European Commission

# Mobilizing industrial capacity for advanced biofuels and policy updates

**Dr Maria Georgiadou**

Senior Expert
Renewable energy R&I policy

European Commission

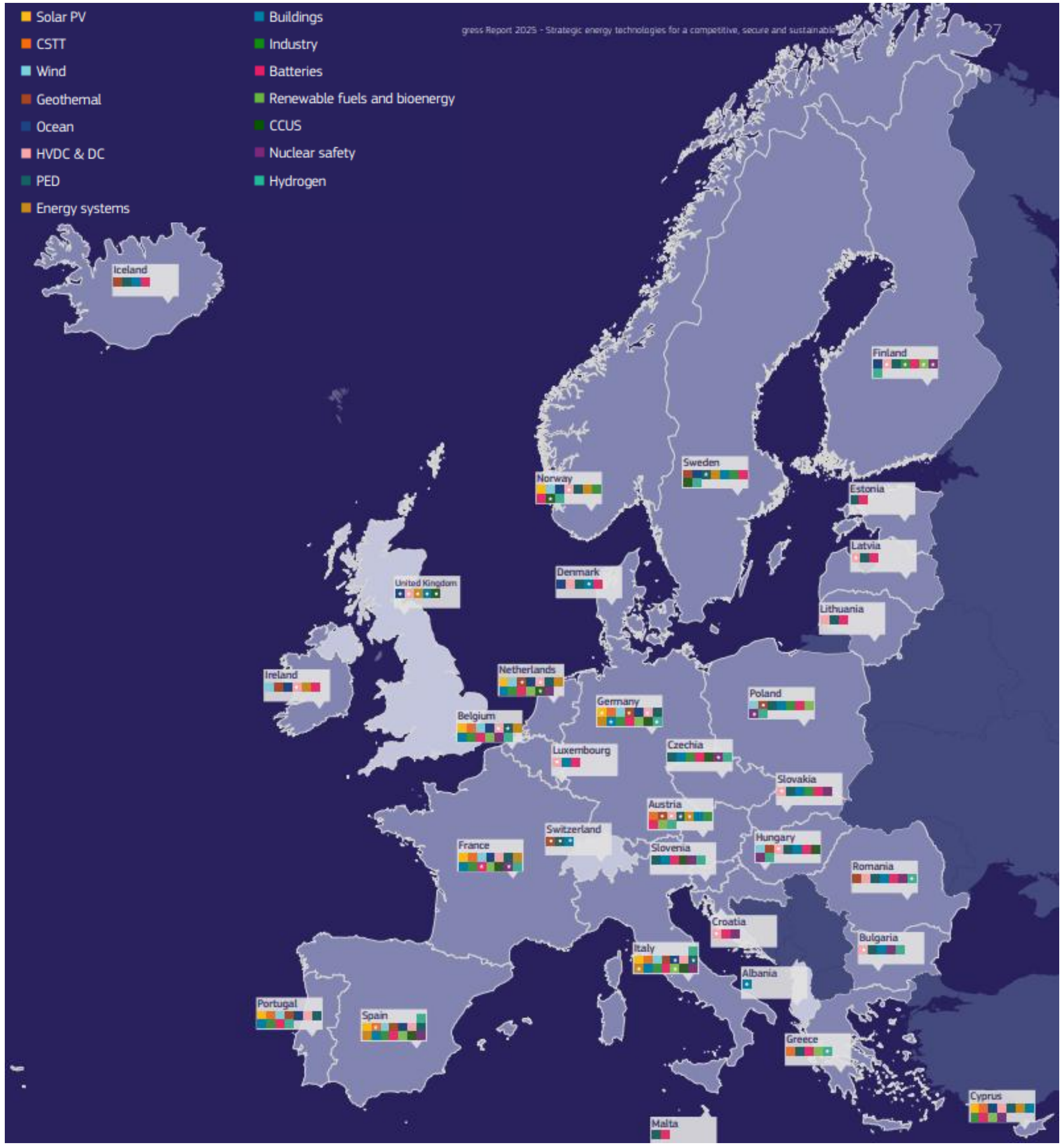
DG Research and Innovation

# AccelerateEU - Energy Union COM(2026) 370 final

- Affordable and Secure Energy through Accelerated Action
- Immediate action from the Commission to step up EU-level coordination includes
    - *[May 2026] The Commission will …work on measures,… as well as to **increase domestic EU production of sustainable biofuels***
- Immediate action from the Commission to support Member States includes
    - *[2026 onwards] ..the Commission will continue supporting initiatives to advance the production of …sustainable **biogas and biomethane** …. taking careful consideration to the **scaling up** of existing plants, reducing permitting bottlenecks and improving the **transport of sustainable feedstock** across regions*
    - *[Q2 2026] …the Commission …will support industrial decarbonisation and accelerate the development of **hydrogen-based** Sustainable Aviation electro-Fuels (eSAF) and Sustainable Maritime electro-Fuels (eSMF).*

# SET PLAN IWG Renewable Fuels and Bioenergy

- Established in 2007 and one of main instruments of Energy Union since its creation - 5th pillar on research, innovation and competitiveness
- Governed by the SET Plan Steering Group and is Part of NZIA as of 2024
- Brings together governments, industry and academia to align public and private R&I priorities and funding in Europe
- The **Renewable Fuels and Bioenergy** IWG develops a Common Implementation and Investment Plan (Thematic Vision, SRIA, and Implementation Commitments) linked to National Ministries and European Commission
- Covers renewable gaseous and liquid fuels for transport and industry, including advanced biofuels, biomethane, synthetic e-fuels, RFNBOs, biohydrogen, direct solar fuels
- 16 SET Plan Countries (**BE, DE, ES, FI, FR, IT, LT, MT, NL, NO, PI, PT, SE,SI, SK,TR)** participate and spur domestic support

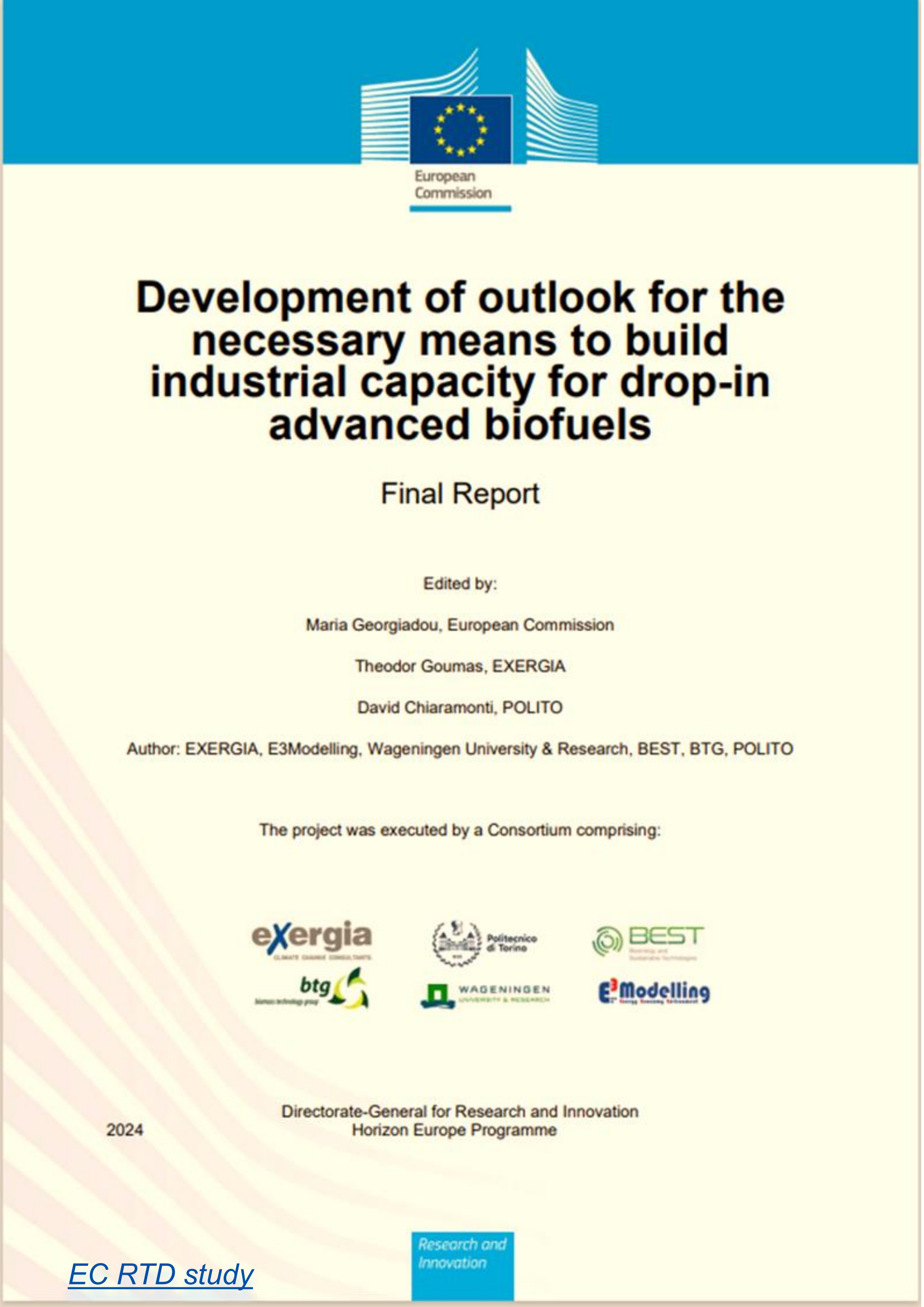



*JRC SET Plan Progress Report 2025*

*NOT LEGALLY BINDING*

# EU perspective for Advanced Biofuels and RFNBOs

- Important for decarbonization of overall EU economy, particularly transport
- Integral part for implementing EU Policy for clean transition & industrial decarbonisation
- Strategic Energy Technology (SET) Plan priority action area
- EU holds technological advantage in production and innovation development, but production capacity remains limited and needs to be scaled up at a reduced cost
- Two recent RTD studies reveal potential and mobilization of industrial capacity building
- Horizon Europe support technologies with > 400 million € in 2021 - 2025 under Cluster 5 and two SET Plan flagship calls of 70 million € in 2026-2027 bridge technology to scaleup
- Upcoming CIIP of SET Plan IWG 8 create synergies across EU for interregional IVCs
- Need clustering and coordination of critical players for implementing the potential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# Development of outlook for the necessary means to build industrial capacity for drop-in advanced biofuels

Final Report

Edited by:

Maria Georgiadou, European Commission

Theodor Goumas, EXERGIA

David Chiaramonti, POLITO

Author: EXERGIA, E3Modelling, Wageningen University & Research, BEST, BTG, POLITO

The project was executed by a Consortium comprising:

2024

Directorate-General for Research and Innovation
Horizon Europe Programme

Research and Innovation

*EC RTD study*

## Objective

Identification of the factors for industrial growth of advanced and sustainable biofuels production in the EU under the **pertinent EU policy and respective regulatory framework**

## Key findings

**Demand for biofuels in transport** in the EU could increase by a factor of up to **2.5 towards 2030**, compared to 2021, to meet climate targets.

Industry declares ready to invest; **capacity expansion** in EU for advanced biofuels and biomethane could reach **23.6 Mtoe per year in 2030**.

Substantial exploitation of agricultural biomass **sufficient to cover demand** even in low mobilization – in 2030, **310 - 836** million dry tons available for energy markets (~**20% - 55%** of **technical** potential). In 2050, dedicated LC and oil crops from **unused degraded lands** and as **cover** and **intercrop** needed in combination with normal food production.

Under certain conditions, **demand for advanced biofuels may be even higher** making the biofuel industry strategically important for EU, to ensure a timely and cost-effective delivery of emissions savings reduction.

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# Mobilization of Industrial Capacity Building for Advanced Biofuels

Final Report

edited by
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Author: EXERGIA, POLITO, BEST

The project was executed by a Consortium comprising:

eXergia Politecnico di Torino BEST

EC RTD Study

Directorate-General for Research and Innovation
Horizon Europe Programme
2026

## Objective

Identifying and proposing ways to realize **essential industrial value chains** contributing to EU targets, considering technical, financial, business and feedstock-related aspects via collecting data **directly from industries and funding providers**

## Key findings

A **significant increase** in biofuel production capacities based on **RED/Annex IX feedstocks** required **now to 2030-2040** to meet EU targets, also compensating for possible delays in e-mobility and e-fuels.

**No single value chain** can deliver more than 50% of the required sustainable fuels - need a portfolio of **complementary solutions** with a **diverse mix of technologies** to utilize the full range of eligible feedstocks and produce the complete spectrum of necessary fuels.

The **scale-up** of value chains towards these targets requires further **financial and administrative support** to enable **both** feedstock mobilization and industrial capacity build-up.

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# Outcome


- Advanced biofuels can be sustainably produced **domestically**, without dependencies for technologies and feedstock
- Business models of industrial value chains illustrate **the gap** between the biofuels LCoP and the market price of fossil fuel counterparts
- By **2030**, annual financial support to build industrial plants and mobilize necessary feedstock from **€4.5 to €8.75 billion** for 60% of the foreseen demand; higher level of support needed for deployment towards **2040**
- **Existing** EU funding schemes and instruments at EU level
- **1/3 of MS** have effective support measures in national strategies, EU and state R&I funding suitable for development, European technology providers have know-how and personnel to build industry

# Biomethane Industrial Value Chain

### Feedstock
Sequential crops
- Agricultural and agroprocessing residues
- Manure
- Sewage sludge
- Biowaste / MSW

### Main output(s)
- Biomethane

### Sector(s) of use
- Road (mainly HDV)
- Aviation

### Maturity level
Proven commercial

TRL 9/9

## LEVELIZED COST OF PRODUCTION*

| MSW (Waste-to-Biomethane) | M+C+R (Manure + Seq. Crops + Residues) |
|---|---|
| **98** (44) €/MWh | **130** €/MWh |
| TYPICAL | TYPICAL |

RANGE: 44 – 147 €/MWh

Comparison with other IVCs

44 €/MWh — 98 €/MWh — 130 €/MWh — 450 €/MWh

## KEY INSIGHTS

### Feedstock
- MSW has lower/negative feedstock price, but additional pre-treatments are generally required leading to increased plant CAPEX and OPEX.

### Technology
- Anaerobic Digestion is a commercial technology for biogas plants.
- Many biogas upgrading techs are available and can allow for CO2 recovery

### Market
- Expected to increase, with different mandates at MS level.
- Low NG prices may be a barrier for bio-CH4 entering in the market.

## ANNUAL SUPPORT TO DEVELOP THE IVC

REDUCTION OF LCoP TO ACHIEVE PARITY TO FOSSIL FUEL COMPARATOR (M+C+R) **17 %**

**7.85 Mtoe in 2030** (production from RED eligible crops)

Expected contribution to meet the RED III target

| | 2030 |
|---|---|
| PER-MWh SUPPORT | *€/MWh fuel* |
| Farmers and aggregators | 4.8 – 7.9 |
| Industrial unit | 21.4 |
| TOTAL SUPPORT | *mln EUR / yr* |
| Upstream mobilisation | 442 – 724 |
| Industrial develop. | 1,954 |
| **Total IVC** | **2,396 – 2,678** |

*: Averaged value over plant lifetime, NOT considering inflation and taxes
The values in parentheses are based on thakeholders' consultation results

# HVO – HEFA Industrial Value Chain

### Feedstock
Lipidic feedstocks:
- Oil crops (intermediate or from degraded land)
- Residual and/or waste lipids

### Main output(s)
- HVO
- HEFA-SAF
- Bio-naphtha
- Bio-LPG

### Sector(s) of use
- Road
- Aviation

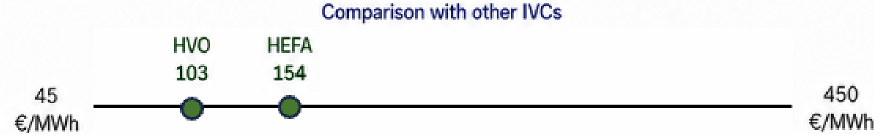
### Maturity level
Proven commercial

TRL 9/9

## LEVELIZED COST OF PRODUCTION*

| HVO | HEFA |
|---|---|
| 103 €/MWh TYPICAL | 154 €/MWh TYPICAL |

RANGE: 72 – 135 €/MWh (HVO) I 105 – 201 €/MWh (HEFA)




## KEY INSIGHTS

### Feedstock
- Waste lipids: limited availability, dependency from imports.
- V.O. from intermediate crops or degraded land to play a role in the near future

### Technology
- Flexibility is crucial for operational stability and economic viability.
- Ren. $H_2$ and soil C accumulation to further reduce GHG impact.

### Market
- Growing demand and strong support from policies and mandates.
- Competition on feedstock use between markets

## ANNUAL SUPPORT TO DEVELOP THE IVC

REDUCTION OF LCoP TO ACHIEVE PARITY TO FOSSIL FUEL COMPARATOR (road - aviation) **5 - 38 %**

**4.21 Mtoe in 2030** (overall output)

Expected contribution to meet the RED III target

| | 2030 |
|---|---|
| PER-MWh SUPPORT | €/MWh fuel |
| Farmers and aggregators | 3.2 – 7.3 |
| Industrial unit (HVO - HEFA focused) | 7 – 75 |
| TOTAL SUPPORT | mln EUR / yr |
| Upstream mobilisation | 157 – 357 |
| Industrial develop. | 343 – 3,672 |
| **Total IVC** | **499 – 4,029** |

*: Averaged value over plant lifetime, NOT considering inflation and taxes

# Gasification + Methanol Industrial Value Chain

### Feedstock
- Ligno-cellulosic biomass, including agricultural and forestry residues.

### Main output(s)
- Bio Methanol

### Sector(s) of use
- Maritime

### Maturity level
- Key units (gasification, methanol synthesis) are proven
- Full system integration is approaching maturity

TRL 8–9/9

## LEVELIZED COST OF PRODUCTION*

TYPICAL

**116**

€/MWh

RANGE: 107 – 138 €/MWh

Comparison with other IVCs

44 €/MWh — 450 €/MWh

## KEY INSIGHTS

### Feedstock
- Wide range of feedstocks accepted, including low-value residues.
- Accurate feedstock pre-treatment is required to ensure quality.

### Technology
- Torrefaction of input biomass and additional ren. $H_2$ use could improve syngas quality and yield as well as process efficiency.

### Market
Expected to increase in the maritime sector

## ANNUAL SUPPORT TO DEVELOP THE IVC

REDUCTION OF LCoP TO ACHIEVE PARITY TO FOSSIL FUEL COMPARATOR **30 %**

**1.37 Mtoe in 2030**

Expected contribution to meet the RED III target

| | 2030 |
|---|---|
| **PER-MWh SUPPORT** | *€/MWh fuel* |
| Farmers and aggregators | 4.0 – 6.5 |
| Industrial unit | 36.4 |
| **TOTAL SUPPORT** | *mln EUR / yr* |
| Upstream mobilisation | 63 – 103 |
| Industrial develop. | 580 |
| **Total IVC** | **643 – 683** |

*: Averaged value over plant lifetime, NOT considering inflation and taxes

# Ligno-Cell. EtOH | L-C EtOH-to-Jet | Gasification + F-T Industrial Value Chains

## Feedstock
- Ligno-cellulosic biomass, including agricultural and forestry residues.
- **Gasification**: all the above + Sewage Sludge and Biowastes

## Main output(s)
- **EtOH**: Bio Ethanol
- **AtJ, F-T**: SAF + gasoline + diesel

## Sector(s) of use
- **EtOH**: Road
- **AtJ, F-T**: Aviation, Road

## Maturity level

**Ligno-cell. EtOH**

TRL 8/9

**EtOH-to-Jet**

TRL 8

**Gasification +F-T**

TRL 7/8

## LEVELIZED COST OF PRODUCTION*

| Ligno-cell. EtOH | L-C EtOH-to-Jet | Gasification + F-T |
|---|---|---|
| **208** €/MWh | **324** (378) €/MWh | **161** (450) €/MWh |
| TYPICAL | TYPICAL | TYPICAL |
| RANGE: 180 – 240 €/MWh | RANGE: 276 – 378 €/MWh | RANGE: 124 – 450 €/MWh |

Comparison with other IVCs

44 €/MWh — Gasification + F-T — Ligno-cell. EtOH — L-C EtOH-to-Jet — 450 €/MWh

## KEY CHALLENGES

### Ligno-cell. EtOH + L-C EtOH-to-Jet
Technically demanding and cost-intensive

**Feedstock:** need approval of EU crops competitive with bagasse

**Technology**: Pre-treatment, enzyme efficiency, pentose sugars conversion

### Gasification + F-T
Lower TRL, interdependent advancements

**Feedstock**: Ensure access to low-cost, sustainable residues

**Technology**: Upscaling gasification, integration of F-T process with biomass-derived syngas

## ANNUAL SUPPORT TO DEVELOP THE IVC

**REDUCTION OF LCoP TO ACHIEVE PARITY TO FOSSIL FUEL COMPARATOR**
**(Aviation fossil without penalties)**

**70 %** ATJ

**38 %** FT-SPK

**2.29 Mtoe** ATJ

**1.49 Mtoe** FT-SPK

in **2040**

**Expected contribution considering a RED III (2030) and Fit-for-55 (2050) trajectory**

| | ATJ | FT-SPK |
|---|---|---|
| **PER-MWh SUPPORT** | *€/MWh fuel* | |
| Farmers and aggregators | 15.4 | 11.9 – 19.5 |
| Industrial unit | 281 | 74 |
| **TOTAL SUPPORT** | *mln EUR / yr* | |
| Upstream mobilisation | 410 | 207 |
| Industrial develop. | 7,494 | 1,282 |
| **Total IVC** | **7,894** | **1,489** |

eXergia CLIMATE CHANGE CONSULTANTS · Politecnico di Torino · BEST Bioenergy and Sustainable Technologies

***: Averaged value over plant lifetime, NOT considering inflation and taxes**
**The values in parentheses are based on stakeholders' consultation results**

*NOT LEGALLY BINDING*

# Horizon Europe Work Programme

## Climate, Energy and Mobility, Sustainable, secure and competitive energy supply

**WP 2025**

**Large-scale production of liquid advanced biofuels / RFNBOs**

**WP 2026-2027**

**De-risking renewable fuel technologies and value chains**

**Establishing renewable fuel value chains across Europe**

*NOT LEGALLY BINDING*

## **HORIZON-CL5-2026-11-D3-04:** De-risking renewable fuel technologies through transnational pre-commercial procurement of renewable fuel industrial value chains

- Create **market readiness** of **essential** renewable fuel technologies that can cost-effectively contribute to **domestic commercial production** beyond 2030, bringing their **industrial value chains** at **TRL 8, a**nd support **SET Plan** Renewable Fuels and Bioenergy Action

- Introduce **competitive** development of R&D, validation and possibly, first deployment of **industrial** value chains **in phases** from several providers in **any** EU MS/ACs by pre-commercial procurement, built on existing knowledge

- Increase **investment capacity** of R&D providers combining **additional** Union support and **foster deployment**

- Procurers contracting entities primarily **concerned** in transport decarbonization to boost real take off for solutions in this area of public interest, e.g., EU **airport** and **port** authorities, **aircraft operators** and **shipping companies,** other state, regional or local **authorities**

- **Pre-Commercial Procurement** (PCP), **40 M**, **1** project, opens **4 Aug 2026**, closes **1 Dec 2026**

# **HORIZON-CL5-2027-02-D3-08:** Co-funding Strategic Energy Technology (SET) Plan renewable fuel value chains at EU, national, regional, local levels

- Connect **regional** renewable fuel **value chain activities** across Europe, especially with partners from Eastern European MS and ACs, involving regions with lower innovation performances, to overcome fragmentation where different regions have different capacities (feedstock, technology, skills)

- Realize the **SET Plan Action** for renewable fuel technologies, at all TRL and market up-take, but also new identified interregional and transnational challenges across value chains and horizontal activities, with a joint comprehensive plan of activities

- Encourage participation of public interest legal entities such as **state,** and notably **regional** and **local** authorities with particular interest in regional development of renewable fuel value chains

- 70% funding rate of eligible costs, beneficiaries may provide financial support to third parties (FSTP) ) in the form of grants

- Develop and implement **a joint** comprehensive **plan of activities** through joint transnational calls on an annual basis - learn from ERA-NET Bioenergy, BESTF3 and **LEAP-SE** EU-AU P

- **COFUND**, **30** M€, **1** Project, opens **3 Dec 2026**, closes **31 Mar 2027**

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* European Commission (2025), Good practices for implementing financial support to third parties (FSTP) in EU grants

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# *Thank you!*