

# The Role of CCS in the EU Green Deal

CEM CCUS Initiative Webinar

*Thursday 25 February 2021, 15:30 – 16:30 CET*

# SOME HOUSEKEEPING ITEMS

## **Two Options for Audio** (select audio mode):

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### **3. Panelists - Please mute your audio device when not presenting**

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# SOME HOUSEKEEPING ITEMS (CONTINUED)

## To ask a question

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- A video/audio recording of this Webinar and the slide decks will be made available at:

<https://www.youtube.com/user/cleanenergypolicy>

<https://cleanenergysolutions.org/training/carbon-capture>

# Webinars to disseminate country and sector experience

The screenshot shows a YouTube browser window displaying a playlist titled "CEM: Carbon Capture, Utilization and Storage" by the "Clean Energy Solutions Center". The main video player shows a webinar titled "Tomakomai CCS Demonstration Project at 300 thousand tonnes cumulative injection" from a "CEM CCUS Initiative Webinar: CCUS in Japan, June 25<sup>th</sup>, 2020". The speakers are Yoshihiro Sawada and Jiro Tanaka from the International Affairs Department of Japan CCS Co., Ltd. The video has 367 views and was posted on June 30, 2020. The playlist includes six videos:

- 1. Carbon Capture, Utilization and Storage in Japan (1:00:23)
- 2. Key Financing Principles for CCUS (1:27:59)
- 3. Direct Air Capture of CO<sub>2</sub>: Helping to Achieve Net-zero Emissions (59:27)
- 4. Progress and Layout for Carbon, Capture, Utilization and Storage in... (59:31)
- 5. A Roadmap to At-scale Deployment of Carbon Capture, Use, and Storage... (1:01:26)
- 6. Approaching Final Investment Decision: CCUS Developments in... (58:07)

At the bottom of the playlist, there is a video titled "Carbon Capture, Utilisation and Storage (CCUS): Time to inject..." by EURACTIV, with 1.4K views and posted 1 year ago. The Windows taskbar at the bottom shows the time as 10:34 and the language as ENG.

<https://www.youtube.com/playlist?list=PLKRmGa9s99JVssP8Gb5buwLg3Bl1I1l3>

# AGENDA

1

## Welcome & Introductory Remarks

- **Stig Sverningsen**  
*Deputy Director-General*  
Ministry of Petroleum and Energy  
Norway

2

## Role of CCS in the EU Green Deal

- **Peter Horvath**  
DG Energy  
European Commission
- **Jan Steinkohl**  
DG Energy  
European Commission
- **Vassilios Kougionas**  
DG Research and Innovation  
European Commission
- **Katrien Prins**  
DG Energy  
European Commission
- **Maria Velkova**  
DG Clima  
European Commission

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## Panel Discussion and Q&A Session



**Peter Horvath**  
*Policy officer, DG Energy*  
European Commission

Peter Horvath works as policy officer at the Directorate General (DG) for Energy of the European Commission, in the Unit responsible for Innovation, Research, Digitalisation and Competitiveness. Most of his work relates to international cooperation on energy research and technology, incl. relations to the International Energy Agency and the Clean Energy Ministerial, as well as European research and innovation support to carbon capture and storage. Previously he also worked for six years at DG Research of the Commission, where he covered international climate and energy topics. Before moving to Brussels, he held various jobs in Hungarian higher education and public administration.



**Jan Steinkohl**  
*Policy officer, DG Energy*  
European Commission

Jan Steinkohl works as policy officer at the Directorate General (DG) for Energy of the European Commission, in the Unit responsible for Renewables and Energy System Integration Policy. He is also the contact point for CCS in this unit.



## **Vassilios Kougionas**

*Policy Officer, DG Research and Innovation*  
European Commission

Vassilios Kougionas is a policy officer in DG Research and Innovation, European Commission, in the unit of Clean Energy Transition. His main tasks relate to the EU research and innovation support to CCUS/low carbon hydrogen, the EU Strategic Energy Technology Plan and international cooperation under Mission Innovation. Vassilios is a vice chair of the IEA Working Party on Fossil Energy.

Previously he worked at the Directorate General for Energy of the European Commission, at the National Technical University of Athens, at C.N.R.S. Institute of Catalysis in Lyon, France and as a Senior Research Fellow at Imperial College London.

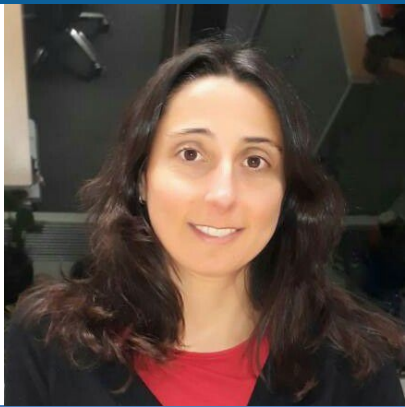
Vassilios holds a PhD in Chemical Engineering from Imperial College, London, a Masters of Science in Advanced Chemical Engineering and a Bachelors degree in Petrochemical Engineering from University of London. He has also a Masters in Business Administration from Solvay Management School Brussels.





**Katrien Prins**  
*Policy Officer, DG Energy*  
European Commission

Katrien Prins has worked at the European Commission in DG Energy since 1998, in the Units responsible for Internal Market for Electricity and Gas, Energy Efficiency and Renewables and now in Infrastructure and Regional Cooperation. She has also worked for seven years in DG Transport in different units.



**Maria Velkova**  
*Policy officer, DG Clima*  
European Commission

Maria Velkova is a policy officer in DG Climate Action, European Commission. Her main tasks revolve around the implementation of the Innovation Fund programme for supporting large-scale demonstration projects in the industry and energy sectors. Maria also follows the EU policy and regulatory work on carbon capture, utilisation and storage. Previously, she has worked on the EU regulation of GHG emissions from transport fuels and on supporting research and innovation in renewable energy technologies.

Before joining the European Commission in 2008, Maria Velkova worked in the areas of SME and industrial policy, renewable energy and energy efficiency in the Bulgarian public administration. She has Master's degrees in Environmental Change and Management from the University of Oxford and European Economic Studies from the College of Europe. Her Bachelor's degree is in European Business Administration from the University of National and World Economy, Sofia jointly with the University of Humberside.



Host & CEM CCUS Initiative Co-Lead:

**Stig Svenningsen**

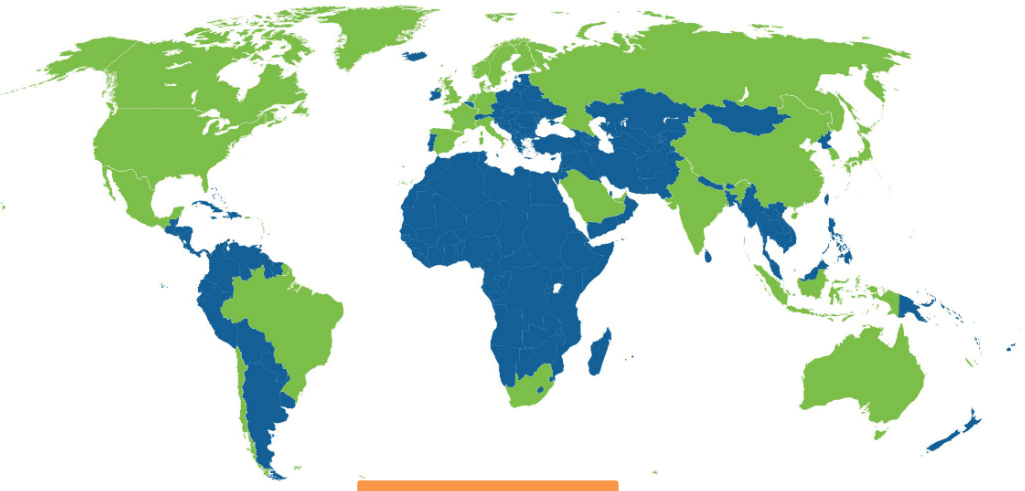
*Deputy Director-General*

Ministry of Petroleum and Energy, Norway

Stig Svenningsen has been working for the Norwegian Ministry of Petroleum and Energy since 2001. Stig is currently Deputy Director-General and heads the Section for Climate and Emissions to Air in the Department for Climate, Industry and Technology.

Stig's section covers the Ministry's policies on climate change and other emissions to air, including national policies and international cooperation on issues, related to energy and climate change. This includes Norway's Clean Energy Ministerial membership. Stig is presently one of four co-chairs of the CEM CCUS Initiative and is a member of the Advisory Board of the CEM Hydrogen Initiative.

# The Clean Energy Ministerial (CEM) is a global process



**27 CEM Members**

■ Clean Energy Ministerial participant

**90%**

Clean energy investments

**75%**

Global CO<sub>2</sub> emissions

## The CEM CCUS Initiative

Saudi Arabia, United States, South Africa, Norway, Japan, United Arab Emirates, Mexico, United Kingdom, China, Canada, Netherlands.

**Observer:** European Union

**Logo:** CARBON CAPTURE, UTILIZATION & STORAGE. ACCELERATING CCUS TOGETHER. AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL.

- Lead countries:** Norway, Saudi Arabia, the United States and United Kingdom
- Participating CEM members:** Canada, China, Japan, Mexico, Netherlands, South Africa and United Arab Emirates; in addition, the European Commission is an observer
- Industry:** oil and gas, cement, steel, ...
- Financial institutions:** private banks, investment firms, multilateral banks (MDBs)
- Organizations:** Carbon Sequestration Leadership Forum (CSLF), International Energy Agency (IEA), IEA Greenhouse Gas R&D Programme (IEAGHG), Mission Innovation (MI), Global CCS Institute (GCCSI), and Oil and Gas Climate Initiative (OGCI)

# CEM CCUS Initiative: accelerating CCUS together by:



Actively **including CCUS** within Clean Energy Ministerial agenda and global clean energy discussions.



Facilitating identification of both near and longer-term **investment opportunities**.



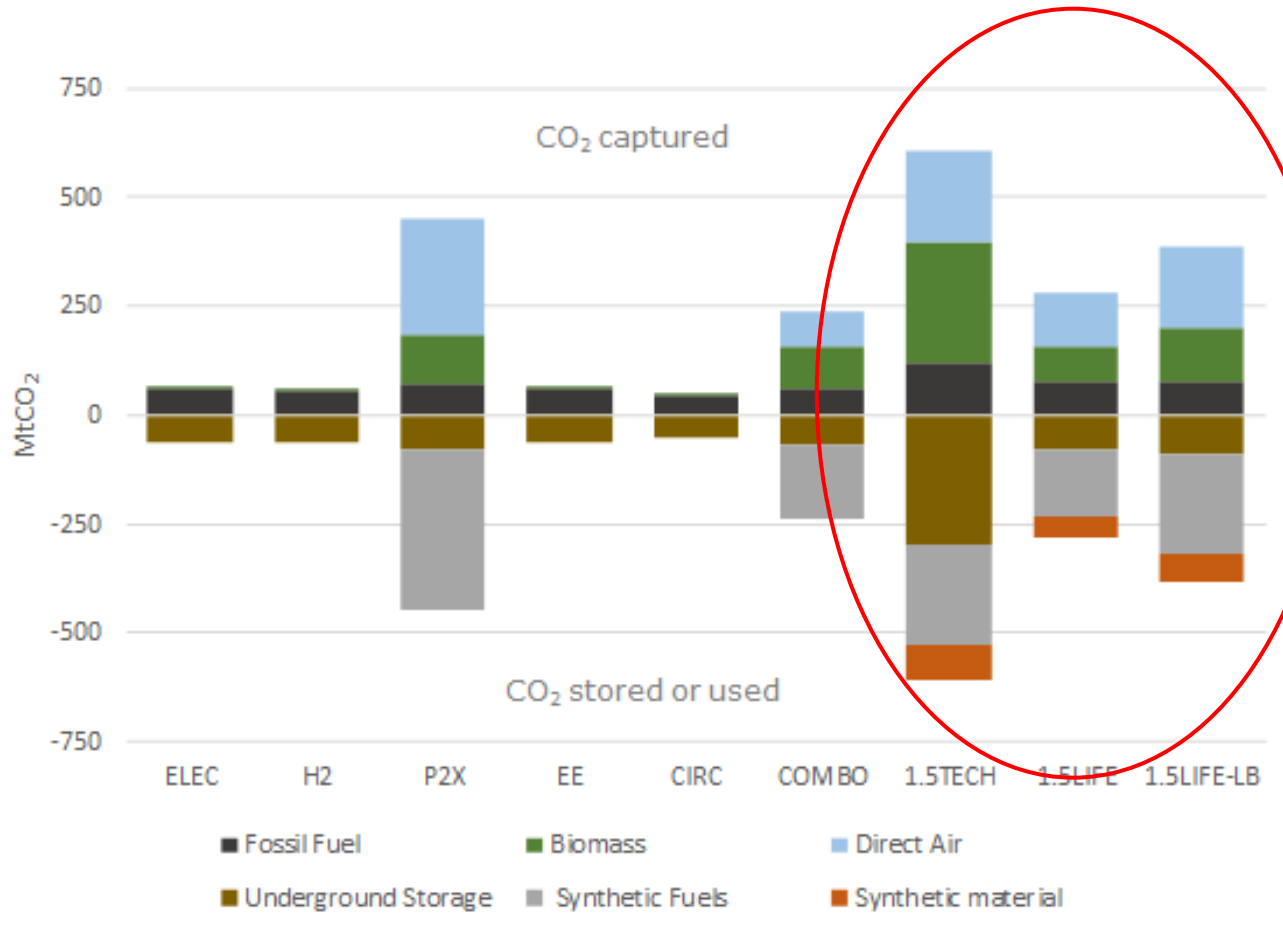
Bringing **together** governments, the private sector and the investment community.



Disseminating **best practice** in CCUS policy, regulation and investment.

## Increased ambition (2030): Zero or very low carbon technologies and business concepts need to be developed and tested at scale in this decade

## Long-term perspective (2050): Climate neutrality



- CCS will be required to reduce emissions of any remaining fossil fuels use (power sector, industry)
- Necessary for certain hard to decarbonize industrial processes
- CCS combined with biomass (BECCS) or direct air capture (DACCS): required to generate net carbon removals if we are to achieve climate neutrality
- Storage in materials (e.g. in plastics) is also seen as an option
- CCU fuels in some scenarios

Source: Scenario Analysis Results for CCUS, Vision for a Clean Planet by 2050

# Overview 1: EU policies relevant for CCS

- **The EU Climate Law:** climate neutrality by 2050
- **Climate target plan:** -55 % CO<sub>2</sub> reductions by 2030
- **Energy System Integration Strategy and Hydrogen Strategy**
- **Trans-European Networks – Energy Regulation**
- **CCS Directive:** ensures CCS is done safely for the environment and human health
- **EU Emissions Trading Scheme (ETS):** allowances do not need to be surrendered when CO<sub>2</sub> is geologically stored (CCS); -> Updated EU ETS will strengthen the carbon signal
- **Strategic Energy Technology (SET) Plan – Research and innovation targets**
- **Sustainable taxonomy:** CCS included

# Overview 2: EU funding relevant for CCS

## Main EU programmes for CCUS funding:

- Horizon Europe – research and innovation programme
- Innovation Fund – drives innovative clean energy technologies towards the market
- Connecting Europe Facility – building the cross-border infrastructure for a clean energy system

## Recovery and Resilience Facility:

- Grants and loans for implementing Member States' national Recovery and Resilience plans
- €560 billion in total, 37% climate mainstreaming target
- Plans to be received from 15 October 2020 to 30 April 2021

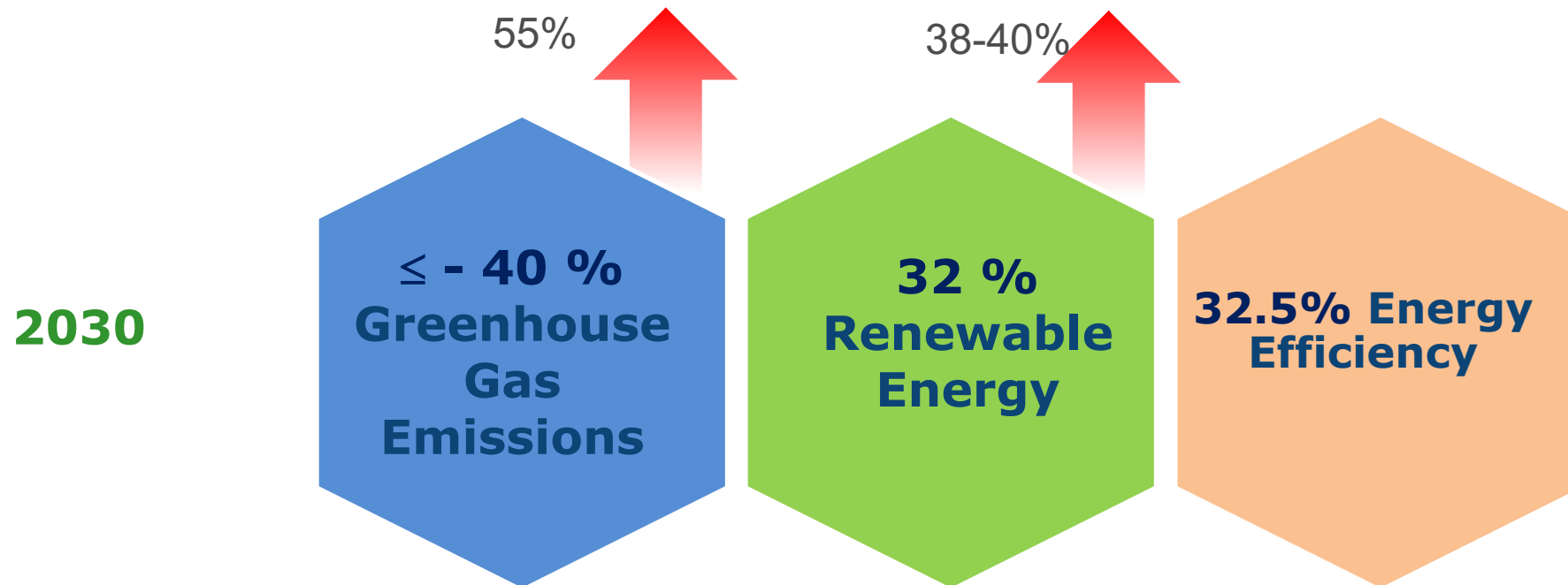


# European Green Deal and energy and climate targets

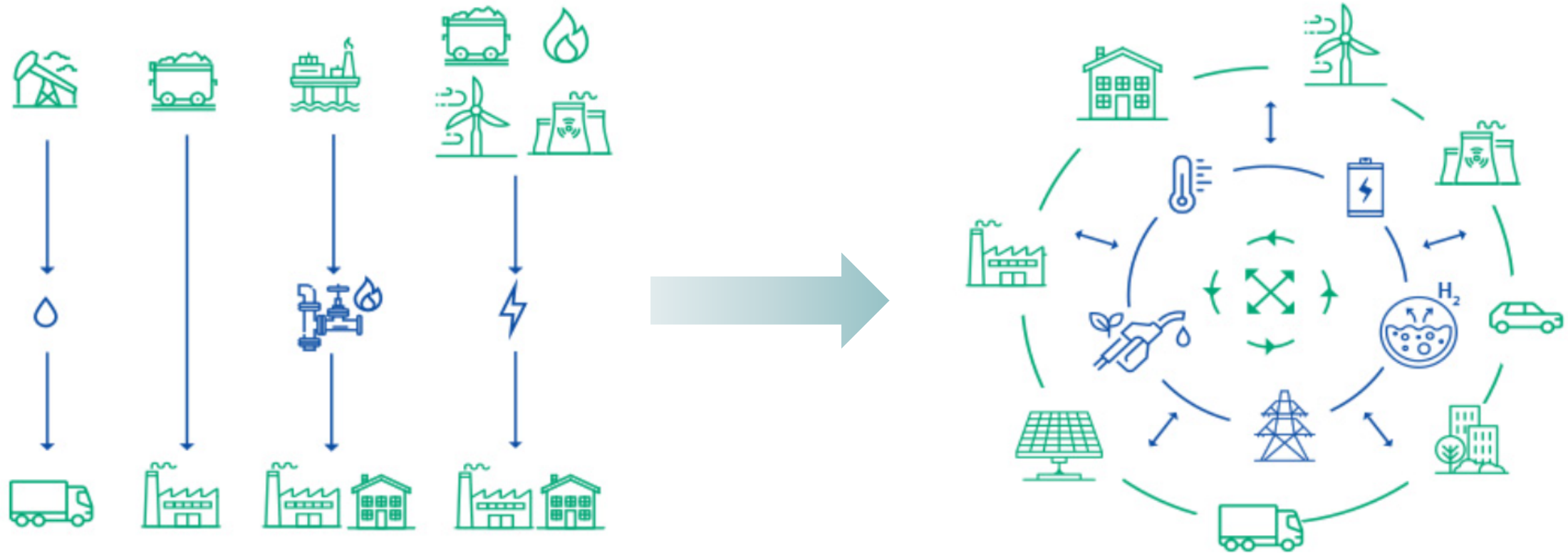
The **European Green Deal**  
Climate neutrality



PARIS2015  
UN CLIMATE CHANGE CONFERENCE  
COP21·CMP11



# Energy system integration



Contains section on “enabling carbon capture, storage and use to support deep decarbonisation, including synthetic fuels”

# Analytical basis

## 2030 Climate Target Plan Impact Assessment

A major part of the reductions in 2050 is due to technologies such as clean gases and carbon capture and storage and carbon removals, including CCUS technologies and CO2 storage in materials. Clearly, the step up of technology deployment between 2030 and 2050 will be a significant challenge.

<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020SC0176&from=EN>

## A Clean Planet for All analysis

CCS and CCU lie in the **critical path** for scenarios where negative emissions would be needed.

CCU could allow CO2 utilisation into one or several product cycles, avoiding the use and emissions related to an equal carbon amount of fossil based resources provided that the energy used in capturing and converting the CO2 is zero carbon.

[https://ec.europa.eu/clima/sites/clima/files/docs/pages/com\\_2018\\_733\\_analysis\\_in\\_support\\_en\\_0.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf)



# Horizon 2020 → Horizon Europe

*The next EU research and innovation programme*

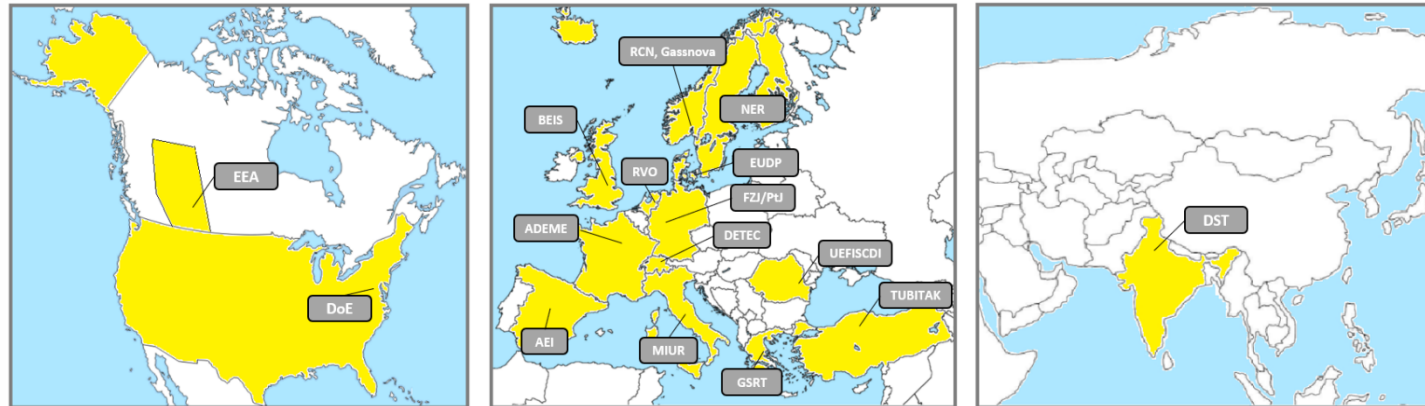
- Political agreement for a budget of around €95.5 billion for 2021-2027 (current prices). This includes €5.4 billion (current prices) from NextGenerationEU to boost our recovery
- It will see over 35% of its funds supporting the achievement of the climate goals under the Green Deal
- Horizon Europe- Cluster 5 "Climate Energy and Mobility": the Work Programme 2021-2022 includes topics on CCUS

# CCUS research and innovation in Horizon Europe

- CCUS will play crucial role in [Horizon Europe/EU Green Deal](#) in particular for the transition of energy-intensive industries and the power sector towards climate neutrality
- Demonstration of the full CCUS chain by integrating in industrial facilities
- Cost reduction of CO<sub>2</sub> capture
- Integration of CCUS in hubs and clusters, and knowledge sharing activities
- Ascertaining safe CO<sub>2</sub> storage
- Low carbon hydrogen from natural gas with CCUS
- CCUS combined with sustainable biomass, could create negative emissions
- Conversion of captured CO<sub>2</sub> to useful products

# ACT as a vehicle for cooperation with Mission Innovation countries

Funding agencies from 16 countries (***bold italic***= new in 2019/2020), regions, and provinces are collaborating on calls and knowledge sharing within CCUS



- ***Alberta (Canada)***
- USA
- ***Denmark***
- France
- Germany
- Greece
- ***Italy***
- Netherlands
- Norway
- Nordic countries
- Romania
- Spain
- Switzerland
- Turkey
- UK
- ***India***

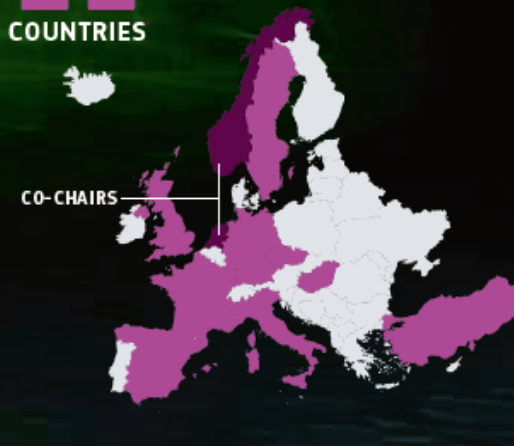
[www.act-ccs.eu](http://www.act-ccs.eu)



## Implementation WG CCUS

Co-chairs: ZEP ETIP, NL and NO

**11**  
COUNTRIES



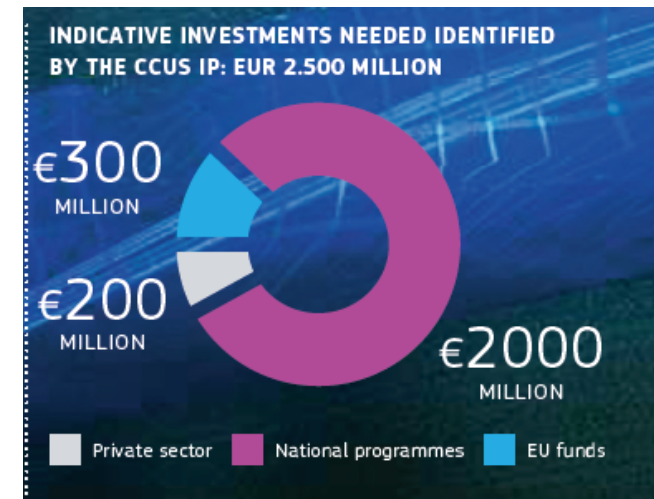
CO-CHAIRS

**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, the EERA, the CCUS Project Network



# The current TEN-E Regulation (2013)

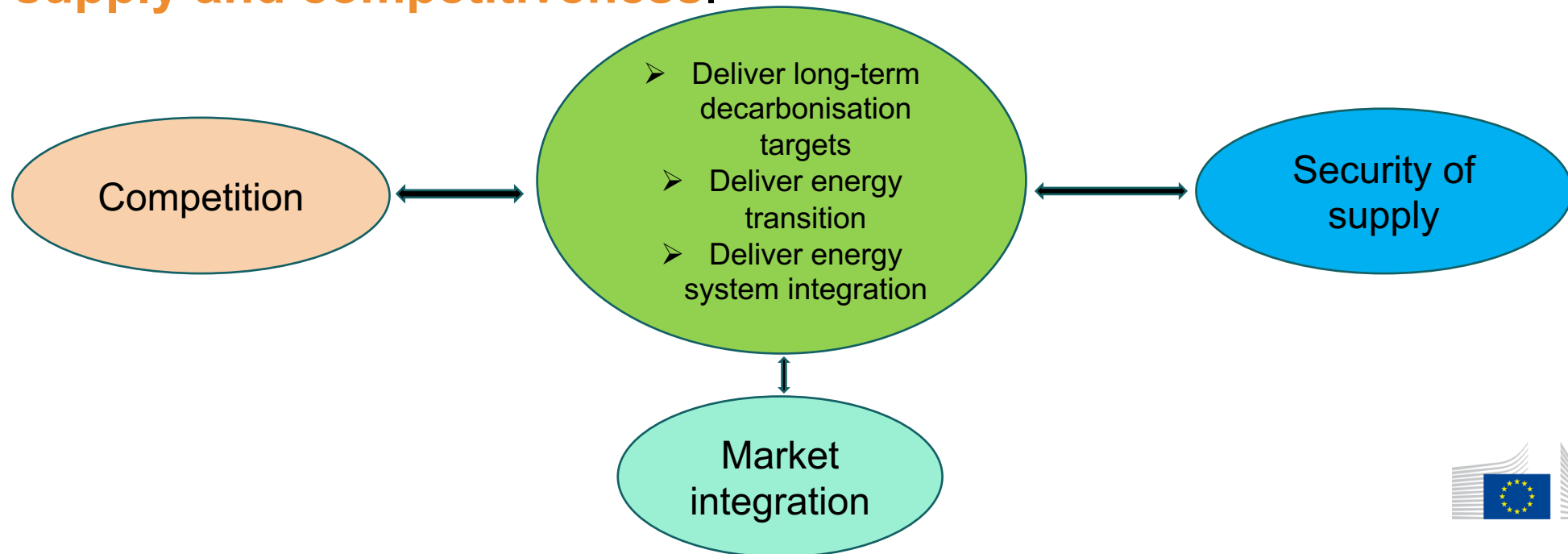
- Established a new approach to infrastructure planning by setting a framework for the timely development and interoperability of projects of common interest (PCIs)
- Focus on cross-border electricity and gas networks but covers also smart (electricity) grids and CO2 networks
- TEN-E has been successful in addressing security of supply, energy isolation, improving interconnectivity





# Revised TEN-E 2020, instrumental for the European Green Deal

- Revised TEN-E proposal: fit for the infrastructure needs of the clean energy system of the future focusing on the (upgraded) **2030/ 2050 climate and energy targets**, the **climate neutrality objective** and **technological developments** whilst ensuring contribution to market **integration, security of supply and competitiveness**.



# A. Full alignment of infrastructure with the EGD (1/2)



- Through an increased focus on **offshore grids** covered under four new priority corridors reflecting Europe's sea basins and building on **regional cooperation strengths**;
- The TEN-E operationalizes the ambitions in the EU Strategy for Offshore RES by including dedicated planning (**integrated offshore development plans**), permitting (**one-stop shop**) and regulatory tools (**incentives**) to facilitate scale-up of offshore grids to the target 300 GW in 2050;

# Full alignment of infrastructure with the EGD (2/2)

- **Exclusion of natural gas infrastructure** due to achieving an integrated and shock-resilient gas grid in Europe
- **Exclusion of oil pipelines**

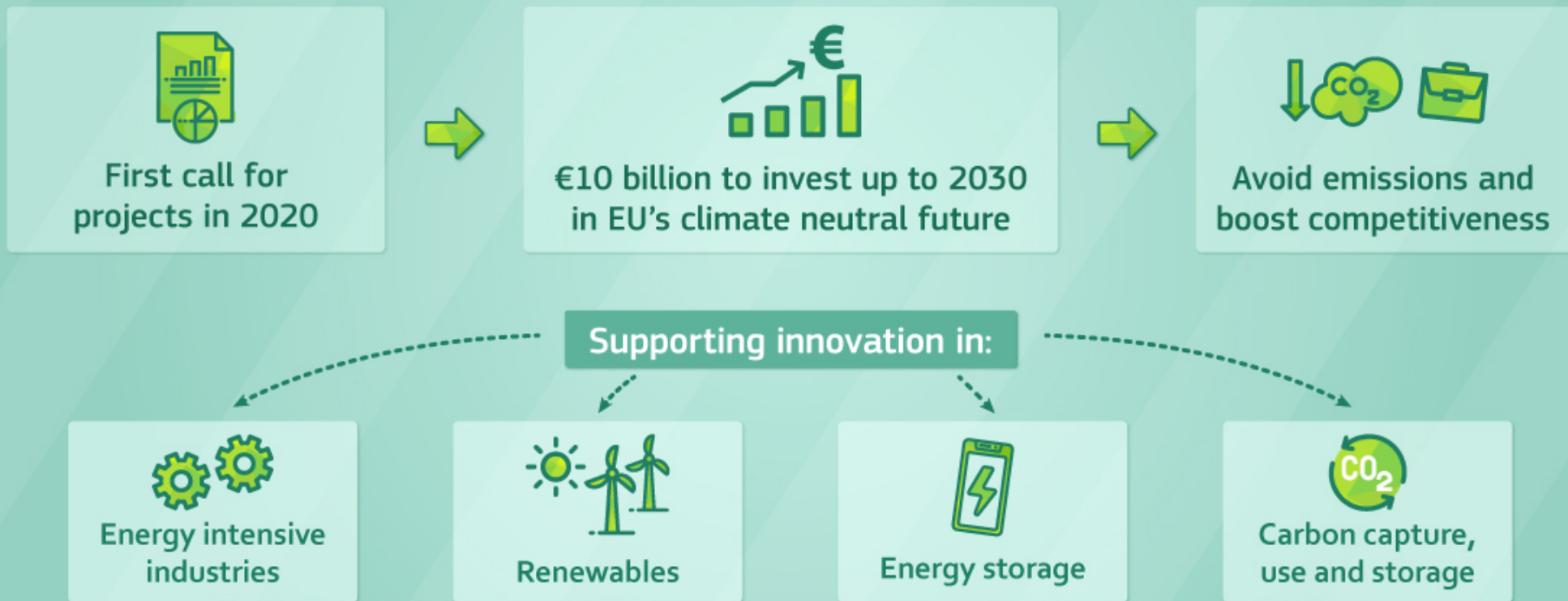
Instead:

- Support for new and repurposed **dedicated hydrogen networks and electrolysers** above 100 MW
- Tapping into locally produced renewable and low-carbon gases (biogas, biomethane) through IT-focused **smart gas grids**



# INNOVATION FUND

Driving clean innovative technologies towards the market



Funded by: EU Emissions Trading System

# Innovation Fund key features

Volume of at least **EUR 10 billion** until 2030 (at EUR 20 carbon price)

Support of up to **60%** of **additional costs** related to innovative technology

**40%** of grant disbursed at financial close

Financed from the revenues of the **EU Emissions Trading System**

Support of additional capital **and** operating costs (up to 10 years)

**60%** of grant disbursed during 10-years operating period against GHG emission avoidance

**Annual calls** for large-scale and small-scale projects (CAPEX < EUR 7.5 million)

Single applicant or consortium

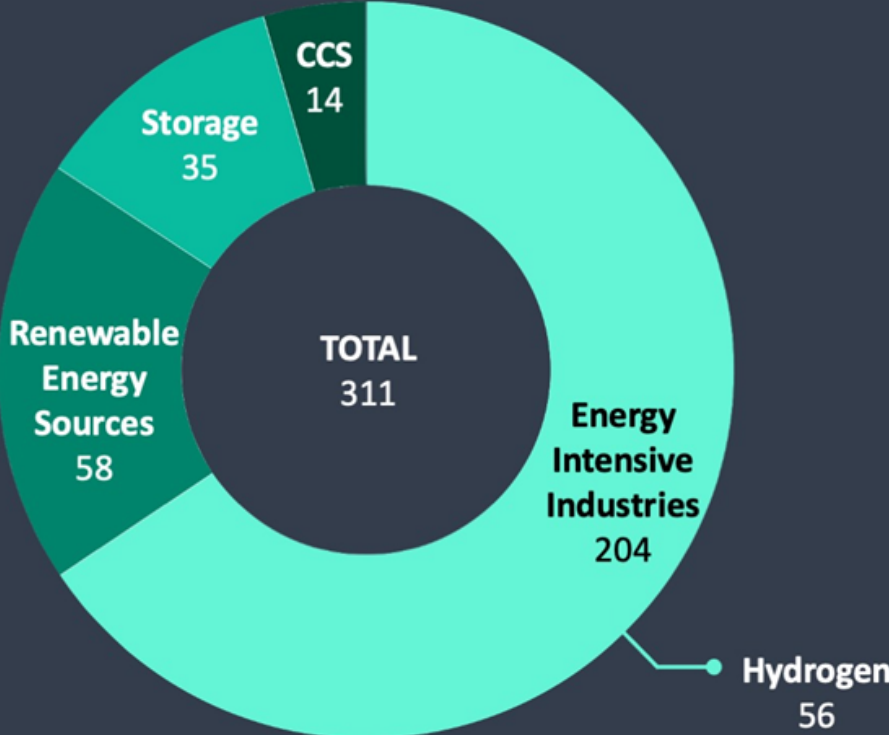
Project development assistance

# 1<sup>st</sup> call for large-scale proposals applications closed on 29 October 2020

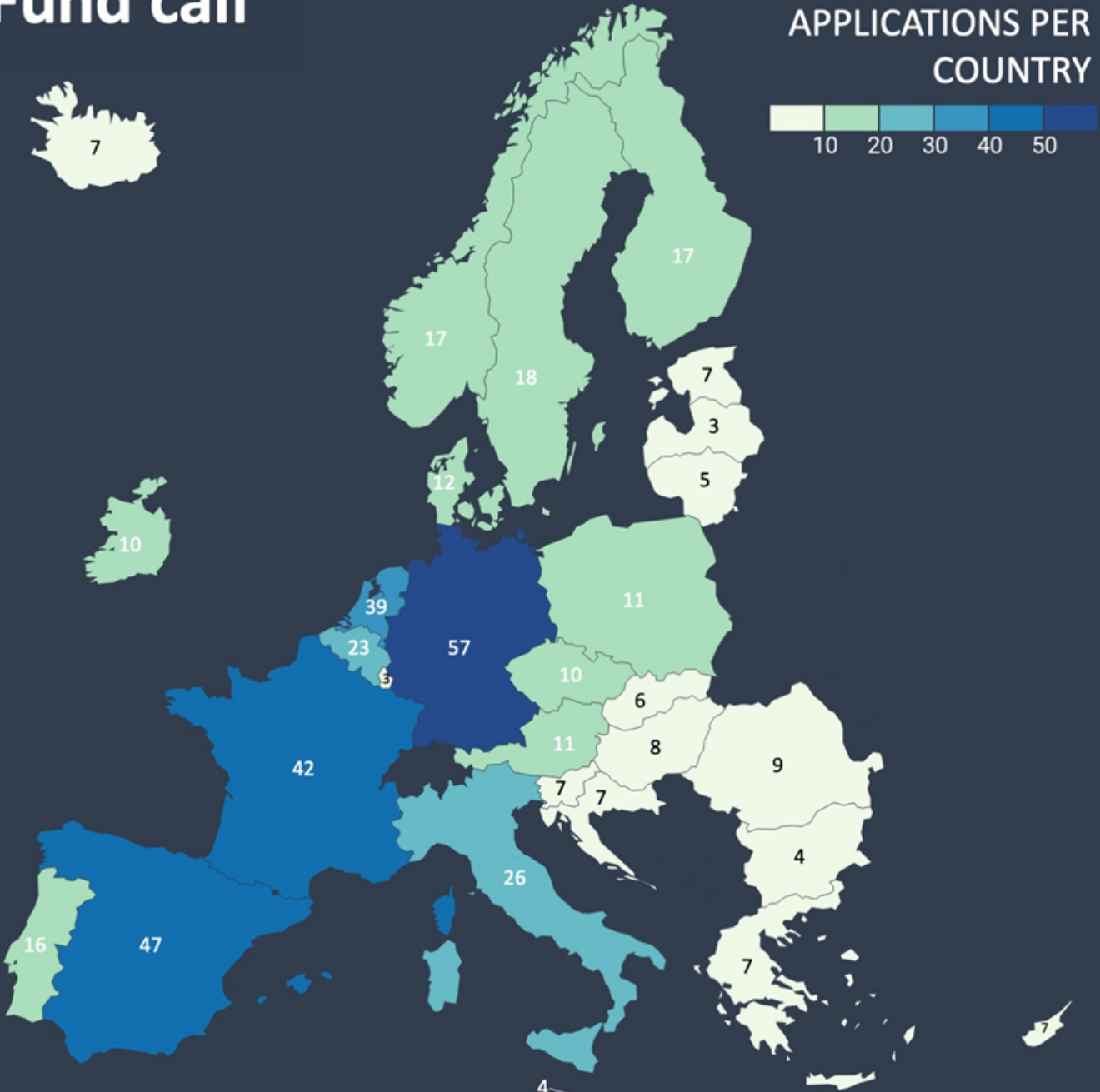
## RESULT

**311 proposals were submitted  
requesting in total €21.7  
billion with the potential  
to avoid 1.2 billion tCO<sub>2</sub>e.**

# Applications to first Innovation Fund call

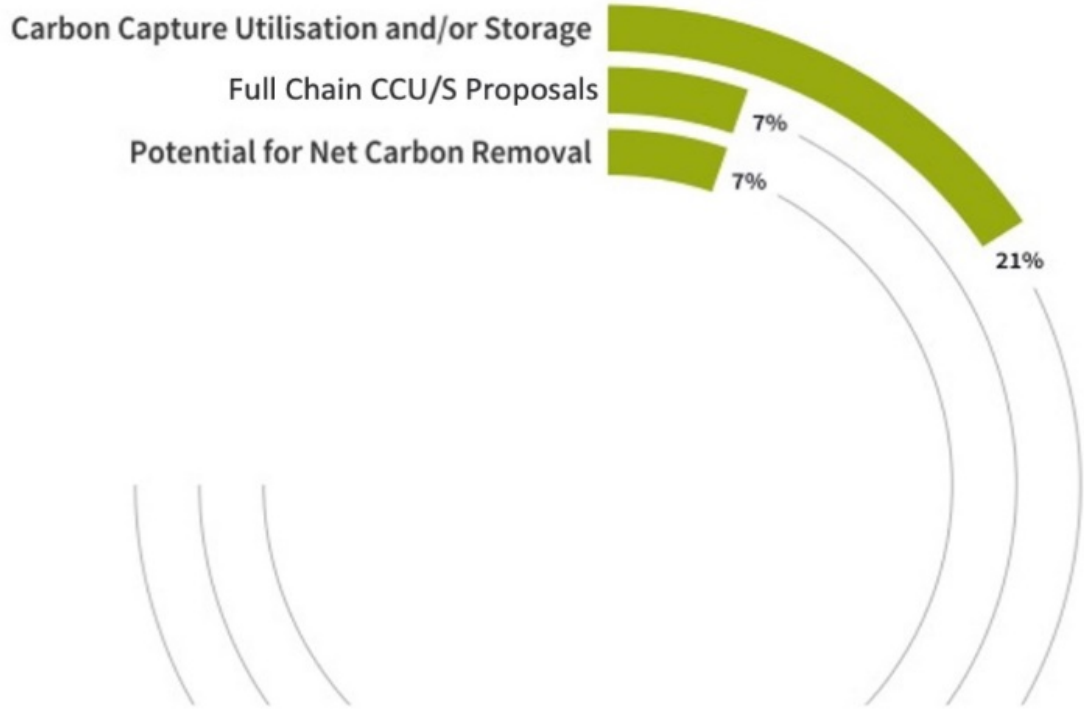


APPLICATIONS PER ACTIVITY  
of which some are cross-sectoral applications



## TECHNOLOGY PATHWAYS

# CARBON CAPTURE TECHNOLOGIES



**captured from**

- biogenic
- steel & cement
- CHP
- chemicals
- refineries
- air
- paper

**utilised into**

- hydrogen
- fuels
- chemicals
- construction materials

**Disclaimer:** Count includes both projects that have selected a specific sector & projects that use a specific technological pathway in relation to total number of proposals received.



# Discussion and Q&A

Panel host:



**Peter HORVATH**  
European Commission



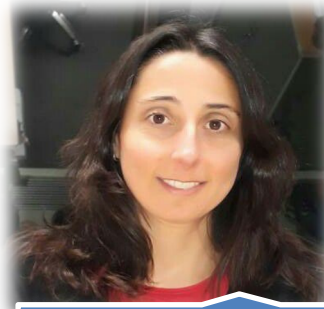
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<https://www.linkedin.com/company/clean-energy-ministerial-ccus-initiative/>



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<https://www.youtube.com/user/cleanenergypolicy/playlists>



[info@cemccus.org](mailto:info@cemccus.org)