





<b>FOREWORD</b>	<b>4</b>
<b>KEY FIGURES</b>	<b>10</b>
<b>AVR'S YEAR IN A NUTSHELL</b>	<b>12</b>
<b>PROFILE, MISSION, VISION AND STRATEGY</b>	<b>18</b>
How we add value	20
<b>OUR STAKEHOLDERS AND MATERIAL THEMES</b>	<b>22</b>
AVR reporting policy	22
Materiality matrix	24
Material themes, goals en KPIs	24
<b>MATERIAL THEMES</b>	<b>26</b>
<b>A SAFE WORKING ENVIRONMENT</b>	<b>26</b>
Always work safely	26
Kimberly Langerveld and John Janssen tell us	32
<b>CO<sub>2</sub> EMISSIONS</b>	<b>34</b>
Towards a climate-neutral AVR	34
Bennie Rutgers tells us	42
<b>INNOVATION</b>	<b>44</b>
Continuous renewal	44
Stefan Lubezuk and Peter Onderwater tell us	50
<b>RELIABILITY</b>	<b>52</b>
Reliable service provision	52
Patricia Stooker and Jeffrey van der Leij tell us	58
<b>RECYCLING</b>	<b>60</b>
Recovering raw materials for re-use	60
Marco van Velzen and Jeroen Schelling tell us	66

<b>RENEWABLE ENERGY</b>	<b>68</b>
Renewable energy from residual waste	68
Marcel Kooman and Remon Waasdorp tell us	74
<b>SUSTAINABLE EMPLOYABILITY</b>	<b>76</b>
Fit and energetic employees	76
Rob Janse and Marie-Claire van der Schoor tell us	82
<b>OTHER EMISSIONS</b>	<b>84</b>
Minimising our emissions	84
Maryam Dabirian tells us	90
<b>FINANCIAL STABILITY</b>	<b>92</b>
Basis for our continuity	92
Christiaan Vrijhof tells us	96
<b>GOVERNANCE</b>	<b>98</b>
Corporate governance	99
Legal structure	99
One-tier Board	99
Personalia	100
Message from the board	103
Compliance	104
Risk management	105
Operating risks	105
Financial risks	109
<b>CONDENSED FINANCIAL STATEMENTS</b>	<b>111</b>
<b>IN CONCLUSION</b>	<b>116</b>
Looking forward to 2022	116
<b>COLOPHON</b>	<b>120</b>



Rob de Fluiter Balledux, CFO, and Yves Luca, CEO

# Staying connected

Yves Luca & Rob de Fluiter Balledux

A strong year, but one with more challenges than ever before. This is how CEO Yves Luca and CFO Rob de Fluiter Balledux sum up 2021. AVR's stability was good, as were its financial results, but achieving this demanded extra efforts. One keyword that is very appropriate in respect of our employees is 'connection'.

## How can we sum-up 2021 in a nutshell?

**Yves:** "After the contraction in 2020 due to the corona virus we very quickly saw signs of an economic recovery. However, that went hand-in-hand with shortages, not only of good people but also of raw materials we use in our processes, such as sulphuric acid, ferric chloride and MEA (mono-ethanolamine – the substance needed to bind the CO<sub>2</sub> we capture from our flue gases). Although the delays in deliveries of these materials did not bring us to a standstill, acquiring the right quantities of the right quality took additional time and effort and the scarcity drove up

prices. Nevertheless we performed well in 2021."

**Rob:** "2021 was a successful year when you look at the financial results. We had some windfalls, such as the extension of the large contract for the Water Treatment plant that we hadn't counted on and the higher energy prices from which AVR was able to profit. On balance AVR supplies more energy than it uses for its plant and installations. Because we don't want to be too dependent on price fluctuations, we have locked-in part of the price risk through hedging. But, around 20% of the volumes is not hedged and on that portion we were able to profit from the higher prices."

**In 2020 the corona situation led to a change in the composition of the waste mix and this caused some problems. Was this also the case in 2021?**

**Rob:** "To an extent, yes, waste quality is still under pressure. To an extent that's due to the composition, but the form in which it is delivered to us also plays a role. Streams for recycling are extracted from the residual waste, but not everything in those streams can actually be recycled. What the recycling company cannot recycle is sent back to us. This includes plastics that are difficult to process, or for which processing is too expensive. As these essentially petroleum products with a high energy value are delivered to us as finely ground granules the incineration process can deviate from the normal parameters. This makes the job of processing a comparable volume of waste harder and more complex. The result was a declining and fluctuating quality and, partly due to this, slag formation – ash melting together into lumps in the hot-spots in the incinerator. We were able to reduce this and keep our emissions well under control. That was a major achievement that demanded a great deal of commitment and skill from our employees."

**Did the Koploper (Frontrunner) programme contribute towards the results?**

**Yves:** "Definitely. In Koploper, which ran from mid 2020 to April 2021, we worked on the operational excellence strategic pillar. But I should start by saying that this also had a dark-side. During this period we lost sight of the connection with the people on the shop floor. That was a mistake."

**Rob:** "In Koploper our attention was focused too much on the processes and not enough on the people. The employee satisfaction survey showed this very clearly. A number of employees indicated they were dissatisfied with the communication. The corona measures made matters worse because less personal contact

was possible. We must listen to our people better, that message has come through very clearly. We are taking this very seriously and are working on it in various initiatives."

**Yves:** "Outdoor Days involving all kinds of activities aimed at clarifying what went wrong and improving it as well as to make a start on rebuilding the connection have been organised with employees and management. We've also received input from other channels. One of the problem areas is the communication between the different management levels. This will be paid a lot of attention in 2022. It's good that we are now aware of the situation because we want to be a company in which people can speak out and are heard. We're now putting a lot of energy into this."

**Rob:** "Rest assured we are going to do this differently. But, getting back to Koploper: the programme has definitely led to more stable processes and better performances in the field of safety and emissions. In that respect our strategy has worked out well."

**Talking about the strategy, that hasn't changed for several years. Why not?**

**Yves:** "Our strategy is focused on the long term and, in our view, its main lines are still correct. Every two years we organise strategic sessions during which we expand actions within the strategy with the focus on the existing goals. Koploper was the interpretation of the operational excellence strategic pillar. Another pillar – growth – had yet to be clearly defined. We are doing that now with the (intended) acquisition of the Amsterdam waste processing company, AEB. We signed the agreement in December and are now waiting for the approval of the ACM – the authority that supervises mergers and acquisitions. It's going to be a major transaction."

**Rob:** "In 2021 we also made good progress within our existing operations. The plants ran well and, in part thanks to our portfolio with waste volumes, we



processed 50,000 tons more waste than foreseen. More attention was also paid to the climate and we aim to expand further in that area. In the autumn we submitted an application for an SDE++ subsidy for the construction of a CO<sub>2</sub>-capture plant in Rozenburg that is far larger than our plant in Duiven. This will increase AVR's share in the energy transition."

**Yves:** "Some of the captured CO<sub>2</sub> goes to the glass-house horticulture sector, but storage in empty offshore natural gas fields is also increasingly coming into the picture. The infrastructure for this still has to be set-up. The transportation and storage must be 100% safe. We expect this will happen in three to five years. This is CO<sub>2</sub> that after sitting underground for millions of years

has, in a very short space of time, been released into the atmosphere. Storing it will win u time to solve an extremely difficult climate problem."

**The government has given the climate problem as its reason for imposing an import tax on foreign waste. AVR is opposed to this.**

**Yves:** "Absolutely. The government has misrepresented the situation. In the Netherlands waste is used to generate energy. This is not the case in other countries. Many countries still landfill waste and that results in huge emissions not only of CO<sub>2</sub> but also of methane – a greenhouse gas that is far more harmful than CO<sub>2</sub>. Over the past 10 years the Dutch government

has increased waste incineration capacity and by so doing made importing waste necessary. Now the government is saying that the Netherlands is providing a solution to CO<sub>2</sub> emissions for which other countries are not paying. The government isn't looking at Europe, it's only looking at the Netherlands. The Dutch government's view is that if other countries create more CO<sub>2</sub> emissions with their waste that's their own problem and it's up to them to solve it. But CO<sub>2</sub> refuses to acknowledge national borders. And that's not all. The waste processors in the public sector have – via in-house contracts and outside the market – acquired the total volume of waste collected by the public authorities. The private sector is, therefore, lagging behind, because a government sector is not issuing any tenders so these waste volumes do not come onto the market. And then the government imposes a levy on imported waste. This only affects the private sector, and that means there is not a level playing field.”

Rob: “The Vereniging Afvalbedrijven (Dutch Waste

Management Companies Association) includes both public and private processors, which makes addressing this issue difficult. So the private companies have joined forces in the Afvalvergroeners (Waste Greeners) with the aim of drawing attention to our role in the circular economy. We are contesting this point of the import tax, but are also raising other issues. For example, to be permitted to process volumes from affiliated municipalities the public processors must comply with the legal stipulations. We have questions regarding the interpretation of these stipulations. In addition to insourcing and outsourcing there is also a ‘quasi-insourcing’. This means that municipalities that do not hold any shares in a public company may, if certain conditions are met, allow such a company to process their waste. In our opinion by so doing they are circumventing the market.”

Yves: “If the government wants to reduce the capacity, isn't it only fair that capacity should also be removed from the market owned by the government itself.”



### Meanwhile AVR continues to invest and innovate. What happened in this area in 2021?


Rob: “We invested heavily in the new Turbine F, which went into service at the end of 2021. This is a back-pressure turbine that generates electricity and heat. With this new turbine we are ensuring that far less energy is discharged unused via our water cooling systems. The turbine is extremely energy-efficient and thus contributes towards the achievement of our strategic goals. The first experiences with the turbine are good and it is actually doing even better than we expected. In addition we have taken the decision to invest in a new system to remove and transfer the bottom ashes from our incinerators. We wanted to make a start on this during 2021, but were overtaken by the rising steel prices, which made this investment more expensive. Staying within the budget caused us a lot of headaches.”

Yves: “The bottom ash transfer system at our Rozenburg facility has to be reorganised because at the moment it is vulnerable with various conveyor belts and transfer points. Sometimes large chunks become trapped and then everything stops, because all the incinerators are linked. That's too great a risk. The current system is also very maintenance intensive. The new system will take come closer to the water so loading the bottom ashes onto a ship for transport will involve fewer actions. The working conditions will also be better.”

### How has AVR started 2022?

Rob: “We are building on our strategy which has proven itself year after year. Even so we anticipate that once again in 2022 we will face a number of challenges in different areas. We hope the legislation related to the import tax will be repealed and that we can get a better grip on the fluctuating quality of the residual waste we receive. We also want to improve the crucial connection between managers, supervisors and employees. That is very dear to our heart.”

Yves: “In 2021 the commitment of our employees was once again excellent, yet again in difficult circumstances. We are extremely grateful to them for this and hope they will be equally committed in 2022. We are doing everything we can to restore the connection. And, naturally, we sincerely hope that the situation around the corona virus will finally change, so that once again more real contact on the shop floor will be possible. That will be a great relief for everyone.”



**Number of employees**  
(ftes)

**459**

2020: 460

- 1



**Safety**  
(IF-rate)

**1.6**

2020: 2.4

- 0.8



**Sick leave**  
(percentage)

**5.0**

2020: 5.4

- 0.4



**EBITDA**  
(€ mln)

**138.7**

2020: 138.5

+ 0.2




**Net result**  
(€ mln)

**42.6**

2020: 36.1

+ 6.5




**Quantity of waste processed**  
(kton)

- 3

Household waste	774
Commercial waste	631
Hazardous waste	106
Imported waste	201
<b>Subtotal residual waste for energy plant</b>	<b>1,713</b>
Biomass: waste wood	131
Biomass: paper pulp	141
Waste water	281
<b>Total processed residual waste</b>	<b>2,266</b>

**2,266**

2020: 2,269




**Total energy-output**  
(PJ)

**8.4**

2020: 8.3

+ 0.1




**Converted into the number of household Equivalents to which we supply energy**  
(households)

**158,000**

2020: 157,000

+ 1,000



**CO<sub>2</sub> emissions**  
(kton)

**2,363**

2020: 2,359\*

\*New metering method, see CO<sub>2</sub> emissions on page 34

+ 4

## Switching from the CO<sub>2</sub> Performance Ladder to ISO 50001

Whole of 2021

The CO<sub>2</sub> Performance Ladder enabled us to measure the emissions from the gas used in our offices and from the fuel used by our leased vehicles and other rolling stock. But the majority of our emissions come from waste incineration. And we gained only minimal insight into our energy usage. We have now switched to the ISO 50001 system, which monitors our overall energy performance rather than just the CO<sub>2</sub> emissions. This is not only more pertinent information for AVR it also ties in with the other ISO systems we use: ISO 9001 for quality, ISO 45001 for safety and ISO 14001 for the environment. During 2021 we worked hard to meet all the ISO 50001 stipulations. We have just been informed that we have been granted certification. We hope to hear very soon that we have been granted certification.



## Waste Heroes (Afvalhelden) in the limelight

March 2021

AVR was a participant in the national Waste Heroes Week that revolves around employees in the waste sector. Videos in which colleagues in Rozenburg and Duiven explained their role in the waste chain and why it was important were produced. They were proud to explain how they worked hard to generate as much renewable energy and recover as much raw materials as possible.



## Hydrogen in the spotlight

March 2021

The daily newspaper 'de Gelderlander' interviewed AVR's Energy & Residual Materials Director, Michiel Timmerije, to find out about using hydrogen as an alternative to fossil fuels or as a raw material for the chemical industry. At AVR there are numerous possibilities: as we can produce hydrogen sustainably using the electricity generated by processing residual waste it dovetails perfectly with our efforts to maximise the amount of energy and raw materials we extract from waste. Although such an installation won't appear overnight, in Michiel's view hydrogen definitely has a future.



## AVR achieves aspirant status on the Social Entrepreneurship Performance Ladder (PSO)

April 2021

This scientifically-substantiated quality mark of TNO enables an objective measurement of the extent of social entrepreneurship. With PSO people in a vulnerable labour market position can participate in sustainable and worthwhile employment. Samer Alhajaly from Syria is one example. Samer has been working for AVR as a Loading Operator for over two years and is also studying. AVR facilitates workplaces itself and also encourages its suppliers and contractors to do the same.



## AVR in action against cyber-crime

April 2021

AVR, like many other companies, is vulnerable to the digital practices of malicious parties. This is why we have made our systems as secure as possible. Our employees are a link in the total cyber-security chain. By training them properly and making them aware of the dangers we close the back door to cyber-criminals. For example, every employee follows a course on handling personal data and recognising phishing.



## Afvalvergroeners (Waste Greeners) oppose import tax

May 2021

In 2020 our sector was confronted with an import tax on waste introduced by the Dutch government on the basis of the mistaken assessment that this would reduce greenhouse gas emissions. In fact the tax is counterproductive because it makes it cheaper for the exporting countries to landfill their waste rather than export it. The result is increased emissions, especially of aggressive methane gas. This measure means the Netherlands needs many more wind turbines to generate green energy and thousands of jobs have been put at risk. On 25 May action was taken: the Afvalvergroeners, the Association of Private Waste Processors of which AVR is a member, and the FNV (Federation of Dutch Trade Unions) jointly submitted a petition to the House of Representatives.

## Koploper (Frontrunner) is concluded

April 2021

The Koploper (Frontrunner) project was started in June 2020 with the aim of making processes more streamlined and efficient. On 26 April 2021 we closed down Koploper and together looked back at a successful project. The operating processes now run more smoothly, there is more insight and oversight, and the operating results have improved. But we haven't finished: AVR is continuing to focus on improvement through the newly-formed Operational Excellence Department.



## Financial administration in-house

June 2021

After eight years of outsourcing in June 2021 AVR once again brought its financial administration in-house. The seven colleagues in the new department in Duiven are responsible for processing supplier invoices, organising payments, sending invoices to customers and keeping the ledger up-to-date. This move brought the administrative component in closer contact with business operations.

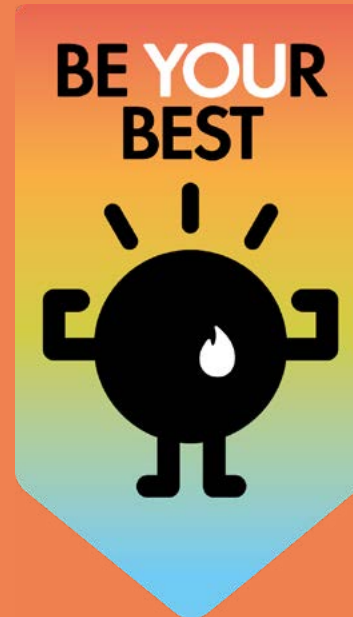




## AVR employees get moving for VoorBlijBlijvers (Stay Fit Stay Happy)

July 2021

One conclusion of the preventive medical check-up of AVR employees carried out at the end of 2020 was that more attention should be paid to the physical lifestyle. This is why AVR's sustainable employment programme - 'Be (Y)our Best' - is offering something new: VoorBlijBlijvers. Via an online portal our employees can access tips for a healthy and energetic lifestyle and carry out a health check. Together with GoodHabitz, the online learning platform for acquiring knowledge and skills, this forms a total package that enables our people to get the most out of themselves and their job.



## AVR's customers are very happy

November 2021

A score of 8.8! That was the outcome of the customer satisfaction survey carried out by research bureau Markteffect. The key reasons for this (high) score were AVR's reliability, its having the right expertise in-house, and the pleasant cooperation due to the short communication lines. AVR is also good at thinking along with its customers in a solution-oriented way. Areas with room for improvement were also noted: more clarity regarding the acceptance of waste and more information about our sustainability initiatives. We are, of course, working on this.



## The team gets to work on slag

August 2021

How well an incinerator works is partly dependent on the composition of the waste. This is not consistent: the offering has changed due to the corona virus plus an increase in construction waste in combination with drought. Inconsistent combustion results in slag formation, which is a major problem. This was reason enough for AVR to set-up a multidisciplinary slag team comprising colleagues from eight departments. This wide scope is necessary because the entire chain - from waste delivery to residual waste incineration and flue emissions - is involved. Together we can look at every phase of the process and work on a solution.

## Perfect Days 2.0

December 2021

A Perfect Day for AVR is a day with no incidents or contraventions, a day on which work is carried out safely and the production units meet their targets. Until now, every time we had a perfect day we put € 100 in the savings pot. Every month the money in the savings pot was donated to a charity nominated by AVR colleagues. Now we have introduced Perfect Days 2.0 and that means change! To start with we are now saving € 200 per Perfect Day, and the proceeds go to good causes in or around where our facilities are located that make a contribution towards people, communities or the environment. The donation from AVR must have a real impact and not be a proverbial 'drop in the ocean' and must reflect AVR's mission. Employees, customers and suppliers nominate projects and the Perfect Days Committee select the three AVR's people can vote for. The Perfect Days savings pot is emptied every quarter.

## AVR's acquisition of Amsterdam company AEB

December 2021

The municipality of Amsterdam announced the intended acquisition of AEB (Afval Energie Bedrijf - Waste Energy Company) by AVR. The sale will not be completed until it has been approved by the ACM (Autoriteit Consument & Markt - Consumer & Market Authority), but we are already looking forward to the opportunity to together make an even greater contribution towards the achievement of wider sustainability goals.

# Profile, mission, vision and strategy

## AVR in brief

AVR specialises in the processing of various types of residual waste: household and commercial waste, waste water, paper pulp residue, waste wood and hazardous waste. AVR strives continuously to achieve the maximum recovery of energy, raw materials and other materials from this residual waste through effective, efficient and safe business operations. We ensure that plastics, drinks cartons, films and metals are recycled and minerals are used in (road) construction. And by incinerating the residue of the residue we supply sustainable steam, heat and electricity to our surrounding area and by so doing obviate the use of fossil fuels. In this way AVR makes an important contribution towards the achievement of the Dutch and European goals related to climate and energy. And AVR does all this with residual waste that other people often think is worthless.

AVR has two facilities, in Duiven and Rozenburg, and four residual waste transfer stations in Den Haag, Utrecht and Rotterdam. The central location of these facilities is very advantageous for both the suppliers of residual waste and the purchasers of energy and raw materials. Whenever possible the residual waste is brought in by water. When that is not possible it is brought in by road. At the end of 2021 AVR employed 472 people (459 FTEs).



### Our mission: to create a clean world in which nothing is wasted

AVR gives a useful purpose to what most people consider worthless residual waste streams by converting them into raw materials and energy. The target is always to convert all the residue of the residue nobody else can do anything with into something worthwhile, and with a minimal environmental-impact. We believe our solution is the best available at this time. It's why we are here and it's also our motivation: to create a clean world in which nothing is wasted. We, together with our proud employees, are working day in and day out to bring about positive change.



### Our vision: too good to waste

Vital raw materials are being depleted and harmful greenhouse gas emissions are changing the climate. If we want this planet to be liveable for future generations we must make radical changes now. Changes like implementing a circular economy and an energy supply that is 100% renewable. The way we handle residual waste is a key factor in making our planet more sustainable. The global population keeps on increasing, the global waste mountain keeps on growing and in many countries the majority of the residual waste is still dumped as landfill, which results in huge emissions of methane and other greenhouse gases.

AVR makes an important contribution towards reducing difficult residual waste streams: as experts in handling the residue of the residue we make new beginnings possible. Achieving this in a constantly-changing world demands a flexible approach. With our sights set firmly on tomorrow we offer the best solution for the residue of the residue available today. At the same time we ourselves are constantly changing, adapting. Because that is our goal: to offer the best solution for the day-to-day challenges facing our society and to constantly seek ways to do it that are better, cleaner, more efficient and emission-free. You can't have one without the other: we are striving for a natural balance between economy and ecology. Doing that is what enables us to not only provide a social solution for keeping the streets clean, but also gives us the capacity to be a driving force for far-reaching and risky innovations. A circular and sustainable 2050 is coming. AVR will be part of it.



### Our strategy

AVR has developed a strategy that will add substance to its mission and vision. The key elements are encapsulated in three pillars our organisation works on every day:

(Long-term) (residual) waste contracting;

Maintaining, and where possible further improving, operational excellence;

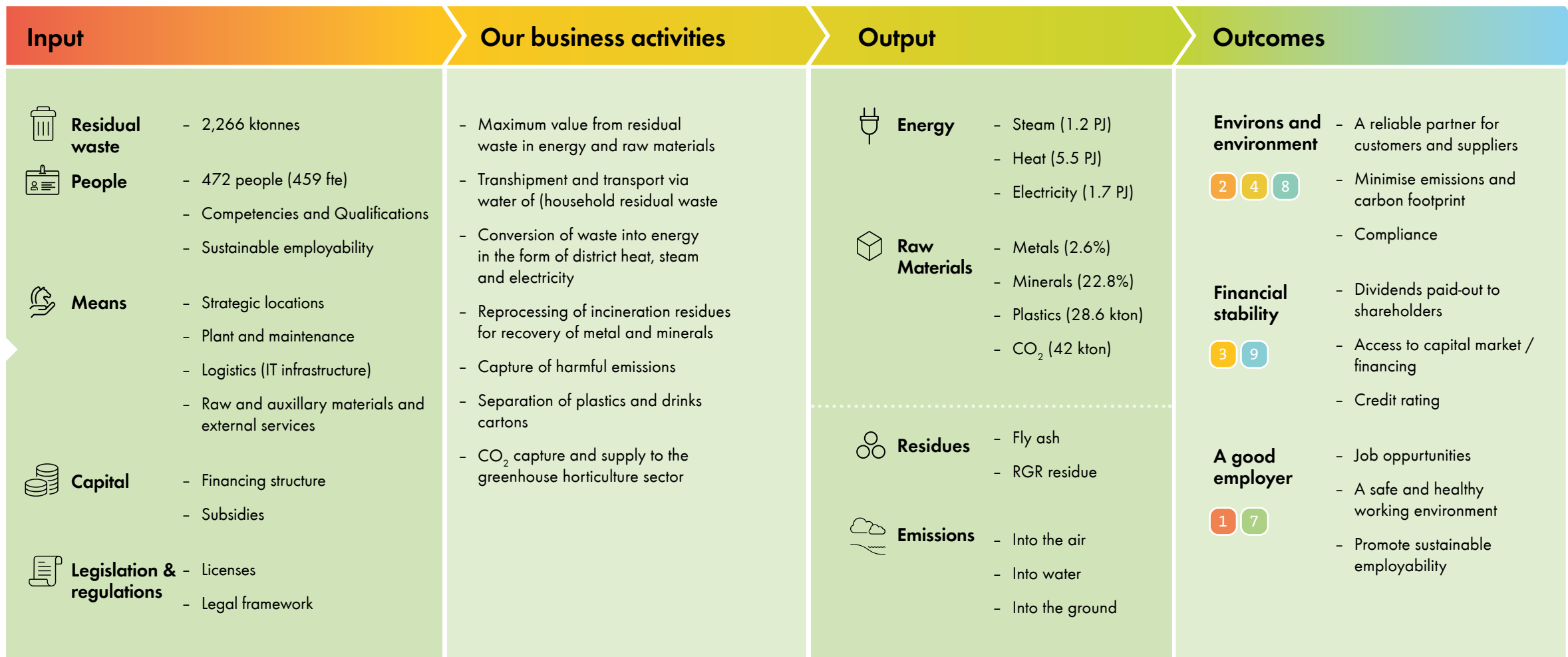
Maximising energy and raw material efficiency and minimising the CO<sub>2</sub> footprint and negative environmental impact.

The successful implementation of our strategy depends on our employees. They make the difference in respect of all three pillars, which is why safety is always the priority in everything we do. It's also important that our employees are healthy and energetic, can develop their potential and grow and can carry out their tasks in the optimum way.

# HOW WE ADD VALUE

## Our mission

Create a clean world in which nothing is wasted



### Material themes

- |                              |                             |
|------------------------------|-----------------------------|
| 1 A safe working environment | 6 Renewable energy          |
| 2 CO <sub>2</sub> emissions  | 7 Sustainable employability |
| 3 Innovation                 | 8 Other emissions           |
| 4 Reliability                | 9 Financial stability       |
| 5 Recycling                  |                             |

### Impact

5 6

Contributing towards a clean world (by preventing landfill of waste)

Contributing towards renewable energy generation and eco-goal achievement

Contributing towards the transition to a circular economy

# Our stakeholders and material themes

## AVR reporting policy

AVR's financial and economic contribution is substantial. We are a strong and solid company with economic relevance. We also make a significant social contribution by recovering raw materials for recycling and re-use from residual waste and thus form a link in the circular economy. We convert the residual waste that would otherwise be dumped – the last residue of the residue – into energy and by so doing prevent the use of fossil fuels.

In 2017 we took a first step towards an integrated Annual Report by gathering initial information via an internal stakeholders' dialogue. This information was used to determine our material themes and define important KPIs. To enable us to carry out the stakeholder dialogue we identified and classified all the stakeholder groups.

In 2019 we organised a stakeholders' day to also gather input from external stakeholders with which we could take the next step in our reporting. Delegations from all 10 of our stakeholder groups provided input regarding AVR's social contribution and impact and the themes they considered material. This information was used to determine new themes as was reported in AVR's Annual Report. Our Annual Report was also expanded to include Governance information.

Throughout 2020 our focus was on the internal processes under the material themes. As a component

of the Koploper (Frontrunner) project we critically reviewed our reporting structure and KPIs. The aim was an improved embedding of the KPIs in our existing processes and the further professionalising of the management information regarding KPIs.

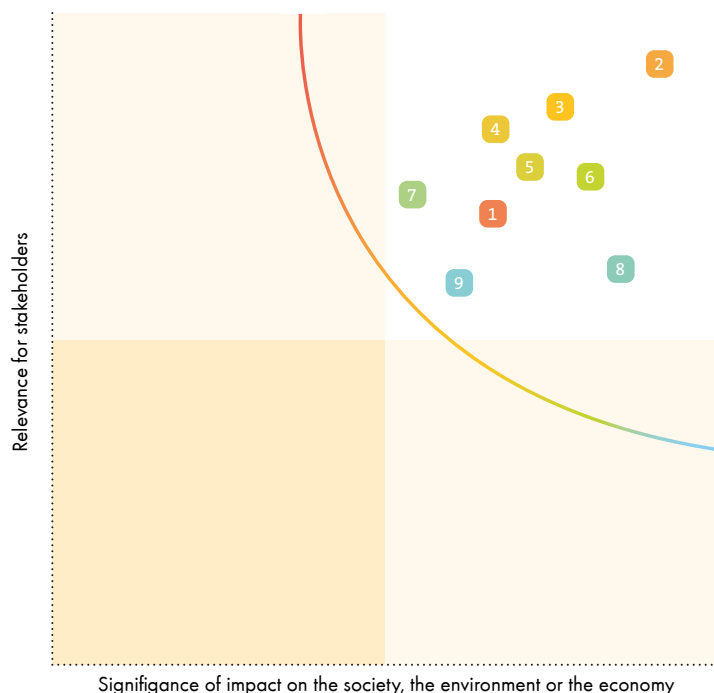
We had intended following this up in 2021 by organising an external stakeholders' dialogue to review our material themes. Because we believe a physical meeting gives considerable added-value to such a dialogue, and the corona virus made such a meeting impossible, we postponed the review until 2022. As this stakeholders' dialogue is yet to take place, in this Annual Report for 2021 we are reporting on the same material themes as in previous years.

In April 2021 the European Commission adopted the Corporate Sustainability Reporting Directive (CSRD). The consequence of this Directive is that more companies (including companies classified as 'large') must report on sustainability. The Commission's aim with this Directive is to achieve more consistency between European companies in respect of their sustainability reporting. AVR also comes within the scope of the CSRD and will prepare its Annual Report in accordance with the Directive from the 2023 financial year on. Recently, with the help of a Consultant, we started a project within AVR aimed at mapping the impact of this change and preparing the organisation for this in good time.



### Materiality matrix

Our material themes are shown in the materiality matrix. They are ranked in accordance with their relevance for the stakeholders and their importance for society, the environment and/or the economy.



### Material themes, goals and KPIs

The nine themes that are most material for our stakeholders have been linked to AVR's strategic goals. One or more KPIs have been specified per theme. The KPIs make AVR's impact on these themes measurable. Every year we assess whether these KPIs provide sufficient clarity regarding the effects or whether addition or adjustment is required. The full overview is shown below.

Material themes	Strategic goals	KPI
1 <b>A safe working environment</b>	<ul style="list-style-type: none"> <li>Continuation and improvement of our operational excellence</li> <li>Promoting and guaranteeing a safe working environment</li> </ul>	<ul style="list-style-type: none"> <li>IF rate</li> <li>Number of Safety Observation Rounds (SOR)</li> </ul>
2 <b>CO<sub>2</sub> emissions</b>	<ul style="list-style-type: none"> <li>Maximisation of energy and raw material efficiency and minimisation of our CO<sub>2</sub> footprint</li> </ul>	<ul style="list-style-type: none"> <li>CO<sub>2</sub> emissions (in CO<sub>2</sub> equivalents)</li> <li>Share of biogenic in CO<sub>2</sub> emissions</li> <li>CO<sub>2</sub> emissions avoided through energy supply</li> <li>CO<sub>2</sub> emissions avoided through recovery of raw materials</li> </ul>
3 <b>Innovations</b>	<ul style="list-style-type: none"> <li>Long-term (residual) waste contracts</li> <li>Maximisation of energy and raw material efficiency and minimisation of our CO<sub>2</sub> footprint</li> <li>Continuation and improvement of our operational excellence</li> <li>Growth</li> </ul>	<ul style="list-style-type: none"> <li>Investments in innovation</li> </ul>
4 <b>Reliability</b>	<ul style="list-style-type: none"> <li>Long-term (residual) waste contracts</li> <li>Continuation and improvement of our operational excellence</li> </ul>	<ul style="list-style-type: none"> <li>Plant availability percentage</li> <li>Reliability of steam and heat supply</li> </ul>
5 <b>Recycling</b>	<ul style="list-style-type: none"> <li>Maximisation of energy and raw material efficiency and minimisation of our CO<sub>2</sub> footprint</li> </ul>	<ul style="list-style-type: none"> <li>Quantity / percentage of reclaimed separated raw materials</li> </ul>
6 <b>Renewable energy</b>	<ul style="list-style-type: none"> <li>Maximisation of energy and raw material efficiency and minimisation of our CO<sub>2</sub> footprint</li> </ul>	<ul style="list-style-type: none"> <li>Total volume of energy supplied - heat, electricity and steam</li> <li>Percentage of biogenic in the energy supply</li> </ul>
7 <b>Sustainable employability</b>	<ul style="list-style-type: none"> <li>Continuation and improvement of our operational excellence</li> <li>Increasing our employees' potential</li> </ul>	<ul style="list-style-type: none"> <li>Percentage of sick leave</li> </ul>
8 <b>Other emissions*</b>	<ul style="list-style-type: none"> <li>Continuation and improvement of our operational excellence</li> </ul>	<ul style="list-style-type: none"> <li>Nitrogen (NO<sub>x</sub>)</li> <li>Particulates</li> <li>Dioxin</li> </ul>
9 <b>Financial stability</b>	<ul style="list-style-type: none"> <li>Long-term (residual) waste contracts</li> <li>Maximisation of energy and raw material efficiency and minimisation of our CO<sub>2</sub> footprint</li> <li>Continuation and improvement of our operational excellence</li> </ul>	<ul style="list-style-type: none"> <li>Revenue</li> <li>EBITDA</li> <li>EBIT</li> <li>Net result</li> <li>Cash flow</li> <li>Cash position</li> <li>Investments</li> </ul>

# A safe working environment

## Always work safely

AVR's facilities operate day and night. This means being alert for safety 24/7. Our installations are complex and one misstep can have major consequences. All reasons to make safety our top priority and why a safe working environment is AVR's most important material theme. How we do our utmost to ensure our employees and contractors arrive home safe and healthy after every working day (or night) is explained in this section.



IF-rate\*

**1.6** -0.8

2021: 1.6  
2020: 2.4  
2019: 3.0

Number of Safety Observation Rounds (SOR):

**1,391** + 224

2021: 1,391  
2020: 1,167  
2019: 1,076

\*The IF-rate (Injury Frequency rate) is the number of accidents resulting in sick leave per million hours worked (during the calendar year).

**KPI: Accidents**

In 2021 the IF-rate once again fell: from 2.4 in 2020 to 1.6. The accidents that necessitated the employees involved taking sick leave all involved falls and trips. One employee fell down a staircase, another tripped on a step.

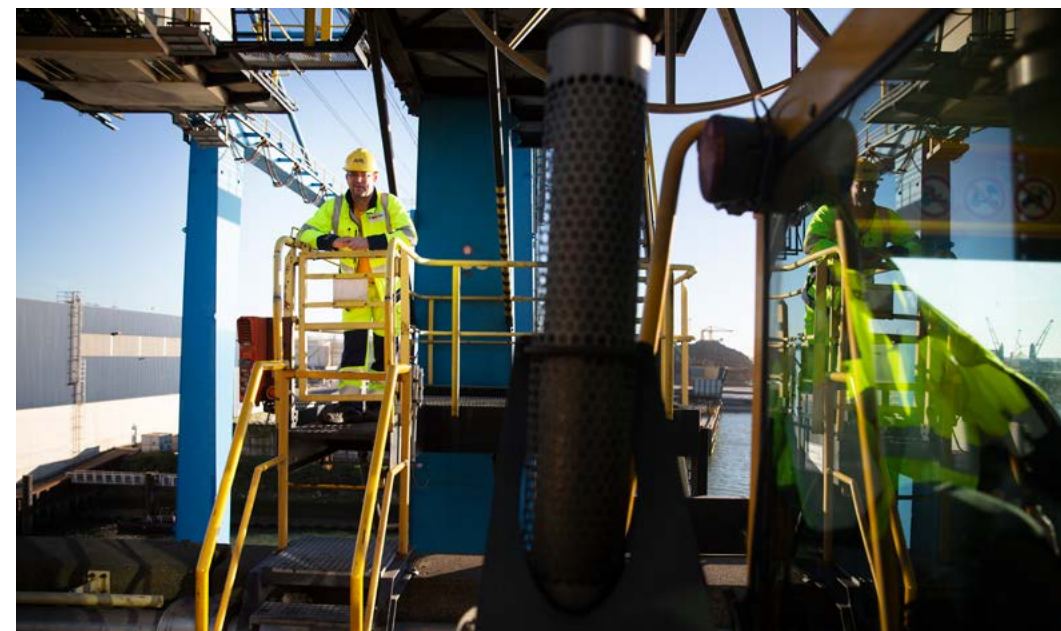
At the end of 2021 the counter for the number of accident-free days at the Duiven facility stood at 563. This means there has been no accident resulting in sick leave at this facility for over 18 months.

The decrease in the IF rate is due to a number of actions. The SHEQ Department (Safety, Health, Environment, and Quality) has intensified its connections with the operational departments: more frequent

contact and more connection with the shop floor. The direct communication has resulted in more awareness, more collaboration and continuous improvement. Working together to improve and monitor the working environment has resulted in risk awareness increasing steadily and remaining high. This is bearing fruit. We are pleased by the downward trend, but not yet satisfied. Every accident is one accident too many, so we are continuing our efforts to drive the IF-rate down even further.

**KPI: Number of Safety Observation Rounds**

Our target is a minimum of 900 Safety Observation Rounds (SOR). This target has been amply exceeded for several years in a row: in 2021 1,391 SORs were completed (2020: 1,167). Once again this was a



good result, especially as there were significantly fewer people on-site than there were before corona because some employees were working from home. The walking of SORs is well embedded in AVR's safety culture and considered important. During the Rounds the emphasis is on starting a conversation with the people who carry out the work. Talking about safe working increases safety awareness.

**Safe working and corona**

Since the outbreak of the corona crisis in March 2020 AVR – as a company in a vital sector – has carried on working. We have implemented measures, such as splitting teams, isolating groups of employees and working from home whenever possible. When direct contact is not absolutely essential we communicate via Teams, including on our sites. All these measures were

effective in 2020 and continued to be effective in 2021. We have also, since the start of the crisis, consistently complied with governmental measures, such as social distancing whenever possible and wearing face coverings. During 2021 we relaxed the measures when the situation permitted and when more stringent measures had to be implemented again we complied with the guidelines. We follow government standards very closely and communicate any changes.

Despite the outbreak of the new Omicron variety the number of infections at AVR remained relatively low compared to the start of the corona crisis.

**Toolbox meetings**

Regular Toolbox meetings take place to enable us all to continue learning in the field of SHEQ. During a Toolbox

meeting an employee tells a group of colleagues something about a specific topic, for example the personal protection equipment or how a particular procedure works. In 2021 319 Toolbox meetings took place.

#### Notification and follow-up

Every incident or near-incident (*near miss*) is reported and the cause is always investigated. In recent years the quality of the notifications has improved thanks to the management paying extra attention to the notifications and the way notifications are followed-up. The number of repeated reports has fallen sharply. In 2021 we once again saw that employees are prepared to report matters. This shows they feel involved and are concerned about safety, health, quality and the environment. In total over 1200 notifications were submitted. What we can still improve is the feedback to the employee who prepared the report so that he or she knows what was done with it.

#### Major Accident Hazards Decree

Our supervisors – Inspectorate SZW (*Ministry of Social Affairs and Employment*), DCMR (*Rijnmond Regional Environmental Service*) and the Veiligheidsregio Rotterdam-Rijnmond (*Regional Safety*) inspect AVR's facilities in Rozenburg to ensure they are not causing any hazards to the surrounding area. This takes place in accordance with the guidelines of the Major Accident Hazards Decree (BRZO). Three topics are examined every year: fire safety, our efforts to prevent incidents and the risk studies we carry out. In 2021 the inspection team found several topics requiring improvement. We have studied these improvement proposals and have adopted them for safety awareness reasons. We look forward to the follow-up inspections in 2022 with confidence.

#### Alcohol, drugs and medicines policy

In recent years a number of tests related to working under the influence of alcohol, drugs and medicines have been carried out at Rozenburg and Duiven. These tests have not resulted in any significant quantities of positive tests. We can conclude that regular testing has a positive effect.

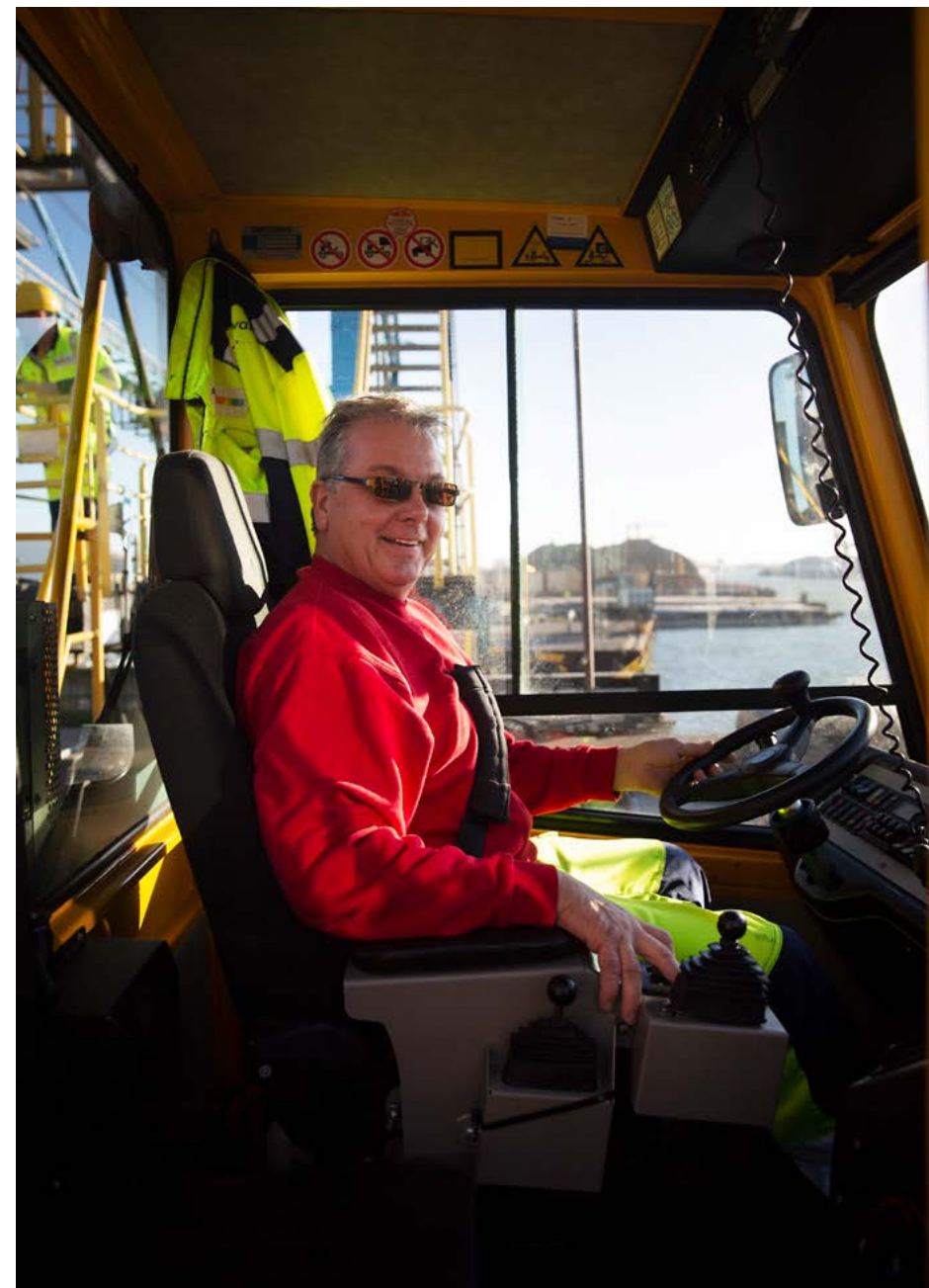
#### AVR Safety Prize

Contractors and sub-contractors spend many hours on the AVR sites and sometimes things go wrong. But rather than just focusing on the negative we also want to highlight the positive. This is why every year since 2017 AVR has awarded a Safety Prize to a contractor that has demonstrated excellent quality in the area of safety. The winners of the 2020 AVR Safety Prize, Trigion, were presented with the impressive trophy on 23 March 2021. Trigion's work for AVR includes receiving visitors and contractors and ensuring our sites are secure. Trigion received the Prize because during the corona crisis in 2020 the company proved to be an extremely cooperative and flexible partner that dealt professionally and resiliently with all the measures that had to be implemented. Trigion's people remained friendly and understanding throughout.

The winner of the 2021 AVR Safety Prize will be announced later in 2022.

#### Safety in 2022

Various initiatives in the area of safety are planned for 2022. We will be rolling-out a number of projects to further reduce exposure to hazardous substances and we will be paying extra attention to work permits and installation security. In both cases behaviour plays an important role. We want to improve these aspects through talking to and listening to each other.







“It’s not easy: telling your own team your story with twenty pairs of eyes looking at you”

Kimberly Langerveld | Safety Expert – Rozenburg

John Janssen | Foreman Fitter – Rozenburg

**John:** “I work for AVR from Croonwouter&dros and am in charge of the day-to-day maintenance and troubleshooting in the factory. It’s work that demands you are constantly aware of safety. Every day we think about it at the beginning of our shift and, of course, also continuously while we are working. One component of every monthly Toolbox meeting is Kimberly’s talk about a special topic. During the Toolbox meetings or the start of shift discussions I never hear: ‘here we go again’, everyone always takes it seriously.”

**Kimberly:** “Contractors such as John bring with them their own company’s safety procedures. This enables us to help each other by sharing knowledge, listening to each other and looking out for each other. Very often that leads to improvements. We must trust each other, we do it together. After all, we all want the same thing: for everyone to go home safely at the end of the day.”

**John:** “Yes, that’s why we do it. One accident that is a good example of this. Somebody working in the factory wanted to quickly connect a cable at height and stood on a valve to do it. There was a scaffolding tower just round the corner

but it had been erected in the wrong place. Instead of standing on the valve the employee should have handed the task back and reported that the scaffolding had not been built correctly. We stopped work to investigate.”

**Kimberly:** “In the event of a serious incident you may have to deny someone access to the site. But John and AVR’s SHEQ Department jointly decided not to send the person in question off the premises. He’d have learned nothing from such a punishment. But I wanted to make it very clear to him what the consequences could have been, because he could easily not have gone home safely. We took a different approach: we made him tell a Toolbox meeting what could have happened.”

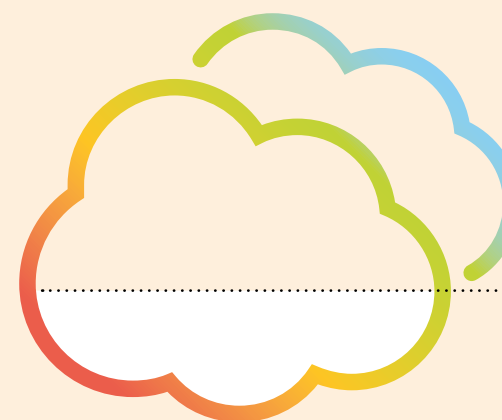
**John:** “Not everyone has the confidence to do that. It’s not easy: telling your own team your story with twenty pairs of eyes looking at you. He gave a presentation to us first before standing in front of his colleagues. It really had an effect – on everyone.”

**Kimberly:** “Certainly. Nobody wants what happened to a colleague to happen to them. I think that between us we found the best solution for everyone.”

# CO<sub>2</sub> emissions

## Towards a climate-neutral AVR

Once we've removed everything that can be recycled or re-used from the residual waste what's left over is used to generate electricity, steam and heat. This is a sustainable process because this energy does not have to be generated by burning fossil fuels. This is how we prevent CO<sub>2</sub> emissions. We already capture some of the CO<sub>2</sub> released by incinerating the residual waste. Our goal is climate-neutral operation in 2050.



Total CO<sub>2</sub> emissions\*  
in CO<sub>2</sub> equivalents  
(kton)

**2,363** +4

2021: 2,363  
2020: 2,359  
2019: 2,294

Share of biogenic  
CO<sub>2</sub> emissions\*  
(percentage)

**60%** +1

2021: 60%  
2020: 59%  
2019: 59%

CO<sub>2</sub> emissions\*\* avoided  
through supply of energy  
(kton)

**684** -25

2021: 684 kton  
2020: 709 kton  
2019: 708 kton

CO<sub>2</sub> emissions avoided through  
recovery of raw materials  
(kton)

**242** +16

2021: 242 kton  
2020: 226 kton  
2019: 186 kton

\* In 2021 we used a new method to measure the CO<sub>2</sub> emissions.

\*\* A new measuring method was also used for this KPI in 2021.

See both explanations on the following page.

**Targets**

In 2030 AVR wants to add no additional CO<sub>2</sub> to the atmosphere through the processing of residual waste. We are working towards achieving this target by capturing CO<sub>2</sub> for useful application or storage and by avoiding CO<sub>2</sub> emissions from our customers by supplying them with energy and raw materials. AVR's operation must be fully climate-neutral In 2050.

**KPI: Total CO<sub>2</sub> emissions in 2021**

In 2021 our CO<sub>2</sub> equivalent emissions amounted to a total of 2,363 kton (2020: 2,359 kton, measured using the 2021 method). In 2021 we changed our measurement method. The CO<sub>2</sub> emissions we reported in 2019 and 2020 were calculated on the basis of AVR's own process records for which there were no formalised guidelines or protocols per individual plant. As of 2021 we are reporting in accordance with the new reporting and monitoring stipulations of the Dutch Emission Authority (*Nederlandse Emissieautoriteit - NEA*). In the new measurement method the basis for the emission figures is formed by the amount of waste processed and not by the measurement in the flue as was the case prior to 2021. (For a more detailed explanation of the methodology please see the explanation of the basis for the CO<sub>2</sub> tax.) For the biomass energy plants (BEC/TCI) and the Water Treatment plant (WT) we report the measured process emissions. For comparison purposes the figures for 2019 and 2020 shown in this Annual Report have been adjusted in accordance with the new measuring method.

**KPI: Share of biogenic in CO<sub>2</sub> emissions**

A large portion of the residual waste AVR processes is biomass and comprises waste wood, paper residue and organic material. The biodegradable part of this waste is fixed annually on a flat-rate basis by the national government. We call the CO<sub>2</sub> that comes

from incinerating biomass, biogenic CO<sub>2</sub>. In 2021 the share of biogenic CO<sub>2</sub> for all the waste streams processed by AVR was 60%.

**KPI: CO<sub>2</sub> emissions avoided through the supply of energy**

The energy we generate by incinerating residual waste and waste biomass does not have to be generated by burning fossil fuels. This means we are preventing fossil fuel CO<sub>2</sub> emissions from our energy customers. We call this CO<sub>2</sub> emissions avoided in the chain. In 2021 AVR's supply of energy avoided the emission of 684 ktons of CO<sub>2</sub>.

This figure is calculated on the basis of the protocol for the quantifying of greenhouse gas emissions from waste operations of *Enterprises pour l'Environnement (EpE)*. The emission factor for electricity generated in the Netherlands has decreased due to the higher proportion of renewable generation. As a result, the supply of electricity from AVR avoided less CO<sub>2</sub> in the chain than in the preceding years. For comparison purposes the figures for 2019 and 2020 shown in this Annual Report have been adjusted in accordance with this method.

**KPI: CO<sub>2</sub> emissions avoided through the recovery of raw materials**

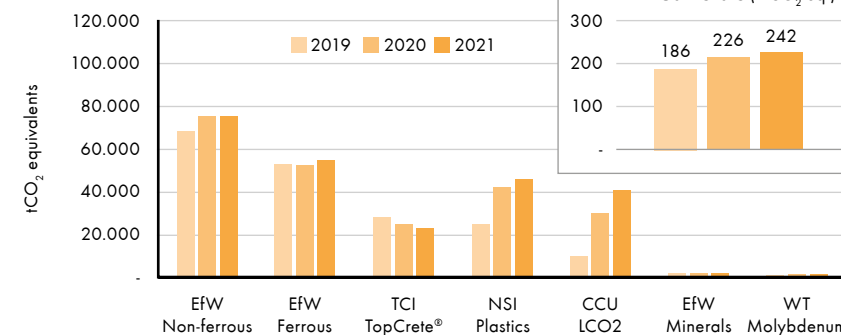
AVR recovers raw materials such as metals, minerals, plastics and CO<sub>2</sub>. We report on this in the [Recycling section on page 60](#). By recovering raw materials we prevent the use of fossil resources required for the extraction of new raw materials. In 2021 AVR's recovery of raw materials prevented the emission of 242 ktons of CO<sub>2</sub> (including the captured CO<sub>2</sub>).

**Basis for the CO<sub>2</sub> tax**

Since 1 January the CO<sub>2</sub> emissions from the Dutch waste incineration plants (WIPs) have been monitored

Recycling raw materials prevents more and more emissions

Sources: actual volumes, LCAs and EpE factors\*



Data in the diagrams comprises actual volumes of raw materials recovered from (residual) waste entrusted to AVR. Because most of the emissions from this are 'scope 3', AVR follows how emission factors develop. (LCA = Life Cycle Analyses; EpE = *Enterprises pour l'Environnement*)

by the Dutch Emissions Authority (*Nederlandse Emissieautoriteit - NEA*). The basis for this levy is the national climate legislation aimed at substantially reducing the CO<sub>2</sub> emissions from Dutch industry. If a company does not achieve the stipulated reduction target it must pay a CO<sub>2</sub> tax on the excess emissions. The reduction target set for the WIPs is 35% in 2030 compared to the average historic (fossil) CO<sub>2</sub> emissions during the reference period (2014 - 2018). These historic emissions were determined on the basis of the processed waste streams.

The NEA has set standard emission factors for the various waste streams and support fuels, which the WIP operator can use to calculate the plant's annual fossil and biogenic ('green') emissions. The historic activity level (fossil CO<sub>2</sub> emissions) forms the basis for the reduction target. For 2021 the threshold for the tax basis on this reference point is 120% and will decrease linearly to 68.7% in 2030. The CO<sub>2</sub> tax was introduced in 2021 with an initial rate of € 30.48 per

ton of excess CO<sub>2</sub> emissions. This rate will increase linearly to € 128.71 per ton of excess CO<sub>2</sub> emissions in 2030.

By reducing the CO<sub>2</sub> emissions to below the permitted emissions threshold value the WIP operator can accumulate dispensation rights and thus limit the financial consequences of the tax. Dispensation rights can also be transferred between operators to compensate for a shortfall or to benefit from a surplus. For WIPs the 'scope 1' emissions (the direct emissions) are the yardstick. In other words: reduction is only possible by directly reducing fossil emissions per plant and/or by capturing CO<sub>2</sub> and then demonstrably storing it permanently (carbon capture and storage, CCS).

The historic activity level of AVR's two WIPs has been set at 678 kton. For the CO<sub>2</sub> tax the historic activity level is the average fossil emissions in the period 2014-2018. The number of dispensation rights is determined by applying a factor of 0.97 to the historic



emissions. The historic activity level is the basis for the number of dispensation rights for the CO<sub>2</sub> tax in the period 2021-2025.

In this Annual Report we are reporting the quantities as stated in our emission report verified by classification body DNV and as reported to the NEA.

In 2021 our total fossil CO<sub>2</sub> emissions from the two WIPs amounted to 659 kton. To comply with the climate legislation, by 2030 our direct fossil CO<sub>2</sub> emissions must have been reduced by around 240 kton. However, our reduction ambitions in this field go even further. They are also broader in approach, because as well as the reduction of the direct emissions that are the yardstick for the CO<sub>2</sub> tax we are also looking at our reduction in the chain. Our target is for our direct emission reduction plus the reduction in the chain to be such that in 2030 our business operations add no new fossil CO<sub>2</sub> to the atmosphere.

#### Biomass

Since 1 January 2021 the CO<sub>2</sub> emissions from our Thermal Conversion Plant (TCP) in Duiven and the Biomass Energy plant (BEP) in Rozenburg have come under the EU Emission Trading System (EU-ETS). As a result there is an obligation to monitor and report the (fossil) CO<sub>2</sub> emissions. The competent body for this is the NEA.

As far as the fossil CO<sub>2</sub> emissions are concerned, every year AVR must hand in so-called EU-ETS allowances. These two plants can also 'earn' CO<sub>2</sub> allowances because the energy they generate (such as process steam and district heat) or the products they deliver (such as cement clinker) reduce our customers' fossil CO<sub>2</sub> emissions. On top of the requirements of the EU-ETS system, AVR reports not only the externally-verified fossil CO<sub>2</sub> emissions but also,

voluntarily, the total CO<sub>2</sub> emissions (biogenic and fossil) measured in the flue. Savings in the chain are a component of our total statement of avoided emissions.

#### Water Treatment

In de Water Treatment plant (WT) AVR processes harmful 'salt-laden' waste water. In the WT we process these waste water streams thermally using oil-containing waste streams and natural gas as fuel.

The CO<sub>2</sub> emissions from our water treatment plant, unlike those from the waste incineration plants and biomass energy plants, do not come under an obligatory reporting method. Our Annual Report does include the figures that have not been externally verified, such as flue measurements, as reported to the DCMR Milieudienst Rijnmond environmental service. Due to their origins the CO<sub>2</sub> emissions are considered to be fossil emissions. During this treatment process industrial residual heat is recovered and supplied as district heat. Savings in the chain are included as described earlier in the Report under 'CO<sub>2</sub> emissions avoided through the supply of energy' and 'CO<sub>2</sub> emissions avoided through the recovery of raw materials'.

One of our waste water customers intends carrying-out the processing in-house. However, the start-up of this customer's plant has been delayed and AVR, at the customer's request, has continued providing most of the processing. As a result we have emitted more CO<sub>2</sub>. Against this we have supplied more industrial residual heat to the Rotterdam heat chain than in 2020.

#### CO<sub>2</sub> capture

In 2021 the CO<sub>2</sub> capture plant in Duiven delivered 37% more CO<sub>2</sub> than in 2020. This increase is good, but we are going to implement further improvements in the production process. ([Read more about this under Reliability on page 52.](#)) At the request of our

customer the plant continued operating for several weeks longer than planned because, due to the high natural gas prices, only a limited offering of conventionally-produced CO<sub>2</sub> was available on the market.

During the autumn 2021 SDE++ round AVR submitted a grant application for projects with a reduction potential of over 500,000 tons of CO<sub>2</sub> a year. AVR opted for a combination of storage (carbon capture and storage, CCS) and the re-use of CO<sub>2</sub> in the glasshouse horticulture sector (carbon capture and usage, CCU). Support is necessary due to the large unprofitable top of these investments. The outcome of the application is not yet known. Read more about this in the [Innovation section on page 44](#).

The intention is to use the subsidy to build a large-scale CO<sub>2</sub> capture plant at our facility in Rozenburg and extend the existing CO<sub>2</sub> capture capacity in Duiven by building a second plant. Engineering works are going full steam ahead at both facilities and the license applications have been submitted to the relevant environmental services. AVR has also signed letters of intent with renowned partners for the transportation, storage and use of the captured CO<sub>2</sub>. AVR is especially dependent on the development of costly large-scale public infrastructure for the transport and storage of CO<sub>2</sub> in offshore gas fields. The progress of this will partly determine the timeline of the realisation.

AVR, in collaboration with the Dutch Waste Management Association (Vereniging Afvalbedrijven), has provided input to two Ministries for a framework for the administrative processing of CO<sub>2</sub> streams via an infrastructure that in the future can be used for transportation to permanent storage (CCS) and re-use (CCU). This will mean that in the future an allocation can be made based on the origin of the CO<sub>2</sub>, for

example biogenic for re-use and fossil for permanent storage. This is a logical division because biogenic CO<sub>2</sub> is not a new addition to the atmosphere (it was there already), while fossil CO<sub>2</sub> is new (it's been taken out of the ground).

### Application of CO<sub>2</sub>

In the short and medium term AVR will continue to market the captured CO<sub>2</sub> as a growth enhancer in the glasshouse horticulture sector. Once the infrastructure is in place, permanent storage of some of the captured CO<sub>2</sub> in (empty) offshore natural gas fields is envisioned. But our longer term aim is a structural reduction of the unavoidable CO<sub>2</sub> emissions from our processes and with that a lower adverse impact on our living environment. That is why we are investigating new application fields for CO<sub>2</sub>.

Towards this end, in 2021 AVR, together with European (knowledge) institutions, public-private partnerships and start-ups, carried out a number of studies in the field of mineralisation. This is a technology involving binding CO<sub>2</sub> in (waste) materials to create recyclable minerals. We believe the time will come when this technology can be widely applied for the production of new raw materials. In this way large amounts of CO<sub>2</sub> can be permanently stored.

Together with our cooperation partners we are investigating the application areas and the necessary incentive frameworks, such as subsidies, fiscal advantages or a mandatory share in new products. In addition, AVR is keeping a close watch on developments of applications for the captured (biogenic) CO<sub>2</sub> in (renewable) fuels and (green) chemicals.

### Import tax

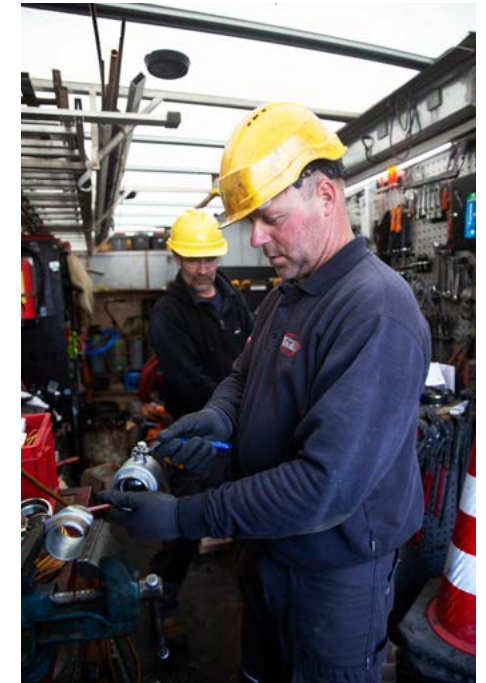
Since 1 January 2020 the Dutch government has levied an import tax on imported residual waste. The

government has introduced this tax to give substance to the Urgenda-adjudication for the reduction of CO<sub>2</sub> emissions in the Netherlands. In 2020/2021 AVR – as part of a total waste sector package – offered the government the accelerated decommissioning of a number of the water treatment plant incineration lines thereby reducing fossil CO<sub>2</sub> emissions by around 200 kton. This is the reduction the government assumes it will achieve with the import tax. The waste sector stated it would accelerate plant decommissioning on condition that import tax on residual waste was dropped. Ultimately the government did not take advantage of this offer. A missed opportunity, because this measure was validated by the external consultant appointed by the government and thus would demonstrably contribute towards reducing CO<sub>2</sub> emissions, while the tax on imports only leads to emissions being shifted between countries and ultimately will not result in any real CO<sub>2</sub> emission reduction.

### En route to ISO 50001 certification

Until 2021 we used the CO<sub>2</sub> Performance Ladder for the reporting and bookkeeping of our CO<sub>2</sub> emissions in the chain. But because our primary aim is to manage our own energy consumption and the related emissions we are switching to ISO 50001. We want to do more than just manage the CO<sub>2</sub> emissions from our processes; we also want to reduce their energy consumption so we can deliver more renewable energy, heat and steam to our customers. With ISO 50001 we will get a good picture of all the energy streams, find out where we can make the greatest savings and effectively monitor the measures we have implemented. This system will also fit in better with the other ISO management systems we use: ISO 9001 (quality), ISO 45001 (safety) and ISO 14001 (environment).

Making this switch involves a lot of research and audits. Within AVR we have many complex systems



and processes. We must be able to show conclusive substantiation based on calculations and different reference values for every forecast and measurement. This is why the implementation of ISO 50001 meant preparing a lot of inventories in 2021. We expect that after the audit in March 2022 the foundations for this new working method will have been laid and with the help of this standard we will be able to report our improvements in a transparent manner.



Bennie Rutgers | Day Shift Operator – Duiven

“It’s nice to be stimulated and learn new things”

“I’ve worked for AVR since 1995. I started as a Shovel Driver, have been a Loading Boss and then for years I worked shifts as a Crane Operator. When my predecessor retired I was asked to work day shifts in the water treatment and CO<sub>2</sub> capture plant. I started in January 2019 and I still learn something every day. It’s nice to be stimulated and learn new things, because after doing the same thing for 25 years you get a bit rusty. This really is very different work. I also went back to school, which was great fun. In the CO<sub>2</sub> capture plant the flue gas released by the waste incineration is cleaned. A chemical agent - mono-ethanolamine, or MEA - is added to which the CO<sub>2</sub> binds. The CO<sub>2</sub> is then cooled and put under pressure so the gas becomes a liquid. It can then be loaded onto trucks and taken to the growers who use it in their glass-houses to accelerate the growth of strawberries and tomatoes. It’s my job to check that all the doses are correct and whether the quality of

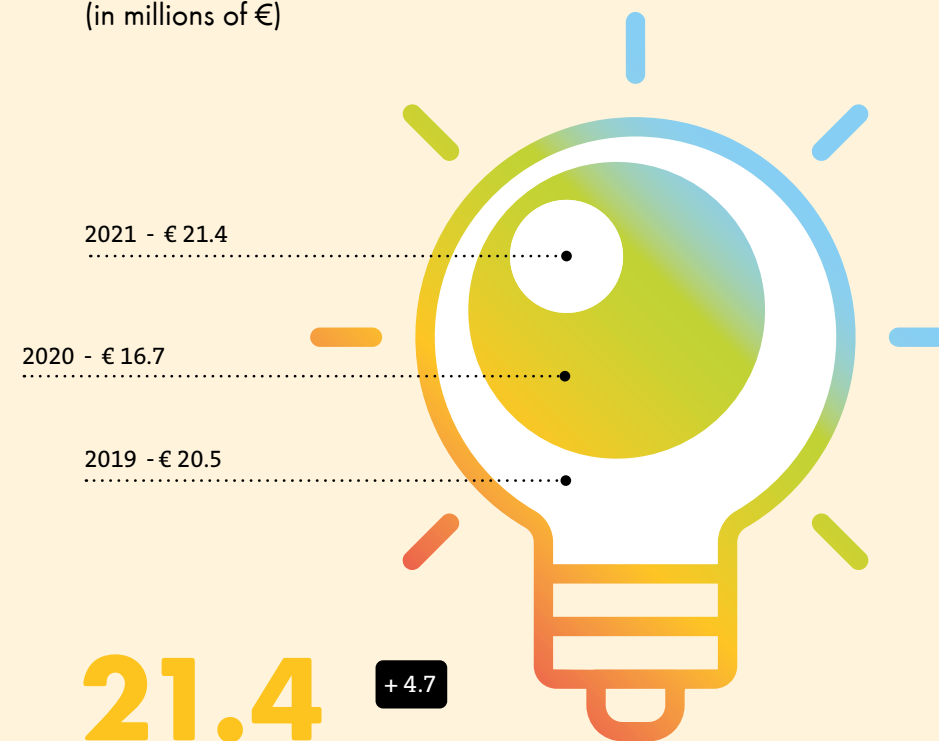
the CO<sub>2</sub> is good enough. The water must also be clean. In the growing season, that’s from 1 March to 1 October, the plant runs 24/7. Loading the trucks also doesn’t stop. It’s amazing how much you can programme. It goes from: if this stops, this pump must shut down and this valve must open. I’m getting better and better at finding out for myself what’s going on when something stops. Then I deal with it. If I can’t I call the programmers in. If it still isn’t solved we have to telephone a specialist supplier, but that only happens very rarely. It’s going well. The delivery of MEA did come under heavy pressure because the raw material prices rose sharply and the suppliers had production problems, but we still managed to deliver the CO<sub>2</sub> to our customers. And we’re making progress with the plant. In the beginning we were still looking for the best settings, so the plant didn’t run optimally, but now it’s going much better.”

# Innovation

## Continuous renewal

The development of technologies for recovering raw materials from residual waste and generating renewable energy from the residue of the residue never stops. This is why we are able to recover more and more valuable raw materials from the received residual waste and the yields from our energy generating installations are constantly increasing. In a nutshell: we are doing more with less. That's why we invest in new and renewed plant and digital technologies.

## Investments in innovation (strategic projects and ICT) (in millions of €)





### Investing for renewal

For AVR innovation means the constant searching for possibilities for new projects and activities with which we can achieve our goals as effectively as possible and reinforce our sustainability. In our view innovation also includes the optimisation of existing plant and processes.

### CO<sub>2</sub> capture in Rozenburg and Duiven

Due to the success of the CO<sub>2</sub> capturing plant in Duiven, in 2021 we worked on preparations for the large-scale capture of CO<sub>2</sub> at our Rozenburg facility. We also want to expand the existing capture capacity in Duiven by adding a second plant. AVR submitted grant applications for both projects during the 2021 SDE++ subsidy round. The around 4,000 projects that were submitted added up to € 12 billion in subsidy requests: the total available SDE++ subsidy

budget in 2021 was € 5 billion. The SDE-pot is, therefore, heavily oversubscribed and the government gives priority to projects with a low subsidy intensity. In other words, the projects for which the least subsidy has been requested. If the 2021 round doesn't result in AVR being granted any subsidy we will prepare ourselves for the 2022 subsidy round.

### Turbine F

In 2021 the new Turbine F went into service in Rozenburg. This back-pressure steam turbine delivers electricity, process steam and district heat. Operating at full power the turbine will enable AVR to supply process steam to businesses in our immediate vicinity and, at the same time provide 60,000 households with electricity and 100,000 households with heat. Turbine F can also 'jump in' if there is a calamity elsewhere, which increases the reliability of our supply.

In 2021 construction was completed and the turbine underwent extensive testing. Turbine F has been in full - successful - operation since the end of November 2021 and the first electricity and low-pressure steam for district heat have been delivered. The formal acceptance is planned for spring 2022.

### Renovation of OSSU

The transfer station in Utrecht (OSSU) is where the waste from the Province of Utrecht is stored and transhipped for processing. To be able to guarantee the service to our customers at the transfer station in the coming years the entire facility and working method are being





modernised: We are making transshipping simpler and faster and switching from containers (and compressors) to the shipping of loose waste. This will save time and maintenance and be less susceptible to malfunctions. In 2021 we completed all the demolition work. The new facilities are scheduled to be ready for use at the end of 2022. See also: '[Peter Onderwater and Stefan Lubezuk tell us](#)' on page 50.

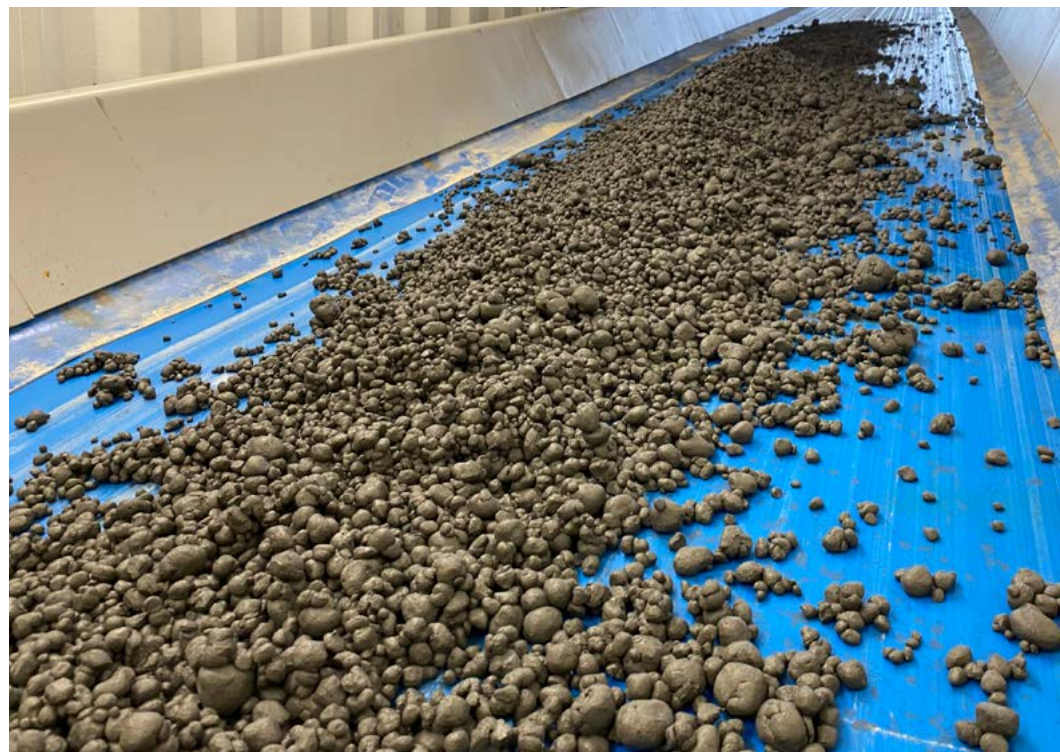
**Post-separation improved again**

We work continuously on improving our post-separation plant (PSP) in Rozenburg. This plant sorts household waste into different fractions to extract plastics and drinks cartons for recycling. In 2021 we carried out

a significant modification of the plant to increase its performance. Please see the [Recycling section on page 60](#).

**OWF in the biomass energy plant**

The Organic Wet Fraction, or OWF, is the first residual stream (from 0 to 80 mm) released in the post-separation process in our PSP. This stream comprises mainly scraps of paper, wood, textile, plastic and an inert fraction (glass, stone and porcelain). The first tests to process the OWF from the PSP in our biomass energy plant (BEP) in Rozenburg were carried out in 2020. After several successful tests, in 2021 we decided to build a cleaning plant in the PSP building in which the



OWF could be cleaned-up to achieve a non-biomass content of under 3%. This plant has the capacity to make 35 ktons of OWF a year suitable for further processing in the BEP. Construction was completed and the plant went into service at the end of 2021.

**Waste crane modernisation**

We want to modernise the cranes with which we move the waste so they can be controlled completely automatically. This will increase the utilisation rate and reduce the maintenance costs. The waste will also be mixed better before going into the incinerator, which will increase the combustion efficiency and keep the temperature more constant. This will extend the lifetime of the incinerators. In 2021 we focused primarily on preparing and compiling a business case for the project. If this is followed by a positive investment decision the modernisation will take place in 2022-2023.

**New conveyor belt system in Rozenburg**

At the end of 2021, after a long period of research, the decision was taken to replace the current conveyor belts and infrastructure for the removal of slag at the Rozenburg facility with a new transport system. The planned facilities will follow a new route to a central location on the site. The new system and route will have many advantages: a shorter transport distance, improved reliability, lower maintenance costs, reduced CO emissions, safer working conditions and an optimised logistics process for the removal and storage of bottom ash. Work is scheduled to start in the second quarter of 2022.

**Other innovations**

Before we take the decision to invest we carry out extensive research, sometimes over a long period. Current on-going studies are looking at chemical recycling and the production of 'green' hydrogen as a storage medium for recovered energy or as a transport fuel.

**Investments in digitalisation and ICT upgrading**

AVR uses the Power BI data visualisation tool. Developing more daily Power BI reports from the data warehouse gives AVR's management better throughput, availability and output control information.

We have also invested further in systems such as Proficy Plant Applications and Trendminer for the collection and analysis of our plant process data and we now use wireless smart sensors to measure vibrations and noise. The IT applications for mobile working have been extended. Waste acceptors can now register the location and calorific value of loads on their mobile, which makes the production process more manageable. And inspection rounds are now largely recorded using the mobile. This has improved and sped up the follow-up by the employees who carry-out the maintenance. In 2021 the digital workplace remained an essential as working together at a distance continued to be a necessity. As a result, digital team meetings have become the standard form of consultation and the number of physical meetings will decrease structurally. Robin Robot, our Robotic Process Automation tool, became a 'grown-up' in 2021 and every day worked his way through a large 'pile' of administrative work.

Stefan Lubezuk | Group Leader Transfer & Transport – Utrecht

Peter Onderwater | Architectural Designer – Utrecht

**Stefan:** “The Utrecht Transfer Station (the Over-slagstation Utrecht, or the OSSU) was built in 1977. This is where the waste from Utrecht comes to be weighed and readied for transshipment to Rozenburg. The number of weighings has risen to 188 per day. That’s more than the OSSU can handle, certainly not now we transfer the waste from almost the entire Province. The operation no longer runs smoothly.”

**Peter:** “The contract with Utrecht has been extended and that has been an impulse for modernisation. We are going to construct a totally new building the size of a football field. A large open hall without columns, with a roof suspended from trusses. The suspended construction is due to a requirement from the municipality: the building must not stand in the water, but it must be possible to get a boat under it. So part of the building is suspended over the water. It’s certainly not an everyday construction.”

**Stefan:** “The operation is also going to be totally different. Until now the waste has been compressed before being loaded into containers. That is cumbersome, because you need all kinds of equipment to get the waste onto the boat. We’re now getting rid of those steps: the

waste will soon be loaded into the boats loose. That saves the weight of the containers, and the in-between space can now also be used.

The transported volume will remain the same, without all the extra stages. Hence the big hall.”

**Peter:** “This is a once-in-a-lifetime construction. It’s a challenge, something to be proud of. When the new OSSU is built, drive towards it and you’ll see something special.”

**Stefan:** “I’m also very enthusiastic. It will take some getting used to for the employees. Some of them have worked here right from the start. But if you’re honest and open and show the benefits of the new situation it will come to life. Change is difficult, especially for people who have worked here a long time. We have to take that into account, because they’re the people who work here. Only by working together can you make something both the constructor and the end users are happy with.”

**Peter:** “Part of the old site has been demolished and the work has been temporarily moved to an area at the back. The operation will continue during construction and that’s why extra attention has been paid to safety. We’re going to build the new OSSU in 2022. And then there will be something unique.”



“The OSSU gets a unique new construction and the working method changes with it”

# Reliability

## Reliable service provision

AVR's customers must be able to rely on a continuous energy supply. And our waste suppliers want to be able to dispose of their waste at all times. That means all AVR's plant should be able to run with as few interruptions as possible. So our reliability works in two ways: AVR's performance is dependent on the availability of our plant and the reliability of our supply. Both these factors determine the quality of our service.

### Incinerator availability (AVR-wide)

90.7% -0.5



2021: 90.7%  
2020: 91.2%  
2019: 90.7%

### Reliability of the heat and steamsupply

98.8% -0.8

2021: 98.8%  
2020: 99.6%  
2019: 97.7%

### Definition of the KPIs

The availability of our plant and equipment determines the reliability of our energy provision. The goal of our endeavours in respect of reliability is long-term continuity. We want to achieve a very reliable energy supply by investing in future-proof plant and efficient working methods.

### Incinerator availability

In 2021 incinerator availability in Rozenburg was 91.4%. This was above target and also higher than the availability in 2020 (91.3%). Although the 2021 Duiven incinerator availability of 90.9% was higher than in the preceding year, for the second year running it was lower than the target of 91.8%. The combined availability of both plants was 90.7%. Once again this was slightly lower than the target of 91.2%.

The availability of the biomass energy plant (BEP) in Rozenburg was lower than expected due to several technical problems that resulted in more stoppages. In the coming years we will put extra emphasis on the drawing-up and effective implementation of good long-term maintenance schedules.

Although the performance of the post-separation plant (PSP) in Rozenburg was better in 2021 than in 2020 the target was still not achieved. This was due to technical problems that were addressed in 2021, including through modifications.

The water treatment factory achieved the target. Although it had previously been announced that the contract with the waste water supplier would be terminated, it was recently extended.

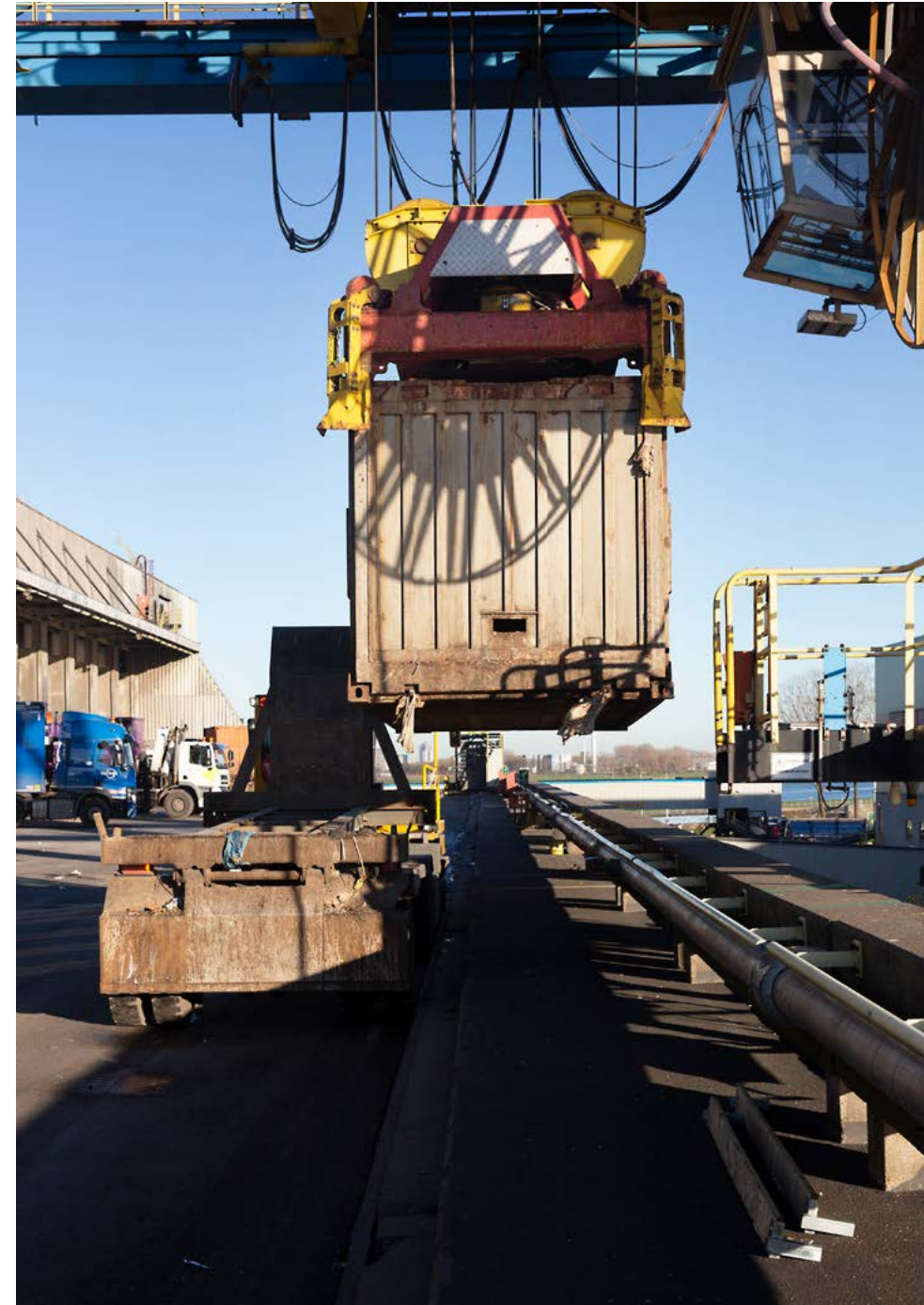
### Plant reliability

The availability of our plant was influenced by various factors.

The weather throughout one week in February 2021 was extremely cold and, because the supply of waste stagnated, we had to temporarily lower the temperature of several waste incinerators in Rozenburg and shut down one incinerator for a short period. Apart from that, for the most part the first half of the year proceeded as normal.

In Duiven the throughput was above target despite a relatively large amount of unplanned downtime. This downtime problem occurred at both facilities, primarily in the second half of 2021. It arose because over time the composition of the residual waste has changed. Because AVR itself as well as some of our customers are striving to achieve recycling targets, certain materials such as plastic – are extracted from the waste. Some of this material proves to be unsuitable for recycling so comes back to us as a monostream with a high energy value (high-calorific waste). We have to mix this stream with the other residual waste very carefully in order to ensure an even combustion. We also have some customers who supply their waste shredded and this too causes problems with the combustion. On top of that, the hospitality sector was closed down for most of the year and very few events took place, so the specific waste from these sectors was missing. To achieve a stable mix for incineration we need this waste – which is more compact and contains more moisture so has a lower energy value – to mix with the high-calorific waste, such as commercial waste and non-recyclable plastics, the supply of which did continue. This is why achieving an even incineration became a challenge and in both Rozenburg and Duiven led to slag formation – the fusing of ash into lumps in hot spots in the incinerators.

Our incineration lines were designed in the past for a different waste mix and we are investigating how we can achieve the best balance in the waste mix



we incinerate and how we can tackle slag formation when it occurs. Because we have a lot of knowledge in-house, a multidisciplinary AVR 'slag formation team' has been set up comprising people from a number of departments including Procurement, Production, Logistics and Plant Performance. The team has, for example, discovered exactly what happens in an incinerator during slag formation by filming with a camera that filters the infrared radiation of flue gases out of the picture so you can see into the fire pit. This enables us to recognise slag formation at an early stage so we can very quickly take action. The team meets every week and has reduced the downtime.

In addition, the most experience Operator in Rozenburg has been deployed to Plant Performance. He has taught his colleagues to work with more finesse and thus manage the process better. This craftsmanship has been rolled-out in all the teams.

We are also endeavouring to find solutions that will solve the problem before it arises by talking to others in the chain. For example, by finding out why customers pre-process waste and which materials they extract. In this way we can work with our customers to find a solution. We're averting waste streams that encourage slag formation. We're also taking steps to automate mixing.



### The effects of the Koploper (Fronrunner) project

The Koploper project ended in April 2021 as planned. Through this project we have learned to work more efficiently and in a more structured way. AVR-wide this has led to a far better functioning consultation structure. The consultation structure through which we monitor and adjust performance is being applied more stringently and the consultations themselves run more smoothly thanks to improved chairmanship and evaluations. There is also more exchange of best-practices between Rozenburg and Duiven. All this has had a positive effect on availability and reliability.

In recent years AVR regularly hired Lean-consultants to look at how we could achieve more effective and structured processes and working methods. AVR wants to develop this knowledge in-house so we can reduce our dependence on these consultants and safeguard the effects of Koploper within AVR. This is why, in June 2021, we laid the foundations for the establishment of our own Operational Excellence Team.

### TCI

The thermal conversion plant (TCP) in Duiven performed well, but the throughput was lower than planned. This was due to changes in our customer base and, therefore, in the supplied paper pulp: The pulp we received had a higher energy value so the quantity we could process at the same time was lower. Over the year as a whole we processed all the pulp we received.

### CO<sub>2</sub> capture plant

The CO<sub>2</sub> capture plant achieved the budgeted production of 12 tons of CO<sub>2</sub> per hour. However, the plant was shut down for two weeks in the summer due to corrosion in a heat exchanger. We got the plant back into service as quickly as possible and

then, at the end of the growing season of the market gardeners to whom we deliver the captured CO<sub>2</sub>, we began looking into the cause of the problem. We discovered that the corrosion was related to the reaction of the MEA - the chemical washing liquid with which we capture the CO<sub>2</sub>. To solve the problem we are making modifications to the plant.

AVR is a pioneer in the field of large-scale CO<sub>2</sub> capture using such a plant. We are gradually acquiring knowledge about the plant and the processes. To solve this corrosion problem we are collaborating with knowledge institutions such as TNO, the supplier of the MEA, the company that built the plant and the customers we supply with CO<sub>2</sub>. At the same time as we are carrying out the modification we are also addressing some minor issues we have encountered since the start. These are the type of problems always encountered by pioneers and to deal with them we have put together a special team. We will utilise the knowledge we have gained when we begin constructing a far larger CO<sub>2</sub> capture plant in Rozenburg.



“Slag forms when the incinerators don't burn evenly”

Patricia Stoker | Weighbridge Operator – Rozenburg

Jeffrey van der Leij | Working Foreman – Rozenburg

**Patricia:** “All incoming trucks stop on my weighbridge for weighing-in and documentation. It's all household and commercial waste. Other waste comes into AVR via other routes. I weigh the trucks when they drive in. Then they go to Jeffrey on the unloading platform. When the truck is empty it comes back to the weighbridge and the difference in weight is the weight of the load. Every day is different, but Monday morning is often very busy and a queue can build up. I keep in touch with Jeffrey via a walkie-talkie, especially when it's busy.”

**Jeffrey:** “Patricia gives the driver a routing and documentation about the waste. We have to check this because every type of waste goes into a different chute for the incinerators. Which chute the load has to go into is decided on the platform. We pre-sort the waste very carefully because it must be well mixed before it goes into the incinerator. That's important for keeping the incineration temperature even. And contaminants, such as car tyres, batteries and large pieces of construction and demolition waste, must not go into the incinerator.”

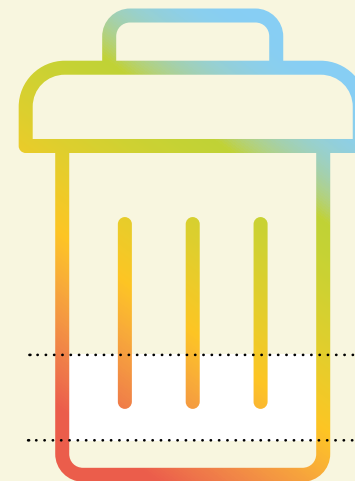
**Patricia:** “I also keep in contact with Jeffrey about the waste because at the weighbridge you don't see what's in a truck. Further on they can look into the load with cameras. Sometimes the waste doesn't meet the specifications. For example it may contain insulation material or mattresses. That's not covered by the acceptance conditions.”

**Jeffrey:** “The Sales Department makes an agreement about what the customer will bring and acceptors check whether the load complies with the agreement. They are trained to do that. The waste mustn't contain any contaminants. Sometimes the crane operator checks the load and sees that something isn't right. If there are any contaminants in the load they are removed and the driver takes them back, or we take them away. If there are too many contaminants we talk to the Sales Department. If the load is rejected it has to be put back on the truck and taken off the site. Customers aren't pleased when that happens – they want to get rid of their waste. But when the incinerators don't burn evenly slag forms. Cleaning an incinerator costs ten thousand euro a day. Prevention is better.”

# Recycling

## Recovering raw materials for re-use

The circular economy is gaining momentum and AVR is contributing towards this with the processes at both its facilities. We do our best to close cycles by extracting the very last remnant out of the residue. We treat all materials as valuable. That's how we limit the use of new raw materials and reduce emissions of greenhouse gases. Our goal is to recover raw materials for the most valuable reuse



### Quantity of recovered or separated raw materials

#### Minerals

(as a % of the quantity of waste)

**22.8%** =

2021: 22.8%

2020: 22.8%

2019: 22.8%

#### Metals

(as a % of the quantity of waste)

**2.6%** +0.1

2021: 2.6%

2020: 2.5%

2019: 2.4%

#### TopCrete (kton)

**28** -3

2021: 28 kton

2020: 31 kton

2019: 31 kton

#### Molybdenum (ton)

**160** -3

2021: 160 ton

2020: 163 ton

2019: 137 ton

#### Plastics (kton)

**29** +3

2021: 29 kton

2020: 26 kton

2019: 19 kton

#### CO<sub>2</sub> applications (ton)

**42** +11

2021: 42 ton

2020: 31 ton

2019: 10 ton

**Avoided emissions**

Recycling raw materials and other materials means sustainability gains in a number of areas. It prevents the use of (fossil) raw materials for extraction or production and it avoids CO<sub>2</sub> emissions. In 2021 AVR avoided 262 ktons of CO<sub>2</sub> emissions in this way. For more information about the avoided CO<sub>2</sub> per recovered raw material see the section [CO<sub>2</sub> emission on page 34](#).

**Post-Separation Plant**

KPIs post separation	2021	2020
Volume throughput (kton)	428.1	415
Volume output (kton)	28.6	25.5

*Performance*

In 2020 we began our Koploper (Fronrunner) project – our programme for operational excellence. The project was rolled-out further in early 2021 and in April 2021 was closed as planned. The result for the post-separation plant (PSP) was more efficient and effective working practices. These included the shift hand-over between teams, the daily cleaning stop and the short, fortnightly, line shut-down for minor maintenance. We also implemented a number of organisational changes.

At the end of 2020 we also added an extra vibrating screen to the first line of the PSP. This has enabled the PSP to sieve out more organic material, which has

improved the recovery of plastics and drinks cartons and the purity of the material. These effects of the extra screen were very noticeable in 2021.

The operational improvements plus the adjustment of the plant have had a positive effect on performance: not only availability (79.7%) but also the throughput volume (428.1 kton) and the output volume (28.6 kton) were better than in 2020. The recovery percentage rose from 51.7% in 2020 to 57.4% in 2021.

After installing an extra screen in the PSP at the end of 2020, in 2021 we took further steps to increase the plant's performance. The operational work processes and systems were improved and we also decided to

implement a major modification aimed specifically at improving the plant's separation efficiency; in other words the recovery. After a long period of investigating, testing and engineering, in 2021 we began extending both sorting lines with an additional near-infrared scanner. These extra scanners enable us to extract more hard plastics and drinks packaging out of the waste. Two existing scanners for the separation of plastic films were also replaced by one new and improved scanner. The work was started at the end of November 2021 and is expected to be completed by mid-2022. The modifications have not only led to a higher separation efficiency, they have also improved the quality of the separated plastics and drinks packaging.

In our 2020 Annual Report we announced that we had to stop separating drinks cartons because there wasn't enough recycling capacity. Luckily, at the end of January 2021 we were able to resume the separation of drinks cartons.

Our aim was to enable the sorting and recycling of the total volume of 3D plastics in the Netherlands from 2021. In 2021 96% of the 3D output in the Netherlands was sorted of which 83% was also recycled in the Netherlands. In 2021 4% of our 3D production was sorted and recycled abroad.

*Customers*

AVR gained no new customers in 2021 but did win tenders from several municipalities in the eastern part of the Netherlands. These tenders went into effect at the beginning of 2022. The contract with ISGO (Goeree Overflakkee) ended on 1 April 2021. This lost volume of waste has been replaced with residual household waste from existing municipal customers. A number of these customers, including the municipalities of Utrecht and Nieuwegein, have indicated that they want more volume to be separated.





**Legislation**

A deposit on small PET bottles was introduced on 1 July 2021. The expectation is that this will reduce the share of hard (3D) plastics (which includes PET bottles) in the household waste. How large the reduction will be is still not certain. However, although continuous measurement has, indeed, shown the share of hard (3D) plastics has decreased, the total share of plastics in the delivered household waste has remained quite stable.

**Recycling materials from bottom ash**

After residual waste is incinerated 25-28% remains as (damp) bottom ash. This consists of minerals, such as grit, sandy material and metals. Together with

partners and with the help of advanced technology we recover these valuable materials for recycling. All the recovered mineral granulates and sand can be used as building material in place of primary raw materials. Most of the applications are bonded concrete products, such as floors and kerbs. A percentage is also freely applicable in road and cycle path construction. Additional rinsing of the extremely low concentrations of metals and salts ensures years of life in a clean environment.

Recovered metals can be re-used one-to-one: the most valuable form of re-use. The increasing scarcity of metals is an extra stimulus to maximise metal recovery.

Some metal streams, such as aluminium from cans, can better be sorted in advance so less is found in bottom ash.

In 2022 AVR, together with Blue Phoenix's CEMPR business unit and with the support of an EU Life subsidy, will start a demonstration project in Duiven to produce certificated cement filler from bottom ash. This will increase the circular value of the finest fraction bottom ash.

**TopCrete from paper residue**

Paper can be recycled seven to eight times before the fibres become too short for further recycling. AVR uses this residual material as biomass for the generation of sustainable electricity and heat in its thermal conversion plant. The paper fillers that then remain can be recycled into a chalk-rich product, TopCrete. This has end-of-waste status, so can be applied freely. The volume release depends on the residual fillers in the slurry after paper recycling. AVR has for many years used this material as a sorbent to de-acidify flue gasses. More and more waste-to-energy plants, especially plants in Germany, are using the material due to these binding and absorption properties. It is also widely used as a cement substitute. The laboratory exploration into the use of calcium hydroxide (slaked lime) in phosphate recovery we conducted in 2021 in cooperation with Water Boards was a technical success. Follow-up studies have already improved process efficiency. A location with a suitable scale and capacity for a pilot trial is still being sought.

**CO<sub>2</sub> capture**

The CO<sub>2</sub> capture plant captures CO<sub>2</sub> from the flue gases released after residual waste is incinerated (see the [CO<sub>2</sub> emissions section on page 34](#)). Our partner, Air Liquide, purchases the captured CO<sub>2</sub> from AVR, after which most of it is used as a growth

accelerant in the glasshouse horticulture sector. A small amount is used in industrial processes.

At the end of 2020 we made a start with the carbonation of minerals, or the binding of CO<sub>2</sub>, sand and cement to fine ashes. Our intention was to continue working on this in 2021, but this project has been paused because the sales market is waiting for new circular legislation. (See also [CO<sub>2</sub> emissions on page 34](#).)

**Molybdenum recovery**

In the water treatment plant in Rozenburg AVR processes the waste water from a chemical company in the port of Rotterdam. From this waste water we recover molybdenum - a rare heavy metal that can be reused in the steel industry. The residue of this process is clean water. We deliver the residual heat that is released during this process to the Rotterdam district heat network. The company that supplies the water had announced that it would start doing the molybdenum reclamation in-house in 2021, but as the start-up has been delayed for the time being the contract with AVR has been extended. The volumes AVR processes for this customer are expected to decrease in the coming years.



Marco van Velzen | Process Technologist – Rozenburg

Jeroen Schelling | Strategic Purchaser – Rozenburg

Marco: "Our post-separation plant extracts plastics, films and drinks cartons from the residual waste. These are recycled. We regularly take samples and we saw there was still a lot left in them. To get that out an adjustment to the plant was needed – a modification. I came up with a concept design for it. Then I brought Jeroen in."

Jeroen: "We started the Recovery project as a team. Infrared scanners suspended over the plant conveyor belt scan the waste as it passes and see, extremely quickly, what has to be removed – blown out using compressed air. We did not have the resources to improve the plant ourselves, so we approached companies that did."

Marco: "We asked a question with, as a basis: we need a machine like this, with this amount of return from the scanners. From the design you can, for example, calculate how many kilos of steel and how much wiring you need. Together with Jeroen I asked various contractors for quotes. After thorough research we approached a number of parties – some with which we had experience and some new ones."

Jeroen: "In the autumn we selected the main contractor and construction began on 23 November. The modification was connected

to the existing installation during a planned, one-week maintenance shutdown. This meant both sorting lines were off-line. That required good coordination within AVR. Everything had to be right: the finances, the planning, and the quality. Usually the contractor also supplies all the materials, but we'd foreseen long delivery times for the new infrared scanners so had ordered them ourselves back in the summer."

Marco: "The plant, complete with the new modification, was scheduled to go into service on 23 January 2022. I began collecting data in February 2021, so the modification was completed within a year. People say, man that took a long time! But actually it was very fast. It's a fantastic process, from a design on paper to a working plant that I made up. Really nice. And it was achieved in a perfect collaboration with Jeroen, that was really great. Of course we had help from colleagues, but we did most of it together."

Jeroen: "Yes, it was all very smooth and very professional. And the plant will continue to develop, which makes it interesting. Working on something like this and watching it grow is a lot of fun."

"People say: Man, that took a long time! But actually it was very fast"

# Renewable energy

## Renewable energy from residual waste

After we have recovered all the valuable raw materials from the residual waste through post-separation, what remains is once again a valuable residual stream. This value rests primarily in the potential to use this residue to generate energy: steam, heat and electricity. We supply this energy to industrial concerns in our vicinity or to the regional district heat network. In this way nothing is lost and the generation of this energy is renewable.

### Total energy output (PJ)

**8.4** + 0.1



heat



steam



electricity

2021: 8.4  
2020: 8.3  
2019: 8.1

### Share of biogenic / green in the energy supply (percentage)

**53%** - 5



2021: 53%  
2020: 58%  
2019: 57%

**Division into heat, electricity and steam**

	2021	2020	2019
Heat (in PJ)	5,5	5,4	5,3
Electricity (in PJ)	1,7	1,7	1,7
Steam (in PJ)	1,2	1,3	1,2

**The definition of sustainable energy**

AVR follows the official definition of sustainable (renewable) energy used in the Electricity Act and by the Central Bureau of Statistics (CBS): Energy to which society has access for an unlimited period and the use of which does not cause any disadvantage for the living environment and the possibilities for future generations.

Every year the government determines the energy percentage that is fixed in the biodegradable fraction, the so-called fixed part. In 2021 this was 53%, which means that 53% of the energy output of our waste incineration plants was classified as renewable and certificated with guarantees of origin. The energy we generate in our thermal conversion plant in Duiven and the biomass energy plant in Rozenburg is 100% renewable.

The non-biodegradable part of the residual waste is also converted into energy in our waste incineration plants. According to the definition, industrial residual heat and energy from non-biodegradable residual waste are not renewable energy, but they do reduce the use of fossil resources.

We also process industrial waste water to reclaim industrial residual heat that we then supply to households in the form of district heat.

**Results**

In 2021 our net energy delivery rose by around 1% compared to 2020. The supply of thermal energy – a combination of district heat and process steam – also increased by over 1%.

Zoom in on the figures and we see a difference in the way the various heat sources were used: we supplied less heat and steam from the two biomass energy plants, while the use of industrial residual heat increased. We use industrial residual heat as the primary heat source for district heat rather than our other heat sources of heat because, due to its relatively low temperature (< 90°C), this is its only useful application. Less thermal energy was supplied from our biomass energy plants due to a combination of operational availability and choices based on the so-called 'merit order' – the method by which the market volume and price of the energy product are determined. During 2021 high electricity prices on the spot market led to a substantial downwards adjustment of the SDE+ subsidies for our biomass energy plants. This led AVR to give other heat sources, including heat and steam from the waste incineration plants, priority on the basis of cost price. Each day AVR, like the other energy producers, calculates the best utilisation of its sources on the basis of energy efficiency, cost price, customer demand and its production offering. This is why in 2021 our biomass energy plants generated relatively more 'green' electricity.

**An extremely cold February**

During the winter of 2020/2021 we had one month of extreme weather conditions. In February low outside temperatures combined with snow and ice on the roads meant the delivery of waste by road was limited, but the demand for district heat was the highest ever. Thanks to intensive cooperation with our chain partners the supply of heat was given top priority and there



were no disruptions worth mentioning in the supply. During that period we reduced our electricity generation to a minimum to safeguard maximum district heat.

**District heat**

We are seeing a steady growth in the number of connections to the district heat networks supplied by AVR (the Arnhem and Rotterdam regions). This growth is due primarily to the regional plans to make residential areas natural gas-free. The growth is tempered to an extent by the fact that the connected homes are better insulated.

In April 2021 we were able to increase our heat supply through the first low-pressure steam supply to a neighbouring recycling company in Duiven that, as a result, could say 'goodbye' to a gas-fired steam boiler. And in November the decision was taken to link the Rotterdam and Den Haag district heat networks. This project, called WarmtelinQ, is being

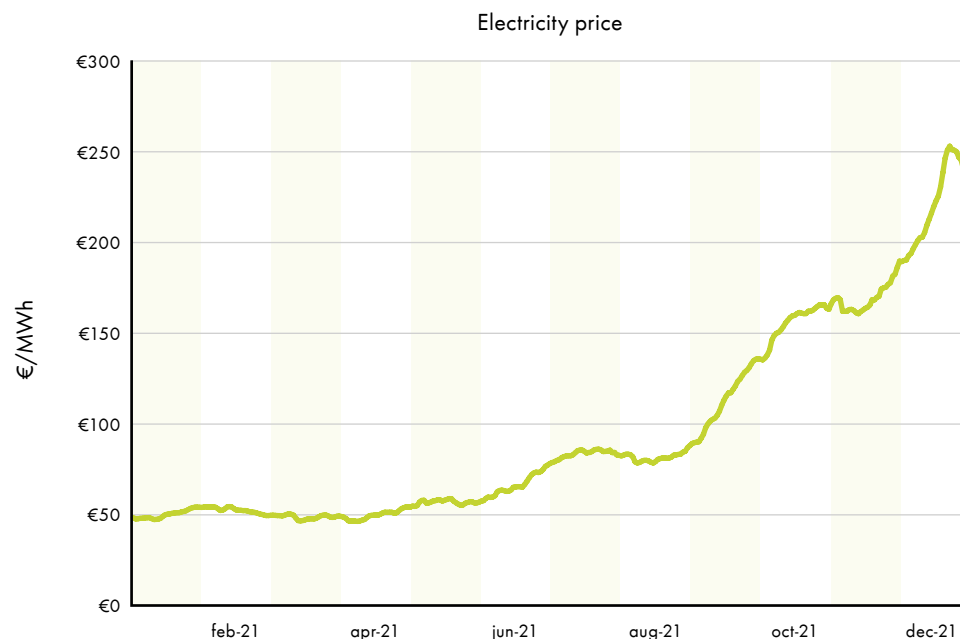
implemented by NV Nederlandse Gasunie. In 2021 AVR and Eneco, the company we supply with district heat, signed supplementary agreements for the long-term reservation and unlocking of extra heat capacity for delivery to Den Haag via WarmtelinQ.

Unfortunately, in October 2021 the Rotterdam Town Council decided that no further financial support would be given to the WarmtelinQ+ initiative - the route from Rijswijk to Leiden over which Warmtebedrijf Rotterdam (WBR) would deliver to Vattenfall. Since 2020 WBR has had an obligation to supply Vattenfall with heat for the district heat network in Leiden. Initially WBR was going to do this via its own heat transport pipeline (the 'Leiding over Oost'), but this idea was abandoned on economic grounds. WBR had planned to sign a contract with Gasunie for transport capacity, WarmtelinQ+, to enable delivery to Vattenfall in Leiden. The Rotterdam Council's decision has jeopardised not only the supply of heat to Leiden, but also the

survival of WBR as a whole. Since 2013 AVR has supplied heat to WBR, which WBR then transports and supplies to Eneco and Vattenfall. The Rotterdam Council's decision means WBR cannot continue to meet its obligations. WBR has asked the Court for a WHOA-procedure (Wet homologatie onderhands akkoord – pre-insolvency restructuring mechanism) to prevent its bankruptcy and this has been granted. AVR is consulting various stakeholders in the Rotterdam heat chain regarding how the supply of heat can be continued now the municipality of Rotterdam has decided it will no longer take on a risk-bearing interest in WBR. If in the short-term the WHOA procedure does not result in an agreement, the bankruptcy of one or more WBR companies can be expected. AVR has made financial provisions for this.

### Rising energy prices

Corona brought about a significant change in our energy activities in 2021 because after the early 2021 lockdown the economy surged. The energy market also felt the repercussions: the average electricity spot price for 2020 was around € 32 per MWh, the average for 2021 was € 102 per MWh, with most of the increase occurring in the second half of the year. Demand was higher, policy to reduce the production of fossil and nuclear electricity was introduced, and there were heated political discussions regarding the supply of sufficient natural gas to Europe. These three factors caused energy prices to rise explosively. Even though AVR mitigated much of its exposure to price changes through hedging, these enormous fluctuations did have an effect on the financial result and, therefore, on asset utilisation. As energy prices increased the



Electricity price development in 2021 (Source: Refinitiv)

energy subsidies (SDE+) were adjusted downwards which also reduced the cost price of the various energy sources.

### District heat price increase

There has been a lot of social discussion about the increased price of district heat and its linking to the natural gas tariff. Once a year the ACM specifies the maximum price the heating companies can pass on to protected consumers. This price is linked to the price development of natural gas. District heat customers have no freedom of choice and the government wants to ensure that these customers never have to pay more than (in the worst case pay the same as) people who still use gas to heat their home. This is the guiding principle 'No more than usual'.

Now the price of natural gas has risen to such an extent many district heat customers consider presenting them with the same price increase is unfair. After all, they no longer use natural gas. Looked at it from the consumer's point of view this reasoning is understandable, but for the supplier and producer the situation is more nuanced. Maintaining the supply of district heat during the peak winter month generally still requires the use of natural gas. On top of that, the pumps are driven by electricity. In other words: when the price of natural gas rises so does the cost price of district heat. In addition, many sustainable heat sources (geothermal, aquathermal, biomass etc.) are only feasible with subsidies, and the government has linked these subsidies to the natural gas price. This means that high natural gas prices lead to low subsidy support for sustainable production. AVR is in favour of abandoning the natural gas price reference, but then over the entire chain from consumer to producer. The downside of this is that if, at some time in the future, the natural gas price drops, the heat price will not, as is currently the case, automatically decrease with it.

### Turbine F

In November the new Turbine F went into service in Rozenburg. This has given AVR more possibilities to respond flexibly to customers' heat demands. Turbine F is a back-pressure turbine that can produce electricity and low-pressure steam simultaneously and very efficiently. By the end of 2021 the turbine had already produced around 17,000 MWh of electricity. This equates to the annual consumption of over 5,000 Dutch households.

### Collaboration

In 2021 there was considerable consultation between AVR and its partners in the Rotterdam Port complex regarding whether and how the supply of process steam, and the infrastructure needed for this, could be expanded further. All the parties are willing, but thus far very little progress has been made. High investments, low gross margins and (new) legislation and regulations regarding the allocation of CO<sub>2</sub> emissions make this extremely complex for both customers and suppliers. AVR is striving to integrate new supplies of high temperature steam with the existing energy portfolio via a cascade. Consider, for example, a combination – AVR supplies steam to the process industry and the process industry then returns low temperature steam (condensation) to AVR, which AVR can re-use for district heat.



“From nothing to a working turbine. That’s a strange sensation”

Marcel Kooman | Senior Project Manager – Rozenburg

Remon Waasdorp | Project Coordinator – Rozenburg

Marcel: “Our brand-new Turbine F went into operation in November. It has replaced Turbine C, which produced far less energy, and has been built in the same place as the old turbine. It works like this: hot, high pressure steam drives the turbine, which produces electricity. The used steam is then still hot enough 130 degrees for district heat, and there is a great need for it. It’s how we heat 100,000 houses in Rotterdam and supply electricity for 60,000 households. And very little energy is lost.”

Remon: “Marcel was the Project Manager for the project, I came in during the construction. Normally I don’t get involved with projects until a much later phase, but this time I was brought in early to learn. It’s like driving a car. You don’t say to someone: here are the keys, off you go, good luck. They first have to learn to drive. I learn everything about the turbine myself and involve people in the project so everyone can get a feel for it. Every week I compile a summary with photographs and mail it around. And I take care of the practicalities, such as transferring

of knowledge to the employees and organising work permits.”

Marcel: “It’s all super technical, people need to be properly informed. The best thing of all is that something old has gone away and its place has been taken by something new that provides far more energy: steam with, as a bonus, electricity. It’s very tangible, which makes it very good to work on.”

Remon: “Yes, it’s great. It starts as a hole in the ground. Then it goes from paper to construction. Then it gets more and more impressive: it goes from nothing to an installation that produces steam and electricity. That’s a strange sensation you don’t experience very often.”

Marcel: “That is, indeed, beautiful. I see it more often because I work on investment projects. They can involve new construction or large-scale modification. Turbine B dated from the 1970s and was scheduled to operate for 25 years. We still have two turbines from that time, A and C, that have now been in service for nearly 50 years. I suspect F will also last longer than it was designed for.”

# Sustainable employability

## Fit and energetic employees

Our employees can give the best of themselves in their work when they are motivated, healthy and energetic. The employability of our employees is, therefore, a key attention point because without their commitment AVR will get nowhere. We offer opportunities for growth and development, for example through training. And their health and vitality are the focus of our 'Be (Y)our Best' programme. This is how we help our employees go to work with pleasure and in good health and to have the knowledge they need to do their work well.



## Sick leave

5.0%

- 0.4

2021: 5.0%  
2020: 5.4% \*  
2019: 5.4%

\* In our 2020 Annual Report we reported 5.5%. However, retroactive corrections have been made (for example in notifications of partial recovery or of a first or final sick day) and have resulted in an adjustment of the annual figure.



**Definition of sustainable employability**

Sustainable employability is a material theme because energetic, fit employees form the basis of our company. Our success depends, to a great extent, on how resilient, energetic and knowledgeable they are. This is why we pay a lot of attention to our employees' health and wellbeing.

**KPI: Sick leave**

Last year we were proud that, despite corona, the sick leave figure did not rise in 2020. Now we can announce that we are proud that, in an almost equally difficult 2021, the sick leave percentage fell from 5.4% to 5.0%. This has been achieved in part thanks to the support of our Managers and our health and safety service provider.

**Coping with corona**

In 2021 the corona crisis continued to be paid attention in relation to the health and safety of our employees. For more about this please see the section [A safe working environment on page 26](#).

Whenever there was a (possibility of) corona infection we looked for solutions. Was working from home an option? Was there a possibility of alternative work that will make sick leave unnecessary? In a substantial number of cases this enabled sick leave to be avoided.

**Managers**

The dialogue between management and employees play a very important role in reducing or preventing absenteeism. Good contact and guidance could mean an employee doesn't take longer sick leave

than necessary. It is important that Managers have the communication skills needed to initiate the conversation about this. In 2021 we provided Managers with made-to-measure support to supplement the absenteeism guidance. Those who could use extra help or support with tackling frequent or long-term absenteeism, or who wanted to take preventative action, were assisted by the case manager of our occupational health and safety service plus, if necessary, the HR business partners – our HR Department's own advisers.

**Be (Y)our Best Programme**

The aim of the 'Be (Y)our Best' Programme is to prevent absenteeism and support our employees' health and wellbeing. The programme offers employees the opportunity to, according to their individual needs, work on their (mental) health and develop themselves further by gaining new knowledge and skills. In 2021 the interventions from this programme continued unabated. Our offering included financial coaching, corporate social work, physiotherapy and (preventive) appointments with our company doctor.

**Education and training**

In part due to the corona situation, in 2021 barely half of our training budget was actually spent on training. However, training courses in the field of safety and emergency response (*bedrijfshulpverlening - BHV*) are essential for our organisation. This is why, despite corona, in 2020 75% of our courses in this field took place and in 2021 the figure was an impressive 90%. In cooperation with the SHEQ (Safety, Health, Environment, and Quality) Department and with the assistance of the Production Departments, our partner in safety training worked out a scenario exercise with which the entire BHV organisation can be trained. The members of the first AVR team trained using this exercise were very positive about the experience.

To support our employees the opening page of the AVR Intranet includes a link to the training programme with an overview of the providers of training courses that can be followed by employees. Interested employees can register directly from there. The page also contains a calendar in which the joint education and training courses are described. Employees can sign up for these as well. Most of these courses are related to BHV and safety.

**Koploper (Frontrunner)**

The Koploper, which began in June 2020, ended in April 2021. The Koploper project has improved our work processes as well as our consultation and meeting structure.

**Employee satisfaction**

In 2021 we conducted an employee satisfaction survey. Our employees are quite satisfied in respect of many aspects, such as work content, cooperation within their own team, desired behaviour, development and training possibilities, safety and health, the role of their direct Manager and customer focus. But they are significantly less satisfied with other aspects. A common thread can be seen very clearly: the communication between higher management and the 'shop floor' leaves much to be desired. We need to listen better to each other. Naturally there are difference between teams, departments and locations, but the desire for recognition, connection and the 'human dimension' is shared by everyone. The signals are clear and we are taking them very seriously. We are looking for a new balance between focusing on targets, facts and figures and focusing on each other and everyone's knowledge and skills.

**Diversity, inclusion and social participation**

AVR wants to mean more in the field of social participation. AVR is in this respect, a learning organisation.





We want to give interns opportunities for work experience placement. And we are fully committed to training in the Professional Guidance Learning Pat (*Beroepsbegeleidende Leerweg - BBL*).

In 2021 we worked hard throughout AVR on the further implementation of Social Return. We're doing this by developing a road map that explains what Social Return means and how everyone can make a contribution. Social entrepreneurship is regular agenda item at the management level.

In 2021 AVR achieved Aspirant status on the Dutch Social Entrepreneurship Performance Ladder (*Prestatieladder Socialer Ondernemen - PSO*), the scientifically-based TNO quality mark that makes the degree of social entrepreneurship objectively visible. The aim of the PSO is to help more people with a distance to the labour market to find work in regular organisations. Achieving Aspirant status means that we will grow to a Tread level on the PSO Performance Ladder within two years. Every tread higher up the ladder means that we are offering more employment opportunities to people in the PSO target group.

The Syrian refugees who have been permanently employed by AVR since 2020 are highly regarded by their colleagues. In 2021 they were regularly in the spotlight in interviews, on the Intranet and in our company magazine.

### Recruitment

We are noticing shortages on the labour market, but in 2021 we still found filling our vacancies in good time relatively easy. In virtually every case this was achieved through our own recruitment or via internal transfers; only minimal use was made of recruitment and selection agencies. The shortages became more

noticeable as the year progressed. We foresee having to put more effort into recruitment in 2022.

### Introduction and induction of new employees

A good introduction within AVR leads to skilled, committed and motivated employees and to less early outflow. It also reduces the risk of accidents. AVR has revised its introduction and induction process for new employees. The AVR Intranet contains an overview of the mandatory introduction, the training courses and the familiarisation activities available to all employees and Managers. The programme is continuously revised and up-dated in line with developments within AVR.

### Lean working

In 2021 additional Lean process improvement training courses were provided at every level within AVR. Lean is a method for working more efficiently. One component of this is the 5S-method for a clean and tidy workplace (5S stands for sort, set in order, shine, standardise and sustain). Together with our change management partner we have developed a game in which we can combine Lean awareness with knowledge and optimisation of work processes throughout AVR. These training courses will continue in 2022.

Within the Lean improvement trajectory we have started with the simplification of our HR processes to enable HR-self service to be expanded so that information is clearer and available sooner. We have also worked on the digitisation of (mutation) forms and the workflow of the assessment interviews and bonus settlement.

### Smoke-free AVR

In 2021 we made all the preparations to make the whole of AVR smoke-free from 1 January 2022. Employees who still smoked were offered a 'stopping smoking' course.



“We’ve learned a lot about connection”

Rob Janse | HR Manager (interim)

Marie-Claire van der Schoor | Communications Manager

**Marie-Claire:** “Via various channels, including the Employee Satisfaction Survey, it became clear to us that not everyone in AVR is satisfied and connected to each other in the right way. Last year we completed the Koploper project, which focused on process improvement. At the same time we were still dealing with corona, as a result of which employees had to work in bubbles and establishing mutual connection was more difficult. These two factors contributed towards dissatisfaction. Information from the shop floor to management and vice versa also didn’t get through. When people feel they aren’t being heard they start complaining and sometimes show undesirable behaviour. And it’s the Managers who have to pay the price. So the focus had to be shifted to our human capital.”

**Rob:** “What did the results show me? Colleagues whose interaction was official to official rather than the far more important person to person. And colleagues who felt less ownership. In a start-up, for example, it’s different, everyone feels equally involved. If they don’t, something is going wrong. The stratification at AVR, plus the distance, also plays a role in this. The employment conditions are assessed as ‘OK’, and AVR’s results are good, that’s not where the problem lies.”

**Marie-Claire:** “Overall what’s missing is connection. In September and October we organised eight Outdoor Days, during which

we worked with external coaches to shed light on experiences and bring them out in the open via sports and games. Employees could say what was bothering them. Some backed off, others seized the opportunity. And everyone could think about a solution. Various ideas were put forward. For example that management should have a face on the shop floor. That distance is too great.”

**Rob:** “Good management training is also important. Leadership doesn’t simply happen by itself, it’s a profession that requires skill. Where it’s lacking we have to bring it in. A leader demonstrates exemplary behaviour and speaks to people about their behaviour: that’s how (or not how) we do it here. Those conversations can be difficult, you have to be taught the necessary skills.”

**Marie-Claire:** “During the Outdoor Days employees who had been critical of management, were given the role of Manager in a game. They soon discovered it wasn’t that easy. The Outdoor Days provided even more insights. For example that we focus mainly on the little bit that doesn’t go well rather than on the big bit that does go well. And that it’s in the Rotterdam mentality to think a 7 is a good number when really they mean a 9. Material enough to get to work. We’ve already made a start – we are listening and we’ve set up the Verbindend (Connection) project. For everyone in AVR.”

# Other emissions

## Minimising our emissions

By processing residual waste we convert it into desirable products, such as energy and recovered raw materials. But this process also releases less desirable products: Harmful substances such as nitrogen, fine particulate and dioxins. We clean the flue gases released during the incineration of residual waste in order to reduce them to below the permissible limits. When carrying out our activities we also take the environment into account as much as possible.



### Rozenburg

**NO<sub>x</sub> emissions**  
(kg/ton waste)

**0.29** - 0.2

2021: 0.29  
2020: 0.31  
2019: 0.33

**Fine particulate emissions**  
(kg/ton waste)

**0.0024** - 0.0011

2021: 0.0024  
2020: 0.0035  
2019: 0.0036

**Dioxin emissions**  
(g/ton waste)

**0.00000012** - 0.00000005

2021: 0.00000012  
2020: 0.00000017  
2019: 0.00000011

### Duiven

**NO<sub>x</sub> emissions**  
(kg/ton waste)

**0.24** + 0.01

2021: 0.24  
2020: 0.23  
2019: 0.27

**Fine particulate emissions**  
(kg/ton waste)

**0.0017** - 0.0002

2021: 0.0017  
2020: 0.0019  
2019: 0.0018

**Dioxin emissions**  
(g/ton waste)

**0.00000017** - 0.00000006

2021: 0.00000017  
2020: 0.00000023  
2019: 0.00000033

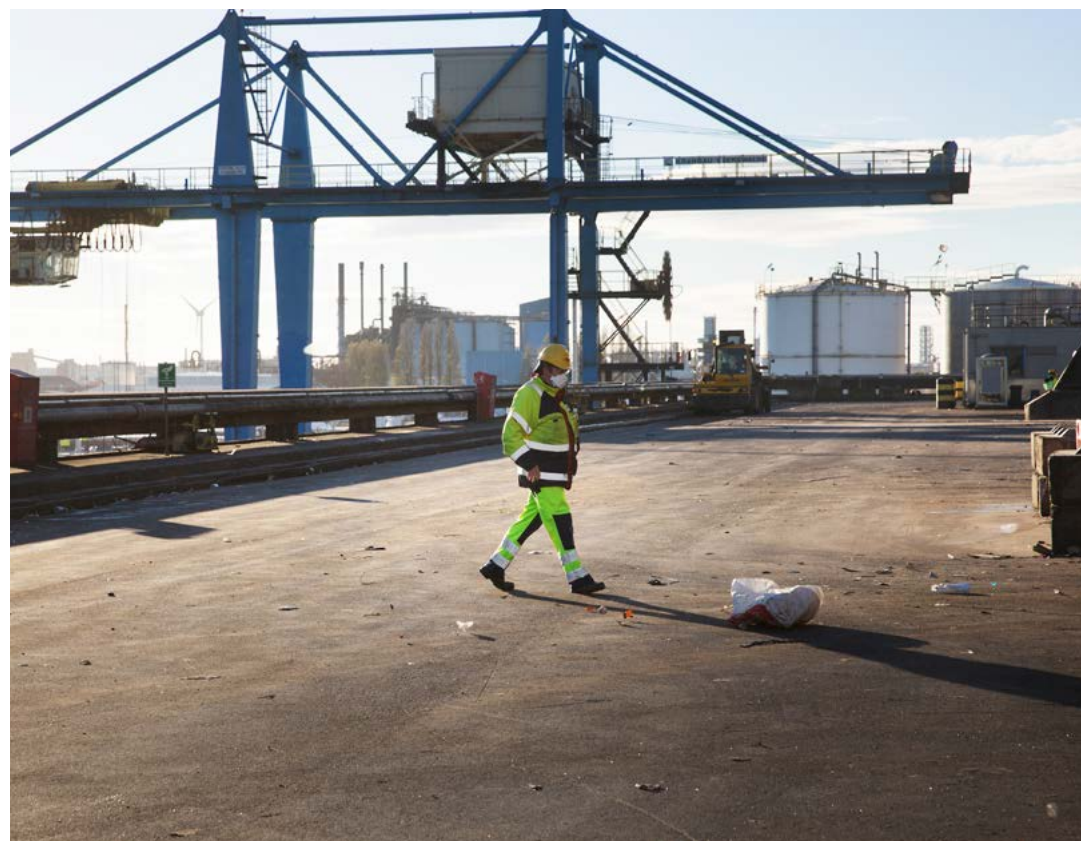
### Definition of other emissions

Our processes result in the release not only of CO<sub>2</sub> but also of other harmful substances, such as nitrogen (NO<sub>x</sub>), fine particulate (PM10) and dioxins. The residual waste we receive also contains Substances of Very High Concern (SVHC). We call the emissions of all substances other than CO<sub>2</sub> 'other emissions'. Under this heading we also include the smell from the residual waste we process, the noise made by our activities and litter.

### Decrease of emissions into the air

Thanks to numerous improvement projects and new insights into process control, emissions from the waste incineration plants in Rozenburg and Duiven have declined sharply virtually right across the board.

Due to the fluctuations in the waste flows, process disturbances can occur in the incinerators. We have procedures and working methods to remedy these disruptions as quickly as possible. In the event of



a disturbance, it is possible that the emissions will exceed the permitted values (the emission limit values) for a short period of time. By acting as quickly as possible in the event of a disturbance, we reduce emissions below these limit values. The licensing and enforcement authorities monitor this.

The implementation of various measures has reduced the number of NO<sub>x</sub> exceedances at the thermal conversion plant (TCP) in Duiven, where paper residue is processed. Adjustments have been made to the pelletisers (the machines that compress the pulp into pellets), a new burner has been installed, and at the end of 2021 a bypass was introduced on the steam boiler – an eco-circuit. This has made it easier to keep the catalyst at the right temperature during start ups with process deviations.

### Carbon monoxide (CO)

Changes to the composition of the waste mix (see [Reliability on page 52](#)) increased the number of process disruptions, which also affected the emission of CO. The level of emissions says something about the completeness of the incineration. Various optimisation projects since 2019 have led to a noticeably improved and more controllable incineration process and with that a reduction in the number of exceedances of the CO daily average.

### KPI: Nitrogen (NO<sub>x</sub>)

Increased operational attention has reduced the number of NO<sub>x</sub> exceedances at both facilities. In Rozenburg the heat management has also been improved, which has reduced the number of times the DeNO<sub>x</sub> installation fails due to the temperature being too low.

### KPI: Total dust (fine particulate)

Fewer dust exceedances at the waste incineration plant in Rozenburg is the result of more focus on main-

tenance and operational attention plus an overhaul of the activated carbon filters and electrostatic filters for the flue gas cleaning. If dust emission increases the process is adjusted effectively.

### KPI: Dioxins

AVR frequently brings in independent metering companies to measure its emissions. On two occasions in 2021 measurement showed an exceedance of the permitted dioxin emission level. AVR reacted immediately: the installations were emptied and thoroughly inspected and the activated carbon filters concerned were overhauled and optimised. Extensive 're-measurement' showed that the emissions were once again at the normal, low, level. We have now made a provision for the implementation of an extensive online active carbon filter monitoring programme. This will mean that, in the future, we can react even earlier on the basis of deviating process parameters and, as a result, will be less dependent on the 'not-continuous' metering of this type of emissions.

### Substances of very High Concern (SVHC) (Zeer zorgwekkende stoffen - ZZS)

In 2020 AVR carried out an extensive SVHC inventory over the entire process at both facilities. The DCMR Milieudienst Rijnmond evaluated the report concerning the Rozenburg facility and deemed it satisfactory. The ODRN assessment for Duiven has not yet been completed. AVR is compiling an inventory of existing systems with a view to the future when emission standards will be stricter.

### Complaints of nuisance

In 2021 our Rozenburg facility received a number of complaints about smell as well as complaints about flies. One of the neighbouring companies was particularly affected. As a corrective measure we decommissioned a number of waste storage bays.

Stricter regulations banning the use of pesticides to prevent flies have made combating them increasingly difficult. We have covered the bays with netting to stop the flies getting in. This has had additional benefits – less wind-blown litter and the gulls cannot damage the bales and spread the waste. A project has been started aimed at improving the storage of baled and film-wrapped waste in order to reduce the nuisance and, possibly, increase the buffer capacity. We have also improved the ‘housekeeping’ throughout the facility and reduced spillage during transport and storage.

In April 2021 a local resident contacted AVR in Duiven regarding a strange noise. This was caused by the explosives used to remove dust from the boilers. After this explanation was received there were no follow-up questions. There were also no external complaints regarding Duiven.

### Contact with the local community

In Rozenburg industry, recreation and living all come together. We want to keep the nuisance we cause our neighbours as low as possible. Burengesprek Botlek Europoort (*Botlek Europoort Neighbourhood Conversation*) is a platform on which companies, partners and authorities maintain an open dialogue with residents in the surrounding municipalities. The partners are the municipality of Rotterdam, DCMR Milieudienst Rijnmond and the Safety Region Rotterdam-Rijnmond. The dialogue is shared via the Platform’s website, Facebook page and Twitter account and, when possible, physical meetings are organised.

Burengesprek works both ways. We proactively keep residents informed and we listen to them. This lowers the threshold for them to tell us what is bothering them and why. At the same time they see that good things are happening in the facilities and that creates more

mutual understanding. Complaints about activities that cause temporary nuisance can be prevented if residents are told about them in advance via Burengesprek. In addition, the participating companies in the region exchange and share ideas and information, for example about shut downs, renovations or developments that could cause nuisance. We communicate this jointly to all the neighbours. If any complaints or questions are received via Burengesprek or DCMR’s complaints hotline, everyone can give an explanation or pass the information on to the relevant company.



Although there is a reasonably large distance between AVR’s facility in Duiven and the inhabited world, there too maintaining good contact with local residents is important. This is why we are participants in Taskforce InnoFase (the name of the industry park in Duiven where the AVR facility is located), through which we focus primarily on communication with neighbouring companies. AVR has good contact with Stichting Milieuvrienden Duiven (*Environmental Friends Duiven*). This Association strives for a good a good living environment for residents of Duiven and the surrounding area and for the preser-

vation and improvement of nature, the landscape and natural historical values. AVR in Duiven is also involved in Natuur en Milieu Gelderland (Gelderland nature and environment) and is a member of Groene Allianties de Liemers – a regional cooperation for the promotion of sustainability and circularity between companies.



Maryam Dabirian | Process Technologist – Rozenburg

“I enjoy working with colleagues from different disciplines”

“As a Process Technologist I spend a lot of time analysing data to discover useful information that can improve a process. But it doesn't stop there, because the gap between theory and practice is very wide. I check in the field whether the installation is in order and whether the interpretations and analysis results are correct. It's important that my analysis matches the reality. Incineration doesn't only create CO<sub>2</sub> emissions, it also creates emissions of other substances, such as CO, NO<sub>x</sub> and fine particulate. The emissions must not exceed specified limits. If they do we make a Root Cause Analysis, or RCA, to find out the cause. The Shift Chief makes a report and I analyse all the related process parameters that could lead to emissions. To acquire more information I also talk to the Operators on duty. Then I compile a report that includes all the graphs and notations from the shift log the Operators complete for every shift. I end my report with a conclusion and some recommendations. The report is reviewed during the weekly 'stable operation' meeting with colleagues from the Production and

Maintenance Departments. What has influenced the process and what the causes of the emissions were are discussed and, depending on the cause and its severity, action is taken to return the installation to a good condition. Precisely when an emission will occur cannot be predicted and that makes my work challenging and interesting. If a component of an installation stops working you can expect an emission exceedance, so action has to be taken quickly. It's more difficult with substances such as CO and NO<sub>x</sub> because we are dependent on the composition of the waste and the performance and efficiency of all the processes related to the waste processing. I have a great job, because I enjoy diving into complicated matters. You need to know about the installation and the process and trying to put those pieces of the puzzle together is the bit I find particularly interesting. I enjoy working with colleagues from different disciplines because it enables us to learn from each other and complement each other when necessary. Cooperation is AVR's strength!”

# Financial stability

## Basis for our continuity

A healthy company is a company with a steady financial foundation. That is an important goal for AVR, because this basis gives us the opportunity to invest in innovations with which we can continue to pursue our goals in the longer term. It also enables us to absorb setbacks when they arise. That is why we are continuously working on our financial stability.



**EBITDA**  
(in millions of €)

**138.7** +0.2

2021: € 138.7 mln  
2020: € 138.5 mln  
2019: € 132.8 mln

**Net result**  
(in millions of €)

**42.6** +6.5

2021: € 42.6 mln  
2020: € 36.1 mln  
2019: € 37.9 mln



**Revenue**  
(in millions of €)

**317.5** +35.9

2021: € 317.5 mln  
2020: € 281.6 mln  
2019: € 267.3 mln

**EBIT**  
(in millions of €)

**79.9** +4.5

2021: € 79.9 mln  
2020: € 75.4 mln  
2019: € 80.8 mln

**Investments**  
(in millions of €)

**57.7** +6.2

2021: € 57.7 mln  
2020: € 51.5 mln  
2019: € 66.5 mln

**Cash flow**  
(in millions of €)

**0.3** -9

2021: € 0.3 mln  
2020: € 9.3 mln  
2019: € -8.2 mln

**Cash position**  
(in millions of €)

**30.1** +0.3

2021: € 30.1 mln  
2020: € 29.8 mln  
2019: € 20.5 mln

### What is financial stability

We define financial stability as a solid financial basis that guarantees AVR can continue to exist, is profitable, can make (strategic) investments and can absorb unexpected set-backs. We have budgets approved by our supervisors for our goals and KPIs. These KPIs are driven by our activities, which we have described in the other sections of this Annual Report.

### Our financial stability in corona time

The effects of the corona pandemic on AVR's financial stability have remained limited. The greatest risks were, and still are, installations having to be shut down due to too little waste being delivered or there being too few suitable employees available to process the waste. Luckily neither of these situations has arisen.

Changes in the composition of the waste did mean keeping the incineration process stable demanded considerably more attention. Whereas in 2020 the corona crisis led to lower energy prices, in 2021 the opposite applied – prices rose substantially. This has a positive effect on revenue. The limited impact of the pandemic meant that in 2021, as in 2020, AVR did not utilise the Dutch government's (financial) support and recovery package.

### Results

AVR's closing financial result developed positively in 2021: net result amounted to € 42.6 million - € 6.5 million higher than for 2020. Operating result (EBIT) was € 4.5 million higher than for 2020 due to a combination of higher revenue and higher costs, including a number of one-time effects.

### KPI: Revenue

Revenue (including other income) rose from € 281.6 million in 2020 to € 317.5 million in 2021. Waste volumes were higher than in 2020 due to a

good production performance. In addition, the price development of both waste and energy made an important contribution towards the higher revenue, which was partially offset by lower subsidy revenue. The revenue also included one-time proceeds from the Water Treatment plant and a one-time write-down related to a district heat contract.

### KPI: EBITDA and EBIT

Despite the higher revenue in 2021 EBITDA rose only slightly to € 138.7 million (2020: € 138.5 million). This was primarily caused by one-time items related to the write-down of a district heat contract and costs related to the acquisition of AEB. Personnel costs rose and the costs of both consumables and energy increased as a result of higher prices. Write-offs were € 4 million lower than in 2020. As a result the operating result (EBIT) for 2021 amounted to € 79.9 million – an increase of over € 4 million compared to 2020 (€ 75.4 million).

### KPI: cash flow

In 2021 AVR achieved a positive cash flow of € 0.3 million. The positive cash flow comprised a cash flow from operating activities amounting to € 183 million, of which € 58 million was used for investments and € 125 million for financing activities. The cash flow from financing activities comprised interest payments (€ 29 million), dividend pay-outs (€ 43 million), a repayment on the credit facility (€ 50 million) and lease payments (€ 3 million).

### KPI: cash position

The cash position remained stable at € 30 million.

### KPI: investments

In 2021 AVR's investments amounted to € 57.7 million (2020: € 51.5 million) and were related to both existing plant and innovations and optimisations, such as the new

Turbine F in Rozenburg, the optimising of the sorting line and the renewal of the transfer station in Utrecht (OSSU).


### Financing structure

AVR has a prudent financing structure: nearly 50% of the financing is through shareholder equity and subordinated loans from the shareholder. This financing structure is reflected in the relationship between the Company's debt and its operating result before depreciation and amortisation (EBITDA) – the so-called leverage. AVR has a leverage ratio of around 2x, - the net debt amounts to approximately twice the EBITDA. AVR strives to achieve the long-term retention of a maximum leverage of 3x. This makes it clear that our strategy is focused on long-term stability that enables us to absorb unexpected negative financial effects and continue investing in developing AVR and making it more sustainable.

AVR's outstanding loans and credit facilities with banks and investors amount to € 300 million. At the end of 2021 existing loans amounting to € 50 million expired. AVR repaid these loans with its own funds. No new financing was raised during 2021. At the end of the year AVR did start the process of obtaining acquisition financing for the expected acquisition of AEB. AVR intends financing AEB in the same prudent manner as described above.

Financiers believe in AVR's innovative strength, the steps we are taking towards a circular and climate-neutral world and the results of these steps. As a result, AVR was advanced a so-called Green syndicate loan by five banks. We have linked sustainable targets to this loan and receive an interest-rate discount if we achieve these targets. This form of financing shows that banks recognise the importance of the steps AVR is taking to promote a circular economy. We intend a further 'greening' of our financing in future financing rounds.





Christiaan Vrijhof | Controller

“Financial stability is very important. We strive for healthy growth and for that you need a solid foundation. Many years of steady growth is better than one year of maximum result. That is also the approach of our shareholder, which is why we are able to set our sights on a more distant horizon. Stability also gives you the peace of mind to look ahead and invest. In the Financial Department we follow what is happening in practice. The financial figures are a translation of this. Financial stability starts with reliable data about the primary processes. If that’s a mess, the financial results are also less reliable.

I’ve worked for AVR for more than 10 years and not one of those years has been boring. The world of waste and energy is constantly developing. It is a beautiful, but also complex, world because a lot happens at the same time. We have stringent recycling targets, we want to produce as much energy as possible from the incineration of the residual waste, we strive for the cleanest possible residual products, and at the same time we must comply with increasingly stringent environmental demands. All this demands continuous innovation and creative thinking.

And that’s something AVR does very well.

In the Financial Department we are constantly analysing. If the costs increase we investigate what is happening. We prepare reports, but at the same time we are close to the business processes. We also look at the wider picture – at what is happening in the world – so we can identify opportunities and threats. For example to ensure a security of supply of certain chemicals or plant components we need. So we look at both the mini in-house world and the macro outside world. The figures are a reflection of the reality, but looked at the other way around the way you can influence reality by the way you interpret those figures.

Strategic investment plays a part in this long-term view. The conversion of an incinerator in Duiven is an example of this. The refractory bricks in the firebox had to be replaced every year, which meant an annual maintenance shut down. We now work with membrane walls, which are quite a bit more expensive but last much longer. That’s how we look at the optimum return on an investment. And we can do that because we are financially stable.”

“Stability gives you the peace of mind to look ahead and invest”

# Governance

## Corporate governance

AVR stands for good Corporate Governance, proper supervision and transparent accountability to all its stakeholders, also in respect of the social role AVR wants to play.

### Legal structure

The ultimate holding company of AVR, Dutch Enviro Energy Holdings B.V. (DEEH), is a private company incorporated under Dutch law to which the (partially exempt) structure regime is applicable. On the grounds of this regime in 2017 a Supervisory Board was appointed. AVR applies the Anglo-Saxon model of a one-tier Board in which the Supervisory Board members (or the Non-executive Directors) and the Directors (the Executive Directors) work together in a single Board. The Executive Directors are responsible for the day-to-day management of the company and the Non-executive Directors supervise the Executive Directors.

### One-tier Board

The one-tier Board comprises eight Directors: four Non-executive and four Executive. The Board meets at least six times a year. The Board has formed three sub-committees of its members within which there is scope for a more in-depth appraisal

of specific topics: the Remuneration Committee, the Audit & Treasury Committee and the Sales & Operations Committee.

The members of the one-tier Board are CEO Yves Luca, CFO Rob de Fluiter Balledux, five representatives of the shareholders and a Non-executive member nominated by the AVR Works Council.

### Shareholders

Since 2013 all the shares in the capital of AVR have been held by a consortium in Hong Kong led by Cheung Kong Infrastructure Holdings Ltd. (CKI). CKI, a Hong Kong listed company with over 130,000 employees spread across participations in Hong Kong, China, Europe (including the UK), Canada, Australia and New Zealand, is a world player in the field of infrastructure.

## Personalia

Currently the one-tier Board van DEEH comprises the following members:



### Neil McGee, Chairman and Non-executive Director

Neil McGee (70), Australian nationality, has a long track record within the CK Hutchison Group. Neil's other functions include Executive Director of Power Assets, the energy company in Hong Kong. He is also Managing Director of Hutchison Whampoa Europe Investments S.à r.l. and a member of the Board of Husky Energy – a stock exchange listed Canadian energy company. Neil has a Bachelor of Arts degree and studied Law.



### Ed Nijpels, Non-executive Director

Ed Nijpels (71), Dutch nationality, is a former Minister of the Environment and Queen's Commissioner in Friesland. Ed is the Chairman of the Progress Consultation Climate Accord and Crown appointed member of the Dutch Social and Economic Council (SER). He studied Law.



### Hing Lam Kam, Non-executive Director

Hing Lam Kam (75), Chinese nationality, has been the Group Managing Director of Cheung Kong Infrastructure since it was established in 1996. He is also Deputy Managing Director of CK Hutchison Holdings Limited and Deputy Managing Director and Executive Committee Member of CK Asset Holdings Limited. He studied construction and business administration.



### Andrew Hunter, Executive Director

Andrew Hunter (63), British nationality, is Executive Director of Cheung Kong Infrastructure and Executive Director of Power Assets. Andrew is also a member of the Scottish Institute of Chartered Accountants and the Hong Kong Institute of Certified Public Accountants. He has over 38 years of experience in accountancy and financial management. Andrew has a Master of Arts degree and studied business administration.



### Duncan Macrae, Non-executive Director

Duncan Macrae (51), British nationality, is Head of International Business at Cheung Kong Infrastructure. He has over 26 years of experience in the field of infrastructure investments. Duncan is a member of the Institute of Directors in the United Kingdom. He studied philosophy, politics and economics.



### Charles Tsai, Executive Director

Charles Tsai (64), Canadian nationality, has worked for Power Assets since 1987, since 2014 as CEO with responsibility for all foreign participations. Charles is a Registered Professional Engineer and Chartered Engineer. He studied mechanical engineering.

## Message from the Board

COVID-19 continued to dominate our lives in 2021. The past year was again a testing time for our staff, contactors, suppliers and other stakeholders.

In a year in which operational conditions continued to be tough, AVR managed to exceed its financial targets. From a health and safety perspective 2021 was a satisfying year with internal health and safety targets being met.

Our one-tier Board of Directors was able to meet seven times over the past year thanks to the possibility of video conferencing.

In 2021 the Company won the tenders for processing the residual household waste of the municipality of Hellevoetsluis and many municipalities in the east of the Netherlands. In the coming years these agreements will contribute towards the long-term strategy of the Company's commodities portfolio.

One important milestone for the Company was the start of the steam deliveries to a neighbouring recycling company in Duiven, which has enabled that company to reduce its carbon footprint significantly. Another important milestone for AVR was the commissioning of the new Turbine F in Rozenburg. This Turbine will facilitate the delivery of both electricity to the grid and low pressure steam to the district heat system of the greater Rotterdam area.

In early December AVR signed an agreement to acquire the Amsterdam-based energy-from-waste company AEB Holding N.V. (AEB) from the municipality of Amsterdam. The agreement was the result of a competitive sale process in which AVR emerged as the most successful bidder for AEB. The sale is subject to regulatory approval, which is anticipated later this year. I would like to thank the dedicated AVR team and the shareholders CKI/Power Assets – their work, effort and close cooperation made this transaction possible. I am confident that the combination of our existing business and AEB will further enhance our progress to sustainability, a circular economy and customer focus during the coming years.

The disruption caused by the COVID-19 pandemic has brought many challenges. I am confident that AVR will emerge from the pandemic stronger, more focused and better positioned to deliver on our mission to contribute to a cleaner world wherein nothing is wasted.

I would like to thank all our staff for their hard work and perseverance during the past year. I would also like to thank our shareholders for their continuing support. And I particularly would like to thank our customers for further building on the long term relationships that enable us to expand our activities.

On behalf of the Board  
**Neil McGee**, voorzitter DEEH



### Yves Luca, Executive Director

Yves Luca (56), Belgian nationality, is the CEO of AVR and a member of the Board of the Dutch Waste Management Association. Yves has 25 years of experience in the waste sector. His previous positions included COO of Van Gansewinkel. Yves studied economics.



### Rob de Fluiter Balledux, Executive Director

Rob de Fluiter Balledux (58), Dutch nationality, CFO van AVR. Rob's positions prior to joining AVR included Financial Director of Martinair and CFO of Van Gansewinkel. He studied business economics.



General Counsel-Company Secretary **Bram Witsenburg** (50) acts as the Secretary of the one-tier Board. Previously he was attorney-at-law and Company Lawyer for companies including ARCADIS and McGregor Fashion Group. Bram studied Law.

## Compliance

AVR's Directors and shareholders set great store by the correct adherence to the applicable legislation and regulations. To safeguard this compliance the organisation has drawn-up internal policies and procedures for its operating processes. Compliance is a continuous improvement process, certainly in view of the increasing regulatory burden and complexity.

A number of spearheads in the area of compliance are applicable for AVR: compliance with environmental law (licences), public procurement law, accounting law, energy law, consumer law, financial law and privacy law. Compliance with the legislative fields mentioned above has direct consequences for AVR's 'licence to operate'. Preventing fines and other enforcement measures is also essential to maintain the Company's good reputation. The SHEQ (Safety, Health, Environment and Quality), IT and HR departments and the General Council support the organisation and its operations with solicited and unsolicited advice and, when necessary, the required knowledge.

### Safety, Health, Environment and Quality (SHEQ)

In 2021 key task for AVR's Environmental Coordinators was the application for the revision permit, including for the two waste-to-energy plants in Duiven and Rozenburg. All the proverbial i's were dotted and t's were crossed to make absolutely sure that AVR complies with current and future legislation and regulations. Numerous documents about soil, noise, smell and air, as well as wind-blown litter and fire safety, went to and came back from DCMR Milieudienst Rijnmond and the fire service until everyone agreed with the enforcement.

All the safety studies related to external security were reviewed. The inspection pursuant to the Decree on Major Accident Hazards (*Besluit risico's zware ongevallen - Brzo*) was carried out in Rozenburg and the outcome was positive. This also applied for the audits in respect of fire insurance and port security. And thanks to the enormous effort all the environmental emissions and safety indicators were all improved.

In 2021 the corona crisis once again had a substantial impact on AVR. As a company in a vital sector AVR had to do everything possible to keep the virus outside the gates and safeguard business operations. Thanks to all the implemented measures – such as segregating the teams, retaining the one and a half metre social distancing wherever possible, and taking the temperatures of our own and contractors' employees – this was achieved. The regional safety agency has tested and approved our business operations.

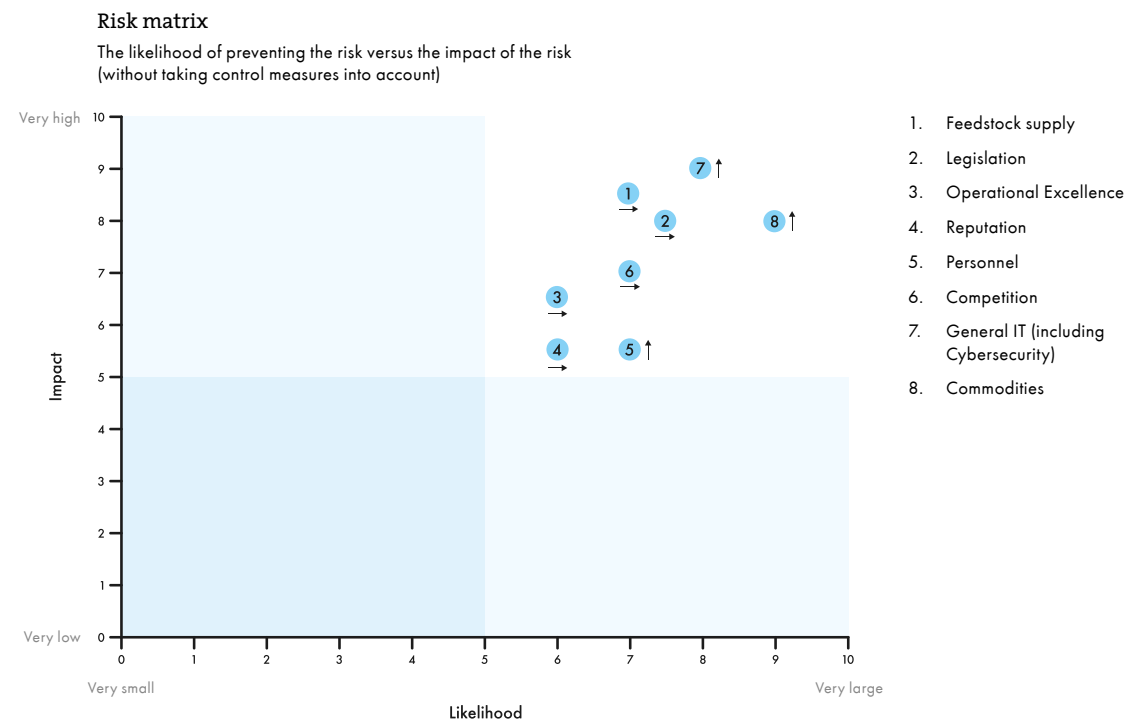
## Risk management

### Operating risks

The risk areas that are the most important for AVR on the basis of its strategy have been identified. Each year the risks related to these areas and the functioning of the measures to limit these risks are evaluated. In this 2021 Annual Report the most important (changes in) eight operating risks faced by AVR are explained along with the measures that have been implemented to mitigate these risks.

### Risk matrix

The risk matrix includes the eight most important risks identified by AVR in the assessment for 2021. The matrix indicates the likelihood of preventing the risk versus the impact of the risk, without taking into account the internal control measures implemented by AVR. This is followed by descriptions of the control measures.



*Commodities*

This is the risk that AVR will suffer losses as a result of the volatility of commodity prices (electricity, gas, diesel and metals). This risk applies particularly to the prices of the energy and residual materials supplied by AVR. We follow an active hedge policy the objective of which is to cover at least 80% of the raw material price risk for one year ahead through hedge contracts and cover 40% for at least two years ahead. This policy is included in the financing conditions AVR has agreed with its banks and investors.

During 2021 gas and electricity prices rose explosively worldwide due to an increasing demand for energy and a lagging supply. Price volatility also increased. The result of this development is that the inherent risk for AVR in respect of commodity price volatility has increased.

*Waste offering*

This is the risk of volatility in the volume and quality of the residual waste offered by waste customers in both the short-term and the long-term. We regularly check the balance between our contract portfolio and our medium/long-term capacity. We aim to achieve an optimum mix of different streams (domestic residual household waste, domestic commercial waste and imported waste) in order to limit, as far as possible, the volume and quality of residual waste being dependant on individual streams.

During 2021 the corona pandemic continued to cause a decrease in the offering of commercial waste. This was to an extent offset by increased volumes of household waste. Besides that, the tax on imported residual waste (as of 2020) and Brexit (as of 2021) led to higher costs for the import of waste from the UK. As both developments were already taken into account in our risk assessment in 2020 the risk of an inadequate supply of waste remains the same.

*Legislation and regulations*

This is the risk that the introduction or extension of legislation or regulations will have a negative effect on the stability and development opportunities of AVR's activities. We are represented in various branch organisations and also maintain contacts with regulatory bodies and policy makers so we can defend our interests. In our communications strategy we strive to make the outside world aware of the leading role AVR can play in respect of themes such as the circular economy and energy transition.

On 1 January 2021 the CO<sub>2</sub> tax went into force in Dutch Law. This could have a negative impact on our financial stability. This development was already taken into account in our risk analysis in 2020. Our assessment of the risk in respect of legislation and regulations has, therefore, remained the same.

*General IT including cyber security*

This is the risk that disruptions in the IT sphere as a result of general IT disruptions or cyber crime could lead to outages of primary operating processes. AVR has outsourced the majority of the technical and functional IT support for the process automation and office automation to external specialists. In recent years a considerable amount has been invested in further improving security. In the field of cyber security we work with security software that is always up-to-date and we implement an active awareness-building programme among our employees.

IT is becoming increasingly important for AVR. In addition, we are seeing cyber crime becoming more and more prevalent and far-reaching all over the world. Based on these developments the risk assessment has been raised.

*Personnel*

This is the risk of AVR being unable to recruit or retain sufficient competent, motivated and professional employees to enable it to carry out its activities. Employee health is also covered by this risk. We endeavour to ensure we retain existing employees and attract potential new employees through our 'Be (Y)our best' programme.

The corona pandemic has increased the risk of our having insufficient deployable personnel to keep business operations running 24/7. AVR has responded to

this by introducing an extensive package of measures and procedures in-line with the guidelines of the RIVM. In addition, the current scarcity on the labour market has also made it more difficult for AVR to attract well-qualified personnel. This has led to a slight increase in the estimated risk.

*Operational excellence*

This is the risk that, due to process and plant inefficiencies, AVR is incapable of operating at competitive (cost) prices or is unable to process the agreed volume of residual waste or supply the agreed quantity of energy.





A focus on operational excellence was a spearhead in recent years through the Koploper (Fronrunner) project. The first positive results of the project became visible at the end of 2020 and the trend continued in 2021. This led to a lower risk assessment.

*Competition*

This is the risk that AVR's competitiveness will deteriorate.

The introduction of a waste tax on the import of residual waste to the Netherlands has adversely affected our competitive position. In the medium-term this could lead to the current stream of waste from the UK to the Netherlands drying up and, as a consequence, increased competition for domestic waste volumes.

To limit its dependence on individual waste streams as far as possible, AVR strives for an optimum mix of several streams (domestic residual household waste, domestic commercial waste and imported waste). We also strive to gain a competitive advantage in the provision of services to municipal waste customers through the post-separation of waste (since 2018) and the (partial) capture of CO<sub>2</sub> emissions from the incineration process (since 2019).

*Reputation*

This is the risk that the external communications about AVR's goals and developments are insufficiently effective as a result of which the concept of, or the support for, AVR's goals and developments is undermined.

Our communication strategy is aimed at making the trend-setting role we can play in the circular economy and the energy transition visible to the outside world.

**Financial risks**

AVR's business activities mean it is exposed to financial risks of which the most important are.

*Price risk*

This is the risk of price fluctuations in respect of both energy and waste. For commodity prices a hedge policy is applicable as is also described above under the operating risk Commodities. The risk related to waste prices is limited because AVR has many long-term contracts with fixed price agreements and indexing.

*Interest rate risk*

This is the risk of interest-rate fluctuations. At the end of 2021 AVR had over € 300 million in outstanding financing. As only € 10 million has a variable interest rate and € 290 million has a fixed interest rate, the interest rate risk, after mitigating measures, is very low.

*Credit and counterparty risk*

This is the risk that counterparties cannot make good their financial obligations to AVR. AVR works with creditworthy parties (D&B reports of credit ratings) and avoids the concentration of major credit with individual counterparties.

*Liquidity risk*

This is the risk of a shortage of liquidity that results in AVR being unable to meet its (immediate) long-term and short term payment obligations. The risk is obviated by AVR's current financing structure, which in the short-term gives AVR access to sufficient unused credit facilities and in the long-term limits the refinancing risk by splitting the total financing requirement into separate parts each with a different term.

*Currency risk*

AVR has received financing in American dollars. The currency risk on these loans in foreign currency is fully covered by means of cross currency swaps. Apart from these loans AVR is not involved in any transactions in foreign currency.

## Cyber security

In 2021 the threat of cyber crime once again increased world wide. In the 'arms race' with the cyber criminals AVR continued investing in the reinforcement of its digital defence lines as part of its critical infrastructure.

AVR's Security Operations Center AVR scans continuously for vulnerabilities in our systems. This diligence has resulted in AVR's timely protection against various cyber attacks, such as the ones that came to public notice in 2021. AVR works constantly on the procedures related to Cyber Incidence

Response, with which we can tackle the intrusion or failure of IT and operational (OT) in an integrated way. In 2021 we strengthened our technical protection from phishing, but people remain the weak link. This is why all our employees have been trained and tested to handle phishing attacks. All AVR employees follow a cyber-security training programme that includes not only an awareness course but also specific training in the field of phishing and passwords. In addition, in 2021 various parties once again audited and tested AVR's cyber-security and the awareness of its management and employees.



# Condensed financial statements

This is a condensed financial overview. These statements have not been audited. Audited financial statements have been filed with the Chamber of Commerce.



## CONSOLIDATED STATEMENT OF FINANCIAL POSITION AS OF 31 DECEMBER 2021 (x € 1,000)

	31 December 2021	31 December 2020
<b>ASSETS</b>		
<b>Non-current assets</b>		
Property, plant and equipment	520,113	510,751
Right-of-use assets	15,439	17,530
Goodwill	316,417	316,417
Other intangible assets	40,386	48,248
Deferred tax assets	50,053	44,812
Derivative financial instruments	6,120	2,399
Other non-current financial assets	-	16,834
<b>Total non-current assets</b>	<b>948,528</b>	<b>956,991</b>
<b>Current assets</b>		
Inventories	8,297	7,397
Trade and other receivables	40,342	51,145
Prepayments	3,798	795
Cash and cash equivalents	30,075	29,815
<b>Total current assets</b>	<b>82,511</b>	<b>89,152</b>
<b>Total assets</b>	<b>1.031.039</b>	<b>1.046.143</b>

## CONSOLIDATED STATEMENT OF FINANCIAL POSITION AS OF 31 DECEMBER 2021 (x € 1,000)

	31 December 2021	31 December 2020
<b>EQUITY AND LIABILITIES</b>		
<b>Capital and reserves</b>		
Issued capital	100	100
Share premium	260,364	260,364
Cash flow hedge reserve	(37,063)	(2,959)
Retained earnings	(24,174)	(17,740)
Unappropriated result	42,617	36,100
<b>Equity attributed to the parent</b>	<b>241,845</b>	<b>275,864</b>
<b>Non-current liabilities</b>		
Borrowings	538,957	538,957
Lease liabilities	16,340	18,495
Derivative financial instruments	14,255	1,565
Deferred tax liabilities	36,828	36,152
Provision for jubilees	1,286	1,355
Other provisions	13,606	14,491
<b>Total non-current liabilities</b>	<b>621,271</b>	<b>611,015</b>
<b>Current liabilities</b>		
Trade and other payables	39,812	34,441
Borrowings	-	49,782
Lease liabilities	2,256	2,332
Current tax liabilities	15,835	21,675
Derivative financial instruments	47,117	4,423
Amounts payable to shareholders	3,520	3,520
Other provisions	10,018	7,836
Other liabilities	49,366	35,255
<b>Total current liabilities</b>	<b>167,924</b>	<b>159,264</b>
<b>Total liabilities</b>	<b>789,195</b>	<b>770,279</b>
<b>Total equity and liabilities</b>	<b>1,031,039</b>	<b>1,046,143</b>

## CONSOLIDATED INCOME STATEMENT AND OTHER COMPREHENSIVE INCOME FOR THE YEAR 2021 (x € 1,000)

	2021	2020
Revenue	300,845	252,982
Other income	16,605	28,618
Raw materials, supplies and energy	(30,861)	(18,134)
Third-party processing	(23,679)	(23,304)
Third-party maintenance	(21,419)	(23,654)
Employee benefit expenses	(47,613)	(44,732)
Depreciation and amortization	(58,712)	(63,021)
Impairment loss on financial assets	(19,211)	(880)
Other operating expenses	(36,010)	(32,430)
<b>Operating result</b>	<b>79,945</b>	<b>75,445</b>
Financial income and expenses	(29,989)	(29,945)
<b>Result before tax</b>	<b>49,956</b>	<b>45,500</b>
Taxes on result	(7,338)	(9,401)
<b>Profit/(loss) for the year</b>	<b>42,617</b>	<b>36,100</b>
<b>Attributable to shareholders of the company</b>	<b>42,617</b>	<b>36,100</b>
<b>Other comprehensive income:</b>		
Gain/(loss) on cash flow hedges taken to equity	(45,472)	(8,235)
Income tax direct through equity	11,368	2,059
<b>Total attributable to the Owners of the Company</b>	<b>8,513</b>	<b>29,924</b>

## CONSOLIDATED STATEMENT OF CASH FLOWS FOR THE YEAR 2021 (x € 1,000)

	2021	2020
<b>Result before tax</b>	<b>49,956</b>	<b>45,500</b>
<i>Adjustments for:</i>		
– Depreciation, amortization and impairment	58,712	63,021
– Change in provision for jubilees	(69)	(42)
– Change in other provisions	898	4,121
– Financial expenses	29,989	29,945
– Change in other financial assets	16,834	(2,357)
– Changes in working capital	26,493	(2,153)
<b>Cash flow from operating activities</b>	<b>182,813</b>	<b>138,035</b>
<i>Investments in:</i>		
– Property, Plant & Equipment	(57,707)	(51,534)
<b>Cash flow from investment activities</b>	<b>(57,707)</b>	<b>(51,534)</b>
Repayment of lease liabilities	(2,744)	(2,945)
Interest paid	(29,159)	(28,796)
Repayment of borrowings	(50,411)	(10,000)
Dividend paid	(42,533)	(35,480)
<b>Cash flow from financing activities</b>	<b>(124,847)</b>	<b>(77,221)</b>
<b>Net increase in cash and cash equivalents</b>	<b>259</b>	<b>9,280</b>
Cash and cash equivalents at 1 January	29,815	20,536
<b>Cash and cash equivalents at 31 december</b>	<b>30,075</b>	<b>29,815</b>

# In conclusion

## Looking forward to 2022

In 2022, restoring the connection with and between our employees will be a spearhead. With an eye on the future, we look forward to the expected acquisition of the Amsterdam-based company AEB. We will redesign our site in Rozenburg for greater safety and efficiency, and we hope to receive a subsidy to build a CO<sub>2</sub> capture plant in Rozenburg as well. We also hope that the war in Ukraine will be over in the foreseeable future and that it will not cause too great shockwaves in the rest of the world.

### Restoring connection

We have taken on board the results of the 2021 employee satisfaction survey 21 and we are doing everything we can to restore, and where it is missing create, connection between our employees on the shop floor and the management. We are offering a wide variety of instruments, courses and opportunities towards this end. We are striving for a working environment in which everyone has the space to express pleasure and displeasure and in which people listen to each other. We also see the need to provide feedback to employees who ask questions of, or express their dissatisfaction to, their supervisors which are then passed to the management for resolution. We are keeping our finger on the pulse and making adjustments where necessary.

### Acquisition of AEB

A true milestone in 2022 will be the acquisition of the Amsterdam-based waste-to-energy company AEB. The agreement with the municipality of Amsterdam was signed at the end of 2021, but the Authority for Consumers & Markets (ACM) is still considering whether to give its approval. We expect a decision in the first or second quarter of 2022. With this acquisition we will achieve our strategic growth target. We hope to come back to this in far more detail in our 2022 Annual Report.

### Refurbishment of bottom ash transfer

In 2022 the system that transfers the bottom ashes from the incinerators in Rozenburg will undergo a major refurbishment. This will make the transfer more efficient and, at the same time, simpler, which will reduce risks. The centre of gravity will also move nearer the river bordering AVR's site so that fewer transshipments are necessary. This will contribute towards making the work safer and more efficient.

### SDE++ subsidy for CO<sub>2</sub> capture

In 2021 we submitted a subsidy application for the construction of large-scale CO<sub>2</sub> capture capacity. We hope this application will be granted in 2022. Together the applications for an SDE++ subsidy in the 2021 round added up to around € 12 billion and the government has only made € 5 billion available. Many requests are dependent on the development of the CO<sub>2</sub> price. The higher the price the lower the subsidy given by the government. (This does not apply for waste incineration plants, which do not come under the European ETS trading system.) The current CO<sub>2</sub> price of around € 80 per ton makes it appear likely that the government will only dispense a small portion of the subsidies. Applications for a lower amount per saved ton of CO<sub>2</sub> will be given priority. The sum requested by AVR



is large, but our cost price is comparatively very low, so we are hopeful our application will be successful and we can achieve our ambitions. Should our application not be successful we will resubmit it for the 2022 round. The subsidy is necessary because as yet we do not have a profitable business case: we can't yet supply all the captured CO<sub>2</sub> as raw material. The storage option is coming more and more within reach.

### War between Russia and Ukraine

In February 2022 the situation in Eastern Europe escalated with the Russian invasion of Ukraine. The war between these two countries was still going on at the time of going to press. The war has increased the impact of the economic challenges, such as rising inflation (partially caused by rising commodity prices) and disruption of the global supply chain. AVR has no activities in Russia or neighbouring countries, nor does it conduct direct business with counterparties that are located or conduct business in these countries. However, the supply chain of some AVR's suppliers may be effected by the situation in Ukraine. AVR is positively affected by the strong increase in electricity, steam and gas prices, as we produce and sell electricity, steam and heat (price correlation with gas). We have contracts for steam and heat in place, which are mostly index linked. The rising energy prices have a negative effect on the government grants related to the variable commodity prices of sustainable produced commodities. We expect the price

increase related to the sales of electricity and heat to exceed the decrease in receipts of government grants.

On the procurement side, the costs for fuels, gas and chemicals are increasing. However, the higher revenues are more than offsetting the higher costs. As a result, the increase in electricity and gas prices is expected to have a positive effect on AVR's result in 2022. Increasing disruption in the supply chain can affect AVR's business. At this moment, the main impact relates to pressure on prices and delivery terms for Capex projects and chemicals. So far, we see no significant risks for continuance of our regular operations. We will closely monitor the geopolitical uncertainty and unpredictability of events related to the war between Russia and Ukraine.



### Published by

AVR.  
Postbus 1120  
3180 AC Rozenburg (ZH)

### Text and translation

Domani BV

### Photography

Miranda Koopman, Studio CAPAZ  
Tijmen Kielen  
Vattenfall Solar Team

### Design

Studio CAPAZ, strategisch design

### Print

Zwaan Lenoir

### For additional information

Marie-Claire van der Schoor, press officer AVR  
T: +31 6 10534105  
E: [communicatie@avr.nl](mailto:communicatie@avr.nl)

This Annual Report is published by AVR.  
Nothing in this publication may be copied  
or published externally without the prior  
permission of AVR.