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# Horizon 2020 Work Programme for Research & Innovation 2018-2020

Enabling the decarbonisation of  
the use of fossil fuels during the  
transition to a low-carbon economy

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Innovation



## Challenge

- Fossil fuels will be used in Europe's power generation as well as in industrial processes for decades to come.
- Carbon capture, utilisation and storage (CCUS) for the power and industrial sectors will be critical to reaching the 2050 climate objectives in a cost-effective way.
- The integration of (fluctuating) renewable electricity generation in our energy system requires new solutions for fossil fuel power plants to provide highly flexible yet efficient back-up power to stabilise the grid.



# New directions for CCUS

- Problematic business case for CCUS in power generation
- Emphasis is shifting from CCS in power plants to CCS in energy-intensive industry such as steel and cement, for which CCS is the only way to further reduce their CO2 emissions
- CO2 utilisation options in the process industry, such as transforming CO2 into fuels, chemicals and materials, could further improve the economic case for CCS
- CCS in hubs and industrial clusters (with decoupling of capture, transport and storage) is probably the best business model

# What is needed in terms of R&I ?

- CCS in energy intensive industry needs to step-up to pilot-scale
- Pilots on promising new capture processes
- Pilots for geological storage to strengthen public awareness
- Pilots on promising CCU processes for fuel production
- Detailed inventory of 'bankable storage' using agreed methodology

**WP 2018-2020 addresses the key targets agreed by CCUS stakeholders in the SET Plan**



# Horizon 2020 Energy WP 2018-2020

- **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 in different settings (2020)

# LC-SC3-NZE-1-2018: Advanced CO2 capture technologies

## Specific challenge:

- A significant reduction in the energy intensity of the CO2 capture process is needed to make CCS more cost-effective

## Scope:

- Pilot demonstration of advanced technologies or processes for CO2 capture that have a high potential for reduction of the energy penalty and cost
- Test and prove operating conditions, operational flexibility, reliability and cost efficiency
- Evaluate the cost, technical requirements and operational/safety impacts on transport, storage and/or utilisation as part of integration in a CCUS cluster
- Solutions should be environmentally benign

# LC-SC3-NZE-1-2018: Advanced CO2 capture technologies

## Additional info:

- Proposals must state clear targets and KPIs for energy use, capture rate and cost of capture
- Progress technologies to TRL 5-7
- Expected EC contribution EUR 5-10 million per project; RIA
- Topic budget EUR 20 million
- Call opens 15 May 2018 with deadline 06 September 2018



# CE-SC3-NZE-2-2018: Conversion of captured CO2

## Specific challenge:

- Conversion of captured CO<sub>2</sub>, for example using hydrogen made from renewable energy, to produce fuels is a means to replace fossil fuels, as well a promising solution for seasonal energy storage.
- However, the conversion process is highly energy intensive

## Scope:

- Development of energy-efficient, economically and environmentally viable CO<sub>2</sub> conversion technologies for chemical energy storage or fossil fuel displacement
- Solutions should allow for upscaling in the short to medium term
- Life Cycle Assessment (LCA) is an important part of the work



# CE-SC3-NZE-2-2018: Conversion of captured CO2

## Additional info:

- Proposals must state clear targets for energy use in the conversion process, production costs and product yields
- International cooperation is encouraged, in particular with relevant Mission Innovation countries such as China
- Progress technologies from TRL3-4 to TRL 5-6
- Expected EC contribution EUR 3-4 million per project; RIA
- Topic budget EUR 12 million
- Call opens 15 May 2018 with deadline 06 September 2018

# LC-SC3-NZE-3-2018: Strategic planning for CCUS development

## Specific challenge:

- Roll-out of CCUS requires a growing network of industrial clusters, CO2 hubs and storage sites, connected by pipelines and shipping routes
- Shared infrastructure will bring economies of scale

## Scope:

- Elaboration of detailed plans for CO2 gathering networks, industrial clusters and storage sites
- Identification of transport corridors
- Perform initial impact assessments
- Develop local business models within promising start-up regions
- Assessment of cost-effective storage capacity in selected regions

# LC-SC3-NZE-3-2018: Strategic planning for CCUS development

## Additional info:

- Cooperation with industry and engagement with local stakeholders is important
- Demonstrate how outputs will contribute to CCS roll-out in the short term (<3 years), medium term (3-10 years) and long term (>10 years)
- Expected EC contribution EUR 2-3 million per project; CSA
- Topic budget EUR 3 million
- Call opens 15 May 2018 with deadline 06 September 2018

## LC-SC3-NZE-4-2019:

# Integrated solutions for flexible operation of fossil fuel power plants through power-to-X-to-power and/or energy storage

- Flexible operation of power plants is a challenge; ramping up and down leads to wear-and-tear, loss of efficiency and hence increased emissions
- A solution is 'load levelling' by storing power during periods of light loading and delivering it during periods of high demand
- Topic invites pilot demonstration of the integration of energy storage and/or use of excess energy in fossil fuel power plants
- All relevant forms of energy storage are eligible; this includes power-to-X and re-electrification
- Expected to progress technologies to TRL 6-7
- Expected EC contribution EUR 6-10 million per project; IA
- Topic budget EUR 20 million
- Call opens 07 May 2019 with deadline 27 August 2020

## LC-SC3-NZE-5-2019: Low-carbon industrial production using CCS

- Integrating CO2 capture in industrial installations
- Address all aspects, i.e, **technical** (integration, scalability, purity); **safety** (transport); **financial** (cost of capture and integration) and **strategic** (business models, operation and logistics of clusters and networks)
- Areas with high CO2 emissions and a nearby storage capacity are prime sites for cluster development and will generate the highest impact
- International cooperation is encouraged, in particular with relevant Mission Innovation countries such as China
- Expected to progress technologies to TRL 6-7
- Expected EC contribution EUR 10-12 million per project; IA
- Topic budget EUR 33 million
- Call opens 07 May 2019 with deadline 27 August 2020

# Thank you!

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