



We inspire
with energy.

More than electricity

Magazine accompanying the 2017 Annual Report



Highlights 2017

Sights set on the future

We are expanding the power plant site used by our MVV Umwelt subsidiary on Friesenheim Insel in Mannheim and investing around Euro 100 million. Here, we operate two plants to produce energy from waste and waste timber. On the one hand, we are linking the site to Mannheim's existing district heating grid. The heating energy from waste incineration will thus be used in future not only to supply steam to adjacent industry, but also in district heating. This will make Mannheim's heating energy even more environment and climate-friendly and also boost energy efficiency at the CHP plant. On the other hand, we are extending the waste-fired plant with a further component of a sustainable resource-efficient economy. In an extra system, we will produce green energy from the pre-dried sludge resulting from wastewater cleaning. This way, we will also recover phosphorus, a crucial component in manure production, and one whose natural deposits are increasingly scarce.

194

Euro million invested

In the 2017 financial year we invested Euro 194 million, of which Euro 64 million in growth and Euro 130 million in our existing business.

More direct marketing

We have further boosted our position as Germany's leading direct marketer. In the 2017 financial year, we directly marketed around 7,400 MW of electricity from renewables. Over this period, our Juwi subsidiary connected around 389 MW of installed onshore wind power and photovoltaics capacities to the grid. In the year under report, we agreed a strategic partnership for direct marketing with SMA Solar Technology AG. Together, we aim to develop a solution for photovoltaics system installers and operators which enables the systems to be integrated easily and inexpensively into energy trading right from the operations launch.





Focus on customers

We support our customers in implementing their own energy turnarounds by offering innovative products and services, as well as smart solutions. In the year under report, for example, we significantly enhanced energy efficiency at the packaging manufacturer Linhardt. Its electricity, heating and cooling energy are generated at a gas-powered CHP plant. Its lighting was converted to efficient LED technology. This additionally enables around 900 tonnes of CO₂ to be saved a year.

With our industrial and commercial customers we build long-term efficiency partnerships and draw on all-round efficiency solutions to tackle the complex energy challenges they face. We have significantly extended our digitally-based range of solutions. As a result of the shareholdings we have acquired in DC-Datacenter-Group, Econ Solutions, Qivalo and Recogizer, we are able to offer diverse, innovative and attractive energy-related services and mature energy and efficiency solutions with modular structures. Our shareholdings in Beegy, Luminatis and Enerix also contribute to this range of services.



Küstenkraftwerk K.I.E.L. takes shape

Construction work on the Küstenkraftwerk K.I.E.L. power plant is progressing, if not quite as fast as planned. The 20 highly efficient gas motors at this plant will simultaneously generate electricity and heating energy using combined heat and power generation technology. This new plant is set to replace a coal-powered plant. Together with a heating energy storage facility and an electrode boiler, it will then safeguard the supply of district heating to the Kiel area. The state-of-the-art power plant can be started up with the utmost flexibility, a feature which makes it eminently suitable for the energy turnaround.

Financial year

2017

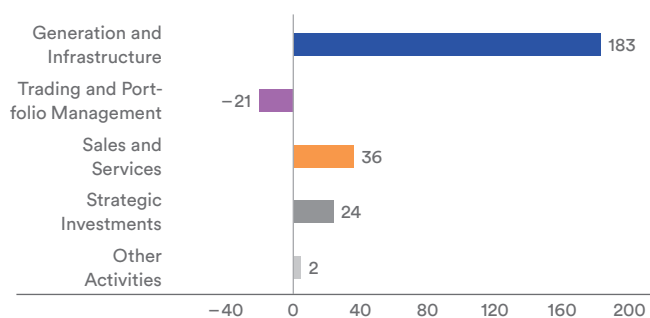
Adjusted EBIT

224

Euro million

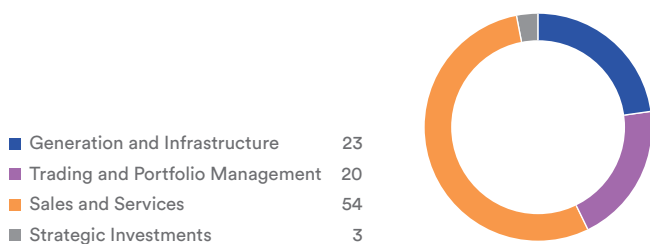
ADJUSTED EBIT BY REPORTING SEGMENT

Euro million



SALES BY REPORTING SEGMENT

Shares (%)



Sales

4.0

Euro billion

More than electricity Inspired in heading for the new energy system

As a forward-looking and competitive energy company, we are shaping the transformation to the energy system of the future.

MVV at a Glance

With around 6,100 employees and sales of Euro 4.0 billion in the 2017 financial year, we are one of Germany's leading energy companies. Our activities focus on providing our industrial, commercial and private household customers with a reliable, economical and environmentally-friendly supply of energy. In this, we cover all stages of the energy industry value chain.

We have consistently aligned our corporate strategy to the energy system of the future. In all our activities, we can count on the mature competence and expertise of our employees. They stand to benefit from secure and attractive jobs in future as well.



We inspire with energy

The powerful unity of our corporate strategy, culture and brand make us pioneers of the energy turnaround. We talk to our Executive Board.

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1 More energy future

The smart energy system of the future combines the electricity turnaround with a turnaround in heating energy and mobility. We are implementing specific projects in the FRANKLIN conversion project in Mannheim.

Page 8



More sustainability

Sustainability is absolutely crucial. New strategic sustainability targets are now determining our activities.

Page 40



2 More energy turnaround

We unite highly efficient conventional energy generation with renewables and enhance energy efficiency, not least by using combined heat and power generation to produce environmentally-friendly district heating.

Page 22



3 More energy intelligence

We act as partners to our customers and support them by offering innovative and forward-looking products and services.

Page 32

We inspire with energy

The energy turnaround is changing the energy system and presents new challenges for energy companies such as MVV. We discuss this with our Executive Board: Dr. Georg Müller, Dr. Hansjörg Roll and Ralf Klöpfer.

We are at the beginning of a new energy age. What will it look like?

Dr. Georg Müller: None of us has a crystal ball, but we can be sure that the future of the energy industry will be shaped by three key megatrends: decarbonisation, decentralisation and digitisation. One characteristic of the future energy system will be the smart way in which it links renewable energies plants generating energy on a decentralised basis, i.e. in numerous small units on location, and highly efficient conventional energies. Generation and consumption will be managed digitally, i.e. in real time. The energy turnaround is irreversible. We are unreservedly committed to it and are ourselves actively taking responsibility. After all, the new energy system will not arise of its own accord, neither will it be built overnight – it is a task for several generations. At the same time, during the turnaround process the energy system has to meet three criteria: It has to make both economic and ecological sense and it has to guarantee supply reliability. For our company, we believe that the opportunities offered by the energy turnaround outweigh the risks.

And what role has MVV played to date in the energy turnaround?

Dr. Hansjörg Roll: We acted early to set MVV on course for the new age. For us, it was clear even before Fukushima that renewable energies would gradually assume a leading role in the energy supply. In 2009 already, we set ourselves an investment target of Euro 3 billion for the next ten years. In 2016, we had more or less reached this target. We have invested in renewable energies, in energy efficiency and in maintaining and modernising our existing plants and grids.

Ralf Klöpfer: At the same time, we decided in 2009 already that we would no longer be making any new investments in coal. On the other hand, the topics of energy efficiency, resource protection and greenhouse gas avoidance have become increasingly important not only to us, but to our customers as well. That is why we have also contributed to the energy turnaround with numerous customer projects.

01



01 Dr. Georg Müller
CEO,
Commercial Affairs
and Labour Director

02 Ralf Klöpfer
Sales

03 Dr. Hansjörg Roll
Technology

02



03





Sector coupling

- » The three energy system sectors – electricity, heating energy and transport – have to be inter-linked in such a way as to facilitate the use of ever increasing volumes of renewable energies.
- » The electricity supply system was previously characterised by large, central generation plants only generating the volume of electricity actually required at any given time.
- » The energy system of the future will be more decentralised and renewable. The energy volumes available will fluctuate and will not always correspond to current requirements.
- » Supply and demand for electrical energy have to be coordinated in both spatial and temporal terms.

What targets does MVV aim to achieve?

Dr. Georg Müller: Together, our strategy, our corporate culture and our strong new brand form a powerful unity. Our aim is to convince our customers and inspire them with our energy. We are channelling our competence, experience and innovative power to combine renewable and highly efficient conventional energies. In the years ahead, we will be investing a further total of Euro 3 billion in the future energy system. Here too, we will be focusing in equal measure on renewable energies and energy efficiency and on ensuring supply reliability, i.e. safeguarding the future functionality of our existing infrastructures. The foundation for these activities is provided by our focus on sustainability. By 2026, we intend to connect renewable energies with total capacities of 10,000 MW to the grid, double our proprietary generation volumes from renewables and simultaneously triple our net CO₂ savings to one million tonnes a year. We are a competent partner for the energy turnaround, and that to all our customer groups. Our alignment has also been positively assessed in external sustainability ratings.

Dr. Hansjörg Roll: The transformation in the energy system is increasingly evolving from the electricity turnaround seen to date into an all-round energy turnaround. If climate protection targets are to be met, the heating energy and transport sectors will also have to be included in the energy turnaround.



That brings us to sector coupling: What contribution is MVV making to this?

Ralf Klöpfer: Here too, we are actively promoting exciting developments. Linking up the three sectors of the energy system will require smart structures and efficient, environmentally-friendly processes which enable energy to be stored or converted into other forms suitable for use in non-electrical applications. To this end, we are offering suitable products and solutions and promoting digital energy management.

Dr. Hansjörg Roll: For us, sector coupling is actually not a new topic. By working with combined heat and power (CHP) technology, our conventional plants already make an innovative and highly efficient contribution towards sector coupling. We produce electricity and heating energy simultaneously and thus enhance our generation efficiency. CHP guarantees maximum efficiency and therefore also reduces CO₂ emissions.



Sustainability ratings

- » **Carbon Disclosure Project:**
Score A–, Score Level Leadership, October 2017
 www.cdp.net
- » **oekom research:**
B–/good, Prime Status, August 2017
 www.oekom-research.com



WE ARE INSPIRED:



**To act as partners
to our customers
and help them
shape their own
energy turnarounds.**



That is why this technology also has good future prospects – our new gas-powered CHP plant in Kiel, for example, will show in exemplary fashion how renewables and conventional energies can be linked. The plant can be ramped up to full capacity in just five minutes and returned to zero just as quickly. It is a highly flexible plant whose heating energy storage facility and electrode boiler enable it to react even more closely to requirements within the new energy system. With a primary energy efficiency rate of 90%, it is spearheading developments in Europe. In general, storage solutions, demand flexibilisation and power-to-X technologies are set to play an ever more important role when it comes to sector coupling.

What is your plan for MVV?

Dr. Georg Müller: We are successfully evolving from an energy supplier into a high-performance energy services provider. To inspire with energy, we are also drawing on opportunities offered by digitisation. We are taking this course together with our customers, who are just as interested in an environmentally-friendly energy supply and wish to manage their generation and consumption smartly. Their needs and wishes are our key focus. As their partner, we offer innovative and forward-looking products and services – drawing on our competence, our experience and our power of innovation. That applies to our private customers just as

much as to our industrial and commercial customers, whom we support with numerous digitally-based efficiency and energy management solutions. We substantially extended our range of solutions in the past financial year by acquiring further shareholdings enabling us to generate savings for our customers with big data analysis and are upholding this course in the current financial year as well. For private customers, we offer one-stop “Smart Energy” solutions – comprising a photovoltaics system, a battery storage facility and, if needed, an electric vehicle charging station. This way, we are helping our customers to shape their own energy turnarounds.

FRANKLIN Conversion Project

1

The smart energy system of the future combines the electricity turnaround with a turnaround in heating energy and mobility. We are implementing specific projects in the FRANKLIN conversion project in Mannheim.



**More
energy
future**

**Modern homes
for modern living**

Building the future in Mannheim

**FRANKLIN shows the way forward:
Developing an entirely new district in this
way will sustainably shape Mannheim's
future profile.**

Construction finally began in April 2016. FRANKLIN, Mannheim's new district on the conversion space along Federal Highway 38, is now emerging. MWS Projektentwicklungsgesellschaft mbH has been developing specific plans for the conversion in this former US military area since 2011. Over this period, the local population has also been actively involved and has submitted more than 1,000 ideas. The results are certainly respectable. A new, state-of-the-art district is being built, one which sends out clear signals in terms of social mix and inclusion, which finds a balance between leisure space and urbanity, successful urban construction and modern architecture and which integrates innovative energy and mobility. The expectations in the energy concept are particularly high: The clearly defined goals are integrative, intelligent and environmentally aware energy generation, supply and use.

The plans for the new district have been set out and can be monitored in the "FRANKLIN Certificate", a mission statement which transparently summarises all of the quality criteria for the new district. After all, what is at stake here is the trailblazing development of an area of 1.4 million square metres. That is almost the same size as inner-city Mannheim.

50 hectares

of green space for sport and leisure.



1,000

jobs to be created by 2025.

110,000

square metres of former barrack buildings to be unsealed and dismantled.

9,000

people to live in FRANKLIN in the years ahead.

4,200

new residential units to become homes for future residents.





I AM INSPIRED:



**When people
think about
tomorrow's needs
today already.**



Achim Judt

Managing Director

of MWS Projektentwicklungsgesellschaft mbH.

MWSP is a subsidiary of the City of Mannheim and

GBG Mannheimer Wohnungsbaugesellschaft mbH.

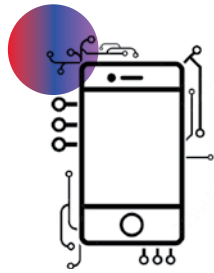
It promotes urban development projects in Mannheim –

one of which is FRANKLIN District.

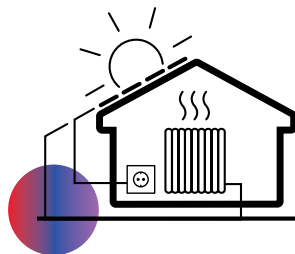


Smartly interlinking energy

At FRANKLIN, energy flows are made transparent. In combination with smart energy efficiency solutions, consumption can be better managed.



Surplus electricity is fed into the low-temperature district heating grid using power-to-heat. The heat storage can be smartly controlled.



Electro-mobility is part of the energy concept. Active management of charging stations creates a more flexible energy system.



- 01 Energy-Efficient Construction
- 02 FRANKLIN E-Bus Line
- 03 Energy-Efficient Renovation and Construction of Housing Units
- 04 Energy Mobility Cube
- 05 Public Buildings
- 06 Smart Business Park
- 07 LED Street Lighting
- 08 Integrated Mobility Points

A district sets course for the future

With their innovative concepts, MVV's activities at FRANKLIN form part of the C/sells showcase programme. Various "showcase regions" in Germany are testing forward-looking solutions in research projects and raising their visibility.

C/sells is part of the "Smart Energy Showcase – Digital Agenda for the Energy Transition" subsidy programme launched by the Federal Ministry for Economic Affairs and Energy (BMWi) in 2015. This is all about the energy turnaround, which will lead to more renewable energies and decentralised generation. The programme is focusing here on finding smart and efficient ways to interlink and digitise generation, distribution and storage solutions.

The C/sells research project is simulating and testing a smart electricity grid capable of interregional application in Germany.

The energy management system that is being investigated in the C/sells research project comprises numerous small units known as cells. These may be individual properties, districts – like FRANKLIN – or entire cities. Each cell first tries to cover its own electricity generation and consumption needs directly on location. Only when this is no longer possible do the cells exchange energy with each other. This way, smart grids pool forces on an interregional basis.

Redesigning an entire urban district, like FRANKLIN, offers the opportunity to witness tomorrow's energy system in action today already.

By digitising and interlinking the generation, distribution and storage infrastructures and the properties in FRANKLIN District and by building up virtual platforms we are enabling a wide variety of participants to act autonomously while also being connected. This way, residents will become part of the energy turnaround. In this project, we are gathering experience that will enable us to integrate the high share of renewable energies expected in future into secure and efficient grid operations and thus to exploit efficiency and flexibility potential.

At FRANKLIN, we are putting a range of exciting concepts into practice. These will enable us to research and shape the future energy system. We are building a smart low-temperature district heating grid into which we are integrating renewable energies. This grid coordinates both generation and heating energy procurement so as to minimise heating energy losses. By designing a state-of-the-art charging infrastructure, we aim to investigate potential flexibilities and optimised charging processes for the transport sector. A fully networked metering concept provides the basis for monitoring energy flows in the district. The fundamental redesign of the entire quarter enables us to try out a unique energy concept. On this basis, we will be able to offer further innovative products and services.

FRANKLIN is set to become a model district – a "showcase" for the future of the energy turnaround.

Heading for the “city of the future”

Pooling forces to implement the energy turnaround.

The energy turnaround is not a solitary enterprise. It needs all of us, committed companies and individuals. After all, it is not about having to do without things, but about putting new ideas, innovative solutions and smart concepts into practice. It is about pooling our forces to master the transition from the old to the new energy system.

We have been rethinking energy for many years now and know how exciting this is. Our products and services are designed to be sustainable – also for our customers. Together with other players, we are writing what is a new chapter in the city’s history at FRANKLIN District. We are heading for the next stage of our energy future.

FRANKLIN will show the way forward.

We have designed the energy concept underlying the efficient and ecological supply of energy to individual households and the community as a whole. Among other aspects, this comprises energy data transparency and state-of-the-art energy management. A fully networked metering concept for electricity, heating energy and water, one that is accurate to the second, provides the basis for transparency. Monitoring energy flows this way will also benefit future residents. For them, we intend to develop further added-value services as the

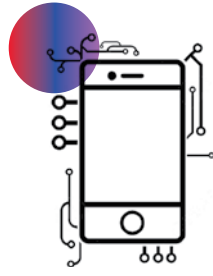
project progresses, such as ways to identify energy guzzlers and detect broken appliances or burst water pipes. Smart metering and smart grids will interact closely to this end. Residents in the new district will be far more focused on how their electricity and heating energy is generated, how they use their energy and how they can actively manage their energy consumption.

Over and above this, we are taking a further major step forward. When we say that the energy turnaround can only work if we all pool our forces, then we are thinking much further ahead than just about sharing electricity with neighbours. For us, it is about networking energy, for example with information panels offering the community an overview of services and requirements. New technical appliances, such as smart smoke detectors and humidity gauges, will significantly increase the protection offered to residents and enhance their safety.

The future is brimming with new opportunities. We are seizing these and actively bringing the future one step closer at FRANKLIN.



www.franklin-mannheim.de



- 01** Extensive planning is absolutely crucial for a project of this size.
- 02** Energy is increasingly becoming a community issue, and one that affects every individual.
- 03** Smart metering will be standard in future and will shape our daily energy experience.
- 04** We played a key role in planning FRANKLIN's energy concept from the very outset.
- 05** Our products offer a complete overview and make energy consumption transparent.





I AM INSPIRED:



**When my quality
of life does not harm
the environment.**

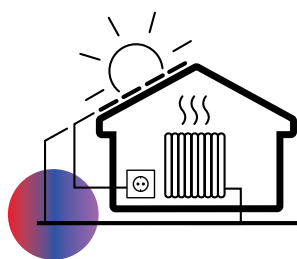


Vanessa Zenczuk

Product Manager at MVV's Sales Department.
As a future resident of FRANKLIN District,
Vanessa Zenczuk stands to benefit from our services
in the "city of the future".



Combining tradition and innovation



The supply of heating to FRANKLIN District will efficiently bring together proven concepts and new ideas.

Environmentally-friendly district heating will continue to play a major role at the former US military complex.

We are rethinking the existing concept and making it sustainable for the long term. Our target is ambitious – the volume of energy used by FRANKLIN's future residents will be just a third of the energy previously used by the US troops. To achieve this, the site will

work with Mannheim's first low-temperature technology. The supply temperature will only be 70 degrees, rather than the figure of 110 to 130 degrees seen previously. The district heating grid will be equipped with 18 kilometres of specially isolated new pipelines. Not only that, we aim to integrate heating energy from renewable energy sources in a way that makes sense, for example by converting surplus photovoltaics electricity using power-to-heat technology and feeding this into the system. Heat pumps are also being considered as a source of energy. To facilitate smart control, we will be deploying a heat buffer storage facility. Ultimately we will achieve a primary energy factor of 0.42 in Mannheim – an outstanding value. The heat supply to FRANKLIN will comprise a well thought out mix of centralised and decentralised sources while the share of renewable energies is set to rise continually as the project progresses.



01 Heating energy turnaround – cosy rooms, lower energy consumption and successful interaction with renewable energies.

Emission-free mobility



The mobility concept is a key aspect of the overall plan.

High quality of life and responsible resource use – these are two of the key priorities in developing FRANKLIN and mobility planning plays an enormously important role in this respect. An electric bus line has been planned, as have car and bike sharing options and attractive links to local transport networks. Another major factor for residents is a sustainable infrastructure for electric vehicles. And it goes without saying that the energy needed for emission-free mobility will be linked to generation on location.

As a one-stop provider, we ensure a sustainable charging infrastructure.

Mobility at FRANKLIN is a topic which we addressed at a very early stage of proceedings. We are offering a smart network of charging stations and professional operations management from the very outset. Here, all services – from planning to servicing to billing – are available from a single source.

02 E-mobility will be part of day-to-day life for residents at FRANKLIN.



Energy within reach

Private and public charging stations will be distributed across the entire district: at all major locations and directly next to the new owners' and tenants' parking spaces if desired. To catch on with private consumers as well, e-mobility will have to satisfy various requirements. The new infrastructure has to be "fit for the future", so that new technologies can be integrated in future as well. We are channelling our energies into bringing regenerative electricity to residents' cars quickly and conveniently and making sure that it remains affordable.

2

We unite highly efficient conventional energy generation with renewables and enhance energy efficiency, not least by using combined heat and power generation to produce environmentally-friendly district heating.

More energy turnaround



Linking renewable and conventional generation

- 01 Our photovoltaics systems enable our customers to play an active role in the energy turnaround.
- 02 By developing and operating windfarms, we are pressing ahead with the energy turnaround.
- 03 Biomethane plants can produce energy from renewable resources regardless of sun and wind conditions – we have a cluster of four biomethane plants in the Magdeburger Börde region.



1.1

billion kilowatt hours: That is how much electricity we generated from renewables in the year under report.

3


percent: the growth in our green electricity generation volumes compared with 2016 financial year.

732

million kilowatt hours of electricity: Produced at plants operated by Juwi and Windwärts.



Moving from electricity to all energy



The energy turnaround is speeding up. Electricity has been the main focus to date, but heating energy and transport are now increasingly in the spotlight as well. National climate protection targets can only be met if individual sectors are successfully coupled. In heating energy, it is about enhancing energy efficiency, e.g. by working with new technologies. This is also true for conventional generation, which we will still need during the energy turnaround. Not only that, renewables have to be integrated. The mobility sector should also contribute to the energy turnaround with low-emission drive systems.

We also need to rethink energy management: How will we deal in future with surplus electricity from renewable energies?

Our investments, products and services and our digitally based energy management solutions help to link renewable and conventional generation. We have worked for years now to expand renewables and highly efficient conventional generation with combined heat and power (CHP). In the years ahead, we will be investing a further Euro 3 billion to expand renewables, boost energy efficiency and modernise our existing grids and plants.

We reached two key milestones in our renewable energies project development business field in the year under report. In January 2017, our Juwi subsidiary passed the 2,000 MW mark for installed onshore wind power capacity. Our Windwärts subsidiary expanded its technical operations management and now for the first time manages more than 500 MW of wind and solar power involving 259 wind turbines and 21 solar parks and systems.

 www.mvv.de/strategy





I AM INSPIRED:



**When sustainability
is given priority
in all areas of life.**



Lars Kaller

Director of Freudenberg Forest District.

He accompanied the planning and building process for the windfarm in Freudenberg in Main-Tauber District.



Building our energy future



Building the future energy system requires renewable energies to be expanded.

The expansion in renewable energies is progressing apace. In Brandenburg, for example, Juwi is developing the windfarm in Schmölln. Soon, four turbines with total capacity of 13.2 MW will produce enough climate-friendly electricity to cover the needs of more than 9,000 households. And in Lower Saxony Windwärts has built a windfarm in Düste with five turbines and a total capacity of 11.75 MW.

Electricity storage facilities make it possible to use renewable energies more efficiently.

Electricity generation is increasingly decentralised. In Germany, 60 % will come from renewables by 2035 and this share will even rise to at least 80 % by 2050. However, wind and solar power generation volumes fluctuate very widely. That makes it all the more important to offer innovative storage solutions able to accept surplus electricity or convert this into heating energy.

01 Renewables expansion – here the windfarm in Freudenberg (Main-Tauber District) under construction – is moving the energy turnaround forward.

The challenge: a flexible yet stable electricity system

Electricity storage facilities are a key pillar of the future energy system. They make it possible to offer a flexible supply and also balance out fluctuations.

Whether it is private customers generating electricity from photovoltaics systems on the roofs of their houses or industrial customers producing their energy from biomass in a CHP plant – both groups wish to use their clean electricity when they really need it. Sensible storage solutions can balance out peak loads. They do this by not feeding the electricity into the grid when it is generated, thus eliminating any need to buy back the electricity when it is needed.

Depending on the industry, company size, existing plants and patterns of use, we can offer individual solutions all aimed at meeting the same goal – to optimise peak load management and cut ongoing energy costs.

Large-scale storage facilities, such as pump storage in the form of mechanical systems or power-to-gas plants, are of interest when renewables actually do cover the majority of electricity requirements. Battery storage facilities are currently far better known. In the form of lithium-ion batteries with ever greater performance capacity, these are promoting the distribution of storage technologies and particularly benefiting the development of e-mobility solutions.

The energy turnaround is a huge task. We are taking on the challenge – and adding our own enthusiasm, expertise and energy.



Why do we need storage solutions?

- » They balance out supply and demand
- » Provide system services to support system stability
- » Increase domestic value creation by avoiding electricity exports
- » Integrate electricity from renewables into the market

02



02 Private customers as well wish to use the energy produced by their photovoltaics system during the day, and that reliably and at any time. Our high-performance lithium-ion batteries make that possible.

Flexible in every respect

The energy turnaround can only work with a smart energy mix. After all, we cannot yet entirely do without conventional generation. With “Küstenkraftwerk K.I.E.L.”, its gas-powered CHP plant, our subsidiary Stadtwerke Kiel is building a power plant fit for the energy turnaround.

It is currently our Group's largest investment project. The coastal power plant, the only one of its kind in Europe, will cost around Euro 290 million. It will safeguard the district heating supply for more than 73,000 customers in and around Kiel, while emitting 70 % less CO₂ than its predecessor. By working with combined heat and power (CHP) generation, it will simultaneously produce electricity and heating energy. This leads to high efficiency: 45 % thermal, 45 % electrical. At 90 %, the plant's primary energy use is highly efficient. The 20 gas motors can reach full capacity in less than five minutes. By comparison, the existing power plant needs four hours for this. Not only that, each motor can be controlled individually and is conditioned to start up several times a day. That is especially important when there is no wind and the sun does not shine. This way, the power plant ideally complements regenerative generation units. It can react with absolute flexibility to fluctuating volumes of electricity from wind turbines and photovoltaic systems.

It thus promotes energy efficiency and ecological sustainability. Above all, it enhances grid stability. The power plant is integrated into a smart energy system including an electrode boiler and heating energy storage facilities. The boiler helps to stabilise the electricity grid. It uses surplus electricity to produce hot water that can be used directly as district heating or sent for interim storage in the heating energy storage facility. With a height of 60 metres, this facility will also be filled when the gas-powered CHP plant generates electricity but the heating energy simultaneously produced is not required immediately.

Given its modular generation concept, the coastal power plant can react with the utmost flexibility to all of the requirements of the energy market. We will pioneer further gas-powered plants of this kind and thus set a milestone in the energy turnaround.

Modular and flexible gas-powered CHP plant: The heating energy storage facility is already in operation.



Individual customer solutions

3

More
energy
intelligence



We act as partners to our customers and support them by offering innovative and forward-looking products and services.

Products and services made to measure

Smartly managing energy

We are developing innovative services and products for smart, decentralised energy management – all aimed at satisfying the wishes and needs of our industrial, retail and commercial customers. By digitising processes and products we are actively showing the way forward.

3,500

customers at MVV EnergySolutions and MVV ImmoSolutions, both of which are subsidiaries of MVV Enamic.

1,600

efficient contracting systems at MVV EnergySolutions and MVV ImmoSolutions.

01



01 By offering personal and dedicated advice to our customers, we help them to participate in the energy turnaround themselves.

02 With Smart Light Efficiency, we offer a one-stop package for what is a modern, environmentally-compatible and cost-saving lighting concept.



Energy efficiency services

These days, it is no longer a matter of saving energy wherever possible. For us, it is more about how we can put energy to smart and efficient use and interlink its generation, storage and consumption. That is why we are developing digital solutions and making these available to our business and private customers.

One example is our innovative Smart Efficiency Control: As an efficiency partner to our customers, we combine regular analyses of their energy data with sophisticated proposals for optimisation. Our Smart Light Efficiency solutions are another example: Converting to LED offers substantial potential savings, and that on a scale of which companies are often not aware. What we do for our customers in a wide variety of sectors is substantially cut their energy costs while bringing their infrastructures in line with the latest technology.

Together with our partners and shareholdings, we combine energy industry expertise with digital intelligence and a wealth of experience. This way, we offer precisely tailored solutions – enabling our customers to head for an energy-efficient future.

 www.mvv.de/energieeffizienz

Interlinking energy data

Energy at a Glance

- 01** Facts at your fingertips:
Transparency is the first step towards optimising and managing energy use.
- 02** Easy upgrading:
Installing and directly evaluating measurements in just a few minutes.

All-round solutions for smart energy management



Creating transparency. Identifying potential. Optimising costs.

Making complex energy flows transparent and manageable in an increasingly digitised environment – that is the service we offer customers with our all-round, modular solutions portfolio.

By working with smart hardware and software systems, we help our customers to exploit potential savings as quickly as possible. Data provides the basis for robust, forward-looking decisions. Obtaining, analysing and evaluating this data need not be complicated. Using professional data and process monitoring, customers can exploit potential savings and react flexibly at all times to production requirements.



We work together with our subsidiary Econ Solutions to create all-round solutions. Econ enables customers to integrate measurement appliances, feelers, sensors and any other data sources independently of manufacturers and media. Its software acts as the platform for energy and efficiency analyses. Flexible evaluations lead to a compact report with easily comprehensible graphics enabling companies to have an overview at all times. Intuitive navigation makes data handling uncomplicated and produces results that can be acted on quickly – via app as well of course. With the right efficiency partner at your side, smart energy management is easy and viable.

03



Sunny prospects

03 Generating your energy on your own roof – sunny prospects for retail customers as well.

We offer convincing energy and service packages to our retail customers.

Can consumers shape the energy turnaround in their own homes? They certainly can. With proprietary photovoltaics systems on their roof and smart storage in the form of our battery facility, private customers can make a key contribution to achieving the important overall target. Not only that, they stand to profit themselves in the process. To this end, we have developed solutions that guarantee long-term planning reliability for our customers. We combine individual components so as to ensure that customers can make optimal use of the electricity they themselves generate. We also link this up to the topic of electro-mobility. By offering proprietary charging stations, we enable customers to charge their electric vehicles quickly, safely and conveniently, and that right in front of their own homes.

Our services are modular. We therefore supplement our innovative energy packages with clever service packages optimally tailored to meet our customers' needs and wishes – and even offer an electricity flat rate. After all, we wish to accompany our customers as competent and reliable partners – not only today, but in the long term as well.



I AM INSPIRED:



**When people
are open
to new ideas.**



Martina Nighswonger

Managing Partner at Gechem GmbH & Co KG.
Gechem is a medium-sized specialist for
chemical-technical products. As one of MVV's
industrial customers, it draws on our smart energy
procurement product Electricity/Gas Energy Fund.



More sustainability

Sustainability is the basis for our corporate responsibility as a business

We are driving the energy turnaround. At MVV, sustainability is not just a tradition; it is the principle guiding us on our course towards the energy system of the future.

We assume economic, ecological and social responsibility – not just from one financial year to the next, but also well into the future. After all, most of our investments have long-term implications. In the year under report, we published our strategic sustainability targets. These are ambitious. But to get far ahead, you have to think far ahead.

We have set medium-term sustainability targets for many years now and aligned our actions to these targets. Back in 2009, we decided we would no longer invest in coal-based generation. Since then, we invested Euro 3 billion in renewable energies and making our infrastructure fit for the future. And we plan to invest the same amount again in the years ahead.

We take climate protection seriously. In view of this, we naturally only account for real CO₂ savings benefiting the overall climate system. Selling power plants to third parties or similar steps would improve our climate balance sheet but not help our ecosystem.

With the Öko-Institut, we have developed an approach to ensure we record our measures correctly. Our CO₂ balance sheet accounts for all increases and decreases in emissions resulting from those measures for which we bear the economic risks. This produces a figure depicting the actual net CO₂ reduction. In the 2016 financial year, we reached around 330,000 tonnes of annual CO₂ savings in the energy system. We aim to triple this figure by 2026 – savings would then correspond to the annual emissions of 300,000 cars each driving 15,000 kilometres a year.

 [www.mvv.de/
corporate-governance-engl](http://www.mvv.de/corporate-governance-engl)

 www.mvv.de/responsibility

MVV's targets by 2026 in figures

1 million

tonnes of net CO₂ savings a year – three times the 2016 figure.

10

gigawatts of renewable energies to be connected to the grid.

800

megawatts of proprietary electricity generation from renewable energies – twice the 2016 figure.

↓

Renewable energies project development

Renewable energies currently account for 30 % of Germany's electricity generation. By 2050, this share should rise to at least 80 %. With our subsidiaries Juwi and Windwärts, we will bring further renewable energies to the grid and thus make a substantial contribution to protecting the climate.



MVV's strategic sustainability targets

» **We are assuming responsibility for protecting the climate.**
We will triple our annual CO₂ savings to one million tonnes.

» **We are making the energy turnaround happen.**
We will bring 10,000 MW of renewable energies to the grid.

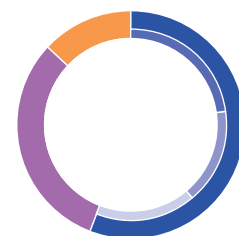
We will double our proprietary electricity generation from renewable energies.

The energy system of the future will remain our key investment focus: We will be investing a further total of Euro 3 billion in the energy turnaround.

» **We are making the energy turnaround possible for all our customers.**

We act as a competent partner to all our customers – from private households to industrial players – and offer them the products and services they need to shape their own energy turnarounds.

ELECTRICITY GENERATION Shares (%)



FY 2017

■ Electricity from renewable energies ¹	56
■ Electricity from biomass and biogas plants	23
■ Electricity from wind power	17
■ Electricity from biogenic share of waste/RDF	16
■ Electricity from CHP	31
■ Other electricity generation	13

¹ Due to their immaterial shares, electricity generation volumes from hydroelectricity and photovoltaics have not been presented in this overview.

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