



IEA Bioenergy
Technology Collaboration Programme



IEA Bioenergy TCP - Mid Term Report

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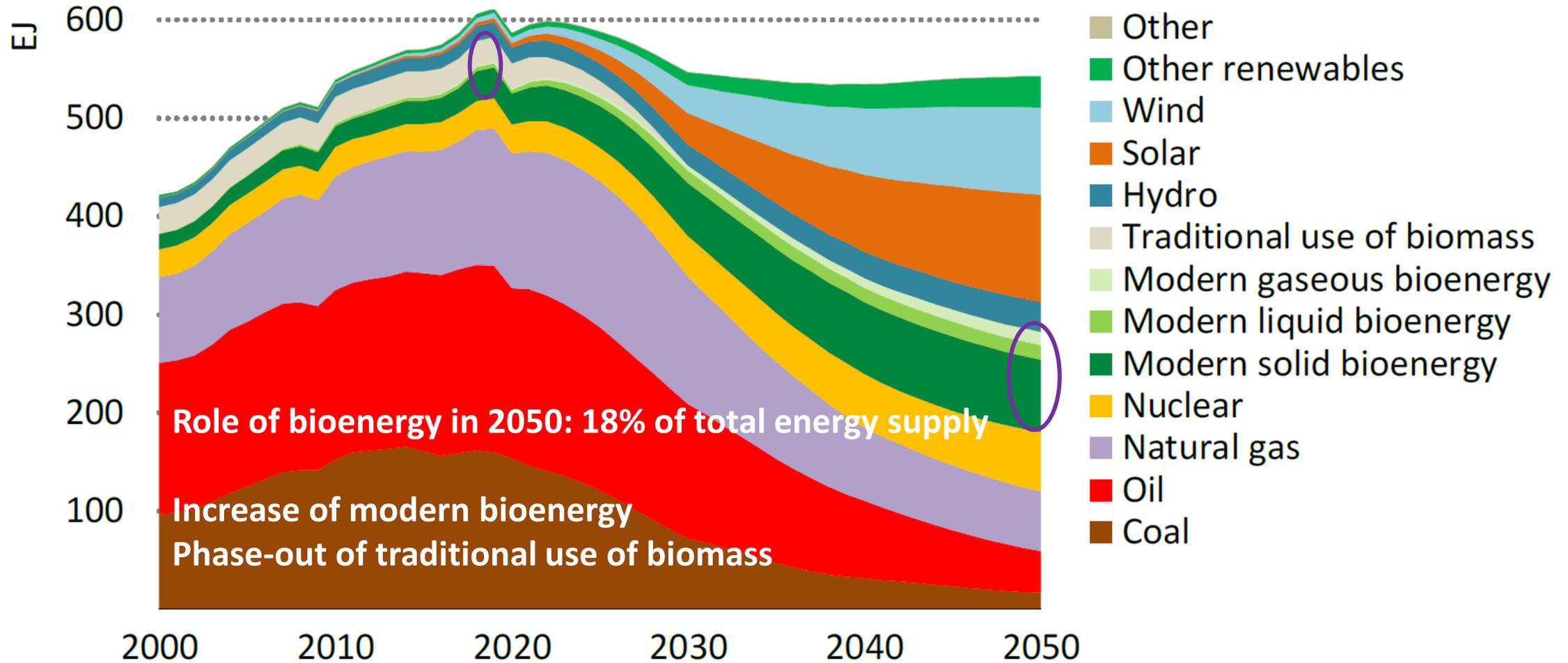
REWP81 Meeting 5-6 April 2022

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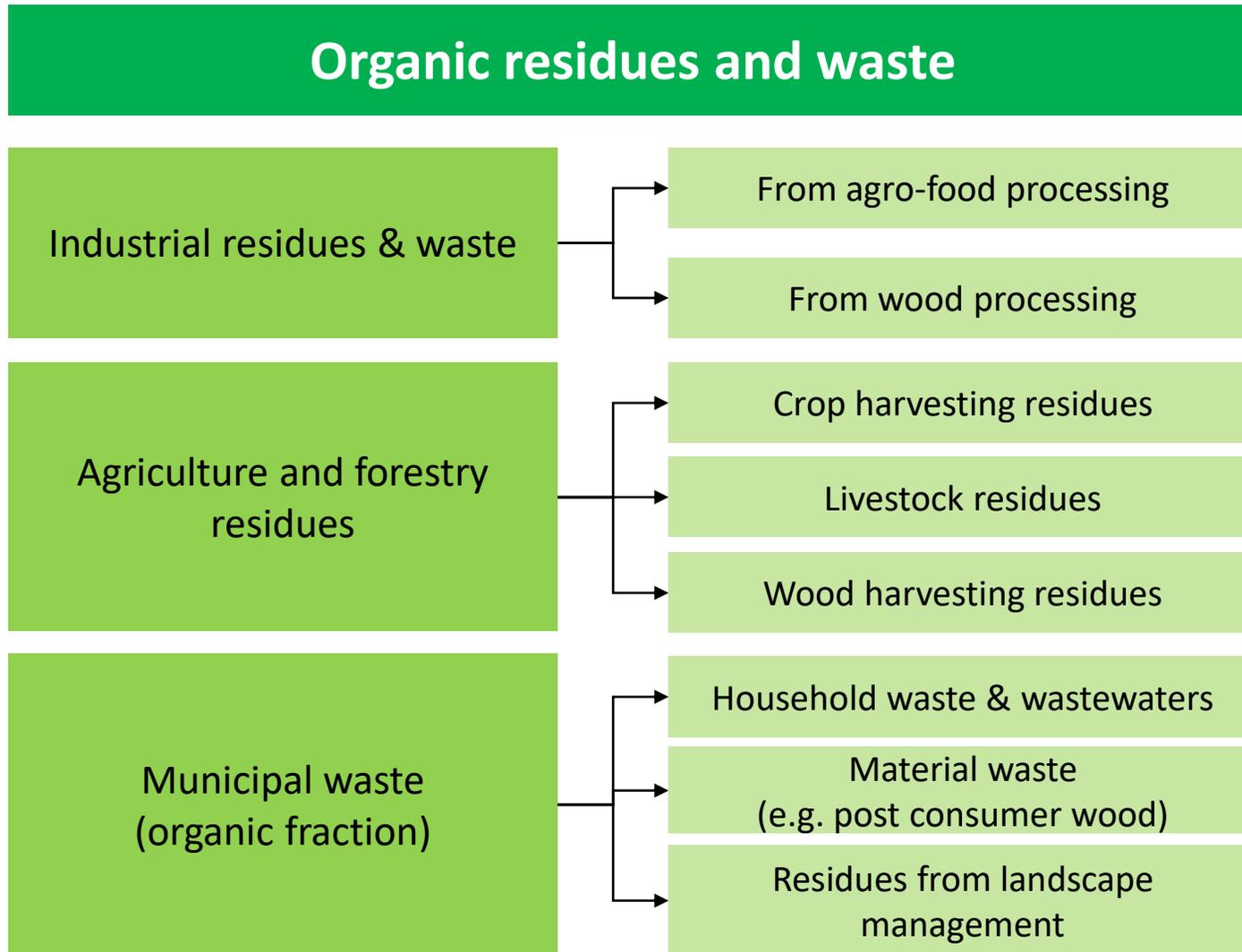
Is there a long term role for bioenergy?

- Commonly **important roles** in pathways keeping global warming below 1.5/2 °C
- **No silver bullets but mix of options** including energy conservation and efficiency measures, bioenergy and other renewables, and carbon dioxide removal (CDR) options.
- Particularly relevant in **hard-to-abate sectors** (e.g., aviation, maritime transport, industry heat) and in association with CDR (BECCS) to counteract residual GHG emissions
- Biomass use for energy **needs to be balanced** with provision of food and biomass for bio-based products; commonly co-production of bioenergy and other bioproducts, or cascading use.
- Nevertheless there are **limits to biomass & land availability** and rapid expansion is challenging due to trade-offs (*not unique for bioenergy*).

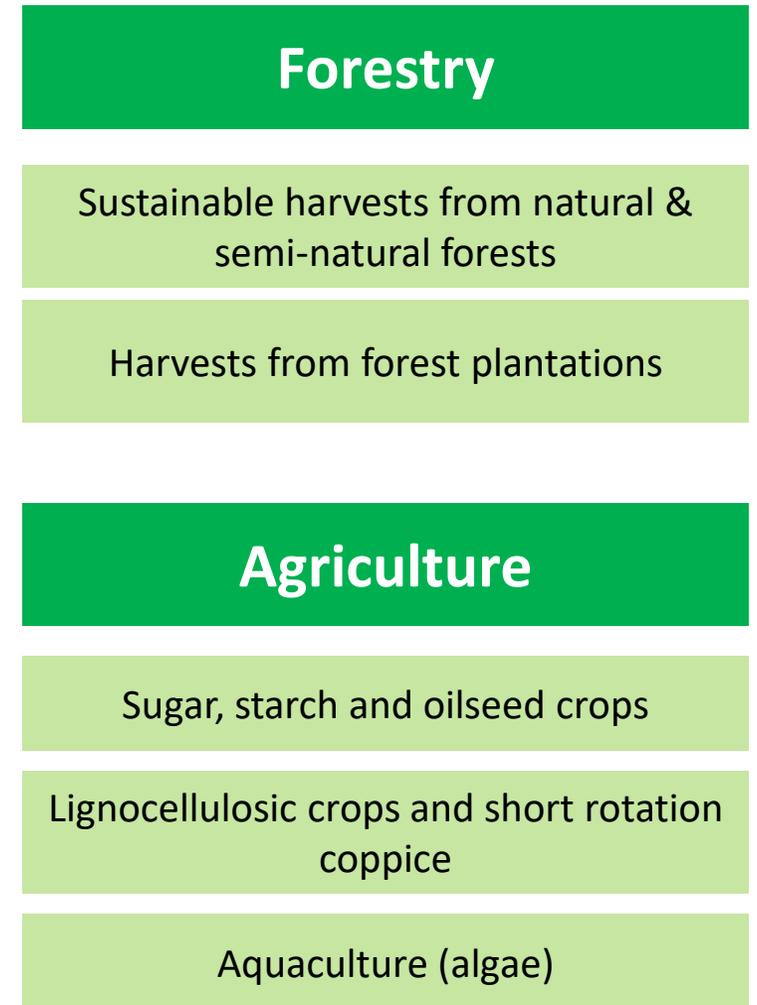
Role of bioenergy in IEA roadmap Net-Zero-by-2050 (2021) - total energy supply



Multiple sources of biomass



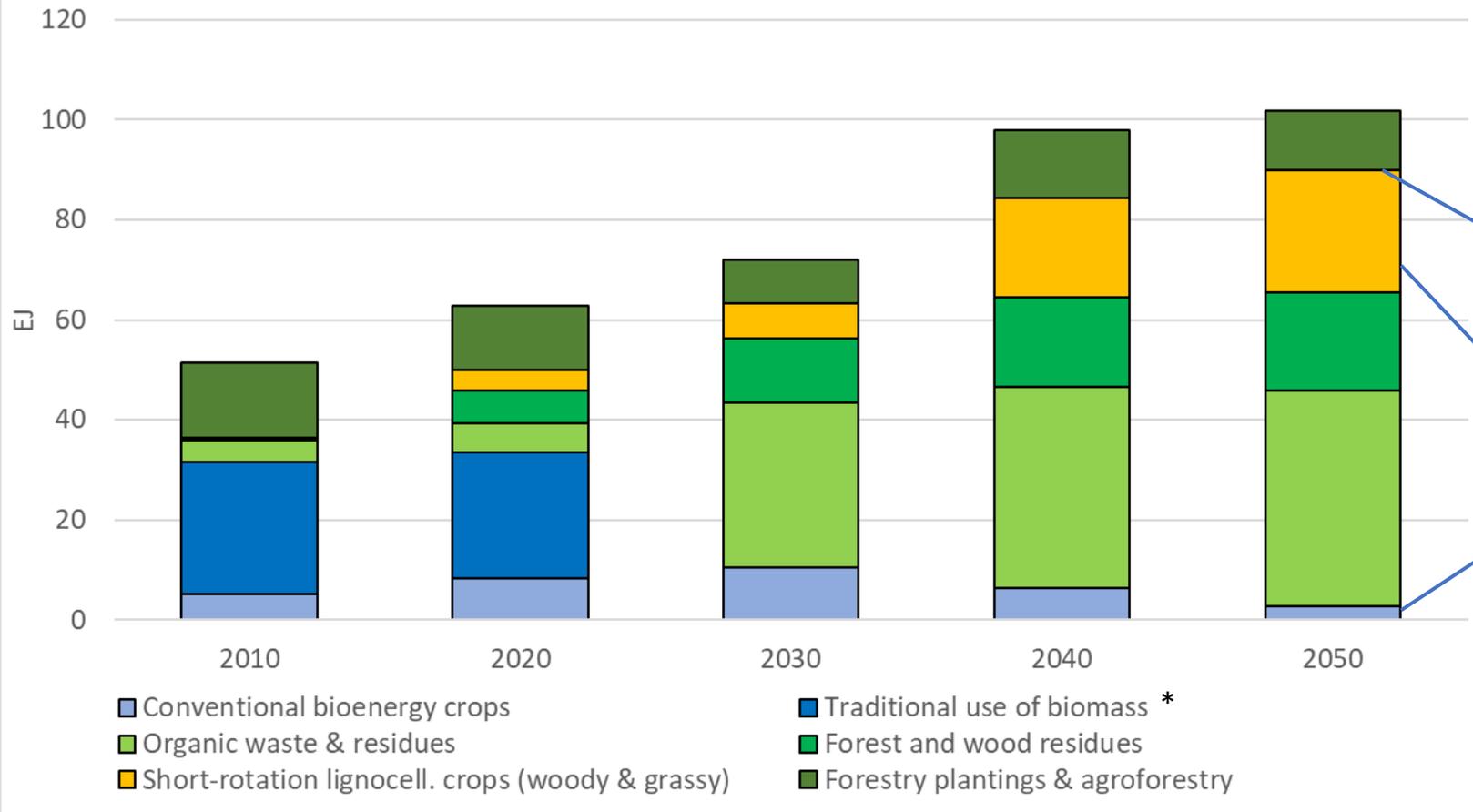
Most debated



Source: IEA ETP 2017

Biomass use in IEA NZE2050

Global bioenergy supply in the IEA Net-Zero by 2050 Scenario



Overall limit 100 EJ (*to be on the safe side*)

60 EJ from agri, forestry & industry residues & wastes

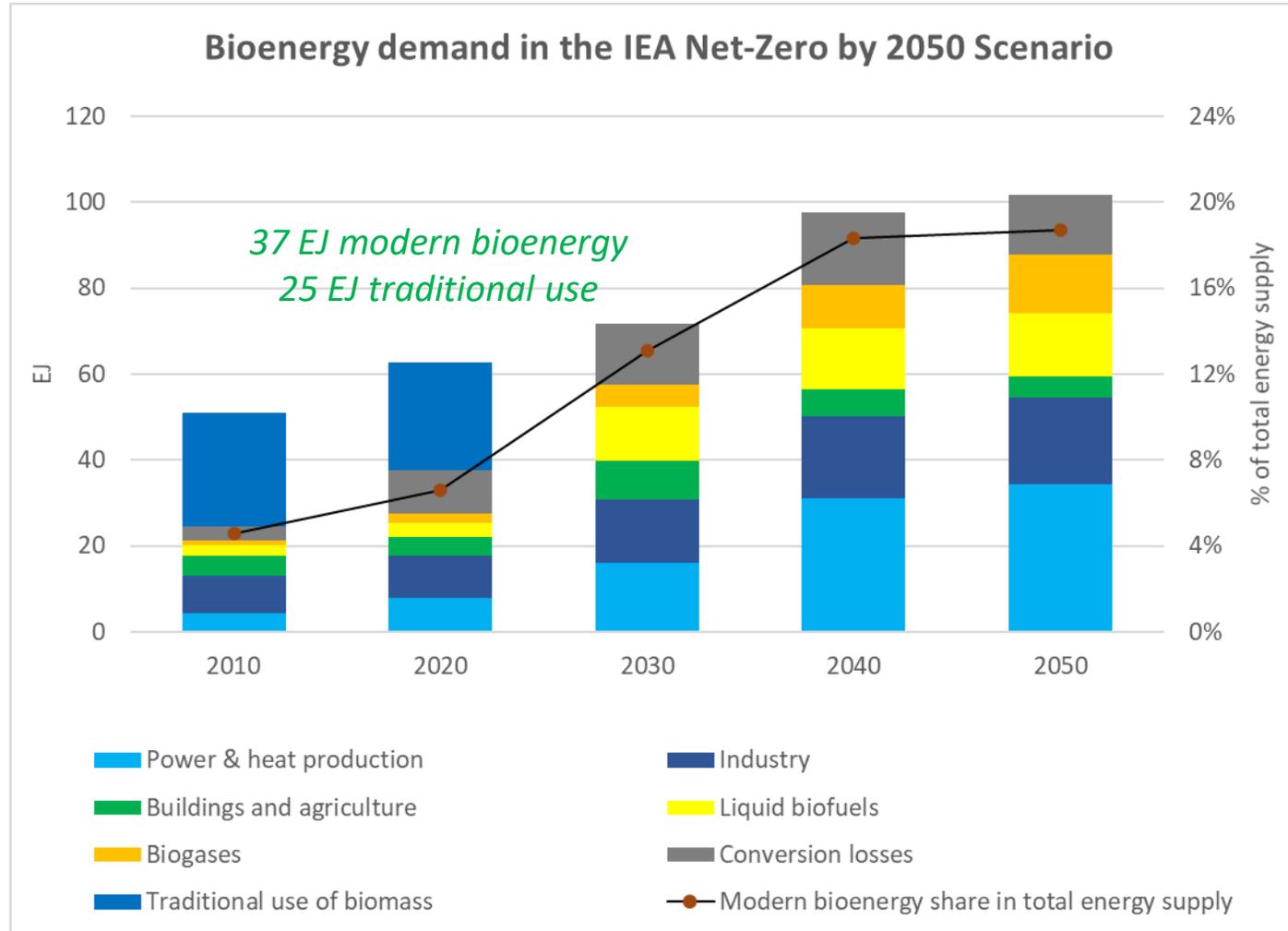
40 EJ requiring land use

- New sustainably managed forestry plantations & agroforestry
- Short rotation lignocell. crops
- Conventional bioenergy crops (declining)
- 140 Mha land use for bioenergy crops (70 Mha marginal lands - 70 Mha croplands ~current use for biofuels)

Data source: International Energy Agency (2021), Net Zero by 2050

**Some of the resources now used in 'traditional way' can be available for modern use if sustainability principles are respected.*

IEA NZE roadmap: traditional use of biomass to phase out - modern bioenergy to triple from today's levels



Modern bioenergy is used to directly replace fossil fuels or to offset emissions indirectly through its combined use with CCUS*

* CCUS = carbon capture & use or storage

Unique role for sustainable bioenergy in the transition away from fossil energy

- Available now to phase out fossil fuels in existing energy infrastructure
- **Versatile:** role in different sectors - heat, power, transport fuels
- **Storable/dispatchable:** complements intermittent/seasonal renewables in power systems
- Next to producing energy, it can **remove atmospheric CO₂** (“negative emissions”) via deployment of Carbon Capture & Storage (CCS) : BECCS / Bio-CCS

Renewable energy production (for different sectors) in combination with negative emissions is unique to bioenergy

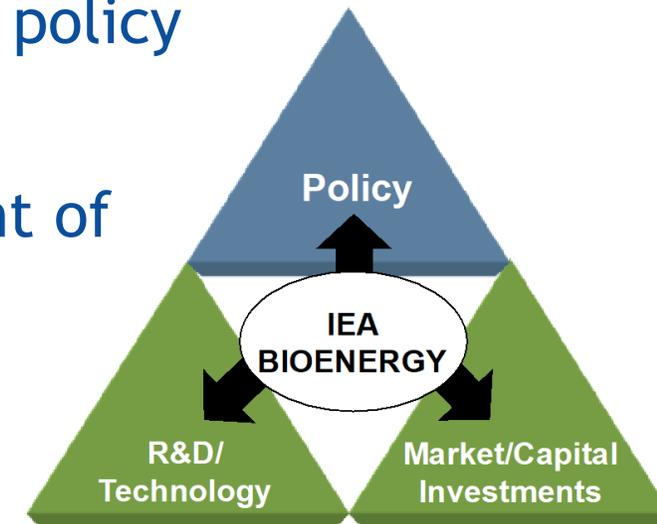
Bioenergy contributes to *climate change mitigation* when:

- Biomass is grown **sustainably** or based on waste/residues
- **Converted** to energy products **efficiently** (often together with other biobased products)
- Used to **displace fossil fuels**

IEA Bioenergy TCP

Aims:

- International **collaboration** and **info exchange** on bioenergy research, technology development, demonstration, and policy analysis
- Facilitate the commercialization and market deployment of sustainable bioenergy systems = **climate positive, environmentally sound, socially acceptable and cost-competitive** (incl. external costs)



Work programme carried out through **Tasks and Special Projects**, covering the full value chain from feedstock to final energy product

26 Contracting parties



Budget in 2021:
~ 2 Million US\$
Tasks: 11 (+ Special/Strategic Projects)
Participation: 116
Direct participation:
> 200 persons



Turkey is in the process of joining IEA Bioenergy

US Grains Council in process to become Limited Sponsor

Bioenergy TCP Action Areas: 2020-2025

A sustainable system for energy and materials supply with biomass

- Demonstrating the key role of bioenergy in a decarbonising world, the complementary role with other renewables, and the potential to provide negative emissions (BECCUS)
- Contribution to Sustainable Development
- Embedding bioenergy into the broader bio-economy
- Incorporating the security, flexibility and stability provided by bioenergy in the fuels, electricity, gas and heating systems

Innovative Technologies

- Enabling the development and application of innovative technologies (collaboration & best practices)
- Developing advanced biofuels from lignocellulose and waste & consider their role in hard-to-abate transport sectors (aviation, marine, long-distance transport)

Bioenergy TCP Actions: 2020-2025

Sustainable Supply Chains

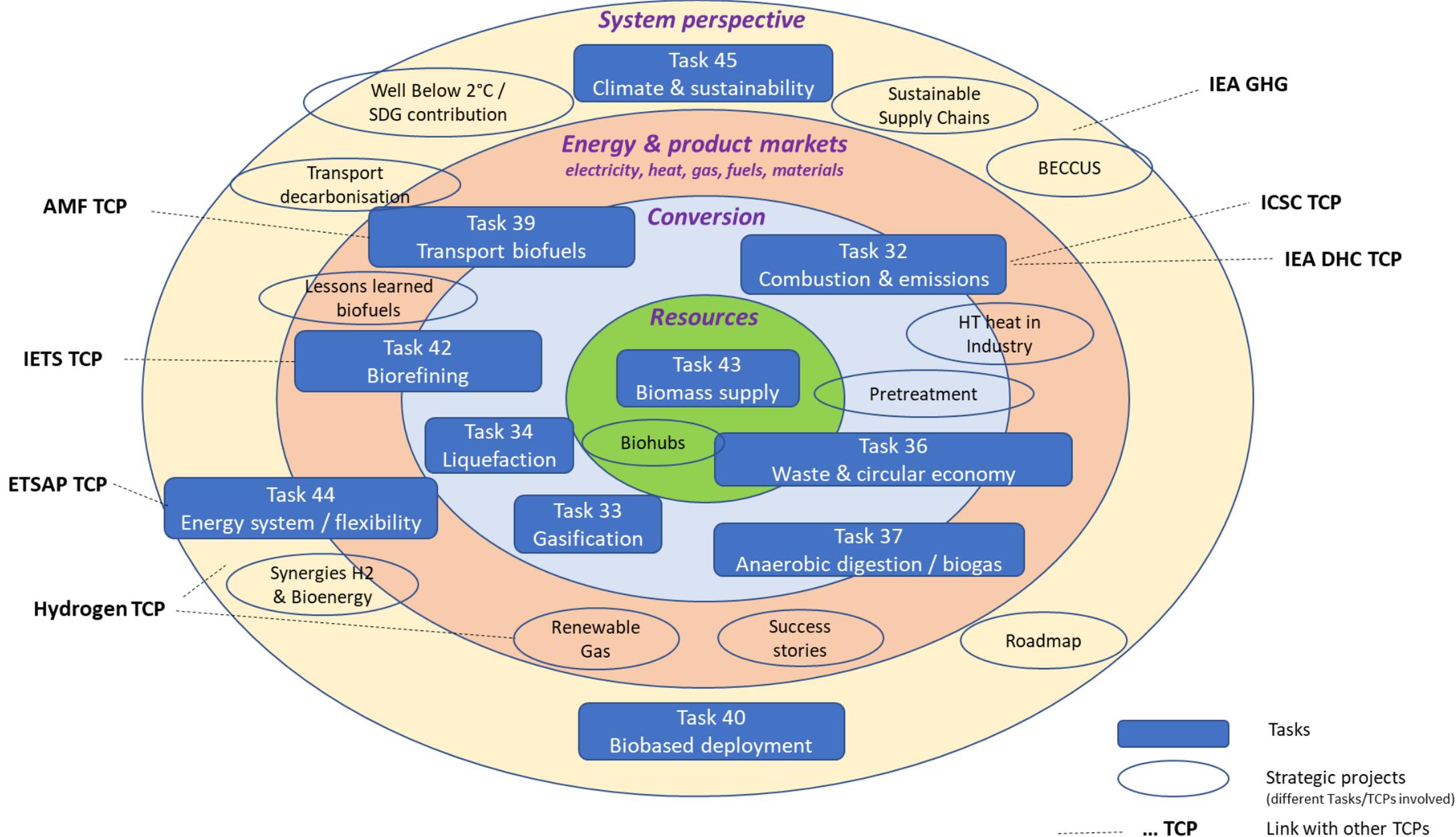
- Mobilize biomass resources through landscape management, reuse of abandoned agricultural lands; sustainable sourcing in agriculture and forestry; logistics to mobilize underutilized residues
- Support sustainability governance & certification
- Promote market deployment of efficient biobased value chains

Operational Optimisation

- Engaging relevant stakeholders in a dialogue & science based analysis to inform political/public debates
- Expanding collaboration with emerging and developing countries
- Ensuring the optimal use of communication channels



Tasks / activities in IEA Bioenergy



Recent highlights

IEA Bioenergy triannual conference 2021

“The role of biomass in the transition towards a carbon neutral society”

Online, 29 November - 9 December 2021

- 10 technical sessions and 4 panel sessions on central topics feedstock mobilisation/sustainability governance; transport biofuels; green gas; circular economy and industry; and bioenergy in the energy system
- 1200 people (from ~90 countries) participated in one or more sessions



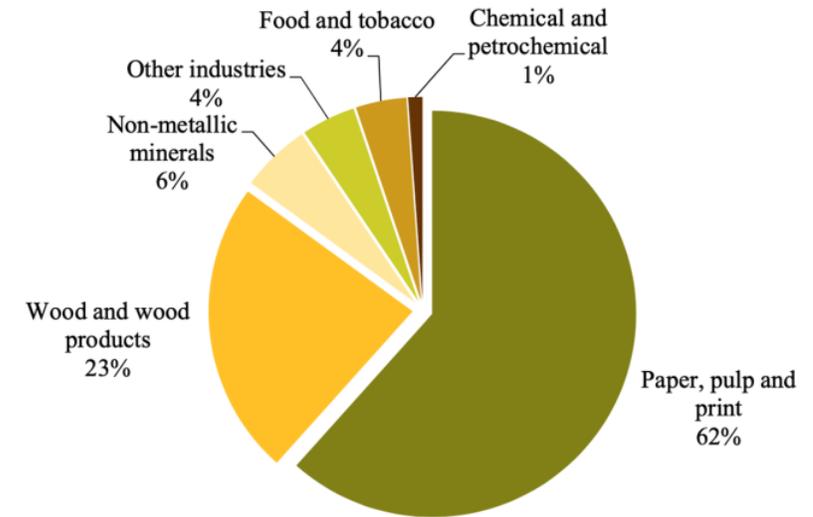
Overview of Speakers and moderators in the conference

IEA Bioenergy triannual conference 2021: Key takeaways

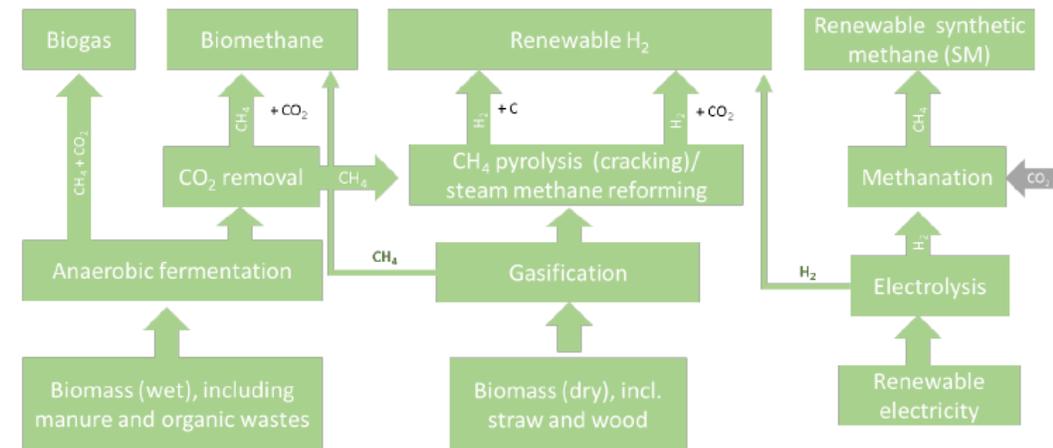
- Bioenergy's role in decarbonisation is substantial; BECCS is one of the critical options to achieve negative emissions
- Bioenergy should not be considered in isolation - it is part of the broader bioeconomy
- Increased efforts needed for sustainable biomass mobilisation; sustainability governance is key
- Transition is accelerating; priorities of biomass use will evolve
- Reliable and coherent political framework conditions needed for the necessary scale-up
- Flexibility is one of the key characteristics of bioenergy; important synergies with hydrogen

Recent Task highlights

- Decarbonizing industrial process heat: the role of biomass (Task 32 and others)
- Emerging gasification technologies for biomass and waste (Task 33)
- Biobased gasoline from sawdust via pyrolysis oil and refinery upgrading (Task 34)
- The role of waste-to-energy and material recycling in circular economy (Task 36)
- Renewable gas - discussion on the state of the industry and its future in a decarbonized world (Task 37)



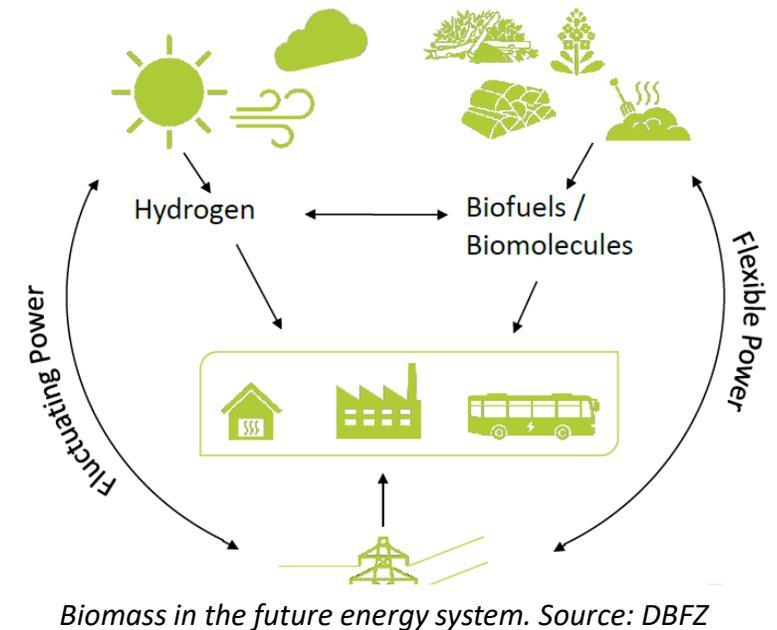
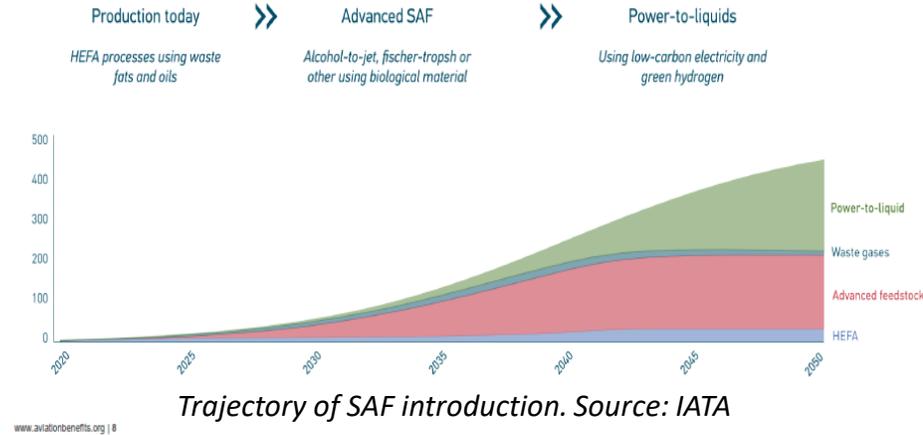
Use of biomass for industrial process heat across different sectors in the EU-28 in 2017



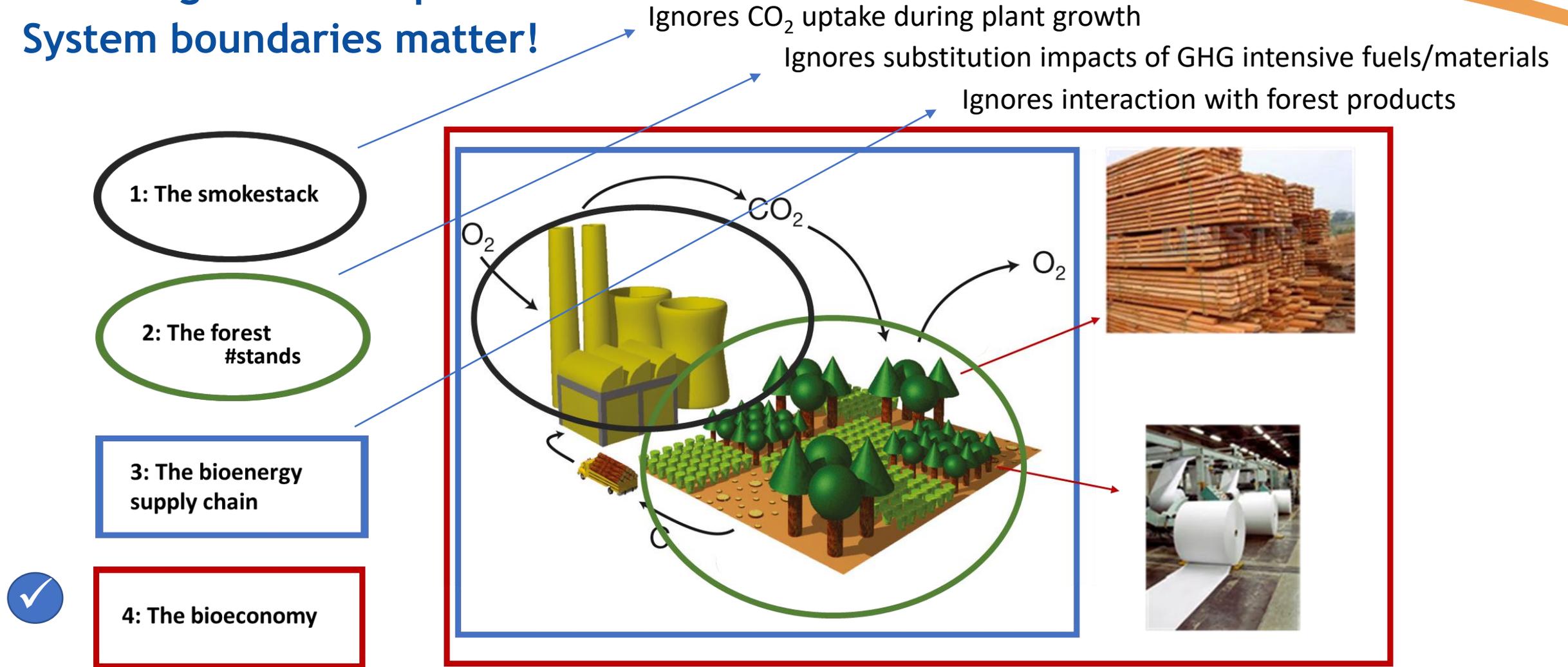
Overview renewable gases. Source: IINAS

Recent Task highlights

- Progress in the commercialisation of biojet / sustainable aviation fuels (Task 39)
- Deployment of bio-CCS: case studies (Task 40 and others)
- Factsheets of biorefinery concepts (Task 42)
- Biomass supply chains and their contribution to Sustainable Development Goals (Task 43 and others)
- Technologies for flexible bioenergy (Task 44)
- Applying a science-based systems perspective to dispel misconceptions about climate effects of forest bioenergy (Task 45)



Assessing climate impacts: System boundaries matter!



Forests managed according to sustainable forest management principles and practices can contribute to climate change mitigation by providing bioenergy and other forest products that replace GHG-intensive materials and fossil fuels, and by storing carbon in the forest and in long-lived forest products.

Strategic Inter-Task projects go beyond focus of individual Tasks & consider the broader picture!

- Bioenergy for high temperature heat in industry
- Deployment of BioCCU/CCS value chains
- Renewable gas - deployment, markets and sustainable trade (incl. H₂)
- Assess successes and lessons learned for conventional / advanced biofuels deployment
- The contribution of Advanced Renewable Transport Fuels to transport decarbonisation in 2030 and beyond (*with AMF TCP*)
- The role of bioenergy in a Well-Below-2 °C/SDG world
- To start soon:
 - Synergies of green hydrogen and bio-based value chains deployment
 - Management of biogenic CO₂ in BioCCU/CCS

TCP Dissemination & outreach

- **Communication plan & follow-up**
- **Website:** The TCP website is the hub to find all information on the Tasks, publications, events, news items
<https://www.ieabioenergy.com/>
- **Social media:** LinkedIn & Twitter (*~4300 followers currently, steadily increasing*) - key to support visibility & dissemination, next to mailings
- **Webinars:** 2 monthly IEA Bioenergy webinars with typically 200-500 online participants –
<https://www.ieabioenergy.com/iea-publications/webinars/> (*Tasks also organize their own events*)
- **Regular workshops / stakeholder interactions:** several events organized by the Tasks, but also centrally by ExCo (in conjunction with ExCo meetings)
- **Short summaries of Task reports & factsheets**
- **Newsletters**

- **Communication support:** Contract with Communications consultant to reach broader than the 'Bioenergy bubble'

Conclusions

- Bioenergy has key role to play in the clean energy transition and in the circular bioeconomy
- IEA Bioenergy continues to provide crucial science-based analysis to inform policy makers and other key stakeholders
- Improved methods for disseminating IEA Bioenergy messages are being explored to increase the effectiveness of our communication and the impact of our work
- Collaboration with relevant international bodies (e.g., GBEP and Biofuture Platform) is developing strongly

Thanks for your attention!
Questions?

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