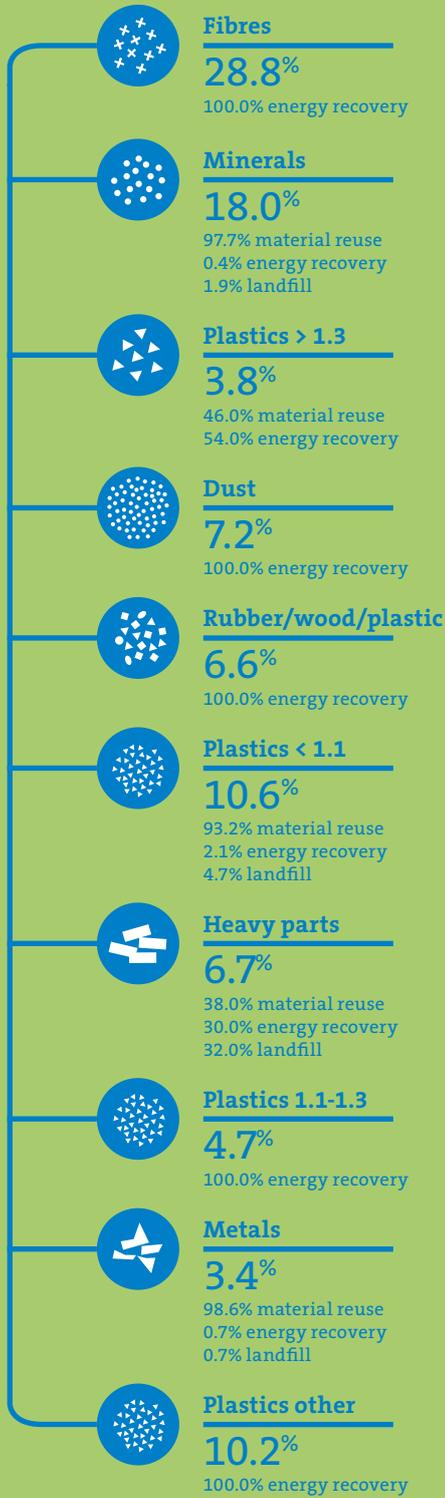
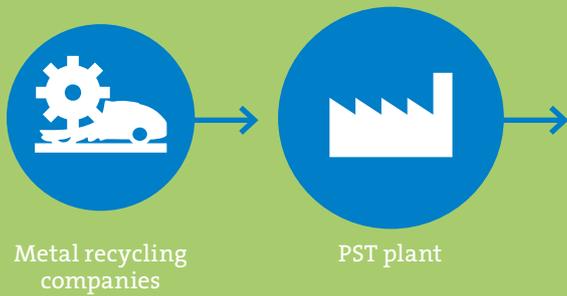
In a number of products, our material can partially be used to replace wood, for example for posts used to fence off fields. As the material is further developed, it should be possible in the future to use ARS pellets in the automotive industry. For the fibres, that would represent a complete raw material cycle.

Energy consumption PST plant
in KWh per tonne

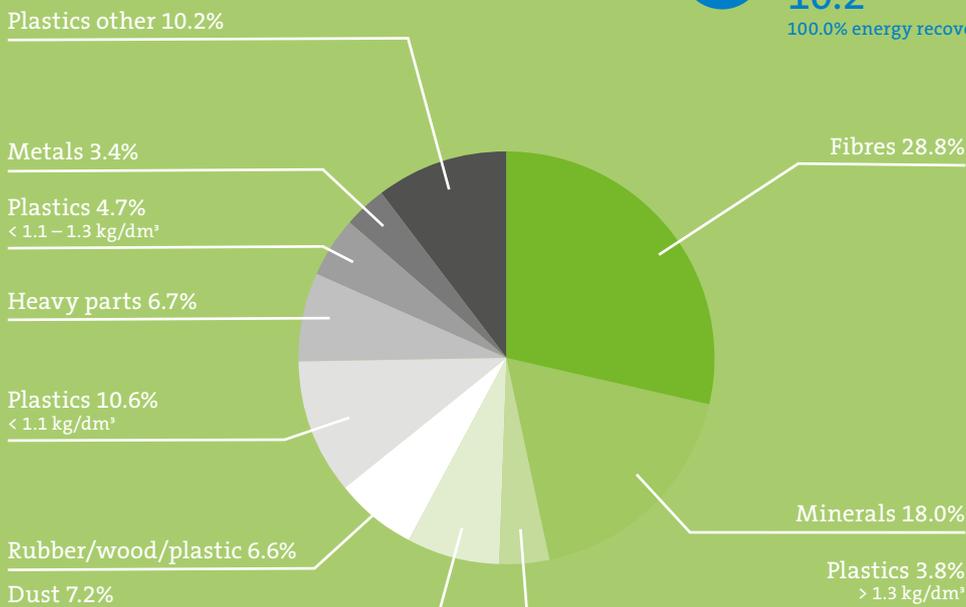


End result PST plant

The PST plant separates the shredder residue into the following materials (result per material broken down into material reuse, energy recovery and landfill).



Breakdown of materials PST plant in %



2016: Switch to wind energy



97%

indirect CO₂ emission to fall by 97% in 2016



> 170 units

in PST plant for processing shredder waste



10,000 tonnes fibers per year in 2016

Advanced Recycling Solutions (ARS)



Manager Business Development Allard Verburg:

‘97.0% recovery achieved - that's what makes it all worthwhile’

Manager Business Development Allard Verburg is employed at the PST plant in Tiel. He is responsible for purchasing 40,000 tonnes of shredder waste every year, and then selling the more than twenty finished products from the plant, as well as research and development. Below he describes his work and his role at ARN.

Purchasing, sales and R&D

“I started off life as a mining engineer, specialising in material recycling. In other words a raw materials technologist. Since 2011, I have been employed here as Manager Business Development, a position that brings together three major blocks of activities: purchasing, sales and R&D, for further improving the separation of waste fractions. My job is an attractive mix of technology and commercial activities, in an ever changing environment. It is also highly practice-oriented and very much hands-on. In the plant, you find yourself dipping your hands in trays of recycled material and as it runs through your fingers, automatically thinking about how you can achieve even better separation, to generate higher revenue.

Varied position

That, for example, is how we came up with the idea of investigating the possibility of retrieving the tiny copper wires from the mineral fraction. You start off by writing a

plan, then carry out tests at machine suppliers and recycling companies in the Netherlands and abroad, before presenting a business case to the so-called Operating Committee. It is up to them to give the green light for investments. And then it is the task of the technical manager to buy the machines and implement the project.

Mine is a very varied position and definitely not a 9 to 5 job. Throughout every day, I complete a whole variety of different tasks. I may be negotiating with metal recycling companies to ensure the delivery of sufficient residual waste, or searching the market for new suppliers and customers wishing to purchase our finished products. And of course we are in constant contact with the government to determine whether our proposed sales routes comply with legislation and the applicable regulations.

Closely monitoring technical developments

For me, the most attractive element of my job is stimulating innovative projects. If a number of potential customers tell

A man in a dark suit, light blue shirt, and blue tie stands in a recycling facility. He has his arms outstretched and a joyful expression. The air is filled with falling confetti. In the background, there is a grey corrugated metal building with a sign that reads 'WEL' and several recycling symbols. The ground is paved and also has some debris on it.

‘Stimulating innovation’

me that a particular product is not yet pure enough, it is my job to investigate how we can solve the problem. In 2014, for example, we installed a shaker machine to separate wood and rubber from the plastic fraction. The result is a 40% better yield of good quality plastics, suitable for material reuse. Yet another innovation of which at ARN can be duly proud.

That's what makes it all worthwhile

As a raw materials technologist, I closely monitor technical developments aimed at improving the separation of materials. It is a continuous challenge to meet the 95% recycling target, at the lowest possible cost. Now we have been up and running for five years, we have entered the phase in which we also have to meet commercial targets. The next goal is to reduce costs and maximise revenue while of course still hitting the 95% recycling target. Yes, I am certainly proud that this year we scored a 97% recycling performance. That's what makes it all worthwhile.”



Relationship between ARN and the market

- 'Erkend Duurzaam' certification.
- Responsible collection and processing of waste materials.
- Consultancy.



Developments in 2015

- Study into car material composition.
- 'Erkend Duurzaam' developed for the metal recycling sector.
- Knowledge shared with car dismantling sector in Turkey.



Prospects for 2016

- Ecotest to be undertaken at PST plant.
- Participation in new European waste platform.
- Feasibility study for the recycling of boats and other means of transport.
- Affiliation to sector organisation AutomotiveNL.

Developing and sharing knowledge

Role in the mobility and recycling chain

It is our mission to deliver added value by sharing our knowledge and experience within the sector and by innovating. The advisers at ARN enrich the sector with their practical and directly applicable knowledge. They develop innovations and fulfil the primary tasks of ARN in the framework of the End-of-Life Vehicles (Management) Decree (Bba) and the Batteries and Accumulators (Management) Decree (Bbb).

The consultants at ARN Sustainability are experts in a variety of fields, but the main common denominator is the knowledge built up by ARN consultants on waste and recycling, reuse and waste management, and the smart recycling of raw materials:

- ARN advises and supports **waste management** companies on the efficient and environmentally responsible collection and processing of waste flows
- We advise customers on **recycling processes** by sharing the knowledge we have developed at the PST plant
- We help structure and calculate the costs of **smart recycling chains**
- We offer advice on **raw material retention**, for example by carrying out Life Cycle Assessments
- The consultants know everything about **new mobility and its impact on recycling and the consumption of raw materials**, such as second life for batteries from electric cars
- We implement the CSR programme **Erkend Duurzaam** for the mobility sector.



Study into material composition of cars

- The material composition of cars is changing. Increasingly, cars are made from lightweight materials, such as high-tech plastics and lightweight metals. More and more materials are being mixed to profit from the best characteristics of composite components. Composites in the automotive sector include plastics strengthened with carbon fibres, glass fibres and bio-based fibres.
- In 2015, we examined the composition of the modern car, and identified key trends. The aim of the study was to gain an insight into the influence of materials and components in modern cars on the dismantling of cars and the PST plant. This knowledge is important for ARN to enable the organisation to continue to achieve the 95% recycling percentage in the future, and to fulfil its statutory obligations.

Prospects for metal composition in cars

- A shift is currently occurring in the material balance towards more plastics and glass, and less metal. At the same time, the use of metal will shift from heavier iron-bearing metals to lighter metals such as aluminium.
- The options for the useful application of composites for the time being remain limited above all to energy recovery and fuel recovery. On the other hand, a start has been made on developing thermoplastic composites, that offer better recycling options, and the development of chemical recycling.
- More and more electronic systems are being used in cars. This for example translates into increased use of rare metals. Miniaturisation of copper wires and their ever broader use represents ever growing technological challenges in terms of recycling.
- The processing of Li-Ion batteries represents an economic, technical and organisational challenge. In the long term, we can expect lead-acid starter batteries to be replaced by Li-Ion variants.



New_Innonet

To bridge the chasm between policy makers and industry, the European Commission has called upon European recycling companies via its Horizon 2020 subsidy programme to establish a network. We are participating in the founding of this new European waste platform based on our knowledge and experience of recycling and sustainability in the automotive recycling sector.

The New_Innonet project, financed by the European Union, is concentrated on three high-volume regulated waste flows: electrical and electronic equipment, packaging and vehicles. The aim is to encourage a so-called near-zero waste economy. ARN is task manager for the component End-of-Life Vehicles (ELV).

The parties implementing the project are a network of knowledge and research centres and industrial service providers. The task of the consortium is to chart out the major bottlenecks in the three waste flows. They will also formulate a joint research vision, and set out specific research objectives. The eventual goal for the network is to develop a blueprint for a European Technology Platform (ETP).

The outcomes of the study will contribute to European policy making such as formulating innovation targets for the European Commission. In 2016, the workload for ARN within the project, which was launched in 2015, will include developing a research agenda for the ELV sector.

Recycling pleasure yachts

In 2015, we explained the ARN recycling system at the conference on the Future of Yacht Recycling, in Amsterdam, with a view to exchanging knowledge which could help face up to the recycling challenges for the pleasure boat sector. In the Netherlands, according to the sector organisation for the Dutch Yacht Building Industry, more than 25,000 yachts and motorboats are decaying in Dutch marinas, many with untraceable owners. The biggest problem is that more than half of the material used on these pleasure boats is 'fibre-reinforced' plastics for which, for the time being, there are insufficient possibilities for reuse. The processing costs for polyester are high, and as such have to be paid for. Furthermore there is no registration or collection system for boats, and no recycling fund for accelerating the process. In 2016, we will be organising a feasibility study, the aim of which is to determine whether and how we can use our knowledge to launch a boat recycling system.



25,000
old yachts and
motor cruisers
in yacht marinas



Future of Yacht Recycling
at the PST plant

Improved waste management in the Netherlands Caribbean

As part of a Green Deal with the government, we are joining other parties from the recycling sector to improve waste management in the Netherlands Caribbean area. We are supporting the process of charting out the volume of waste on the so-called BES islands, as well as assessing the quality of the waste and its origins. We will also be examining possibilities for the separation and/or post-separation of the waste flows. The final goal is to organise a knowledge platform for waste management.

Knowledge for the Turkish dismantling sector

- In 2015, a demonstration and training location for car dismantling was opened in Turkey, close to the city of Istanbul. Turkish dismantling companies, environmental inspectors, the local automotive industry and students can visit the location for a two-day training programme.
- At the request of the Dutch government, ARN deployed its knowledge in advising the training centre on the requirements that must be met, as Turkey wishes to comply with the European 95% recycling performance target, by 2020.
- The training programme, that includes both theory and practical components, discusses every stage of the car dismantling process. Employees are taught how to comply with Turkish environmental legislation. There is also consideration for safety and quality aspects. After completing the training, all participants receive an officially approved certificate. The purpose of the training centre is to improve operational standards at car dismantling companies in Turkey, and to encourage the reuse of components. The Turkish automotive sector is a solid growth market; responsible dismantling is still very much in its infancy.





'Erkend Duurzaam' programme

With our 'Erkend Duurzaam' sustainability certification programme, we offer businesses in the mobility sector a measuring instrument to demonstrate their efforts in the field of corporate social responsibility (CSR). For these companies, Erkend Duurzaam delivers clear added value. Using the quality label it is for example possible to earn an interest rate discount from the Rabobank, for the sustainable loan system. This discount programme was introduced in 2015. A demonstrable CSR policy is also increasingly an essential precondition in business tenders and tendering procedures by government.

In 2015, among many others, the 385 companies in the Netherlands' largest independent garage formula received the Erkend Duurzaam certificate. In the course of the year, the metal recycling sector also signed up to the quality label. By the end of 2015, more than 1,500 companies had received a Erkend Duurzaam certificate. They are all listed on the website www.erkendduurzaam.nl.

In 2016, we will be taking steps to adjust the energy module Erkend Duurzaam Plus, so that certified businesses also comply with the compulsory energy saving measures demanded by government.

Waste management

ARN supports businesses in their waste management process, from A to Z. Our customers, the garages and vehicle body repair companies, can have their waste sustainably collected and disposed of via ARN. We also offer advice on sustainable design for workshops and offices, and pass on any changes to legislation and regulations. We offer our services via a single information desk, for all waste flows.

Sustainable waste management leads to cost savings, even if only by limiting the most expensive waste flow of all, residual waste. Plastic film, for example, weighs little but occupies a relatively large amount of space. By stockpiling this film separately, companies can often save up to 20% space in their residual waste container.

To encourage personnel at other companies to participate in sustainable waste management, we keep them informed of the importance of waste separation and prevention. In 2016, we will be launching a campaign to tell our customers about what happens to their waste. Sustainable business practice is something you must beam out. We can help businesses in that process.

ARN is VIHB-certified. All waste is collected, separated and responsibly disposed of by ARN-approved companies. All our customers can input their waste collection requirements via the ARN Extranet, and have access to all disposal details relating to their waste flows.



ARN to participate in Rabobank CE Challenge

Raw materials are becoming increasingly scarce and in many cases more expensive. For many businesses, this is the motivation to critically consider their own raw material consumption. However, as revealed by the CE Challenge that was concluded in 2015 at a meeting with more than 500 interested parties, there is more. Circular business practice is a powerhouse for innovation, and contributes to an improved living, working and residential environment. Circular business practice offers entrepreneurs opportunities for new products and increased sales, for added value for (residual) products, for lower costs and for a futureproof business model. Five automotive companies, including ARN, and three companies in the food sector, joined the Rabobank in the search to make the transition to circular business.



> 385
companies

largest independent garage
formula in the Netherlands
receives Erkend Duurzaam
certificate



> 1,500
companies

certified Erkend
Duurzaam



2016

Ecotest to be carried
out at PST plant

Erkend Duurzaam quality label

Erkend Duurzaam encourages businesses to include sustainability in their business processes, and to focus on corporate social responsibility (CSR). we are responsible for implementing the Erkend Duurzaam programme on behalf of the sector organisations BOVAG, Vereniging FOCWA Schadeherstel, RAI Association and STIBA.

The quality label comes in three variants:

- **Erkend Duurzaam Basis** provides businesses with an insight into the existing CSR situation and identifies possibilities for cost savings.
- **Erkend Duurzaam Plus** includes the elements from Erkend Duurzaam Basis together with two additional modules for reducing energy consumption and cutting waste flows.
- **Erkend Duurzaam Premium** raises participating companies to the highest CSR level and gives access to business customers who impose high demands on sustainability and CSR. Businesses with an Erkend Duurzaam Premium certificate report on their efforts, and appear in the NEN Publication platform ISO 26000.



‘The intermediate trade is the service link in the chain’

In the automotive recycling chain, the intermediate trade is the link between the car dismantling and the metal recycling companies. ‘We buy up the stripped vehicle bodies and various other components such as wheel rims and cable harnesses. We then pass on these items as raw materials to the metal recycling companies,’ explained Gabriël van Seumeren, Director of Prometaal in Maarsse. As chairman of the Metal Recycling Federation (MRF), he also represents the metal recycling companies. As Van Seumeren emphasised, all these businesses have a number of challenges to face up to.

ARN-recognition of intermediate traders has been possible since 1 July 2014. As a result, they are now officially part of the automotive recycling chain. For years, Van Seumeren has been calling for just that recognition. ‘We are the link between the car dismantling companies that turn a registered vehicle into a clean end-of-life vehicle, and the metal recycling companies who process the scrap into feed metal for the steel industry. It is essential that interim traders meet professional standards, since any chain is only as strong as its weakest link, and that is not a status the intermediate trade wishes to acquire,’ concluded Van Seumeren.

Attractive chain partner

He went on to emphasise that despite its apparently minor role, the intermediate trade delivers a considerable contribution to chain efficiency. In Van Seumeren’s words, ‘We meet the needs of the car dismantling companies. By offering high-quality and good service, we remove many of the concerns of these companies. In turn, the shredder companies can easily take delivery of a constant flow of end-of-life vehicles. Since 2015, we have been able to register end-of-life vehicles via the ARN Extranet, and then take care of any further administration. That makes the service provided by ARN-approved intermediate traders attractive for both chain partners. The intermediate trade is the service link in the chain.’ ARN approval has been good for the intermediate trade. ‘It legitimises our work and confirms our role in the chain,’ suggested Van Seumeren. ‘I also have the impression that tighter regulation has reduced fraud in the scrap metal trade.’

Difficult times for metal recycling companies

As chairman of the MRF, Van Seumeren also represents the interests of the metal recycling companies. One of the problems facing the sector is overcapacity. There is fierce competition to secure sufficient materials. Another problem is the dumping of steel on the world market, mainly by China. As Van Seumeren explained, ‘The metal recycling companies are experiencing difficult times. Shredder overcapacity and the overproduction of steel mean that the prices they can earn for their semi-manufactured goods and scrap are very poor. End-of-life vehicles, however, have no share in that situation.’

Stricter emission standards

Another element in the picture is that work is underway in Brussels on a proposal for stricter emission standards for metal recycling companies. The aim is that these European standards will become the central guideline for issuing licences to operate. However, the standards currently being proposed seem quite unrealistic, according to Van Seumeren. He referred to a study among French metal recycling companies that has shown that it is not possible to comply with the new standards in the European proposal without huge investments. The MRF has also sounded the alarm bells. ‘If the proposed standards were made definitive, they would represent a clear threat to the European metal recycling companies.’ With these words, Van Seumeren summarised the concerns within the sector. ‘Environmental investments must remain realistic and economically viable for the sector.’

‘A significant contribution to chain efficiency’

Cooperating on further sustainability

According to Van Seumeren, if the automotive recycling chain is to become more sustainable, the most important contributor is the design phase. “We must avoid making cars that can no longer be recycled. For improving safety, it may be entirely logical to use composite materials, but composites are technically very difficult to separate into their component parts. We will need to join all the links in the chain in determining how to further optimise the process. That applies both for prevention, reuse and recycling. “ARN will have to take the initiative in bringing all chain partners together, to discuss future steps for making the chain more sustainable,” suggested Van Seumeren. In his opinion, the future role for the organisation above all lies in coordination and promotion. “ARN must be the binding factor that brings together manufacturers, car dismantling companies and recyclers, in discussing these subjects. Furthermore, with its PST plant, ARN has a huge pool of expertise in the field of recycling practice.”

Future role of ARN

Van Seumeren is also interested in the future role that ARN sees for itself in the recycling chain. In his opinion, the relationship with the car dismantling companies plays a key role. “ARN initiated professionalisation in the car dismantling sector twenty years ago, and made the process possible. However, over the past few years, ARN’s role in automotive recycling has changed. I am interested to see how ARN defines its future role, and what added value ARN aims to deliver, in order to secure the loyalty of car dismantling companies in the future.”

Twenty years' experience in recycling

ARN works alongside all parties in the automotive recycling chain to achieve the statutory targets laid down in the End-of-Life Vehicle (Management) Decree. We monitor all data generated in the chain and join the chain parties to ensure that materials from cars are correctly processed. Using the data from the chain, we prepare reports that are submitted to government. The knowledge and experience acquired by ARN over the past twenty years is shared with parties inside and outside the mobility sector.

Improving the quality of the internal organisation

To further optimise the quality of our internal organisation, and to improve the success in achieving our targets, we further improved our risk management, in 2015. After updating the possible strategic risks and their impact on our organisation, we tightened up the management measures. We periodically report to the supervising bodies on the way in which we deal with risks. All work processes are described in the Business Control Framework (BCF), that forms a sound basis for the adequate functioning of our internal organisation. Together with the multiyear plan, risk management provides the framework for our work over the coming years.

ISO 9001 and 14001

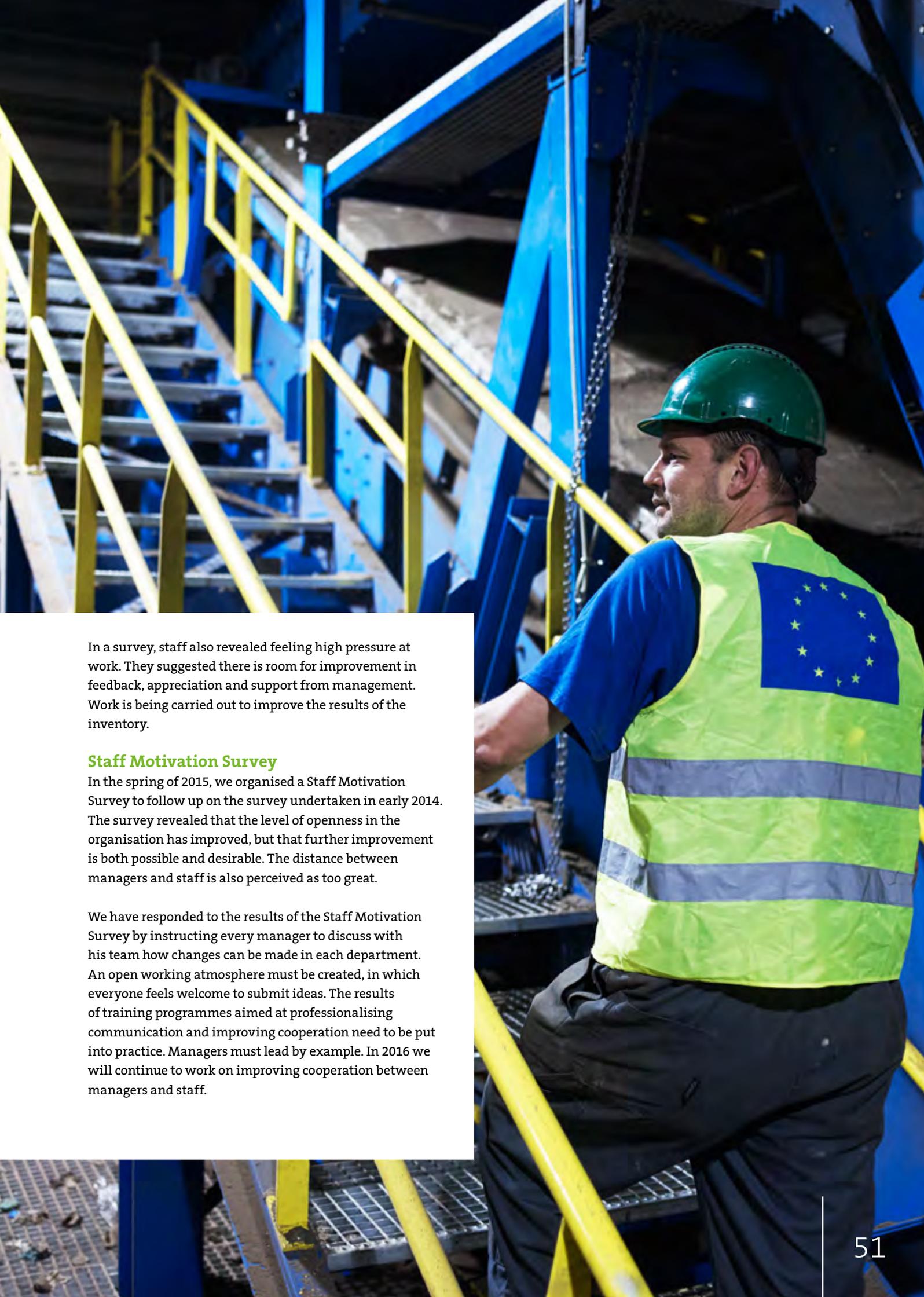
ISO certification helps us to optimise our work processes and to demonstrate that every aspect of our business is well organised. ARN Auto Recycling and the PST plant were certified in accordance with the ISO 9001 standard in 2015. The quality management system clarifies our work approach and makes ARN more transparent, as an organisation. We are also working to actively make further improvements, and report regularly on that process. In 2014, the PST plant earned ISO 14001 certification for its environmental management system.

HRM policy

At ARN, the focus is on facilitating the maximum reuse of products and raw materials, and minimising value destruction. We expect our staff to concentrate on the role they play in that process, and to contribute clearly to that mission in their work activities. In line with that expectation, projects must also make a contribution to our core activity. We are convinced that the reuse of raw materials is the right course to follow, and it is our task to beam out that conviction as clearly as possible to the outside world.

Risk inventory and evaluation working conditions

An inventory of the health and safety risks for our staff revealed in 2015 that monitor screen working and pressure of work are among the greatest risks to the health of our staff and/or the continuity of the organisation. These risks can involve sickness absenteeism, permanent occupational disability, work-related diseases and accidents at work. We operate an excellent in-house emergency service, and use furniture that complies with the latest ergonomic requirements. One recommendation is to reduce the maximum period during which members of staff are permitted to work behind a monitor screen to six hours. This can be achieved by introducing a good system of breaks, creating workstations at which staff can carry out their work standing and introducing standing meetings.



In a survey, staff also revealed feeling high pressure at work. They suggested there is room for improvement in feedback, appreciation and support from management. Work is being carried out to improve the results of the inventory.

Staff Motivation Survey

In the spring of 2015, we organised a Staff Motivation Survey to follow up on the survey undertaken in early 2014. The survey revealed that the level of openness in the organisation has improved, but that further improvement is both possible and desirable. The distance between managers and staff is also perceived as too great.

We have responded to the results of the Staff Motivation Survey by instructing every manager to discuss with his team how changes can be made in each department. An open working atmosphere must be created, in which everyone feels welcome to submit ideas. The results of training programmes aimed at professionalising communication and improving cooperation need to be put into practice. Managers must lead by example. In 2016 we will continue to work on improving cooperation between managers and staff.

Training / (graduation) internships

In 2015, we continued the programme of training for managers and staff, launched in 2014. The training courses are aimed, among other things, at effective communication and cooperation. We believe in the importance of sharing our knowledge and experience with young people. Both at the office and in the plant, we always have interns from various study programmes. In 2015, we supervised a total of 6 interns.

Global Reporting Initiative (GRI)

For a number of years, ARN has been making efforts to structure its reports according to the guidelines contained in the Global Reporting Initiative (GRI) for reporting on sustainability and corporate social responsibility. Two students from Avans Hogeschool will complete their graduation assignment at ARN in 2016. The aim is to offer ARN useful handholds in matching future reports with the GRI G4 guidelines. The outcomes of the studies will be used to lay down recommendations for a possible integrated report for 2016.

Membership

ARN is a member of the Dutch Association for Producer Responsibility (*Vereniging Producentenverantwoordelijkheid Nederland – VPN*), of Eucobat and of the Association of Waste Disposal Companies (*Vereniging Afvalbedrijven*). ARN benefits from the exchange of knowledge within these networks.

Stakeholder survey

In 2015, we carried out a stakeholder survey in the form of interviews with various target groups of the ARN organisation. The focus of these interviews was to discover how these target groups view ARN as an organisation, and the sector in which the company operates. The stakeholders were also asked to identify their expectations of ARN. The image that emerged from the survey revealed ARN as the leading expert in the field of automotive recycling. By linking current themes including the circular economy, raw materials and sustainable transition to automotive recycling, we can increase the focus of our expertise. As a result, the activities of ARN and its chain partners can be made clear to a broader public, in an even more positive light.

Open days at the PST plant

We are proud of our PST plant, and throughout the year organise tours of the production line for the processing of shredder waste. In 2015, this included offering the one thousand recipients of our newsletter an opportunity to visit the plant. So many people registered that two open days were organised for a large group of interested visitors. This made it possible for us to share what we do with the last remaining residue of a car, to a wide variety of business representatives.

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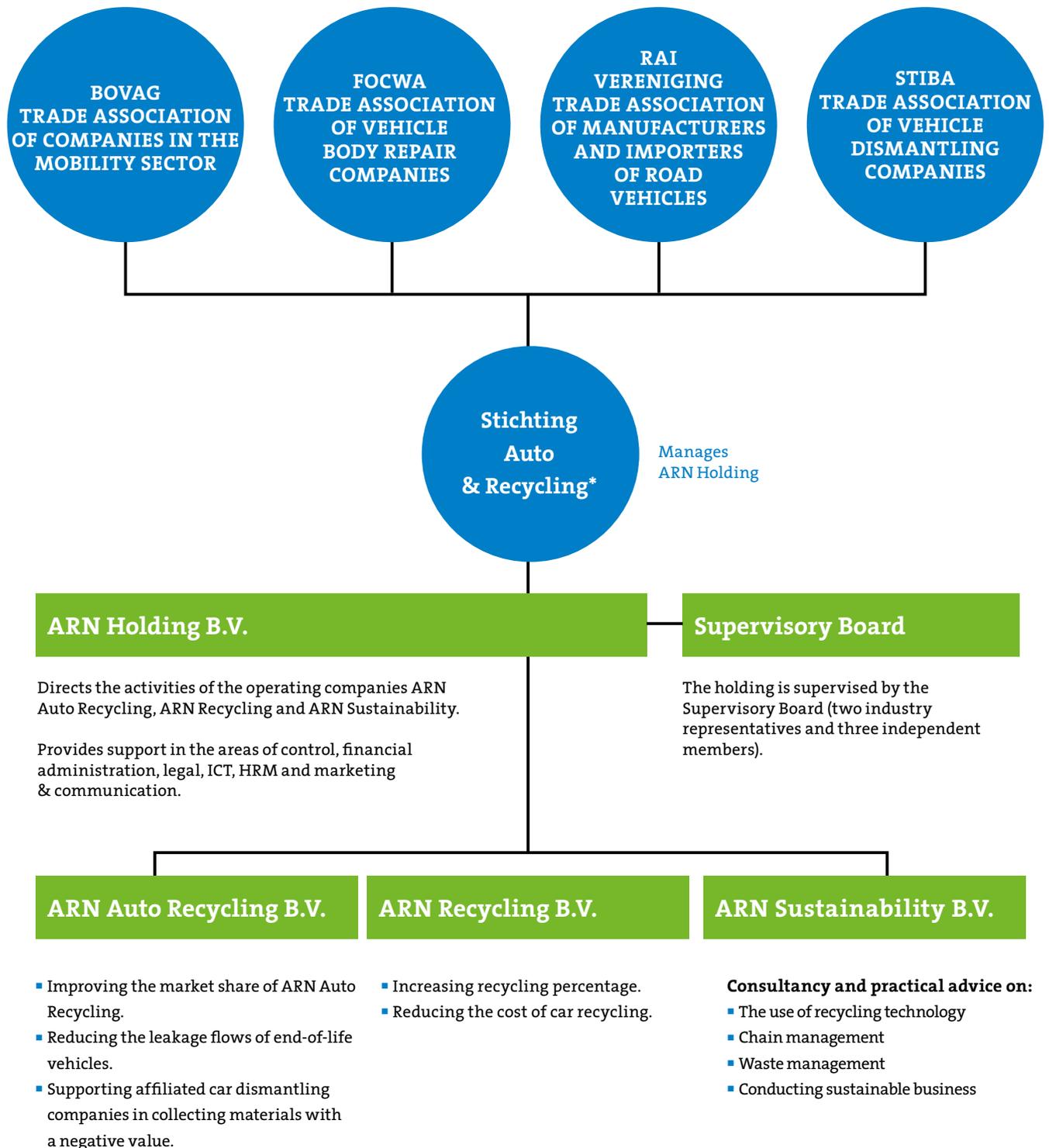
ARN business relations day

On 10 December 2015, ARN organised a business relations day at the Louwman Museum in The Hague. During the course of the day, we informed our network about our current activities in the field of automotive recycling, and the challenges we are currently facing. Guest speakers and consultants from ARN shared their knowledge on the circular economy, recycling of new materials and a second life for end-of-life batteries from electric cars.

Key figures ARN organisation

	2015	2014
Sickness absenteeism		
ARN average	5.1%	4.7%
Amsterdam	1.2%	1.1%
Tiel	8.3%	7.6%
Number of FTE	72.7	73.3
Distribution men/women	77%/23%	82%/18%

ARN organisation chart



* Stichting Auto & Recycling is a foundation with four executives who represent the mobility industry in the Netherlands.

Annexes

Annex 1:

Notes to the recycling performance 2015

In accordance with European rules, ARN reports to the RAI Association on the performance of the car recycling chain every year. This recycling performance is calculated on the basis of the average unladen weight of all end-of-life vehicles recorded in ORAD, the Online Car Dismantling Registration system of the Government Road Transport Agency (RDW). On the basis of this information, the average weight of end-of-life vehicles in 2015 was set at 1,038 kg.

In 2015, 185,110 end-of-life vehicles were deregistered for dismantling (2014: 188,279) at car dismantling companies affiliated to ARN. The total number of deregistered end-of-life vehicles at ARN-affiliated car dismantling companies and non ARN-affiliated car dismantling companies in 2015 was 213,639. In total, 167,777 dismantled end-of-life vehicles arrived at the shredder companies (2014: 188,487). One possible explanation for this discrepancy is that car dismantling companies still have a number of end-of-life vehicles on their premises that have not yet been delivered to the shredders. The low metal prices in 2015 have resulted in the stockpiling of end-of-life vehicles, in expectation of better times.

In addition to stockpiles at car dismantling companies, the intermediate trade has also been stockpiling end-of-life vehicles. At the end of 2014 and in early 2015, ARN signed a contract with all intermediate traders to gain a greater insight into and a better grasp of the flow of end-of-life vehicles between car dismantling companies and shredder companies. Within this system, car dismantling companies, intermediate traders and shredder companies register the flow of end-of-life vehicles via an extranet application. The shredder extranet provides ARN with information about:

- weighing details of end-of-life vehicles;
- numbers of end-of-life vehicles disposed of by car dismantling companies;
- numbers of end-of-life vehicles delivered to shredder companies via intermediate traders;
- numbers of end-of-life vehicles delivered directly to shredder companies;
- numbers of end-of-life vehicles received by each shredder company.

This system was established and implemented in 2014 and 2015. In the course of 2016, the system will be further improved and optimised, to improve the accuracy of registration.

The performance of the car recycling chain in 2015 was calculated on the basis of weighing details from the chain partners, and three shredder trials carried out in 2015. The three shredder trials at the three Dutch shredder companies provided an insight into the recycling performance of the chain. For each of these trials, 400 vehicles were collected that give a representative picture of Dutch end-of-life vehicles. From the 400 sample vehicles, the compulsory dismantling parts and materials for reuse and recycling (engines, second-hand parts, etc.) had already been removed. The dismantled end-of-life vehicles were fed into the normal shredder route, where mass balance sheets were drawn up. The shredder residue flows from these vehicles were then processed in the post-separation system at the PST plant. For each of these trials, mass balance sheets were drawn up that provide detailed indications of the performance of the shredder company in question, and the post-separation performance at the PST plant. For the first time, this information provided a complete insight into the contribution of the PST plant to the overall recycling performance. For 2015, this performance amounted to a total of 12.4% (5.1% recycling and 7.3% energy recovery).

The three shredder trials formed the basis for calculating the recycling performance of the metal recycling companies and the PST plant. The overall recycling percentage was calculated on the basis of the number of end-of-life vehicles per shredder company, as registered via the shredder extranet, the average end-of-life vehicle weight and the shredder trials.

As shown in the infographic on page 7, the recycling performance of the automotive recycling chain for 2015 amounts to 97.0%. Of that total, 87.7% relates to reuse and recycling, and the remaining 9.3% to recovery. With these figures, ARN complies with the European End-of-Life Vehicle Directive.

Financial report 2015

Finances

This appendix reports about the finances of the Stichting Auto & Recycling. The recycling activities for cars and thus the activities of ARN are financed from the recycling fee fund. The management contribution we receive for car batteries is used for the recycling of these batteries. ARN directs the recycling chain from the vehicle dismantling companies through to the PST plant.

ARN Sustainability finances its activities by paid assignments and projects from third parties and for internal customers. All the positive results derived from these activities are added to the fund and thus benefit the organisation.

Assignment

Our assignment is to achieve a 95% recycling performance as effectively and efficiently as possible, and so guarantee the continuity of car recycling. To perform our legal task in the environmentally friendly recycling of end-of-life vehicles, the buyer of a new passenger car or light commercial vehicle pays a recycling fee. We do not aspire to maximise profit. For ARN, a better recycling performance means making a responsible choice between economy (costs), ecology (CO2 footprint) and recycling percentage. This will eventually lead to an optimum sustainability performance.

Market

ARN operates in the car recycling chain in the market for end-of-life vehicles and everything connected with them. At the PST plant, our activities are aimed at converting residual materials into secondary raw materials. ARN Sustainability advises market parties with its acquired knowledge of the use of recycling technologies, chain management, waste management and sustainability in the mobility industry.

Sustainable investment

The Stichting Auto & Recycling follows a defensive risk-avoiding investment policy with a focus on sustainability. In our statement of investment principles, the focus is on sustainable investment. The so-called ESG criteria are integrated in the investment process. ESG stands for ecology (environment), social policy and governance. The ESG policy itself is based on internationally accepted guidelines, including the UN Global Compact and the Principles for Responsible Investment (PRI) of the United Nations. These guidelines are aimed at respecting human rights, respecting labour rights, fighting corruption, protecting the environment (including preventing climate change) and respecting the values of good corporate management.

We have appointed two asset managers who are responsible for our investment policy. Each quarter they report to the Investment Committee of the Stichting Auto & Recycling.

The consolidated balance sheet and consolidated profit and loss account include the figures for Stichting Auto & Recycling, ARN Holding B.V., ARN Auto Recycling B.V., ARN Recycling B.V. and ARN Sustainability B.V.

The consolidated annual accounts of ARN Holding B.V. were drawn up on the basis of Title 9 of Book 2 of the Dutch Civil Code. The financial statements of the Stichting Auto & Recycling were drawn up on the basis of principles selected by the foundation itself. The most significant differences between the accounting principles selected by Stichting Auto & Recycling and Title 9 Book 2 of the Dutch Civil Code involve the existence of the recycling fee fund and the non-consolidation of group companies.

Consolidated balance sheet as at 31 December

The consolidated balance sheet and the consolidated profit and loss account incorporate the figures from Stichting Auto & Recycling, ARN Holding B.V., ARN Auto Recycling B.V., ARN Recycling B.V. and ARN Sustainability B.V.

(following appropriation of profits in euro)

	2015	2014		2015	2014
Assets			Liabilities		
1 Intangible fixed assets	215,030	339,656	7 Equity	14,521	14,521
2 Tangible fixed assets	29,111,304	31,182,583	Total equity	14,521	14,521
3 Financial fixed assets	45,687,036	45,305,116	8 Recycling fee fund	72,780,265	75,092,078
Total fixed assets	75,013,370	76,827,355	9 Battery management fund	7,239,939	2,968,746
4 Stocks	332,495	121,971	10 Provisions	649,221	76,189
5 Receivables	8,726,145	5,735,703	11 Long-term liabilities	10,710	10,937
6 Cash and cash equivalents	3,257,351	1,723,969	12 Short-term liabilities	6,634,705	6,246,527
Total current assets	12,315,991	7,581,643	Total	87,314,840	84,394,477
Total assets	87,329,361	84,408,998	Total liabilities	87,329,361	84,408,998

Consolidated profit and loss account

(in euro)

	2015	2014
13 Income from recycling fee	18,574,235	16,272,401
14 Income from battery management fee	4,559,281	1,484,042
15 Income from investments	1,111,618	4,145,879
16 Other income	5,134,564	4,809,676
17 Interest and similar income	25,011	15,171
Total income	29,404,709	26,727,169
18 Cost of sales	14,106,231	12,875,977
19 Costs of outsourced work and other external costs	3,636,038	3,165,723
20 Wages and salaries	4,074,730	4,001,619
21 Social insurance contribution and pension costs	882,902	824,458
22 Depreciation of fixed assets	3,721,229	4,123,068
23 Other impairments	341,083	496,064
24 Other operating costs	572,067	51,824
25 Interest and similar costs	114,712	58,273
Total operating costs	27,448,992	25,597,006
Operating result	1,955,717	1,130,163
26 Tax on the result	3,663	333,404
Result after tax	1,959,380	1,463,567

Explanatory notes to the financial report 2015

1. Intangible fixed assets

The intangible fixed assets consist of purchased software and are amortised in a straight line to zero over a period of five years.

2. Tangible fixed assets

Tangible fixed assets comprise land, buildings, machinery and equipment. At year-end 2015, ARN Auto Recycling B.V. had 210 drainage installations (2014: 214) which were lent to affiliated car dismantling companies.

3. Financial fixed assets

The Stichting Auto & Recycling has delegated the management of the investment portfolio to two asset managers. The funds are invested in both bond and share funds. The asset managers have been given a defensive and sustainable mandate, derived from the statement of investment principles of the Stichting Auto & Recycling. In this way, the risks connected with investment are limited as far as possible, and sustainable investment is guaranteed.

4. Stocks

The stocks consist primarily of shredder residue for the production of ARN Recycling B.V. and end fractions.

Any loss in value as at the balance sheet date is taken into account in the valuation of stocks.

5. Receivables

The receivables consist mainly of debtors, the management fees still to be invoiced and other amounts receivable.

6. Cash and cash equivalents

The cash of the Stichting Auto & Recycling, ARN Holding B.V. and its subsidiaries is held at creditworthy banking institutions.

7. Equity

The capital of the Stichting Auto & Recycling has been paid up by the shareholders RAI Vereniging, BOVAG, Vereniging FOCWA Schadeherstel and STIBA. Each organisation has contributed a proportional share to the capital.

8. Recycling fee fund

The fund incorporates the annual results of the Stichting Auto & Recycling with respect to the End-of-Life Vehicles (Management) Decree (Bba). The annual result of the Stichting Auto & Recycling with respect to Bba is visibly contributed to or deducted from the recycling fee fund in the statement of income and expenditure. The fund is to be considered as a reserve for both anticipated and unforeseen future expenditure.

9. Battery management fund

The fund incorporates the annual results of the Stichting Auto & Recycling with respect of the Bbb. The annual results of the Stichting Auto & Recycling with respect to Bbb are visibly contributed to or deducted from the battery management fund in the statement of income and expenditure. The fund serves for both anticipated and unforeseen future expenditure.

10. Provisions

A provision is established for major maintenance to buildings at ARN Recycling B.V. on the basis of expected costs over a period of fifteen years.

In 2015, a provision was established for the expected costs for alterations to the quality fee.

11. Long-term liabilities

The affiliated car dismantling companies have deposited a guarantee for the use of logo signs. As at 31 December 2015, 236 (2014: 241) car dismantling companies had an affiliation agreement.

12. Short-term liabilities

The short-term liabilities consist mainly of accounts payable and the item 'liability to car dismantling companies for materials'.

The item 'liability to car dismantling companies for materials' shows the dismantling payment still to be made to the car dismantling companies as well as the costs still expected for collection and processing. This liability is linked to the outstanding material balances of each company. Outstanding material balances represent the materials that are still in the end-of-life vehicles that have been registered for dismantling, are in the existing packaging or have already been disposed of but not yet claimed for.

13. Income from recycling fee

In 2015, a recycling fee was charged for 500,024 (2014: 437,755) newly registered vehicles.

14. Income from the battery management fee

For Li-Ion batteries, the management fee is between € 15 and € 180 including VAT, depending on the weight of the battery. The management fee for lead (starter) batteries is € 0.05 excluding VAT. In 2015, management fees were charged for 32,669 (2014: 9,459) Li-Ion batteries and 767,161 (2014: 766,304) lead (starter) batteries.

15. Income from investments

The Stichting Auto & Recycling has issued a defensive mandate to its asset managers, which is characterised in particular by investment in bonds and shares.

16. Other income

Other income consists mainly of the proceeds from the sale and purchase of materials and marketing of knowledge to third parties.

17. Interest and similar income

Interest consists mainly of the interest on deposits and savings.

18. Costs of sale

In 2015, there were 236 (2014: 241) affiliated car dismantling companies, which between them dismantled 185,110 (2014: 188,279) end-of-life vehicles. Dismantling reimbursements are paid to the car dismantling companies. In addition, the costs of sale include costs for the collection and processing of the ARN materials. The costs of sale include production costs at ARN Recycling B.V. The costs of sale also relate to the cost price of purchase, collection, lease of packaging and storage of materials.

19. Costs of outsourced work and other external costs

Costs and other external costs relate to such items as publicity, accommodation, offices, transport and other operating costs.

20. Wages and salaries

The average workforce consists of 73.0 FTE (2014: 70.5 FTE). The increase mainly concerns ARN Recycling B.V. The employees perform work for the Stichting Auto & Recycling, its subsidiaries and external parties. The Stichting Auto & Recycling has a Board consisting of four members; ARN Holding B.V. has a Supervisory Board comprising five members.

21. Social insurance contribution and pension costs

In addition to the compulsory social insurance contributions, this item also includes pension costs. From the moment of entering service, employees participate in a group pension scheme.

22. Depreciation of fixed assets

This item relates mainly to the depreciation on the drainage installations that ARN Auto Recycling B.V. has lent to the car dismantling companies and the depreciation on the machinery of ARN Recycling B.V.

23. Other impairments

Further optimisation of the production line in the ARN Recycling plant in 2014 and 2015 has led to the replacement and decommissioning of a number of machines. The valuation of these machines was subject to a permanent impairment in 2014 and 2015.

24. Other operating costs

The other operating costs concern the addition to provisions.

25. Interest and similar costs

This relates mainly to investment management fees.

26. Tax on the result

The corporation tax concerns the recognised available tax loss carry forwards. The unrecognised losses eligible for tax loss carry forwards amount to € 337,700 (2014: € 750,000). ARN Holding B.V. and its subsidiaries form a fiscal unity for the purpose of corporation tax.

GRI index

For this report, we have made use of the G4 guidelines for sustainability reporting from the Global Reporting Initiative (GRI). We report in accordance with the 'Core' option.

GRI indicator	Description	Explanation or reference	Page in the report	Explanation for non or partial reporting
Strategy				
G4-1	Statement by the CEO	Preface	4, 5	
G4-2	Important consequences, risks and possibilities	Preface/Fleet development/PST plant	4, 5, 8, 9, 35, 36	
Organisation profile				
G4-3	Name of the organisation	Back page, colophon		
G4-4	Brands, products and/or services	Our world in pictures/ Developing knowledge	10, 11, 42	
G4-5	Location of the headquarters	Back page, colophon		
G4-6	The number of countries where the organisation is active	Back page, colophon		
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G4-8	Sales markets	Our world in pictures, Developing knowledge	10, 11, 42	
G4-9	Size of the company	About ARN	53	
G4-10	Breakdown of staff	About ARN	53	
G4-12	Description of the supply chain of the organisation Description of the value chain	Our world in pictures	10, 11	
G4-13	Significant changes to the organisation during the reporting period	Preface	4	
G4-14	Explanation of the application of the precautionary principle	Our world is changing (trends and developments)	8	
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G4-22	Entities included in the consolidated annual accounts	Not applicable		
G4-23	Reformulations	Not applicable		
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GRI indicator	Description	Explanation or reference	Page in the report	Explanation for non or partial reporting
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Colophon

Publication

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and ARN Holding B.V.

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