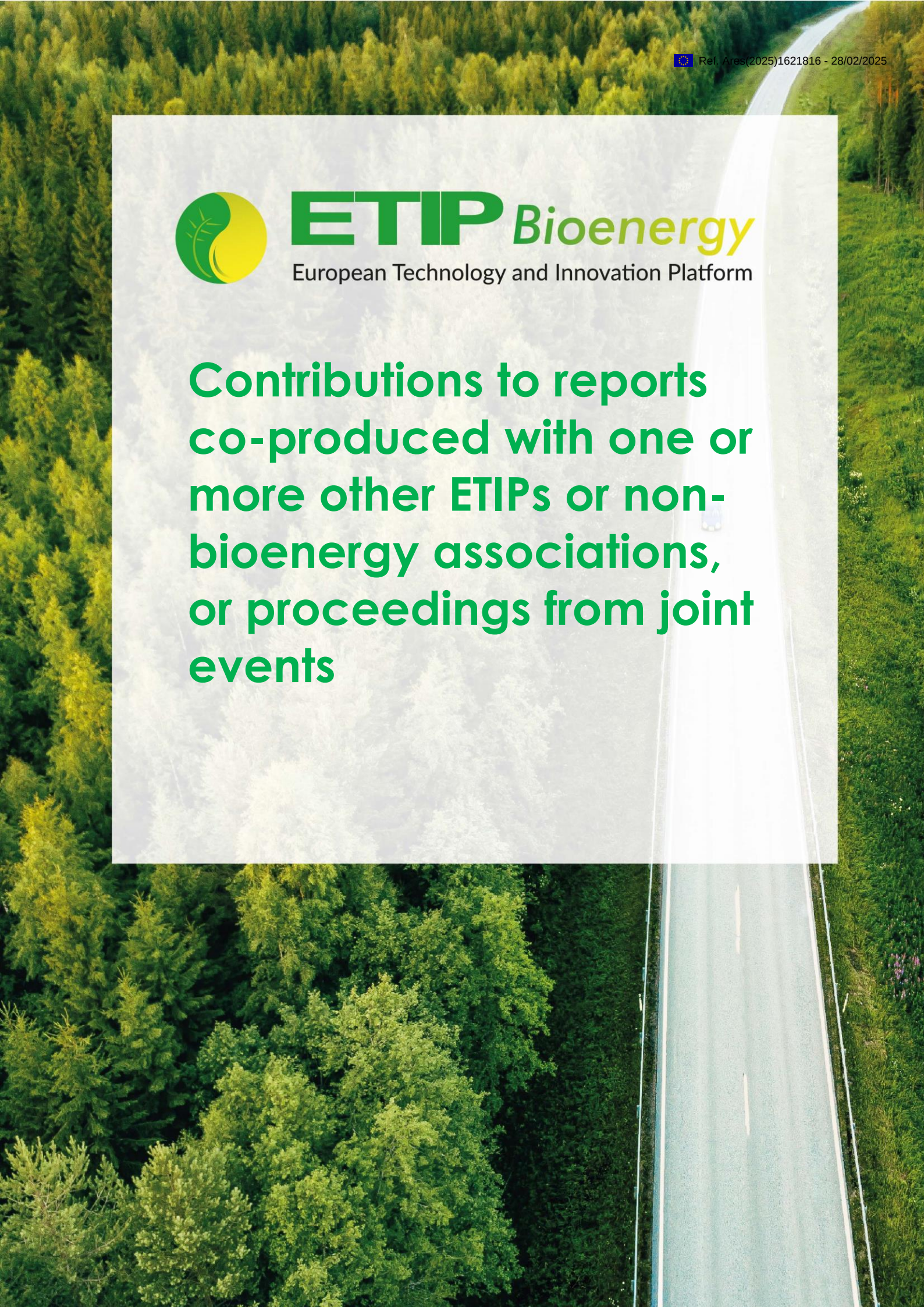

ETIP Bioenergy

European Technology and Innovation Platform

Contributions to reports co-produced with one or more other ETIPs or non-bioenergy associations, or proceedings from joint events

Project: ETIP-B2022-2025

European Technology and Innovation Platform Bioenergy – Support of Renewable Fuels and Advanced Bioenergy Stakeholders 2022-2025

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PROJECT PARTNERS

BEST - Bioenergy and Sustainable Technologies GMBH, Austria	BEST Bioenergy and Sustainable Technologies
RISE – Research Institutes of Sweden AB, Sweden	RI. SE
EUREC – European Renewable Energy Research Centre	EUREC The Association of European Renewable Energy Research Centres
ETA – Energia, Trasporti, Agricoltura Srl, Italy	etaflorence renewable energies
CSD – Center For The Study Of Democracy, Bulgaria	CSD CENTER FOR THE STUDY OF DEMOCRACY

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Executive summary

This report, referring to activities undertaken within Task 2.5 – *Joint activities between ETIP Bioenergy and other ETIPs or stakeholder fora*, comprises two written contributions and three event reports. These have been elaborated/held with other ETIPs on specific topics, namely:

1. ETIP Bioenergy's contribution to a report *Skills in the Renewable Energy Sector: Visions from the European Technology and Innovation Platforms* [joint activity with ETIP Batteries, ETIP Hydropower, ETIP PV, RHC-ETIP, ETIP Geothermal, ETIP SNET, and ETIP Wind]
2. ETIP Bioenergy's contribution to a joint ETIPs report with suggestions to improve the draft NECPs of 2023 [joint activity with RHC-ETIP, ETIP PV, ESTELA, ETIP Wind, ETIP Geothermal, and ETIP Ocean]
3. Event report from the workshop "Best practice for social acceptance of renewable energy projects" [joint activity with ETIP Wind and ETIP Hydropower]
4. Event report from the webinar "Renewable energy options for industrial processes: What opportunities for RES technologies following the provisional agreement on the Net-Zero Industry Act?" [joint activity with RHC-ETIP, ESTELA and ETIP Geothermal]
5. Event report from the webinar "BIOCCS Deployment Examples" [joint activity with the Zero Emissions Platform ZEP, which runs the European Technology and Innovation Platform (ETIP) for industrial carbon management]

The contributions and event reports are included in this deliverable in the order presented above. ETIP Bioenergy's contribution to a joint ETIPs report, which contains suggestions for improving the draft NECPs of 2023, is not easily traceable (i.e. the specific text contributed by ETIP Bioenergy cannot be presented in the deliverable). Therefore, the complete report is accessible through the link above. Section 2 of this deliverable contains only an executive summary of the joint report.

The different ETIPs have been working closely together on interdisciplinary and overlapping issues to ensure high-level expertise in R&I processes and continuous knowledge transfer. The ETIP Bioenergy Secretariat has facilitated the formal involvement of ETIP Bioenergy representatives in other ETIPs and relevant energy initiatives, and vice versa. Several joint activities with other ETIPs have taken place within the scope of the current support project. The four presented joint activities are considered the major ones.

1. ETIP Bioenergy's contribution to a report Skills in the Renewable Energy Sector: Visions from the European Technology and Innovation Platforms

1.1. Introduction

Bioenergy and renewable fuels are an essential part of an integrated energy system. They contribute to a climate energy mix as a clean and reliable form of energy, and provide many benefits, such as support to decentralized and flexible energy production, contribute to energy security, and constitute part of the bioeconomy. Bioenergy is needed to replace the massive amount of fossil energy that is currently consumed. Our over-reliance on fossil energy sources has resulted in significant impacts at various levels, most importantly climate change due to the emission of greenhouse gases, and economic and social impacts due to supply insecurity, as the ongoing Ukrainian-Russian conflict has shown. Bioenergy and renewable fuels will support the decarbonization (in the sense of defossilisation) of Europe and in particular of its transport system.

Biomass is already widely used in the EU for energy applications providing more than 10% of EU total primary energy supply and contributing to the block's climate and energy security objectives. Bioenergy alone exceeds the contribution of all other renewables together, such as wind, solar, and hydropower. Nevertheless, critical to the future of the bioenergy sector is a large and sufficiently skilled workforce to manage the needs of bioenergy facilities. It takes a large number of workers to sufficiently run a facility: according to the industry, it can take approximately 1,680 to 1,700 workers to run a bioenergy plant (for co-processing, hydrotreatment/deoxygenation, gasification/biomethanol, bioDME synthesis, fermentation, transesterification, and saccharification – in order of the most amount of workers to the least). To gain greater insights on the current status of jobs/skills for the sector as well as future needs and policy recommendations, ETIP Bioenergy has surveyed and interviewed stakeholders of the bioenergy sector.

1.2. Focus 1 – Future/New/emerging skills and job profiles

The first step to building a skilled workforce is identifying skills necessary for the future of the sector – and ensuring that education and training programmes reflect those skills. When looking at the current state of the workforce in the bioenergy industry, there is a clear lack of sufficient young engineers with a solid technical educational background who can bring new life and energy into the sector.

There are two broad categories of skills that are important to the manufacture and deployment of

bioenergy technologies in the next five to seven years. First and foremost, engineering skills are critical. This broad term encompasses a wide range of engineering skills necessary to the bioenergy sector, including mechanical engineering, chemical engineering, and biotechnological engineering. But beyond engineering focus areas, further technical competencies and hands-on experiences are needed for those entering the bioenergy sector. Stakeholders spoke about the need for craft-persons and skilled welders to lead technical installations as well as experts in analytics, knowledge integration, and sustainability assessments.

Within the technical engineering needs of the bioenergy sector, certain specific skills or experiences are beneficial. For the bioenergy sector in particular, this can include laboratory skills and microbiology processes and techniques. For example, an engineer specialized in fermentation processes, in the biorefining of lignocellulose, or in sustainable biomass procurement. Furthermore, specialities such as bioinformatics and the digital industry will become more prevalent in the near future, as digitalization is incorporated into energy systems to a greater extent. Digital skills will also necessitate advanced analytics skills and data analysis.

The second broad category of skills needed are so-called “soft” skills in sustainability, communication, and commercialization. Good communicators are vitally important to explain the needs of the bioenergy sector as well as the importance of bioenergy as a renewable energy source part of the future carbon neutral system. Creative or lateral thinking is also advantageous to be able to adapt to circumstances or uncertainty, as is a sense of teamwork and collaboration to creatively problem solve and think critically about solutions. In order to scale up the sector in the future, project development and management experience will be vital. This can include management in public affairs, regulatory updates, and marketing.

All these skills are valuable in the short and medium term to build up the industry and scale up manufacturing processes, but certain skills are more important than others in the long term – at least according to stakeholders in the bioenergy industry. For the most part, this is the broad categories of skills mentioned above. Engineering and technical expertise are paramount – especially engineers with commercialization experience who can bring and hold all the required complex technologies in operation. Craftsmen and -women, specialists in bioinformatics and the digital industry, and specialists in process design and scaling up will also be vital to the future of the sector. Finally, innovation is key to the development of any sector. Ensuring that innovation thrives in bioenergy research will be critical to addressing the future needs of the industry – including challenges of availability of supply, production capacity, and evolving regulatory landscapes.

1.3. Focus 2 – Jobs and education needs in RD&I

Having identified the job profiles and skills needed for the bioenergy industry, it is also important to

describe the jobs and education needs in research, development, and innovation (RD&I). Stakeholders certainly overwhelmingly agree that there is a shortage of skilled workers in the bioenergy sector, and this shortage will only continue over time as projects develop.

The greatest needs in the sector lie in the areas with the greatest shortage of skilled workers. Highest on this list are people with an engineering or technical background (processes, automation, electrical issues etc.) to build and operate bioenergy/biorefinery plants. In the bioenergy RD&I field, there is also a particular lack of skilled workers in applied research and innovation – particularly when it comes to integrating digitalization into the sector. Finally, hands-on craftsmen and -women in electrical operations, welding, and certification are also areas where bioenergy has the greatest needs.

Gaps in the sector also mean gaps in current education measures. Without proper education, future bioenergy engineers will clearly lack the skills needed for success. According to experts in the bioenergy industry, there are a number of gaps in education. Firstly, proper exposure to a variety of different technologies, including digital opportunities. Bioenergy itself is often not offered as a course in universities, and there are insufficient PhD programmes relevant to bioenergy. Finally, students are not introduced enough to applied, industry-relevant research or allowed to delve into practical experience and training at the field level. University courses combined with practical experience would give the most well-rounded education to future engineers. However, higher-level education is not the only area where education for the bioenergy sector is lacking. As previously noted, hands-on crafts persons in electrical operations, welding, and certification are important areas for the industry. Therefore, it is also necessary to address training gaps beyond universities – namely through apprenticeships where individuals can receive hands-on training in the necessary skilled for working at bioenergy plants. Companies should be motivated to hire apprentices – not only university graduates – and train them directly at the plants to fulfil the wide array of jobs needed for a plant to function. Doing this know-how transfer would ensure sufficient skilled workers for the long-term future.

There are also different needs with respect to different technologies within the bioenergy sector. The list below reflects some of these separate needs – and particularly where skills gaps are most prominent:

- Biorefineries can be dangerous and therefore require petrochemical skilled workers. Biorefineries are often located in the countryside, which makes them less attractive for workers. However, there is great potential in shifting skilled workers from the oil industry to the biorefinery sector.
- In the future, there could also be a lack of workers in combustion R&D
- A few very skilled workers are required to run a biodiesel facility – approximately five workers per plant. Operating the plants requires some further workers without specific skill requirements. This sector is less of a concern, however, and is expected to get enough skilled workers since biodiesel plants hire on European level.
- A fossil refinery employs about 2,000 workers, plus a similar number of workers for

maintenance. There is potential to keep a similar amount in biorefineries as petrochemical skilled workers can be retained.

- Bioethanol, biodiesel and biogas plants are well-developed, and so are their workers. But new/emerging technologies, such as pyrolysis, gasification, alcohol-to-jet (ATJ), and hydrothermal liquefaction (HTL) will require new skills. There are particularly prominent skills gaps in the bioenergy field when it comes to specialisations in aviation and maritime.

1.4. Focus 3 – Policy recommendations/regulations

Like the engineers in the bioenergy sector, policymakers also need a certain level of education when it comes to making the best decisions for the industry. Only by understanding the industry, policies which target the sector's specific needs and strengths can be applied. In the most general terms, bioenergy can and should benefit from more overt political support. Bioenergy should be seen as an attractive, sustainable renewable carbon source. Clear and reliable policy – with fewer bureaucratic hurdles and complicated regulatory practices –should incorporate bioenergy in the mix towards 100% renewable energy consumption by 2035.

Beyond general political support for bioenergy, the policy recommendations for the bioenergy industry can fall into two main categories: financing and education.

- Financing: Bioenergy should benefit from additional funding for more investment-intensive competence areas. Stakeholders also suggested EU grants for real training experiences and a reduced tax for industrial companies employing young graduates or apprentices.
- Education: To support students on the path to joining the sector, there should be enhanced links between higher education programs and industry. European programmes for students in the field of bioenergy, partnering universities with bioenergy producers, would also increase enrollment and the appeal of the industry. Furthermore, many of the new cutting-edge technologies are not taught in all universities; therefore, centres of excellence should be established at the regional level in multiple countries to stimulate this area. Finally, financing is also an important aspect of education – with more modern infrastructure at technological universities and more promotion of technical education, the skills and education gaps in the bioenergy sector can be addressed.

Additionally, education in the bioenergy sector does not always entail university studies. As stated earlier, craftspeople are vitally important to the industry and are currently lacking – and will only continue to be an issue for the sector in the long term as craftspeople retire. There should be more support and advertising for young people to join apprenticeships and learn hands-on skills such as welding and electrical operations to lead technical installations.

The complete report can be accessed here.

2. ETIP Bioenergy's contribution to a joint ETIPs report with suggestions to improve the draft NECPs of 2023

This report presents an analysis of the R&I dimension of draft National Energy and Climate Plans (of ten Member States). It was written with a focus on topics of common interest across technologies (e.g. the country's renewable energy and R&I strategy, digitalisation) and only seldom comments on specific RE technologies. Nevertheless, several renewable energy ETIPs have provided feedback and technology-specific comments, including ETIP Bioenergy. ETIP Bioenergy also actively participated in the meetings with national representatives organised in the follow up to this report. Other involved ETIPs were ETIP on Renewable Heating & Cooling, ETIP Photovoltaics, ESTELA, ETIP Wind, ETIP Geothermal, and ETIP Ocean.

The report examines the 'Research, Innovation and Competitiveness' content related to renewable energy of the draft National Energy and Climate Plans of ten Member States:

- The Netherlands
- Spain
- Italy
- Sweden
- Denmark
- Slovakia
- Luxembourg
- Lithuania
- Germany
- Portugal

The report is divided into two sections:
Part 1 analyses NECPs on a country-by-country basis, discussing the extent to which each NECP takes account of the adoption of the legislation in the "Fit for 55" package; the country's renewable energy and R&I strategy; and funding mechanisms illustrated in the NECP.

Part 2 looks at how countries have covered a few selected cross-cutting themes. These are not commented on in Part 1:

- Skills/education/training
- The SET Plan (EU's Strategic Energy Technology Plan)
- Collaboration within the research community

The report can be found here.

3. Workshop proceedings “Best practice for social acceptance of renewable energy projects”

3.1. Executive summary with main recommendations

This report summarises the findings from an online workshop on “Best practice for social acceptance of renewable energy projects” that took place on 6 November 2024. This event was co-organised by three SET Plan groups, each representing a different renewable energy technology: ETIPWind; ETIP HYDROPOWER; ETIP Bioenergy. The agenda of the event brought together renewable energy project developers, researchers, and industrial federations.

This executive summary presents the key recommendations that were presented by practitioners.

Recommendations for project developers and other renewable energy professionals:

- Engage early with local communities, ideally during or before a project’s permitting phase;
- Build a large coalition by partnering with stakeholders outside of the energy sector, such as football unions and local industry;
- Maintain contact with key stakeholders and foster trust over time. Communities that have renewables in their territory are usually more open to having more;
- Conduct a socioeconomic impact assessment to identify specific needs and develop a dedicated program that goes beyond energy for a given community;
- Create public-private partnerships for projects with multiple actors and complex supply chains;
- Communicate using clear language and a broad range of channels.

Recommendations for policymakers:

- Streamlining permitting rules in line with new EU requirements should be done carefully by national authorities to avoid mistrust from civil society;
- Local and regional authorities need sufficient staff to carry out permitting procedures;
- The perception of renewable energy technologies varies from country to country. Decision-makers should keep track of public perceptions with help from researchers and industry;
- Strengthen public authorities’ tools to identify and counter disinformation campaigns.

3.2. Introducing ETIPs joint activities and the relevance of social acceptance

The online workshop on strategies for boosting public acceptance was held within the framework of the Strategic Energy Technology (SET) Plan, where European researchers, clean technology industries, and policy-makers regularly meet to discuss innovation in the energy sector and ways to accelerate the transition towards a climate-neutral energy system. The event was organized by Energy Technology and Innovation Platforms (ETIPs) for three renewable energy sectors: ETIP Bioenergy; ETIP HYDROPOWER; and ETIPWind. The organization of this event on social acceptance is one of several joint activities that ETIPs are undertaking during the 2022-2025 period on topics of common interest, such as preparing common recommendations on National Energy and Climate Plans and addressing skills gaps in clean technology sectors.

Europe is working to meet its climate commitments, strengthen energy security, and reduce prices. A key step towards realizing these objectives is the EU's binding target to more than double renewable energy in gross final consumption from 22% in 2020 to at least 42.5% by 2030[1]. There was an unprecedented level of renewable energy deployment in 2023, and the rate will have to increase further to reach 42.5% by the end of this decade. In the context of a rapid energy transition, having social acceptance or social license from local communities is necessary to continue deploying renewable energy projects on the ground. At the same time, a level of social acceptance from the wider society is necessary for public authorities to continue developing the right conditions for renewables.

For the energy transition to succeed, renewable energy experts must demonstrate and communicate the benefits that their technologies bring to the economy and society, as well as how adverse impacts on people and the environment are mitigated. ETIPs can play an important role in the area of social acceptance by providing technical solutions to address socioeconomic and environmental challenges.

[1] Renewable energy targets, European Commission

3.3. Outline of the ETIPs workshop on social acceptance

This online workshop took place on Wednesday, 6 November 2024 from 9:00 to 11:00. It gathered experts from the wind, bioenergy, and hydropower sectors to discuss common challenges and opportunities to strengthen social acceptance for renewable energy. The event sought to identify best practices to engage local communities and gain their support for building or upgrading renewable energy projects. Experts also shared their experiences in communicating to a wider audience on the benefits of their technologies and addressing citizens' concerns related to infrastructure projects such as sustainability and biodiversity.

Speakers included industry representatives and researchers. Participation was limited to invited experts active in the renewable energy sector, primarily from the three ETIPs involved, with the objective of having an open and in-depth discussion. There were 55 attendees at the workshop, who were encouraged to ask questions and share best practices during the two panel discussions. An agenda (see below) was circulated to all participants before the event.

Event title: Best practice for social acceptance of renewable energy projects - Joint workshop of ETIPWind, ETIP Bioenergy and ETIP HYDROPOWER.

Final agenda:

5 min	Introduction and moderation: Nicolas de la Vega, Policy and Project Manager at EUREC
55 min	**Session 1: Social engagement - Strategies to involve local communities and tackle NIMBYism** Presentations by speakers (8' each): Hydropower: Mattia Seira, Manager of Territorial Relations and Sustainability at Edison SpA (confirmed) Wind: Emma Reiners, Director Global Marketing & Communications at Acciona Energia Bioenergy: Sivaramakrishnan Chandrasekaran, PhD from the Delft University of Technology Panel discussion with speakers (30')
55 min	**Session 2: Social acceptance - How to communicate on the benefits of renewable energy? How to address sustainability and biodiversity concerns?** Presentations by speakers (8' each): Bioenergy – Remina Aleksieva, Analyst in the Energy and Climate Program at the Center for the Study of Democracy (Confirmed) Hydropower: Gemma Regniez, Head of Communications at the International Hydropower Association (Confirmed) Wind: Mariya Trifonova, Chief Assistant Professor at the University of Sofia (Confirmed)

	Panel discussion with speakers (30')
5 min	**Conclusions & further steps:** Nicolas de la Vega, Policy and Project Manager at EUREC

3.4. Findings of the social acceptance workshop

The workshop was divided into two sessions, each with three presenters and a panel discussion, to address different dimensions of social acceptance for renewable energy technologies. Each session included one representative from the wind, biomass, and hydropower sectors. Speakers and participants were encouraged to speak openly to share their experience, challenges encountered, and examples of best practice. Where relevant, speakers were asked to draw parallels with other renewable energy and clean technology sectors.

3.5. Session 1: "Social engagement: Strategies to involve local communities & tackle NIMBYism"

The first session examined the dynamics of deploying renewable energy projects locally. The moderator asked presenters to share their experiences interacting with local communities, including how they engage with them throughout the different phases of the project and ways to mitigate NIMBYism. The panel included two large renewable energy project developers and a researcher working on a project about social engagement in renewable energy supply chains.

3.6. Presentations by speakers

Mattia Seira, Manager of Territorial Relations and Sustainability at Edison SpA, represented the hydroelectric sector. He introduced Edison, a market leader in Italy that also operates in four other EU countries. Edison manages gas infrastructure and over 250 electric utilities with a combined installed capacity of 9GW, including hydroelectric dams, wind farms and photovoltaic farms.
Mr. Seira said that a developer of a renewable energy project needs to have a clear understanding from the starts of at least two elements: all legal requirements applicable in the specific territory; a fine-tuned internal policy that also addresses social engagement. It is preferable to engage with the community long before construction (during the permitting phase or event before), to build trust with the community.
He said that there are measures to mitigate disturbances, and where this cannot be avoided, it is possible to compensate communities for disturbances caused. Mr. Seira said that hydropower is part of the alpine culture and is often trusted by communities that have lived close to a dam for generations. Project developers often have budgets to support schools and sponsorships for local

communities. In areas where there is already a hydropower plant, it's usually easier to install another one. He gave the example of a community in the region of Piedmont, where a crowdfunding initiative for the building of a new hydropower plant reached its target in just 10 days.
Ms. Emma Reiners, Director of Global Marketing & Communications at Acciona Energia, gave a presentation on wind energy deployment. Acciona is a large Spanish energy company with over 14 GW of installed capacity and a presence in 40 countries.
She mentioned that it is a challenging time for renewable energy developers and anyone building infrastructure. She introduced the concept of "NIMBYs going BANANNAs," where the known social response of *Not In My Back Yard* is becoming *Build Absolutely Nothing Near Anyone*. Part of this comes from fear of the unknown. Another challenge is that no two communities are the same. To address this, a developer needs in-depth knowledge of the local community. Acciona's approach is to start by making a socioeconomic impact assessment, where energy is just one element among many. Following that, a community will get a dedicated program, where under the right circumstances, it is possible to co-develop it with community members. For example, when building a wind park, Acciona added a Wi-Fi tower (at an additional cost of €1.5 million) for a rural community with patchy internet.
Ms. Reiners said that relationships take a long time to build and must be maintained with a community. Even rural areas that seem deserted at first glance also have a community that should be engaged by developers.
Some of the measures used to support local actors include small grants programs contributing to health, education, and sustainable development; neighbourhood benefits programs to compensate those living or working closest to a wind turbine; scholarship programs; and a plan to communicate the positive benefits for all parties involved.

Sivaramakrishnan Chandrasekaran, a PhD student from Delft University of Technology, presented a research project on designing biohubs for sustainable marine biofuels production.
Mr. Chandrasekaran stated that biomass can foster social development in local communities. The CLEANSHIPPING project, funded by the NWO Research Foundation, is led by Delft University of Technology. The objective is to create biohubs to produce biofuels for shipping that benefit both local communities and biofuel producers. This requires context-specific circular approaches and sustained stakeholder engagement. Prospective biohubs also need the right technical support to conduct sustainability and techno-economic assessments. The project conducted biohub case studies using different feedstocks in three countries: Colombia, Spain, and Namibia.
He highlighted that the key takeaways from the project are that setting up biohubs is feasible and can create value for communities. Public-private partnerships are valuable instruments that help integrate multiple stakeholders, share knowledge, and secure funding. Economic incentives are necessary to support biofuels in shipping.

Pannel discussion

Question: Does the latest push to speed up permitting make a difference for project developers?
Reply from speakers: Changes at EU level are on paper for the moment, the key is how (and how quickly) this will be implemented and if it is accompanied by additional administrative capacity. It was

also said that speed should not come at the expense of more hesitation by local communities, we still need quality engagement to get social acceptance. Ideally at the permitting stage, a developer should already have the support of the local community.
Question: To what extent is a community in a region with renewable energy utilities likely to agree to build more?
Reply from speakers: The community is usually more supportive, but after having several windmills, they may feel they have enough. When it comes to replacing old turbines with new ones, people often support it, as the new machinery produces more energy and brings more money to the community. For hydropower, it's usually part of the culture in the valley, so acceptance is good.
Before closing, the moderator asked each speaker to deliver one last statement. Ms. Reiners said that it is not our job to change people's opinions; all we can do is educate, teach, and hope they will make an informed decision in favour of renewable energy. Mr. Chandrasekaran said that people can change their views, but this often requires presenting the right message and effective engagement strategies. Mr. Seira said that people living away from political centres want to be recognized. Even if a company arrives with money and big promises, there is a good chance that they will not be interested, but when there is engagement, it becomes easier to make progress.

3.7. Session 2: "Social acceptance - How to communicate on the benefits of renewable energy? How to address sustainability and biodiversity concerns?"

The Moderator introduced the second session that looked at how to communicate to the general public and specific audiences on the benefits of renewable energy technologies. It also focused on how to address citizen's concerns related to renewables, such as on sustainability, circularity and biodiversity. The panel included two researchers and one trade federation. Presenters were encouraged to give practical examples of public campaigns and engagement strategies.
Presentations by speakers:
Remina Aleksieva, an Analyst in the Energy and Climate Program at the Center for the Study of Democracy, represented the bioenergy sector. Ms. Aleksieva presented the key lessons from a study using participatory methods to create citizen panels to engage and educate citizens on bioenergy projects in Bulgaria, Italy, Sweden, and Austria. The panels focused on two broad dimensions: sustainability in agriculture and forestry, and just transition and social innovation. Attendees were given questionnaires before, during, and after the citizen panels to assess the evolution of their attitudes toward EU policy-making, bioenergy, and biofuels.
She presented the key takeaways from the study. The level of information among citizens increased significantly (by an average of 45%) after two rounds of panels, and their trust in bioenergy as a sustainable solution also increased moderately. There were clear differences per country in people's visions for the future of bioenergy. For example, Austrians looked at decentralization and a healthy lifestyle; Bulgarians focused on public-private partnerships, waste management, and education; Swedes emphasized technology development and innovation; and Italians valued circular approaches

and a fair distribution of resources. The researchers expect that closely examining national sensibilities can contribute to the development of better public policies. It is valuable to bring together researchers and citizens.

Gemma Regniez, Head of Communications at the International Hydropower Association (IHA), spoke on behalf of the hydropower sector. The IHA represents around a third of the world's total hydroelectric capacity across 120 countries. Critics of hydroelectric dams often highlight the impact on river biodiversity, fishing livelihoods, and the security of older infrastructure. However, people are also aware of its numerous advantages, including the creation of new jobs, increased economic activity for local communities, and the generation of flexible and affordable electricity for consumers. To convey the many advantages of the sector, the IHA has created Frankie, a mascot that delivers facts about hydroelectric power. Several initiatives highlight the sector's benefits:

- Guidance for hydropower communications and consultation
- Yearly Global Hydropower Day, marked with webinars, events and a social media campaign;
- Global Alliance for Pumped Storage Hydropower at COP29 addressing energy storage;
- Hydropower Sustainability Alliance launched in 2023;
- Participation in projects such as ReHydro to refurbish existing plants.

Mariya Trifonova, Chief Assistant Professor at the University of Sofia, represented the wind sector. Ms. Trifonova introduced ETIPWind's Strategic R&I Agenda 2025-2027, which outlines the European sector's 23 research and innovation priorities and the need to invest €1.8 billion of public spending over the next three years to address these priorities effectively.

She observed that academics have often focused disproportionately on technological aspects, neglecting the human and societal dimensions. Society is becoming more sensitive to new energy infrastructure projects, with studies documenting an increase in opposition over the last twenty years. She noted that, compared to other technologies, wind energy is often closer and more visible to local communities and consumers. This visibility is a double-edged sword that can either help garner support or create opposition. The language researchers and experts use is not the language of the community; therefore, it is necessary to simplify and personalize the message to address their concerns and aspirations.

In public debates, the loudest voices are often the most powerful, and a well-organized small opposition of 20 or 30 people can be enough to stop or significantly delay an entire wind project. Often, this opposition is linked to a negative campaign against wind energy that is well-organized and not organic (e.g., driven by political and economic interests). She gave an example of a negative campaign in Bulgaria, where free publications resembling newspapers were distributed in the hundreds of thousands with disinformation about wind power. Since these materials are not recognized as official media, Bulgarian media regulators cannot intervene.

She recommended studying more closely the factors driving local opposition, which may not always be fully rational in an economic sense. Researchers' findings should be disseminated via broad channels (including social media) using more accessible language to reach a wider audience. Renewable energy developers and public authorities should partner with stakeholders outside the

industry, such as football unions and local businesses.

3.8. Conclusions and further steps

The moderator thanked the speakers and participants for joining the event. He mentioned that a public report summarizing the main outcomes of the workshop will be prepared in the weeks following the event. The findings will be disseminated through ETIP's communication channels and shared with key stakeholders, including European Commission officials.

4. Webinar "Renewable energy options for industrial processes: What opportunities for RES technologies following the provisional agreement on the Net-Zero Industry Act?"

Webinar - 17 June 2024 11:00 - 12:30 CET

On 17 June, 2024, ETIP Bioenergy hosted an online webinar on the topic of Renewable energy options for industrial processes. Andrej Misech, a member of the ETIP Bioenergy secretariat facilitated the presentations and discussion during the event.

The transition to renewable energy is critical for industries to achieve sustainability and meet ambitious net-zero emissions targets. The webinar explored various renewable energy technologies that already are and can be integrated into industrial processes. Industry-specific examples were presented to illustrate their deployment. The webinar also offered the opportunity to exchange with speakers and discuss and reflect on the opportunities that the recently agreed Net Zero Industry Act will create for European RES technologies contributing to the decarbonisation of industrial processes.

Andrej Misech, member of the ETIP Bioenergy has provided a very brief introduction to industrial process heat, highlighting associated challenges and available renewable energies able to supply this heat. Nicolas de la Vega followed with an overview of the Net Zero Industry Act, focusing on relevant aspects related to the use of renewable in industries. These included technologies covered by the act Article 4), non-price criteria in RE auctions (Article 26), net-zero regulatory sandboxes (Article 33), and pre-commercial procurement and innovative PP (Article 27).

The invited experts from solar thermal, concentrated solar thermal, bioenergy, geothermal and heat pumps sectors presented practical cases showcasing their respective RE technologies supplying process heat for industries. The presentations showed that different technologies are suitable in different scenarios and there is no one-size-fits-all. Moreover, in some cases hybridisation (e.g. biomass and CST) is possible and the most suitable solution to achieve the desired outcomes.

Consensus among the experts emphasised the ned for sustained strategic support from the European Commission in long-term (i.e. decades). Such support would allow companies secure early capital and ultimately lead to cost reductions through mass production. Additionally, given that some projects take 5-10 years to establish, long-term political backing is essential.

Slide presentations:

Introduction to industrial process heat & Net Zero Industry Act

Andrej Misech & Nicolas de la Vega, EUREC

Solar heat for industrial processes–net zero solutions in practise
Wolfgang Gruber-Glatzl, AEE INTEC

CST technologies for process heat application in industry
Peter Heller, DLR

Bioenergy for industrial heat: five full scale examples
Jaap Koppejan, ProBiomass BV

The Rittershoffen geothermal plant, an illustration of the decarbonization of the food industry
Guillaume RAVIER, ES-Géothermie

Industrial Heat Pumps: Status & Perspectives
Benjamin Zühlsdorf, Teknologisk Institut

Video recording

5. Webinar "BIOCCS Deployment Examples"

Webinar – 18 December 2023 14:00 – 16:00 CET

On 18th December, 2023, ETIP Bioenergy conducted an online seminar on the topic of Bio-CCS. 66 participants from Europe and around the globe joined the webinar. Dina Bacovsky, Chair of ETIP Bioenergy Working Group 2 facilitated the presentations and discussion.

Bioenergy processes often involve the production of CO2, e.g. when combusting biomass for heat and power production, or when producing ethanol or biogas. This CO2 has formerly been removed from the atmosphere by photosynthesis and bound as carbon in biomass. When the biomass is then combusted for energy or converted to a product or a gas, the carbon is released. It can be captured and geologically stored, resulting in negative carbon emissions.

Joop Hazenberg, Secretary General of the Zero Emissions Platform ZEP, provided an overview on the current status of projects on carbon capture and utilization and storage. More than 70 CCS/CCU projects are looking to become operational by 2030. Most of these projects are located around the North Sea, and the majority of them is connected to electricity or district heating production.

Joop mentioned that storage of CO2 should be used to compensate for sectors that cannot be fully decarbonized. CO2 capture is mentioned in many National Energy and Climate Plans (NECPs); however, investments into capturing CO2 will only be made if storage is available as well. Geological formations in Europe can provide billion tons of storage for CO2, but efforts are still needed to develop a supportive policy framework.

Allanah Paul, CDR Research & Technology Advisor at Bellona Europe, quantified the role of carbon removal technologies: studies envisage up to 12 Gt of CO2 removed per year by 2050, with BECCS contributing some 1-4 Gt.

Constraints for deployment potential are the amount of sustainably sourced biomass that can be made available and the geological storage capacity. Biomass side-streams can provide significant CDR potential, but these represent upper ceilings of potentials, not goals. It is important to make best use of the biomass; it should be used to replace the use of fossil fuels, not other renewable energy or instead of electrification. Positive incentives should encourage capturing all easy-to-capture carbon, regardless of its origin.

Jannike Bjerkas, Director CCS and Carbon Markets in Hafslund Oslo Celsio, presented the status of the company´s CCS project at their waste-to-energy facility. She explained that methane emissions from landfills are a large contributor to GHG emissions. Waste should be avoided, materials should be reused or recycled, but some waste needs to be removed, i.e. incinerated, hereby creating CO2. This is waste CO2 that we need to get rid of.

Construction of the carbon capture facility at the Waste-to-Energy facility of Hafslund Celsio in Oslo started in August 2022, and the start-up was planned for 2028. The goal was to capture 90% of the facility´s CO2, of which about 50% is biogenic CO2. However, cost estimates increased and caused pausing of the project in March 2023. Now a new FEED study is under elaboration until next summer, when a decision will be taken. Key enablers of the project are state funding and city funding, avoided costs for fossil emissions and carbon removal certificates (estimated at 200 €/t).

Jens Fuhrmann, Head of Strategic Development BECCS at RWE Generation, explained RWE´s activities on carbon capture and storage. If the entire society needs to become carbon neutral, the energy system needs to become negative, since other sectors are hard- or not-to-abate. RWE produces sustainable electricity and heat from biomass, captures CO2 and hands it over to partners for storage; others in the value chain need to ensure the sustainable sourcing of biomass and its efficient conversion. There should be no doubts about the sustainability of the biomass used, and biorefining should ensure that biomass is put into best use before biomass goes into power.

RWE has two projects for capturing CO2 at power stations in the Netherlands. Eemshaven is only 8 years old and Amer 13 years old; both started as coal power plants and are now being repurposed to biomass. Amer shall be fully converted to run on biomass by 2025, and full capture of CO2 is planned for end of 2029.After the presentations there was some time for discussion with the audience.

Event details and Agenda

Slide presentations:

State-of-play of CCS in Europe and the role of carbon removals
Joop Hazenberg, Zero Emissions Platform (ZEP)

Systemic considerations for sustainable and credible BioCCS deployment
Allanah Paul, Bellona

Hafslund Oslo Celsio CCS project – Waste to Energy with CCS can provide negative emissions
Jannicke Bjerkås, Hafslund Celsio

BECCUS @ Amer & Eemshaven Power Station
Jens Fuhrmann, RWE

Video recording