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H2020 Energy
virtual info day

Carbon Capture & Storage and Batteries

Presentation of the H2020 2019 calls for funding

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Flexible operation of fossil fuel power plants through P-X-P and/or energy storage

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Challenge

- Increasing energy production from RES
- Role of fossil fuel power plants changes
- Fluctuating back-up instead of base load
- Consequences for wear-and-tear and lower efficiency ➔ higher GHG emissions
- Need for load-levelling ➔ storing and releasing power

Scope

- Validation and pilot demonstration of P-X-P
- Not only meet EU emission limits but reduce emissions
- Enable system for synthetic fuels, hydrogen enriched fuels
- Better integration of combined heat/power production
- TRL 6 -7 (technology demonstrated in relevant environment; system prototype demonstration in operational environment)
- To be complemented by societal activities

Expected Impact

- Contribution to smart, secure and resilient power system
- Better load levelling in fossil fuel power generation through integration of energy storage
- Results should lead to smoother operation, optimal efficiency, better environmental performance
- Adaptation to energy system with increasing share of intermittent RES

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

Innovation Action ➔ Funding 70 %

Budget 20 Mio €

Proposals of 6 – 10 Mio € adequate for challenge

Opening 7 May 2019

Deadline 27 August 2019

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Low carbon industrial production using CCUS

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Challenge

- CCUS for industrial sectors is critical to reaching the 2050 climate objectives in a cost-effective way.
- CCUS in these sectors faces significant challenges due to its high cost and the fierce international competition.
- Industrial sectors currently account for 20% of global CO2 emissions, and in the 2 degree scenario, should represent half of the stored CO2 by 2050.
- Sectors with high CO2 emissions include steel, iron and cement making, oil refining, gas processing, hydrogen production, biofuel production and waste incineration plants.

Scope (1)

- Projects will focus on integrating CO2 capture in industrial installations, whilst addressing the full CCUS chain.

- Projects will elaborate a detailed plan on how to use the results, i.e. the subsequent transport, utilisation and/or underground storage of the captured CO2.

- Important aspects to address are:
  - technical (e.g. the optimised integration of capture plant with industrial processes; scalability; CO2 purity),
  - safety (e.g. during transportation and storage), financial (e.g. cost of capture; cost of integration)
  - strategic nature (e.g. business models; operation and logistics of industrial clusters and networks).

Scope (2)

- Projects are expected to bring technologies to TRL 6-7
- Technology development has to be balanced by an assessment of the societal readiness towards the proposed innovations.
- Projects should explore the socio-economic and political barriers to acceptance and awareness
- International cooperation is encouraged, in particular with relevant Mission Innovation countries such as China

Expected Impact

- Demonstration of integrated-chain CCUS from industrial sectors will accelerate the learning and drive down the cost.

- The impact of projects under this call will be determined by the extent to which the results will be exploited such as:
  - The plan on how the captured CO2 will be actually utilised and/or stored, either in the project or in the future and
  - the maturity and quality of the proposed post-capture solutions.

- Projects that are carried out in areas where there is both a high concentration of CO2 emitting industries and a nearby capacity for geological storage are considered prime sites for ***hub and cluster developments*** and will generate the highest impact on full-scale deployment in the medium to longer term.

LC-SC3-NZE-5-2019-2020

Innovation Action ➔ Funding 70 %

Budget 33 Mio € in 2019

Proposals of 10-12 Mio € should be adequate

TRL 6 – 7

Opening 7 May 2019

Deadline 27 August 2019

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RTD Joint Battery Call 2019-2020
Topic LC-BAT2-2019

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ADVANCED MATERIALS AND NANOTECHNOLOGIES

- *Support to the implementation of EU policies*

  - International CO2 reduction challenges
  - Juncker priority: Sustainable and affordable energy, secure supply
  - In line with specific EC policies
    Energy Union, Energy Package (ACEI),
    Mobilty Package 2017
  - Implementation of the SET-Plan integrated roadmap

ADVANCED MATERIALS AND NANOTECHNOLOGIES

- *Invest in Green Economy (new opportunities towards jobs and growth)*

- *Leverage existing R&D results and project clusters for reaching market deployment*

→ **Seek support from all stakeholders**

ADVANCED MATERIALS AND NANOTECHNOLOGIES

- *Value-chain approach*

➢ **Diversification of energy sources: increasing share of renewables; decentralising energy production**
➢ **Decarbonisation of fossil energy sources**

➢ **Development of flexible energy storage**

Strengthening EU materials technologies for non-automotive battery storage

TRL from 4 to 6

Specific Objective:

Energy Union and implementation of European and national energy policies rely on increased use of sustainable energy production, as solar or wind energy. This will allow a reduction of CO2 emissions, a cleaner air and environment in general, and reduction of the dependence from fossil fuels. New production technologies as industry 4.0 will make Europe more competitive.

The obstacle:

Future energy supply will be much more decentralised, due to e.g. decentral production of solar and wind power, or due to more delocalised ways of industrial production. These industrial sites, as well as small robotised devices or even private households need specific battery storage solutions.

The challenge:

Europe needs to strengthen the battery storage value chain through use of advanced materials and nanotechnology to prepare European industry to be competitive in these markets.

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Strengthening EU materials technologies for non-automotive battery storage

Scope:

- Develop more **price competitive, better performant and highly safe battery** storage solutions with **improved lifetime** by lowering cost and capital expenditure through development of **less expensive and more performant materials** (advanced electrode materials, electrolytes), use of new chemistries, packaging and cell design or battery production processes
- Consider **safety aspects, sustainable materials**, environmental friendly prodcution processes, **second life applications**
- **Recycling** should be inherently possible on a large scale permiting overall costs that do not hamper market aceptance
- Strengthen existing EU value chain
- The new **solution and its output targets** (cyclability, reliability, usage and lifetime) **should be demonstrated and tested**
- A full **life cycle assessment** and economic cost study of the new solution has to be included

LC-BAT-2-2019

Strengthening EU materials technologies for non-automotive battery storage

RIA
100%

Expected impact:

- Enhanced market success of the more competitive and sustainable technologies, obtained by **strong reduction of cost** a) for stationary applications, **below 0,05 € / kWh/cycle** , and b) cost reduction by **at least 20% in all other cases**
- More competitive products due to increased lifetime, a) with **cyclability** for stationary energy storage clearly beyond current standards, to reach **at least 5000 cycles at 80% of Depth of Discharge**, and b) significantly improved cyclability in all other cases
- More sustainable products that are based on recyclability with an **improved recycling efficiency, ideally beyond 50%,** reaching economic viability (that has to be demonstrated)

Relevant **indicators and metrics**, with baseline values, should be clearly stated Performance of new materials should be in line with those specified in the **SET plan**

4-6 Millions Euros

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What will come next (from NMBP):

- **Preparation of WP 2020**
  Photovoltaics/ ocean energy

- **Preparation of updated WP2019/2020**
  LC-NMBP-29-2019: Materials for non-battery based energy storage

- **Preparation for succesor of Horizon 2020**
  Horizon Europe
  Co-creation

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LC-BAT-3-2019: Modelling and simulation for Redox Flow Battery Development

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Johan BLONDELLE
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DG RTD G.2, Advanced Energy Produ

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Challenge

- Redox Flow Batteries are considered prime candidates for grid-scale stationary energy storage
- Performance determined by redox couples and electrolytes
- Current designs use metal-based redox pairs
  - Non-European origin
  - Environmental impacts
- Performance limited due to water-based systems

- Identify suitable pairs + electrolytes
  - Low cost
  - High efficiency
  - Sustainable
  - Optimised redox potential, reversibility, stability, solubility, availability

Scope

- Development of mathematical models for numerical simulation and high-volume pre-selection of electrolyte flow and electrochemistry
- Models to allow
  - characterization of new chemicals and designs
  - Charge, mass and heat transport mechanisms
  - Identification of cell-limiting mechanisms
  - Forecast of cell performance
  - Optimisation of design and scale-up
- Simulation models should be validated with experimental examples + demonstrate how new chemistries can be explored

Expected Impact

- Accelerate the search for new non-rare and non-toxic materials
- Reduce production costs for materials and components
- Optimise design and performance of full-scale RFB systems for grid balancing

- Contribute to SET-Plan targets
- Stimulate investment in low-carbon energy sector, boosting innovation-driven growth and industrial competitiveness

Summary

- RIA
- Single-Stage
- EU contribution **€2 Million** (not an eligibility criterion)
- Topic Budget €5 Million
- Opening Date 24 January 2019
- Deadline 25 April 2019

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LC-BAT-4-2019: Advanced Redox Flow Batteries for stationary energy storage

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Challenge

- Redox Flow Batteries are considered prime candidates for grid-scale stationary energy storage
- Performance determined by redox couples and electrolytes
- Current designs use metal-based redox pairs
  - Non-European origin
  - Environmental impacts
- Performance limited due to water-based systems

Scope

- Develop and validate RFB based on new redox couples and electrolytes (e.g. organic or earth-abundant substances)
- Focus on
  - environmental sustainability,
  - high energy and power density
  - Maximisation of lifetime and efficiency
  - Minimisation of cost (including balance of plant components)
- To be reflected in setting of KPI's

Expected Impact

- Contribution to reduced energy storage cost of 0,05€/kWh/cycle by 2030
- Stimulate investment in low-carbon energy sector, boosting innovation-driven growth and industrial competitiveness
- Contribute to acceleration of integration of large shares of intermittent renewables (PV and wind)

Summary

- RIA
- Single-Stage
- EU contribution **€3-4 Million** (not an eligibility criterion)
- Topic Budget €15 Million
- TRL at start: 3
- TRL at end: 5
- Opening Date 24 January 2019
- Deadline 25 April 2019

The calendar of the calls

Call identifier	Opening date	Deadline to apply	Total budget
BAT-2 BAT-3 BAT-4	24 JAN 2019	25 APRIL 2019	€44 M
NZE-4 NZE-5	07 MAY 2019	27 AUGUST 2019	€53 M

Thank you!

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EU Participant Portal

www.ec.europa.eu/research/participants