Renewable Fuels for a resilient society

06.November 2025

Welcome

INNO FUELS INNOVATIONSPLATTFORM

Platform Hernieuwbare Brandstoffen.

ETIP Bioenergy
European Technology and Innovation Platform

Agenda

09:00 - 09:15	**Welcome and proposition of renewable Fuels on Resilience Topics** *Loes Knotter of the Platform Renewable Fuels* *Dr.-Ing. Olaf Toedter (InnoFuels) Karlsruhe Institute of Technology (KIT)* *Patrik Klintbom (ETIP Bioenergy) Research Institutes of Sweden (RISE)*
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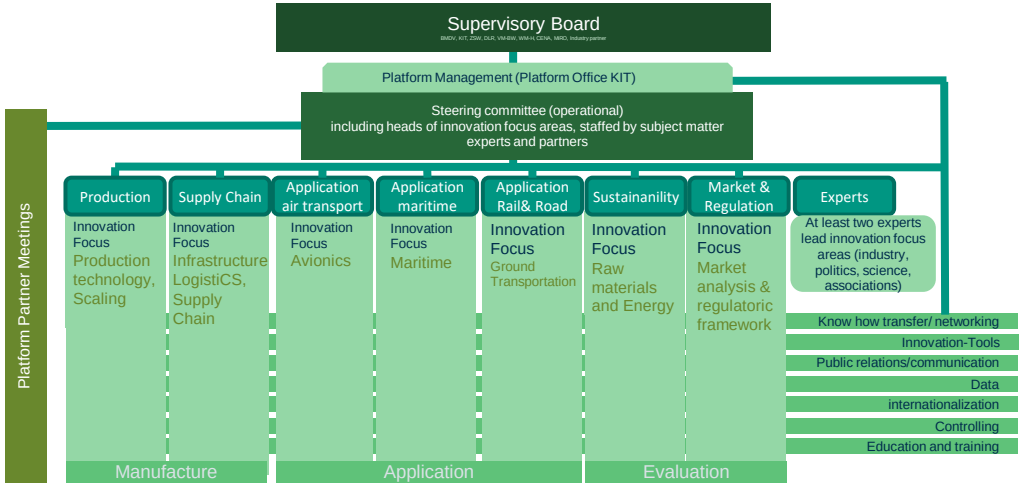
Welcome and proposition of renewable Fuels on Resilience Topics

Brief introduction of the organizations

- **Objective:**
  Accelerate the ramp-up of electricity-based and advanced biofuels through concrete planning approaches.

- **Stakeholders:**
  Research institutions, manufacturers (automotive, aviation, shipping), energy providers, federal and state ministries
  → supported by associated partners contributing specific expertise

- **What makes InnoFuels unique?**
  First and only exchange platform for refuels → structured into 7 thematic fields of activity



- **Funding:**
  InnoFuels is funded with **€5.24 million** by the **Federal Ministry for Transport** under the *Renewable Fuels Funding Programme*.
  Coordination: **NOW GmbH**, supported by **VDI/VDE-IT** and the **Agency for Renewable Resources (FNR)**.

With funding from the
FUNDING PROGRAMME RENEWABLE FUELS
Federal Ministry of Transport
Coordinated by
NOW GMBH.DE
Project management agency
VDI|VDE|IT
FNR

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Independent knowledge and innovation platform

Independent knowledge and innovation platform

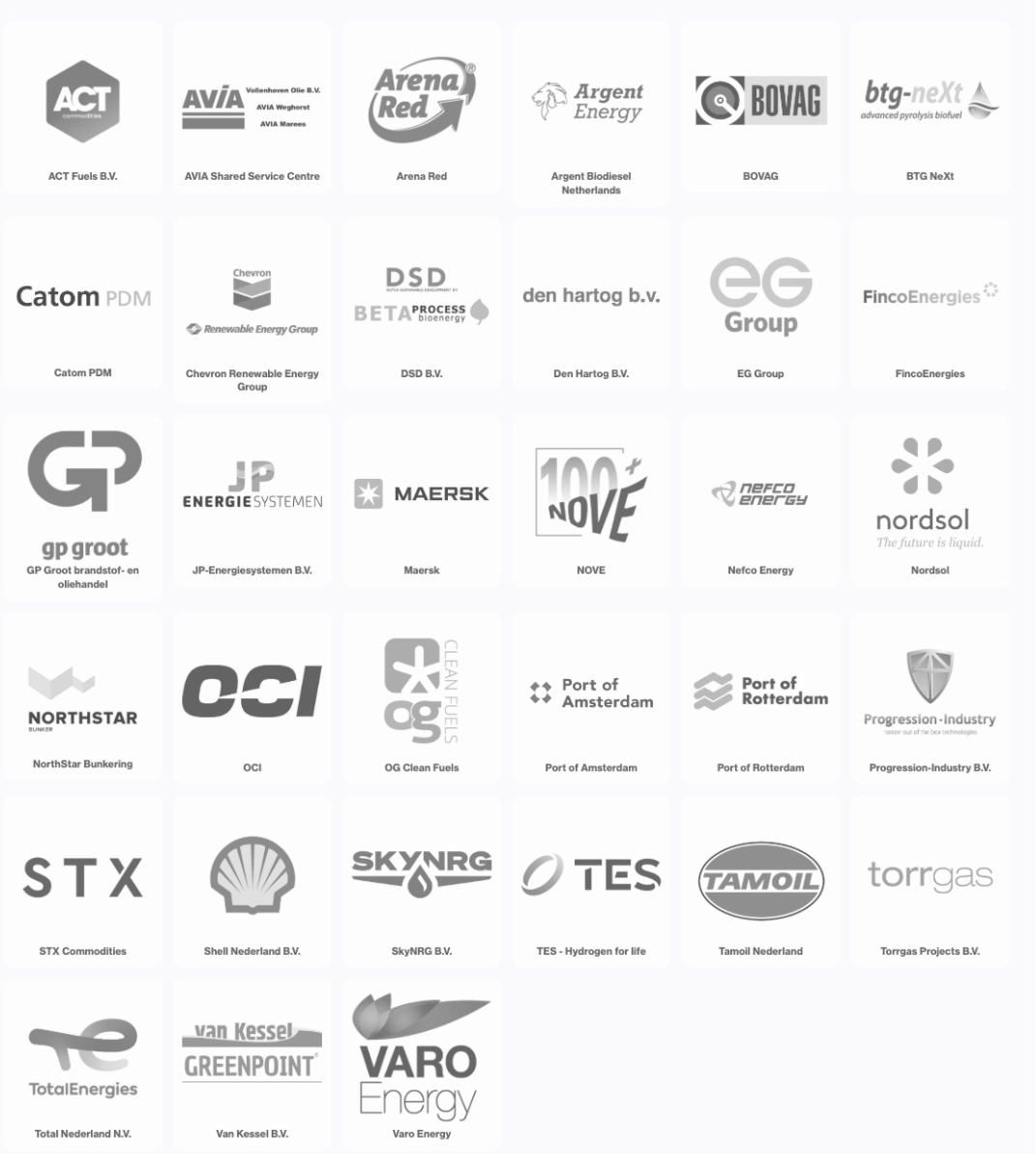
Our mission: ramping up renewable fuels and phasing out fossil fuels to reach net zero emissions by 2050.

We are working on the mission by focusing on:

- **Independent knowledge development** , analysis and research in various transport sectors.
- **Actively communicating** the need for and benefits of renewable fuels for the Dutch transport sector, society and economy.
- **Chain-wide approach**: from raw material to end user, in which certainty of sustainability and transparency are important pillars.
- **Stimulating projects and pilots** that focus on creating synergy with other biobased sectors
- **Translation of developments** and obstacles in the market into policy advice.

- We are a member-based platform with 33 members

- **We are not a conventional lobby group or business association**



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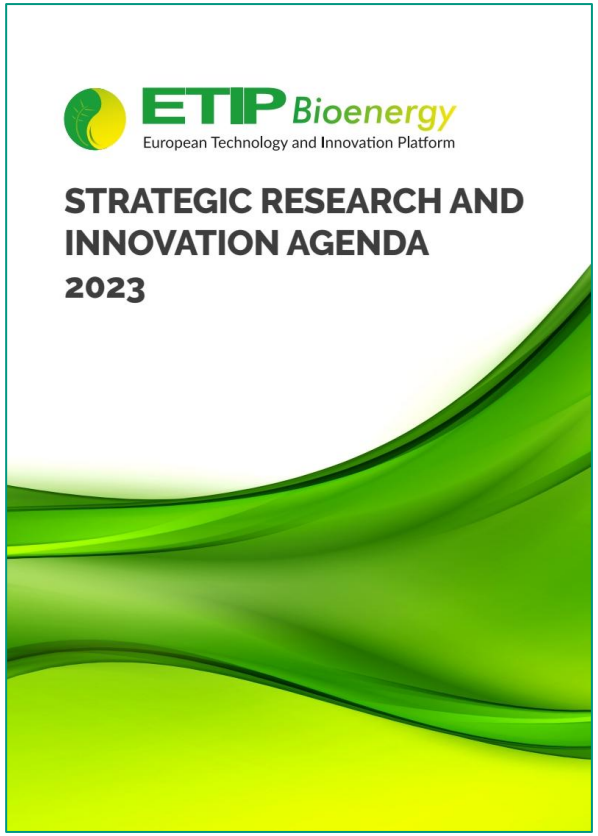
Welcome and proposition of renewable Fuels on Resilence Topics

Brief introduction of the organizations

ETIP Bioenergy
European Technology and Innovation Platform

- Industry led stakeholder forum for renewable fuels and bioenergy
  - Focusing on research, development and deployment
  - Recognised by the European Commission as key actor
  - Strong connection to the SET Plan
  - SRIA Provide the basis for further RD&D on renewable fuels and bioenergy

- Structure
  - Steering Committee
  - Secreteriat funded by the European Commission
  - WG1 Biomass Availability
  - WG2 Conversion
  - WG3 End-Use
  - WG4 Policy and Sustainabilty
  - Biomethane Task Force



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Preparedness for crisis situations – Annual demanded fuel volume from military in times of war

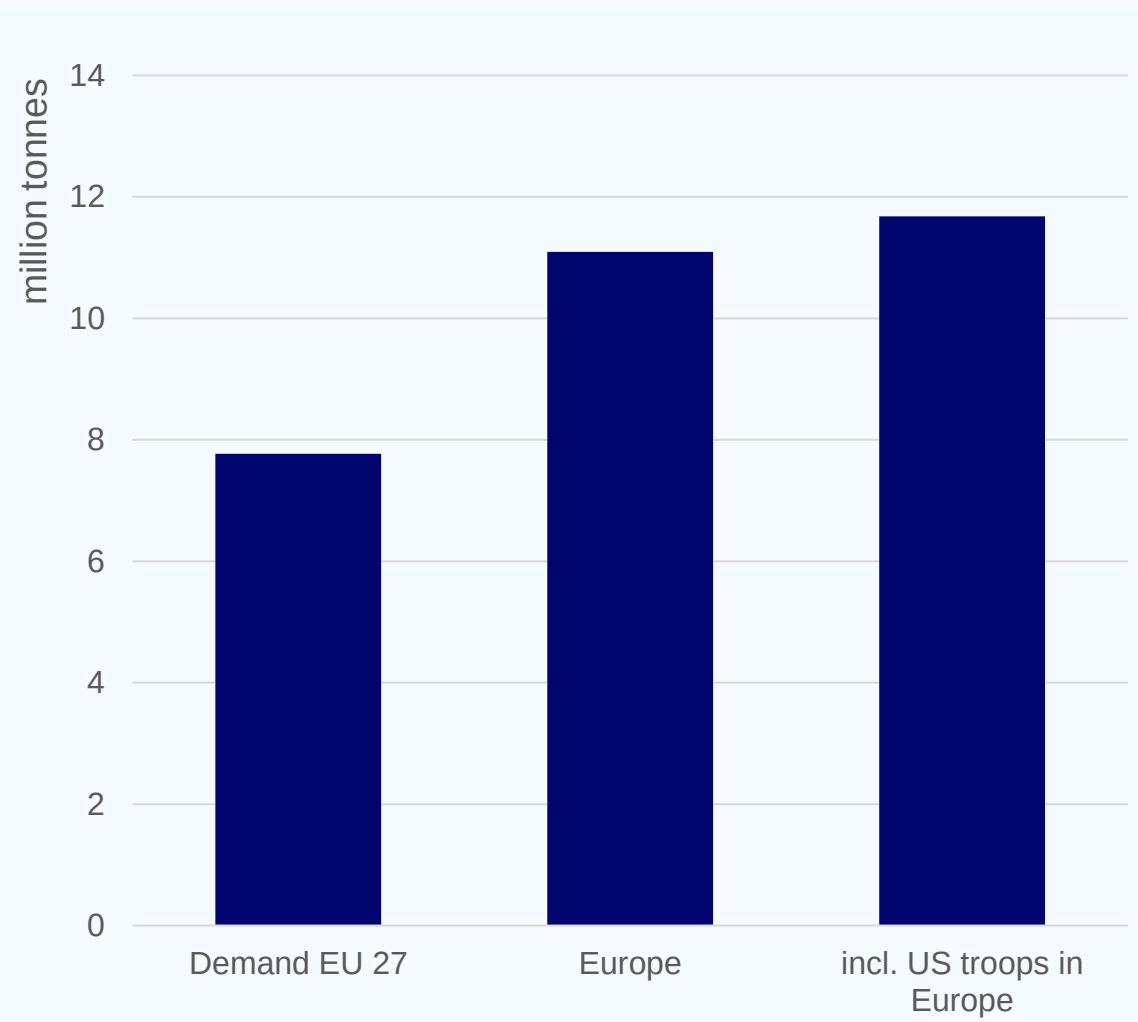
- Rule of thumb (taken from Rheinmetall proposition):

  20 Liters of fuel per soldier per day

- Military personnel*

EU 27:	1,33 million
Europe:	1,9 million
Including US soldiers deployed in Europe	2 million

*Could very well be more already, as other sources say Ukraine alone has 900,000 active military personnel



Source: Values for military personnel are retrieved from the European Council on Foreign Relations (ECFR, 2024) and globalfirepower.com

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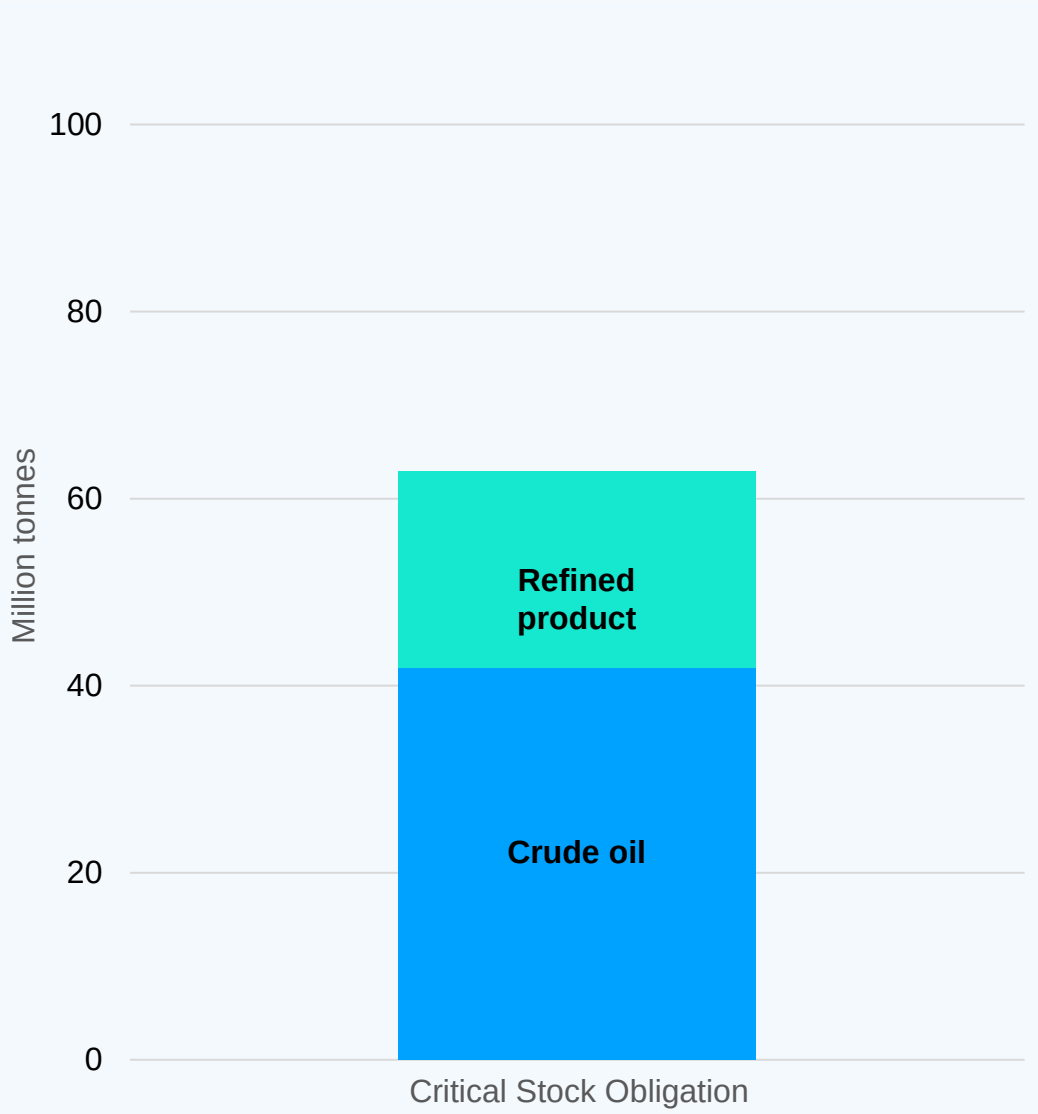
Critical stock obligation obliges Member States to keep a reserve stock of oil products

- The reserve stock of oil products is equivalent to
  - net 90 days import, or
  - 61 days of consumption.

- Composition of stock
  - 1/3rd needs to be held in refined oil products
  - 2/3rd can be held in crude oil



Source:
Critical stock obligation volumes for EU-27 calculated based on consumption level data from Eurostat, 2025, assuming implementation on 61 days of consumption;

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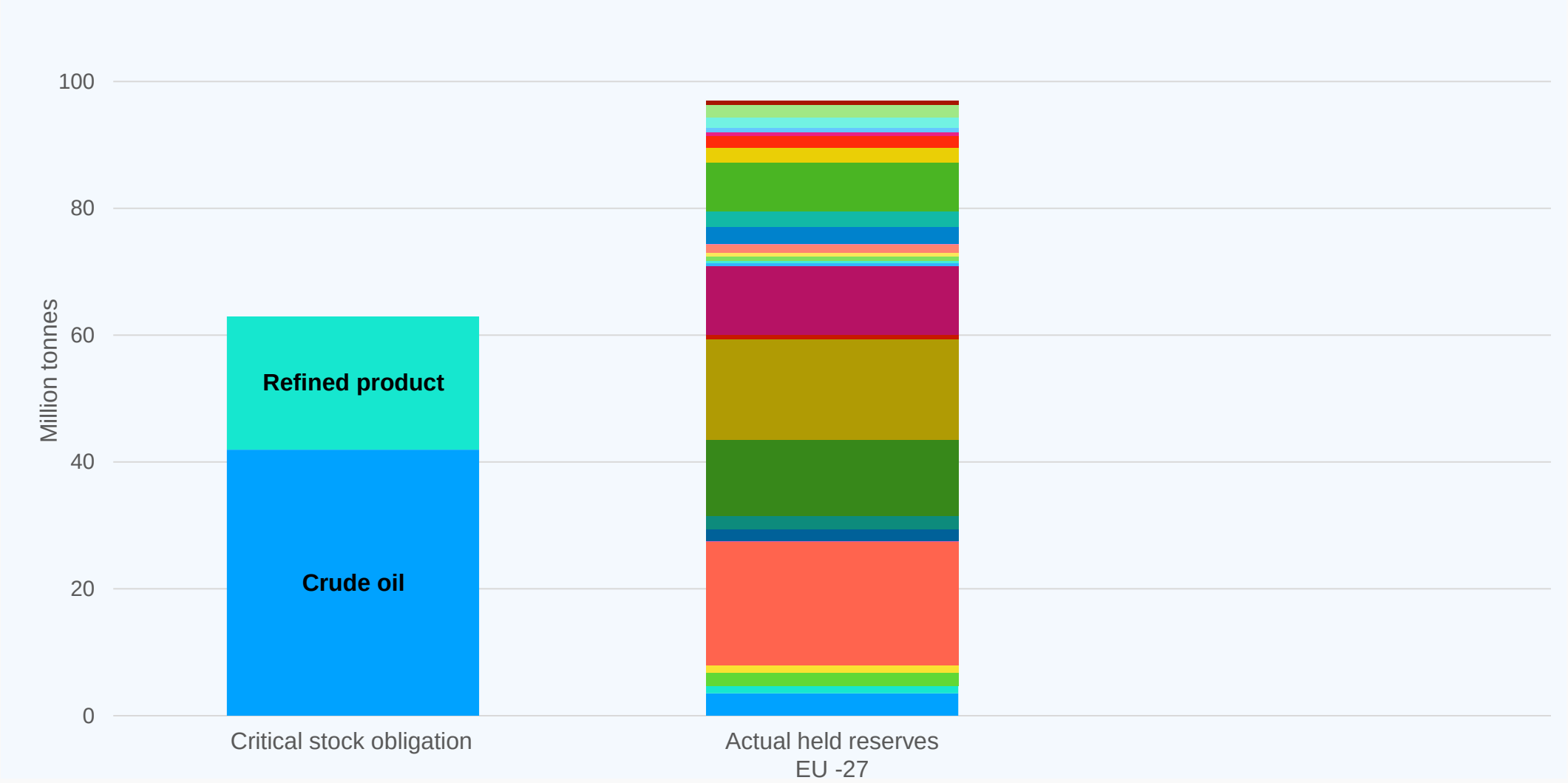
Actual reserves in EU-27 Member States exceed the obligation



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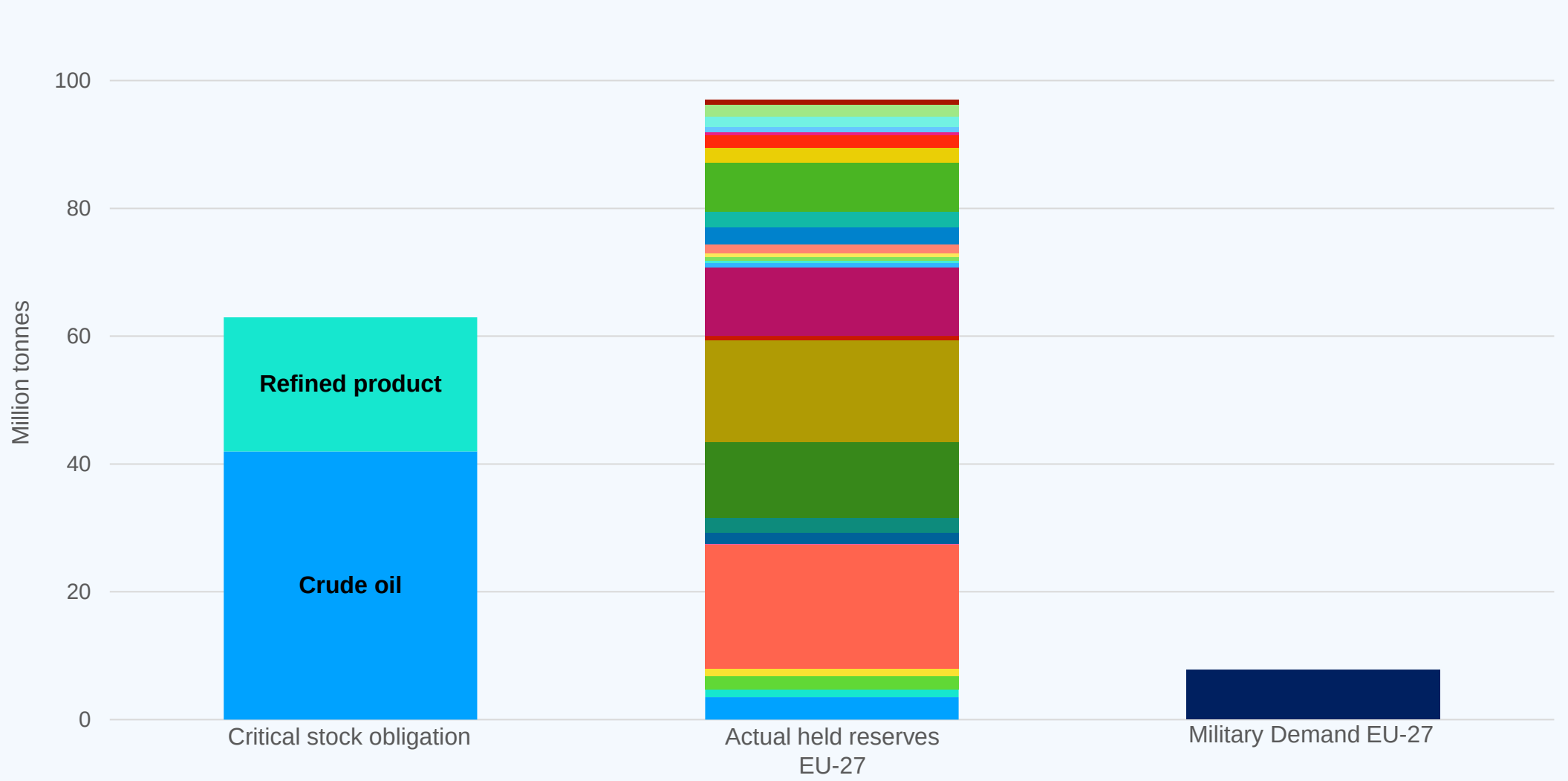
Source:
Critical stock obligation volumes for EU-27 calculated based on consumption level data from Eurostat, 2025, assuming implementation on 61 days of consumption;

Source:
Eurostat, 2025

Military demand is small compared to existing oil product reserves – but not renewable



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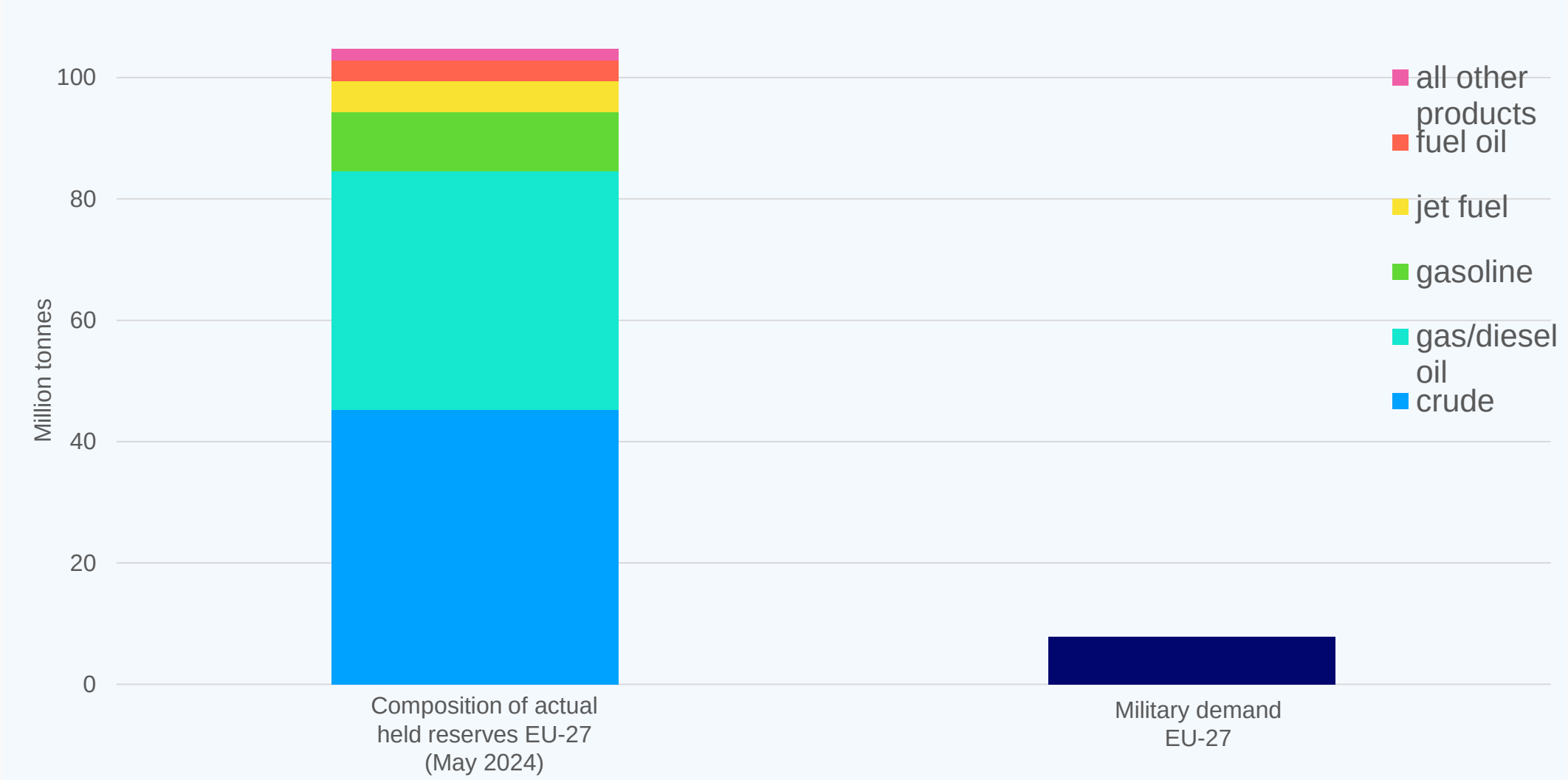
Source:
Critical stock obligation volumes for EU-27 calculated based on consumption level data from Eurostat, 2025, assuming implementation on 61 days of consumption;

Source:
Eurostat, 2025

But composition is fossil and largely needs refining capacity



Source:
Eurostat, 2025

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Planned capacity needs to materialise to meet military demands

Source: Values for production volumes are retrieved from the studio Gear Up, Green Production Facility database | Volumes for mandates are retrieved from EASA (2024) report State of the EU SAF market in 2023

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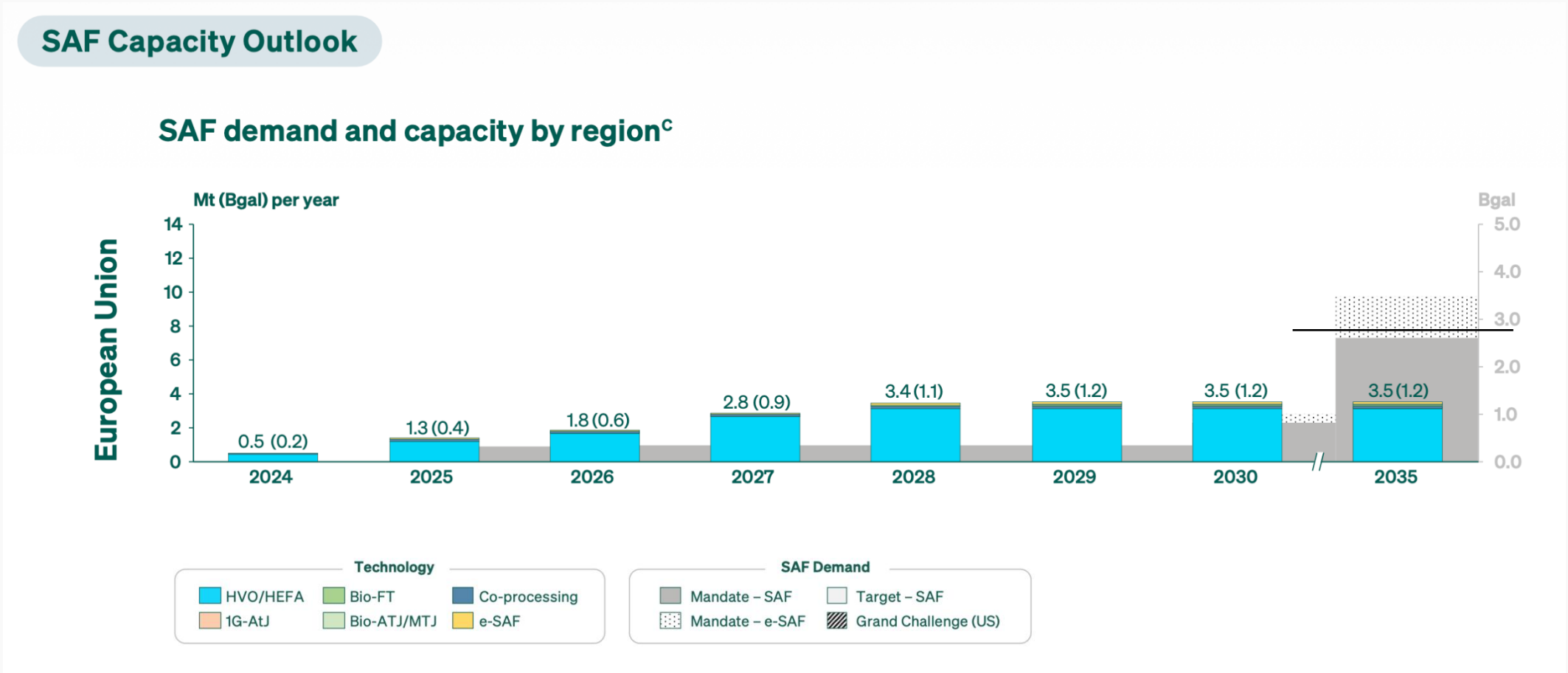
Current and planned SAF capacity: HEFA dominance



Source: SkyNRG, ICF, 2025, 2025, SAF Market Outlook

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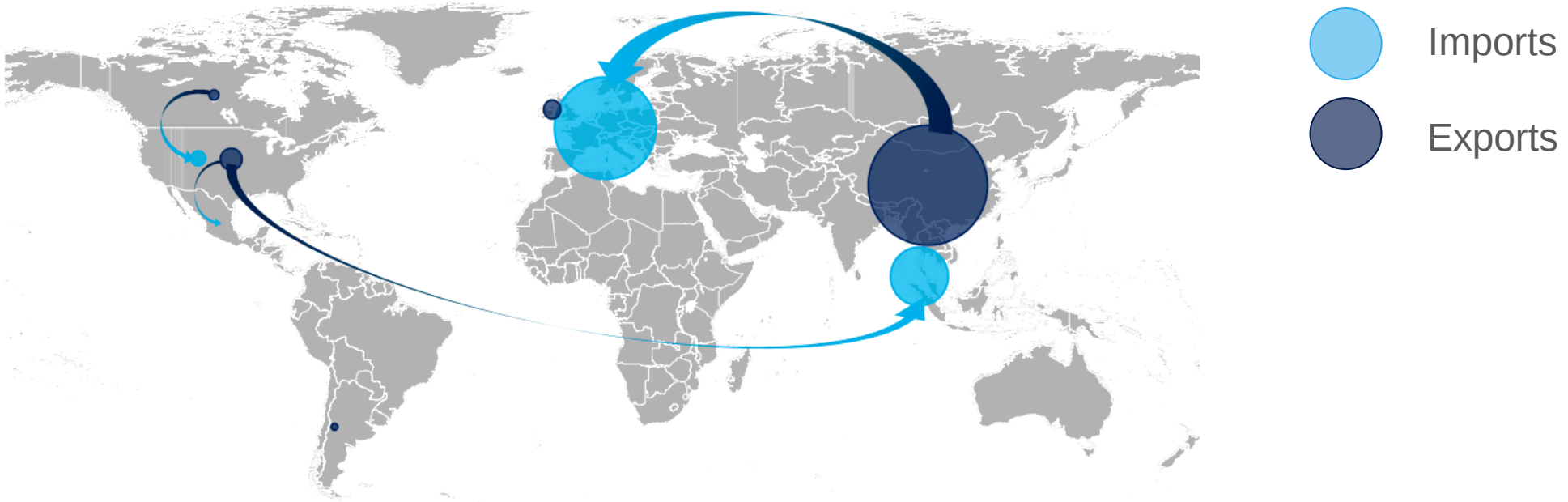
HEFA dominance leads to feedstock import dependency

UCO exports and imports (2023)



- Conclusion:
  - Mismatch between dominant conversion technology (HEFA) and feedstock availability (largely outside of EU)

Source: Global Data, 2023. UCO Supply outlook

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Therefore we need

Alternative renewable fuel technologies that use European biomass

or

Diversify feedstock base for HEFA pathways with intermediate crops

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Theoretical potential alternative HEFA feedstocks by far sufficient

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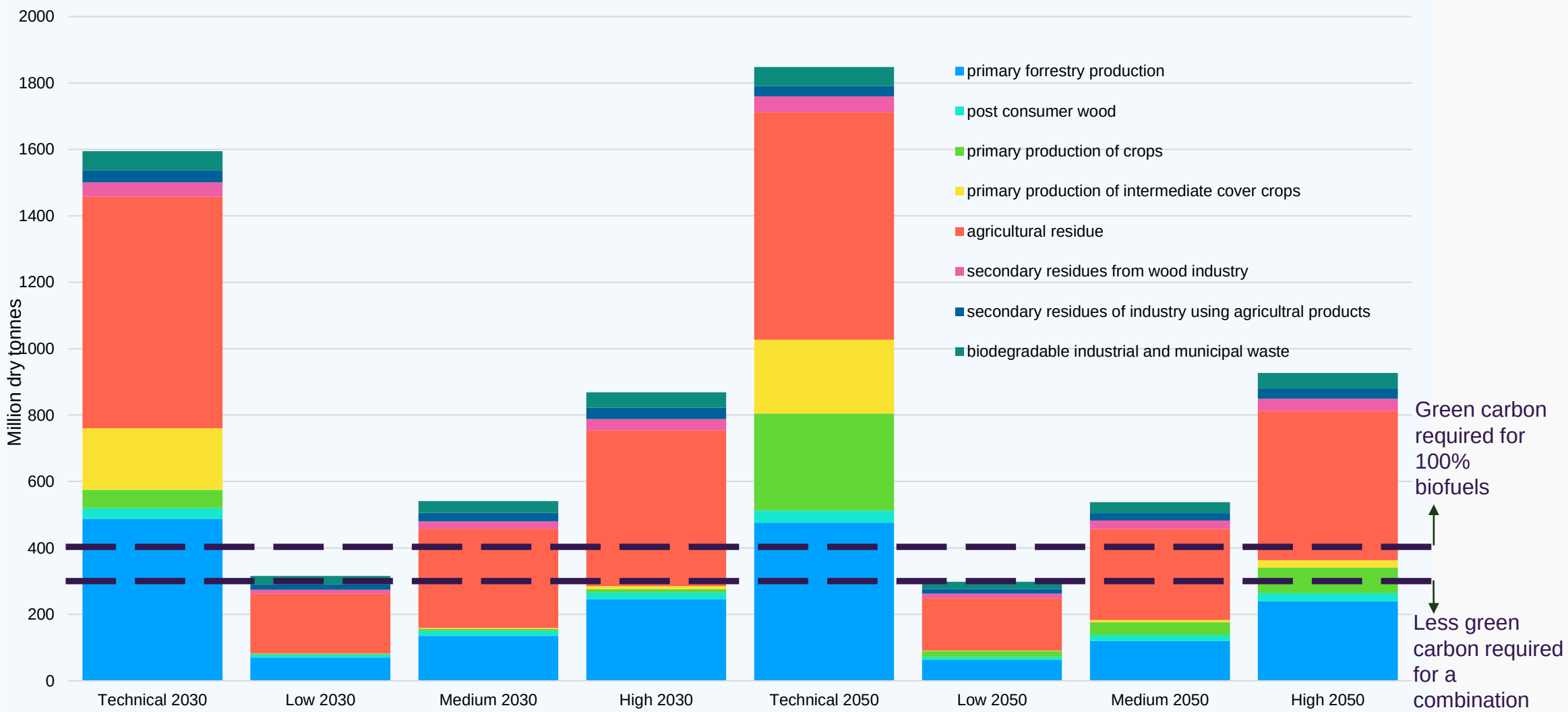
Sources:
POME: T&E 2025, Palm oil in disguise?; ISCC 2025, Understanding POME context and controversy (website news item)
CTO:Ecofys 2017, Crude tall oil low ILUC risk assessment
Other waste oils: Confidential study by studio Gear Up, involving interviews with experts and stakeholders in lipid residues industry.
UCO: IEA 2023, Liquid biofuels – feedstock forecast

European feedstock potential for alternative biofuel technologies



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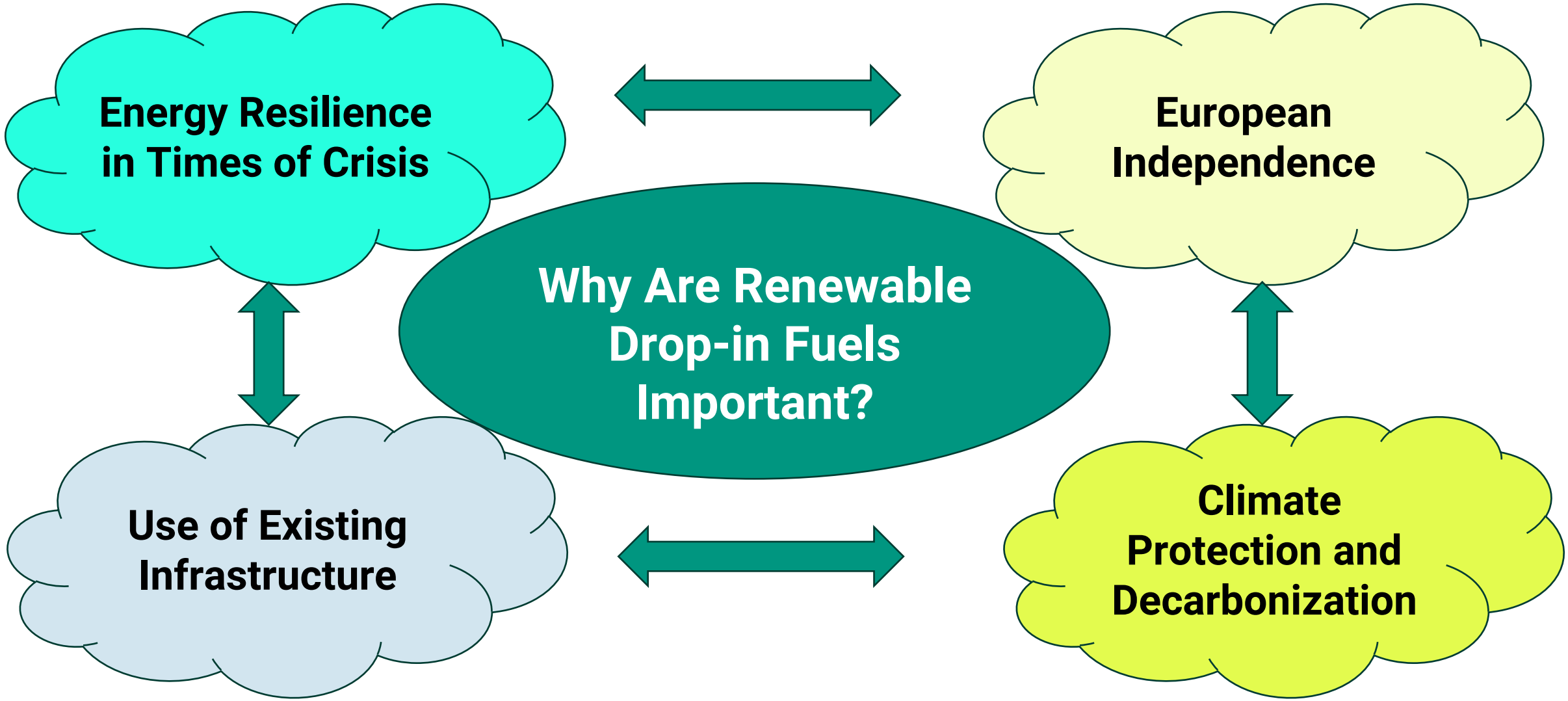
Source: European Commission (2024) Development of outlook for the necessary means to build industrial capacity for drop-in advanced biofuels – Annex 2 Report on Task 2

Welcome and proposition of renewable Fuels on Resilience Topics

Why is this topic important?



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Aim of the workshop:

Defining Problem Definiton

Defining the enabling conditions and barriers

Focus on integrating technologies into a scalable, decentralized energy system — not just isolated solutions.

Build a coalition

Bring together stakeholders from industry, research, policy, and civil society to design a resilient renewable fuel system for Europe. Which stakeholders are missing?

Defining next steps

Launch a collaborative initiative to unite key actors around a shared vision and implementation strategy.

Part 1 – Setting the scene for a proposition of renewable fuels for resilience

- Where do we stand on instruments for strategic autonomy & resilience in the EU?
- Key numbers and insights on fuel demand for military purposes
- Mismatch between current production capacity and European feedstock base

With contributions by:

Loes Knotter (Platform Renewable fuels)
Patrick Bosmans (NATO/CEPS)
Ville Korhonen (DG ECHO)
Frank Schulze (Exolum gmbh)

Frank Schulze
Managing Director

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Bioenergy – A key to European Resilience?

Patrik Klintbom, RISE
Chair ETIP Bioenergy Steering Committee

2025-11-06

Resilience

There is some confusion regarding concepts: resilience, resistance, preparedness, and more are mentioned in the debate..

The concept of resilience includes:

- An ability to face major disruptions
- These disruptions are of a nature that it is not possible to calculate probability or consequences (unknown unknowns)
- Examples include natural disasters, wars, cyberattacks, sabotage, pandemics, etc.
- Common strategies for resilience are: redundancy, flexibility, agility, and cooperation

How can bioenergy contribute?

Bioenergy today

- Almost 60% (2021) of renewable energy in EU is from biomass
  - Thus the largest source but the least discussed
  - Delivers benefits and renews every year in Europe

- Still one of the few alternatives that can be applied now and deliver now
  - How do we increase deployment?
  - Significant effort needed to push market deployment. The SET Plan context is key

- Transport applications
  - As mentioned many times before. Electrification is not the alternative as it takes time and is not suitable everywhere.
  - Transport will remain dependant on liquid and gaseous fuels for decades and permanently for aviation, shipping and long-distance transport.
  - Thus failing to support bioenergy in transport means continued support for fossil fuels

The SET Plan – a central initiative

- The integrated SET Plan – The plan to accelerate the development and deployment of low-carbon technologies in EU
- Biomass and bioenergy contribute with the following:
  - Defossilisation
  - Circular economy development
  - Biodiversity through sustainable practices
- European competitiveness:
  - Energy independence
  - Job creation
  - Innovation
  - Economic growth
  - Technological advancements

Going forward

- The need for resilience and increased energy security should give an even stronger case for bioenergy
- Need to provide the boundary conditions for the following
  - Continued support for low-TRL technologies
  - Clear support all the way to the market in each TRL level
  - Support the "first och a kind plants" to lead to commercial plants
  - Create clear conditions for real capacity additions now. Many technologies are ready
- Phase out fossil fuels
  - Russian energy still imported to EU
  - Russian fossil energy replaced by other unstable and non sustainable supplies of fossil energy
  - Fossil fuels major reason for conflicts

Final remarks

- Renewable fuels and bioenergy can provide capacity on short term
  - The status of value chains are clear
  - Technology infrastructure exist for further development
- Sectors such as aviation and shipping have liquid fuels as the long-term permanent solution
- Renewable fuels and bioenergy are inherently resilient and dual use compatible
- European based feedstock are available, forest residues, agriculture residues and waste
- Procurement could be the way forward. Needs to be analysed to avoid chicken/egg discussion.
- A European value chain for sustainable fuels can be seen as an insurance for Europe

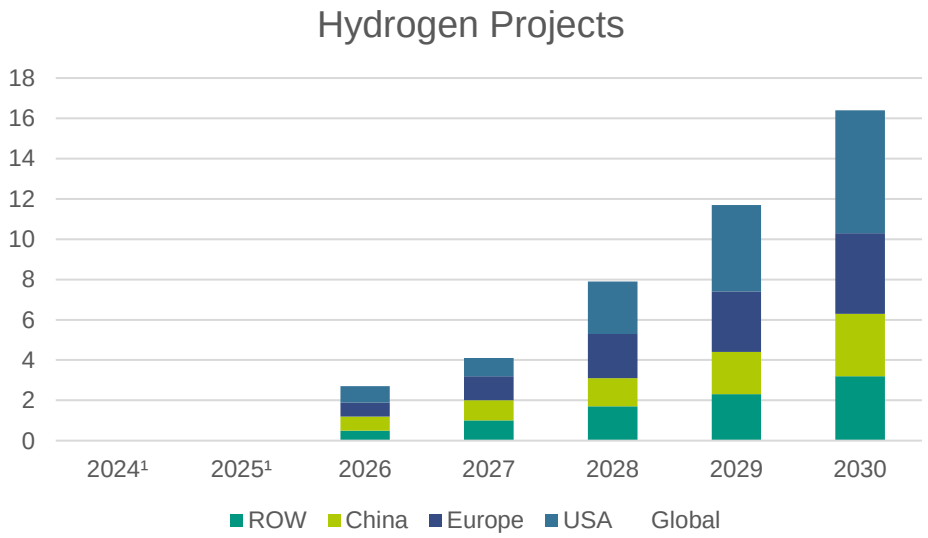
Creating a ramp-up proposition of renewable fuels for resilience

- **Ramp-Up-Limiting Factors:**
  - Hydrogen
  - Carbon dioxide
  - Scaling of production
- **Central vs. decentral production**
  - Scaling production by large scale units
  - Scaling production by numbering up

Creating a ramp-up proposition of renewable fuels for resilience

Ramp-Up-Limiting Factors:

Hydrogen



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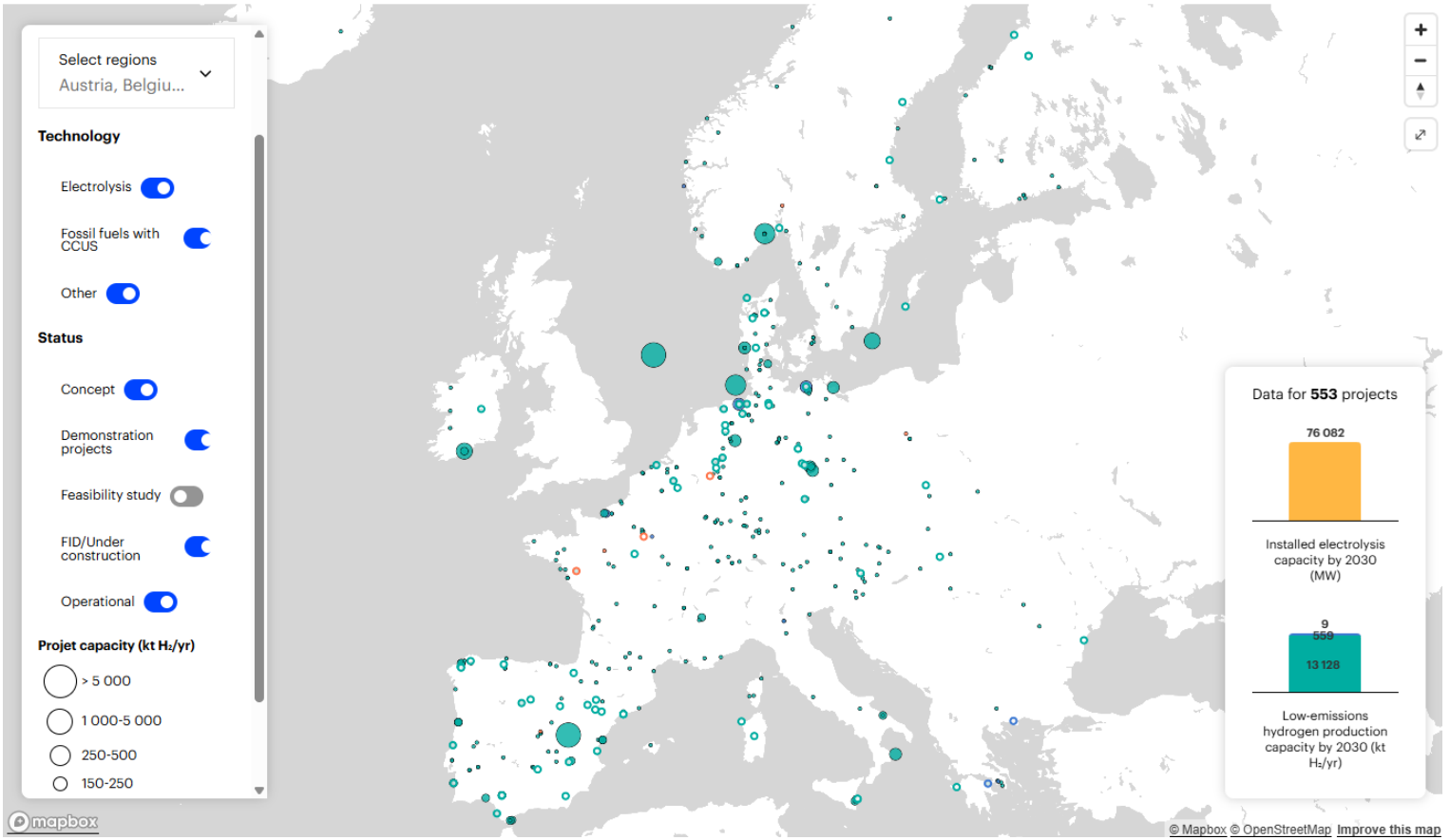

Source IEA

All Projects planned, just a few in construction or in production

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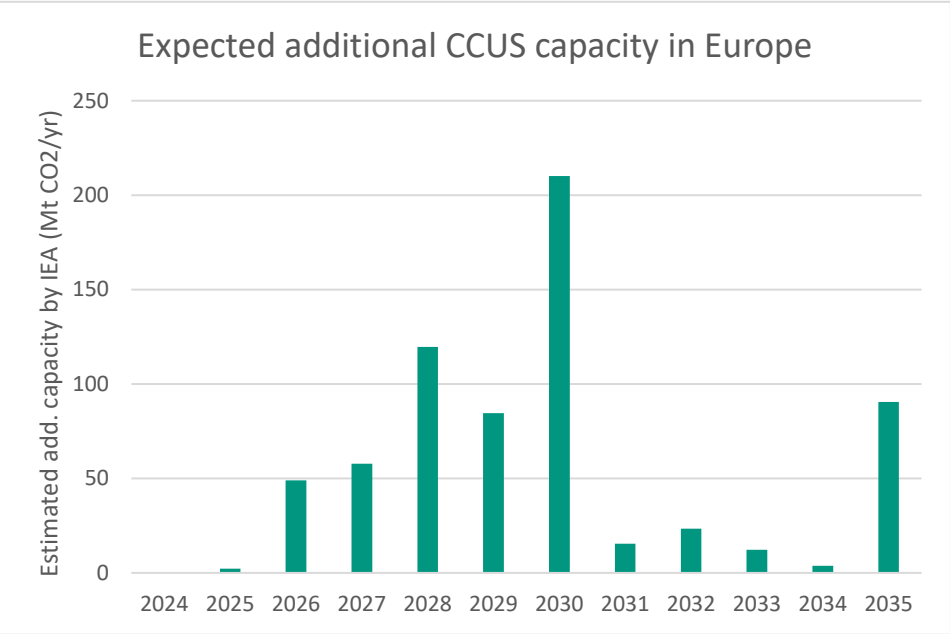
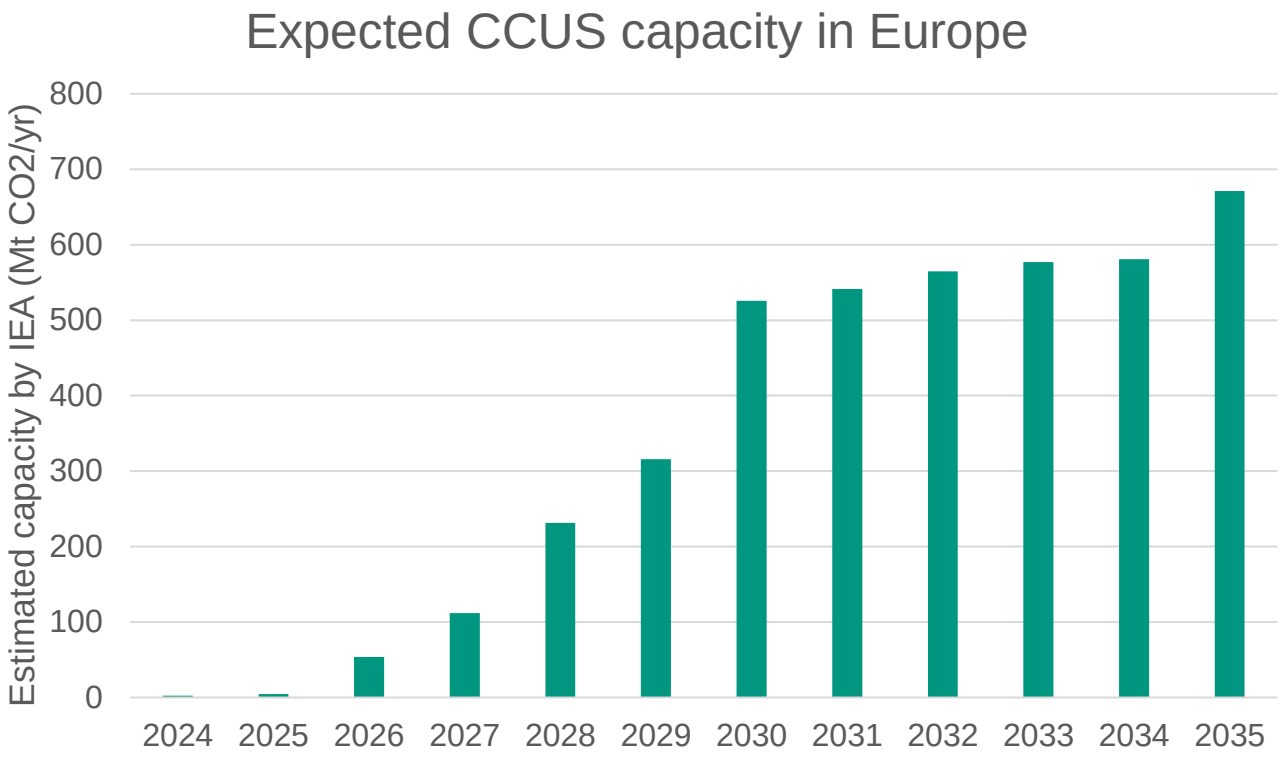
Creating a ramp-up proposition of renewable fuels for resilience

Ramp-Up-Limiting Factors:

- Carbondioxide: IEA CCUS Projects





All Projects planned, just a few in construction or in operation resulting in ~ approx 122 Mt Fuel /yr

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Creating a ramp-up proposition of renewable fuels for resilience

Scalability of synthesis plants enables ramp-up of fuel production

- Technology maturity requires scaling
- Scaling is only possible in steps
- Times determined by planning, approval, and construction

x ml/ experiment | **1-100 l/a** | **1- 1.000 t/a** | **10.000 - 50.000 t/a** | **> 500.00 t/a**

Scaling steps of 3-5 years per & scaling step requires long-term security

Creating a ramp-up proposition of renewable fuels for resilience

- **Ramp-Up-Limiting Factors:**
  - Scaling of production by numbering up

  - Pro‘s
    - Smaller investment volume → other offtake volumes acceptable
    - Smaller infrastructure necessary → adaptable design
    - Higher feedstock variability
  - Con‘s
    - Infrastructure cost per volume → chemical park required
    - Higher logistics effort per volume → existing infrastructure required
    - Fuel supply and demand should be coordinated locally

→ **Central and decentral production need suitable offtake agreements each**

Part 2 – Co-creating a ramp-up proposition of renewable fuels for resilience

- Defining the core elements of a resilient production system
- Acceleration & flexibility of renewable fuel scale up

With contributions by:

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Part 3 – How do we organise a new kind of supply system based on renewable fuels?

- **What are follow-up questions we need to address?**
  - A new kind of supply system
  - Where is the biggest need in Europe?
  - How to organise transport of fuels?
  - How much do other services need (emergency services, hospitals?)
- **Which stakeholders/perspectives are still missing in this coalition?**
  - Representatives from military & emergency services?
  - Who in your network can you think of to ask to join the next session?
- **What are next steps to realise this?**
  - Develop core proposition of enhanced supply system
  - Biorefineries & hydrogen
  - Apply for funding (NATO/EU innovation funds) – e.g. competitiveness fund
- **How do we develop our knowledge base?**
  - Ways to document knowledge & exchange
  - European-based (no US cloud service), secure but accessible e.g. Quodari

Closing

Are you interested in joining a coalition to develop supply systems based on renewable fuels?

Then we look forward to hearing from you!

info@hernieuwbarebrandstoffen.nl

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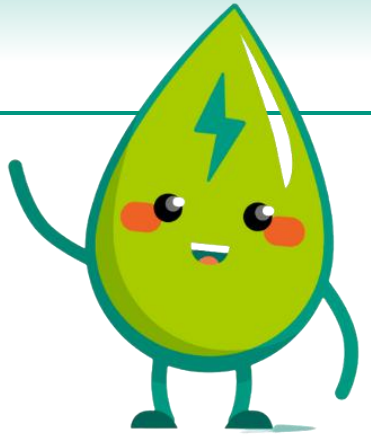
Thank you for your attention.



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FUNDING PROGRAMME RENEWABLE FUELS
With funding from the Federal Ministry of Transport
Coordinated by NOW-GMBH.DE
Project management agency VDI|VDE|IT FNR