

energy innovation austria

2/2024

Current developments
and examples
of sustainable energy
technologies



Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

Shaping the energy transition

Women point the way in research and the energy industry

Equal opportunities and diversity in research and business have been shown to result in more innovation and represent important levers in driving forward the energy transition and climate neutrality by 2040. Experts such as Sonja Wogrin, who is shaping the energy system of the future with her team at Graz University of Technology, show the highly successful role that women are playing in scientific and technical professions in designing a sustainable future of energy.

Photo: Lunghammer/Graz University of Technology

More innovation thanks to equal opportunities

Women as stakeholders in the energy transformation

The energy transition and Austria's national objective of achieving "Climate neutrality by 2040" pose major challenges for our economy and society. The transition to a low-carbon economy and energy system that is fit for the future and based on renewable energy sources can only succeed if all available potential is exploited and lots of talented individuals take part. Women play a key role in this transformation process. Equal opportunities are needed in research and technology development, business and organisations, and in all key decision-making areas if we are going to be able to utilise the expertise and commitment of women in shaping a sustainable future of energy.

DIVERSITY AS A DRIVER OF INNOVATION

Many studies¹ have shown that equal opportunities contribute to greater openness and diversification in companies and organisations and promote the development of innovative strategies and solutions. Teams with a balanced proportion of women are often more solution-oriented, creative and efficient. Diversity has

been shown to increase company performance and productivity, encourages sustainable and innovation-friendly structures and contributes towards greater employee well-being and engagement. There is an urgent need therefore to step up efforts to motivate women to gain qualifications in science, technology, engineering and mathematics and to provide targeted support to their career opportunities in the energy industry. A study commissioned by the European Commission's Climate, Infrastructure and Environment Executive Agency (CINEA) is currently analysing the role of women in energy research in order to identify the factors for success for effective interventions in 35 countries.²

The current threat of a shortage of skilled personnel could also act as a driver for more equal opportunities, as many new positions, such as those in the fields of renewable energy sources, hydrogen or storage technologies, can only be filled if more women are recruited for these professions.



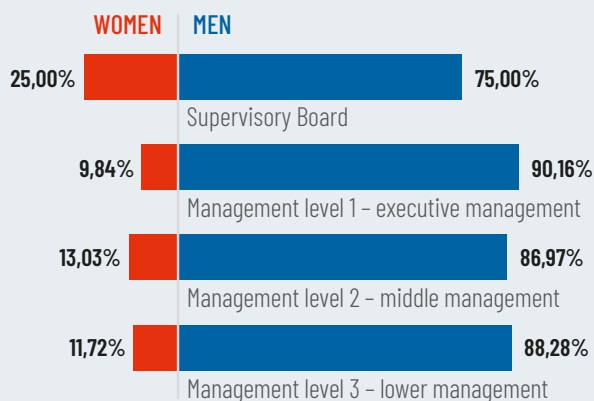
Photo: IDRIC

“ A just transition is imperative to achieve a sustainable future for all, whilst addressing the climate change emergency. Promoting equality and diversity across all aspects of the transition is also essential for the co-development of solutions towards a greener future. A multifaceted and whole system approach is key to our organisation, the Industrial Decarbonisation Research and Innovation Centre (IDRIC), as it is only through responsible innovation that we will address the complex challenges of a just transition. In this way, we are embedding and promoting equality, diversity and inclusion in our industrial clusters and research institutions to bring societal and economic prosperity.”

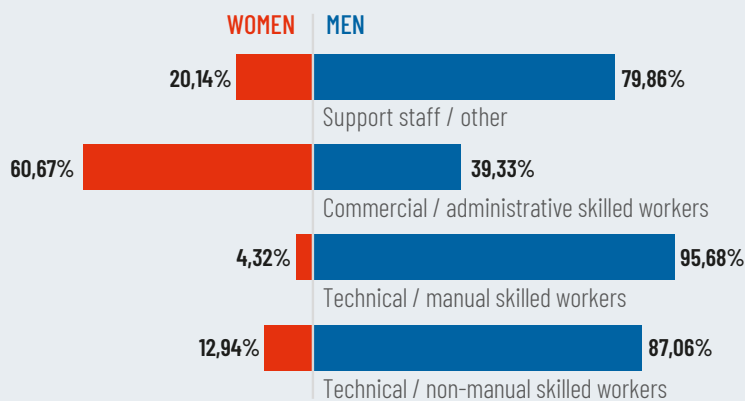
PROFESSOR MERCEDES MAROTO-VALER
IDRIC DIRECTOR AND INDUSTRIAL DECARBONISATION CHAMPION,
UK INDUSTRIAL DECARBONISATION RESEARCH & INNOVATION CENTRE (IDRIC)

Winner of the Net-Zero Industries Mission Award 2023 in the category "Female Innovators"

Proportion of women by management level



Proportion of women by job profile



Source: AIT study on "Equal opportunities in the energy transition" (data from 116 Austrian organisations)



Photo: Christina Maria Huber, neoom

EFFECTIVE MEASURES

The study on equal opportunities in the energy sector also reveals strategies and measures that can be used to improve gender equality in companies. Gender-sensitive language, a work-life balance and actual implementation of equal opportunities in everyday life are becoming increasingly important in the minds of employees. The specific recommendations stated in the study include the targeted promotion of young talent and teacher training, the creation of role models, transparent and fair application processes and the development of new working models (part-time working and job sharing, working from home models, flexible working arrangements, parental leave and leaves of absence, paternity leave, etc.).

WOMEN IN THE AUSTRIAN ENERGY SECTOR

It is also evident in Austria that the energy sector requires targeted measures to promote greater diversity. Only 24% of employees in this sector are women according to a study on equal opportunities in the Austrian energy sector that was commissioned by the Climate and Energy Fund and conducted by the AIT (Austrian Institute of Technology).³ Annual reports and sustainability reports as well as information on issues such as the advancement of women, gender mainstreaming and diversity were used for these analyses. Overall, data from 116 organisations of different sizes from all nine Austrian federal states were analysed.

A significant correlation could be seen with the size of the company, as the larger the company, the lower the proportion of female employees. The proportion of women generally varies widely depending on the area of activity, with only 10% of executive management positions on average held by women. The proportion of women is highest in the commercial/administrative sector at 61%, and lowest among technical/manual specialists at 4%.

In this edition, we introduce some experts from the fields of research and business who show great commitment working in key positions in the energy sector and are making an important contribution towards the transformation of the energy system. Selected current projects, which are being implemented with the support of the Federal Ministry of Climate Action and the Climate and Energy Fund, provide an insight into the work of these role models.

¹ "Diversity is good for Growth" study, PWC 2019 www.pwc.de/de/real-estate/pwc-diversity-is-good-for-growth.pdf

² Study on Gender Balance in the R&I Field to Improve the Role of Women in the Energy Transition empirica.com/news/study-on-gender-balance-in-the-ri-field-to-improve-the-role-of-women-in-the-energy-transition

³ nachhaltigwirtschaften.at/de/news/2023/20230724-studie-chancengleichheit-energiewende.php

PROMOTING WOMEN IN THE ENERGY SECTOR

Strategies and proposals

“EQUALITY IN ENERGY TRANSITIONS” INITIATIVE

Women’s networks play a key role in promoting equal opportunities and empowering women in the energy sector. Since 2018, the Federal Ministry of Climate Action has been taking part in the “Equality in Energy Transitions” initiative¹, a technology collaboration programme of the International Energy Agency and initiative of the Clean Energy Ministerial. The programme is devoted to strategies and measures for the targeted promotion of women in energy research and the energy industry. The aim is to connect women in energy-related professions with each other and to support the exchange of information and transfer of knowledge. It involves different measures that are intended to increase the visibility of women in technical and scientific professions – especially in leadership positions – in order to create role models for young women.

Various networking formats are being developed and implemented, including e.g. the Female Ambassador programme². Female Equality Ambassadors are managers from many different areas of the energy sector. The current period of the Equality Initiative in Austria sees the four female ambassadors Hemma Bieser (OurPower), Eva Dvorak (Coordination Centre for Energy Communities), Michaela Killian (Wien Energie) and Valerie Reif (Magnus Energy), who are all committed to encouraging more women to pursue a career in the energy sector and to supporting them on their career path.

- 🔗 Podcast: nachhaltigwirtschaften.at/de/iea/publikationen/2023/iea-equality-podcast-equality-initiative.php
- 🔗 www.equality-energytransitions.org

¹ www.equality-energytransitions.org

² nachhaltigwirtschaften.at/de/iea/technologieprogramme/equality/botschafterinnen-programm-2023.php

PROMOTING PEOPLE IN RESEARCH, TECHNOLOGY DEVELOPMENT AND INNOVATION

The Austrian Federal Ministry for Climate Action supports people in research, technology and innovation in order to increase employment opportunities and support career development. Particular attention is paid to increasing the proportion of women, building up RTI knowledge and expertise and creating the structures required to promote research careers. The aim is to attract young people to research through real-life experience and to empower female researchers and technicians already in the profession. However, support is also offered to organisations in order to promote equal opportunities, diversity and participation, create an innovation-friendly culture and thereby work to address the shortage of skilled personnel in Austria.

Different support programmes for more women in energy professions include internships for schoolgirls and female students as well as industry-related dissertations for doctoral training at the interface between science and industry. The FEMtech website includes profiles of more than 200 women who are experts in science and technology. A “Femtech Expert of the Month” is introduced to the general public.

- 🔗 www.ffg.at/en/talents
- 🔗 www.femtech.at/en



**KLIMAFONDS
DOSSIER
CHANGEGLEICHHEIT**

Background information, reports, interviews, etc. on the subject of “equal opportunities” can also be found in a Climate and Energy Fund dossier.

- 🔗 www.klimafonds.gv.at/dossier/changegleichheit

Female power for the energy transition at Austria's largest power plant

Michaela Killian, Wien Energie



Photo: Wien Energie/Michael Horak

One of the Austrian female ambassadors of the international "Equality in Energy Transitions" initiative is 35-year-old Michaela Killian, who took over the management of Wien Energie's Simmering and Donaustadt power plants in 2023 and thus became responsible for around 140 (almost exclusively) male employees.

Michaela Killian, who was also a competitive sportswoman for many years (playing volleyball), initially studied technical mathematics at TU Wien. She switched to the Institute of Mechanics and Mechatronics for her doctorate, before conducting post-doctoral research on predictive algorithms in industrial processes after completing her studies. One real-life application of this field of research includes building automation. Killian began her career as a data scientist in the Asset Operations department at Wien Energie in 2019. Her responsibilities in this role included optimising systems and increasing their level of automation based on data analyses. **"This work gave me a good insight into the power plants, waste incineration plants and the renewable energy generation division at Wien Energie,"** explains Killian. **"This is why I decided to go one step further into technology."**

Michaela Killian has managed the two large power plants in Simmering and Donaustadt since the autumn of 2023. Prior to this role, she had been Head of Operations Management since early 2022, and now has overall responsibility for the power plants, putting her in a key position to drive innovation for the energy transition and help shape the secure and sustainable future of energy.

GREEN HYDROGEN AS THE ENERGY SOURCE OF THE FUTURE

One key topic here is the use of green hydrogen in the energy system of the future. Green gases will play an increasingly important role as energy carriers for the heating transition and in the transportation sector.

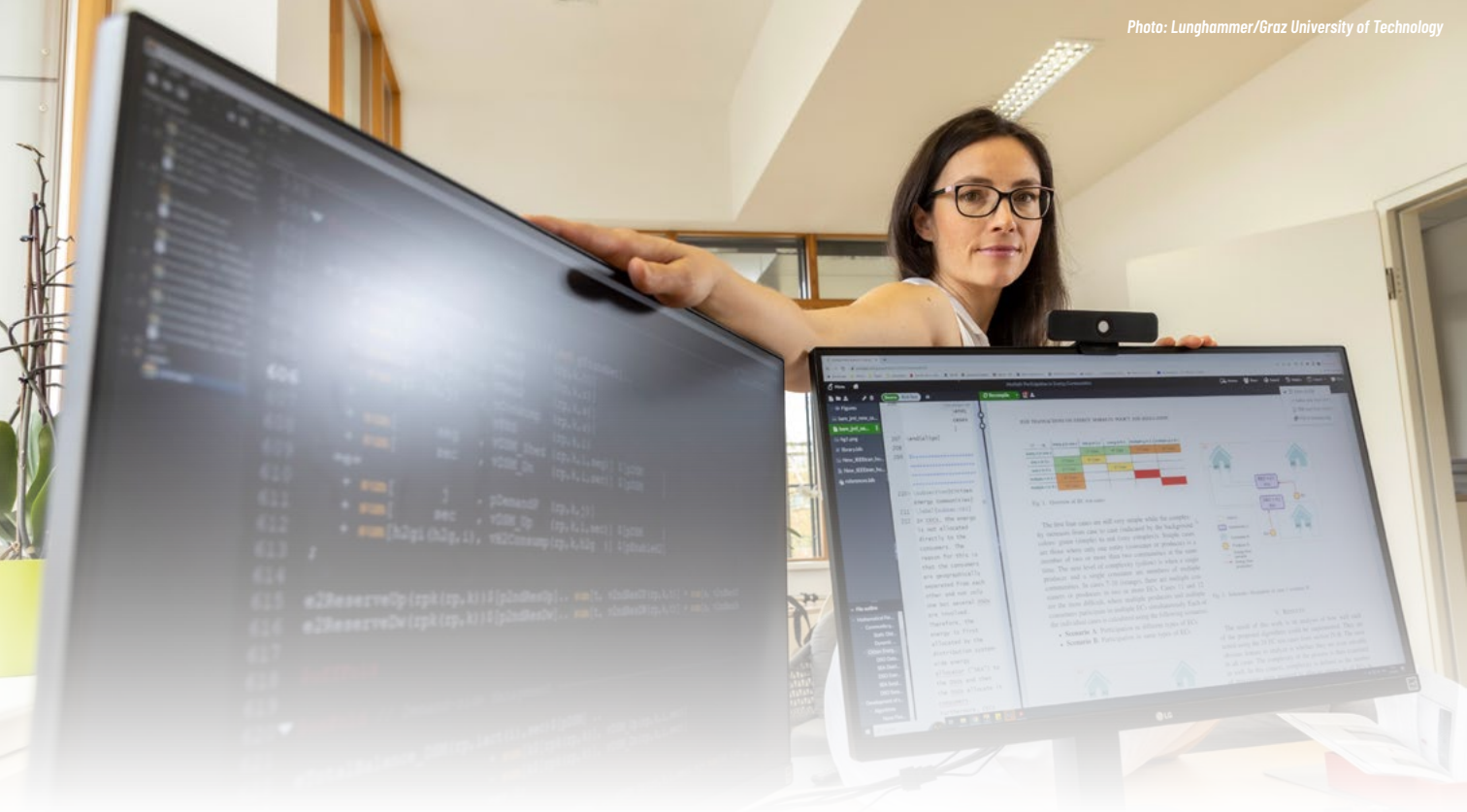
A large-scale demonstration project was launched at the Donaustadt power plant in 2023 involving the world's first hydrogen operating trial in an existing gas turbine of this size. Working together with VERBUND, RheinEnergie and Siemens Energy, it is testing out co-firing hydrogen into the gas turbine of a combined heat and power plant for the first time. The results so far are promising: the Donaustadt power plant is capable of saving around 33,000 tonnes of CO₂ every year by adding just 15 per cent by volume of green hydrogen.¹ **"In 2040 we will still be needing flexible power plants. So we are already working on solutions today that will let us decarbonise our power plant portfolio in the coming years"**, says Killian.

¹ See article in the eia edition 4/2023 www.energy-innovation-austria.at/article/h2real/?lang=en



Donaustadt power plant, photo: Wien Energie/Max Krapitz

Wien Energie is not just using hydrogen in its power plant. It will also be producing hydrogen: this spring, a hydrogen production plant goes into operation at the Vienna Simmering site. Wien Energie's electrolysis plant with a capacity of 3 megawatts generates up to 1,300 kilograms of green hydrogen (H₂) every day at the campus of operator Wiener Netze. All the electricity used for this purpose comes from renewable sources, such as solar and wind power as well as hydropower and the plant produces enough hydrogen daily to refuel around 60 buses and HGVs. Climate-neutral hydrogen is already being used by transport operator Wiener Linien as fuel for buses. Line 39 A in Vienna will e.g. be the first to undergo a complete conversion to zero-emission drives by 2025.



Modelling the energy system of the future

Sonja Wogrin,

ENERGETIC Research Center at Graz University of Technology

The energy industry is faced with some enormous changes. How can we manage the energy transition and become climate-neutral by 2040? Researchers at the ENERGETIC Research Centre at Graz University of Technology (TU Graz) are focusing on this very topic and are developing innovative solutions for the energy system of the future.

Sonja Wogrin, who was named Austrian of the Year in the “Climate Initiative” category by the daily newspaper “Die Presse” in 2023, heads up both the Center and the Institute for Electricity Economics and Energy Innovation at TU Graz. Her area of expertise is modelling and analysis of energy systems. *“I’ve always loved solving puzzles and problems”,* says Wogrin, *“which is maybe what motivated me to study Technical Mathematics at TU Graz. I discovered the topics of energy and electricity markets as part of my dissertation in Spain, during a time when the expansion of renewables was really booming.”*

The energy transition towards a 100% renewable energy supply requires a comprehensive transformation process. Lots of different components and numerous different players must collaborate as effectively as possible in the energy system of the future in order to ensure a secure and sustainable supply. It is precisely this complexity in the energy system that Sonja Wogrin finds so exciting about her field of research.

“The electricity system is a marvel of technology”, says Wogrin, *“because there needs to be a balance between supply and demand of electricity at all times. As a mathematician, I thought to myself at the time ‘wow, that’s it’. The energy sector is one area that really covers all bases, from technical challenges to uncertainties such as the weather, regulatory framework conditions as well as numerous political, economic and social aspects.”*



Photo: Lunghammer/Graz University of Technology

ANALYSIS OF DECARBONISED ENERGY SYSTEMS

What happens in the energy system when large quantities of renewable energy sources need to be generated and integrated and how does this transformation affect load flows, energy distribution and storage systems, as well as the energy markets?

“The energy systems are so highly complex because everything is always so interconnected”, explains the expert, **“and the question of where the expansion of renewables takes place and what technologies and framework conditions are needed for this has a major impact on the development of the overall system.”** Reliable modelling of these complexities is necessary in order to be able to assess future requirements and make the right investment decisions. Sonja Wogrin and her team at TU Graz are developing state-of-the-art optimisation and simulation models for the operation of integrated sector-coupled energy systems. These models form the basis for creating techno-economic analyses for climate-neutral energy systems.

INFRATRANS 2040

The InfraTrans 2040 project¹ was recently completed in which three expansion scenarios for the energy infrastructure in Austria in the areas of electricity, gas and heat were developed and comprehensively evaluated both from a qualitative and quantitative point of view. All the scenarios clearly show that electricity consumption will increase significantly by 2040 and that a massive expansion of renewable energy sources will definitely be necessary in order to achieve the national climate targets.

“We currently have electricity consumption of around 70 terawatt hours in Austria and this could double by 2040, which would mean that it would then be 140 TWh. Nobody has a crystal ball, but from my point of view increased expansion of renewables is a no-regret measure,” says the project manager with conviction.

The project team’s objective was to analyse three scenarios, each with a different focus (import/export focus, sector coupling and energy efficiency) and to derive possible infrastructure expansion plans from these. Several models (LEGO, HyFlow, ASCANIO) were designed specifically for the respective investigation purpose and coupled with each other. Then a multi-criteria analysis and evaluation was carried out in order to systematically compare technical, techno-economic, macro-economic and ecological aspects with each other and to determine the respective dependencies.

¹ Project consortium: Graz University of Technology, Institute of Electricity Economics and Energy Innovation (project management), Montanuniversität Leoben, Economic Research Institute (WIFO)



Photo: Lunghammer/Graz University of Technology

“The basic motivation behind the scenarios was to generate a spectrum and show that there are several options available for us to achieve our objective. Expanding renewables makes sense in all of the options. With this in mind, we also analysed, for example, the necessary expansion of power lines in the transmission grid”, explains Wogrin. The simulations showed that a massive expansion of renewables could result in grid bottlenecks on both the east-west and north-south axes, which would make reinforcement of the Austrian transmission grids necessary. Austria’s integration into the European transmission grid was also taken into account, which is a very important aspect that had not yet been mapped in earlier scenarios.

The experts were able to use the modelling to identify different possible transformation paths for the infrastructure up to 2040. A GIS-based and web-compatible map (e.g. for energy infrastructures, the potential of renewable energy sources, local energy requirements), which was also developed as part of the project, provides an overview of the complex interrelationships.

WHAT ADVICE WOULD YOU GIVE TO YOUNG WOMEN ABOUT EMBARKING ON A CAREER IN THE ENERGY SECTOR?

“There is currently an enormous spirit of optimism prevailing in the energy sector, and so much to do that a degree in technology, e.g. electrical engineering, is the best way to make a difference. In a few years you will then be working on the new design for the energy market, meaning that you really can play an active role in shaping the future.”

We urgently need more women in the energy sector because they come with a different background and have a more broad-based approach to these issues. We also know that more diverse teams work much more effectively. What I would like to say to young women is that if you care about the climate then please go into technology.”

On the path towards climate-neutral industry

Irmela Kofler, K1-MET



Photos: K1-MET

The decarbonisation of industry is an important lever in achieving European and national climate targets and at the same time represents one of the biggest challenges. Industry is responsible for almost 29% of energy consumption in Austria. The energy-intensive iron and steel, cement and chemical sectors in particular require very high temperatures for their production processes and are responsible for causing significant greenhouse gas emissions.

Irmela Kofler is head of the Decarbonisation and Sector Coupling research area at the metallurgical competence centre for ferrous and nonferrous metallurgy K1-MET in Austria and focuses specifically on these industrial processes. ***“We are supporting industry on the path towards CO₂-neutral production and have two priorities here”***, explains the expert. ***“The first one is to avoid CO₂ emissions by using alternative energy sources, such as hydrogen. Secondly, wherever CO₂ emissions are indeed unavoidable, we want to generate valuable material from them.”***

The native of the Austrian city of Linz was fascinated by large industrial plants even as a child. Her enthusiasm for technology and exciting chemistry lessons at school provided the motivation for her to pursue a technical chemistry degree, initially with the aim of going into pharmaceutical research. But working on milligram scales in the lab was not the right thing for her after all, and so Kofler did a doctorate in process engineering. ***Kofler remains convinced that “the earlier they come into contact with technical topics and the more these become a matter of course, the more likely it is that girls will have the confidence to have these professions on their shortlist”.***

DEMO PROJECT IN THE STEEL AND CEMENT INDUSTRY

The ZEUS (Zero Emissions through Sector Coupling) lead project was launched in 2023 to demonstrate the production of green hydrogen and the recycling of renewable gases and liquid hydrocarbons in an industrial environment. K1-MET is the consortium leader for the project, with Irmela Kofler acting as the supervisor and having overall financial responsibility for the major research project.

ZEUS is focused on the steel and cement industries, where decarbonisation is difficult. The objective is to develop and provide a pilot demonstration of a comprehensive holistic concept for climate-neutral production: from the production and processing of green hydrogen under fluctuating process conditions, through to capturing CO₂ from industrial waste gases and converting it into valuable hydrocarbons (e.g. synthetic natural gas) that can be stored. Different technologies (6 MW PEM electrolysis, CO₂ capture, catalytic methanation, CO₂ electrolysis) are being researched, tested and linked to form process chains for this in an industrial environment.

“The holistic CO₂-neutral process chain, which is demonstrated using the example of the steel and cement industries, is also transferable to other branches of industry. We compare different technologies so as to highlight the most energy-efficient way,” explains Kofler.

In addition to expanding renewable energy production, another important focus involves coupling the energy industry with power-intensive industries. Sector coupling aims to convert surpluses from renewable electricity generation into storable energy carriers and contribute towards stabilising the energy system. Capturing CO₂ and converting it into storable products is the central approach in those processes where CO₂ emissions are unavoidable. The ZEUS consortium¹ is made up of partners from the energy sector, industry and research and covers the entire value added chain (plant engineering, technology development, production, etc.). Through trials at two industrial sites, the project will contribute towards accelerating the adoption of climate-friendly technologies in practice and towards entrenching the concept of sector coupling in Austria.

¹ Project consortium: K1-MET GmbH, Energy Institute at the Johannes Kepler University Linz, Institute of Organic Chemistry - Johannes Kepler University Linz, GIG Karasek GmbH, Montanuniversität Leoben - Chair of Process Engineering for Industrial Environmental Protection, Rohrdorfer Zement - Zementwerk Hatschek GmbH, TU Wien - Institute of Chemical, Environmental and Bioscience Engineering, Verbund AG, voestalpine Stahl GmbH, WIVA P&G - Hydrogen Initiative flagship region Austria Power & Gas



360° solutions for the energy transition

Christina Maria Huber, neoom

The FEMtech initiative by the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) introduces women from research and technology to the public with their work in scientific and technical professions. Christina Maria Huber from neoom was the FEMtech expert of the month in October 2023.

As head of the cleantech company's Sustainability department, Christina Huber operates at the interface between legal, economic, technical and organisational issues. Her education gave her an ideal foundation for this. After graduating with a bachelor's degree in economics, she opted for the interdisciplinary degree programme Environmental Technology and International Affairs offered by TU Wien together with the Diplomatic Academy. **"I actually came across the topic of decentralised renewable energy systems by chance through a part-time job and then wrote my bachelor's thesis on smart power grids and their role in the energy transition",** says Huber. **"I realized that the technical solutions exist, but that they often do not reach business or society, because of the different languages these actors speak. I decided I wanted to become a bridge builder between the technical, economic and social aspects. Finally, I found myself working in corporate sustainability, which is very fitting."**

neoom is an international company that originates in Austria and that develops complete solutions for the energy transition. It provides comprehensive support to companies, municipalities and private customers in transitioning towards a decentral renewable energy supply. neoom works with regional partners to plan and build solar storage power plants. It uses its own smart energy management platform neoom CONNECT to control storage systems, photovoltaic systems, as well as e-charging stations and heat pumps from

third-party providers to ensure optimal utilisation. The company also develops and implements new business models and compatible financing concepts. **"We utilize the emerging opportunities offered by energy markets to develop new business models. Renewable energy communities are one example of this. By the beginning of 2024, we had already founded around 70 energy communities, making us one of the largest providers in Austria,"** emphasises Huber.

Designing sustainable solutions for the energy transition involves a wide range of interdependent technical, economic and social issues, and this is precisely why Christina Huber sees lots of opportunities for women in this professional field. **"I am delighted to see women increasingly represented in the sustainability sector. I think they are particularly suited to the tasks of bringing about far-reaching changes and of thinking about social dimensions, transparency and fairness in ecological and economic terms,"** says Huber with conviction. **"Diversity has been shown to improve corporate success and that is why we need women in scientific and technical professions to help shape the energy transition."**



Photo: Jakob Barth

FAÇADE MODULES FOR ENERGY-EFFICIENT BUILDING RENOVATIONS

The RENVELOPE research project involves the development and testing of multi-functional CO₂-neutral serial systems for the renovation of existing buildings. The concept is based on modular and flexible building envelope elements consisting of a support structure, a thermal insulation layer and energy-active technologies for renewable energy supply (PV, heat pumps, battery storage systems, etc.). The objective is to use these modules to complete both the thermal renovation as well as the energy system switch in one single work step. There are 17 Austrian project partners from research, the building, battery and solar industries developing innovative solutions, that will be demonstrated on three different high-volume building typologies. neoom is a project partner in the development and trial of the façade elements (e.g., research that is taking place on integrating battery storage systems into the building envelope) and is contributing its expertise in areas that include "digital monitoring and operational optimisation".

The project is being implemented as part of the Green Energy Lab research initiative. [greenenergylab.at](https://www.greenenergylab.at)

Heat pump technology for industrial processes

Veronika Wilk, Austrian Institute of Technology



Photo: Fotodienst/Christian Mikes

Photo: AIT/Krischanz

The provision of process heat is a key issue when it comes to the transformation of industry towards climate neutrality. Many branches of industry need heat in the form of hot air or steam at high temperatures for various production steps.

Veronika Wilk and her team at the Austrian Institute of Technology (AIT) conduct research into the decarbonisation of thermal processes in industry. Her work includes analyzing waste heat potential and the question of how renewable heat can be used efficiently and repeatedly in the production process. Heat pump technology, which is still not widely used in industry, could be part of the solution. *“Our research relates to the area of high-temperature heat pumps because industrial utilisation calls for temperatures above approx. 100 degrees”,* explains the head of the “Efficiency in industrial processes and systems” research field at AIT. *“In the last ten years, there have been important developments to increase the temperature level. Finding the right materials, such as suitable refrigerants or compressors that can withstand these high temperatures, is essential. It is also very important to cooperate with industry and prove the reliability of the new technology with as many operating hours as possible.”*

Veronika Wilk grew up with renewable energy technologies as her father worked in the photovoltaic sector and renewable energy was also subject to a lot of discussion at school. Her interest in environmental protection and renewable energy sources motivated her to study chemical engineering – a combination of mechanical engineering and technical chemistry, with a focus on large technical plants. *“I wrote my thesis on the topic of gas generation from waste and residual materials, which is a very exciting topic that addresses energy and resource efficiency”,* says Wilk. *“After graduating, I worked as a postdoc researcher at TU Wien before joining AIT in 2014. It was very important to me to continue in applied research and work on the latest developments. The key topic of energy and resource efficiency still concerns me today, but now from a slightly different perspective – now it’s about solutions for CO₂-neutral heat supply in industry.”*



Photos: Fotodienst/Christian Mikes

HIGH-TEMPERATURE HEAT PUMP FOR A VIENNA-BASED PHARMACEUTICAL COMPANY

The current AHEAD project¹ involves developing and demonstrating an innovative solution for supplying heat to processes at the pharmaceutical company Takeda. The high-temperature heat pump system utilises waste heat from the cooling process to produce steam and relies on heat pumps with natural refrigerants and steam compressors. The system consists of a steam-generating heat pump from SPH Sustainable Process Heat, which is adapted for the use of natural refrigerants and combined with steam compressors to generate steam at 11 bar(a)/184°C.

The AHEAD system is designed to meet the requirements of the pharmaceutical company, but can be expanded for temperatures of 200-260°C without requiring further development. Veronika Wilk and her team at AIT are developing an optimised operating strategy aimed at running the AHEAD system with minimal energy requirements. The system is scheduled to go live in early 2025. ***“We will then continue to scientifically monitor the operation together with the heat pump manufacturer to see whether the system is working as efficiently as we expect it to do. We will also be working on the control and further optimisation of the system as part of the project scope”***, explains the project manager.

Global pharmaceutical manufacturer Takeda aims to have its facilities operating with net-zero greenhouse gas emissions before 2035. The AHEAD project is an important milestone on the road towards this objective. The high-temperature heat pump has the potential to generate steam that is virtually CO₂-neutral in over seven months, which represents a saving of 1,600 tonnes of CO₂ each year.

A concept aimed at implementing the AHEAD system at other Takeda sites in Vienna and worldwide is also being developed as part of the project. The decarbonisation potential of the technology in other sectors (paper, chemicals and petrochemicals as well as food) is also being investigated. The demonstration project will thereby serve as a practical test for Austrian industrial companies from various sectors.

The innovative concept received the Mission Innovation “Net-Zero Industries Award Austria” in the “Outstanding Project” category in 2023.

¹ Project consortium: AIT Austrian Institute of Technology, SPH Sustainable Process Heat GmbH, Takeda Manufacturing Austria AG

The AHEAD project is part of the NEFI (New Energy for Industry) innovation network, which promotes the decarbonisation of industrial companies through innovation and technology development. www.nefi.at/en



Photo: Fotodienst/Christian Mikes

MILESTONES IN THE AHEAD PROJECT

- > Design of the the heat pump and plan of the on-site integration at Takeda
- > Test bench trials
- > Installation of the AHEAD system
- > Creation of a system model for optimised operation
- > Commissioning of the system
- > Evaluation of the AHEAD system after 4,000 operating hours
- > Concept for the roll out of the system
- > Determination of the decarbonisation potential for Austria

INFORMATION

H2Real

Wien Energie

Contact:

Michaela Killian

michaela.killian@wienenergie.at

positionen.wienenergie.at/projekte/waerme-kalte/grueneskraftwerk-donaustadt

InfraTrans 2040

Institute of Electricity Economics and Energy Innovation/TU Graz (IEE)

Contacts:

Sonja Wogrin, Udo Bachhiesl

iee@tugraz.at

www.tugraz.at/institute/iee/forschung/abgeschlossene-projekte/infratrans2040

ZEUS – Zero Emissions through Sector Coupling

K1-MET GmbH

Contact:

Irmela Kofler

irmela.kofler@k1-met.com

www.k1-met.com/en/zeus

RENVELOPE

AEE – Institute for Sustainable Technologies (consortium leader)

Contact:

Florine Leighton, M.Sci., PhD.

f.leighton@aee.at

renvelope.at

greenenergylab.at/projects/renvelope

AHEAD

AIT Austrian Institute of Technology

Contact:

Veronika Wilk

veronika.wilk@ait.ac.at

www.ait.ac.at/ahead

www.nefi.at/en/project/ahead

FEMtech Initiative of the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK)

www.femtech.at

IEA Equality in Energy Transitions Initiative

www.equality-energytransitions.org



Climate friendly production, FSC certified,
Green Seal and Austrian Eco Label

You can also
visit
us at:

[www.energy-
innovation-
austria.at](http://www.energy-innovation-austria.at)

energy innovation austria presents current Austrian developments and results from research work in the field of forward-looking energy technologies. The content is based on research projects funded by the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology and the Climate and Energy Fund.

www.energy-innovation-austria.at

www.open4innovation.at

www.nachhaltigwirtschaften.at

www.klimafonds.gv.at

www.energieforschung.at

IMPRINT

Publisher: Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, (Radetzkystraße 2, 1030 Vienna, Austria)

in cooperation with the Climate and Energy Fund (Leopold-Ungar-Platz 2/142, 1190 Vienna, Austria)

Edited and designed by: Projektfabrik Waldhör KG, 1010 Vienna, Am Hof 13/7, www.projektfabrik.at

For change of your shipping address contact: versand@projektfabrik.at