



Presentation of most relevant calls in Horizon Europe

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Outline of the talk



- An overview of the opportunities around
 - Carbon Capture and Use (CCU)
 - Fossil-free fuels and chemicalsin the work programme (WP) 2021-2022 of Horizon Europe (HE)

- A focus on the topics relevant to the SUNERGY ramp-up phase and on the SUNERGY label for proposals

Pillar 1 Excellent Science

European Research Council

Marie Skłodowska-Curie
Actions

Research Infrastructures

Pillar 2 Global Challenges and European Industrial Competitiveness

- Clusters
- Health
 - Culture, Creativity and Inclusive Society
 - Civil Security for Society
 - 4 Digital, Industry and Space**
 - 5 Climate, Energy and Mobility**
 - 6 Food, Bioeconomy, Natural Resources, Agriculture and Environment**

Joint Research Centre

Pillar 3 Innovative Europe

European Innovation Council

European innovation
ecosystems

European Institute of
Innovation
and Technology

Widening Participation and Strengthening the European Research Area

Widening participation and spreading excellence

Reforming and Enhancing the European R&I system

- **35 topics on CCU and fossil-free fuels and chemicals:**

- 20 Research and Innovation Actions (RIA)

- 21 Innovation Actions (IA)

- 4 Coordination and Support Actions (CSA)

Total budget:
≈ 907 M€

- **22 topics in 2021 and 13 in 2022**

- **Share of topics per pillar/cluster :**

- Pillar 2, cluster 4 "*Digital, industry and space*" : **10** topics

- Pillar 2, cluster 5 "*Climate, energy and mobility*" : **20** topics

- Pillar 2, cluster 6 "*Food, bioeconomy, natural resources, agriculture & envir.* " : **2** topics

- Pillar 3, European Innovation Council: **3** topics



- Calls covering different aspects around CCU and fossil-free fuels and chemicals:
 - Materials, catalytic processes
 - Energy storage, hydrogen, bio- and renewable fuels, solar fuels, artificial photosynthesis
 - Photosynthesis, plants, cyanobacteria & (micro)algae
 - Process industries
 - Digital transition
 - CO₂/non-CO₂ greenhouse gases removal and conversion, decarbonisation, defossilization, waste reduction and use
 - Renewable energy technologies, sustainability, LCA
 - Circular economy, bioeconomy, regional scale
 - Environmental, social & economic benefits, educational aspects
- Calls (RIAs, IAs, CSAs) covering different aspects of the value chain up to TRL 8

Main objectives:

- Transforming the EU industry for a clean, more bio-based, climate-neutral, circular and competitive economy
- Securing EU global industrial leadership and strategic autonomy in key technologies
- Shaping technologies and innovations that work for people

Pillar 2, cluster 4

Digital, industry and space

10 topics



Destination 1 – CLIMATE NEUTRAL, CIRCULAR AND DIGITISED PRODUCTION

- A new way to build, accelerating disruptive change in construction: **1** topic
- Enabling circularity of resources in the process industries, including waste, water and CO₂/CO: **2** topics
- Hubs for circularity, a stepping stone towards climate neutrality and circularity in industry: **1** topic
- Integration of Renewables and Electrification in process industry: **1** topic

Destination 2 – INCREASED AUTONOMY IN KEY STRATEGIC VALUE CHAINS FOR RESILIENT INDUSTRY

- Green and Sustainable Materials: **1** topic
- Materials for the benefit of society and the environment and materials for climate-neutral Industry: **4** topics

Relevant keywords : Materials, catalytic processes, process industries, waste reduction and use, circularity, regional scale

Main objectives:

- Accelerate the twin green and digital transitions and associated transformation of our economy, industry and society
- Achieve climate neutrality by 2050

Pillar 2, cluster 5

Climate, energy and mobility

20 topics



Destination 1 – CLIMATE SCIENCES AND RESPONSES FOR THE TRANSFORMATION TOWARDS CLIMATE NEUTRALITY

- Climate sciences and removal: **1** topic

Destination 2 – CROSS SECTORAL SOLUTIONS FOR THE CLIMATE TRANSITION

- Emerging breakthrough technologies and climate solutions: **3** topics

Destination 3 – SUSTAINABLE, SECURE AND COMPETITIVE ENERGY SUPPLY

- Global leadership in renewable energy: **12** topics
- Energy systems, grid and storage: **3** topics
- Cross-cutting issues: **1** topic

Relevant keywords : CO₂/non-CO₂ greenhouse gases removal and conversion, renewable energy technologies, bio- and renewable fuels, solar fuels, artificial photosynthesis, decarbonisation, circularity, sustainability, environmental, social & economic benefits, educational aspects

➤ **Pillar 2, cluster 6 "Food, bioeconomy, natural resources, agriculture & environment"**

Destination 3 – CIRCULAR ECONOMY AND BIOECONOMY SECTORS

- **Innovating sustainable bio-based systems and the bioeconomy: 2 topics**

Relevant keywords : circular and bioeconomy, photosynthesis, photoautotrophic organisms, plants, cyanobacteria, (micro)algae, LCA, societal dialogue

➤ **Pillar 3, European Innovation Council: 3 topics**

→ *HORIZON-EIC-2021-PATHFINDERCHALLENGES-01 Novel routes to green hydrogen production*

→ *HORIZON-EIC-2021-TRANSITIONCHALLENGES-01 Energy harvesting and storage technologies*

→ *HORIZON-EIC-2021-ACCELERATORCHALLENGES-01 Green Deal innovations for the economic recovery*

Relevant keywords : green hydrogen, solar fuels, energy storage, CCU, circular economy

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SUNERGY: the path to a large-scale R&I European initiative



Origin of the initiative

H2020 CSA projects
(03/2019 → 02/2020)

"Ramp-up" phase

- Coordination, community building, roadmapping
- Implementing the SUNERGY roadmap
- Portfolio of projects (RIAs + IAs) with CSA as 'glue' (Green Deal 2020 call, Horizon Europe)

Large-scale R&I initiative



SUNERGY

2020

2024



Strategic Research & Innovation Agenda (SRIA)

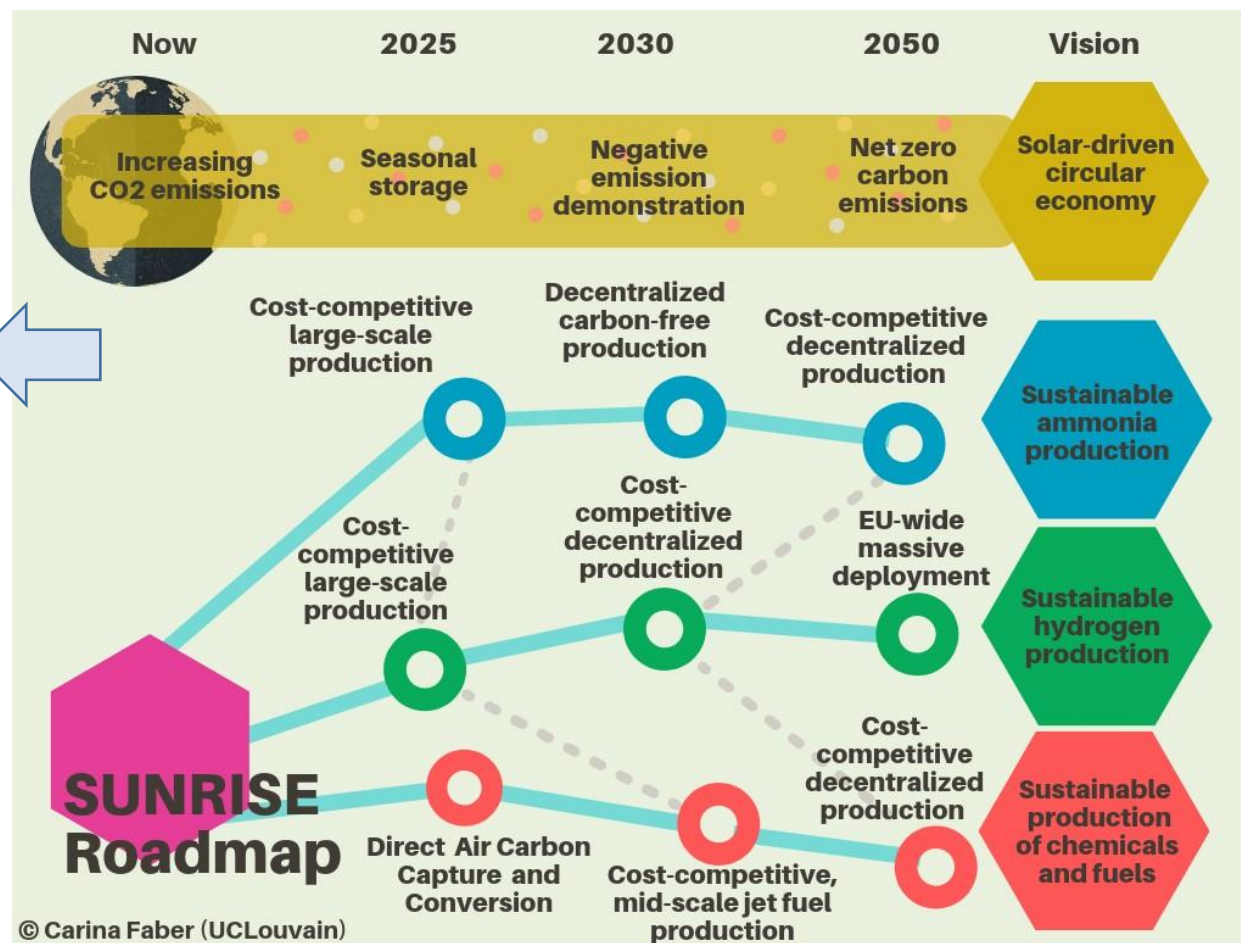
Research needs
towards sustainable production of fuels and chemicals

[ENERGY-X Research Needs report](#)



**SUNERGY
SRIA**

**Consultation
of the
community**



[Sunrise Technological Roadmap](#)

Green Deal Call H2020-LC-GD-2020

Building a low-carbon, climate resilient future

➤ **Topic LC-GD-3-1-2020:** Closing the industrial carbon cycle to combat climate change - Industrial feasibility of catalytic routes for sustainable alternatives to fossil resources

Type of instrument: Innovation Action, IA

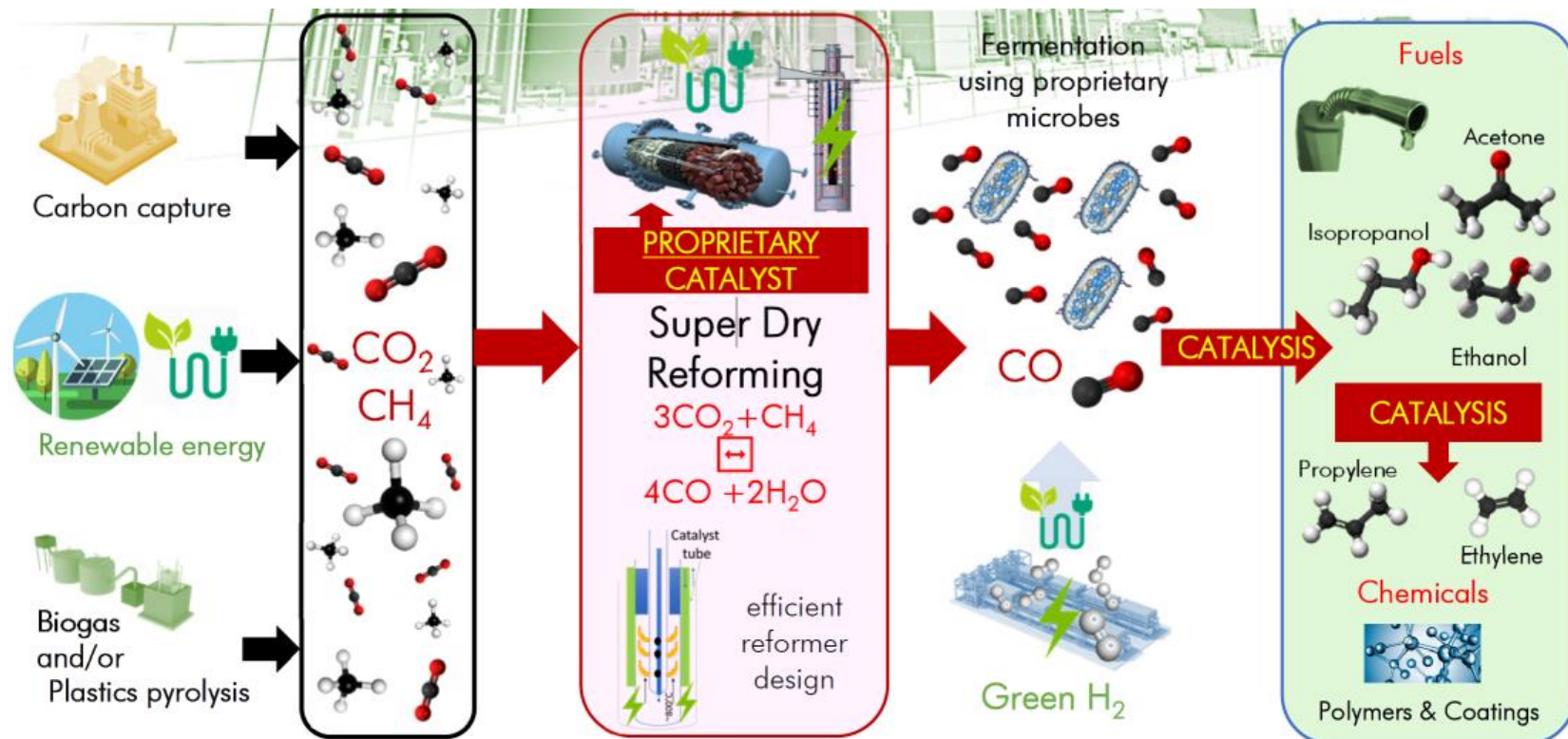
Call deadline: 26 January 2021

Total budget total/per project : 80 M€/40 M€

↳ **16** proposals submitted including

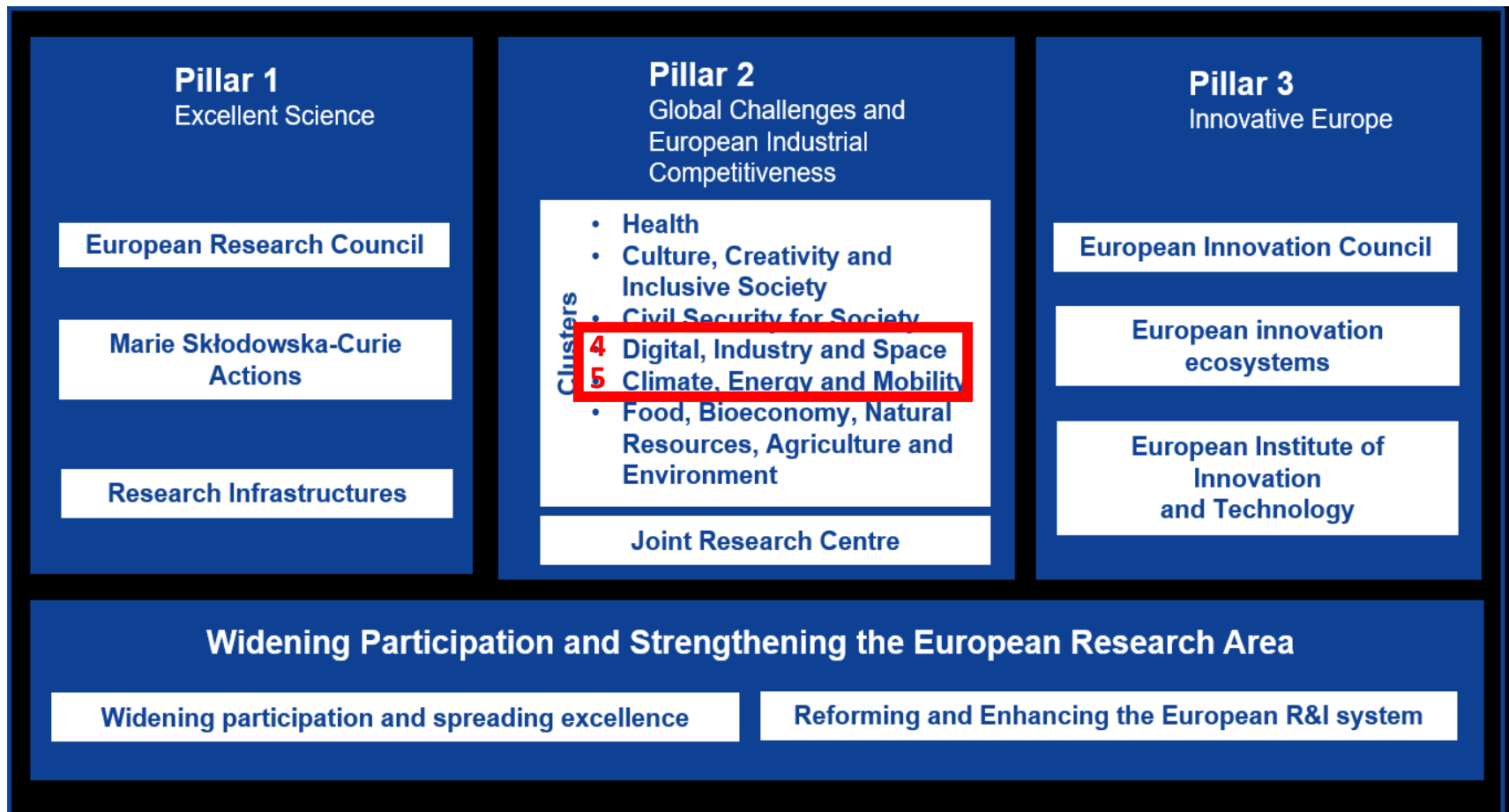


A **SysteM AppRoach**
To close the industrial
Carbon cycle



Horizon Europe work programmes 2021-2022

SUNERGY ramp-up phase



SUNERGY 5 topics for the ramp-up phase

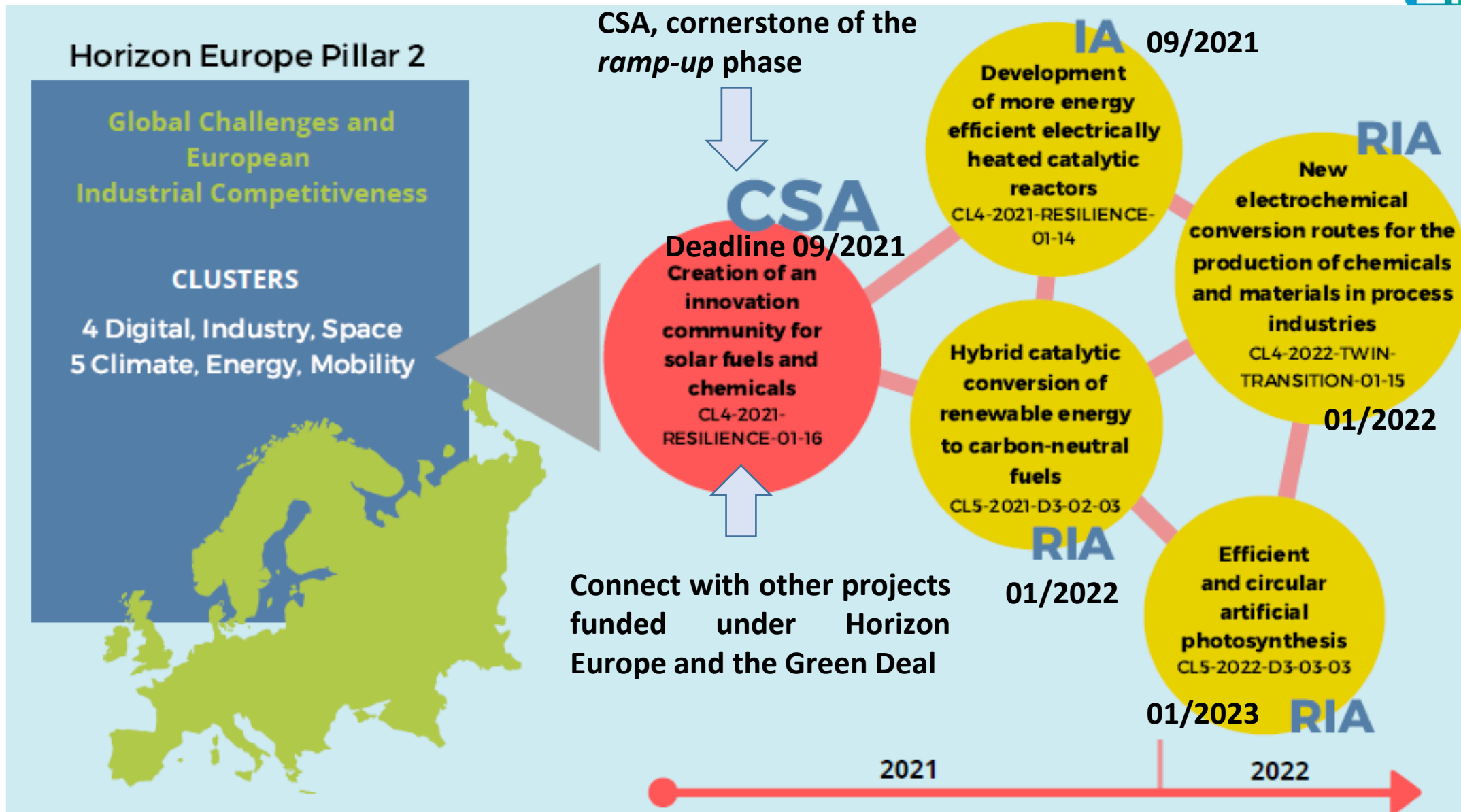


To summarize:

- **5 topics:**
 - 3 RIAs
 - 1 IA
 - 1 CSA
- **Total budget: ≈ 85 M€**

- Concerted action by 13 member and associate states to bring 5 priorities into future work programmes with support from industry
- Contribution to other topics proposed by other communities

SUNERGY ramp-up phase in practice



- Conditions to get a label/support letter from SUNERGY for your proposal:
 - Send request to contact@sunergy-initiative.eu at least two weeks in advance with the abstract and the consortium composition
 - Proposal should be in line with the goals of SUNERGY
 - ½ of consortium members have provided a [letter of support](#) to SUNERGY

The request is reviewed by SUNERGY board and support office

- No limitations of SUNERGY labels provided (except for the CSA call HORIZON-CL4-2021-RESILIENCE-01-16 with one label)

To conclude: Take home messages



- 35 calls (RIAs, IAs, CSAs) around CCU and fossil-free fuels and chemicals in the work programme 2021-2022 of Horizon Europe
- Calls covering different aspects of the value chain (from materials to systems and cross-cutting aspects) and TRLs up to 8
- Possibility to have a SUNERGY label for proposals and for selected projects to establish synergies within the SUNERGY ramp-up phase
- Follow-up event for the topics open in 2022
- Join us to participate to the activities of [CO₂ value Europe](#) and [SUNERGY](#) on *e.g.* identifying future R&I priorities

Thanks for your attention !

Supplementary slides



Destination 1 – CLIMATE NEUTRAL, CIRCULAR AND DIGITISED PRODUCTION

- **A new way to build, accelerating disruptive change in construction: 1 topic**
 - *HORIZON-CL4-2021-TWIN-TRANSITION-01-11: Automated tools for the valorisation of construction waste (RIA)*
- **Enabling circularity of resources in the process industries, including waste, water and CO₂/CO: 2 topics**
 - *HORIZON-CL4-2021-TWIN-TRANSITION-01-22: Adjustment of Steel process production to prepare for the transition towards climate neutrality (IA)*
 - *HORIZON-CL4-2022-TWIN-TRANSITION-01-11: Valorisation of CO/CO₂ streams into added-value products of market interest (IA)*
- **Hubs for circularity, a stepping stone towards climate neutrality and circularity in industry: 1 topic**
 - *HORIZON-CL4-2021-TWIN-TRANSITION-01-14: Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale (RIA)*
- **Integration of Renewables and Electrification in process industry: 1 topic**
 - *HORIZON-CL4-2022-TWIN-TRANSITION-01-15: New electrochemical conversion routes for the production of chemicals and materials in process industries (RIA)*

Destination 2 – INCREASED AUTONOMY IN KEY STRATEGIC VALUE CHAINS FOR RESILIENT INDUSTRY

- **Green and Sustainable Materials: 1 topic**
 - *HORIZON-CL4-2021-RESILIENCE-01-11: Safe- and sustainable-by-design polymeric materials (RIA)*
- **Materials for the benefit of society and the environment and materials for climate-neutral Industry: 4 topics**
 - *HORIZON-CL4-2021-RESILIENCE-01-14: Development of more energy efficient electrically heated catalytic reactors (IA)*
 - *HORIZON-CL4-2021-RESILIENCE-01-16: Creation of an innovation community for solar fuels and chemicals (CSA)*
 - *HORIZON-CL4-2021-RESILIENCE-01-17: Advanced materials for hydrogen storage (RIA)*
 - *HORIZON-CL4-2022-RESILIENCE-01-14: Membranes for gas separations - membrane distillation (IA)*

Destination 1 – CLIMATE SCIENCES AND RESPONSES FOR THE TRANSFORMATION TOWARDS CLIMATE NEUTRALITY

- **Climate sciences and removal: 1** topic

→ *HORIZON-CL5-2022-D1-01-01-two-stage: Carbon Dioxide Removal (CDR) approaches (RIA)*

Destination 2 – CROSS SECTORAL SOLUTIONS FOR THE CLIMATE TRANSITION

- **Emerging breakthrough technologies and climate solutions: 3** topics

→ *HORIZON-CL5-2021-D2-01-08: Emerging technologies for a climate neutral Europe (RIA)*

→ *HORIZON-CL5-2021-D2-01-10: Technologies for non- CO2 greenhouse gases removal (RIA)*

→ *HORIZON-CL5-2021-D2-01-11: Direct atmospheric carbon capture and conversion (RIA)*

Destination 3 – SUSTAINABLE, SECURE AND COMPETITIVE ENERGY SUPPLY

- **Global leadership in renewable energy: 12 topics**

- *HORIZON-CL5-2021-D3-01-02: Sustainability and educational aspects for renewable energy and renewable fuel technologies (CSA)*
- *HORIZON-CL5-2021-D3-02-02: Next generation of renewable energy technologies (RIA)*
- *HORIZON-CL5-2021-D3-02-03: Hybrid catalytic conversion of renewable energy to carbon-neutral fuels (RIA)*
- *HORIZON-CL5-2021-D3-02-09: Carbon-negative sustainable biofuel production (RIA)*
- *HORIZON-CL5-2021-D3-02-16: Innovative biomethane production as an energy carrier and a fuel (IA)*
- *HORIZON-CL5-2022-D3-02-03: Innovative renewable energy carrier production for heating from renewable energies (IA)*
- *HORIZON-CL5-2022-D3-02-04: Technological interfaces between solar fuel technologies and other renewables (RIA)*
- *HORIZON-CL5-2022-D3-02-05: Renewable energy carriers from variable renewable electricity surplus and carbon emissions from energy consuming sectors (IA)*
- *HORIZON-CL5-2022-D3-02-06: Direct renewable energy integration into process energy demands of the chemical industry (RIA)*
- *HORIZON-CL5-2022-D3-02-08: Demonstration of complete value chains for advanced biofuel and non-biological renewable fuel production (IA)*
- *HORIZON-CL5-2022-D3-03-03: Efficient and circular artificial photosynthesis (RIA)*
- *HORIZON-CL5-2022-D3-03-07: Development of algal and renewable fuels of non-biological origin (RIA)*

Destination 3 – SUSTAINABLE, SECURE AND COMPETITIVE ENERGY SUPPLY

- **Energy systems, grid and storage: 3 topics**
 - *HORIZON-CL5-2021-D3-01-15: Integration of CCUS in hubs and clusters, including knowledge sharing activities (CSA)*
 - *HORIZON-CL5-2021-D3-01-16: Cost reduction of CO₂ capture (new or improved technologies) (RIA)*
 - *HORIZON-CL5-2022-D3-01-15: Decarbonising industry with CCUS (IA)*
- **Cross-cutting issues: 1 topic**
 - *HORIZON-CL5-2021-D3-01-18: Support to the activities of the ETIPs and technology areas of the SET Plan (CSA)*

➤ Pillar 2, cluster 6 "Food, bioeconomy, natural resources, agriculture & environment"

Destination 3 – CIRCULAR ECONOMY AND BIOECONOMY SECTORS

▪ Innovating sustainable bio-based systems and the bioeconomy: 2 topics

→ *HORIZON-CL6-2021-CIRCBIO-01-09: Unlocking the potential of algae for a thriving European blue bioeconomy (IA)*

→ *HORIZON-CL6-2022-CIRCBIO-02-04-two-stage: Photosynthesis revisited: climate emergency, "no pollution and zero-emission" challenge and industrial application (RIA)*

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**Specific conditions for applications*