

## Innovation

OMV seeks innovative solutions to optimize operations, explore business opportunities, and establish new business models. We develop new technologies and products with the aim of reducing our impact on the environment, increasing efficiency, and achieving our main goal of lowering the carbon intensity of our operations and product portfolio.

We believe that transitioning to a circular economy will significantly reduce our impact on the environment and our CO<sub>2</sub> emissions. A circular economy decouples economic growth from resource constraints, while eliminating as much as possible the leakage of waste into the environment and, in particular, into the oceans as well as to landfills. The circular economy will also curb global warming. Through the efficient use of our precious resources, we can recover and reuse byproducts or waste to make new materials and products. This process has the potential to greatly decrease associated emissions across product value chains.

The creation of a truly circular economy also has wider societal implications. It will provide economic benefits to society by reducing the major financial burden of ineffective waste management systems and pollution management, and will create new business opportunities and employment at various stages of the value chain. A circular economy will also result in better living and working conditions, and in general in a cleaner environment.

In 2020, OMV took a major step in its circular economy and innovation journey through the acquisition of a controlling stake in leading polyolefins producer Borealis. Borealis' innovative activities in plastics recycling, such as the Ecoplast and mtm plastics recycling plants, and initiatives, such as Project STOP (see also [Waste](#) and [Community Investments](#)) and the Design for Recycling (DfR) initiative, are perfect additions to OMV's ReOil<sup>®</sup> technology for chemical recycling of post-consumer plastic to synthetic crude.

OMV manages the development of innovative technologies and the transition to a circular economy in a number of ways: through investments, through innovation centers to harness innovation inside the organizations, and through strategic partnerships.



## Investments

We are committed to becoming a major player in the circular economy and will invest up to EUR 1 bn by 2025 in innovative energy solutions such as ReOil®, Co-Processing, hydrogen, and mechanical recycling for a circular economy and lower-carbon future. In 2020, EUR 45.4 mn were invested in sustainability innovations in Upstream and Downstream.

The Group's research and development (R&D) expenses increased from EUR 49 mn in 2019 to EUR 61 mn in 2020. Out of total R&D expenses in 2020, EUR 13 mn (or 21%) was attributable to low-carbon solutions, such as hydrogen, advanced fuels, plastics recycling, Co-Processing, carbon capture and utilization, and other Upstream and Downstream innovations.

## Innovation Centers

In 2020, OMV opened its Innovation & Technology Center (ITC) in Gänserndorf. The outstanding technologies of OMV Upstream, which are developed in the Weinviertel region of Austria and used worldwide, are exhibited on around 1,600 m<sup>2</sup> by using state-of-the-art presentation technology. The main focus is placed on the technology areas of geology and geophysics, drilling technology, artificial lift, smart oil recovery, material and corrosion, saltwater treatment, and nanotechnology. Sustainability is the connecting factor for all technologies. The ITC is intended for OMV business partners, investors, OMV employees, and universities, as well as schools and interested visitors.

Borealis' key innovation sites are its Innovation Headquarters (IHQ) in Linz, Austria, and two Innovation Centers: in Stenungsund, Sweden, and Porvoo, Finland. Three PE and PP pilot plants are also integral to Borealis' competencies in innovation and technology. Two of these pilot plants are in Porvoo and one is in Schwechat, Austria. Borealis' innovation facilities engage in independent but coordinated efforts, with the common aim of developing innovative solutions that provide added value for customers and end users. The IHQ's main R&D focus is on polymer design and compound research for polymer applications in the energy, automotive, advanced packaging, and health care industries. In the Innovation Center in Stenungsund, the focus is on polymer design, scientific services, and R&D in the area of energy and infrastructure industry solutions. The Innovation Center in Porvoo is an important site for advanced catalyst and process research, as it includes catalyst scale-up facilities and fully integrated Borstar™ PE and PP pilot plant lines. All Innovation Centers collaborate closely with local and international universities and research institutes.

The Bourouge Innovation Center in Abu Dhabi, UAE, cooperates closely with Borealis' Innovation Centers to explore enhanced

infrastructure, automotive, and advanced packaging application solutions.

## Collaboration With Research Institutions

OMV collaborates globally with universities, research institutes as well as with industry partners and relevant initiatives.

For example, OMV and Borealis cooperate with various research institutions in the following areas:

- ▶ Hydrothermal liquefaction of biomass waste to bio-oil (with University of Leoben)
- ▶ Fast pyrolysis of biomass waste to bio-oil (European-funded research project)
- ▶ Storing and utilizing sustainable electric energy via synthetic e-fuels or chemical products (through a partnership within the German-funded Kopernikus project)
- ▶ Gaining deeper knowledge of the value chains of recyclates from different waste streams and identifying best possible applications where recyclates are the primary material (Circumat is a multifirm partner consortium project funded by the Upper Austrian funding line "Innovatives Oberösterreich 2020")
- ▶ Creating an infrastructure that is necessary for further developments of products, including ones made from recyclates (The LIT Factory is the open research platform of the Linz Institute of Technology (LIT) of Johannes Kepler University Linz funded by the Austrian Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology, the Province of Upper Austria, the City of Linz, and company partners. Borealis is one of the major initiators.)

## EverMinds®

Borealis' dedicated platform EverMinds® serves to streamline all Borealis circular-economy-related activities in order to boost their impact and engender familiarity with the topic. It facilitates deeper collaboration between Borealis and its partners in the interest of developing innovative and sustainable polyolefin solutions based on the circular model of recycling, reuse, and design for circularity. An example of how EverMinds® serves to promote awareness of the circular economy is the "10 Codes of Conduct for Design for Recyclability." Based on extensive knowledge of polyolefins – polyethylene and polypropylene – as well as expertise from mtm plastics and Ecoplast, the two recycling companies wholly-owned by Borealis, these are ten Codes of Conduct for polyolefin packaging designers to adopt. The Codes provide critical guidelines on how to maximize the quality and quantity of packaging materials that can be recycled, while at the same time supporting the achievement of recycling targets and contributing to a more sustainable transition to a circular economy.



## Circular Economy

### Plastics Recycling

The versatile properties of plastics enable a plethora of products and applications which make daily life safer, more mobile, and more eco-efficient. These properties allow us to ensure more sustainable living, while the global population grows and demand for plastics increases. However, within the linear economic model, plastic products are made, used, and then disposed of. Continuing with this model will lead to more plastic waste and environmental pollution, while putting pressure on the planet's limited resources. The reduction of plastic waste is a key aspect of the material topic Circular Economy.

There is a growing consensus on the need for a circular economy to preserve the environment. In 2020, the European Commission developed a Circular Economy Action Plan, which aims to increase plastics recycling rates and minimize plastic leakage into the environment. OMV recognizes the environmental footprint of petrochemicals and assumes responsibility for petrochemical value chain impacts throughout their lifespan. The solution is to further transition to a circular economy, where plastics are reused, recycled, and made from renewable feedstock.

### Chemical Recycling

OMV has been exploring the potential for utilizing post-consumer plastics – polyethylene, polypropylene, and polystyrene – through chemical recycling since 2011. The Austrian Research Promotion Agency has also contributed with subsidies covering part of the project investment. The first test facility was launched in 2013. In 2018, the next-level test facility – the ReOil® 100 pilot plant – began fully refinery-integrated operation with a processing capacity of up to 100 kg per hour and production capacity of up to 100 l of synthetic crude per hour. The crude is then further processed at the Schwechat refinery into fuel products or base materials for the plastics industry.



The ReOil® process is an important part of the circular economy, where post-consumer plastics are used to create value-added products, thereby reducing dependence on natural resources and lowering carbon intensity as compared to standard oil processing. This innovative chemical recycling technology closes the loop of post-consumer plastics recycling. Substituting crude oil with post-consumer plastics is estimated to reduce CO<sub>2</sub> emissions by 45% from the use of this product and lower energy demand by 20% in comparison to using fossil resources.<sup>31</sup> OMV holds the patent for this chemical recycling process in Europe, the United States, Russia, Australia, Japan, India, China, and other countries.



In 2020, OMV worked on testing various market feedstocks to further improve the thermal cracking process. Additional activities included developing the necessary technical parameters for a further scale-up and supporting the engineering process initiated at the end of 2019 to develop a ReOil® demo plant with a post-consumer plastic feedstock capacity of 16,000 to 20,000 t per year. A special focus was on feedstock preparation and post-treatment of the ReOil® synthetic crude to be processed in the refinery. OMV aims to develop ReOil® into a commercially viable industrial-scale recycling technology with a processing capacity of up to 200,000 t of used plastics per year by 2025. OMV has also signed a memorandum of understanding (MoU) with ADNOC for the establishment of a joint working group to assess the feasibility of a scalable ReOil® plant in the United Arab Emirates.

<sup>31</sup> Austrian Federal Environmental Agency, "ReOil – Bewertung eines Konzeptes zur kaskadischen Nutzung von Altkunststoffen im Raffineriekontext" (available only in German), 2016



### Sustainability Strategy 2025 Target

- ▶ Develop ReOil® into a commercially viable industrial-scale process (capacity: up to 200,000 t of post-consumer plastics transformed per year)

### Status 2020

- ▶ More than 250 t of post-consumer plastics transformed into synthetic crude in 2020
- ▶ ReOil® plant integrated in 24/7 operation of the refinery

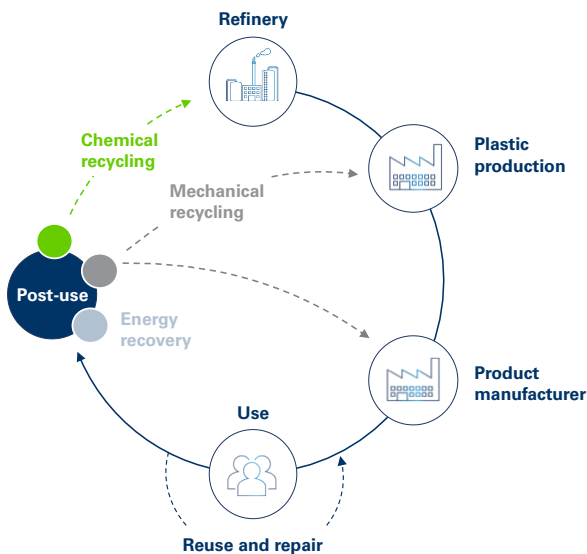
### Action Plan to Achieve the Target



- ▶ Continually improve the process and the reliability based on defined test run programs, and utilize results achieved to improve process modeling and the design basis for the ReOil® demo plant
- ▶ 2022: demo plant with a post-consumer plastic feedstock capacity of around 16,000 t per year

**SDG targets:** 8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead; 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities; 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse; 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

## Mechanical Recycling



With the acquisition of Borealis, OMV is also expanding into mechanical recycling. Borealis mechanically recycles polyolefin plastic materials in Germany (mtm plastics) and flexible

plastics in Austria (Ecoplast). It has committed to delivering 350,000 t of recycled polyolefins (polyethylene [PE] and polypropylene [PP]) per year for the production of second-generation products by 2025. Major European polyolefin plastics producers have pledged to the EU Commission that they will deliver 1 mn t of recycled polyolefins.

In 2019, Borealis and the EREMA Group, the global market leader in the development and production of plastics recycling systems, signed a letter of intent signaling their aim to deepen their existing mechanical recycling partnership.

### Recycled Product

Borealis aims for its Consumer Products portfolio to be 100% recyclable, reusable, or contain renewable content by 2025. In 2020, Borealis launched the new plastics recycling technology Borcycle™. This evolving technology will be used to produce high-quality compounds made of recycled polyolefins (rPOs). For example, Borcycle™ MF1981SY is one of several new rPO compounds especially suited for use in visible black parts, e.g., in small appliances. The solution contains over 80% recycled materials and delivers an ideal balance of stiffness and impact. Pilot applications molded in this sustainable addition to Borealis' rPO portfolio include several parts for a Bosch vacuum cleaner.

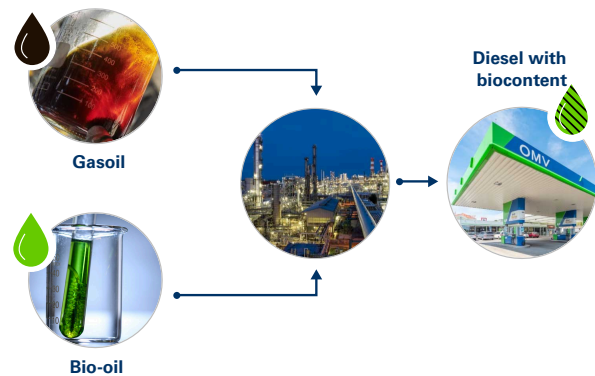
## Biowaste as Raw Material

Together with partners, OMV is actively pursuing the development of industry-scale projects to produce biofuels and/or biochemicals from waste biomass. Waste biomass such as agricultural, forestry, and wood processing residues or mixed municipal waste are not in competition with the food and feed chain. While the conversion of such waste biomass to high-value products is often technically challenging, the related benefits are a significant reduction in CO<sub>2</sub> compared with fossil-based fuels and local resource utilization that creates value.

### Co-Processing

OMV uses new technologies to increase the quality and stability of fuels with biogenic components through what is known as Co-Processing. Co-Processing involves introducing biogenic feedstock during the fuel refining process instead of the conventional method of blending biogenic components into fuel after production. This concept allows OMV's existing refineries to produce transportation fuels from various types of biogenic feedstock, such as domestic rapeseed oil, sunflower oil, used cooking oil, or future advanced oils. The high degree of integration within OMV refineries reduces greenhouse gas emissions from Co-Processing by up to 85% compared with the EU standard for similar finishing steps for biofuels.

### Co-Processing



In 2016 and 2017, OMV successfully conducted the first field trials of Co-Processing in the Schwechat refinery using rapeseed oil and obtained certification in accordance with the REDcert standard, an EU-recognized system for the certification of sustainable biomass. In 2020, a further field trial was successfully completed at the Petrobrazil refinery. OMV continues to implement the Co-Processing technology, and by 2025, the Company aims to co-process approximately 200,000 t of sustainable feedstock per year, depending on future legislation.



#### Sustainability Strategy 2025 Target

- ▶ Raise the share of sustainable feedstock co-processed in the refineries to ~200,000 t per year by 2025

#### Status 2020

- ▶ Basic engineering finalized for Schwechat refinery
- ▶ Process studies finalized for Petrobrazil refinery

#### Action Plan to Achieve the Target



- ▶ Selection of technical concept and start of process design work for Co-Processing at the Petrobrazil refinery
- ▶ Perform detail engineering for Co-Processing in Schwechat

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### Other Projects and Products

OMV is currently planning to construct and operate a pilot plant to convert different types of raw glycerin, an eligible second-generation bio-feedstock, into propanol. Propanol can be used as a biofuel blend and for biochemicals.

During 2020, Borealis achieved a milestone by launching additional renewable polyolefin grades based on second-generation feedstocks sourced from biomass waste. To that end, Borealis and Neste, the world's leading provider of sustainable renewable diesel and renewable jet fuel, and an expert in delivering drop-in renewable chemical solutions, have entered into a strategic cooperation for the production of renewable polypropylene (PP). Neste offers bio-based alternatives (including ones based on lower-quality waste and residue oils) to conventional fossil-based feedstock for use in the production of polymers and chemicals. Borealis will use Neste's renewable propane, produced in Rotterdam, at its facilities in Belgium to create an entire portfolio of applications based on renewable PP. Through this project, Borealis uses bio-based feedstock to partially replace fossil feedstock in the commercial production of PP.

In 2020, Borealis also launched Bornewables™, a new range of circular polyolefin products. Bornewables™ are produced with renewable feedstock derived entirely from waste and residue streams. These premium polyolefins provide similar material performance as virgin polyolefins, but with a reduced carbon footprint. Unlike renewable feedstocks that are produced with agricultural crops grown for food and livestock feed, Bornewables™ are made of renewably sourced feedstocks that are derived from waste and residue streams, including vegetable oil production, and oil waste and residues. The entire Bornewables™ product range is ISCC PLUS-certified.

### CO<sub>2</sub> as Raw Material

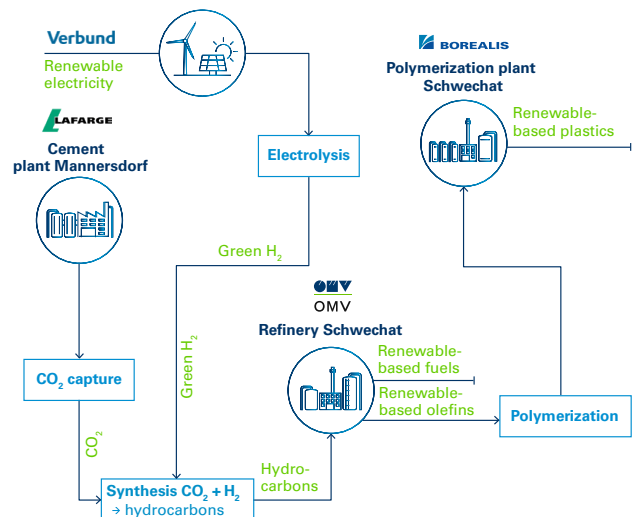
OMV aims to capture CO<sub>2</sub> and use it as a resource, such as by capturing CO<sub>2</sub> emissions from the refineries, hydrating the CO<sub>2</sub>, and then reusing it as fuel. We are currently planning to construct and operate an innovative electrolyzer at our Schwechat refinery, where steam and CO<sub>2</sub> will be used to generate syngas. (For more information, see [Sustainable Aviation Fuels](#).)

In 2020, OMV, Lafarge Zementwerke GmbH (part of the LafargeHolcim Group), VERBUND, and Borealis co-signed a Memorandum of Understanding (MoU) for the joint planning and construction by 2030 of a full-scale plant to capture CO<sub>2</sub> and process it into synthetic fuels, plastics, or other chemicals. The plant will eventually capture almost 100% of the 700,000 t of CO<sub>2</sub> emitted annually by Lafarge's cement plant in Mannersdorf, Austria. In combination with green hydrogen (from renewable energies) produced by

VERBUND, the captured CO<sub>2</sub> will be transformed by OMV into renewable-based hydrocarbons, which, in turn, can be used to produce renewable-based fuels or be utilized by Borealis as a feedstock to manufacture value-added plastics.

The main objective of the Carbon2ProductAustria (C2PAT) project is to engineer and operate a carbon capture plant at the cement plant. Infrastructure and a fully operating system for producing renewable-based hydrocarbons will also be built. This compound will be used to produce a broad range of renewable-based olefins, plastics, and fuels. The partners aim to put the full-scale plan into operation by 2030. A first step toward this goal will be to further investigate current technological and economic hurdles by jointly conducting research and development on the envisaged carbon value chain.

### C2PAT – Cross-Sectoral Value Chain to Drive Climate Neutrality



### Further Innovations

#### Hydrogen

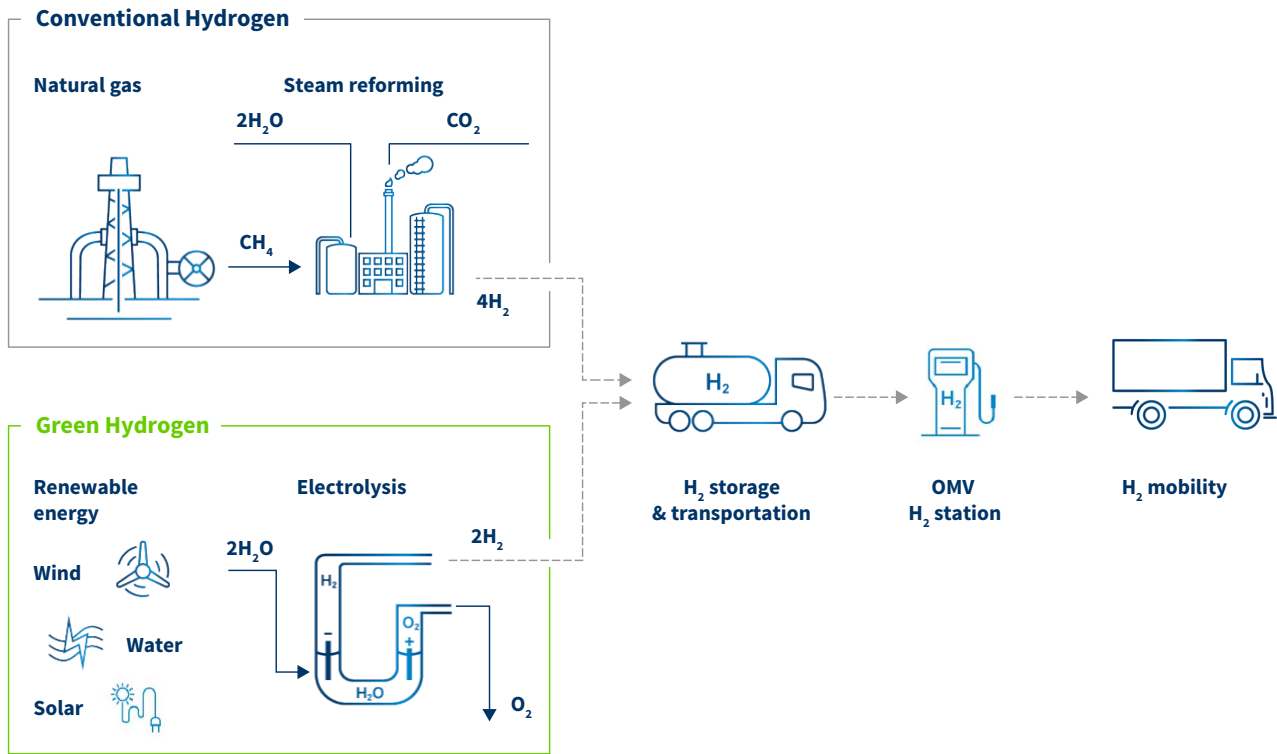
We are working to advance and optimize the entire energy value chain with sustainable clean hydrogen. OMV is currently developing a first-of-its-kind green hydrogen production system based on a 10 MW electrolysis project at the Schwechat refinery as part of its UpHy project. The electrolysis will be powered by renewable electricity, producing green, zero-carbon hydrogen. The initial plan is to use the green hydrogen in the refinery in Schwechat for the hydration of vegetable oil and fossil fuels, thereby reducing the CO<sub>2</sub> emitted by up to 15 kt per year. The second step will be to use the green hydrogen for decarbonizing hard-to-electrify transportation segments like



buses and trucks. (For more information on UpHy, see [Hydrogen Mobility](#).)

The activities are part of the H2Accelerate project, where OMV is developing the heavy-duty infrastructure network

around the TEN-T corridors in Europe. H2Accelerate is a joint approach together with four European partners under the framework of the newly launched Hydrogen IPCEI call (Important Project of Common European Interest).



In conventional hydrocarbon-based hydrogen production, we are looking into ways to prevent  $CO_2$  produced in the steam-reforming process from being expelled as emissions. Instead, we aim to capture it and use it as a feed-stock for producing methanol. This is then further turned into renewable-based chemicals and fuels.

Another highly promising alternative is splitting natural gas into hydrogen and pure solid carbon with the pyrolysis method. This process does not emit any  $CO_2$  and even uses less energy compared to electrolysis with water.

### Upstream Technologies

Optimizing drilling and production processes prolongs the lifetime of hydrocarbon reserves, thus increasing production efficiency and reducing the impact on the environment. OMV continuously works on optimizing the amount of hydrocarbons that can be extracted from an oil reservoir (recovery rate) and on extending the reliability of facilities and materials.

OMV is among the global front runners in terms of achieving high recovery rates in mature fields. By 2025, OMV aims to increase the amount of oil that can be extracted from selected fields in Central and Eastern Europe by 5 to 15 percentage points, making our Company a leader in efficient production in the region.

In 2012, OMV started injecting viscous saltwater to achieve higher recovery rates in a pilot project in the Matzen area in Austria. This launched our Enhanced Oil Recovery (EOR) activities and paved the way to attaining the strategic goal of further increasing the recovery rate. In total, 430,000 bbl of incremental oil were produced by the end of 2020. We were able to significantly increase oil rates compared to conventional produced saltwater reinjection. In 2020, OMV made further progress in rolling out EOR projects in various fields in Austria and Romania.

OMV has made considerable progress in developing new technologies and improving the operational performance of produced water treatment processes. In a series of field pilots targeting optimum produced saltwater quality for reinjection, OMV was able to identify innovative flotation

and filtration technologies which can also effectively treat challenging emulsions. Thanks to the implementation of new technologies in running produced water treatment facilities, OMV greatly reduced the amount of water treatment chemicals used. Moreover, cleaning processes were finetuned to achieve a high quality of the injection produced water. Furthermore, OMV is investigating the possibilities for capturing CO<sub>2</sub> from its own assets and introducing it into former gas reservoirs to reduce OMV's carbon footprint (carbon capture and storage [CCS] technology).

Extending the lifetime and reliability of facilities and materials ensures safe and efficient hydrocarbon production. Over the past 20 years, OMV has implemented extensive materials selection and corrosion management programs to ensure asset integrity, reduce safety risks, and minimize environmental impact. Applying these measures at nearly 6,500 wells with artificial lift systems resulted in measurable reductions in power consumption and downtime

of sucker rod pumps. Consequently, the number of well interventions decreased by 25% in Austria, reducing associated HSSE risks accordingly. OMV is investigating nanotechnologies in the field of advanced coatings to extend material resistance, for enhanced oil recovery and well stimulation, in the field of chemicals to inhibit paraffin deposits to optimize the production process, and in the field of spill prevention and remediation for soil and water. OMV continues its cooperation with third-party research institutes on these technologies and is in the process of setting up programs together with other operators. OMV works on extending the lifetime of operational facilities by mitigating abrasion and corrosion. To this end, cross-linked polyethylene pipes are inserted in tubing with a special polymer lining that was developed by OMV and patented in 16 countries. In addition, OMV has performed pilot tests on polymer flowlines under various operating conditions, which will allow us to cut costs and increase the efficiency of flowline replacement.



### Sustainability Strategy 2025 Target

- ▶ Increase the recovery factor in the CEE region in selected fields by 5–15 percentage points by 2025 through innovative Enhanced Oil Recovery methods

### Status 2020

- ▶ More than 130 kboe additional production in pilot project in Austria in 2020
- ▶ Pilot EOR project started in Romania, with an initial increase in the recovery rate and in production in 2020

### Action Plan to Achieve the Target



- ▶ Finalize the pilot EOR project in Romania
- ▶ Further mature the full field implementation project in two Matzen field reservoirs

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## Digitalization

### Digital Transformation – OMV’s Digital Journey

OMV’s Digital Journey is our strategy for digital transformation, which will enable us to become a digital leader in our field and unlock smart opportunities along the entire value chain. Digital transformation is powered by key initiatives orchestrated across the entire Group and built on three pillars: Digitalize, Act, and Enable.



The digital strategy was developed in line with OMV’s structure alongside key divisional programs, namely DigitUP in Upstream, digital*motion* in Downstream, and Finance 4.0 in corporate services. Lighthouse projects have contributed to operationalizing our business strategies and generating maximum value since 2018. Our digital strategy also enables digitalization based on hybrid IT infrastructure services and state-of-the-art cybersecurity. We promote cultural change and develop future skills to foster an innovative mindset and create digital dexterity in our organization.

For OMV, digital leadership also means acting as an industry role model for sustainable HSSE, reducing our carbon footprint, and maintaining a highly efficient and effective process operation. Digitalization is an additional lever for sustainability, for example by increasing remote collaboration (less travel), lowering CO<sub>2</sub> emissions by optimizing data center operations, and unlocking opportunities for improved maintenance in Upstream and Downstream.

Today, digitalization is vital for business at OMV, for example, to ensure optimal evaluation and convergent use of digital and analog data in machine controls for increased efficiency and availability, safer operations, and more targeted maintenance activities. Leveraging our experience, collaborating with strategic partners, and transforming key elements of the IT landscape into platforms allows us to execute a well-balanced portfolio of use-case and value-drive digital endeavors.

## OMV Group

### Digitalization in Procurement

The implementation of the new SAP S/4HANA enterprise resource planning software enables us to use automation and state-of-the-art digital tools, which are key enablers of transformation with the ultimate aim of value-oriented procurement. The SAP Ariba Strategic Sourcing Suite is the basis for a global electronic signature process ensuring efficient remote approval workflows regardless of office location. This results in 75% of purchase orders being fully automated, digitalization of the process, and 100% paperless sourcing resulting in reduced cycle times. (For more information, see [Supply Chain](#).)

### Paperless Initiative at OMV Petrom

OMV Petrom started the roll-out of the Paperless initiative to minimize the use of paper for daily work activities. Goals of the initiative are twofold: avoidance of printed paper and establishing a digital working culture where employees have the necessary tools and skills to go paperless. Numerous other tools in the initiative help reduce the use of paper, including the roll-out of digital signatures and digital documentation storage. Currently e-signatures are replacing paper-based approvals. More than 50% of OMV Petrom employees were enrolled by mid-2020 and over 9,000 documents electronically signed.

### Culture Initiative “Make a Difference”

The objective of this initiative is to create an environment receptive to innovation and change based on our people, culture, and organization by building digital capabilities and adapting our ways of working. The “Make a Difference” initiative consists of a network of over 100 volunteers in six different workstreams and focuses on improving diversity, empowerment, integrated leadership, collaboration, and sustainability at our Company. This initiative is supported by our Digital Academy, which offers online trainings and events. Thanks to webinars and e-learning, OMV employees participated in Digital Academy learning events in 2020 at the same level as before the pandemic.

Each quarter, we also hosted global virtual Digital Breakfasts with over 350 participants to share digital and culture hacks, and F-up Nights to promote a learning culture that celebrates learning from mistakes. In addition, last year we launched a Culture Toolkit containing several guides and tools to support working from home, empowerment in teams, collaborative steering committees, virtual facilitation guides, and much more.



## DigitUP



DigitUP is OMV Upstream’s digital transformation initiative that will make OMV the “digital frontrunner” in the oil and gas industry. We have set up a global program encompassing the entire Upstream value chain to accelerate the integration of digital technologies into our day-to-day activities. Our ambition is to become a safer, more resilient, and more efficient organization. We are committed to “go green” and contribute to OMV’s HSSE and climate targets to reduce the carbon intensity of our Upstream operations. We aim to do this with digital technologies such as automation, cloud technology, and artificial intelligence.

### Digital Subsurface

The Digital Subsurface program focuses on subsurface-related matters ranging from exploration to development within OMV’s supply chain. The digital representation of subsurface models will be part of the high-performance computing (HPC) environment and deliver deep insight into our reservoir properties. Compared to traditional stand-alone models and technologies, no search will be required for information and tools; instead, they are available anytime so that all employees can contribute to fast and valuable decision-making. For example, the Digital Rock project creates Digital Twins of real rocks with all their components in the micrometer range. Compared to traditional rock scanning, this yields fast results, uses less hazardous chemicals for laboratory measurements (mainly mercury), and helps improve the quality of our exploration and development activities. In another lighthouse project, a Digital Twin will connect models for reservoir simulation directly with real-time production data. This Twin allows us to increase the accuracy of our subsurface model predictions and, consequently, update production forecasts more quickly and accurately.

### Real-Time Digital Oilfield

Every two years, the data generated by our operations approximately doubles in volume, with signs this pace is increasing. The subsequent transformation into actionable insights for safe operational performance is complex, and the value of information erodes the longer it takes us to make sense of it. Extending our human ability to cope with this

constant flow of information in operations is at the forefront of our lighthouse project. Value is created if the right performance data is available at the right time to the right skilled professionals in order to facilitate the best decisions. Pilots prove that supplementing the work of our experts with algorithm-based insights, digital reality, and robotics in their day-to-day activities is directly improving on-site safety, while reducing costs as well as our carbon footprint. In the 2020 COVID-19 environment, our remote certification and commissioning approach helped us successfully start our Nawara facilities even with closed borders in Tunisia. It also helped demonstrate to certifiers that our New Zealand pipeline repairs were complete, and it was safe to operate. With high-quality images, including digital site visits and information streamed from location, OMV experts around the world can provide support and make decisions remotely without the need to travel. Based on the aforementioned examples, OMV aims to achieve a sustained reduction in long-distance travel by 30% by 2022 thanks to remote support. This will reduce CO<sub>2</sub> emissions and external costs for staff transportation.

Advanced process control systems are in the execution phase, implementing an algorithm-based predictive model that helps operators control and optimize the facilities at all times so that they can operate as efficiently as possible. This reduces the internal consumption of energy, decreases the carbon footprint, and increases the efficiency of processing chemicals, thus optimizing our carbon footprint and production costs. The connected operator (or connected worker) uses technology that enables direct data and streaming connections between the office and operational production sites, and allows our OMV experts to connect and make decisions remotely, thus making these processes location-independent. This helps facilitate same-day support and just-in-time decisions, which minimizes long-distance travel to high-risk areas. Our CO<sub>2</sub> footprint is therefore reduced, while our employees’ safety is increased.

### Digital Rig of the Future

This program focuses on reducing the time spent during the drilling phase of well delivery, while providing for real-time monitoring to reduce the impact of drilling issues. It uses AI-supported decision-making to address hazards through historical probability. The use of automated rigs and just-in-time logistics shrinks the rig site footprint considerably, reducing traffic to the rig site, improving efficiency, and easing the environmental impact due to less time spent drilling.

Addressing drilling hazards in the planning phase through the use of AI in the Decision Making & Simulation project will cut non-productive time, reducing operating days for the drilling rig. Furthermore, new well delivery software which will automate workflows is ushering in the future of well planning with an integrated, multidimensional model that reacts immediately to new engineering and subsurface information. This will reduce development well engineering



time by 90%. Improving efficiencies in planning and execution opens the door to exploring geothermal drilling.

### Digital Office of the Future

The above DigitUP lighthouse projects are enabled by the Digital Office of the Future. One goal of the Digital Office of the Future lighthouse is to modernize and consolidate our worldwide infrastructure and to provide the technologies needed for safe operations at all our locations. To a large extent, this is achieved through a transition from on-premise data centers to modern and public cloud providers. This transition enables us to actively modernize and consolidate our worldwide infrastructure to remove redundant equipment and to sharply decrease the need for cooling power, thus reducing the carbon footprint of our IT operations.

Another goal of the Digital Office of the Future is to provide the right data at the right time to our decision-makers. We are therefore providing a global and integrated data ecosystem with the objective of increasing the safety and efficiency of our operational activities. For example, our GIS systems display live weather data in combination with our asset data to ensure safe logistics and people transfers to our offshore platforms. We also provide information on safety risks on the roads we use to increase awareness of potential hazards. Moreover, we provide access to about 400,000 real-time sensors in our facilities to ensure that equipment integrity can be monitored.

### digitalmotion

digital*motion* is Downstream's effort to reach the next level of digital transformation covering all business aspects in Downstream's value chain. But digital transformation is more than applying and scaling technology – it's about people and culture. We therefore meet in an impact hub where collaborators share, innovate, and shape the digital transformation in Downstream and contribute to OMV's HSSE and climate targets.

### Predictive Heat Exchanger Cleaning

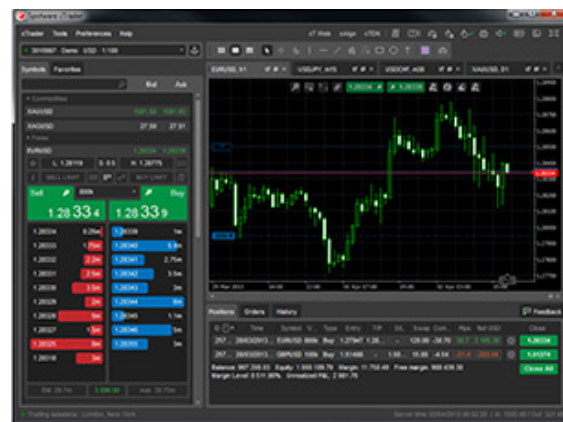
One digital energy-efficiency measure is the development of a "digital twin" to optimize the preheat train of the crude distillation unit in the Schwechat refinery. Process simulation is used here to help optimize the selection of cleaning cycles and flow conditions in the heat exchangers. The result is an increase in energy efficiency, meaning that we can recover more heat from our preheat systems and therefore reduce CO<sub>2</sub> emissions up to 18,000 t CO<sub>2</sub> annually.

### Algorithms to Support Gas Traders

As part of its emissions reduction strategy, OMV has been consistently increasing the share of natural gas in production

and aims for gas to account for around 60% of the production portfolio and for increased natural gas sales in Europe.

Through this emphasis on natural gas, the fossil fuel with the lowest carbon intensity, OMV can reduce the carbon intensity of our energy system today and enhance the viability of operations in the long term. Automatic gas trading supports this scale-up of our gas activities. Western European gas markets have made great strides in the last 15 years. Like financial markets, gas exchanges and brokers operate electronic marketplaces for trading gas contracts. OMV GAS is authorized to trade in twelve EU gas markets with physical gas delivery periods ranging from the remaining hours of the current day up to full calendar years and quoting in different currencies and energy units.



OMV GAS implemented an algorithmic trading tool connected via an API to the electronic trading platform to monitor the various and constantly changing order book activities and related opportunities simultaneously and 24/7. Every event is read and stored in real time in a high-performance database, which generates around 400,000 data records per day. Data analytics tools consolidate market information to search for patterns and optimize trading decisions. These combined with other customized Python scripts developed in-house enable trade signals to be processed in real time and order updates sent or deals closed within milliseconds. Up to 15 algorithms are in operation simultaneously to balance fluctuating gas supply and demand, as well as optimize gas transportation and gas storage capacities.

Consistency, multi-tasking capability, and speed are the main character traits of our algo-trading bot. Once set up and activated, the whole process from order entry, deal closing, deal capturing in the ETRM system, and renomination of the physical gas flow runs automatically without manual interference. These algorithms therefore support the work of gas traders and further optimize OMV's gas portfolio – all day, every day.