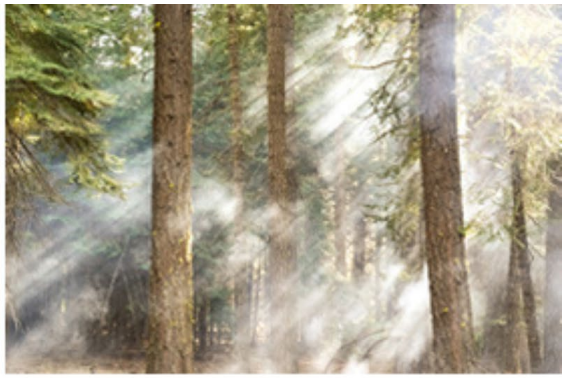
IEA Bioenergy
Technology Collaboration Programme

Task 40
Deployment of biobased value chains

Final Task Report
Triennium 2019-2021

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Final Task Report
Triennium 2019-2021

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INTRODUCTION & BACKGROUND

In IEA Bioenergy Task 40, which has been active since 2004, eight countries participated in the 2019-2021 triennium. Before 2019, the Task 40 focus was on international bioenergy trade and market development of dedicated bioenergy commodities such as wood pellets, wood chips, liquid biofuels, and biomethane. Furthermore, sustainability governance, socio-economic and bioeconomy aspects have been touched upon.

The energy and climate policy "landscape" changed over the last years, and with it the role of bioenergy: Solar and wind power became cost-effective globally, the electrification of energy and transport systems and their integration gained prominence, and a "green" hydrogen economy appeared as a long-term vision. Bioenergy maintained its dominant role in renewable energy supply, but instead of further increasing the quantity of bioenergy supply and use, its quality became more important, as well as broadening the affordable feedstock base, and its sustainability. Bioenergy is now considered more in terms of energy systems integration and flexibility along with e.g., renewable gases, long-term carbon management (BECCUS) and, as part of the broader bioeconomy, delivering on regional development and employment fostering its position as the number one job creator in the renewables sector.

Consequently, the Task 40 focus shifted: For 2019-2021, the focus became "deployment" which is understood broadly as "the act of using something effectively" (Oxford Dictionary), and efficiently.

Task 40 sees its role and mission in clarifying the conditions of deploying biobased value chains – especially bioenergy - within the bioeconomy, considering the longer-term climate and sustainability requirements, and the role of bioenergy and biobased high value co-products in carbon management as part of a future carbon economy. Hence, with the topics covered and results produced, Task 40 provides orientation in this complex field of deployment:

- Where and for what bioenergy can be used most effectively and efficiently, given its limited sustainable resource base?
- How could the transition from currently dominating uses (powerplants, heat) towards future uses of biogenic carbon to provide energy services in synergy with ecosystem, environmental, material, and nutritional services look like?

Task 40 worked in three core areas of operation that all include Intertask projects considering the various biobased value chains, markets, and applications, and sees itself as "horizontal" among the IEA Bioenergy Technology Collaboration Programme (TCP) activities.

WP1: Market developments

- New regional bioenergy markets - key actors, policies and regulation, and technological challenges (e.g., future CHP) regarding deployment, and trade
- Market perspectives and deployment for aviation and marine biofuels (Intertask project)
- Globalized sustainable biobased value chains, incl. market perspectives and synergies between bioenergy and bioeconomy

WP2: Industrial Heat and Processes

- Industrial heat (technologies, markets, and deployment) and processes, considering bioenergy pathways as alternatives/complements to CC(U)S (Intertask project)
- BECCS/U - industries and technologies suitable for BECCS applications, considering deployment requirements (Intertask project)

WP3: Deployment Strategies

- Deployment guidance regarding technological barriers, economic aspects & financing
- Renewable gas - deployment, markets and sustainable trade (Intertask project)
- Role of bioenergy in a well-below-2 °C/Sustainable Development Goal (SDG) world (Intertask project)

REPORT ON THE TASK'S OBJECTIVES

Below, the main activities and deliverables of IEA Bioenergy Task 40 are summarised. In Table 1, a comparison is made between the initially planned deliverables and the ones ultimately achieved, including the additional work performed.

Table 1. Overview of planned vs. achieved deliverables

Deliverable planned	Achieved	Comment
D.1 Assess successes and lessons learned for biofuels deployment (ITP) report	Yes	WP 4 Lessons learnt in supply chains - Sustainable biomass supply chains for international markets (in April 2022)
D.2 Global & new regional markets	No	This has been postponed to the next triennium
D.3 Regional transitions	Yes Yes Yes Yes Yes Yes	1.1 Current and future biomass markets in the European Union (in final report) 1.2 Case study biomass in industry Europe (in final report) 1.3 Case study Germany (individual report and summary in the final report) 2. Strategies to increase the mobilization and deployment of local (endemic) low value heterogeneous solid biomass resources (paper + in final report) 3. Adoption of bioenergy by existing biomass feedstock suppliers (journal paper + in final report) Final report
D.4 Economic & financing guidance	No	This has been postponed to the next triennium
D.5 Bioeconomy synergies	No Yes	WPs 1+3+4 ongoing in triennium 2022-2024 WP2 report: Synergies examples (in May 2022)
D.6 Industrial high-temp heat (ITP)	Yes	Policy report: Decarbonizing industrial process heat: the role of biomass
D.7 Renewable Gases: Deployment, markets and sustainable trade (ITP)	Yes Yes Yes Yes	Synthesis Report of WP1: Biomethane – factors for a successful sector development Synthesis Report of WP2: Status and perspectives of non-biogenic renewable gases Synthesis Report of WP3: Sustainable potentials for renewable gas trade Overall summary report
D.8 BECCS/U (ITP)	Yes Yes Yes Yes Yes Yes	Scoping report: Deployment of BECCS/U value chains - Technological pathways, policy options and business models. Case study on bio-combined heat and power - HOFOR Amager CHP, Copenhagen, Denmark. Case study: Deployment of bio-CCS in the cement sector. Report: Bio-CCUS and bioenergy flexibility – finding the balance. Case study: Deployment of bio-CCS in bioethanol production (in May 2022). Synthesis Report: Deployment of Bioenergy Combined with Carbon Capture and Storage or Utilisation (BECCS/U) (in May 2022)

D.9 Bioenergy role in 2 °C/SDG world (ITP)	Yes	Workshop report: Roles of bioenergy-in energy system pathways towards a-WB2-world

Deliverables D.2 and D.4 have been postponed to the next triennium (accepted by ExCo), and part of D.5 will be continued in the follow-up project in the next triennium. All other deliverables have been achieved (some are going to be finalized until the end of May 2022). Furthermore, the project "Margin potential for a long-term sustainable wood pellet supply chain" has been continued in 2019-2021 from the previous triennium 2016-2018 and the corresponding final report had been postponed to and published during this triennium.

Table 2: Overview of additional deliverables

Additional deliverables originally not foreseen	Comment
Task 41 Special project 11	Synthesis Report - Renewable Gases–Hydrogen in the Grid
Country report Germany	Implementation of bioenergy in Germany – 2021 update

BRIEF DESCRIPTIONS OF KEY TASK REPORTS

1. Margin potential for a long-term sustainable wood pellet supply chain

The global wood pellet market is one of the most dynamic across all bioenergy commodities evaluated by the IEA Bioenergy Task 40 over the last 15 years. By 2015, global trade reached 220 PJ, with expanding cumulative production capacity and increasing plant sizes being symbols of the maturation of this industry. At the same time, increasing competition has reduced the margins in wood pellet supply chains: Established **industrial** (large-scale) use for co-firing with coal or standalone bio-powerplants is under price pressure to become competitive to other low-carbon electricity technologies. Furthermore, coal is being phased out increasingly in Europe and North America due to countries' activities to meet their climate change mitigation ambitions under the Paris Agreement.

The **residential** use markets face increasing competition from e.g., district heating, heat pumps as well as fossil fuels (e.g., natural gas or heating oil) which are still cheap due to the lack of a carbon tax.
Furthermore, biogas and biomethane, as well as renewables gases of non-biogenic origin (e.g., H_2 and power-to-gas) could compete with pellets in residential and commercial heat supply. On the other hand, pellets can play an increasing role in district heating which avoids, compared to pellet stoves, air pollution concerns in cities.

The long-term viability of the wood pellet supply chain and the potential market flexibility are key issues to keep operating. Without long-term viability, individual actors may go bankrupt or mothball their production plants, thus reducing the likelihood of wood pellets becoming a long-term supply option for the future bioeconomy (e.g., for biorefineries), and could imply problems for bioenergy applications which may be needed to achieve net-negative greenhouse gas (GHG) emissions, especially Bioenergy with Carbon Capture and Storage (BECCS), and Bioenergy with Carbon Capture and Use (BECCU). This would not only mean a loss of rural jobs and economic revenue, it could also have wider consequences, such as a delay in the commercialization of advanced biofuel technologies due to the lack of a commodity-type feedstock, and respective transport and trade infrastructures.

This study evaluates the future market prospects of wood pellets in industrial low- and high-temperature heat, industrial processes (e.g., steelmaking), and BECCS/BECCU. It presents a cost baseline summarizing the current market outlook for pellets and respective supply chain "hot spots" in Section 2. Section 3 analyzes potential supply cost reductions. Section 4 details the market prospects, and Section 5 summarizes the key findings and conclusions of this study.

This report has shown that wood pellets are a well-established supply chain for residential heat and large-scale industrial (power) markets, and that existing supply "hot spots" can deliver wood pellets at reasonable

prices. It indicated that further technology development can **reduce wood pellet costs** along (international) supply chains significantly and can **broaden the feedstock base to low-cost material** such as bagasse, other herbaceous biomass, and wood wastes – subject to adequate sustainability requirements. Torrefaction could, compared to traditional white pellets, improve energy, GHG and cost performance of long-distance supply, allowing for additional and widespread applications due to its favourable fuel properties. Yet, given the competition with other renewable energy sources (solar, wind) and energy efficiency in the longer-term (buildings), current wood pellet markets are under price pressure, and actually could shrink in the near future, especially for co-firing in the electricity sector.

Recent results from global modelling underlined that bioenergy is crucial for achieving the Paris Agreement. International trade of wood pellets could help in fulfilling that, but only if sustainability concerns of biomass supply – and for BECCS/U: social acceptance - are sufficiently addressed. Various research indicated that to achieve not only the Paris Agreement, but the overarching Sustainable Development Goals (SDG) as well, bioenergy **can contribute positively**. For this, cross-sector and cross-border **sustainability governance of the bioeconomy** is required, as currently, there are uncertainties around regulatory policies on and overall governance of sustainable biomass, including wood pellets.

2. Regional Transitions in existing bioenergy markets

Policies targeted at reducing GHG emissions and improving energy security of supply have led to strong growth in bioenergy and commoditizing of biomass. Current policies are not enough, and efforts must urgently be redoubled with a drastically changed energy system to keep the Paris climate goal in sight. Biomass has a significant role in meeting these targets, but its position in the energy system will likely change. There is a clear aim on the supply side to **increase the use of low-value, underutilized biomass sources**. On the demand side, to steer towards high(er) value applications, including flexible power generation, high-temperature heat, aviation and shipping, and biobased materials and chemicals as well as BECCS/U for climate change mitigation are necessary. Despite a clear direction, the **transition pathway** towards high-value applications, the logistical challenges, and experiences from biomass mobilization strategies of developed markets and existing infrastructure remains underexplored. The Regional Transitions project analysed future biomass market developments to identify possible logistical challenges and explores strategies to increase the mobilization and deployment of local (endemic) low-value heterogeneous solid biomass resources in the changing market.

According to the review of future bioenergy supply and demand projections under climate targets for the EU to 2030 and 2050, none to modest growth in bioenergy is foreseen in the period 2020 to 2030, partly resulting from the development of lower-cost wind and solar electricity markets. Post-2030 however, strong growth in bioenergy demand is projected, in particular lignocelluosic biomass used in new markets including advanced biofuels, high temperature heat and biorefineries. The role of international trade of solid biomass and liquid biofuels is also projected to grow in the future, but its development is uncertain. Furthermore, part of the domestic supply potential appears to remain untapped, because it is not economic accessible, and there is limited infrastructure, and lack of established markets.

The project selected the European chemical industry sector level to show the impact of different strate- gies including additional circular economy measures or stronger support for biomass in chemical industries. Finally, it zoomed in at the country level for Germany and provided insight into current and future biomass utilization.

The project explored a **collection of strategies** to increase the mobilization and deployment of local (endemic) low value heterogeneous solid biomass resources. Therefore, it classified the strategies under three mobilization levels, (1) legislative frameworks, (2) market creation and the (3) technological innovation level. Following this classification, information is provided on regional development and biomass action plans, multi-level governance challenges, the creation of secondary feedstock markets, the controversy in commoditization and novel technologies such as small-scale mobile pre-treatment and GIS supported operational and strategic planning.

The supply potential of forest residues can still be increased by mobilization of underutilized, low-value wood sources. But eventually, these residues are inherently tied to the production of primary products. Ultimately, as the markets currently stand the increase of woody biomass for fuel will be dependent on increasing the markets for the primary products. There are however also significant supply potentials that are currently untapped including lignocellulosic residues from agriculture and energy crops. Agent-based modelling was used to simulate the evolution of farmer participation in crop residue harvesting and energy crop cultivation under multiple scenarios in the United States (Nebraska, Kansas and Colorado). The results for the herbaceous case illustrate that farmers' credibility has the greatest impact on adoption of crop residue harvest. Additionally, the type of market structure – specifically vertically integrated markets – tends to positively impact grower adoption. In contrast to the corn stover case, for energy crops, farmer credibility and media have substantial impacts on grower adoption. Given the relatively higher risk associated with energy crops, access to information and examples of other farmers adopting the practice has a positive influence on adoption.

3. Deployment of beccs/u value chains

It is becoming increasingly clear that substantial amounts of negative emissions – essentially, the removal of carbon dioxide from the atmosphere – will likely be required if global climate change is to be limited to 2°C above pre-industrial levels. In order to limit warming to 1.5°and thereby substantially reduce the risks associated with global climate change, negative emissions will be a crucial part of the mitigation toolbox. Among the different negative emissions options, bioenergy with carbon capture and storage, or BECCS, is arguably one of the most commonly discussed in climate policy debates.

BECCS is very often discussed in terms of its potential and drawbacks over a very long timeframe, e.g., 2050 and beyond. This report, however, focuses on the potential and challenges associated with **deploying** BECCS systems and value chains in the near to medium term. The report provides a brief overview of different technological options for capture, transport, and storage of CO_2, and offers insights into how BECCS business models could be set up. It further discusses the **role of public policy** and how bioenergy with carbon capture and utilization (BECCU) could play a role in enabling BECCS deployment.

An important starting point for any discussion on BECCS is to see it as a subset of a broader group of options for carbon capture and storage (CCS), because from a technological perspective the general principles are largely the same. When it comes to sectors where capture of biogenic CO_2 would be feasible, bioethanol production facilities are a particularly low-hanging fruit because of the high concentrations of CO_2 available for capture. However, applications in pulp and paper mills also show promise thanks to substantial CO_2 concentrations and availability of excess heat that can be used in the capture processes. In addition, there are BECCS pilot and demonstration projects under development in both power stations (using wood pellets) and in waste-to-energy facilities.

When it comes to transportation and storage infrastructure, these will most likely have to be shared among CCS systems irrespective of whether the source of CO_2 is fossil or biogenic.

Regardless of the area of application, actual deployment of BECCS will require public policy interventions at several levels. To begin with, there is a need for financing to de-risk and/or co-finance industrial investments in large-scale demonstration facilities. In addition, there needs to be a policy mechanism in place that rewards negative emissions. For example, no such mechanism is possible under the EU emissions trading system (ETS). And although there are other possible means of implementing such systems, the discussions on how this could be done are so far quite immature. In terms of the utilization of biogenic CO_2 (BECCU), this could help drive innovation and enable cost reductions supporting to unlock BECCS potential, because BECCS/U share similar needs for CO_2 capture technologies and infrastructure. In terms of the mitigation potential of BECCU in itself, this will vary a lot because BECCU includes a wide range of applications from enhanced oil recovery (EOR) to production of synthetic fuels via so-called power-to-X (PtX).

In conclusion, the technological obstacles to near to medium-term deployment of BECCS systems are likely not prohibitive. However, the policy measures required to incentivize the demonstration, deployment, and operation of BECCS value chains are currently largely absent. It is imperative that policymakers begin an earnest discussion about this as soon as possible if the potential of BECCS as a negative emissions technology is to be realized.

4. Other relevant results

The Task 40 project "Bioeconomy Synergies" took up the issue of high-value biomass products and services (e.g., C sequestration). Here Task 40 gives an overview and discusses the synergy effects between the different bioeconomy sectors and their corresponding supply chains – namely forestry, agriculture, forestry, and biogenic wastes. Thereby, comparing the metabolism of the current economy with a possibly relevant metabolism of a circular bio-based economy, derived from discussions of fossil fuel phase-outs, significantly increasing renewable electricity shares, efficiency and circularity improvements, nutritional transformation, and changing economic valorisation of carbon in general.

Task 40 also led the Intertask project "Renewable Gas: Deployment, markets and sustainable trade", and the Task 41 Special Project 11 "Renewable Gas – H2 in the grid" and contributed to the Intertask projects "Role of Bioenergy in a well-below 2 °C/SDG world", "Industrial heat", and "Assess successes and lessons learned for biofuels deployment".

Furthermore, Task 40 contributed to the IEA Bioenergy country report series, to the Bioenergy Review Update, to several ExCo workshops, and held webinars.

The respective deliverables are listed in Tables 1 and 2.

SUCCESS STORY

Work of Task 40 in 2019-2021 **addressed core challenges identified at the beginning of the triennium** with the strategy to develop **dedicated Task projects** for major issues, and to lead or contribute to respective **Intertask projects**.
Given the circumstances of the (ongoing) COVID-19 pandemic during 2020 and 2021, **actions to disseminate** the results were restricted to Task contributions to online conferences, webinars, and workshops.
Success indicators are participation numbers in the respective events, and download figures for reports, and newsletters as well as social media releases.

With the "flagship" Task 40 project on **Regional Transitions**, we succeeded in developing strategies to mobilise and valorise biomass resources in regional contexts and identifying respective actors.

With the Task 40 project on **Bioeconomy Synergies**, we pioneered to define the conceptual "frame" for positioning bioenergy **within** the bioeconomy and developed first approaches for policy and market design under this framing.

The work on leading the Intertask projects "BECCUS" and "Renewable Gas" led, in close collaboration with the participating other Tasks, to clearly **identify the policy challenges** and to start working on approaches to remove market and regulatory **hurdles for deployment**.

The Task contributions to the Intertask projects "Industrial Heat" and "Lessons Learnt Biofuels" identified policy options to further bioenergy use, based on technology and market review, and analysis of supply chains with respect to previous successes and failures leading to recommendations for changes in future supply chain settings addressing the different role of bioenergy (as described under 1.).

The **key difference of Task 40 work** compared to many others within and outside of IEA Bioenergy was **to integrate technological and market knowledge with policy analysis** to derive clear recommendations for further action – both in the field of deployment (policy instruments to be implemented), and of research needs on market dynamics, as the Task and Intertask work (BECCUS, Renewable Gas, H_2 in the grid etc.) showed.

CONCLUSIONS AND RECOMMENDATIONS

Task 40 work in 2019 – 2021 generated much needed **knowledge on deployment** of bioenergy, and developed respective policy recommendations in the areas of

- Bioenergy transitions (markets, regions)
- Bioeconomy synergies
- BECCUS
- Renewable gas, incl. H_2
- Industrial Heat
- Advanced Biofuels and respective supply chains

With regards to the **next** triennium, Task 40 concluded that a continuation of the successful Intertask work especially on BECCUS and Hydrogen should be carried forward in new Intertask projects "BECCUS 2.0" (to be led again by Task 40) and "Bio/H_2 Synergies" (with major contribution from Task 40).

Furthermore, the **deployment challenges** of changing market dynamics and sustainable **financing** should be taken up in 2022 - 2024, as respective work planned for 2019 – 2021 could not be carried out due to the restrictions of the COVID-19 pandemic.

The scope of work in the 2022 – 2024 triennium is on how to sustainably **maintain or transform** biobased value chains. For this, barriers and drivers for sustainable biomass deployment will be identified, and policy developments reflected that could foster biomass uptake in existing and new (emerging) markets. Here, the consideration of logistics will be a core aspect. A **key new** issue to be addressed will be the impact of developing carbon markets and limited CO_2 emission budgets, on the deployment of biogenic energy carriers, products, and services.

Within this scope of work, international, national, and regional biomass **trade will remain** an issue.

The cross-cutting "horizontal" characteristic of Task 40 work with the explicit focus on **deployment** as the central Task theme should be continued.

ATTACHMENTS TASK 40 — Deployment of biobased value chains

TASK LEADERSHIP AND OPERATING AGENT

Operating Agent: Birger Kerckow, Fachagentur Nachwachsende Rohstoffe e.V. (FNR), Germany

Task Leader: Uwe R. Fritsche, IINAS, Germany

Co-Task Leader: Christiane Hennig, DBFZ (Germany), Olle Olsson, SEI (Sweden)

Task Secretary: Nora Lange, DBFZ, Germany.

LIST OF PARTICIPATING COUNTRIES AND NATIONAL TEAM LEADERS

The Task is organized through 'National Teams' in the participating countries.
The contact persons for 2021 (National Team Leader) in each country are listed below.

Country	Name	Organisation	Role
AT	Lukas Kranzl	TU Vienna	Alternate NTL
AT	Fabian Schipfer	TU Vienna	NTL
AT	Michael Wild	Wild&Partner / International Biomass Torrefaction Council	industry
BE	Ruben Guisson	VITO	NTL
DK	Christian Bang	EA Energy Analyses	NTL
DE	Christiane Hennig	DBFZ	NTL & WP3 Lead
DE	Nora Lange	DBFZ	Task Secretary
DE	Daniela Thrän	DBFZ/UFZ	Alternate NTL
DE	Uwe R. Fritsche	IINAS	TL
DE	Birger Kerckow	FNR	Operating Agent
JP	Shintaro Uda	NEDO	NTL
JP	Yusuke Kawame	NEDO	Alternate NTL
NL	Ric Hoefnagels	Utrecht University, Copernicus Institute	NTL
NL	Ronald Zwart	RWE	industry
SE	Olle Olsson	SEI	NTL & WP2 Lead
US	Richard Hess	INL	NTL
US	Chenlin Li	DOE	Alternate NTL
US	Pralhad Burli	INL	US Team
US	Damon Hartley	INL	US Team

TASK DOCUMENTS

For all ExCo meetings, progress reports are available. Three annual reports have been published, as well as contributions to the biannually IEA Bioenergy Newsletter. For all Task meetings, minutes are available for Task members. All reports and webinar presentations are available for free download from Task 40 website http://task40.ieabioenergy.com/.

TASK MEETINGS AND PARTICIPATION IN MAJOR EVENTS

Event	Date	Comment
Task meeting	31.01.2019	online
Task meeting	27.02.2019	Kick-off meeting in Stockholm, with Task 39, 44 and 45
Task meeting	09.05.2019	online
Task meeting	21.05.2019	online
Task meeting	20.06.2019	online
Task meeting	10.09.2019	online
Task meeting	07.10.2019	online
Presentation	22.10.2019	IEA Bioenergy workshop, Tallinn (Estonia): "Developing business models for efficient use of biomass"
Webinar	13.11.2019	Future Prospects for Wood Pellet Markets
Participation	25.11.2019	ITP WB2/SDG Workshop "Role of bioenergy technologies in energy system pathways towards a WB2/SDG world"
Task 40 & 45 workshop	27.11.2019	Workshop with Task 45 in Berlin
Task meeting	28.11.2019	in Leipzig with visit to a biomass heating plant in Delitzsch
Task meeting	14.02.2020	online
Task meeting	17.04.2020	online
Task meeting	27.-28.05.2020	2 days online meeting
Webinar	16.06.2020	ITP BECCUS Deployment of Bioenergy Combined with Carbon Capture and Storage or Utilisation (BECCS/U)
Task meeting	15.07.2020	online
Task meeting	25.08.2020	online
Participation in RED II workshop series	05.10.2020	WS1: Ongoing developments in EU Member States and the role of REDII
Task meeting	13.10.2020	two days meeting online 13/14.10.
Presentation at IEA Bioenergy eWorkshop	19.10.2020	Contribution of sustainable biomass and bioenergy in INDUSTRY TRANSITIONS towards a circular economy
Participation in RED II workshop series	09.11.2020	WS3: How to ensure that using biomass maintains and protects biodiversity
Task meeting	11.11.2020	online meeting for next triennium proposal
Participation in RED II workshop series	30.11.2020	WS4: Carbon, forests and climate impacts of woody biomass
Task meeting	10.12.2020	online
Participation in RED II workshop series	20.01.2021	WS5: Social impacts of woody biomass
Task meeting	28.01.2021	online
Participation	26.02.2021	pre-proposal meeting IPT Synergies of green H2 and bioenergy deployment for next triennium
Task meeting	11.03.2021	online
Task meeting	23.03.2021	online – special meeting for next triennium proposal
Event	**Date**	**Comment**
Task meeting	28.04.2021	online

Participation	30.04.2021	pre-proposal meeting intertask project Synergies of green hydrogen and bioenergy deployment for next Triennium
Participation	05.05.2021	IEA Bioenergy ExCo workshop: Planning for the new triennium
Participation	18.05.2021	EXCO87 MEETING – 18-19 MAY 2021
Task meeting	10.06.2021	online
Participation	06.07.2021	pre-proposal meeting ITP Synergies of green H2 and bioenergy deployment for next triennium
Workshop	07.07.2021	Workshop on non-biogenic renewable gas
Task meeting	12.08.2021	online
Task meeting	29.09.2021	online
Task meeting	11.10.2021	ExCo 88 meeting virtuell, 11.-14.10.2021
Two presentations at IEA Bioenergy End-of-triennium conference	30.11.2021	Session: Setting up regional biohubs to enhance biomass mobilisation, Ric Hoefnagels & Fabian Schipfer
Task meeting	01.12.2021	final triennium meeting 2019-2021
Moderation at IEA Bioenergy End-of- triennium conference	02.12.2021	Session: Green Gas perspectives, Uwe Fritsche
Presentation at IEA Bioenergy End-of- triennium conference	07.12.2021	Session: Biomass and renewable heat, Olle Olsson
Presentation at IEA Bioenergy End-of- triennium conference	07.12.2021	Session: Bioenergy's contribution to low-carbon energy systems, Christiane Hennig

REPORTS

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Baumgarten, Wibke et al. (2021) Country reports: Implementation of bioenergy in Germany – 2021 update. IEA Bioenergy Task 40. October 2021

Olsson, Olle & Schipfer, Fabian (2021) Decarbonizing industrial process heat: the role of biomass. IEA Bioenergy Inter-task project on industrial process heat. IEA Bioenergy. December 2021

Cavalett, Otávio; Cherubini, Francesco & Olsson, Olle (2021) Deployment of bio-CCS in the cement sector: an overview of technology options and policy tools. Contribution of IEA Bioenergy Task 40/45 to the inter-task project Deployment of bio-CCUS value chains. IEA Bioenergy. December 2021

Fritsche, Uwe (2022) Renewable Gas – Hydrogen in the Grid. Synthesis report. IEA Bioenergy Task 41 Special Project. IEA Bioenergy. January 2022

Fritsche, Uwe & Gress, Hans Werner (2022) Sustainable potentials for renewable gas trade. Synthesis Report of WP3 of the IEA Bioenergy Intertask project Renewable Gas: Deployment, markets and sustainable trade. IEA Bioenergy. March 2022

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Burli Pralhad; Hennig, Christiane & Hoefnagels, Ric (2022) Sustainable biomass supply chains for international markets. Contribution to the IEA Bioenergy ITP Assess successes and lessons learned for biofuels deployment. April 2022

Schmid, Christopher & Hennig, Christiane (2022) Regional Transitions of Biomass Utilisation - A Case Study for Germany. April 2022

Hennig Christiane, Olsson Olle & Thrän, Daniela (2022) Bio-CCUS and bioenergy flexibility – finding the balance. Contribution to the IEA Bioenergy ITP Deployment of bio-CCUS value chains. April 2022.

To be finished April & May 2022:

Regional Transitions" project Synthesis report

WP2 Report on the Task 40 "Bioeconomy Synergies" project

Case Study on "Bioethanol" and contribution to case study on "Bio-CCUS and bioenergy flexibility – finding the balance" and contribution to the system study "Carbon accounting across BECCUS supply chains" for the ITP "Deployment of Bio-CCS/CCU Value Chains"

SCIENTIFIC ARTICLES

Schipfer, F. et al. (2020) European residential wood pellet trade and prices dataset. Data in Brief 32: 106254 https://doi.org/10.1016/j.dib.2020.106254

Schipfer, F. et al. (2020) The European wood pellets for heating market – Price developments, trade and market efficiency. Energy 212: 118636 https://doi.org/10.1016/j.energy.2020.118636

Burli, P. et al. (2021) Farmer characteristics and decision-making: A model for bioenergy crop adoption. Energy 234: 121235 https://doi.org/10.1016/j.energy.2021.121235

Schipfer, Fabian; Pfeiffer, Alexandra & Hoefnagels, Ric (2022) Strategies for the Mobilization and Deployment of Local Low-Value, Heterogeneous Biomass Resources for a Circular Bioeconomy. Energies 15 (2): 433 https://doi.org/10.3390/en15020433

NEWSLETTERS

Task 40 created three newsletters in 2019-2021 to find at:
https://task40.ieabioenergy.com/iea- publications/newsletters-2/

VARIATIONS FROM ORIGINAL PROPOSAL – DELIVERABLES, DEADLINES, BUDGETS

We already mentioned some changes in deliverables and budget in Table 1. We had to postpone a planned Joint Workshop with Task 32, and to cancel the planned Task 40 meetings in Japan and the US, all due to COVID-19. We also had to postpone planned Task projects (and respective budgets) to the next triennium and also postponed some Task project activity and corresponding budget to the next triennium as it could not be executed due to the COVID-19 situation. Furthermore, we shifted some of the not needed travel cost in favour of higher Intertask project budgets.

CO-ORDINATION WITH OTHER TASKS WITHIN IEA BIOENERGY

Co-ordination and collaboration with other IEA Bioenergy Tasks were part of all Strategic Intertask projects (BECCUS, Renewable Gas; Industrial Heat, Lessons Learned Biofuels, and WB2/SDG).

Task 40 also contributed to IEA Bioenergy ExCo online workshops and the End-of-Triennium conference, and led the Intertask projects “BECCUS” and “Renewable gas - deployment, markets and sustainable trade” as well as the Task 41 Special Project on “Renewable Gas – Hydrogen in the grid”.

Task 40 also coordinated the project proposal writing of the new inter-task BECCUS 2.0 and supported the project proposal writing of the new inter-task Synergies bio-based value chains and hydrogen.

CO-ORDINATION WITH OTHER BODIES OUTSIDE OF IEA BIOENERGY

Within the Intertask projects “BECCUS” and “Renewable gas” as well as in Task 41 Special Project on “Renewable Gas – Hydrogen in the grid” we collaborated with the IEA Headquarter, IEA H2, and IEA GHG. We also had exchanges with FAO and IRENA.

INDUSTRY PARTICIPATION

Two industrial partners participated directly within Task 40: RWE and Wild & Partner. Also, Task 40 participated in several industry conferences (e.g., European Biogas Conference, Industry segment of EUBCE).

Task 40 has always appreciated industry input, often providing valuable data and insights to researchers, checking assumptions on input data an identifying important knowledge gaps/ongoing developments, as in the BECCUS and Renewable Gas Intertask projects lead by Task 40.

IEA Bioenergy

Technology Collaboration Programme

Further Information

IEA Bioenergy Website
www.ieabioenergy.com

Contact us:
www.ieabioenergy.com/contact-us/