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Foreword by the GFSE President

As the international community is able to leave COVID-19 by-and-large behind, in-person meetings are resuming and more opportunities present themselves for GFSE to interact with live and on-line audiences.

The Russian invasion of Ukraine in February 2022 has given renewed urgency to energy security as a critical component of national sovereignty in many countries. It has furthermore propelled the EU to de-couple as rapidly as possible from Russian fossil fuels and to accelerate the green transition. This opens up new opportunities for energy cooperation with other regions, including the African continent with which the GFSE has cultivated exchange and sharing of experiences from its very inception.

The green transition needs to be inclusive and participatory; it needs to draw on the life experience and transformational potential of women and men in every society and at every level of the energy systems. Skilling – re-skilling of persons already employed in the “old” energy sector” and up-skilling of persons, in particular women and youth, who are not currently in the labor force – constitutes a major challenge and opportunity. With several of its policy briefs, the GFSE addresses some of the salient issues and I welcome comments and suggestions for further study and exploration.

In the period presented in this report, the GFSE was also invited to participate in a number of national and international endeavors to accelerate the much needed energy transformation. I look very much forward to continue the engagement with our members, our audiences and our partners.



Ambassador (ret.). Irene Giner-Reichl

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1 Introduction

The Global Forum on Sustainable Energy (GFSE) is a neutral multi-stakeholder platform facilitating international dialogue on energy for sustainable development by taking into account the special interests and challenges of developing countries. GFSE aims at the establishment of a sustainable world energy system from a social, economic and environmental perspective.

GFSE contributes to both international discourse and information dissemination on sustainable energy. The multi-stakeholder platform plays a crucial role in facilitating sustainable energy projects by bringing together donors, investors and project developers. Their interaction creates new opportunities and enhances existing initiatives in the field of sustainable energy.

GFSE operates at the intersection of international energy discourse and diplomacy. Conferences and regional fora or workshops are the visible peak of the GFSE activities. GFSE activities can be grouped into three categories, namely networking, dissemination of information and facilitation of project initiatives.

1. GFSE is a networking agent

The Global Forum on Sustainable Energy interacts and networks with other energy initiatives and organizations in the energy field and thereby enhances synergies and complementarities. GFSE has been playing an active role in bringing together several energy-related initiatives, launched at the World Summit on Sustainable Development in 2002 in Johannesburg. GFSE works as an information provider and networking agent for several stakeholders.

2. GFSE informs on sustainable energy

GFSE prepares and initiates events devoted to the promotion of and dissemination of energy technologies in the renewable energy and energy efficiency fields in the context of sustainable development, and to showcasing and discussing inclusive solutions for the transition towards a sustainable energy system.

3. GFSE facilitates project initiatives

GFSE fosters partnerships and facilitates energy for sustainable development initiatives. It supports private-public partnerships by presenting opportunities and identifying partnership possibilities.

History of GFSE Activities

Since its establishment in 1999, the Global Forum on Sustainable Energy has engaged in numerous activities and has significantly contributed to shape the national and international debate on sustainable energy and development.

The Vienna Energy Forum (VEF) developed out of a series of international and regional GFSE Meetings, which addressed different aspects of energy for sustainable development.

More recent activities and publications of the Global Forum on Sustainable Energy are described in this report. The GFSE Activity Reports, including the one for the period 2021-2023 can be found on our website www.gfse.at.

2 GFSE Events

In order to bring together various stakeholders actively working in the energy, climate and developmental fields, the Global Forum on Sustainable Energy regularly organizes thematic workshops and expert discussion rounds. Three events were organized during the 2021 – 2023 phase.

2.1 Side Event "Green Skills for the Youth in the Sustainable Energy Sector" at the Vienna Energy Forum 2021

The Global Forum on Sustainable Energy in cooperation with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) organized a side Event "Green Skills for the Youth in the Sustainable Energy Sector" at the Vienna Energy Forum 2021.

The GFSE side event was held in the context of the The Youth for VEF. The Youth for VEF was the first-ever youth-dedicated space hosted within the VEF and in partnership with the SDG 7 Youth Constituency. The Youth for VEF was created with the objective of providing a platform to empower youth.

The side event **Green Skills for the Youth** took place virtually on 5 July (15:30-16:30) at the Vienna Energy Forum. It brought together representatives from the renewable energy sector to share best practices, discuss challenges and bottlenecks, and exchange experiences on green skills strategies that are needed to scale up solar energy and other renewables. The agenda can be found [here](#).

The event took off with a short introduction to the subject **by Irene Giner-Reichl, president of GFSE and president of GWNET**, who pointed out to the challenges faced by numerous countries to find qualified staff for the energy transition towards a full renewable energy system. After the introduction, the SOLTRAIN Initiative was presented by Werner Weiss (AEE Intec). SOLTRAIN (Southern African Solar Thermal Training & Demonstration Initiative) is a regional initiative on capacity building & demonstration of solar thermal systems in the SADC region, supported by the Austrian Development Agency (ADA). SOLTRAIN provides specialized solar thermal courses and trainings and offers a dual training for company staff. SOLTRAIN has trained about 3400 people between 2009 and 2020 in six countries. It also addresses the areas of awareness raising, R&D, financial incentives and regulations in a comprehensive concept.

During the discussion, **Mr. Weiss (AEE Intec)** emphasized the need to bring together university graduates and installers to allow them learning from each other. He also emphasized the importance of digital technologies for education and training and the lessons learning during the pandemic to make virtual training more effective. Virtual training represents a good way of reaching larger segments of trainees and those who cannot afford to travel long distances to attend in-person training, thereby reducing the costs and making knowledge available to a broader audience.

Thereafter, the panellists lively discussed elements of training strategies. **Mr Christian Holter (SOLID)**, for example, emphasized the need to train young women in solar thermal energy

and raise their interest in technical professions. In addition, the panelists pointed out to the usefulness of dual training that allows trainees to receive education at vocational facilities and at the same time gain hands-on experience on the job.

Michael Müllneritsch (ARACUBA) stated the importance of providing training not only on technical skills but also on business models development, management, market assessment and marketing strategies for renewable energy technologies. He also highlighted the importance of digital tools for micro-learning, in order to provide small portions of knowledge to allow learners study at their own pace.

Marcel Huber (Syncraft) stated that STEM disciplines should be promoted equally to young boys and girls. At small age, children do not show any bias towards a particular profession and this opportunity should be tapped. It is thus very important to address them with the right tools to arise their interest in science and technology in general and, in particular, in renewable energy and energy efficiency. He also sees an important role for university in facilitating practical hands-on experience in real-life environments for students.

Several panelists, among others Ms. Giner-Reichl stressed the importance of women-led initiatives and female role models to promote training for women in the renewables sector and allow them to become technical experts and managers.

In conclusion, all panellists agreed that the young generation requires solid training in renewable energy to raise to the challenge of driving the energy system towards net zero GHG emissions. Training strategies must make use of new, innovative concepts to make the most of available time and resources, combining on-the-job training with vocational education and profiting from digital tools and cooperation. Training has to be embedded in a comprehensive concept encompassing supporting policies, R&D, business models, awareness raising and demonstration.

Educational approaches have to start early raising awareness and interest of young women and men on renewable energy. Ideally, pupils at school should be informed about the possibilities of renewable energy and possible career paths.

2.2 Online Event „Jugend & Green Skills“

On the 1st of December 2021, the Global Forum for Sustainable Energy (GFSE) hosted a virtual event entitled "Youth and Green Skills." Issues of climate change and energy transition concern all generations. This workshop aimed to discuss possibilities for youth engagement in climate and energy policy. With experienced speakers, we were able to learn and debate local, international and global approaches.

Former Ambassador and GFSE President Irene-Giner-Reichl opened the event. She highlighted that the United Nations (UN) had been intensively working on Development Goal 7 (SDG7), "Affordable and Clean Energy," and its acceleration. Overall, the transformation of systems towards carbon-neutral value creation would be too slow. Two essential and large groups that could accelerate and support change are often not involved and do not influence decisions. These two groups are women and youth. Both groups are not well involved, and changing this is a significant concern for us. Also, in the Vienna Energy Forum (VEF) preparatory process, these two groups were explicitly asked to participate actively, and youth and women were empowered to be essential actors of transformation. With this virtual event,

the GFSE makes a small but significant contribution to offering women and young people a stage. Special skills are needed to help shape this transformation of our world and environment - green skills because the future belongs to women and young people.

Involving young people via social media:

In the first lecture, Ms. Susanne Wolf-Eberl presented us with the latest findings and experiences from the project "youthcodes". Young people's understanding of the necessity of the mobility transition will contribute decisively to the success of new mobility patterns and technologies. In the reality of young people's lives, the topic of sustainability, especially self-restraint and traffic avoidance in the context of mobility, currently plays a rather subordinate role. To make the consequences of their mobility behavior comprehensible and meaningful to young people at an early stage and to motivate them to develop conscious, sustainable, and sufficiency-oriented mobility styles, strategies, methods and tools must be identified and reflection mechanisms and discourses initiated via social media. In connection with digital trends (virtual reality) and future life realities (such as gig-working, sharing economy), mobility should also be rethought and lived.

So far, the target group "young people" has only been confronted with partial aspects of the mobility revolution (sharing, cycling, app use, learning videos), etc... However, behavioral changes need an overall view and understanding of future scenarios to select those change options corresponding to the respective lifestyle and self-image. Together with the target group, the project aims to identify their scope for action and thus contribute to behavioral changes that support the mobility transition. The intended qualitative improvements primarily concern the more substantial involvement of the target group of 15-24-year-olds in future mobility scenarios and the expansion of their options for action in their choice of mobility through the inclusion of digital trends. The results should, for example, enable generally valid statements on the target group of 15-24-year-olds in Austria for the calculation and improvement of market potentials e.g., sharing or services. By involving experts, new insights should be gained in mobility awareness-raising, behavioral changes, and activation strategies.

Vocational training in renewable energy in Burkina Faso:

Mr. Robert Moosbrugger from the Vorarlberg University of Applied Sciences presented an Austrian Development Cooperation (ADA) project and its evaluation in Burkina Faso. Burkina Faso is landlocked in the West African Sahel region with a growing national economy (5.7 percent in 2019). After the overthrow of long-time president Blaise Compaoré and the suppression of a coup attempt, democratic elections in late 2015 were peaceful. Roch Marc Christian Kaboré was elected as the new president. Economically, exports of raw materials (gold, cotton) in particular boosted the gross domestic product.

Nevertheless, the fall in international prices and the political crises led to an economic crisis for large parts of the population in recent years. The majority of the working population in Burkina Faso still works in agriculture. Most of the time, the harvest covers the country's own needs and fluctuates greatly due to difficult climatic conditions. The effects of climate change are also increasingly being felt. Although Burkina Faso has made progress in the last 20 years - for example, in primary education and drinking water supply - almost half of the more than 20 million inhabitants live below the poverty line. Austria, therefore actively supports the Burkinabe government in reducing poverty and combating the effects of a wide range of

emergencies - for example, by providing food or addressing the immense challenge of internally displaced persons. Improving education and increasing productivity are among the country's most significant challenges.

The Austrian Development Agency, therefore, promotes practical and needs-oriented vocational training. Per capita, CO2 emissions in Burkina Faso are thirty times lower than in Austria, with twice the population. The current annual electricity production is 1.24 TWh. In comparison, Austria produces around 72 TWh of electricity per year. Energy poverty is a major challenge in Burkina Faso. The electrification rate for the whole country is 22.8%, with huge differences between the urban 68.8% and rural 5%. Burkina Faso has immense potential for solar energy. For better illustration, it should be mentioned that twice as much electricity could be produced in Burkina Faso with the same number of PV modules as in Austria. In vocational education and training, this results in significant challenges. Both structural problems in the sense of scarcity of resources, unequal access, little coordination, and a hardly existing dual vocational training. But also external inefficiencies such as a low reference to practice in training and an internal inefficiency such as in the low qualification of teaching staff. The project aims to actively and sustainably support the energy transition in Burkina Faso and to accompany and link it with vocational training. To improve access to energy, better training, more jobs, and public access to vocational training and increase quality. So far, the project, which will run until the end of 2021, has introduced specialization in "electricity and installation of solar systems," including curricula in eight vocational high schools. The teaching staff has been trained, teaching materials have been updated, and solar systems for practical training have been delivered and installed. More schools are to follow in the future. Women, in particular, are very interested but, unfortunately, still underrepresented. Joint efforts are needed to motivate companies to accept and promote more women.

Community Project on Photovoltaic in Ghana

Gudrun Bruckner from the association "uwa" presented her initiative "Light for Kwanta". The electricity grid in Ghana is very unreliable and unsafe. Time and again, some outages can last from hours to whole days or rationing, as not enough energy is produced for the entire population. For the inhabitants of the village, a permanent power supply is enormously important, especially in the "Awudome Kwanta Library," to be able to use the only publicly accessible computer and to be able to teach without restrictions and with light. Therefore, the association's great concern was to guarantee the power supply, especially in this building. In February 2017, chairwoman Gudrun Bruckner traveled to Ghana with a group of motivated students to install a photovoltaic system on the library's roof. They were supported by an experienced solar technology expert from Austria. Through active contact with a company in Ghana, the photovoltaic modules were purchased locally to strengthen the local economy and use the local producers' experience in developing heat-resistant modules for the Ghanaian climate. The necessary technology is also available in Ghana - but it is not easy to reach for the general population and is financially unaffordable. The most important thing was not only to give the inhabitants of "Awudome Kwanta" access to solar technology but also to provide them with the necessary know-how to maintain the system on their own and possibly to be able to set up further systems themselves in the future. In addition, the awareness of the population for renewable energies should be strengthened.

A Global Perspective and the UNIDO BLOOM Project

Martin Lugmayr presented a supra-regional view from the United Nations Industrial Development Organisation (UNIDO) perspective and present initiatives at a global level. Mr. Lugmayr presented the BLOOM Cluster program. BLOOM is hosted by the Barbados Investment & Development Corporation. It is being set up in partnership with the Ministry of International Business and Industry (MIBI) and technical support from the United Nations Industrial Development Organisation (UNIDO). The cluster will receive financial support from the Global Environment Facility (GEF) funded project "Strategic Platform to Promote Sustainable Energy Technology Innovation, Industrial Development and Entrepreneurship in Barbados" in its initial phase. The project aims to increase the participation of Barbadian companies in the expanding global value chains for the production and service of sustainable energy. More information on the project can be found [here](#). The project is part of UNIDO's regional cleantech cluster program under the GN-SEC. In partnership with regional economic communities, the program supports Least Developed Countries (LDCs) and Small Island Developing States (SIDS) to establish cleantech clusters and associations.

Accelerating the energy transition via sailboat along the African continent

Michael Puttinger described his experiences and adventures during his journey and circumnavigation of the African continent and his cooperation in energy projects in various countries. His travels and activities in the energy sector have taken him to Egypt, Maldives, Seychelles, Mozambique, and currently South Africa. Other future country stops will be Namibia, Gambia, and Senegal. He concludes that it always takes needs-based measures to implement projects. Involving the local population and raising awareness are among the key factors for a successful project. If you would like to follow Mr. Puttinger and his exciting projects and experiences, you are welcome to do so via his website www.wind-driven.com.

2.3 Online Event “Young Women and Green Skills”

On Tuesday, 20.09. 2022, a virtual GFSE workshop took place. Under the title "Young Women and Green Skills", interested parties gathered for a joint exchange of experiences. Outstanding speakers were also attracted to this event.

The event was introduced by **GFSE President and former Ambassador M Mag. Dr. Irene Giner-Reichl**. She sketched a first picture and the contents of the event and emphasized that increasing the involvement of young women in the clean energy sector is very important to advance the energy transition quickly. This includes improving women's education levels, easier access to renewable energy jobs and meaningful participation in decision-making processes at all levels. Women are still highly underrepresented in the energy sector. Too many women are still excluded from this and other sectors, without access to decent, well-paid employment and sound career paths. Women have a substantial potential to contribute to the clean energy transition and their talent is not been utilized well. In the end, she highlighted the aim of this event to enhance the involvement of young women in the field of renewable energy. We want to learn from the experiences of organisations.

In the first presentation, **Ms Raphaela Reinfeld-Spadt, Head of Research and Innovation at Energie Burgenland**, took us on a journey through the challenges of a regional energy service provider in a rural area in search of suitable and well-qualified women in the green energy segment. Women have different needs than men when it comes to the design and framework conditions of their work. The possibilities for a company to offer good framework conditions

for women in this sector are limited. Rather, general and overarching conditions should be considered from a macroeconomic level and appropriate measures to support women in this segment should be sought.

Ms Katharina Pröstler, Gender and Energy Expert at the United Nations and Industrial Development Organization (UNIDO) presented UNIDO's vision. Gender mainstreaming, gender markers and gender guidelines should be integrated into the project cycle of the projects as standard. Targeted and more active action is needed at all levels, macro, micro and meso. All studies so far have shown that gender equality leads to higher and faster economic growth. Women should serve as mentors to women. She concluded her presentation by saying that women are the key to a fast and successful clean energy transformation.

The joy and passion for geothermal energy and the wonderful working environment for women were exuded in our third presentation by DI Dr Edith Haslinger. A senior scientist from the Austrian Institute of Technology. Her love for nature and stones was already awakened in her childhood. She pointed out that sometimes it doesn't take more than a wonderful childhood experience, which can then be realised in later professional life. In her presentation, she highlighted the many advantages of geothermal energy and praised the interdisciplinary field of work. She ended by saying that no two days in her professional life are the same and every project she works on is unique. This offers young women a great opportunity to develop and also to be creative and flexible.

Ms DI Beate Zöchmeister took us on a journey to different jobs where women work at Web Windenergie AG. In her presentation, she referred to jobs that are not always the focus when talking about green jobs. She introduced us to a successful wind power project developer and her best legal advisor when it comes to the approval and implementation of wind power plants. She also pointed out that perhaps more important than the education you have is how you interact and communicate with people. From this point of view, it is possible to attract women from different educational backgrounds to green jobs in the energy sector.

The GFSE would like to sincerely thank the speakers for their time and support in making this event a reality. We hope to be able to offer more such events for you in the future and hope that you will join us again in the future.

2.4 Online Event “Renewable hydrogen and cooperation opportunities between the EU and other world regions”

The objective of this workshop was to discuss the status of the development of renewable hydrogen in Africa and other world regions, specifically for exports towards the EU, and the challenges and opportunities ahead. It also addressed building blocks of cooperation strategies between EU Member States and other world regions for hydrogen production, export and domestic use.

KEY QUESTIONS

1. What are the main barriers for the development of renewable hydrogen?
2. What are possible financing mechanisms for renewable hydrogen in the market development phase?
3. Which projects are currently being pursued? Which barriers are these projects facing?

4. What policies and business models are required to develop renewable hydrogen?
5. Which cooperation strategies should be pursued by the EU to develop renewable hydrogen production in other world regions?

MMag. Dr. Irene Giner-Reichl, Ambassador a.D., President of GFSE, opened the event with a warm welcome and noted the urgency of alternative energy carriers under current circumstances.

DI Dr. Leonardo Barreto-Gomez from the Austrian Energy Agency and GFSE Secretariat summarized GFSE policy Brief on natural gas and renewable hydrogen in Africa and cooperation opportunities with the EU. In his presentation, Mr. Barreto-Gomez talked about the advantages and requirements for intercontinental hydrogen trade. Measures to support investments in hydrogen production projects and H₂-transport infrastructure as well as an increase of demand for renewable hydrogen in the EU will be necessary. The reduction of market risks and removal of commercialisation barriers to renewable hydrogen also play an important role. Trade of hydrogen derivatives such as Ammonia, methanol and e-kerosene may be more suitable in the first phases of market build up. Partnerships between the EU and other regions should go beyond hydrogen, including other renewable energy carriers and energy efficiency as well. A careful balance should be cast between generation capacity to meet domestic demand and capacity to produce H₂. Mr. Barreto-Gomez also pointed out that the cost of producing renewable H₂ has to be much lower in the exporting region than in the importing region to compensate for transport costs. Therefore, Renewable hydrogen projects require significant upfront investments. However, there is competition between project developers to secure the most promising locations and funding and first movers may be willing to accept lower profits to secure advantages in the long term. There are, however also risks for first movers, including including: Uncertain demand, Uncertain regulatory frameworks, Fossil fuel price volatility, Lack of infrastructure, Lack of operational experience or Lack of a skilled workforce. Mr. Barreto-Gomez also spoke about renewable H₂ as feedstock for local industry and asked the participants of the workshop for their opinion: Would hydrogen-dependent EU industry consider relocating to countries with cheaper renewable hydrogen?

Dr. Michael Losch from the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) and World Energy Council Austria, started his presentation stating, that due to Austria's high process emissions, it would not be enough to make heating CO₂ neutral. New processes in "hard to abate"-sectors like the steel and cement industry are necessary. Many of these adapted chemical production processes need hydrogen. Currently Austria imports 90 TWh of gas, and produced 5TWh itself. The huge gap in between local production and import of energy carriers, will be similar in the Hydrogen sector. Dr. Losch hereby stressed the importance of Green Hydrogen, meaning Hydrogen produced through electrolysis using electricity from renewable sources. The currently used Grey Hydrogen that is generated from natural gas, or methane, through steam reforming. This traditional production method is not in line with Austria's CO₂ goals and carbon capture and storage is not an option in Austria the storage is needed for gas.

For Austria to fulfil its future hydrogen-needs, win-win partnerships with other countries, that produce a surplus in renewable energy, are a necessity. Potential partner countries could be from the North of Europe the MENA region, or from Ukraine. A lack of pipelines will mean,

that in the beginning, fuels will mainly be imported by ship, with potential harbors being in Germany, the Netherlands and Belgium. Finally Dr. Losch, referred to Von der Leyens SOTEU speech, stating, that a unified strategy for the EU is needed. Especially in the delegated act, the topic of “additionality” is still open and will still be a challenging one, since current definition will not apply to all regions. Dr. Losch also points out the urgent need to work on multi-national framework for international certification.

Dr. Rudolf Zauner from Verbund and World Energy Council Austria presented a study conducted by the world energy council. He first gave details on the Energy provider Verbund and its expansion of renewables in Europe and Austria. In order to expand to green hydrogen, the hard to abate sectors are in the beginning of the project. Later on hydrogen could also be used as a seasonal storage. Verbund already gathered experience in various fields connected to hydrogen including carbon capture to plastics. Through its activities, the Energy provider realized the importance of partnerships in this new emerging market as value-chains in it are complex. Despite all local expertise and all the progress made by Verbund, imports will be needed. Austria is currently already importing huge amount of energy through natural gas, and these imports must be replaced by imports as a production at this scale is not possible domestically.

The study Dr. Zauner presented, covered decarbonised hydrogen imports into the EU to which the WEC contributed to Austrian part of study. The study found that a large amount of cost lies in the electricity production, therefore it is crucial to go to countries with low electricity cost. Another important task will be to coordinate and efficient infrastructure. All these activities are still on hold, waiting to the implementation of a regulatory framework, defining international standards and a solid well designed certification system. Currently green hydrogen is still not cost competitive compared to grey H₂ and therefore also need financial support to help “kick-off” the new production method. A successful strategy of hydrogen imports builds on stable relationships and can help foster industrial development.

Khalid Salmi from the Regional Center for Renewable Energy and Energy Efficiency (RCREEE), Green H₂ Development in The Arab region (Promising Trends & Sustainability Concerns) introduced RCREEE and presented an overview of the Moroccan hydrogen strategy. He also pointed out to sustainability concerns related to additional renewable electricity generation, irrigation and potable water supply in dry climate zones.

Jorge Pinheiro Machado from R20 spoke about Opportunities and Challenges, R&D and Finance and gave a Brazilian perspective on hydrogen. Opportunities for the industrial sector mainly lie in oil&gas, fertilizers, steel and chemistry. Brazil has abundants of potential for renewable energy like solar and wind in the Northeast of the country and would be interested to export Hydrogen produced by Electrolysis to Europe. More than US\$ 30 billion investment have already been announced. But also the local demand is increasing: Especially in the automotive sector through heavy vehicles Hydrogen production from Ethanol using steam reform may become an option. For local production, using technology to produce H₂ from the waste is also considered an option.

Challenges still facing the sector include lie in yet to be developed technology: New Technologies could make the process more efficient and bring the cost down. There is also still a need for better solutions for transportation and storage. To advance in these technologies, more R&D for fuel cells for the automotive sector is needed. The National Energy Council has

already approved an R&D budget in 2021 in which Hydrogen should be a priority. Overall BNDES and Finep are ready to finance hydrogen projects.

3 GFSE Policy Briefs

The Global Forum on Sustainable Energy develops policy briefs on particular topics of global relevance in the context of sustainable energy and development, which serve as tools to aid the interaction and knowledge exchange between private and public stakeholders on all levels, policy makers and technical experts. All [policy briefs](#) are available on the GFSE website.

3.1 GFSE Policy Brief #12: The Youth and the Energy Transition

The GFSE Policy Brief #12 looks at some key elements of youth engagement in the sustainable energy transition.

The young generation has lots of potential to contribute to the energy transition in many ways, for instance through engagement in decision-making processes at local and international level and as skilled workforce supporting the development of renewable energy, energy efficiency and clean mobility value chains. Youth are emerging as an important source of talent for achieving energy access, renewable energy, energy efficiency targets, and already account for a substantial fraction of jobs in the renewables sector. At the same time, youth is increasingly engaging in climate change and energy transition issues.

One of the most pressing challenges for emerging economies is a shortage of jobs among the youth. Enhanced skills development and decent work opportunities for youth can be created in the sustainable energy and clean mobility sectors. Initiatives to develop business and technical skills and create jobs targeting the youth should be pursued more vigorously, with increased collaboration between the private sector and educational institutions to improve the quality and accessibility of training.

At the same time, we need to build foundations for better governance in the energy sector and encourage multi-level energy and climate dialogue between stakeholders to overcome political resistance and shape the political incentives that are necessary for the transformation. Engaging the youth in decision-making will support shared ownership of transition strategies and help gaining political buy-in in their implementation.

The GFSE Policy Brief examines some examples of youth engagement and green skills for the youth in the energy sector. You can read the Policy Brief [here](#)

3.2 GFSE Policy Brief #13: Green Skills for the Youth

This Policy Brief argues that a successful energy transition must be driven by a workforce with skills and knowledge in renewable energy, energy efficiency, and sustainability, as it will be accompanied by a period in which new jobs will be created, certain jobs will be eliminated, and a number of jobs will be transformed. Education and training systems need to be redesigned to align with national and international priorities to minimize negative impacts on employment and create opportunities for decent jobs that ensure social and gender equity.

In practice, the workforce lacks skills and hinders the effective deployment of renewable energy and energy efficiency technologies. While technical skills remain critical, non-technical skills as communication, negotiation, and management skills are also becoming increasingly important. Training programs should be embedded in a broader policy framework to incentivize skills, training, and certification and be accompanied by harmonized curricula and training certificates at an international level. Partnerships between governments, businesses, educational institutions, and professional associations are necessary.

Examples of such programs that help prepare the workforce for the energy transition are Canada's new Skills for Success program, starting in 2021, or "The National Energy Skills Accelerator "(NESA), a collaborative umbrella organization by 3 British Universities for accessing energy transition courses.

The Policy Brief examines four sub-sectors in which an increase of a workforce with green skills is necessary:

Mini-grids have significant potential to accelerate the uptake of renewable energy, especially in rural areas. To develop and operate mini-grids, mini-grid operators need a range of skills from project development to construction and operation. Many training programs are available, but they tend to focus on technical skills. These need to be complemented by knowledge and skills in other areas such as business models and finance, policy and regulation, health and safety, and data analysis. An example of an effective training program is the RES4Africa's Micro-Grid Academy (MGA) based in Kenya, a capacity building and youth development program that helps bridge the micro-grid empowerment gap.

Buildings consume large amounts of energy and still rely heavily on fossil fuels for their energy supply. To achieve energy efficiency goals in renovation and new building construction, building professionals need to understand the energy performance of the building as a whole and take an integrated approach to building design, construction, operation, and quality control. The current lack of integration between the different sectors involved in the design, construction, and operation leads to a discrepancy between the predicted energy consumption and the actual operational energy consumption. An example of a training program is the FEEBAT "Energy Saving Training for Construction Craftsmen and Companies" in France launched by several ministries and agencies in 2007.

Heat pumps use electricity to transfer heat from a renewable source from a cool space to a warm space and are therefore an energy-efficient alternative for space heating and cooling. However, the lack of skilled labor (designers, planners, and installers) significantly hinders the expansion of heat pumps. Quality training programs need to become more accessible, cost-effective, and provide up-to-date knowledge. The example of training and certification of heat pump installers in Austria shows how the existing workforce, especially installers and engineers working with natural gas heating systems, can be further trained to design and install renewable heating systems with heat pumps.

Sustainable mobility is necessary for industrialized and developing countries alike as it is an effective tool for shifting to more efficient and less polluting modes of transport. With the advancement of electromobility, job profiles in the mobility sector will change significantly, and the workforce's skills

will need to evolve continuously. New skills will range from battery manufacturing, materials science, and electric motor to digital skills and the use of artificial intelligence for the growing importance of vehicle software. The Briefing describes the DRIVEN BY KIDS workshops offer children the opportunity to learn about the future technology of electromobility playfully and creatively as an example as well as the Austrian e-Mobility Check training program for electricians, electrical planners, and other stakeholders planning and installing charging infrastructure.

The Policy Brief can be found [here](#).

3.3 GFSE Policy Brief #14: Women and Green Skills in the Renewable Energy Sector

The Policy Brief on “Women and Green Skills” looks at data from various studies on the gender gap in the energy sector and offers some best practice examples on mitigating it. In the analysis of Access and Consumption, special attention is paid to the effects of limited or no access to electricity and its impact on women's health. Concerning the occupational gender gap, the energy sector is compared to the global workforce average in occupation types, hierarchical positioning, and entrepreneurship. Global goals related to empowering women in renewable energy can be found in several SDG's, and an example is given for the effect policy can have on job accessibility for women. Further best practice examples are described by sector, giving an insight into programs on women in wind energy, photovoltaics, and geothermal energy.

When it comes to women and renewable energy, there is still a significant gender gap in access and consumption as in the workforce. Sustainable modern energy infrastructures and technologies usually reach women and girls last, while they are most dependent on them. Unsafe housing and a lack of clean cooking options causing indoor air pollution are likely to various health problems, especially for women. Electricity and electrical appliances usually reduce the time spent in unpaid energy-intensive household chores and free women to take on paid work.

While the figures vary from country to country, women are underrepresented in the energy sector compared to the global labour force. The numbers are slightly higher in the renewable industry (32%) compared to the conventional energy sector (28%). Most women work in office-related corporate functions such as human resources, finance, and customer service. The numbers in higher positions that could influence decision-making and prep the way for other women entering the field remain especially low. Also, the number of women in technical careers is still very low. The low number of female start-up founders and patent registrations is assumed in the low representation of female students in STEM subjects. A best practice example tackling this issue is the Green Mentoring program "Women in Renewable Energy in Africa," which aims to reduce gender gaps and promote women's leadership in the renewable energy sector in sub-Saharan Africa.

When it comes to global policy goals, gender-responsive energy transition serves many SDGs. However, energy policies that claim to be gender-neutral can neglect the different impacts they may have on men and women. Overall, stakeholders have begun to address the intersections of gender, energy, and sustainable development and advance gender equality, social

inclusion, and women's empowerment in the energy sector. Public commitments like the Equal by 30 campaign show the positive impact of concisely targeted policy.

The transition towards a sustainable energy system opens up substantial opportunities for a skilled workforce. The number of qualified workers and professionals in the renewable energy sector needs to be substantially scaled up. Integrating women in the clean energy sector is essential to achieve sustainable and peaceful energy systems.

Wind energy is one of the fastest-growing renewable electricity sources globally and offers job opportunities for women across the wind energy value chain. The main barriers to entry are perceptions of gender roles and cultural and gender bias hiring practices. Programs like the "Women in Wind – Global Leadership Programme" are designed to accelerate women's careers in the wind energy sector and support women in reaching leadership positions. Training programs like the "Competency-Based Occupational Framework for Wind Turbine" allow the person to advance at her own pace.

The solar PV sector requires a large workforce for installation, sales, operations, and maintenance and offers new job opportunities for women. Gender-sensitive training for women in solar PV helps women take on technical positions. Best practice examples for such programs are the "Barefoot college" that offers training for illiterate women or the "GRID Alternatives" Program that provides training in the installation basics.

The installed capacity of geothermal energy has gradually increased worldwide over the last decade, reaching 15.4 Gigawatts (GW) today. Geothermal energy is a reliable source of firm power and could grow substantially in the future. Geothermal energy can offer new employment opportunities for women; however, there are only a few initiatives to enhance the role of women in the geothermal sector. Programs like the "Women in Geothermal (WING)" platform to engage men in gender equality or "Female Leaders In Energy (FLIE)" to advance the professional development of early to mid-career level women are the exception. More efforts are needed through scholarships, apprenticeships, and mentoring programs for women in geothermal.

While the number of supportive programs varies depending on the sector, successful measures that are needed are similar. More support to networking, mentoring, training, and opportunities for experience exchange is necessary. Possible solutions include networking and mentorship, workplace practices, policies and regulations, and mainstreaming initiatives.

3.4 GFSE Policy Brief #15: Natural gas and renewable hydrogen in Africa and cooperation opportunities with the EU

Europe needs to reduce consumption of Russian natural gas by diversifying its suppliers, reducing gas consumption and switching to other energy carriers, including renewable energy. This policy brief presents an overview of current developments in the natural gas and the renewable hydrogen sectors in Africa. It provides some suggestions for possible cooperation between the European Union and the African continent on LNG and green hydrogen markets.

The existing global LNG market cannot supply the amounts that Europe needs without creating substantial constraints for other regions. The EU has to strengthen cooperation with alternative pipeline and LNG exporters – and with other major gas importers and consumers. It also has to develop international partnerships on renewable energy, including electricity and hydrogen. The EU also has to help govern the existing LNG and nascent hydrogen markets. The EU should promote free, liquid and transparent markets around the world.

Europe's energy, climate and industrial policy choices have multiple impacts on broader global market balances. Strengthened international cooperation on several areas is essential to guarantee the security of energy supply in the EU while complying with environmental and climate policy goals in the long term. This cooperation should also help to prevent to extent possible major negative impacts on the security of energy supply and climate policy goals of other countries outside the EU.

A coordinated approach is necessary to avoid too large negative impacts of Europe's interventions in the market. If Europe pursues scarce LNG supplies without a coordinated approach with other buyers and without investments to boost supply, prices will rise sharply and gas deliveries to buyers in other continents will be more difficult, threatening not only their energy security of supply but also their food security and triggering price increases in many sectors.

Security considerations for the production and transport of both LNG and green hydrogen need to be addressed (e.g. safe maritime routes, democratic producing countries, diversification of suppliers and energy carriers) in order to guarantee Europe's security of energy supply, reducing its vulnerability to single suppliers and single energy carriers. EU energy diplomacy instruments (Energy Diplomacy Action Plan) should be actively deployed in bilateral and multilateral contexts to guarantee peace and security of energy supply.

Cooperation strategies with other world regions should go beyond natural gas and hydrogen and include other renewable energy carriers. The EU should support the development of renewable energy sources and the implementation of energy efficiency in partner countries. A multi-pronged strategy is necessary to guarantee security of energy supply in different world regions and help secure economic development, stability and peace. Relying only on a fossil fuel trade strategy would be risky. Renewable energy potentials are less concentrated than fossil fuel reserves. Including renewable energy in international cooperation strategies will help diversify energy supply in terms of selling countries and energy carriers and democratise the global energy system, avoiding excessive influence by single market actors. At the same time, the EU has to step up efforts to increase its domestic share of renewable energy and improve energy efficiency.

Cooperation opportunities with African countries regarding LNG exports towards Europe could be developed. However, their development will require Europe to make substantial investments in natural gas production, pipelines and LNG infrastructure. Investments should be attached to certain conditions, including monitoring, reporting and verification of methane and CO₂ emission reductions. In addition, financing needs to be linked to the highest social and environmental standards, including air pollution and water regulations.

Care should be taken with regard to investment in LNG or gas infrastructure to avoid the risk of technology lock-in or stranded assets in fossil fuel infrastructure. Cooperation that starts with fossil LNG will have to provide perspectives for a shift towards renewable energies in the medium and long term, including hydrogen.

Investments in LNG infrastructure may compete with investments in renewable energy in Africa, which are needed to facilitate African domestic economic development. A careful balance must be cast between, on the one hand, investments on natural gas exploration and production and LNG export infrastructure and, on the other hand, investments in renewable energy technologies and infrastructure to advance the access of Africans to electricity, clean cooking and clean transport modes, among others.

Renewable energy systems can be more democratic than fossil fuels because the potentials are more evenly distributed across countries and regions. Therefore, an energy system based on renewables has better chances to be more peaceful and avoid undue influence of single energy suppliers on the markets.

Intercontinental green hydrogen trade can help the EU diversify its sources of energy and reduce geopolitical dependence on Russia and other fossil fuel exporters. Green hydrogen trade can rely on a larger number of exporting countries diminishing the influence of single producing countries on the market and contributing to a new geopolitical landscape.

The European Commission has given priority to cooperation with the African Union and the two continents could explore a mutually beneficial renewable hydrogen trade in the long term. The African Union can become a cooperation partner on research and development, regulatory policy and establishment of trade relationships. However, at the same time, Africa need to develop its renewable energy resources for domestic consumption to support its economic development and will require support from Europe for this purpose. There is a need to avoid potential “green colonialism”.

Cooperation between Africa and Europe on renewable energy can become a building block for a broader cooperation on trade, security, technology, climate and environmental policy, thus strengthening the EU’s external relations towards Africa as strategic partner. A sound cooperation requires development of trade relationships, substantial investments, opening of markets and recognition of African countries as equal partners.

Renewable hydrogen production in Africa for local and export markets would help reduce the costs of production through scaling up and learning-by-doing effects. Renewable hydrogen can be used as a feedstock and fuel by African industry to produce green products with higher value-added than raw materials such as green steel, green fertilizers and cement for domestic consumption or exports to the European Union. This could help African countries profit from exports revenues and improve their balance of trade with the EU while avoiding some negative impacts of the EU Carbon Border Adjustment Mechanism (CBAM). If African producers were able to develop less carbon-intensive products such as fertilizers, cement and steel using renewable hydrogen, the impacts of CBAM in their balance of trade with the EU would lessen.

Africa could benefit from revenues from hydrogen exports. These revenues could be invested in access to modern forms of renewable energy and energy efficiency in Africa. This can lead, among others, to a reduction of air pollution and improvement of health conditions as well as economic development.

However, the development of green hydrogen production capacities requires the rapid development of renewable electricity potentials in Africa. A careful balance should be cast between electricity generation capacity to meet domestic electricity demand in Africa and capacity to produce renewable hydrogen. Affordable electricity to meet domestic African demand is required to ensure the economic and social development of the continent. Access to domestic and international financing is necessary to advance the installation of renewable electricity capacity in Africa. At the same time, the structural problems of African electricity systems need to be solved.

3.5 Literature review on framework conditions for renewable hydrogen in Tunisia

A short overview of the conditions for renewable hydrogen was produced and submitted to the BMK and the Task Force Africa of the BKA (in German). Tunisia has great potential for renewables development and thus also for the production of renewable hydrogen. However, the country itself is currently still heavily dependent on imports to cover its own energy needs, and renewables development is still in its infancy.

95% of electricity is generated with natural gas, most of which has to be imported. Therefore, Tunisia has set high goals for the development of renewable energy. The country's solar plan includes a target to achieve approx. 30% renewable installed capacity for electricity generation by 2030 (in 2017 the capacity amounted to 3%). Several projects are in the planning stage. Most of the expansion is taking place through international tenders. However, Tunisia has not made sufficient progress with the renewable energy targets, which were set as part of the Tunisian Solar Plan. The approval procedures for investment projects in the field of renewable energies are to be further improved. Furthermore, scientific and technical capacities are to be built up and qualified workers.

For hydrogen, on the other hand, there are neither planned projects nor specific legislation. In 2020, Germany and Tunisia founded the "Tunisian-German Alliance for Green Hydrogen", which is partly intended to support the creation of an institutional and legal framework. A technical challenge is the water needed to run the electrolysis, as Tunisia suffers from an enormous water shortage. The water used for hydrogen production would have to be obtained through seawater desalination.

4 Cooperation with International Stakeholders

GFSE acts as an information broker for Austrian stakeholders and enterprises in the energy and related sectors about ongoing campaigns and programmes of REN21, REEEP, UNIDO and other international stakeholders located in Vienna, Austria. GFSE regularly informs stakeholders in the energy sector about new publications and/or initiatives of these and other organisations through its newsletters.

4.1 Cooperation with UNIDO

The Global Forum on Sustainable Energy was also a partner and working group member of the Vienna Energy Forum 2021. Leading up to the VEF 2021, the GFSE provided inputs to the preliminary speakers and contributed to the concept. The Vienna Energy Forum 2021 was guided by the motto “Where Action Meets Ambition”.

As part of its contribution to the VEF2021, GFSE organised a side Event at the [Youth for VEF](#). The Youth for VEF was the first-ever youth-dedicated space hosted within the VEF and in partnership with the SDG 7 Youth Constituency. The Youth for VEF was created with the objective of providing a platform to empower youth.

GFSE is also supporting the UNIDO with the thematic structure for the International Vienna Energy and Climate Forum (IVECF2023), which will take place on November 2-3 2023. In this capacity, GFSE has provided the UNIDO with concepts on green skills, and localizing value chains, highlighting issues related to the role of innovation in technology, policy, business models, society and governance in the sustainable energy transition.

4.1.1 Concept on “Green Skills”

A skilled workforce is needed to increase the share of renewable energy and improve energy efficiency

The lack of skills in the workforce makes effective deployment of renewable energy and energy efficiency technologies difficult. Vigorous efforts will be necessary to overcome this substantial barrier. Newly installed systems often do not have the required quality and there is not enough personnel to adopt new sustainable energy technologies at the necessary pace. Training programs need to be improved and scaled up. They also need to become more accessible and inclusive, targeting the youth, women and marginalised groups.

Cooperation between governments, companies and educational institutions

Improving training programmes for sustainable energy systems requires governments working closely with companies and educational institutions to understand their needs, approaches and challenges. Strong partnerships between governments, companies, educational institutions and labour associations are necessary to develop and implement training strategies that deliver the skills required by the renewable energy and energy efficiency sectors. This includes anticipating and forecasting future training needs.

Collaboration between businesses and educational institutions should be strengthened to ensure that the youth develops marketable skills. This includes dual training programs that give young people access to apprenticeships and traineeships in companies while attending

vocational school, as well as programs that link demonstration projects for renewables, education programmes and policy development.

Training programs should be embedded in a wider policy framework to create an incentive for training and certification of professionals. For example, if it is required that installations are made by certified professionals in order to access investment grants or other subsidies, this can act as an incentive to create a market for qualified installers. In addition, policies supporting the replacement of fossil fuel systems by renewable energy systems help create a market for a qualified workforce.

Peer-to-peer learning and knowledge exchange between equipment manufacturers, academia and practitioners would contribute to improving the quality of the training.

Green skills for women

There is a great need for action to develop young women as qualified workforce in the energy sector. For this, they need new career paths. Young women also need support in developing their self-confidence and valuing their own competences. In addition, companies and educational institutions should work to change perceptions of gender roles as well as cultural and social (male-dominated) norms. Moreover, prevailing hiring practices in the renewable energy sector need to be transformed to allow women access to new jobs, among other those in the STEM area. Possible solutions include networking and mentorship, changes to workplace practices (e.g. maternity leave), policies and regulations and mainstreaming initiatives. Activities to raise visibility, awareness and sensitisation are necessary to get women more involved in the energy transition.

Digital skills

Digital skills play a significant role in connection to green skills, as they are essential for implementing new business models in clean energy and mobility and, therefore, creating a job market for those trained in green skills. Digital skills are indispensable to integrate the youth in renewable energy and energy efficiency value chains. This calls for a need to teach digital skills to children and young people in parallel to green skill training. This requires cooperation between a wide range of stakeholders (e.g., the private sector, government, development banks, NGOs, and UN agencies).

Listening to the youth's voice

Moreover, listening to the youth's voice is essential for a good training design. Youth's interests and needs should be reflected in the design of education and training programmes in the sustainable energy sector. Engaging youth perspectives is an important factor to ensure that programmes are aligned with the needs and expectations of young people.

Certification of skills

Acquired skills should – in an ideal case – also be recognized across borders, which is why certification schemes would be necessary. They also help ensure the quality of training and recognition of qualified installers and other professionals by companies and clients, therefore offering perspectives to those in training while also serving as quality insurance.

The transition to a sustainable energy system is a social and technical challenge that requires the meaningful participation of broader society, particularly of citizens, including youth and women. The societal engagement has become central for energy transitions that are more democratic, sustainable, just, and responsive to public values and human needs. To reach its potential, the renewable energy and energy efficiency industry needs to use the entire talent pool available. While green skills are spoken of as a skill for the future, the gap between a young trained workforce and the need for it remains. To raise the interest of choosing a path in renewable energy and energy efficiency, it is essential to give young people a perspective to advance professionally.

An option to do this is through certification schemes that ensure their skills are recognized beyond their training placement. Certification also helps ensure the quality of the workforce. Especially in the renewable sector, in-depth professional knowledge is key to ensuring the fulfilment of safety requirements and efficient installations. The implementation of a certification system for the workforce and accreditation systems for training institutions enables companies to hire good quality workers who can quickly address real-world challenges. In doing so, training and certification should meet local needs but be aligned, whenever possible, to international standards.

Skill standards specifying contents and duration of the training, theoretical and practical parts and the main outcomes of the training could help harmonizing training across technical and vocational education and training (TVET) institutions. Harmonization of curricula and training certification should also be pursued at the international level. Regional accreditation of training programs is useful to guarantee mutual recognition of participants across countries and harmonize curricula guaranteeing minimum standards of qualification.

Necessary resources

To offer trainings that deliver valuable skills to young people, many resources are necessary. First and foremost, educators and trainers must be at hand with expertise and experience. They are at the heart of any training facility and will be those who not only teach but also encourage those learning and give them an example of what to strive towards. Further, necessary resources are the facilities in which trainings can be held. These should be accessible on a geographical, financial, and inclusive level for all those in training. A further important aspect is to ensure that the skills learned in training can be implemented on the market. This can be achieved through cooperation between companies, educational institutions, and governments. It can happen in many different forms, be it through experienced experts in the energy sector acting as teachers in training facilities or through programs that allow those in training direct access to hands-on work experience.

While offering vocational training, it is, therefore, essential to give opportunities to those in training to practice implementing their newly learned skills. This not only ensures skills are gained in a practical way but can also give orientation to those learning and encourage them to unfold their potential. Aspirations to advance in a field and dedicate yourself to training and work become attractive to many as soon as a clear perspective becomes apparent. Depending on the country, training programs already in place for other fields will vary. Expanding tested and successful education structures that the public is familiar with for green skills can give additional clarity in the implementation and the running of the programs and facilities.

Expanding on the international market

For foreign companies introducing renewable energy and energy efficiency products to local markets, the link to local universities and other education institutions can help adapt products and services to the local context. This link helps create programmes to qualify a local work force that responds to the specific needs of businesses. Partnerships with local training and educational institutions to implement dual training help companies overcome this lack of skilled workers. Dual vocational training can be a suitable approach for cooperation between foreign companies and local TVET institutions. Dual vocational training combines apprenticeships in a company and vocational education at a vocational school in one course, allowing apprentices to gain hands-on work experience and receive theoretical foundations at the same time.

Skills for the blue and green economy in Small Island Developing States (SIDS) and coastal LDCs

The challenges facing our current and future generations will vary depending on the country's societal, political, geographic, and economic conditions progressing on the challenging and unwalked path of the energy transition. Especially Small Island Developing States (SIDS) and coastal LDCs that are hotspots of climate change face the need for many changes and developments with limited time.

The SIDS, the Small Island Developing States, are a heterogeneous group of states grouped in three regions: the Caribbean, the Pacific, and Africa; the Indian Ocean and South Pacific regions are aware of their situation and show resilience and unity of vision in engaging globally towards sustainable development. One of their strategies is the blue economy approach, which offers small islands the opportunity to break their dependence on a narrow range of goods and services, predominantly tourism, fisheries, and agriculture, and to expand into new blue growth sectors, including marine biotechnology, aquaculture, and ocean renewable energy. The development of such blue economies will require the rise of a new and well-equipped workforce. , This makes the transmission of skills an important topic for SIDS.

SIDS and coastal LDCs would need to increase their renewable energy capacities significantly by 2030 and develop their potential for ocean energy technologies and related expertise. The demand for labour in the renewable energy sector is expected to increase significantly. Development cooperation programmes can support young people to enter the labour market, by working together with governments to strengthen the skills of teachers at vocational schools and universities, allowing them to act as multipliers for disseminating practical skills.

To further foster the development of skills for the green and blue economies in the SIDS and coastal LDCs and ensure effective cooperation, dialogue platforms between the private sector, training organisations and governments would be useful.

These exchanges can take, among others, in the context of the Global Ocean Energy Alliance (GLOEA), recently launched by the UNIDO, SIDS DOCK and the Stimson Center Alliance for a Climate Resilient Earth (ACRE), and supported by the Governments of Austria and Norway under the Global Network of Regional Sustainable Energy Centres Program (GN-SEC).

The GLOEA will address the needs of SIDS and coastal developing countries, particularly LDCs, to access ocean energy technology, finance and expertise.

Key questions:

1. How can we create more effective programmes to deliver green skills for young people in developing countries?
2. What measures can help create more jobs in the renewable energy and energy efficiency sectors?
3. How can cooperation between educational institutions and companies help create demand-oriented professional training in the field of renewable energy and energy efficiency that meets the needs of companies? How can these cooperation's be fostered?
4. How can education and training in renewable energy be made more inclusive and accessible to marginalized young people?
5. What transformative approaches are needed to address gender gaps and empower young women in the energy transition, including by ensuring equal participation of women and men in the labour market and in decision-making processes?
6. What can companies do to make careers in the clean energy sector more attractive to young women?
7. How can peer-to-peer learning and exchange of experience and best-practice at the international level between young people working in the renewable energy sector be fostered?
8. How can development cooperation contribute to strengthening the role of the youth in the implementation of the energy transition in developing countries?

4.1.2 Concept "Localizing value chains"**Policy measures for a healthy entrepreneurial ecosystem**

A healthy entrepreneurial ecosystem in the field of sustainable energy technologies is necessary. Sustainable energy entrepreneurs take risks to develop and commercialise new products and introduce new business models, contributing to the creation of markets for green technologies. For a sustainable energy technology entrepreneurial ecosystem to thrive, governments must develop supporting policies nurturing enterprises, building markets, introducing technology performance standards, strengthening capabilities, removing infrastructural bottlenecks, and providing finance.

A cross-sectoral and multi-level approach to build a sustainable ecosystem for innovative entrepreneurship in SMEs is necessary to support sustainable energy innovation in developing countries. This requires sound legal and regulatory frameworks both for renewable energy and energy efficiency technologies and innovative SMEs, facilitating access to finance, business support through incubators and accelerators, support to technology development as well as early-stage technology validation and market development, among others. Instruments in these areas must be well interlinked to nurture entrepreneurial ecosystems.

For example, cleantech incubators and accelerators bridge the knowledge gap for start-ups, provide professional services that may not be available or affordable, assisting them from

conception to commercialization. Incubators aim at stimulating economic development and job creation within the local economy. They typically provide shared office space with similar start-ups, promote collaboration between them or with other companies, offer financial and marketing services, and facilitate contacts to venture capitalists and angel investors, and enable networking with local businesses, experts and mentors.

Good understanding of the local context

A good understanding of the local context, the related mind-set of its market actors, community structures and preferences is necessary for the design and market introduction of energy efficiency and renewable energy products and services in developing countries. In the best of cases, customers should be involved in product development as early as possible and companies should be aware of the gender implications of innovative solutions.

Foreign entrepreneurs and particularly small- and medium-sized enterprises (SMEs) should strive to build strong partnerships with local public and private actors and use synergies as much as possible. Foreign actors can collaborate with local stakeholders and draw on existing research and locally available data to collect the most suitable market information. Nonetheless, in many instances data availability and reliability remains poor, so creative solutions to consumer research and market information are needed. The accessibility to the results of market research should be improved by means of an exchange platform or similar activities.

The interest of companies to enter markets in developing and emerging economies may collide with the developmental aim to build up or to adapt local value chains, so the division of labour between the foreign company and the and developing markets needs thorough balancing. Any entrepreneurial activity has to be motivated by the consideration of whether entering a market, or developing or adapting a specific product makes economic sense, taking into account the economic and political realities in the target market. For this purpose, it is necessary to improve the analysis of value chains and facilitate access to market information. Each company or stakeholder should focus on her comparative advantage and strive for cooperative solutions to grow the portfolio of products and services offered in each specific market.

Training of the local workforce

Education and training for the local workforce and other stakeholders are critical to enable the uptake of innovative renewable energy and energy efficiency technologies and the development of local value chains.

Cooperation between companies and local training institutions is key to facilitate the development of a local skilled work force capable of assembling, maintaining and repairing energy efficiency and renewable energy technologies in the local markets. Training should meet local needs but be aligned, whenever possible, to international standards. This process requires substantial communication and backup from the actors involved. An assessment of the skills needed in the local markets should be conducted jointly by the foreign and the local actors prior to their development to make sure that the training responds to demands of the companies. Although the build-up of local capacities should not happen on a case-by-case basis, the specific skills and capacities needed for an innovative sustainable energy solution have to be identified in each case.

It is specifically important to conceive and implement training and support programmes for women. Activities to raise visibility, awareness and sensitisation are necessary to get women more involved in sustainable energy. More support to networking, mentoring, training and more opportunities for experience exchange would be helpful to increase the involvement of women.

Empowering women in the sustainable energy value chain

Women face several barriers to enter the sustainable energy sector. They have more difficulties getting formal employment and accessing financing for their business. They also have fewer opportunities for training and education. There are also fewer women to mentor younger women entering the energy sector. Care-work normally done by women (such as taking care of children) is also not considered when training programmes or career opportunities are conceived.

Gender-responsive energy value chains are necessary. Women are very capable managers, entrepreneurs and salespeople and they can be very effective at selling solar energy products and clean cookstoves to their communities due to their networks and understanding of the energy needs of other women.

Women should be trained on renewable energy and energy efficiency technologies and be supported to create businesses in these fields. Supporting measures are necessary to provide employment opportunities to women and empower them economically through sustainable energy value chains.

Technology cooperation

Technology cooperation is key to achieving the levels of innovation and technical change, which are necessary to advance the uptake of renewable energy and energy efficiency technologies. North-South, South-South and triangular (South-South-North) cooperation facilitates the exchange of knowledge, experience and resources between countries. A variety of governmental, private, academic and civil society organizations can participate in cooperation initiatives across countries that yield dividends to the different parties involved.

Sustainable energy technology cooperation mechanisms should allow all parties to play an active role and draw learning from the cooperation. For this purpose, it is necessary to create an enabling environment in the receiving countries for absorbing new technology, and in the giving countries for providing it appropriately. Particularly in the case of South-South and triangular cooperation, it may be necessary to address gaps in the current ability of countries from the South to appropriately share good practice from their own development experience.

Technology cooperation across countries must go hand in hand with the strengthening of local value chains, the creation of local capacities for public and private actors and the improvement of legal and policy frameworks for renewable energy and energy efficiency markets as well as the adaptation of domestic industrial policies, among others. Otherwise, there is a risk that technology solutions cannot scale up to the required levels, due to lack of local capacities, sound policies or functioning markets. When building local value chains, local actors should develop capacities to at least assemble, install, maintain and repair renewable energy and energy efficiency technologies.

Response to value chain disruptions

Because of multiple crises, including COVID-19, the global energy crisis and the Ukraine war, global value chains for the energy transition have been disrupted.

Some critical resources to produce manufactured goods are becoming scarce or too costly. Companies must either start using such inputs more efficiently or replace them. Energy is also becoming more expensive and it is not available in the quantities required. Companies should actively promote energy efficiency and input substitution to enhance firms' resilience and reduce their vulnerability to value chain disruptions

Industry, for example, has to look for strategies to reduce consumption of fossil fuels, natural gas in particular. Energy savings, efficiency, fuel substitution, electrification, and uptake of renewable hydrogen, biogas and biomethane by industry may reduce significantly the consumption of natural gas and vulnerability to disruptions in the supply of natural gas.

Critical materials are becoming a bottleneck for the energy transition. Several factors affect their availability and the reliability of supply chains. Among others, geographic concentration and limited production capacity as well as the quality of the resources (e.g. ore quality) and the sustainability of the supply chains are issues of concern. In addition, a number of geopolitical risks affect the availability of materials needed for renewable energy, energy efficiency, e-mobility and digital technologies. Some strategic minerals are difficult to substitute. In other cases, substitutes exist and the impact on technology performance is limited. Governments and the private sector need to develop strategies to minimise critical materials dependencies through innovation and to diversify supply, whenever possible.

They also need to work on improving sustainability and traceability of materials and products. The reshaping of value chains provides an opportunity to improve their sustainability. Governments should encourage responsible business conduct and companies should map social and environmental risks in their international supply chains and take measures to prevent or mitigate them. Traceability systems that show where products originate and how they move through the supply chain are needed to facilitate the identification of sustainability risks. Digital technologies can enable a better tracking, tracing and mapping of resources and products.

Recycling and circular economy approaches are useful in reducing waste and improving the efficiency in the use of critical materials, water and energy. They can relieve pressure from strained supply chains in the long term. However, maintaining material quality as close as possible to the original level is challenging and innovations are required. In addition, the recycling and mining industries need to be brought together in an integrated approach to utilize synergies that improves the efficiency of the critical materials supply and use on a life cycle basis.

Sustainable energy value chains to support poverty reduction

Access to cleaner and affordable energy options is essential for improving the livelihoods of the poor in developing countries, and particularly in their exponentially growing urban areas. However, poor segments of the population live in low-cost housing areas or informal settlements with little or no infrastructure, experience severe liquidity constraints and have to satisfy the most pressing short-term needs before they can pay their energy bills or undertake

other investments. New business models, community empowerment, collaborative engagement of multiple stakeholders, awareness raising and new financial and institutional mechanisms are needed to adequately address the urban energy poverty challenges.

Strategies targeting renewable energy or energy efficiency solutions should introduce pro-poor measures (measures to reduce poverty) in urban and rural poverty areas. A pro-poor approach and the willingness of customers to pay must be taken into consideration when developing policies to guarantee sustainability of the energy value chains. Regulation and quality control can help prevent that low-quality solutions are used, which have very short product lives and thereby endanger brand recognition and consumer trust in a technology. Moreover, lack of quality and robustness of energy-efficient products or renewable energy technologies can have serious repercussions, since lower income segments of the populations cannot afford expensive repairs or the purchase of replacement products. Here, designing appropriate regulation, which ensures that products for low-income individuals are of good quality, and complementary policies is a challenge. In addition, introducing and enforcing minimum energy performance standards (MEPS) and labelling as well as environmental standards for energy consuming products contributes to increase awareness of low-income consumers about energy efficient and environmentally-friendly products.

Affordable technological or social innovations and solutions should be developed in the local context and be linked to a participatory process, which involves relevant local actors. Such techniques can help to build up trust and confidence between the involved stakeholders and can lead to long-term success. However, in order to develop local solutions, appropriate financing schemes need to be provided to foster entrepreneurship and innovation. Awareness-raising measures and knowledge management on a targeted case-by-case basis as well as on a wider scale should be undertaken to build-up existing knowledge.

Key questions

1. What are key policies to foster entrepreneurship and local value chain development in developing and emerging countries?
2. How can a better understanding of the local context, national markets, community structures and consumer preferences influence the creation of local value chains for renewable energy and energy efficiency in developing and emerging countries?
3. How can education and training of the local work force best enable the creation of local value chains for energy efficiency and renewable energy technologies?
4. How to create gender-responsive energy value chains?
5. What is the role of technology cooperation between countries in the creation of local value chains for renewable energy and energy efficiency?

4.2 Cooperation with REN21

GFSE is also a member of REN21 and participated in the General assembly and various events, including several RENdez-vous such as:

- Global RENdez-vous: Making Renewables the Norm in 2022
- Global RENdez-vous: Building the Clean Energy Workforce
- RENdez-vous Africa: What Could an African “green deal” look like?
- Green Hydrogen in Africa: Fuelling export markets or local economic development?
- Africa RENdez-vous: Green Hydrogen in Africa: Fuelling export markets or local economic development?
- Paris-Agreement Compatible Scenarios for Energy Infrastructure Workshop

Through its policy briefs on Green Skills, GFSE also contributed to REN21 GSR 2022.

5 Information and Dissemination Activities

The website of the Global Forum on Sustainable Energy (www.gfse.at) serves to inform national and international stakeholders about latest developments, initiatives and events regarding the global efforts to develop a sustainable energy system and ensure universal energy access, about activities of GFSE and important publications. Important news are regularly published on the cover page in the form of newsbuttons.

The GFSE website features top news on its cover page, an introduction to GFSE, its main activities over the years, and a service section. With its newsletter, GFSE updates interested followers on recent events, policy developments and other topics ranking high on the development agenda. During the reporting period, eight (8) newsletters were published. Furthermore, the website provides the possibility to institutions and organisations to promote their own sustainable energy events, which are incorporated into the event calendar.



All [GFSE news](#) are available on our website. The newsletters are also available in Chapter 11 (Annex II) of this report.

6 Additional GFSE Networking and Outreach Activities

Since late 2012, GFSE is a member of the global network REN21 as a non-governmental organisation, and GFSE-President Irene Giner-Reichl has been acting as one of the REN21 vice-chairs since January 2013. GFSE actively participates in networking and outreach activities of REN21, notably through supporting the launch of the Global Status Reports (GSR) through various PR-activities and by providing inputs to the regular REN21 newsletters.

In her capacity as GFSE-President, Irene Giner-Reichl was invited to participate as a speaker in the

- International Digital Security Forum, Vienna, 30 May – 2 June 2022 . <https://idsf.io/> ;
- Pfingstdialog Steiermark 2022, “Green Europe: Deal or no deal?”, 1 – 2 June 2022, Schloss Seggau, Leibnitz (www.pfingstdialog-steiermark.at);
-
- Vienna Energy Security Dialogue, 4 November 2023, on “Humanizing the Energy Transition”, Haus der Industrie, Vienna;
- 1st European and Social Rights Forum, 17 November 2022, Brussels, for photos go to [DG EMPL | Flickr](#), for recordings of the sessions go to the [Forum website](#);
- Spain International Renewables Conference (SPIREC), 20 – 23 February 2023, Madrid; for daily wraps go to [Day 1](#), [Day 2](#), [Day 3](#); the SPIREC Declaration can be found here https://www.ren21.net/wp-content/uploads/2019/05/SPIREC-2023-Declaration_Final.pdf

Since 2022, Irene Giner-Reichl is furthermore serving on the Board of the WEC Young Energy Professionals Program.

7 GFSE Association

The Global Forum on Sustainable Energy is a non-profit association established within the Austrian legal framework.

The Austrian Energy Agency hosts the secretariat of the GFSE and manages the activities of the association. These include care of members, collection of membership fees, management of the financial account in coordination with the responsible bodies of the association, organisation of the general assembly and further tasks as required.

The general assembly convenes once per year after the preparation of annual accounts and successful internal financial audit. The meeting is facilitated and summoned by the Austrian Energy Agency in coordination with the board of the GFSE. The Austrian Energy Agency prepares all documents for the general assembly meetings and ensures the timely execution of the internal financial audit.

Two general assembly meetings, in September 2021 and in October 2022, were held during the contract period. The minutes of these meetings can be found in Chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** (Annex III) of this report.

8 Outlook on Future GFSE Activities

Renewable energy and energy efficiency can significantly contribute to socio-economic development, job creation, air pollution reduction, GHG emissions reduction and industrial development, among others. Efforts to promote renewable energy and energy efficiency should be increased.

Local value chains for RES and EE need to be built. When building local value chains, local actors should develop capacities to at least assemble, install, maintain and repair renewable energy and energy efficiency technologies. They also need to prepare to upgrade their local value chains to capture more value added through a move to more rewarding segments of the value chain, manufacturing products that have more value-added or taking on more complex tasks.

Skills are key for the sustainable energy transition. Today, there are no sufficient qualified workers in the renewable energy and energy efficiency sectors. Therefore, it is essential to implement measures to reduce the risk of skills shortages, support the development of new skills, reskill and upskill workers and harmonise training requirements and skills. Supporting young people, women, marginal groups and existing workers in the fossil sector to develop marketable green skills for the sustainable energy transition is necessary to increase the capacity of developing countries to create a sustainable economy. Initiatives to develop skills and create jobs should be pursued vigorously, through collaboration between the private sector, governmental and educational institutions and improvements in the quality, modularity and accessibility of training.

The Global Forum on Sustainable Energy will continue to play a role in bringing Austrian and international experts from a wide variety of fields together. Thereby, GFSE will continue to highlight the potential of renewable energy and energy efficiency solutions. As it has done in the past, GFSE will ensure that a platform exists for the exchange of experience and capacity building. Through the organization of expert workshops and the involvement in the International Vienna Energy and Climate Forum (IVECF), GFSE will continue to contribute to the energy transition dialogue.

By publishing and disseminating policy briefs and holding virtual meetings on key topics, including green energy skills for the youth, women and green skills, local value chains in developing countries and just transition topics, GFSE helps to stimulate the dialogue between stakeholders. As such, the Global Forum on Sustainable Energy will continue its successful cooperation with UNIDO, REN21, the Global Women's Network for the Energy Transition (GWNEN) and the Global Network of Regional Energy Centres (GN-SEC), while also intensifying cooperation with other stakeholders.

9 Annex I: Agenda of GFSE Events

9.1 Agenda of the GFSE Side Event at the Vienna Energy Forum 2021

Green Skills for the youth in the Sustainable Energy Sector

GFSE Side Event at the Vienna Energy Forum 2021

5 July 2021 15:30-16:30, virtual

Decarbonisation, decentralisation and digitalisation are rapidly transforming the energy sector. Energy systems, which are increasingly based on a combination of decentralised renewable energy, energy efficiency, communication and information technologies and smart and flexible infrastructure are emerging. These emerging energy systems have the potential to empower prosumers, substantially decrease carbon emissions and enable access to clean energy for low-income populations, among others. New energy and digitalisation technologies are changing markets and thus allowing the emergence of new business models for energy services and industrial activities. However, companies in the decentralised renewable energy business in developing countries face barriers to access technology as well as finance and lack business and technical skills. For example, in the solar value chain, a growing number of skilled workers is needed to achieve renewable targets in many countries. Challenges include availability of skilled manpower, quality of training, lack of platforms to advertise solar jobs and other recruitment channels, salary levels, lack of training institutions and accreditation of training institutions.

Companies in the decentralised renewable energy business in developing countries face barriers to hire staff with the necessary business and technical skills. For example, in the solar value chain, a growing number of skilled workers is needed. Challenges include availability of skilled manpower, quality of training, lack of platforms to advertise solar jobs, lack of training institutions and accreditation of training institutions. Youth are emerging as an important source of talent for achieving renewable energy targets. At the same time, one of the most pressing challenges for emerging economies is a shortage of jobs among the youth. Enhancing skills development and creating work opportunities for youth in the renewables sector is essential. This requires governments and industry to prioritize skill building for youth. Cooperation between companies and educational institutions must be strengthened to ensure that the youth develops marketable skills. This includes dual training programmes that grant young people access to on-the-job training and internships while simultaneously attending vocational school and programmes that combine demonstration projects, training and policy development. This event will discuss challenges faced by renewable energy companies and effective ways to improve the skills of the youth in the renewables area.

OBJECTIVE

This event will bring together representatives from the renewable energy sector to share best practices, discuss challenges and bottlenecks, and exchange experiences on green skills that are needed to scale up solar energy and other renewables. The entrepreneurs will present some of the innovative solutions they have come up with to tackle local and/or regional energy challenges. After listening to their experience and initiatives, the panel will discuss future avenues to improve vocational education and training in sustainable energy.

GUIDING QUESTIONS

1. Which specific skills do companies on the ground require in their renewable energy business?
2. Which combination of training instruments and policies will be the most effective way of generating marketable skills?
3. How can digital technologies be used to boost education and training and build up skills of the workforce?
4. How to foster cooperation between companies and educational institutions to improve marketable skills in the renewables business?

Agenda	
10:00 – 10:05	Opening
	<i>Opening and Moderation</i> <ul style="list-style-type: none">• Irene Giner-Reichl, President of GFSE and Vice-Chair of REN21
10:05 – 10:15	Key Note Speech
	<ul style="list-style-type: none">• The Southern African Solar Thermal Training & Demonstration Initiative (SOLTRAIN) DI Werner Weiss, AEE INTEC
10:15 – 10:55	Panel Discussion
	<i>Each panelist gets 4 minutes for an introductory statement; this is followed up by panel discussion</i> <ul style="list-style-type: none">• Mag. Michael Müllneritsch, Aracuba GmbH• DI Werner Weiss, AEE INTEC• DI Christian Holter, SOLID• N.N. Management Center Innsbruck (MCI)
10:55 – 11:00	Closing Remarks
	<ul style="list-style-type: none">• Moderator

9.2 Agenda of the GFSE online event “Jugend und Green Skills”

Jugend und Green Skills

GFSE Workshop

16:00 – 18:00, 1. Dezember 2021, virtuelles Meeting

Die junge Generation verfügt über ein großes Potenzial, um auf vielfältige Weise zur Energiewende beizutragen, zum Beispiel durch die Beteiligung an Entscheidungsprozessen auf lokaler und internationaler Ebene und als qualifizierte Arbeitskräfte, welche die Entwicklung von Wertschöpfungsketten in den Bereichen erneuerbare Energien, Energieeffizienz und saubere Mobilität unterstützen. Es gibt 1,2 Milliarden Menschen zwischen 15 und 24 Jahren auf der Welt, die sich eine bessere Welt wünschen. Diese jungen Menschen haben Leidenschaft für eine nachhaltige Welt und haben Zugang zu Informationen und Plattformen, die keine Generation zuvor hatte.

Die Jugend ist eine wichtige Quelle von Talenten für die Verwirklichung der Ziele in den Bereichen erneuerbare Energien und Energieeffizienz. Gleichzeitig engagiert sich die Jugend zunehmend in Fragen des Klimawandels und der Energiewende. Jugendlichen kommt im Streben nach einem nachhaltigen Energiesystem für alle eine Schlüsselrolle zu.

Junge Leaders können mit politischen Entscheidungsträgern und anderen relevanten Akteuren der Zivilgesellschaft und des Privatsektors zusammenarbeiten, um eine Energiewende voranzutreiben, welche Bezahlbarkeit, Versorgungssicherheit, Wettbewerbsfähigkeit sowie Umwelt- und Klimaaspekte vereint. Die Jugend kann und soll in den entsprechenden Entscheidungsprozessen eingebunden werden. Die Beteiligung der Jugend an der Diskussion zu energiepolitischen Maßnahmen legitimiert deren Umsetzung, insbesondere, weil die Jugend am stärksten mit den zukünftigen Auswirkungen solcher Maßnahmen leben muss und dazu beitragen kann, die Maßnahmen umzusetzen.

Die Jugend wird zu einer wichtigen Talentquelle für die Erreichung der Ziele im Bereich der erneuerbaren Energien. Gleichzeitig ist der Mangel an Arbeitsplätzen für junge Menschen eine der dringendsten Herausforderungen für viele Länder. Die Verbesserung der Qualifikation und die Schaffung von Arbeitsmöglichkeiten für junge Menschen im Bereich der erneuerbaren Energien sind von entscheidender Bedeutung. Dies setzt voraus, dass Regierungen und Industrie der Qualifizierung junger Menschen Vorrang einräumen. Die Zusammenarbeit zwischen Unternehmen und Bildungseinrichtungen muss gestärkt werden, um sicherzustellen, dass die Jugend marktfähige Fähigkeiten entwickelt. Dazu gehören duale Ausbildungsprogramme, die jungen Menschen Zugang zu Praktika in Unternehmen gewähren, während sie gleichzeitig die Berufsschule besuchen, sowie Programme, welche Demonstrationsprojekte, Ausbildung und Politikentwicklung miteinander verbinden.

Der Übergang zu einer nachhaltigen Energiewirtschaft muss gerecht gestaltet werden, um die damit verbundenen sozioökonomischen Kosten abzufedern. Der grundlegende, gerechte Wandel hin zu einem nachhaltigen Energiesystem benötigt das Engagement und Skills der Jugend. Es ist notwendig, Bewusstsein zu schaffen und ‚Jugend-Empowerment‘ zu unterstützen sowie die gesellschaftliche Präsenz von Jugendlichen im Energiebereich zu stärken. U.a. ist eine sinnvolle Beteiligung der Jugend an der Planung, Umsetzung, Überwachung und Bewertung der Energiepolitik erforderlich.

Dafür sind Informationsverbreitung und konstruktiver Dialog notwendig. Junge Menschen sollen ermutigt werden, sich an politischen Prozessen und Entscheidungen zu beteiligen. Sie sollen ihre Potenziale erkennen und stärken. Dabei soll darauf geachtet werden, dass junge Menschen mit unterschiedlichen Bildungsniveaus, sozialen Bedingungen und Wertorientierungen teilnehmen können.

Zu einem gerechten Wandel gehört auch die verstärkte Einbindung junger Frauen im Bereich der Energiewirtschaft. Dazu gehört die Verbesserung der Bildung von Frauen und ihrer Fähigkeit, aktiv und effektiv an bestehenden Energiemärkten teilzunehmen, Zugang zu menschenwürdiger Arbeit zu erhalten und eine sinnvolle Beteiligung an Entscheidungsprozessen auf allen Ebenen zu ermöglichen.

ZIELE

Ziels dieses Workshops ist es, Möglichkeiten für das Engagement Jugendlicher in der Energiepolitik und ihre aktive Teilnahme an der Energiewirtschaft zu diskutieren. Wir wollen von den Erfahrungen österreichischer Organisationen in Österreich und im Ausland lernen.

Schlüsselfragen

1. Wie können Jugendliche unterstützt werden, sich bei energiepolitischen Fragen zu engagieren? Wie kann man ihr Interesse an dem Thema wecken?
2. Wie kann man partizipative Prozesse für Jugendliche im Energiebereich fördern?
3. Wie können Jugendliche bei Strategien für einen gerechten Übergang zu einer klimaneutralen Wirtschaft berücksichtigt und eingebunden werden?
4. Wie können Green Skills für Jugendliche gefördert werden?
5. Welche Maßnahmen können dazu beitragen, bessere Ausbildungsmöglichkeiten und mehr Arbeitsplätze in den Bereichen Erneuerbare Energien und Energieeffizienz zu schaffen?
6. Welche Ansätze sind im Rahmen der Energiewende notwendig, um junge Frauen zu stärken?
7. Wie können positive Rollenbilder für junge Frauen geschaffen werden? Was ist die Rolle von Green Mentoring?
8. Wie können Kooperationen zwischen Bildungseinrichtungen und Unternehmen dazu beitragen, praxisbezogene und bedarfsorientierte Berufswweiterbildungen in den Bereichen Erneuerbare Energie und Energieeffizienz anzubieten?
9. Wie kann Entwicklungszusammenarbeit dazu beitragen, die Rolle der Jugend bei der Umsetzung der Energiewende in Entwicklungsländern zu stärken?
10. Wie kann man jungen Menschen hierzulande ermöglichen, sich mit jungen Menschen in Entwicklungsländern auszutauschen und in Lern- und Arbeitsprojekten der EZA mitzuhelfen?

Agenda	
16:00 – 16:05	<p>Eröffnung</p> <ul style="list-style-type: none"> • MMag. Dr. Irene Giner-Reichl, Botschafterin a.D., Präsidentin von GFSE und Bureau Member REN21
16:05 – 17:20	<ul style="list-style-type: none"> • 5x15 Min. Vorträge • Einbindung Jugendlicher via Social Media, Mag.a Susanne Wolf-Eberl, Geschäftsführung, Research & Data Competence OG • Berufsbildung erneuerbare Energie in Burkina Faso, Mag. Robert Moosbrugger, MSc MSc, - FH Vorarlberg • Community Projekt zu Photovoltaic in Ghana, Gudrun Bruckner, Vorsitzende, We are UWA • Eine globale Perspektive und das UNIDO BLOOM Projekt. Martin Lugmayr, Sustainable Energy expert, UNIDO • Via Segelboot entlang des Afrikanischen Kontinents die Energiewende beschleunigen, Dipl. Ing. Michael Puttinger, SEKEM ENERGY GmbH
17:20-17:50	<p>Diskussion</p> <ul style="list-style-type: none"> • Alle Teilnehmer:innen
17:50-18:00	Abschluss

9.3 Agenda of the GFSE event “Young Women and Green Skills”

Young Women and Green Skills

GFSE Workshop

15:00-17:00 CET, 20.09.2022, virtual meeting

Increasing the involvement of young women in the clean energy sector is very important to advance the energy transition quickly. This includes improving women's education levels, easier access to renewable energy jobs and meaningful participation in decision-making processes at all levels. Women are still highly underrepresented in the energy sector. Too many women are still excluded from this and other sectors, without access to decent, well-paid employment and sound career paths. Women have a substantial potential to contribute to the clean energy transition and their talent is not been utilized well.

The shortage of skilled workers is one of the greatest challenges for the energy transition. There is a greater need for action to develop young women as qualified workforce in the energy sector. For this, they need new career paths. Existing career paths among young people still seem to be rather traditional and they need to be encouraged to follow new paths. Young women also need support in developing their self-confidence and valuing their own competences. In addition, companies and educational institutions should work to change perceptions of gender roles as well as cultural and social (male-dominated) norms. Moreover, prevailing hiring practices in the renewable energy sector need to be transformed to allow women access to new jobs, among other those in the STEM area. Possible solutions include networking and mentorship, changes to workplace practices, policies and regulations and mainstreaming initiatives. Activities to raise visibility, awareness and sensitisation are necessary to get women more involved in the energy transition. More support to networking, mentoring, training and more opportunities for experience exchange would be helpful.

Women also need flexibility in their training, e.g. due to family commitments. Modular, competency-based training that allows the person to progress at their own pace and evaluates knowledge and skills the person is expected to learn as well as support measures such as flexible childcare solutions, among other things, can help women advance their career in the renewable energy sector.

TARGETS

The aim of this workshop is to discuss ways to increase the involvement of young women in the field of renewable energy. We want to learn from the experiences of organisations in Austria and abroad.

Key questions

11. How can young women be supported to train as professionals in the field of renewable energies?
12. What measures can help to create better training opportunities and more jobs for women in the renewable energy and energy efficiency sectors?
13. What approaches are necessary in the context of the energy transition to empower young women?
14. How can existing role models for young women and biases against women in the renewable sector be removed?

15. How can positive role models be created for young women? What is the role of Green Mentoring?
16. How to foster peer-to-peer learning and exchange of experience and best-practice at the international level between women working in the renewable energy sector?

Agenda	
15:00 - 15:10	Opening <ul style="list-style-type: none"> • MMag. Dr. Irene Giner-Reichl, Ambassador (ret.), President of GFSE
15:10- 16:20	Presentations <ul style="list-style-type: none"> • MMag. Raphaela Reinfeld-Spadt, MBA, Head of Research and Innovation @ Energie Burgenland AG • DI Dr. Edith Haslinger, Scientist @ Austrian Institute of Technology • DI Beate Zöchmeiser, MAS, Head of Communications & Investor Relations @ WEB Windenergie AG • Katharina Pröstler, MSc, Gender and Energy Expert @ UNIDO
16:20-16:40	Discussion <ul style="list-style-type: none"> • All participants
16:40-17:00	Closing

9.4 Agenda of the GFSE Event “Renewable hydrogen and cooperation opportunities between the EU and other world regions”

Renewable hydrogen and cooperation opportunities between the EU and other world regions

Online GFSE Workshop

15:00-17:30, 19th of October 2022, virtual Meeting

Africa and other world regions such as Latin America are endowed with substantial renewable energy resources. Increasing renewable energy capacities is important to achieve development goals and improve its security of energy supply. Increasing the renewable energy capacities in these regions may also open opportunities for exports towards Europe.

Renewable hydrogen trade is one of those opportunities. Renewable hydrogen production in Africa and other world regions for local and export markets could help reduce the costs of production through scaling up and learning-by-doing effects. As part of REPowerEU, the EU hydrogen accelerator aims at increasing the production of renewable hydrogen both in the EU and worldwide to replace imported

Russian gas. By 2030, approximately 10 million tonnes of hydrogen should be produced in the EU and another 10 million tonnes should be imported.^{1,2}

In the long term, Europe can become an importer of renewable hydrogen. Increasing the demand for renewable hydrogen in the EU, however, will require, among others, refineries, steel production, fertilizer producers and other chemical industries to switch from natural gas to hydrogen. This requires substantial technology development and investments.

Intercontinental renewable hydrogen trade can help the EU diversify its sources of energy and reduce geopolitical dependence on Russia and other fossil fuel exporters. Renewable hydrogen trade can rely on a larger number of exporting countries diminishing the influence of single producing countries on the market and contributing to a new geopolitical landscape.

The development of an intercontinental hydrogen market will depend on technology, infrastructure, environment, finance, global markets, and geopolitics.³ The production and trade of renewable hydrogen could become an opportunity for economic and social benefits for Africa and other world regions. However, it needs to be a fair trade system with equal-to-equal cooperation between the EU and its partners.

The development of renewable hydrogen production capacities requires the rapid development of renewable electricity potentials. A careful balance should be cast between electricity generation capacity to meet domestic electricity demand and capacity to produce renewable hydrogen. Affordable electricity to meet domestic demand is required to ensure the economic and social development of the continent.

Funding for renewable hydrogen projects still faces hurdles and uncertainties, due to the high costs, regulatory uncertainties, financing availability, and lack of supply chain maturity among others.⁴ Financing of renewable hydrogen projects requires the projects to have a bankable offtake scheme.⁵ Replacing existing uses of grey hydrogen in the production of ammonia and or refineries can be the first opportunities for offtake of renewable hydrogen and may be easier to finance. These offtake models are more familiar to the banks and are more likely to lead to a bankable project. Access to domestic

¹ European Commission, 2022: COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS REPowerEU: Joint European Action for more affordable, secure and sustainable energy. COM/2022/108 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A108%3AFIN>

² European Commission, 2022b: COMMISSION STAFF WORKING DOCUMENT IMPLEMENTING THE REPOWER EU ACTION PLAN: INVESTMENT NEEDS, HYDROGEN ACCELERATOR AND ACHIEVING THE BIO-METHANE TARGETS Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. REPowerEU Plan. SWD(2022) 230 final. Brussels, 18.5.2022. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022SC0230&from=EN> {COM(2022) 230 final}

³ De Blasio, N., Pflugmann, F., 2020: Geopolitical and Market Implications of Renewable Hydrogen: New Dependencies in a Low-Carbon Energy World. <https://www.belfercenter.org/publication/geopolitical-and-market-implications-renewable-hydrogen-new-dependencies-low-carbon>

⁴ Brooks, C., 2022: EU countries failing to lighten burden of hydrogen costs to reach net-zero: study. <https://cleanenergynews.ihsmarkit.com/research-analysis/eib-report-finds-eu-countries-failing-to-lighten-hydrogen-costs.html>

⁵ Norton Rose Fulbright., 2021. Financing hydrogen projects brings unique challenges. <https://www.nortonrosefulbright.com/en/knowledge/publications/cd725de6/financing-hydrogen-projects-brings-unique-challenges>

and international financing is necessary to advance the installation of renewable electricity and renewable hydrogen capacity.⁶ Financial support mechanisms may be required in the first phase to compensate for the higher price of renewable hydrogen.

Renewable hydrogen projects in Africa and other regions face a number of challenges such as lack of technical expertise, low rates of access to electricity and significant growth of domestic demand for electricity, water scarcity, undeveloped infrastructure (ports, pipelines, roads) to facilitate trade and exports and lack of policy and investment frameworks. Transport infrastructure towards Europe, e.g. maritime shipping of Ammonia or transport of gaseous hydrogen via hydrogen pipeline from North Africa can also represent a significant bottleneck and needs to be solved in a cost-effective and safe manner without security risks.⁷ Overcoming these barriers requires cooperation between European and its counterparts.

As Europe pursues scarce LNG supplies, LNG prices are rising sharply and gas deliveries to buyers in other continents will be more difficult, threatening not only their energy security of supply but also their food security and triggering price increases in many sectors.⁸ Including renewable energy and energy efficiency in cooperation strategies between the EU and other world regions will help diversify European energy supply in terms of selling countries and energy carriers and democratise the global energy system, avoiding excessive influence by single market actors. Cooperation that starts with fossil LNG will have to provide perspectives for a shift towards renewable energies in the medium and long term, including hydrogen. Security considerations for the production and transport of both LNG and renewable hydrogen need to be addressed (e.g. safe maritime routes, democratic producing countries, diversification of suppliers and energy carriers).

The development of an intercontinental hydrogen market will require measures to support investments in hydrogen production projects and transport infrastructure but also the increase of demand for renewable hydrogen in the EU. Reduction of market risks and removal of commercialisation barriers to renewable hydrogen use in the EU are necessary.

Besides being exported towards the EU, renewable hydrogen can also be used as a feedstock and fuel by African industry to produce products with higher value-added than raw materials such as green steel, green fertilizers and cement for domestic consumption or exports to the European Union. This could help African countries and other EU trade partners to improve their balance of trade with the EU while avoiding some negative impacts of the EU Carbon Border Adjustment Mechanism (CBAM).⁹

Cooperation between the European Union and other world regions on renewable energy can become a building block for a broader cooperation on trade, security, technology, climate and environmental

⁶ Toro, F., 2022: Countdown to a Green Hydrogen Economy in 2030. What does Brazil need to do to deliver on its ambitions? NIRAS. May 24, 2022. <https://www.niras.com/projects/building-a-green-hydrogen-economy-in-brazil/>

⁷ Barreto, L., 2022: Natural gas and renewable hydrogen in Africa and cooperation opportunities with the EU. Policy Brief #15. Global Forum on Sustainable Energy. https://www.gfse.at/fileadmin/user_upload/gfse_policy_brief_gas_africa_v7_clean.pdf

⁸ Tsafos, N., 2022: Europe needs a smarter way out of Russian gas. Euractiv. 28 March 2022. <https://www.euractiv.com/section/energy/opinion/europe-needs-a-smarter-way-out-of-russian-gas/>

⁹ Pleeck, S., Denton, F., Mitchell, I., 2022: An EU Tax on African Carbon – Assessing the Impact and Ways Forward. Blog. Center for Global Development. February 10, 2022. <https://www.cgdev.org/blog/eu-tax-african-carbon-assessing-impact-and-ways-forward>

policy, thus strengthening the EU's external relations towards other regions. A sound cooperation requires development of trade relationships, substantial investments, opening of markets and recognition of exporting countries as equal partners.

OBJECTIVES

The objective of this workshop is to discuss the status of the development of renewable hydrogen in Africa and other world regions, specifically for exports towards the EU, and the challenges and opportunities ahead. It will also address building blocks of cooperation strategies between EU Member States and other world regions for hydrogen production, export and domestic use.

KEY QUESTIONS

1. What are the main barriers for the development of renewable hydrogen?
2. What are possible financing mechanisms for renewable hydrogen in the market development phase?
3. Which projects are currently being pursued? Which barriers are these projects facing?
4. What policies and business models are required to develop renewable hydrogen?
5. Which cooperation strategies should be pursued by the EU to develop renewable hydrogen production in other world regions?

Agenda	
15:00 – 15:05	Welcome <ul style="list-style-type: none"> • MMag. Dr. Irene Giner-Reichl, Ambassador a.D., President of GFSE
15:05-15:15	<ul style="list-style-type: none"> • Leonardo Barreto, „Natural gas and renewable hydrogen in Africa and cooperation opportunities with the EU”, Austrian Energy Agency/GFSE Secretariat
15:15 – 16:30	Presentations (15 min. each) <ul style="list-style-type: none"> ○ Dr. Rudolf Zauner, Verbund and World Energy Council Austria ○ Dr. Michael Losch, Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) ○ Chigozie Nweke-Eze, Hydrogen projects in Namibia, Integrated Africa Power ○ Khalid Salmi, Regional Center for Renewable Energy and Energy Efficiency (RCREEE), Green H2 Development in The Arab region (Promising Trends & Sustainability Concerns)
16:30 – 16:45	<ul style="list-style-type: none"> • Jorge Pinheiro Machado, R20 , Perspectives from Brazil on hydrogen
16:45-17:10	Discussion <ul style="list-style-type: none"> • All participants
17:10-17:15	Closing

10 Annex II: Brief on “Color codes of hydrogen”

The environmental impact of hydrogen varies depending on its production. The different production methods have color codes to help keep terms memorable and create an overview. Here is a summary of all the color codes and why some types of production and feedstock will be more relevant than others.

GREY HYDROGEN

Natural Gas Reforming without CCUS

Grey Hydrogen is currently the most common and cheapest form of hydrogen production, accounting for 95 % of all global output.¹⁰

It is produced by steam-reforming natural gas. This has CO₂ as a waste product, which is released into the atmosphere. Grey hydrogen is, therefore, not climate neutral.¹¹

BROWN & BLACK HYDROGEN

Lignite and Coal Reforming without CCUS

The oldest method of producing hydrogen is by converting coal into gas. The gas produced during coal gasification is called syngas, and hydrogen can be separated from other elements using adsorbers or special membranes. The gasification process converts organic or fossil-based carbonaceous materials into carbon monoxide, hydrogen, and carbon dioxide. The carbon monoxide reacts with water through the water-gas-shift-reaction to form carbon dioxide and more hydrogen.¹² The process is even more carbon-intensive than grey hydrogen, with brown hydrogen being the worst. Lignite is compressed peat and generates a lot of carbon dioxide when combusted.¹³

Blue hydrogen

Fossil Fuel reforming with CCUS

Like grey hydrogen, blue hydrogen is also produced by steam reforming. The CO₂ produced is then 80-90% stored underground through CCS technology (carbon capture and storage). This means it is not released into the atmosphere, and the hydrogen can be considered low-

¹⁰ CertifHy Canada Inc., “Grey Hydrogen,” 2022. [Online]. Available: <https://www.certifhy.ca/Green%20and%20Blue%20H2.html>.

¹¹ Hydrogen Europe, “The Colors of Hydrogen,” 2022. [Online]. Available: <https://hydrogeneurope.eu/in-a-nutshell/>

¹² S. Giovannini, “50 shades of (grey and blue and green) hydrogen,” 2020 [Online]. Available: <https://energy-cities.eu/50-shades-of-grey-and-blue-and-green-hydrogen/>

¹³ J. Armstrong, “Cracking the Hydrogen Colour Code,” 2021. [Online]. Available: <https://energycentral.com/c/ec/cracking-hydrogen-colour-code>

carbon hydrogen. Though not technically correct, it is often even categorized as carbon neutral.¹⁴ It is not, however, renewable, as the fossil fuels used for the process are a finite resource. The Austrian Hydrogen Strategy focuses on "carbon neutral Hydrogen" instead of "renewable Hydrogen" to keep the possibility of production method open.¹⁵

The method could technically be "renewable" if biomethane were used for feedstock.¹⁶

There are 31 active blue hydrogen production sites worldwide of which seven are in Europe, 12 facilities are in North America, 11 are in the Asia Pacific, and two operational projects are in the Middle East.¹⁷

TURQUOISE HYDROGEN

Methane Pyrolysis

Another production process from natural gas is the pyrolysis of methane. In this process, the methane in natural gas is split into hydrogen and solid carbon. Solid carbon is a granulate that can be safely stored in old mine tunnels, for example, and reused later. As a result, no CO₂ is released into the atmosphere, making it climate-neutral. However, methane pyrolysis is still being tested on prototypes and is not market-ready. It is being developed in the US, Japan, and Australia.¹⁸

PINK HYDROGEN

Electrolysis through nuclear energy

Pink hydrogen is produced by nuclear electrolysis. In addition, the high temperatures of nuclear reactors can produce hydrogen by generating steam for more efficient electrolysis or fossil gas-based steam methane reforming.¹⁹

GREEN HYDROGEN

Electrolysis through renewable electricity

Green Hydrogen is produced by electrolysis (splitting water into its components, oxygen and hydrogen). Renewable energy sources such as wind power, hydropower, or solar energy sup-

¹⁴ Hydrogen Europe, "The Colors of Hydrogen," 2022. [Online]. Available: <https://hydrogeneurope.eu/in-a-nutshell/>

¹⁵ BMK, "Wasserstoffstrategie für Österreich," 2022. [Online]. Available: <https://www.bmk.gv.at/themen/energie/publikationen/wasserstoffstrategie.html>

¹⁶ IEA, "ETP Clean Energy Technology Guide," 2022. [Online]. Available: <https://www.iea.org/articles/etp-clean-energy-technology-guide>.

¹⁷ Stratias Advisors, "Blue Hydrogen in the Next Decade," 2022. [Online]. Available: <https://stratiasadvisors.com/Insights/2022/030922-BlueHydrogen>

¹⁸ Hydrogen Europe, "The Colors of Hydrogen," 2022. [Online]. Available: <https://hydrogeneurope.eu/in-a-nutshell/>

¹⁹ National Grid, "The hydrogen colour spectrum", 2022 [Online]. Available: <https://www.nationalgrid.com/stories/energy-explained/hydrogen-colour-spectrum>

ply the electricity required. It is also referred to as a power-to-gas technology. Green hydrogen is CO₂-neutral but currently still requires high energy input. There are different production methods of electrolysis. There are many types of electrolyzers, some still being developed, but the most common, market-ready ones are:

Alkaline electrolyzers are a well-developed technology that has been used for decades.²⁰

Polymer electrolyte membrane (PEM) electrolyzers are a commercially less-developed technology than alkaline electrolyzers but find themselves on the rise, with most Electrolyser Producers focussing on this technology.²¹

The long-term goal set by the European Commission is to have all hydrogen be green hydrogen produced through electrolysis.²² However, there is a long way to get there. Currently, Green Hydrogen accounts for around 1% of the overall hydrogen production. Since hydrogen via electrolysis is only considered green if the electricity used stems from renewable sources, expansion on renewables like wind and solar will also be necessary.

Though challenging, Green Hydrogen is the only type that is renewable, carbon neutral, and independent from fossil fuels. Green hydrogen should be the focus in terms of certification and investment to reach climate goals and become self-sufficient in energy.

²⁰ IEA, "ETP Clean Energy Technology Guide," 2022. [Online]. Available: <https://www.iea.org/articles/etp-clean-energy-technology-guide>.

²¹ CARMEN, „Marktübersicht Elektrolyseure," 2021. [Online]. Available: https://www.carmen-ev.de/wp-content/uploads/2022/06/Marktuebersicht-Elektrolyseure_2022-07.pdf

²² E. Commission, "Energy, Hydrogen," 2022. [Online]. Available: https://energy.ec.europa.eu/topics/energy-system-integration/hydrogen_en

11 Annex III: GFSE Newsletters

11.1 GFSE Newsletter #17

https://www.gfse.at/fileadmin/4_gfse/newsletters/campaign_7.pdf

11.2 GFSE Newsletter #18

https://www.gfse.at/fileadmin/4_gfse/newsletters/newsletter_july_2021.pdf

11.3 GFSE Newsletter #19

[GFSE Newsletter #19](#)

11.4 GFSE Newsletter #20

[GFSE Newsletter #20](#)

11.5 GFSE Newsletter #21

[GFSE Newsletter #21](#)

11.6 GFSE Newsletter #22

[GFSE Newsletter #22](#)

11.7 GFSE Newsletter #23

[GFSE Newsletter #23](#)

11.8 GFSE Newsletter #24

[GFSE Newsletter #24](#)

11.9 GFSE Newsletter #25

[GFSE Newsletter #25](#)

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