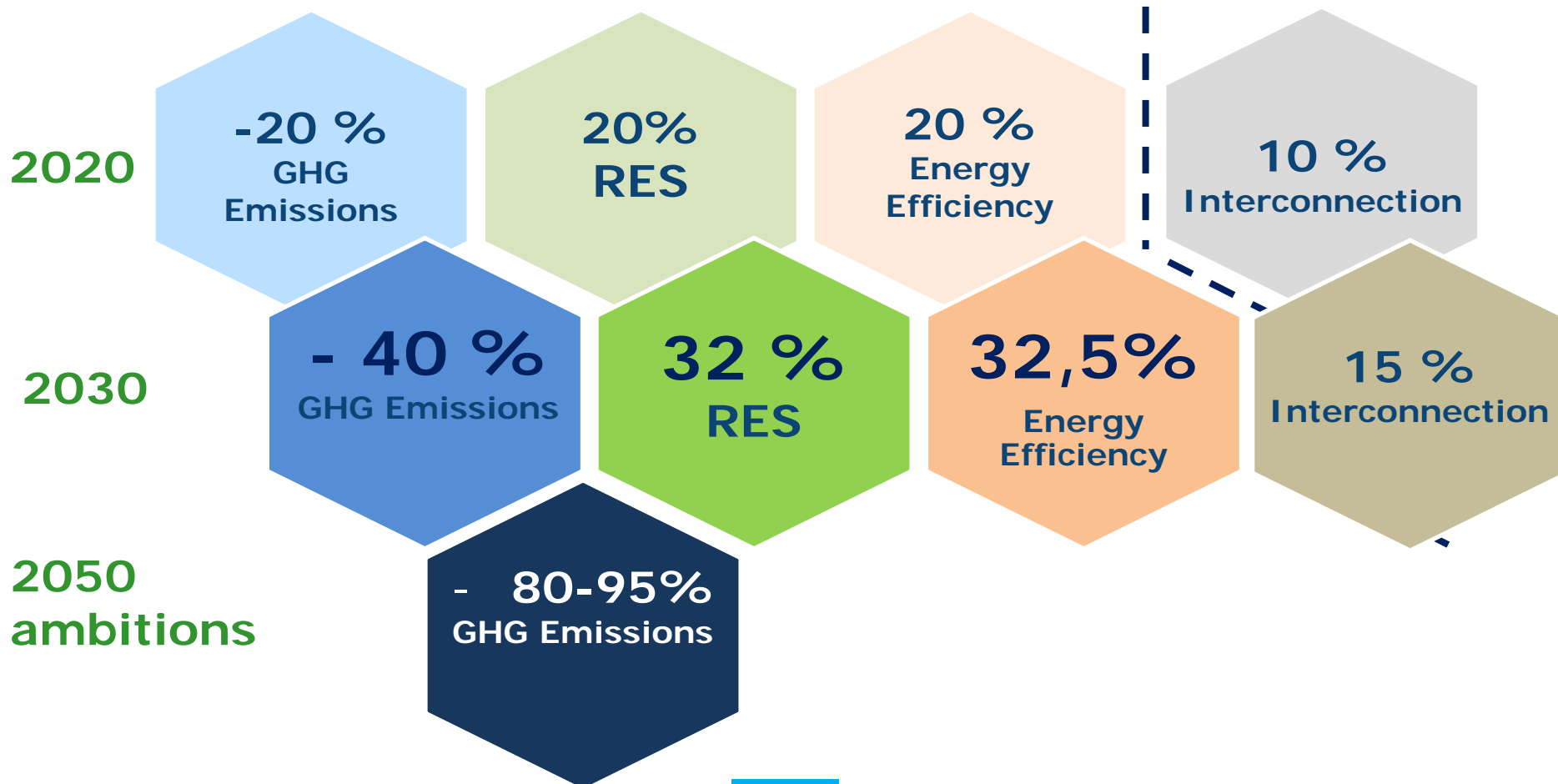


CCUS in the Clean Energy Transition - EU perspective



Dr. Vassilios Kougionas
European Commission
Unit D1 :Clean Energy Transition,
DG Research and Innovation

European Climate & Energy Targets



The EU energy system in transition

- The EU's goal is net-zero GHG emissions by 2050 to stay within 1,5°C to achieve climate neutrality
- The **Green Deal** is raising global ambition to 50-55% GHG emissions reduction by 2030
- This means 'renewables first', with remaining fossil fuel and carbon intensive industries fully decarbonised through CCUS and clean hydrogen
- Remaining fossil fuel power plants must be highly flexible to back-up and balance these fluctuating renewables
- A 'systems approach' addressing electricity, heating, smart grids, transport and energy-intensive industry

A Clean Planet for all

**A European strategic
long term vision for a
prosperous, modern,
competitive and
climate neutral
economy**



Our Vision for a Clean Planet by 2050

- The Paris Agreement objective is to keep temperature increase to well below 2°C and to pursue efforts to limit it to 1.5°C
- The IPCC report confirms that limiting climate change to 1.5°C has to be pursued to avoid worst impacts
- For the EU to lead the world in climate action, it means achieving net-zero greenhouse gas emissions by 2050
- The EU with this vision can inform others how we can deliver collectively a clean planet.
- The Long Term Strategy shows transforming our economy is possible and beneficial.

7 Building Blocks

1. Energy Efficiency
2. Deployments of Renewables
3. Clean, safe & connected Mobility
4. Competitive industry and circular economy
5. Infrastructure and inter-connections
6. Bio-economy and natural carbon sinks
7. Tackle remaining emissions with carbon capture and storage

7th Building Block: Carbon Capture and Storage

- ✓ Rapid deployment of renewable energy and new options to decarbonize industry reduce the need for CCS
- ✓ Still, CCS has a crucial role to close the circle for a net-zero economy:
 - ✓ Energy intensive industries will require it where other alternatives do not exist
 - ✓ If combined with sustainable biomass it could create negative emissions
- ✓ CCS is facing barriers: lack of demonstration plant and proof of economic viability, regulatory barriers in some Member States, public opposition
- ✓ An enabling framework is needed to spur large-scale demonstration, scale up private investments, provide the right signals to the markets and reassure public opinion

Conversion CCU technologies

- ✓ Could contribute towards deep decarbonisation
- ✓ Large-scale expansion of CCU technologies will require large volumes of renewable energy and hydrogen at competitive prices
- ✓ Important as carbon feedstock in the long term
- ✓ Some mineralisation routes provide longer term storage
- ✓ More R&D is needed for both the capture part, including for direct-air capture, and the conversion part
- ✓ Industrial symbiosis: CCUS clusters for optimal use of energy -cross-sectoral innovation is needed

Innovation Fund

First tool to
implement
Long-Term
Strategy

Driving low-
carbon
technologies
to the
market

Regulatory
Framework
adopted on
26 February
2019

Renewable
energy

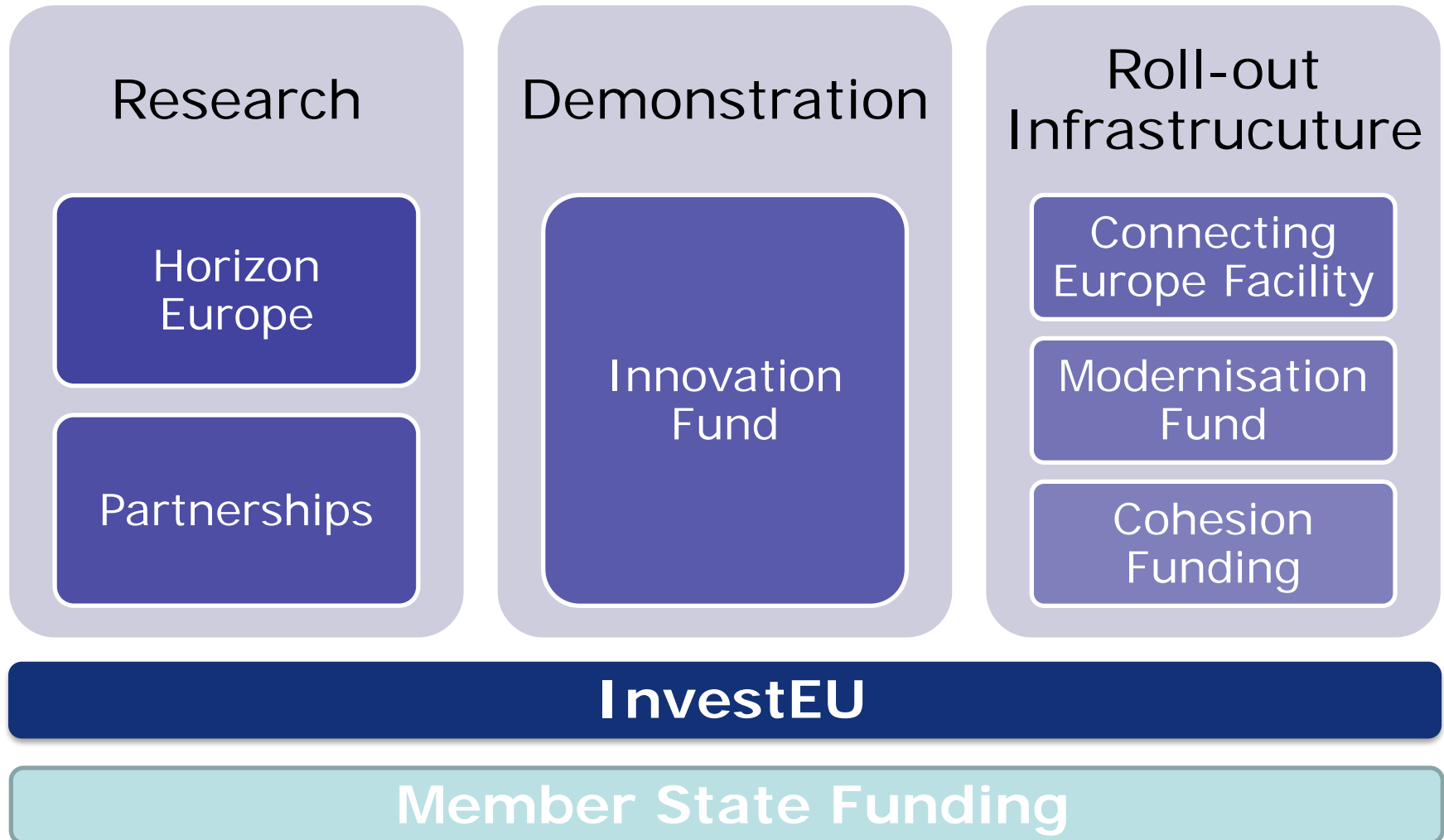
CCUS

**Driving low-carbon
technologies to the
market**

Energy-intensive
industries

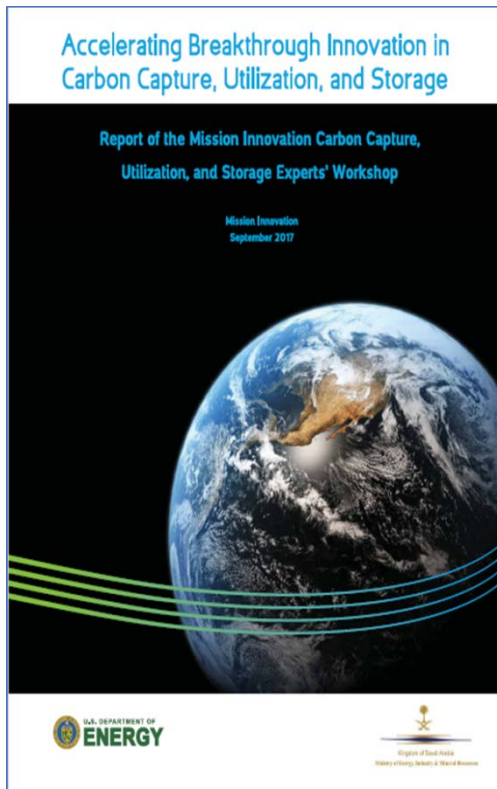
Energy storage

Synergies – Innovation Fund



Mission Innovation Challenge # 3: CCUS

- 20 active countries
- Co-leads: **UK, Mexico, Saudi-Arabia**



		Australia	Brazil	Canada	Chile	China	Denmark	EC	Finland	France	Germany	India	Indonesia	Italy	Japan	Mexico	Norway	Republic of Korea	Saudi Arabia	Sweden	The Netherlands	UAE	UK	USA
1	Smart Grids Innovation Challenge	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2	Off Grid Access to Electricity Innovation Challenge	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3	Carbon Capture Innovation Challenge	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
4	Sustainable Biofuels Innovation Challenge	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5	Converting Sunlight Innovation Challenge	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
6	Clean Energy Materials Innovation Challenge	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7	Affordable Heating and Cooling of Buildings Innovation Challenge	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

- **2nd Workshop in Trondheim Norway 19-20 June 2019**
- **ACT ERA-NET as a vehicle for cooperation with MI countries**

SET Plan Action 9



Implementation WG CCUS

Co-chairs: ZEP ETIP, NL and NO

11

COUNTRIES

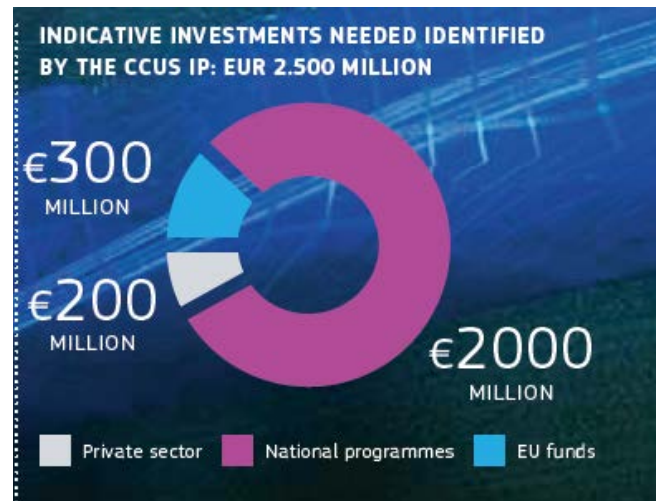
CO-CHAIRS

STAKEHOLDERS

The European Technology Platform for Zero Emission Fossil Fuel Power Plants (Co-Chair), Actys BEE, ArcelorMittal, Bellona, the British Geological Survey, BP, EERA, the European Chemical Industry Council (CEFIC), the European Steel Technology Platform, the European Turbine Network, the European Steel Association (Eurofer), Gassnova, the Global CCS Institute, General Electric, the German Aerospace Center, Greenwin, Heidelberg Cement, the International Energy Agency, IFP Energies Nouvelles, the International Association of Oil and Gas Producers, Mitsubishi Hitachi Power Systems, Port of Rotterdam Authority, the Research Council of Norway, Scinno, Shell, Sirtef, Sotocarbo SpA, TAQA Global and the Netherlands Organisation for Applied Scientific Research (TNO).

Type organisation	IMPACTS9
Gov/Funding	-
Gov/research	-
Research	UKRI British geological survey (UK), SINTEF (NO)
Industry	CCS Association (UK), CO2 Value Europe (BE)
Other	-

Collaboration with the ACT ERANET, the EERA, the CCUS Project Network



ACT – complies with SET PLAN Action 9

- International cooperation – the tool for accelerating implementation of CCS/CCU in power and energy-intensive industries
- Fund research and innovation projects that can lead to safe and cost effective technology
- **Cooperating on joint calls and knowledge sharing**



Horizon 2020 Energy –WP 2018-2020

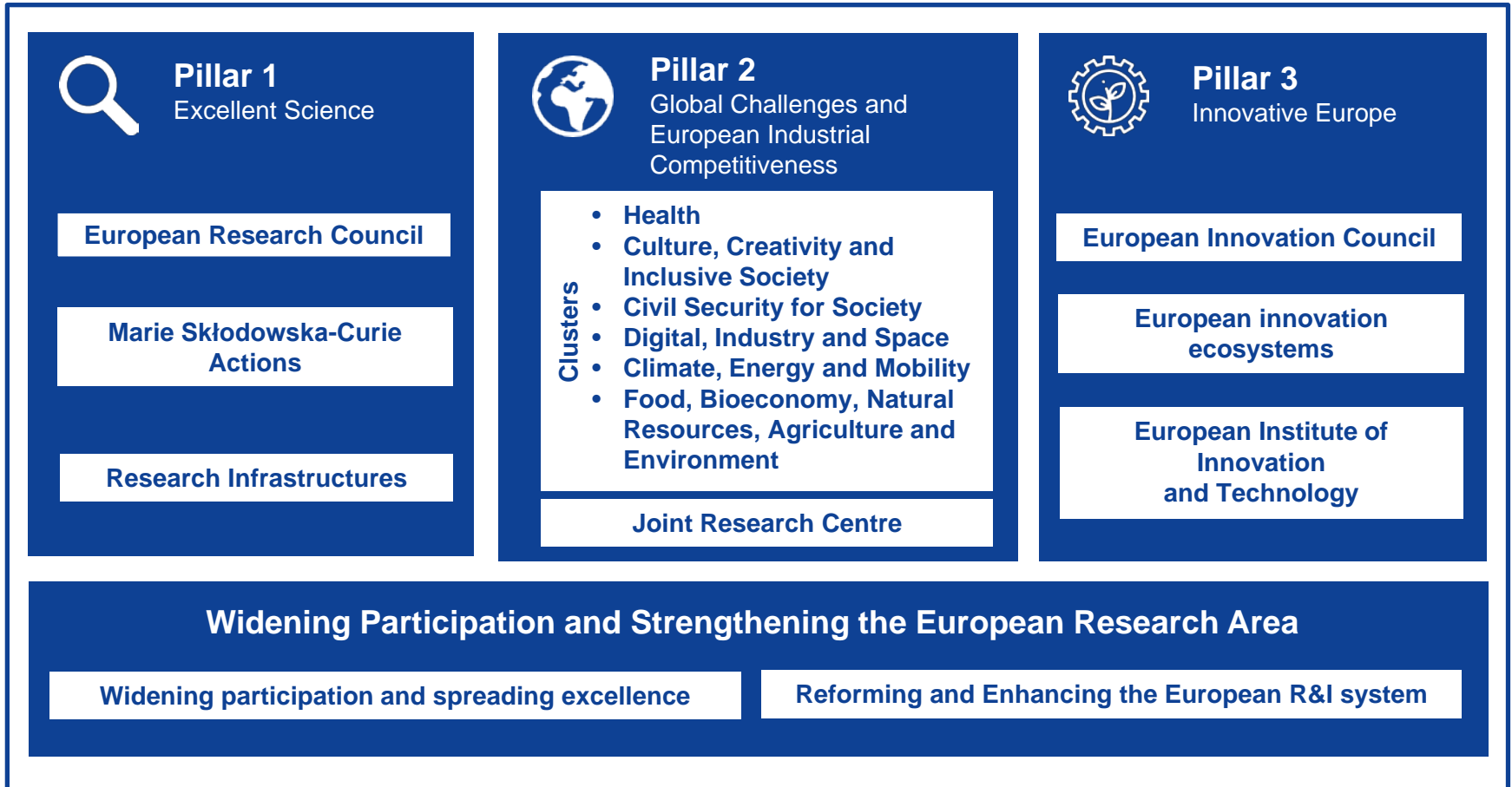
Topics on CCUS



- *NZE-1: Pilots for advanced capture technologies (2018)*
- *NZE-2: Pilots on CO₂ conversion to fuels (2018) **
- *NZE-3: Strategic planning for CCUS deployment (2018)*
- *NZE-4: Integrated solutions for flexible power plants using power-to-X and energy storage (2019)*
- *NZE-5: CCS in industry (2019, 2020) **
- *NZE-6: Geological storage pilots (2020)*

** topics in which R&I cooperation with **Mission Innovation countries** is encouraged*

Horizon Europe: Preliminary structure



Cluster 'Climate, Energy and Mobility'



Area “Energy Supply”

Proposed activities related to CCUS:

- ✓ Technologies and solutions to reduce greenhouse gas emissions from fossil fuel based as well as bio- and waste-to-energy-based approaches producing:
- ✓ power, heating, cooling or biofuels via CCUS and studies of socio-economic and ecological feasibility.

***CO₂- Reuse is proposed to be covered under the Horizon Europe Cluster -Digital, Industry and Space- under the Areas of Circular Industries, Low-Carbon and Clean Industry**



Thank you!

#HorizonEU

<http://ec.europa.eu/horizon-europe>