76° CONGRESSO NAZIONALE ATI
ROMA 15/17 SETTEMBRE 2021

TRANSIZIONE ECOLOGICA E DIGITALE:
Il ruolo dell'energia

SAPIENZA
UNIVERSITÀ DI ROMA
Facoltà di Ingegneria Civile
e Industriale

GREEN HYDROGEN

Programmi e obiettivi

Backing visionary entrepreneurs

European Innovation Council
Green Hydrogen: Research trends and funding opportunities

Antonio Marco Pantaleo

Programme manager energy and green tech

Roma, 15 settembre 2021

Indice

- European Innovation Council
- Programme Manager role and responsibility in EIC
- EIC Challenge call on green hydrogen generation

R&I is essential for building up a successful hydrogen economy

Macro priorities: production, distribution and storage, end-users applications

How:

- improving **technology**
- increasing **efficiency** of the whole value chain, from production to final use
- preparing for deployment through **demonstration** in industrial environment
- **decreasing cost** through developing improved production and business processes
- enhancing **sustainability**
- indicating **skills** needs and **regulatory barriers**

What is going on to support hydrogen economy

- **Horizon Europe** initiatives relevant for the Hydrogen Strategy: new European Partnership, synergies with other Horizon Europe actions, European Innovation Council, European Institute of technology, Co-fund with Member States
- Work on **Single Basic Act of the Hydrogen Partnership** and respective **Work Programmes** (AWP /MAWP) is progressing – Flagship approach
- Member States' **Agenda Process on the ERA Pilot on Green Hydrogen**, supported by the Commission
- **R&I investment agenda**
- International actions: **Mission Innovation 2.0** with mission on hydrogen to be announced
- Contribution to the **European Alliance on Hydrogen**

The way forward is to connect the dots

- Along the value chain, **improving R&I support to deployment** and listening to industry
- Developing critical **synergies** with other relevant policies and programmes: infrastructure needs, evidence-based input for prioritisation and for regulatory frame revision – Inter Partnership Assembly (innovation deal)
- Developing **synergies with national and regional actors**, using the ERA frame – hydrogen ERA Pilot and hydrogen valleys (flagship)
- Support to develop **new skills across the entire value chain** - Skills Pact for Hydrogen (flagship)
- **Open Innovation Test Beds on Hydrogen** in 2021

Also with a Commission Staff Working Document

Commissioner Gabriel asked for a **Staff Working Document on the contribution of EU R&I and science-driven actions on hydrogen to the Hydrogen Strategy.**

This SWD aims at:

- **Complementing MS initiatives** on the agenda process of R&I Pilot on Hydrogen
- Getting an overview on related EU R&I initiatives
- Identifying improvements needed

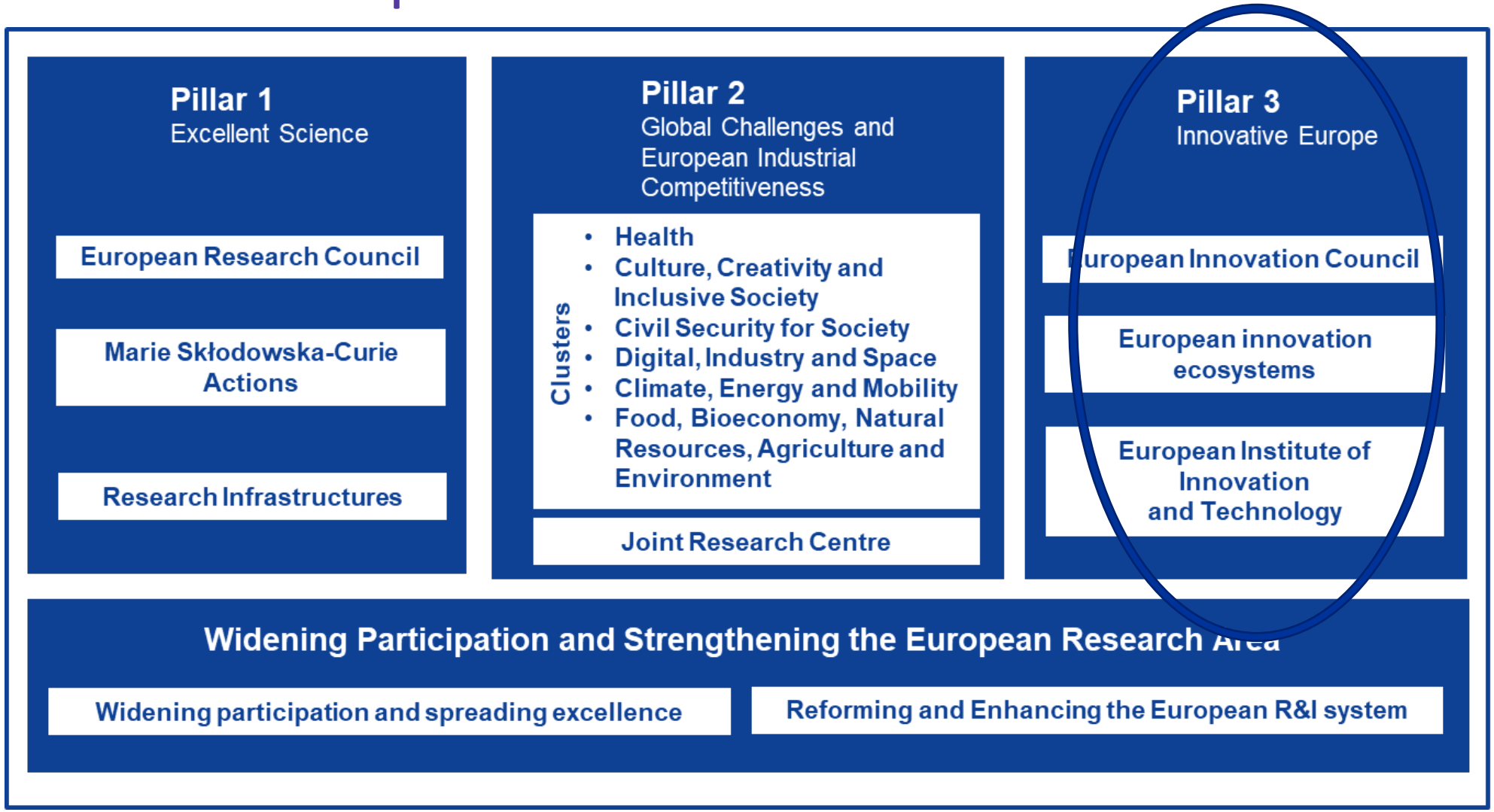
Tentative time table: to be issued for **December 2021**

SWD preparation

- Involving relevant Commission services, with Executive Agencies, the Joint Undertaking, EIC and the EIT – KIC InnoEnergy
- Discussion with the industry about its need and scope for technology infrastructures
- Accelerating on skills –Integrating hydrogen sector in the skills agenda
- Launching the mission on hydrogen at the ministerial meeting of Mission Innovation
- Providing input to the European Hydrogen Alliance and JU assessing projects potentially interesting for implementation through the Alliance pipeline of projects

Horizon Europe

European Innovation Council



Horizon Europe: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

Pillar III: Innovative EU https://op.europa.eu/en/publication-detail/-/publication/377dbf20-b91d-11eb-8aca-01aa75ed71a1/language-en/format-PDF/source-search

European Innovation Council: https://eic.ec.europa.eu/index_en

EIC main instruments and characteristics

Pathfinder
- **Early stage research** on breakthrough technologies
- Grants up to €3/4 million
- Successor of FET (Open & Proactive)

Transition
- **Technology maturation** from proof of concept to validation
- **Business & market readiness**
- Grants up to €2.5 million

Accelerator
- **Development & scale up** of deep-tech/ disruptive innovations by startups/ SMEs
- Blended finance (grants up to €2.5 million; equity investment up to €15 million)
- Successor of SME instrument

- Mission to **identify, develop and deploy high risk innovations** of all kinds
- Focus on **breakthrough, market-creating, deep-tech**
- Steered by **EIC Board** of leading innovators (entrepreneurs, investors, researchers, ecosystem)
- **Business Acceleration Services** (coaches/ mentors, corporates, investors, ecosystem)
- **Pro-active management** (roadmaps, reviews, re-orientations, etc) with EIC Programme Managers
- **Follow up funding for results from Horizon** (ERC, EIT, collaborative) & national programmes

PM Roles : mix of policy and implementation

European Innovation Council

Building strategic intelligence, definition of call topics, evaluation chair and portfolio implementation (+ support in technical due diligence for EIB on equity funding)

Outreach to R&I stakeholders, links to other EU programmes and engagement with broader ecosystem community

Clustering projects in thematic portfolios, capture synergies and enhance cross-sectorial contaminations

Scientific knowledge + networking + entrepreneurial vision to transform research into innovation

(hand on approach)

Scientific intelligence and Proactive Management

Co-create a proactive management culture with EIC staff and POs

Specific aims of PMs at EIC

- **follow-up projects more closely**, not administratively but **content-wise**
- **change, re-orient, suspend or terminate** projects
- **enforce collaboration** between thematically related projects within portfolios
- **put protection of results and exploitation first**, instead of publication
- stimulate **sharing of results** with others for cross-fertilisation and innovation
- **guarantee the rights for inventors** to do something with ‘their’ results

European Innovation Council

Tools available to achieve these targets

- Legal base (specific programme)
- Provisions in the work programme
- Model Grant Agreement and its Annexes
- Integration of the EIC schemes, thinking beyond ‘project’, and Fast Track
- EIC Market Place
- 50K ad-hoc grants for extra innovation and portfolio activities
- Business Acceleration Services

Guiding principles for selection of challenges

European Innovation Council

High innovation potential and recognized industrial interest/market needs

Relevance for EU technological autonomy and expected economic/societal implications

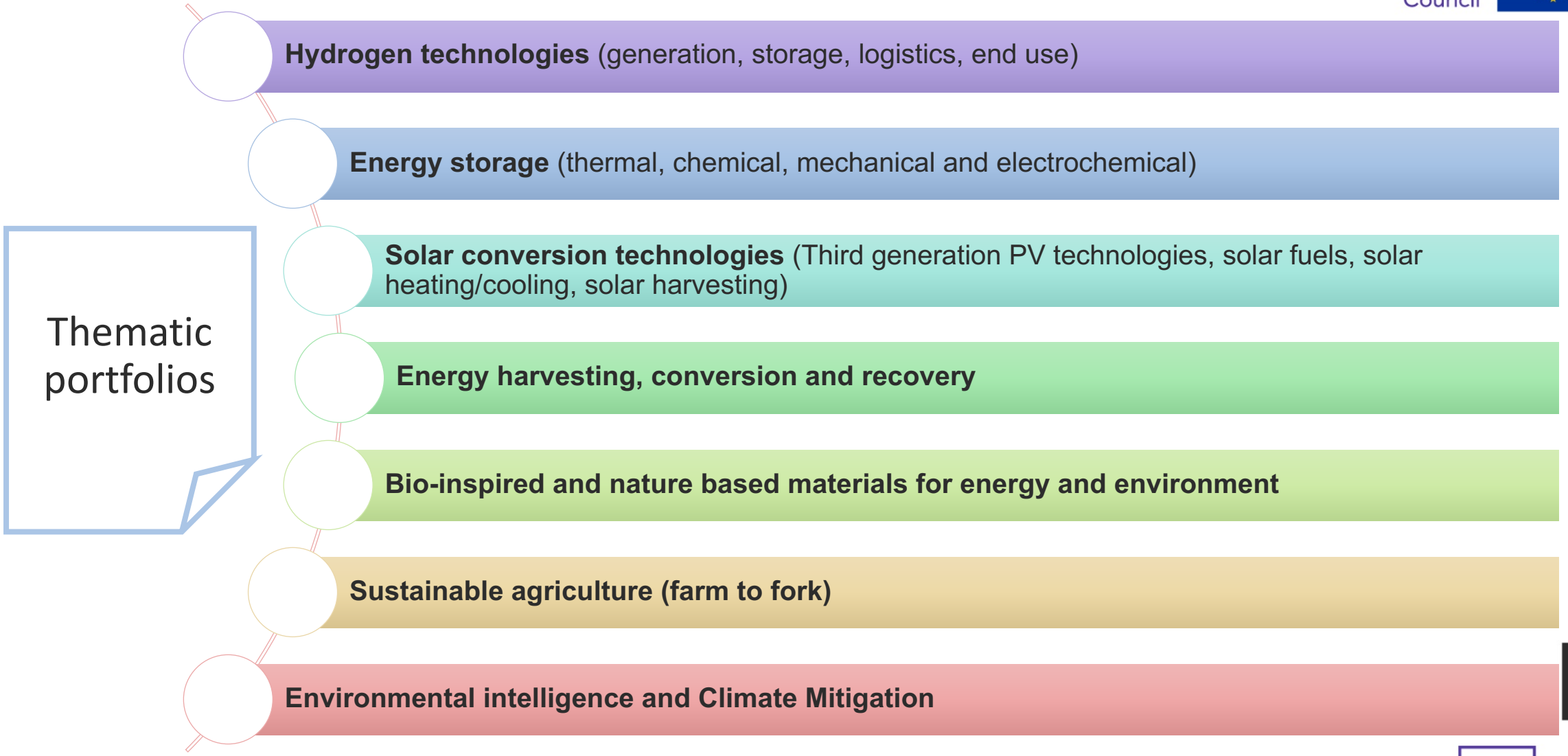
Synergies with other Horizon EU programmes

Non incremental research opportunities (Pathfinder)

EU positioning in the global innovation ecosystem and critical mass of EU stakeholders/researchers

Hand on proactive management: Portfolios approach

European Innovation Council



Hydrogen

European Innovation Council

LESGO – 952068	P - Light to Store chemical Energy in reduced Graphene Oxide for electricity generation
SPINCAT - 964972	P - Spin-polarized Catalysts for Energy-Efficient AEM Water Electrolysis
HiPowAR - 951880	P - Highly efficient Power Production by green Ammonia total Oxidation in a Membrane Reactor
112CO2 - 952219	P - Low temperature catalytic methane decomposition for COx-free hydrogen production
EPISTORE - 101017709	P - Thin Film Reversible Solid Oxide Cells for Ultracompact electrical Energy Storage
Nanostacks - 951949	P - Nanostack printing for materials research
MagnifiCOF - 899895	ILP - Shaping Covalent Organic Frameworks for Industrial Applications
Hydrosil - 101009244	A - Making hydrogen easy to deliver
H2ENGINE - 953629	A - Sustainable. Clean. Uncompromising. The Internal Combustion Engine Becomes Green
Impower2X -	A - Modular Plants for Renewable Chemical Products
ALICE - 851246	ILP - Acting Living Infrastructure: Controlled Environment
HERMES	Heat from H2-metal systems
CLEANHME	Clean energy from H2-metal systems

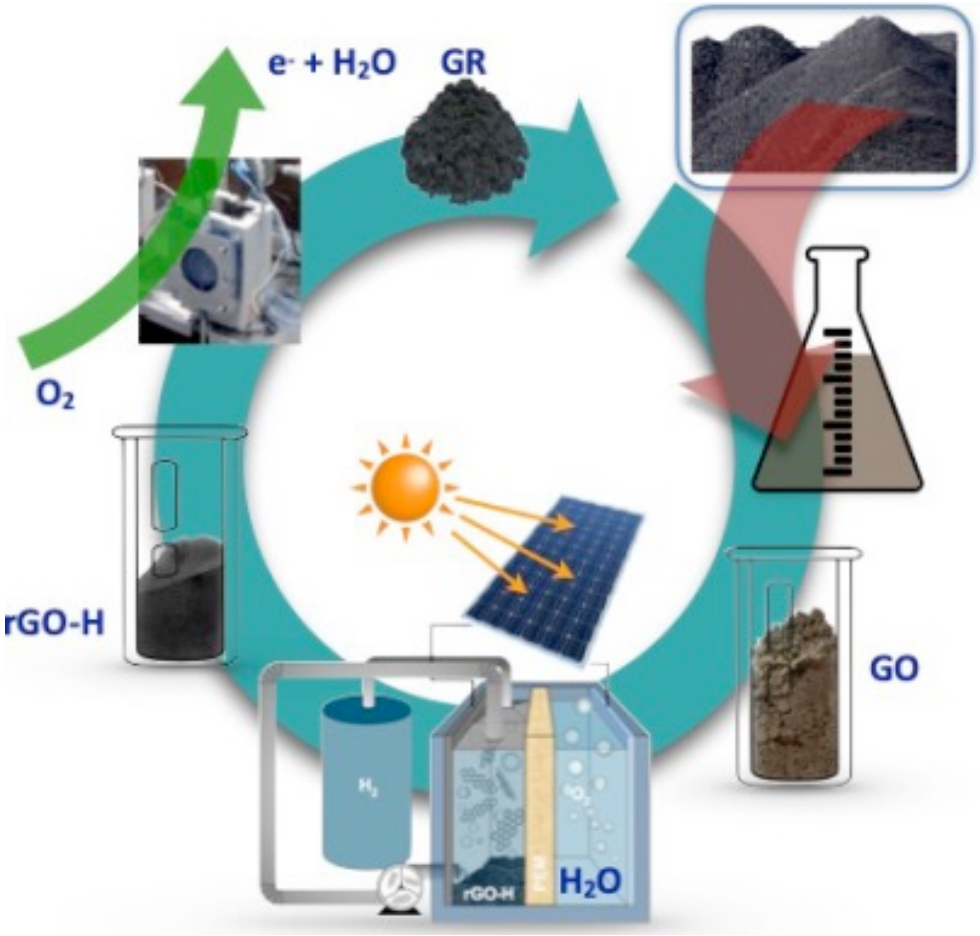
LESGO

European Innovation Council

Light to Store chemical Energy in reduced Graphene Oxide for electricity generation

Transform H2 from electrolysis into **graphene oxide powder** for easy transport.

LESGO proposes to store energy in the C-H bond of reduced graphene oxide (rGO-H). rGO-H can be stored safely, exhibits an energy density more than 100 times larger than that of H2 gas, and can be easily transported wherever the electricity generation is needed.



112CO2

European Innovation Council

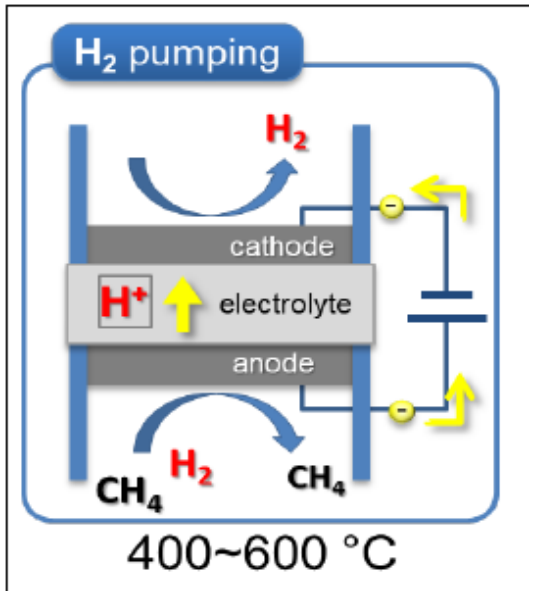
Low temperature methane decomposition for hydrogen production

active and stable CH4 decomposition catalyst, designed for cyclic regeneration;

innovative regeneration process of the CH4 decomposition catalysts;

innovative PCC cells for the electrochemical hydrogen pumping;

compact and efficient membrane reactor that favours the catalyst regeneration



Hydrosyl - making hydrogen easy to deliver

European Innovation Council

Liquid H2 carrier - liquid silicon hydride derivative, stable, non-toxic, non-explosive, non-dangerous and has a long storage life.

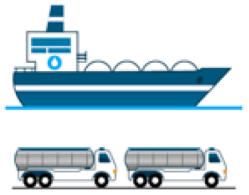
release H2 at the consumption site, on-demand and without external energy input,

- At ambient temperature **H2 is highly volatile**.
- • Hydrogen transport is poorly efficient due to its **low density**
- • Hydrogen is **flammable and highly explosive**
- • With high pressure solutions, transport and storage represent more than 60% of H2 final cost.
- • The existing hydrogen **carrier alternatives are carbon-based or toxic**.

H_2 Charged

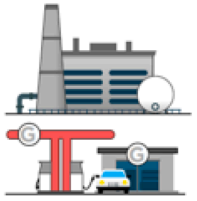
Industrial Processes to charge HydroSil with hydrogen and energy are plugged into hydrogen production sites.

H_2 Transported

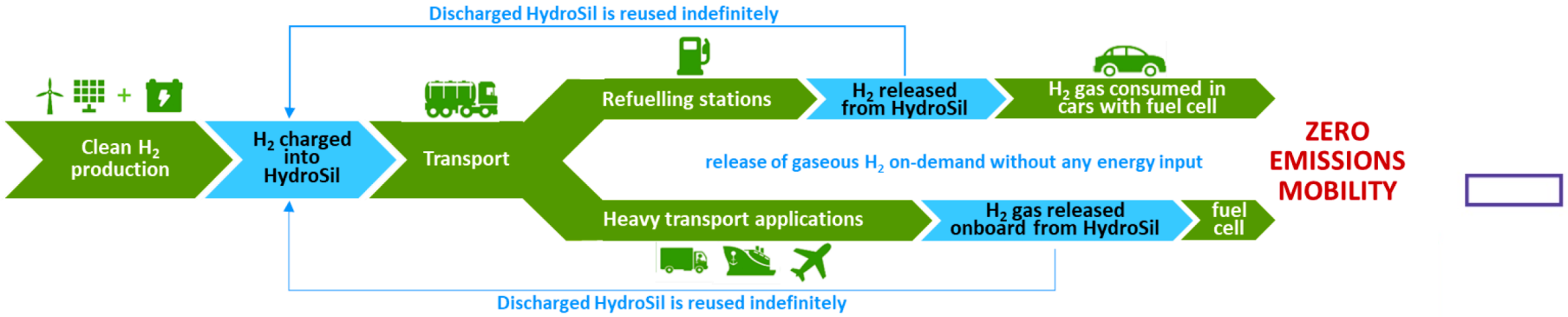


HydroSil is stable and non-toxic and uses the same logistic as conventional liquid fuels.

H_2 Released



Hydrogen is released from Hydrosil on demand, and without energy input, to be used in the mobility sector.



Work programme EIC 2021

European Innovation Council

			Open calls (Section II)		Challenge driven calls (Section III)		
	Who can apply	**What for**	**Call deadline(s)**	**Indicative Budget (EUR million)**	**Challenges**	**Call deadline(s)**	**Indicative Budget(EUR million)**
EIC Pathfinder	Consortia of at least three different independent legal entities (e.g. research organisations, universities, SMEs, industry) established in at least 3 different eligible countries. Single applicants or small consortia (two partners) may be able to apply for Pathfinder Challenges according to the call specifications.	Grants of up to EUR 3 million (open) or EUR 4 million (challenge driven) (or more if properly justified) to achieve the proof of principle and validate the scientific basis of breakthrough technology (TRL 1-4)	19 May 2021	168.00	1. Awareness inside 2. Tools to measure & stimulate activity in brain tissue 3. Emerging Technologies in Cell & Gene Therapy 4. Novel routes to green hydrogen production 5. Engineered living materials	27 October 2021	132.00
EIC Transition	Single applicants (SMEs, spin-offs, start-ups, research organisations, universities) or small consortia (two to 5 partners). Applications must build on results from eligible Pathfinder, FET or ERC Proof of Concept projects	Grants of up to EUR 2.5 million (or more if properly justified) to validate and demonstrate technology in application-relevant environment (TRL 4 to 5/6) and develop market readiness	22 September 2021	59.60	1. Medical devices 2. Energy harvesting and storage technologies	22 September 2021	40.50
EIC Accelerator	Single Start-ups and SMEs (including spin-outs), individuals (intending to launch a start-up/ SME) and in exceptional cases small mid-caps (fewer than 500 employees)	Blended finance: up to EUR 2.5 million grant component for technology development and validation (TRL 5/6 to 8); EUR 0.5 - 15 million investment component for scaling up and other activities.Grant only/grant first under certain conditions. Investment component only for small mid-caps or as follow up to grant only (i.e. for SMEs, including start-ups)	Any time (short applications) Full applications by 9 June 2021 and 6 October 2021	592.50	1. Strategic Health and Digital Technologies 2. Green Deal innovations for the economic recovery	Any time (short applications) Full applications by 9 June 2021 and 6 October 2021	495.10

HORIZON-EIC-Pathfinder Challenge green hydrogen

Novel routes to green hydrogen production

Scope

Hydrogen, actually largely produced from fossil fuels, has the potential to contribute to the development of efficient, sustainable and flexible energy systems.

This Pathfinder Challenge aims at developing **novel processes and technologies to produce green H2** (full life-cycle greenhouse gas emissions close to zero), at **different scales** (from small to large) and **capturing cross sectorial coupling and system integration opportunities**, **entirely based** on (i) **renewable sources** and (ii) **non-toxic, non-critical raw materials**.

It focuses on the potentials of **new biological, chemical, and physical routes for green H2 production** which could also facilitate the implementation of the **circular economy** principles, possibly including the co-production of decarbonised chemicals.

The specific target is to support the development of innovative technologies and platforms for green H2 production, **including both centralised and/or on-demand generation** (i.e. at the premises of the end users and for onsite consumption).

HORIZON-EIC-Pathfinder Challenge – green hydrogen

Novel routes to green hydrogen production

Expected outcome

A proof of concept or **lab-scale validated innovative Green H2 production technology (TRL3)** by biological, chemical or physical routes without the deployment of fossil fuels, potentially including the use of salt or waste water, organic wastes or the co-production of decarbonized chemicals.

Strong recommendations:

Multidisciplinary and cross sectorial approaches are particularly welcome.

Proposers are strongly encouraged to consider the **recovery and recycling** of by-products and wastes (life cycle thinking and circular approach).

The **use of toxic-free** and **non-critical raw materials** is requested and the projects should include a full life cycle analysis of the proposed solutions and their impact on Europe's decarbonisation goals.

HORIZON-EIC-Transition Challenge – energy storage

Energy harvesting and storage technologies

Expected outcome

Proposals are expected to **address prototypes or demonstrators operating in relevant environment conditions (achieving TRL6) combined with a sound business plan and business model** of at least one of the following:

- **Innovative technologies and systems combining energy harvesting and storage**, which are efficient, clean, high energy density and low-cost, integrated for stationary or mobile applications;
- **Innovative concepts and techniques for the combined harvesting and storage** of solar energy (in the form of heat or solar fuels), geothermal or waste heat, **including topics such as long-term thermal storage, cooling and cryogenic storage**, building integrated solutions, thermo-electricity, advanced heat transfer, power to heat to power, and thermo-mechanical energy storage and conversion;
- **Advanced materials and devices for electro-chemical storage (other than Li-Ion batteries)**, at utility scale, mobile or distributed/micro scale level, **also integrated to PV/wind energy systems or for other intermittent sources**. Concepts that offer the potentials for high flexibility, high energy density, efficiency, low-cost, made of toxic-free and non-critical raw materials, should be harnessed to make them usable for specific applications.

HORIZON-EIC-Accelerator Challenge

Green Deal innovations for the Economic Recovery

EIC Accelerator: a four-step evaluation process

1

- You have a disruptive / deep tech idea with a potential to scale up
- **Tell us your story** with short application **at any time**

2

- You prepare a full application with your **business plan**
- We will help you with a dedicated AI tool and free coaching

3

- **You submit your full proposal** at one of the regular cut-off dates
- Your application will be assessed by expert evaluators matched to your field

4

- **You pitch** your innovation to a Jury of experienced investors/ entrepreneurs
- If selected, you will sign the grant and start due diligence for the equity

European Commission

HORIZON-EIC-Accelerator Challenge – green deal topics

Green Deal innovations for the Economic Recovery

Scope

This EIC Accelerator challenge will fund **transformative green deep tech innovations**, which contribute to the goals enshrined in the European Green Deal strategy and the Recovery Plan for Europe. In that particular regard, at least 50% of the companies selected for the interview phase must have submitted proposals relating to one the following areas:

- **Renewable energy, including renewable Hydrogen and energy storage**: to further develop **renewable energy sources**, **green hydrogen or decarbonised fuels production and/or storage at different scales**, from centralised to on demand, as well as for **different applications ranging from stationary to transport**, including solutions that address the whole supply chain to limit the use of critical raw materials, to contribute to the goal of a carbon neutral economy

HORIZON-EIC-Accelerator Challenge – green deal

Green Deal innovations for the Economic Recovery

Scope

Deep renovation of buildings: to increase the energetic and environmental performance of residential, commercial and public buildings, also bundling energy supply and/or demand through innovative technologies and operating strategies, proposing **building embedded energy generation and storage solutions and financial schemes or business models**.

Low carbon industries: including solutions on electrification, circularity and industrial symbiosis of industrial processes, the use of carbon capture storage and utilisation technologies or the **digitisation of industrial processes**.

Battery and other energy storage systems: comprising other energy storage systems such as chemical as well as physical storage technologies (including ultracapacitors), for use on **stationary as well as transport applications**.

European Commission

HORIZON-EIC-Accelerator Challenge – green deal

Green Deal innovations for the Economic Recovery

Expected outcome

Proposals are expected to **scale up next generation low-carbon technologies** developed by high-risk, high-potential small- and medium-sized enterprises (**SMEs**) (including start-ups) from any sector provided that their proposal contributes to **Green Deal goals**.

The outcome is a **global technology leader SME** able to **transform business concepts into market-ready innovations** (new or breakthrough technologies, products, processes, services and business models) and **their rollout**.

Those SMEs will fuel the societal transition towards a **climate-neutral and circular economy** while supporting **EU's competitiveness and leadership in green technologies** and the **recovery from the COVID-19 crisis**.

European Innovation Council

Investment component

- minimum EUR 0.5 million and maximum EUR 15 million,

-usually in the form of direct equity or quasi-equity,

- maximum 25% of the voting shares of the company,

-“patient capital” principle (7-10 years perspective on average).

-Crowd-in expected (derisk investment)

Grant component

- maximum EUR 2.5 million,

-eligible costs are reimbursed up to a maximum of 70%,

-innovation activities supported should be completed within 24 months,

-If validation and demonstration in relevant environment is needed to assess commercial potential

Strumenti a disposizione dei Programme Manager

European Innovation Council

- **Selezione progetti nelle challenge calls**: chair evaluation, criteri di valutazione basati sugli obiettivi complessivi del **portafoglio** definiti nella topic guide
- Supporto nella **due diligence tecnica** per la EIB nella componente di equity per EIC accelerator
- **Supporto ai progetti in corso**: contributo ad hoc di **50 kEur** fino a 3 volte durante la durata del Progetto per facilitare innovazione, trovare nuove applicazioni ecc
- **Supporto di esperti scientifici esterni**: possibilità consulenza tecnico-scientifica su specifici argomenti di ricerca e innovazione (ec. Valutare il potenziale di innovazione di una ricerca, le possibilità di mercato, analisi brevettuali ecc..)

https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/work-as-an-expert

- Avviare specifiche **consultazioni EU** su aspetti legislativi, normativi, standard tecnici ecc che possono ostacolare lo sviluppo di una innovazione, coinvolgendo le DG interessate i principali stakeholders (**innovation deals**)

Fattori chiave per ottenere finanziamenti Horizon EU

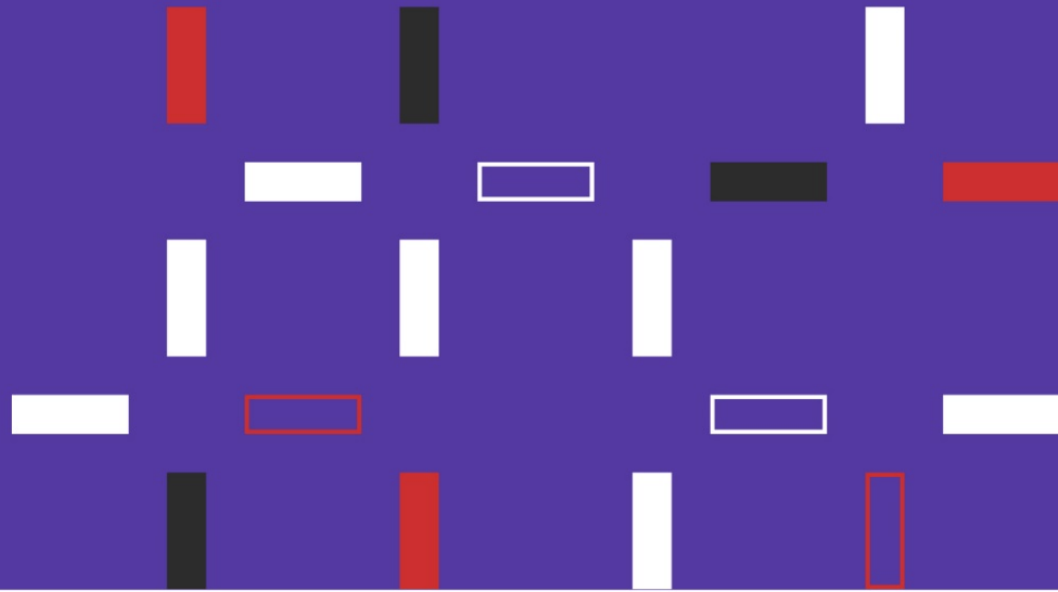
European Innovation Council

- **Conoscenza del policy background**: collegare i progetti alle strategie europee ala base di Horizon EU
- **Studiare attentamente le call**: rispondere puntualmente agli obiettivi della call conoscendone i presupposti e la genesi
- **Proposte tecnicamente eccellenti**: support da parte di grant offices in grado di supportare i ricercatori e le aziende per la presentazione di proposte complete e
- **Multidisciplinarietà, comunicazione, disseminazione, exploitation, IP**: focus su sectors contaminations e proposte 'complete' (valorizzazione risultati, disseminazione, ecc)
- **Interazione con Policy Officers**: rapporto che si costruisce nel tempo, non 'last minute'; importante fare esperienza come valutatori
- **EIC accelerator**: spesso il finanziamento avviene a seguito di diversi tentativi, gender parity, team completo (CEO, CTO, CFO), analisi del mercato e dei competirors

European Innovation Council

Thank you!

Antonio.pantaleo@ec.Europa.eu



Clean and low carbon hydrogen

European Innovation Council

Definitions

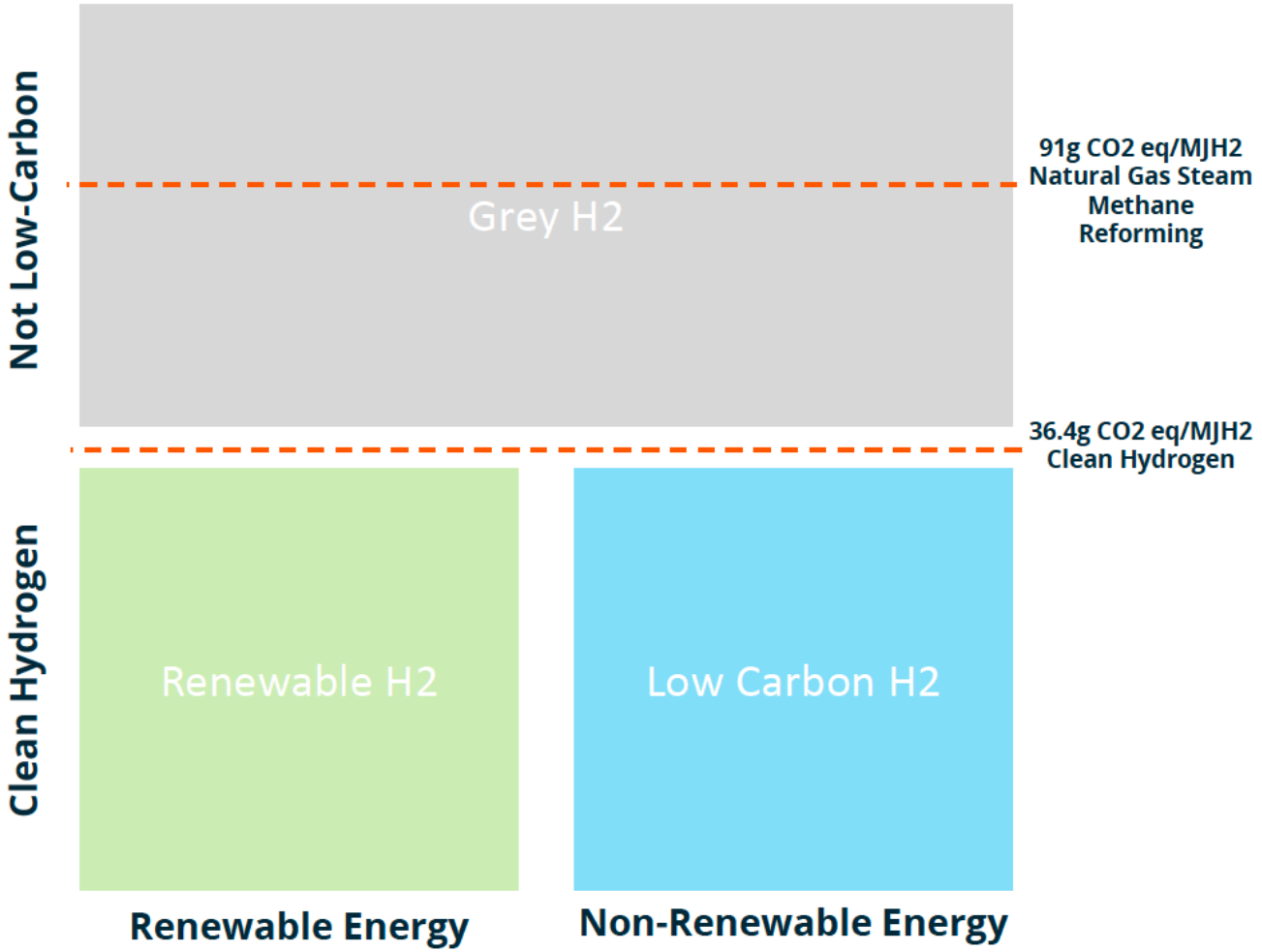
Clean hydrogen: An umbrella term to describe hydrogen with a GHG footprint of 36.4 g CO2 eq/MJH2, including solutions which emissions intensity are at least 60% below Natural gas steam methane reforming (91 g CO2 eq/MJH2) , the incumbent solutions.*

Renewable hydrogen: Hydrogen using electrolysis powered by renewable energy sources, or by non-electrolysis methods from biogenic sources such as waste or biogas.

Low-carbon hydrogen: Hydrogen using fossils fuels, but still below the threshold where carbon is captured and/or reduced. Includes technology platforms which can utilize renewable or fossil fuels with (carbon capture) as feedstock.

Net-Zero hydrogen: Hydrogen with a GHG footprint of zero.

Grey hydrogen: Hydrogen with a GHG footprint of >36.4 g CO2 eq/MJH2.

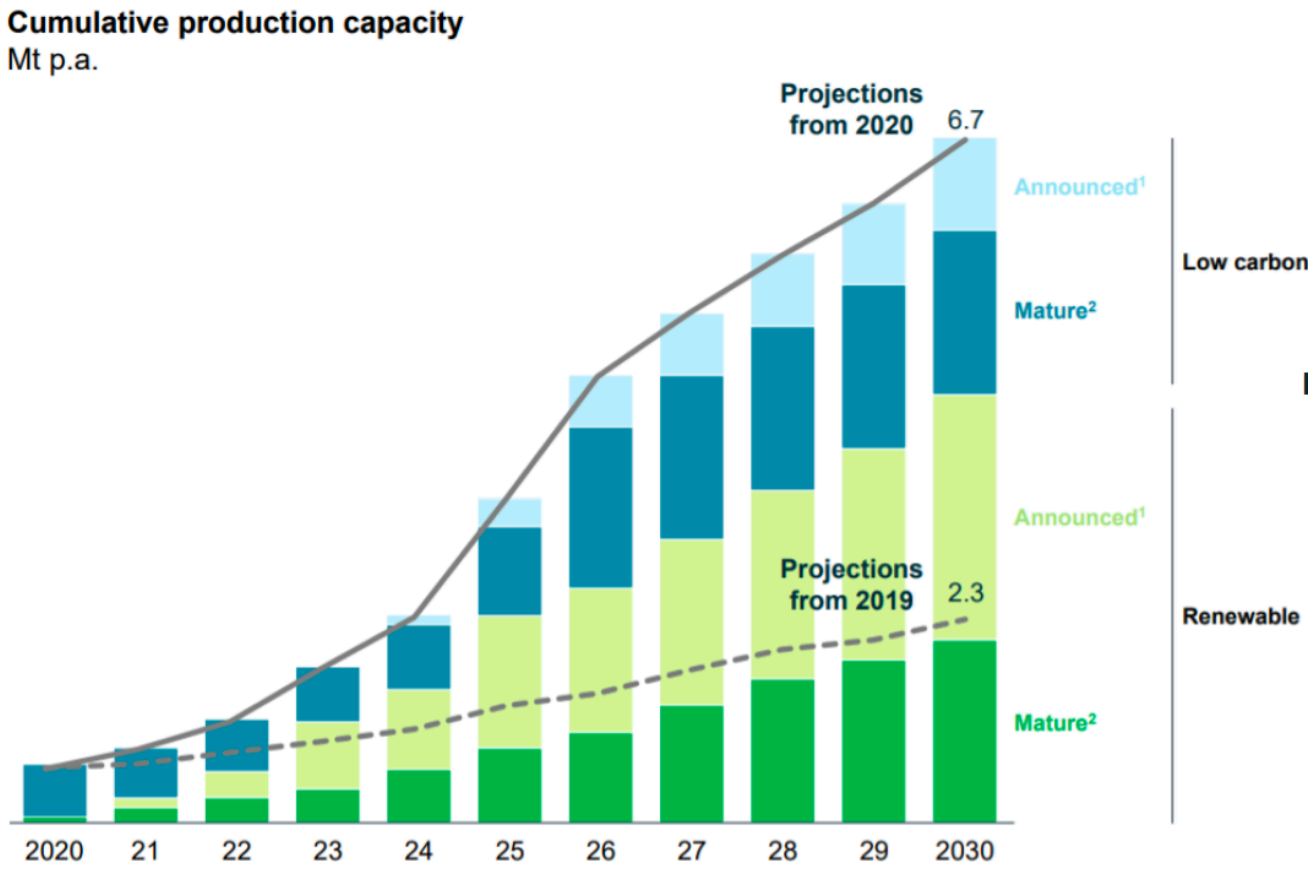


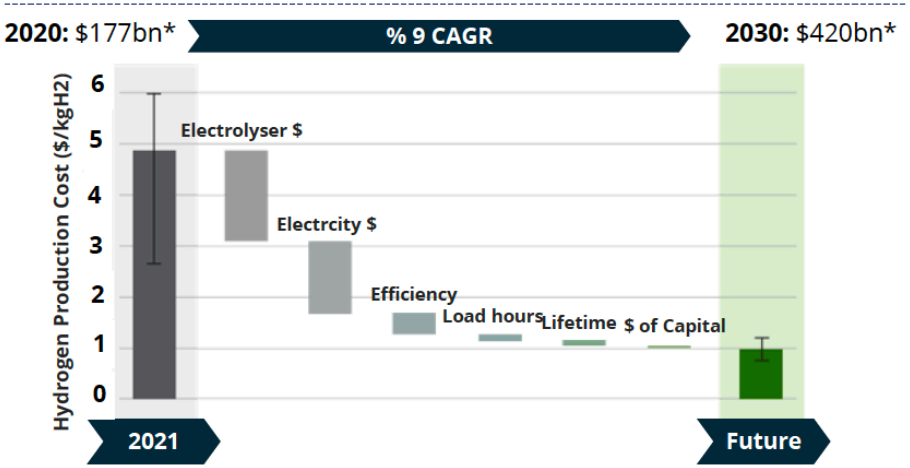
Source: Cleantech Group, CertifHy

Clean and low carbon hydrogen: both part of the mix

European Innovation Council

Announced Clean Hydrogen Capacity though 2030

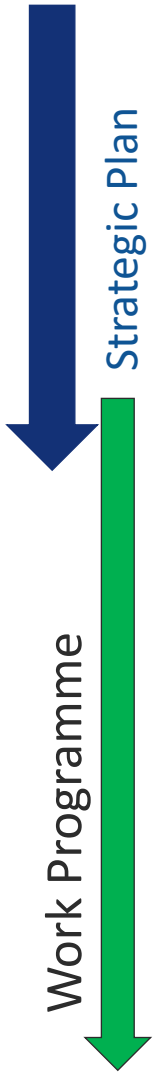




Falling costs: Cost of clean production remains a barrier, but reductions in CAPEX / OPEX moves clean hydrogen to $2.3-$1.4 by 2030 via scaling up

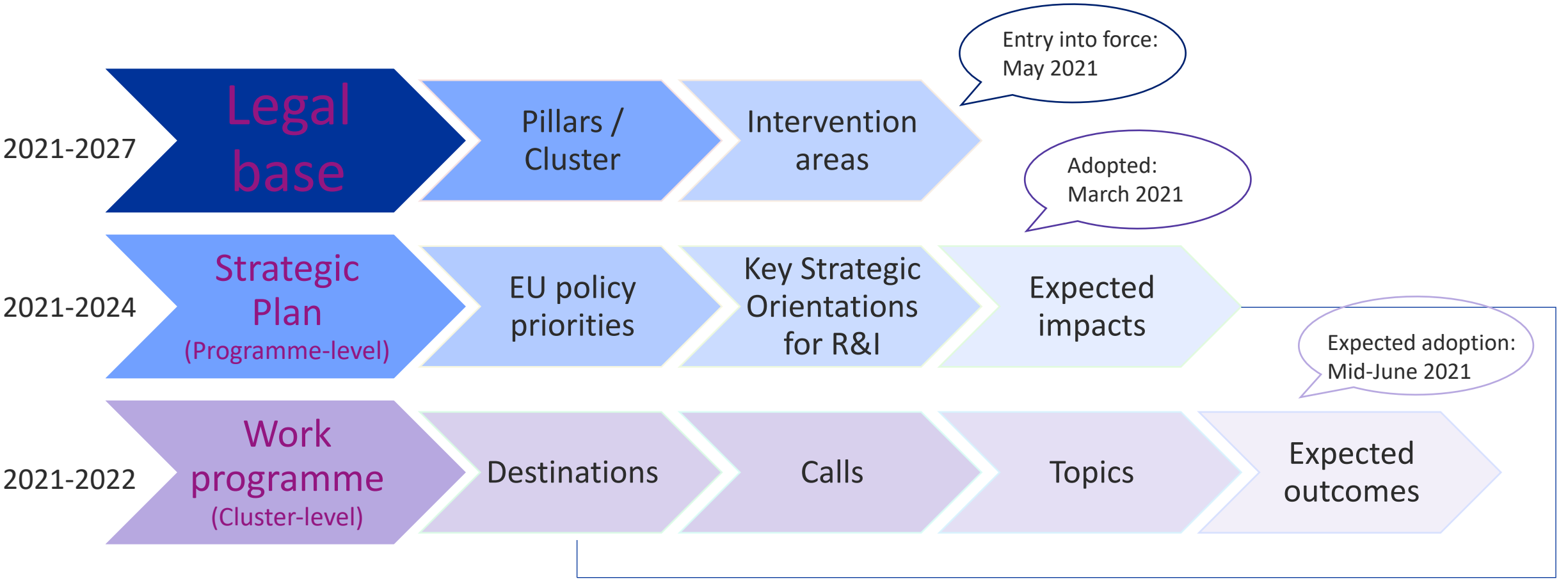
Europe and North America innovation activity: 55% of project pipeline, EU leads large-scale efforts with strong innovation supply. North America leads VC investment.

Horizon Europe – Impact logic



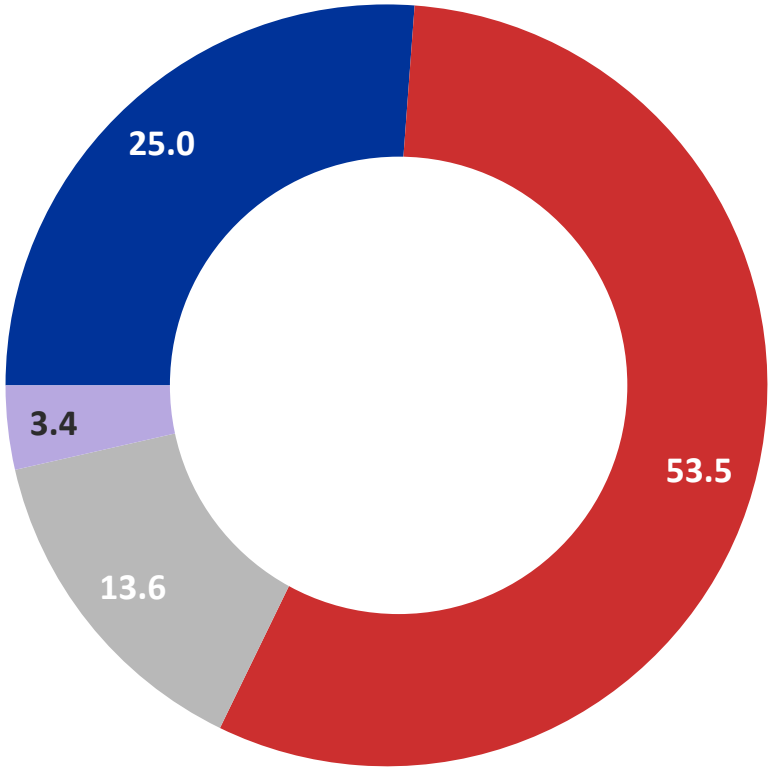
EC Policy Priority	Based on the Political Guidelines for the European Commission 2019-2024 with a focus on three key priorities: Green Deal, Europe fit for the Digital Age, and Economy that Works for People
Key Strategic Orientation	**Set of strategic objectives within the EC policy priorities where R&I investments are expected to make a difference**
Expected Impacts	Wider effects on society (including the environment), the economy and science, enabled by the outcomes of R&I outcomes (long-term)
Destination	Packages of actions around which each Work Programme part within Pillar II will be designed. Destinations are a series of coherent packages aimed at contributing to the expected impacts set out in the Strategic Plan. The Destinations will provide the policy narrative for the calls and actions included in the WP. In the WP, the text of the Destination should reflect the expected impact as set out in the Strategic Plan.
Calls for proposals	Each Destination will be implemented by means of calls for proposals. Under Horizon Europe, we need to align our definition of a 'call' with the Financial Regulation and with the common approach across all MFF programmes.

Programme intervention logic



Horizon Europe Budget: €95.5 billion (2021-2027)

(including €5.4 billion from NGEU – Next Generation Europe – programme of EU for Recovery from COVID-19 crisis)



Political agreement December 2020

€ billion in current prices

- Excellent Science
- Global challenges and European ind. comp.
- Innovative Europe
- Widening Part and ERA

Lessons Learned
from Horizon 2020 Interim Evaluation

Key Novelties
in Horizon Europe

Support breakthrough innovation	European Innovation Council
Create more impact through mission-orientation and citizens' involvement	EU Missions
Rationalise partnerships' landscape	New approach to partnerships
Reinforce openness	Open science policy
Strengthen international cooperation	Extended association possibilities
Encourage participation	Spreading Excellence

Institutionalised European Partnerships in the portfolio

PILLAR II - Global challenges & European industrial competitiveness

CLUSTER 1: Health

- Innovative Health Initiative
- Global Health Partnership
- Transformation of health systems
- Chemicals risk assessment
- ERA for Health
- Rare diseases*
- One-Health Anti Microbial Resistance*
- Personalised Medicine*
- Pandemic Preparedness* *Co-funded or co-programmed*

CLUSTER 4: Digital, Industry & Space

- Key Digital Technologies
- Smart Networks & Services
- High Performance Computing
- European Metrology (Art. 185)
- AI-Data-Robotics
- Photonics
- Made in Europe
- Clean steel – low-carbon steelmaking
- Processes4Planet
- Global competitive space systems**

CLUSTER 5: Climate, Energy & Mobility

- Clean Hydrogen
- Clean Aviation
- Single European Sky ATM Research 3
- Europe's Rail
- Connected and Automated Mobility (CCAM)
- Batteries
- Zero-emission waterborne transport
- Zero-emission road transport
- Built4People
- Clean Energy Transition
- Driving Urban Transitions

CLUSTER 6: Food, Bioeconomy, Agriculture, …

- Circular Bio-based Europe
- Rescuing Biodiversity to Safeguard Life on Earth
- Climate Neutral, Sustainable & Productive Blue Economy
- Water4All
- Animal Health & Welfare*
- Accelerating Farming Systems Transitions*
- Agriculture of Data*
- Safe & Sustainable Food System*

PILLAR III - Innovative Europe

EIT

- InnoEnergy
- Climate
- Digital
- Food
- Health
- Raw Materials
- Manufacturing
- Urban Mobility
- Cultural and Creative Industries

SUPPORT TO INNOVATION ECOSYSTEMS

- Innovative SMEs

CROSS-PILLARS II AND III

- European Open Science Cloud

Institutionalised Partnerships (Art 185/7)
Institutionaised partnerships / EIT KICs
Co-Programmed
Co-Funded

** Calls with opening dates in 2023-24*
*** Calls with opening dates not before 2022*

European Commission

Cluster 5 – Expected impacts

Transition to a climate-neutral and resilient society and economy enabled through **advanced climate science**, pathways and responses to climate change (mitigation and adaptation)

Clean and sustainable transition of the energy and transport sectors towards climate neutrality facilitated by innovative **cross-cutting solutions**

Efficient and sustainable **use of energy**, accessible for all is ensured through a clean energy system and a just transition

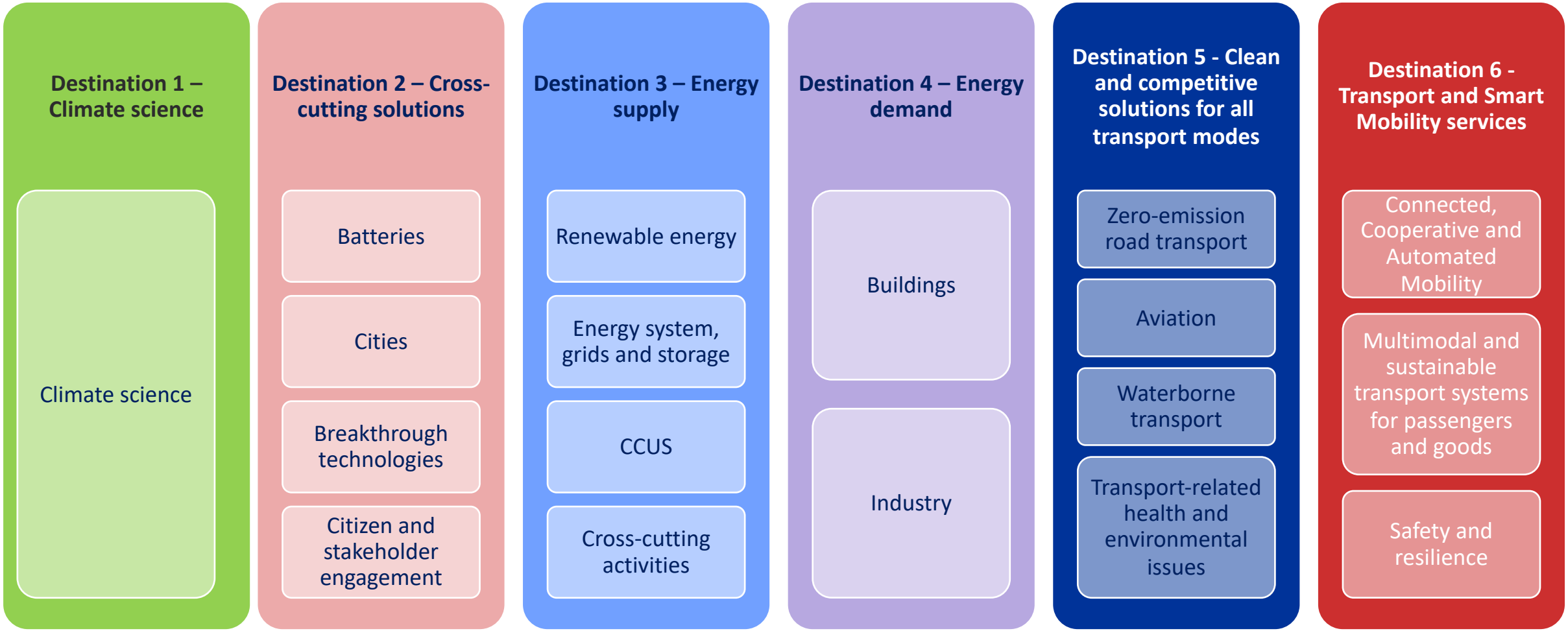
Towards **climate-neutral and environmental** friendly mobility through clean solutions across all transport modes while increasing global **competitiveness** of the EU transport sector

More efficient, clean, sustainable, secure and competitive **energy supply** through new solutions for smart grids and energy systems based on more performant renewable energy solutions

Safe, seamless, smart, inclusive, resilient, climate neutral and sustainable **mobility systems** for people and goods

European Commission

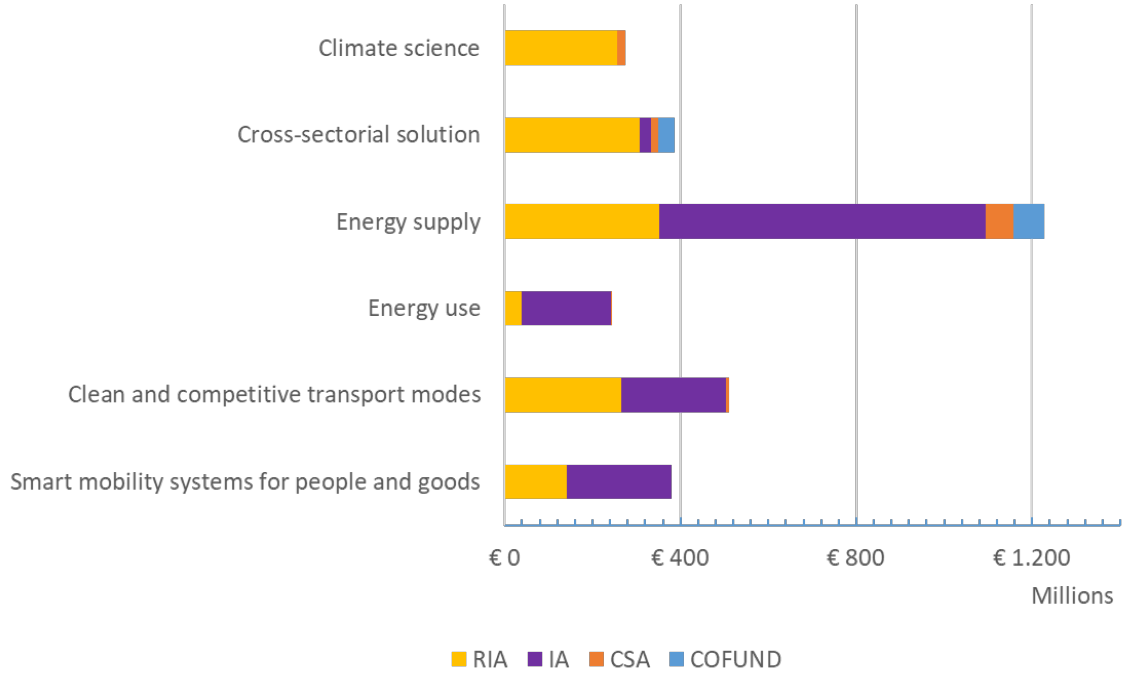
Cluster 5 Work programme - overview



Cluster 5 Work programme - overview

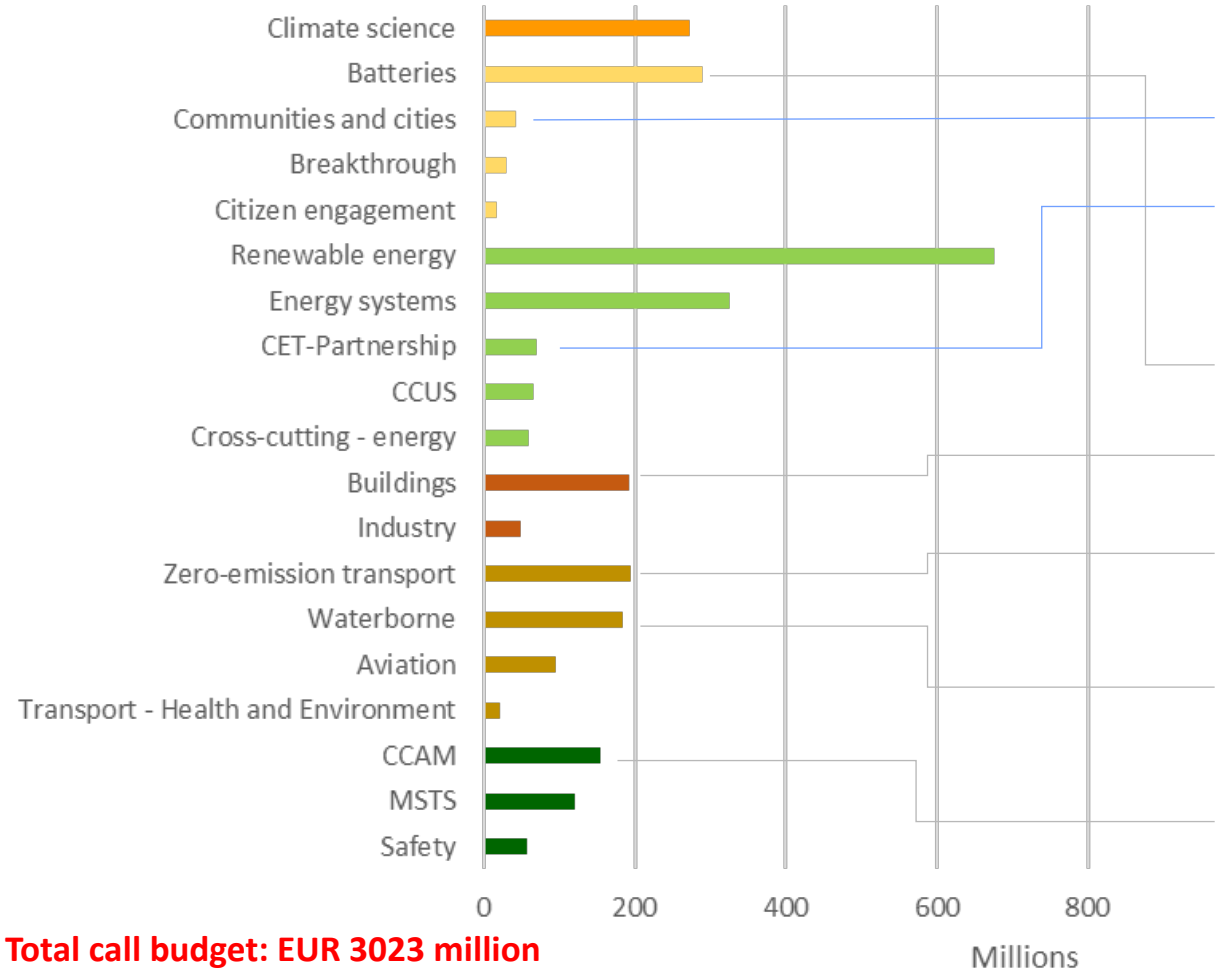
	Budget (Mio €)	Share of total	Number of topics	Share of total
Climate science	274.0	9%	17	9%
Cross-sectorial solution	387.5	13%	25	13%
Energy supply	1226.3	40%	67	36%
Energy use	244.0	8%	18	10%
Clean and competitive transport modes	511.0	17%	31	17%
Smart mobility systems for people and goods	380.0	13%	28	15%
TOTAL	3022.8		186	

EU contribution per Destination and type of action (2021-2022, in Mio EUR)



Cluster 5 Work programme - budgets

EU contribution per thematic area (2021-2022, in Mio EUR)



Total call budget: EUR 3023 million

58 out 186 topics (31% of all) implement European Partnerships (2021-2022)

Co-funded Partnerships:

- **Driving Urban Transition**: 1 topic (37 M€ for 2021-2022)
- **Clean Energy Transition**: 1 topic (70 M€ for 2021-2022)

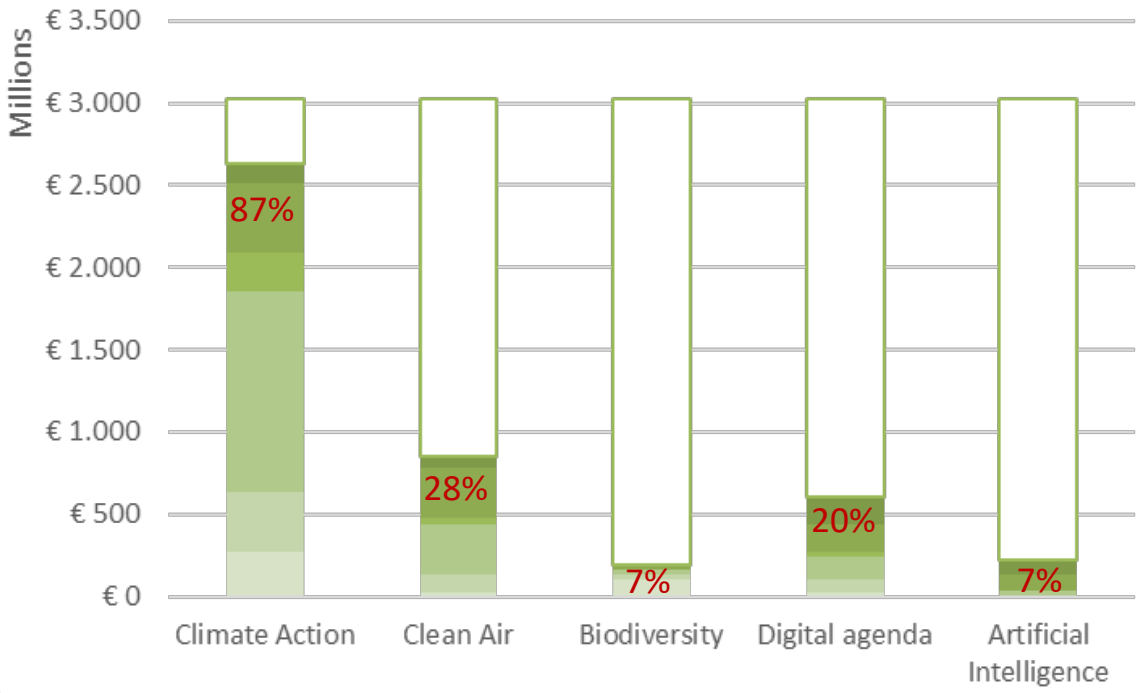
Co-programmed Partnerships:

- **Batteries**: 17 topics (EUR 293 million)
- **Built4People**: 8 topics (EUR 124 million)
- **Towards Zero-Emission Road Transport**: 8 topics (EUR 199 million)
- **Zero-Emission Waterborne Transport**: 12 topics (EUR 167.5 million)
- **Connected, Cooperative and Automated Mobility**: 11 topics (EUR 162 million)

European Commission

Cross-cutting priorities

Contribution of cluster 5 topics to cross-cutting policy priorities
(percentage of total call budget; WP 2021-2022)



Budget share dedicated to climate action in other HE parts:

- Cluster 1: 300 M€ (17%)
- Cluster 2: 30 M€ (7%)
- Cluster 3: 40 M€ (10%)
- Cluster 4: 1235 M€ (41%)
- **Cluster 5: 2630 M€ (87%)**
- Cluster 6: 1345 M€ (72%)

Budget share dedicated to digital agenda in other HE parts:

- Cluster 1: 600 M€ (34%)
- Cluster 2: 95 M€ (22%)
- Cluster 3: 220 M€ (54%)
- Cluster 4: 1840 M€ (61%)
- **Cluster 5: 605 M€ (20%)**
- Cluster 6: 375 M€ (20%)

Some examples of Portfolio activities performed PIs + PMs + POs

- Portfolio kick-off meeting (i.e. Environmental Intelligence portfolio)
- Network meetings between different portfolio projects
  - Science based discussion for identification of needs
  - Set up of new scientific collaborations based on synergies (A+B<C)
  - Stakeholders analysis (identifying leading research, business value chain, investors groups)
  - Design and implementation of science and business matchmaking

Portfolio activities PMs + POs + (PIs)

European Innovation Council

- Networking with EC stakeholders: ERC, DGs, partnerships, EIT,…
- Networking with external stakeholders: NCPs
- Innovation deals
- Set up and management Portfolio database

Important websites

Cluster 5 draft work programme 2021-2022 (version of 21 May 2021):
https://ec.europa.eu/transparency/expert-groups-register/core/api/front/document/51842/download

!!! This draft has not been adopted or endorsed by the European Commission !!!

Information event on cluster 5 calls

https://www.horizon-europe-infodays2021.eu/event/cluster-5-climate-energy-mobility

Funding & Tender Portal

https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/programmes/horizon

Follow us and keep up to date via:

HorizonEU

Commissioner **Mariya Gabriel:** @GabrielMariya

Director-General **Jean-Eric Paquet:** @JEPaquetEU

DG Research and Innovation: @EUScienceInnov @EU_H2020
https://www.facebook.com/EUScienceInnov/

Horizon Magazine: @HorizonMagEU

Horizon Europe website: http://ec.europa.eu/horizon-europe

European Innovation Council: http://ec.europa.eu/research/eic

European Research Council: https://erc.europa.eu/

European Commission

EU Policy priorities

European Green Deal

- Climate Action; Clean Energy; Sustainable Mobility; Eliminating pollution; Building and renovating; Biodiversity; Sustainable Industry

A Europe fit for the digital age

- Artificial Intelligence; European data strategy; European Industrial Strategy; Cybersecurity

An economy that works for the people

- Internal market; Jobs, Growth and investment

Promoting our European way of life

- European Security Union; European Health Union

A stronger Europe in the world

- International partnerships; Trade policy; EU Foreign policy

A new push for European Democracy

- Strategic foresight; Future of Europe

Recent Commission initiatives:

Climate Action

- EU Climate Law (EU climate neutral by 2050)
- 2030 Climate Target Plan (55% GHG reduction by 2030)
- Make sectoral legislation 'fit for 55'
- EU Climate Adaptation Strategy
- Zero Pollution Action Plan

Energy

- EU Strategy for Energy System Integration
- Hydrogen strategy
- Renovation wave for Europe
- Offshore renewable energy

Mobility

- Sustainable and Smart Mobility Strategy

Research and Innovation

- A new European Research Area

THE ROLE OF HYDROGEN IN MEETING OUR 2030 CLIMATE AND ENERGY TARGETS

The use of innovative energy carriers such as **hydrogen, particularly coming from renewable electricity, will play a key role in the European Green Deal**. Hydrogen can be used as a fuel, an energy carrier or a feedstock, and could reduce emissions in hard-to-abate sectors, **particularly in industry and transport**.

The EU Hydrogen Strategy looks to harness the **tremendous business opportunities** associated with the production of decarbonised hydrogen. Global interest will mean new opportunities for EU companies, which are being **stimulated with the proposals adopted by the Commission today**.

2030 TARGETS

40GW of renewable hydrogen electrolysers in the EU

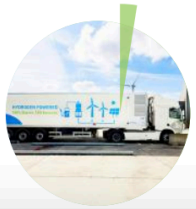
10 million tonnes of renewable hydrogen produced in the EU

REVISED RENEWABLE ENERGY DIRECTIVE

The revised Renewable Energy Directive promotes the use of renewable hydrogen:

- Extending the **EU-wide certification system** for renewable fuels to include hydrogen
- Decarbonising industry and heavy-duty and long-distance transport, with concrete targets

TRANSPORT



2.6% for renewable fuels of non-biological origin

INDUSTRY

50% renewable share in hydrogen consumption

CO_2 STANDARDS FOR CARS AND VANS

The CO_2 standards for cars and vans set technology neutral targets to reduce emissions by 2030 and by 2035. Hydrogen can be part of the solution, **in particular for heavy-duty vehicles**, if the industry chooses to invest in this technology.

ALTERNATIVE FUEL INFRASTRUCTURE REGULATION

The Alternative Fuel Infrastructure regulation will also support the deployment of alternative fuels infrastructure, including refuelling points for hydrogen.

One refuelling station will be available every 150 km along the TEN-T core network and in every urban node.

FUELEU MARITIME PROPOSAL

The FuelEU Maritime proposal covers all renewable and low-carbon fuels in maritime transport, including decarbonised hydrogen and decarbonised hydrogen-derived fuels (including methanol and ammonia).

EU EMISSIONS TRADING SYSTEM PROPOSAL

The EU ETS proposal will include the production of hydrogen with electrolysers under the EU emissions trading scheme, making renewable and low-carbon facilities eligible for free allowances.

ENERGY TAXATION DIRECTIVE

The Energy Taxation Directive sets preferential tax rates for the use of renewable and low-carbon hydrogen for end-consumers.

The policy framework for hydrogen will be completed in December. The Commission will put forward proposals for hydrogen and the decarbonisation of gas markets, to set the regulatory approach for these sectors.