



Time to act.



Contents

01 Editorial

02 Retrospective

02 2021 at MVV

04 Business performance in 2021

06 Time to act: tackling climate protection.

08 Our future: #climatepositive

11 Our milestones



12 Creating sustainable solutions for our customers.

14 Hand in hand: implementing climate protection

15 Enhancing efficiency for business customers

15 Helping private customers to turn their energy around: enormous success with spring campaign

16 Smartly supporting and shaping e-mobility



18 Fresh impetus for the energy turnaround.

20 Halting climate change

21 Accelerating the expansion in the wind power portfolio

21 Photovoltaics as additional building block

22 Generating energy from non-recyclable waste and biomass

22 Promoting climate protection abroad as well



24 Committed to a reliable supply.

26 Securing the energy supply: responsibly and with a long-term perspective

27 Expanding green heat

28 Exploiting efficiency potential

28 Key prerequisite met for energy and mobility turnaround

30 Targeted skills enhancement.

32 Energetically getting more done

34 MVV in figures

36 Financial calendar

Imprint/Contact



Dear Readers,

Climate change is an enormous task for all of us. To meet the targets set out in the Paris Climate Agreement and limit global warming to 1.5 degrees, we need consistent action. As a pioneer of the energy turnaround, we stepped up the pace of our decarbonisation even further in the 2021 financial year. MVV will be climate neutral by 2040 and even climate positive from then on. We call this the “Mannheim Model”. You can find out more about how we aim to achieve this and what we are already doing to build our climate-positive future on the following pages. And if you look at our performance in the 2021 financial year, you will see: Financial success and business stability go hand in hand with climate neutrality.

Have an enjoyable read!

Your MVV

2021 at MVV



Accelerating: expansion in wind power portfolio

We have invested in expanding our renewable generation portfolio for many years now. One focus is on onshore wind power. At the end of March, Stadtwerke Kiel took over a windfarm in Schleswig-Holstein that is due to be connected to the grid at the end of 2021. In April, we acquired a windfarm in Mecklenburg-Western Pomerania. Both windfarms result from proprietary project development by our Juwi and Windwärts subsidiaries.



> Page 21



Founding: joint venture for "Smart City" Mannheim

In May, we founded the joint venture "Smart City" Mannheim together with the holding company of the City of Mannheim, Mannheimer Kommunalbeteiligungen GmbH. Together, we are now devising a concept that, among other aspects, will include smart mobility systems. We have set ourselves clear targets. Just one example: By 2027, all electricity generation at properties owned by the city administration should be converted to renewable energies. This way, we are increasing the speed at which we head for climate neutrality. And we are laying the foundations for a city with better quality of life for everyone and enhanced resource efficiency.



Implementing: sustainable circular economy

In the year under report, we launched operations at what is one of Europe's most modern energy from waste plants in the Scottish city of Dundee. This will make a valuable contribution towards building a modern circular economy.



> Page 23



Building: renewable steam supply

We are making our expertise in generating energy from non-recyclable waste and biomass available to our business customers as well: For the cocoa producer Olam Food Ingredients, for example, we are building a biomass boiler plant and thus supporting the company in cutting its CO₂ emissions.



> Page 17



Transforming: organic waste into biogas

In Saxony-Anhalt, construction work is underway for our second plant for fermenting and generating waste from organic waste.



> Page 22



Facilitating: private energy turnarounds

We support both business and private customers in making a reality of their own energy turnarounds. With measures such as our "Spring Campaign", we managed to convince far more private customers than ever before about the benefits of our climate-friendly solutions.



> Page 15

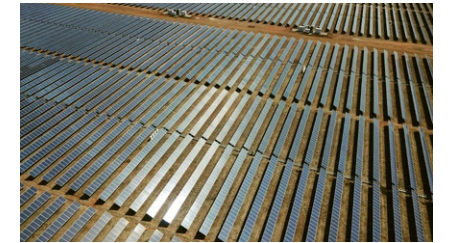


Accessing: potential for green heat

Heat use is responsible for around a third of all Germany's CO₂ emissions. Green heat is therefore crucial for climate protection. To meet our customers' heating needs, we are increasingly drawing on the energy available in household and municipal waste. We are also connecting our biomass power plant in Mannheim to our district heating grid. Moreover, we are accessing further renewable heat potential. In a "Real Laboratory of the Energy Transition", we are working together with other energy suppliers to show how large-scale heat pumps can help us to achieve climate neutrality in the long term.



> Page 27



Promoting: international climate protection

We are promoting climate protection projects outside Germany as well. Our Juwi subsidiary has developed and built solar power plants and hybrid systems abroad for many years now. Among others, our latest projects include solar power plants in South Africa and Japan, as well as solar hybrid power plants with integrated storage solutions in Australia.



> Page 22

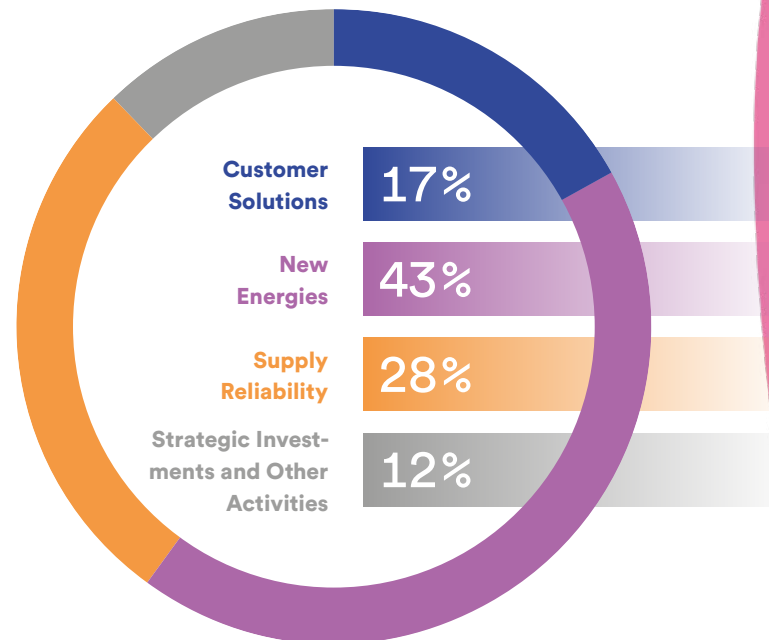
Heading for climate neutrality pays off

We can look back on a very successful 2021 financial year. This shows that financial success and business stability can go hand in hand with climate neutrality.

We began “Heading for Climate Neutrality” in 2009 already and have not allowed ourselves to be deterred from this course. Since then, we have consistently implemented and continuously enhanced our strategy. All our activities have one goal: MVV will be climate neutral by 2040 and even climate positive from then on. A glance at our performance in the 2021 financial year shows we are on the right course. We met the first of the sustainability targets we set ourselves in 2016, and that ahead of schedule. Thanks to the investment and efficiency initiatives implemented in recent years, we have reduced the CO₂ emissions in the energy system by one million tonnes a year. Not only that: We also managed to increase our adjusted EBIT by 19 percent to Euro 278 million – despite the ongoing coronavirus pandemic and challenging conditions in the energy industry and market. This way, we generated the best earnings in our company’s history.

But that is not all: In the 2021 financial year we once again invested more than Euro 300 million. Operations were launched with our new energy from waste plant in the Scottish city of Dundee. In Germany, we connected our energy from waste plant in Leuna to the district heating grid at Stadtwerke Merseburg. In Mannheim and Offenbach, we are building new phosphorous recycling plants which will enable us to recover the phosphorous contained in sewage sludge. Furthermore, we expanded our proprietary green generation portfolio with further windfarms and, for the first time, photovoltaics parks as well from Juwi and Windwärts. In Saxony-Anhalt, we are building what is already our second plant for fermenting and generating energy from organic waste. All our investments have one thing in common: They help us to move gradually but consistently closer to our climate-positive future. Business success is not just reflected in key financials: At the end of the 2021 financial year, MVV had 6,470 employees, and thus 210 women and men more than one year earlier. Their commitment and their expertise lay the foundation for MVV’s successful further development and for achieving our climate protection targets.

Adjusted EBIT by reporting segment



278 Euro m
Adjusted EBIT

6,470
Employees

306 Euro m
Investments



**Time to act:
tackling
climate
protection.**



Our future: #climatepositive

We are still pioneers of the energy turnaround and have further stepped up the pace when it comes to protecting the climate. By 2040, MVV will be climate neutral. After that, it will be one of Germany's first energy companies to become climate positive. And because we started making substantial investments in climate protection, and thus in sustainable growth, more than a decade ago, MVV has already reached some major milestones as it heads for that goal.

We set sustainability as a strategic objective back in 2009. Since then, we have consistently pressed ahead with promoting climate protection and the energy turnaround. We have aligned all areas of our business to this objective and invested substantial amounts. We have expanded renewable energies and green heat, made our grids ready for the energy turnaround and developed a portfolio of innovative solutions with which we enable industrial, business and private customers, as well as local authorities, to implement their own energy turnarounds. We will consistently continue with this course.

MVV is committed to the targets set out in the Paris Climate Agreement and is going well beyond the decarbonisation trajectory set out in the German Climate Protection Act. By 2030, we will already have reduced our CO₂ emissions by at least 80 percent compared with 2018. And we are going even further: By 2040, we intend to be climate neutral. From then on, our future will even be climate positive. That means we will remove greenhouse gases from the atmosphere once again. At the same time, we will make sure that our customers always receive a secure and reliable supply of energy.



DR. GEORG MÜLLER
CEO

Interview with Dr. Georg Müller

The CEO of our group of companies explains why we wish to become climate positive and how that should actually work.

Why has MVV now stepped up the pace even further when it comes to climate protection?

Protecting the climate and promoting the energy turnaround have long been the principles underpinning our actions. As one of the largest emitters, the energy industry has a key role to play in decarbonising the economy and society as a whole, and that in two respects. Expanding renewable energies, e-mobility, the heat turnaround, smart cities – these all need energy and can only work by using climate-friendly technologies. At the same time, the energy industry has to cut its direct emissions to zero. We have been pressing ahead with this for years now and currently with our course of heading for climate neutrality. Climate experts have nevertheless stated very clearly that industrial economies will have to move towards removing greenhouse gases from the atmosphere. With our “Mannheim Model”, we aim to play our part and become one of the first climate-positive energy companies.

How exactly does MVV intend to become climate positive?

As we head for climate neutrality, we have three areas of action: firstly the heat turnaround, secondly the electricity turnaround and thirdly green products and solutions for our customers. The heat turnaround is possibly the most important key for MVV to achieve climate neutrality by 2040. We are Germany's third-largest district heating supplier and will convert all our district heating generation in Mannheim and the metropolitan region to green energy sources by 2030, i.e. from 100 percent fossil-based to 100 percent green. To achieve this, we are drawing on a broader mix of green options than that at almost any other energy company. We are using waste heat from waste treatment, regenerative energies such as biomass and biomethane, river heat pumps and new possibilities in the field of geothermal energy, as well as waste industrial heat. In the longer term, we will even turn our biomass power plants and energy from waste plants into CO₂ sinks. And we have also set ourselves ambitious targets for the electricity turnaround: By 2026, we intend to double our portfolio of renewable capacities once again compared with 2016, as we already managed between 2009 and 2016. Not least, we are also supporting our customers, whether they are private or commercial customers, as well as our SME and industrial customers, as they themselves head for climate neutrality.

Heading for a climate-positive future

We set ourselves ambitious ten-year targets back in 2016 already: We will double our electricity generation from renewable energies from more than 400 megawatts to more than 800 megawatts and connect 10,000 megawatts of renewable energies to the grid. Over the same period, we aimed to treble our annual net CO₂ savings in the overall system to 1 million tonnes. We achieved this target in the 2021 financial year already, i.e. half-way through the original timeframe. That clearly documents the willingness and ability of the entire MVV Group to put its plans into practice.

We made intensive use of the 2021 financial year to further develop our sustainability strategy and to set ourselves even more ambitious decarbonisation targets. Compared with 2018 levels, we now intend to achieve reductions of at least 80 percent in our direct CO₂ emissions (Scope 1) by 2030 and in our indirect greenhouse gases (Scopes 2 and 3) by 2035.

To enable us to reach these targets, we will above all

- » Gradually make our district heating supply green
- » Maintain a high pace for expanding renewable energies to generate electricity and green heat
- » Support our customers in achieving their own climate neutrality by promoting the procurement and supply of green energy and offering services and solutions for their own energy turnarounds and energy efficiency
- » Consistently press ahead with exiting from fossil-based energy generation
- » Not build any new (CHP) power plants powered by fossil-based natural gas for the general public supply (electricity, district heating)
- » Decarbonise our energy from waste plants with CO₂ capturing facilities and thus turn them into CO₂ sinks.

Our milestones



By 2026 compared with 2016

860 MW
proprietary electricity
generation from renewables



By 2026 compared with 2016

10,000 MW
grid feed-in volumes
from renewables



By 2030 compared with 2018

> 80 %
reduction in
energy industry emissions
(Scope 1)



By 2035 compared with 2018

> 80 %
reduction in
indirect greenhouse gases
(Scopes 2 and 3)



Creating sustainable solutions for our customers.





To massively cut CO₂ emissions in the energy turnaround we need a transport turnaround. Our charging points are contributing to this.

47 Euro
m

Adjusted EBIT

At Euro 26 million, adjusted EBIT was higher than in the previous year. Alongside cooler weather conditions compared with the previous year and the new customer business, this increase was also driven by the remeasurement of shares held in a subsidiary due to its complete takeover and subsequent full consolidation.

3,101 Euro
m

Sales

Sales grew year-on-year by Euro 548 million. Alongside higher electricity and gas trading volumes, this growth was driven by higher customer acceptance volumes due to weather conditions and by the new customer business.

Enhancing efficiency for business customers

Ever more companies across all sectors of the economy are now committing to becoming climate neutral. And the energy-related solutions we plan and implement are helping them to achieve this objective. MVV Enamic, our B2B solutions unit for business customers, analyses the situation at the individual customer and devises a tailored response making it possible to enhance energy efficiency and cut costs and emissions. Efficiency enhancement and energy optimisation are important levers enabling companies, whether they have energy-intensive industrial production activities or are housing associations or SMEs, to reduce their ecological footprints.

Based on numerous modules, we have developed a “solutions house” in recent years. Experienced experts from different specialisms work together under one

roof. We pave the way for our customers to enter the energy system of the future by integrating a wide variety of different solutions on their behalf. These include both smart energy procurement on attractive terms and sustainable decentralised energy generation, networked energy management, billing services, smart-metering, e-mobility, highly efficient data centres and LED solutions, as well as corresponding contracting solutions. Our range of products and services also includes trading with energy products, portfolio management, which we pool at our MVV Trading subsidiary, and the commodity-based services business for municipal utility companies and key account customers. For our customers, this means they can focus all their own energies on their core business while we support them with our services.

Helping private customers to turn their energy around: enormous success with spring campaign

Public awareness of climate change is growing rapidly. Private individuals and homeowners too are increasingly asking themselves how they can contribute to limiting climate change, and many consumers wish to become largely independent in energy terms. We have offered our private customers a wide range of solution modules for many years already and these enable them to sustainably shape their own energy balance sheets. We have drawn attention to our solutions with a variety of campaigns. In this financial year, our “Spring Campaign” convinced significantly more people than ever before to implement their own energy turnarounds. We benefited here from increased environmental awareness but also further extended the range of information we provide. Among other instruments, we offered interested parties the opportunity to take part in free webinars that we devised specially for this purpose. Our customers receive everything they need

to advance their own private energy turnarounds from a single source: from advice on installation through to monitoring and maintenance of their energy solution. We provide our customers with innovative products involving one-stop photovoltaics solutions with or without battery storage facilities and charging stations, as well as state-of-the art heating technologies. This way, our customers can use the electricity produced by their photovoltaics system to operate their heat pump and thus make a tangible contribution to the energy turnaround.

We will continue to work closely on further expanding the products and services we offer for the decentralised world of energy and thus promote decarbonisation. This way, we will further strengthen our position as an all-round reliable partner to our private customers.

Hand in hand: implementing climate protection

How can we help our customers to turn the energy turnaround into a reality for themselves – and that quickly and affordably? We have known for many years that there is no one-size-fits-all solution. That is why we find individual answers for each and every customer, regardless of whether they are tenants living in two-room flats, families in detached houses, shop owners, clubs, companies, large industrial players or local authorities.

Our broad, varied and innovative range of solutions is the key to making “green” living and work possible on all levels. With our networked solutions for smart cities, we can act as a system partner to local authorities and make towns and cities fit for the future. Enabling consumers to generate their own solar power and

expanding e-mobility have major roles to play. We are making specific contributions towards achieving climate neutrality, while at the same time making sure that our customers are reliably supplied with electricity, gas, water and heat.



“I am thrilled with our photovoltaics system which was installed this year. It is great fun to monitor online how much electricity we produce with it. On sunny days, it would be enough to supply five detached houses, and that even though our roof does not have a perfect south-facing alignment. But even on cloudy days, we are almost entirely self-sufficient and independent of the public electricity grid.

We opted for the all-in-one solution, including battery storage facilities and a charging station. Why that? On the one hand because it is worthwhile for us in the long term due to our high own consumption rate. And on the other hand, we too want to leave a healthy planet for our children by making our own contribution towards reducing our CO₂ footprint.

One aspect that was particularly pleasing was that we received excellent advice, everything ran smoothly, from the installation and operations launch through to registration with our grid operator and the entry in the market master data register. We did not have to do anything.”

Jochen Breunig | Private customer and MVV employee with his family

Smartly supporting and shaping e-mobility

E-mobility can only gain the upper hand across the board once a close-knit network of charging stations is in place and once the charging process is convenient and relatively short. We aim to provide all members of the local population at our locations with access to fast charging stations for electric cars within a radius of just a few minutes from their homes. To this end, we are planning various fast charging parks in particularly convenient locations or close to shopping facilities. At the same time, we are creating the necessary conditions in the electricity grid to enable the charging infrastructure to be reliably expanded. In January 2021, we launched operations with the first “high

power charging” (HPC) location in the city centre, in this case directly in the vicinity of Mannheim’s central railway station. These stations each have two points at which charging of up to 300 kilowatts is possible.

We have made sure that the actual charging process is smart and convenient. “MVV eMotion”, our free app, provides direct access to all charging points operated by MVV and location partners connected via roaming networks. Not only that: Since May 2021, the app has also shown in real time which charging points are currently available.



Andreas Rudolph
OFI Plant Manager

Sustainable: energy from cocoa husks

There are many reasons why the management at Olam Food Ingredients (OFI) in Mannheim trusts MVV to implement an innovative project for supplying energy for its production activities. One is that OFI, one of the world’s largest cocoa producers, has worked closely with MVV since 2003 and appreciates its all-round advisory expertise. Another is the focus the two companies share on sustainable solutions. “We supply cocoa powder, cocoa butter and cocoa mass made from sustainable cocoa”, explains Andreas Rudolph, head of OFI’s plant in Mannheim, with regard to his company’s activities. OFI complies with the “Cocoa Compass” throughout its value chain and thus meets particularly strict sustainability targets. Among other aspects, the company is committed to ensuring a living income for 150,000 farmers and eliminating child labour from the supply chain. Over and above that, OFI aims to use renewable energies. “We received excellent advice from the MVV team showing us how we can contribute to decarbonisation”, adds Andreas Rudolph looking back.

will produce around 90 percent of the steam needed to process the cocoa beans – and that with the help of cocoa husks. This means that production residues will be directly reused on site.

The new biomass boiler plant will enable the company to cut its CO₂ emissions by more than 8,000 tonnes a year. One welcome side-effect is that fewer lorries will now have to travel across town. As this innovative project being implemented by OFI and MVV will help Germany to meet its national climate targets, it is being subsidised with state funds.

One-stop solutions

“The combined heat and power plant is being built as part of a contracting steam supply agreement. We are seeing to the planning, implementation, financing and operations management over a 16-year period. OFI can channel all its own energies into cocoa processing”, explains Benjamin Focke, the MVV sales manager responsible for the project. MVV’s wealth of experience also ensures smooth project handling: “We are showing companies throughout Germany ways in which they can decarbonise their energy supply and offering them all-round support”, adds Benjamin Focke. “This includes end-to-end services

“We are delighted that we will soon be able to make our products in Mannheim using green process steam. This project will significantly cut our emissions and is very important to us.”

through to computing power, e-mobility and LED solutions. It also means that we make all our experience available to customers and that we have partners on hand who can make a decisive contribution to the success of individual projects.”

14.3 metre high detail

MVV is building a complete boiler plant, with biomass and redundant boilers, buildings and peripheral systems. Benjamin Focke explains why MVV opted for the manufacturer Vyncke for the construction of the 14.3 metre high biomass boiler: “You have to work with extreme precision if you want to use biomass to produce steam. And cocoa husks are a challenge, one for which we need a special boiler with a specific grate. Not only that, we have to be able to optimise the incineration temperature settings.”





Fresh impetus for the energy turnaround.



We are making our contribution to halting climate change: We aim to be climate neutral by 2040 already and climate positive from then on.

622 Euro m

Sales

Driven above all by the positive performance in our project development business, sales grew year-on-year by Euro 31 million.

Accelerating the expansion in the wind power portfolio

In 2021, we took over no fewer than two windfarms with a total capacity of around 29 megawatts from our own project development into our green portfolio. We took over one windfarm in Mecklenburg-Western Pomerania in April and Stadtwerke Kiel took over another in Schleswig-Holstein at the end of March, which will be connected to the grid in spring 2022. We now have wind turbines with installed capacities of 265 megawatts, enabling us to supply environmentally-friendly electricity to more than 140,000 households.

Photovoltaics as additional building block

We have added a further building block to our renewable energies capacities. In a pilot project, we for the first time took over a multi-megawatt free-standing photovoltaics plant from Juwi into our own portfolio in July 2021. Located in Bavaria, this plant has installed capacity of around 13 megawatt-peak. It will produce around 14 million kilowatt hours of electricity a year. "Röckingen Solar Park" covers an area of almost 16 hectares, of which we have used nine hectares for the elevated solar modules and the remaining space for flowery meadows and hedges as a compensatory measure.

It is about the future. That is why we are tackling climate protection and rapidly expanding our wind power portfolio.



Halting climate change

If climate change is to be halted, the energy turnaround will have to be speeded up and sustainable energy generation expanded across the board. Our strategic focus has been on renewable energies for many years now, as we are pioneers of the energy turnaround. We have already invested substantial amounts in a wide variety of renewable energy sources, and we will continue to do so. In the 2021 financial year alone, we invested a total of Euro 124 million in our New Energies segment.

To enable us to become climate neutral, we are taking a forward-looking approach to our planning and actions. We are working to consistently expand our own generation portfolio from renewable resources with a key focus on onshore wind turbines. We are already one of the market leaders in Germany when it comes to the ecological treatment of waste and biomass. We are building on renewable energies not only in our own generation activities but in our project development business as well. Here, we develop, build and operate onshore wind turbines and photo-

voltaics systems for customers in Germany and abroad. With our subsidiaries Juwi and Windwärts we are one of the leading renewable energies project development companies both in Germany and internationally.

At the end of the financial year, our renewable energies plants had installed capacities totalling 564 megawatts; 32 percent of our electricity generation is accounted for by renewable energies and we are rapidly increasing this share.

120 Euro m

Adjusted EBIT

Adjusted EBIT rose year-on-year by Euro 7 million, benefiting from developments in energy market prices and the positive performance of our project development business. Earnings were held back, by contrast, by lower wind volumes compared with the previous year.



Generating energy from non-recyclable waste and biomass

Alongside the incineration of non-recyclable waste, our portfolio also includes the use of biomass and organic waste, as well as the generation of biomethane. We are further expanding our capacities in these areas as well. A state-of-the-art organic waste fermentation and energy generation plant is currently being built in Bernburg (Saxony-Anhalt). Here, we will use everything that is thrown into the organic waste bin to produce environmentally-friendly biogas, and thus sustainable energy. From the end of 2021, this plant should process around 33,000 tonnes of organic waste and feed biogas into the gas grid. Not only that, the process used will give rise to quality-certified compost capable of use as soil conditioner, as well as to liquid organic

fertiliser. Moreover, compared with the open-air composting that has been customary to date, the organic waste fermentation plant will avoid the output of emissions harmful to the climate, saving around 7,400 tonnes of CO₂ a year. Biogas is one of the most versatile renewable fuels and can be used both to generate electricity and heat, as well as to fuel natural gas-powered vehicles. It can be produced regardless of weather conditions and is easy to store. One prime example of a sustainable circular economy that we describe on the next page is our new cutting-edge energy from waste plant in the Scottish city of Dundee, which launched operations in 2021.

Promoting climate protection abroad as well

Juwi has been present in South Africa with its own offices since 2011 already and has implemented several solar parks on a power plant scale there, as well as further major projects. One contract agreed in the 2021 financial year underlines the performance capacity of renewables-based generation particularly clearly. A new solar park with capacities of just under 10 megawatts will in future cover around 30 percent of the electricity requirements at the mining company Pan African Resources. When in operation, the solar park will significantly reduce the company's electricity costs, as well as its emissions, which will be cut by 26,000 tonnes of CO₂ a year. In Japan as well, Juwi is actively involved in the process of transforming energy generation towards 100 percent renewables. In its joint venture with the Japanese project developer Shizen Energy, Juwi is building a 100 megawatt, 186 hectare solar park for Canadian Solar Group in Fukushima. This solar park is due to launch operations in spring 2023 and will then produce around 110 million kilowatt hours of electricity a year.

Hybrid projects enable us to develop an innovative, more sustainable and reliable supply for numerous customers. In Western Australia, for example, we are building a solar park for APA, the power plant operator at an Australian gold mine. This 13 megawatt solar power plant will become part of a hybrid photovoltaics/gas/battery storage solution that will in future cover the electricity needs at the mining location. The installation of the renewable component will reduce CO₂ emissions at the mine by around 16,000 tonnes a year. In the North Territory of Australia as well, a hybrid solution will be used to cover at least half the annual electricity needs of a town with 1,100 inhabitants. Taken together, a 3.9 megawatt solar power plant, a 3 megawatt battery storage facility and a 4.5 megawatt diesel generator will reduce the fossil-based share of the energy supply to the town in Kakadu National Park by at least 50 percent.

Electricity and process steam from non-recyclable waste

On 16 March 2021, the first waste fire was ignited at the newly built energy from waste plant in Dundee, marking the successful launch of trial operations at the plant. It is one of the most modern and efficient plants of this kind in Europe. With an overall efficiency rate of up to 55 percent, the plant generates electrical energy with a capacity of up to 10 megawatts and heat with a capacity of up to 17 megawatts. "The project was tricky at times", says Peter Knapp, the MVV manager responsible for UK companies, when looking back at the construction phase. "We had to make numerous adjustments. Construction work was delayed, for example, by the coronavirus pandemic. And one project partner withdrew from the project; there were major changes in the neighbouring industrial park that we supply with steam."

Capacities extended

The situation at the outset was also anything but easy: "When we took over the existing plant with two older lines at the end of 2017, it was in poor condition.

Downtime was virtually par for the course and there had even been several large fires", comments Peter Knapp with regard to the original state of affairs. "As soon as responsibility for incinerating non-recyclable waste for the city of Dundee and the adjacent local authority of Angus was transferred to us, we immediately did everything we could to make things as safe, clean and sustainable as possible." Refurbishment measures were then implemented at full steam.

Peter Knapp is extremely satisfied with everything that has been achieved, and that not only in terms of the newly built plant. "The original plan was only to operate the two older lines until operations began with our new Line 3, which can incinerate up to 110,000 tonnes of non-recyclable waste a year", he explains. "However, our refurbishment measures enabled us to significantly increase the availability of the older lines. On this basis, it was recently decided to operate them for another ten years." Overall, MVV will therefore be able to incinerate a total of around 200,000 tonnes of non-recyclable waste a year in Dundee.



Graeme Clark
Maintenance
Coordinator

"I have worked at the energy from waste plant in Dundee for nearly 13 years already. I was pleased when MVV took over responsibility for the plant. They give high priority to safety and environmental standards and I feel appreciated as a member of the team. We produce a great deal of valuable energy from waste and also help to reduce waste landfill in the region. That feels right."

This means that the two older lines will also make an important contribution towards reducing the volume of non-recyclable waste sent unused to landfill sites in Scotland in the years ahead. The Scottish Government has set itself the environmental target of reducing the landfill share of waste to zero and of promoting a circular economy. "Not only that, this decision has also enabled us to secure around 20 further jobs in total", adds Peter Knapp.





Committed to a reliable supply.





We are building a circular economy: Green heat produced from waste incineration is good for the climate.

Securing the energy supply: responsibly and with a long-term perspective

Our focus is on turning the climate-neutral energy system of the future into reality. To this end, we are investing, putting the necessary conditions in place and implementing extensive measures. Throughout the transformation process, we are making sure that our customers at all times have a reliable supply of electricity, heat, gas and water.

We are responsible for providing high-performing and reliable grids. That means keeping the grids in good shape; more than anything, it means preparing them for the growing needs of a decentralised energy system. We are continually investing in modernising and expanding our grid infrastructure. Overall, within the MVV Group we operate electricity, district heating, gas and water grids with a total length of more than 19,300 kilometres.

We smartly combine highly efficient conventional and renewable energies. This way, we reduce CO₂ emissions while at the same time ensuring a stable energy supply. Year by year, we are making our conventional energy generation plants, and thus also our environmentally-friendly district heating, more efficient and more climate friendly. We have already reached major milestones. Our new gas-fired combined heat and power plant in Kiel, which has been in operation since November 2019, has cut carbon dioxide emissions by around 70 percent compared with its coal-fired predecessor.

78 Euro
m
Adjusted EBIT

Adjusted EBIT rose year-on-year by Euro 11 million. Compared with the previous year, it benefited in particular from the launch of operations at our gas-fired CHP plant in Kiel, which was available to us for the first full heating period in 2021. This factor was countered by lower revenues from non-regulated divisions.

310 Euro
m
Sales

Sales were Euro 32 million higher than in the previous year. This growth was driven above all by the launch of operations at our gas-fired CHP plant in Kiel.

Expanding green heat

When it comes to decarbonising Germany, buildings are key. After all, heat use accounts for around a third of all the country's CO₂ emissions. Green heat therefore makes a noticeable contribution to climate protection and has been a firm component of our strategy for years now. With a total grid length of around 1,200 kilometres, we are the third-largest district heating provider in Germany. We are increasingly replacing fossil-based heat generation with low CO₂ options and gradually with renewable sources. This way, we are heading for green heat at all our locations.

Since February 2020, we have used the energy resulting from the incineration of household and municipal waste to cover up to 30 percent of annual heat requirements in Mannheim and the region. Having connected the energy from waste plant in Mannheim to the district heating grid, we will now be doing the same for our biomass power plant. We have already put the underlying technical requirements in place. We are currently pressing ahead with plans to convert the turbine. Working with highly efficient combined heat and power generation, this will make district heating from the biomass power plant available from 2024 at the latest.

We are replacing fossil fuels at other locations as well. In the 2021 financial year, for example, we connected the second line at our energy from waste plant in Leuna to the district heating grid in Merseburg. This way, we have halved the volume of CO₂ emissions resulting from heat generation. This reduces the consumption of natural gas by around 80 million kilowatt hours of natural gas each year and saves up to 16,000 tonnes of CO₂ emissions a year.

We are accessing renewable heat potential to enable us to ensure a secure supply of heat in future as well, and that without using any fossil fuels at all. The most important technologies here include industrial-scale heat pumps, geothermal and solar thermal energy, biomass and waste industrial heat. Which of these solutions actually becomes established in the medium to long term will depend both on technical and economic developments and on the regulatory framework.

The process of transforming the heat supply to green heat is complex and requires substantial investments. Together with other energy suppliers, we are making extensive efforts to find feasible approaches. Achieving the energy turnaround is only possible by working together. In a close cooperation with Stadtwerke Heidelberg and Technische Werke Ludwigshafen am Rhein, we are further promoting the regional expansion in green heat.

Exploiting efficiency potential

Efficiency is crucial when it comes to minimising greenhouse gas emissions as far as possible. In our MVV innovation project “BigData and AI”, we are drawing on data to generate key action recommendations. More than 25,000 measurements are recorded almost on a second-by-second basis at our plants. The plants are optimised with the assistance of self-learning algorithms. Variances from optimal operations,

whether they relate to incinerating non-recyclable waste, using wind power, biomass or organic waste or generating biomethane, are detected by analytic software and a monitoring system. This way, we can remedy any problems at an early stage of developments and avoid unscheduled downtime at plants. We are networking our locations in order to promote our digitalisation projects.

“Reliable wireless technology is playing an ever more important role in the energy industry. That is because supply reliability needs high-availability communications such as those possible with 450 megahertz frequencies. Via a shareholder, we hold a stake in 450connect GmbH, which was awarded the contract for 450 megahertz frequencies by the Federal Network Agency (BNetzA) in March.”



Alexandra Halkenhäuser | Head of Grid Strategy and Concessions Department

Key prerequisite met for energy and mobility turnaround

In close alliance with other companies, MVV has called on the Federal Network Agency (BNetzA) to make 450 megahertz wireless frequencies chiefly available for critical infrastructures, such as the energy and water industries. “We need the ability to securely access grids and plants on a remote basis, i.e. without anyone having to be on site to intervene manually”, explains Volker Patzwaldt from MVV Netze. On the one hand, this would enable us to communicate securely and take appropriate actions in the event of a blackout, when all other networks are down. On the other hand, the wireless frequency is necessary to turn both the energy and the mobility turnaround into reality:

“It is one key prerequisite enabling us to manage our grids flexibly and in line with requirements in future”, he adds. “If, for example, high demand for electricity arises in one section of a street because an unusually high number of e-vehicles is being charged at the same time, then we will be able to detect this requirement digitally and adjust the flow of electricity accordingly. This way, we can safeguard the supply.” The wireless frequency will be used in all areas, for example to monitor the temperature of transformers and to communicate a variety of status information, as well as for emergency communications.

Green heat from the Rhine

Georg Baumgärtner
Asset Manager at
MVV Umwelt and
Head of Overall
Green Heat Project



Generating heat with the refrigerator principle

What might at first sound strange could in future make a substantial contribution to reducing Germany’s greenhouse gas emissions. To date, the proven principle underlying the heat pump has mostly been deployed here in small, decentralised heating facilities. Due to the regulatory framework, however, there are hardly any large-scale central heat pumps in Germany. That is set to change: Particularly in regions that are supplied with district heating and have great demand for heat, large-scale heat pumps can contribute to reaching climate neutrality in the long term.

A “Real Laboratory of the Energy Transition” will now show how that can be implemented in practical terms. MVV is tackling this project with four other district heating supply companies. Promoted by the Federal Ministry for Economic Affairs and Energy, all five companies will be building large-scale heat pumps with a variety of environmental heat sources at their respective locations.

We intend to use river water from the Rhine as our environmental heat source to generate district heating. To this end, the power plant Grosskraftwerk Mannheim will be installing a river heat pump with a thermal capacity of around 20 megawatts at its own site. The expertise and skills acquired in the Real Laboratory should then help to generate more green heat with further heat pumps at a later date. The technical potential is very great. Even based on a conservative assessment, it should be possible to withdraw at least 500 megawatts, from the Rhine and Neckar in Mannheim alone. That corresponds to the maximum heat capacity at Block 9 at GKM and is sufficient to supply heat to around 50,000 households.

How does the heat move from the Rhine to the district heating grid?

The river water reaches temperatures of up to 25°C in the summer, but only around 5°C in the winter. That is nevertheless enough thermal energy to vaporise a coolant at low temperatures.

“The Rhine and the Neckar offer great heat potential. Using river heat pump technology, we can tap this potential to build a climate-friendly district heating supply.”

Using an electricity-powered compressor, the coolant steam is compressed so that the pressure and temperature rise. The heat generated in the coolant steam is transferred to the district heating water by way of condensation in a heat exchanger. This way, water temperatures of 83°C to around 95°C can be achieved. During this process, the coolant liquefies and is decompressed once again in the river water heat exchanger. It cools down and, once it has reached a low temperature, absorbs thermal energy from the river water again, i.e. the cycle begins anew. Incidentally, the heat pump principle, which is more or less a reversal of the heat-power process, is also used in our refrigerators at home. There, of course, the aim to keep things cool rather than to generate green heat.





**Targeted
skills
enhancement.**





Diversity, customer satisfaction, sustainability, learning culture, cooperation and decarbonisation were key focuses of our virtual conference; nearly 180 managers attended new ideas forums and took part in various events and discussions in 23 small groups.

Energetically getting more done

Community, Responsibility, Appreciation and Courage – these values form the foundation of our corporate culture and are actively lived by our employees on a daily basis. We share ideas closely, overcome challenges and work on tomorrow’s solutions. Together, we give of our very best. By putting our understanding of good management into practice, we promote and support a culture of working together on a basis of trust and permanent further development.

Sharing ideas closely on all levels

This close cooperation and companywide dialogue strengthen MVV. In the 2021 financial year, we implemented further solutions for virtual cooperation, team management and further training. Due to the pandemic, the process of sharing ideas on major strategic topics mostly took place online.

Around 180 managers participated in our virtual “Lived Energy” conference in May 2021. To make it easier for managers to map the findings of this conference onto their organisational units and intensify these ideas further on location, we work with our well-established

“Management in Dialogue” platform. One focus of this format involves putting customers even more closely at the forefront of our day-to-day decisions, and that in all organisational units.

This exchange of ideas is by no means limited to the Executive Board and other managers. At least once a month, one of our Executive Board members meets our employees to talk openly in small groups, mostly on a virtual basis. Not only that: In the “MVV in Dialogue” format, our Executive Board and employees discuss current topics of relevance to our company.

In discussion with Verena Amann

Verena Amann, what are your goals as the member of MVV’s Executive Board responsible for personnel?

Our aim is to move MVV further ahead in terms of its organisation and its business and to implement specific steps to achieve decarbonisation. The best way to do that is with a qualified, diverse and highly motivated workforce. I see my role as that of a catalyst. I aim to trigger and accompany processes that will enhance our attractiveness as an employer, increase the pace and efficiency of our talent hunt and make sure that highly qualified and talented people want to work at MVV.

And how are you making that happen?

Developing employees is one of the most important pillars of our personnel strategy, and that across all levels. That includes specialist training, as well as management and employee training addressing softer factors and skills. Over and above this, the ways in which we embrace change as a permanent process are essential. Alongside that, the continuous availability of highly qualified, diverse staff is a key aspect in securing the company’s growth. One of the most important factors is to make sure that the company’s whole ecosystem is embedded in a framework that reflects and gives life to consistent values, namely MVV’s corporate culture. This is something that we are continually developing further.



“Talent and diversity are the key to developing our managers.”

Verena Amann | Member of MVV’s Executive Board

Broad range of virtual training measures

At present, most of our training measures also take place online. One factor of great relevance to our change processes and the quality of cooperation within the company was the training measure we held for our new intranet: “MVV Connect”. All in all, we were able to train around 70 percent of the workforce at our Mannheim location. Several divisions also implemented their own additional training concepts. More than 400 employees have already taken part in “Knowledge in a Nutshell”, a series that covers more than 20 seminar topics and has been held since June 2020. A survey showed that the contents of this training were easily mapped onto employees’ day-to-day work. Another way in which we promote skill sharing is our “One Hour Learning – Find out from Colleagues” format. In 60 minute sessions, members of our staff present the expertise in their areas of work, provide practical tips and discuss topics with the other participants.

Major focuses: management development and understanding of management

Dialogue, sharing ideas and reflecting on experience – these aspects play an important role in developing the company. That is why we will further promote the culture of learning and mutual transfer of expertise among our managers and ensure that new management staff are able to become quickly integrated at the company. One key focus of our personnel strategy is to find and further develop suitable management staff. We make efforts to fill vacant management positions as diversely as possible and wherever possible with internal candidates. One of our declared aims is to increase the share of women on all management levels.

Celebrating diversity

We are enhancing the forward-looking development of our company by actively managing diversity in our “Energy for Diversity” programme. This is based on the pillars of promoting women, combining work and family and demographic management. We are convinced that a wide range of skills, qualifications and profiles have a positive impact on our success as a company. We believe that actively promoting greater diversity is a key to MVV’s successful further development.

MVV in figures

	FY 2021	FY 2020	% change
Financial key figures			
Sales and earnings			
Adjusted sales excluding energy taxes (Euro million)	4,131	3,515	+18
Adjusted EBITDA ¹ (Euro million)	482	449	+7
Adjusted EBIT ¹ (Euro million)	278	233	+19
Adjusted annual net income ¹ (Euro million)	177	128	+38
Adjusted annual net income after minority interests ¹ (Euro million)	150	104	+44
Capital structure			
Adjusted total assets at 30 September ² (Euro million)	5,815	4,582	+27
Adjusted total assets excluding margins at 30 September ^{2,3} (Euro million)	4,994	4,582	+9
Adjusted equity at 30 September ² (Euro million)	1,662	1,571	+6
Adjusted equity ratio at 30 September ² (%)	28.6	34.3	-17
Adjusted equity ratio excluding margins at 30 September ^{2,3} (%)	33.3	34.3	-3
Net financial debt at 30 September (Euro million)	628	1,374	-54
Net financial debt excluding margins at 30 September ³ (Euro million)	1,450	1,352	+7
Cash flow and investments			
Cash flow from operating activities (Euro million)	1,203	383	>+100
Cash flow from operating activities excluding margins ³ (Euro million)	360	391	-8
Investments (Euro million)	306	322	-5
Value performance			
ROCE (%)	10.2	7.7	+32
ROCE excluding margins ³ (%)	8.9	7.8	+14
WACC (%)	5.9	6.0	-2
Value spread (%)	4.3	1.7	>+100
Value spread excluding margins ³ (%)	3.0	1.8	+67
Capital employed (Euro million)	2,715	3,018	-10
Capital employed excluding margins ³ (Euro million)	3,115	3,001	+4
Share			
Dividend per share ⁴ (Euro)	1.05	0.95	+11
Adjusted earnings per share ¹ (Euro)	2.28	1.57	+45

1 Excluding non-operating measurement items for financial derivatives, excluding structural adjustment for part-time early retirement and including interest income from finance leases

2 Excluding non-operating measurement items for financial derivatives

3 Excluding collateral deposited at MVV for counterparty default risks (margins)

4 Subject to approval by Annual General Meeting on 11 March 2022

	FY 2021	FY 2020	% change
Non-financial key figures			
Direct CO ₂ emissions (Scope 1) ¹ (tonnes 000s)	3,440	3,315	+4
Indirect CO ₂ emissions (Scopes 2 and 3) ^{1,2} (tonnes 000s)	5,432	4,586	+18
Net CO ₂ savings ¹ (tonnes 000s)	1,002	766	+31
Electricity generation capacity from renewable energies ¹ (MW _e)	564	531	+6
Renewable energies as share of proprietary electricity generation ¹ (%)	32	34	-6
Electricity generation volumes from renewable energies ^{1,2} (kWh million)	1,217	1,274	-4
Green heat generation capacity ¹ (MW _t)	793	752	+5
Green heat as share of proprietary heat generation ^{1,2,3} (%)	36	31	+16
Green heat generation volumes ^{1,2,3} (kWh million)	2,541	1,990	+28
Concluded development of new renewable energies plants (MW _e)	610	262	>+100
Operations management for renewable energies plants (MW _e)	3,811	3,729	+2
Number of employees at 30 September (headcount)	6,470	6,260	+3
of which women	1,825	1,760	+4
of which men	4,645	4,500	+3
of which full time employees	5,513	5,324	+4
of which part-time employees	957	936	+2
Number of trainees at 30 September (headcount)	340	341	0
Share of female managers at 30 September (%)	14	15	-7
Accident frequency rate (LTIF) ⁴ (number of accidents per 1,000,000 hours of work)	4.1	6.7	-39

1 Fully consolidated and at-equity companies

2 Previous year's figure adjusted

3 Heat from biomass and biogas plants and from energy from waste/refuse-derived fuels (RDF)

4 Figures for 2020 and 2019 calendar years

Financial calendar

14 December 2021

Annual Report
2021 Financial Year

14 December 2021

Annual Results Press Conference
and Analysts' Conference
2021 Financial Year

14 February 2022

3M Quarterly Statement
2022 Financial Year

11 March 2022

Annual General Meeting

13 May 2022

H1 Interim Report
2022 Financial Year

12 August 2022

9M Quarterly Statement
2022 Financial Year

14 December 2022

Annual Report
2022 Financial Year

14 December 2022

Annual Results Press Conference
and Analysts' Conference
2022 Financial Year

The dates of conference calls to be held with analysts during the financial year will be announced in good time.

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All of MVV's financial reports can be downloaded from our websites.

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Alexander Grüber (S. 9, 33)

Gennaro Vitale (p. 3 bottom left, p. 14, 16, 28, 30)

Grosskraftwerk Mannheim (p. 29)


OFI (OLAM Food Ingredients)

(p. 2 bottom right, p. 17, p. 17 top right)

Others: MVV

MVV has produced this report in accordance with sustainable environmental protection. We used paper with FSC certification for responsible forestry management and the report was printed in a climate-neutral manner. All CO₂ emissions due either directly or indirectly to printing this report were calculated and offset by investments in renowned climate protection projects.





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