Energy research under Future and Emerging Technologies (FET) in Horizon 2020

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Outline

- *Introduction to FET*
- *Energy-related projects in FET*
- *Funding opportunities in FET-Open and FET-Proactive*

FET mission

- To turn Europe's excellent science base into a competitive advantage by uncovering radically new technological possibilities
- To turn Europe into the best place for collaborative research and innovation in future and emerging technologies

Characteristics

Unique positioning within H2020

- Visionary aiming at S&T breakthrough
- Interdisciplinary, high risk/high gain, collaborative
  - High complementarity with ERC

Successful set of complementary schemes for reaching impact

- From early stage exploratory research, to thematic critical mass & community building, to addressing grand challenges

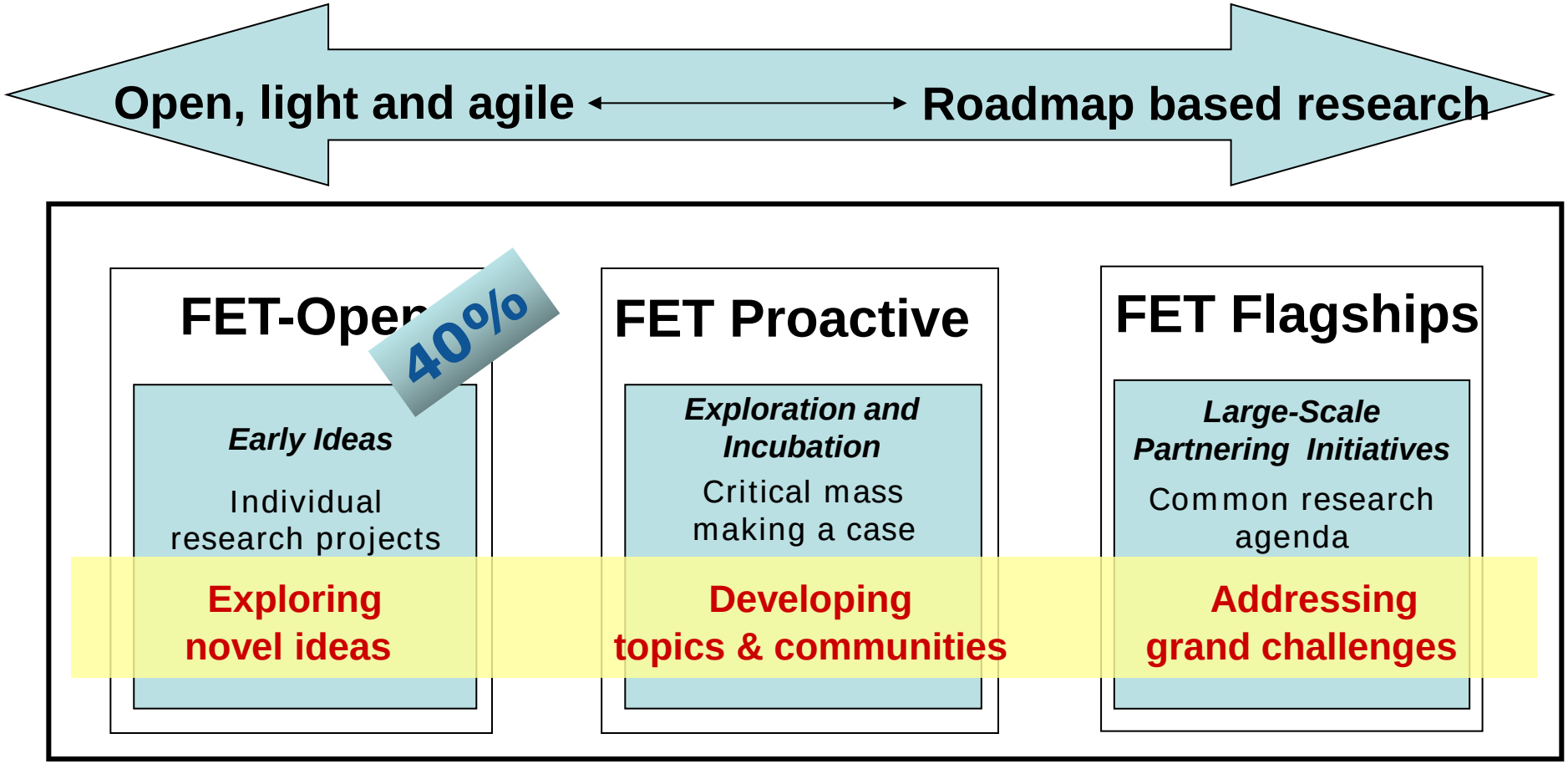
Key role in bridging from science to technology

- Bridging with LEIT

High innovation potential across all schemes

- Kick starting innovation ecosystem
  - Relevant to the discussion on EIC

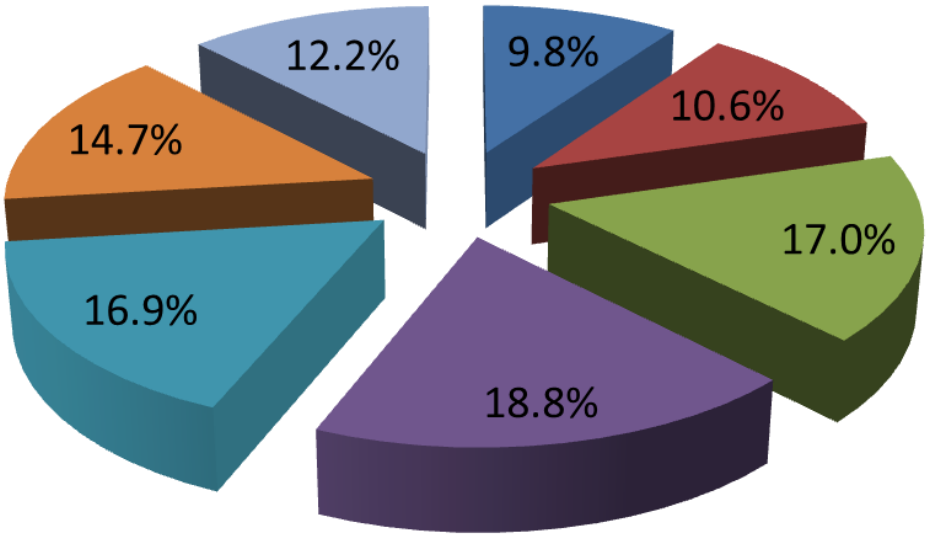
The power of FET – 3 complementary schemes



FET Open

Successfully reaching out to new domains!

Clustering of proposals from the first call



- Energy, Transport, Environment
- Bio-Robotics and HCI
- Life Science, Medicine, Biology, NeuroBio
- Electronics, Telecom, Optics, Hardware, Sensors, Devices
- Computer Science, Bio-informatics, Complexity, Data mining
- Nanoscience, Quantum Physics, Astrophysics
- Materials, Chemistry

Energy-related projects in FET

LirichFCC

Lithium-rich oxyfluorides with cubic dense packing

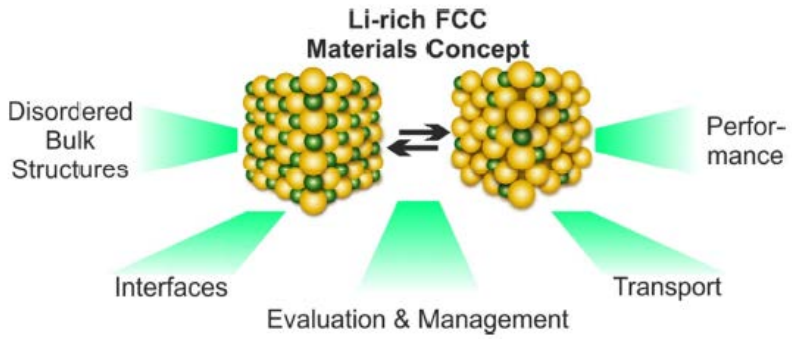
European Commission

The project goal

Explore a new class of material for electrochemical energy storage characterized by a very high concentration of lithium atoms organised in a cubic dense structure

How ?

1. Exploration and optimization of Li-rich FCC materials (structure and composition) as cathodes in electrical energy storage.
2. Understanding and optimization of the chemistry and of the processes at the interfaces.
3. Study of the charge transport at the interface and in the bulk



Impact on

1. Technology:

Revolutionary storage materials with energy densities of 7500 Wh/L

2. Environment:

Push forward existing technologies that rely on compact electric energy storage (electric vehicles).

3. Economy:

Development of new storage concept: disruptive effect on the battery market in Europe.

GOTSolar

The project goal

- *Disruptive approaches for the development of highly efficient, long-lasting and environmentally safe perovskite solar cells (PSCs).*

How ?

GOTSolar aims at reaching the ambitious goal of 24% efficiency and stable PV cell by developing highly efficient and stable materials, hermetic encapsulation and relevant know-how for future upscaling, through:

Development and physical characterization of new pigments

Synthesis of hole-transport materials (HTM) with enhanced charge transport properties

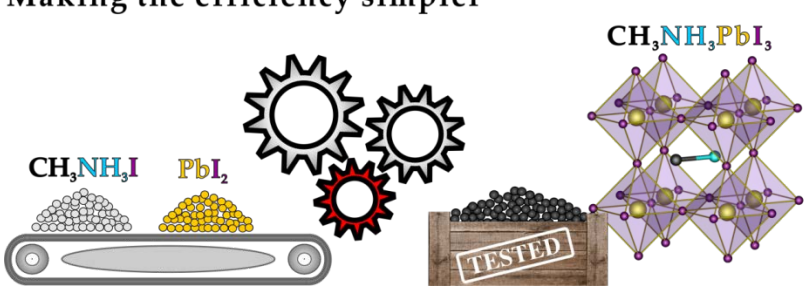
Novel structures of oxide scaffold materials

Innovative laser-assisted sealing

Development and optimization of graphene-based films to be used as transparent counter-electrode

Accelerated aging tests for stability assessment

Long-term vision for PSC technology: the first approach to turn it a profitable technology



Impact

Building environment

PV modules are aimed to become a competitive technology with favorable mechanical, optical and aesthetic characteristics that drive commercial acceptance and allow further deployment by integration of PV functionality into the building environment.

Interdisciplinarity *:* material science, physicists, physical chemists, chemists, numerical simulation and chemical, mechanical and electrical engineering.

More information:
http://gotsolar.eu/general-info/

A-LEAF - 732840

Proactive RIA - Start: 01/01/2017

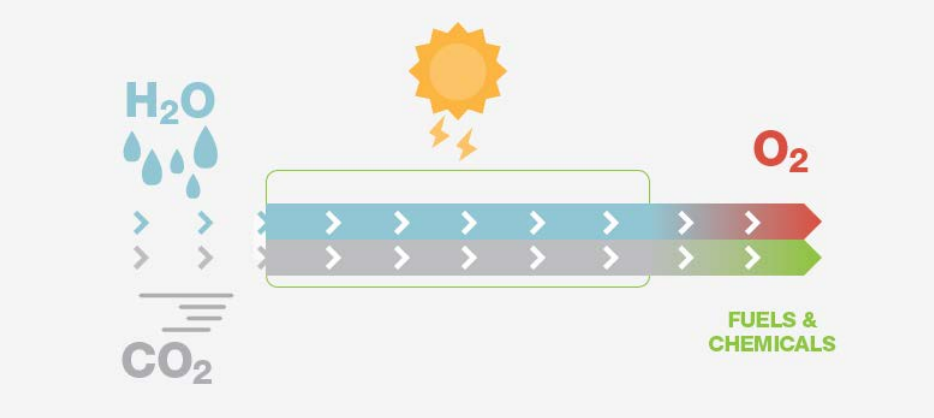
Artificial photosynthesis fuels and

The project goal

To create an artificial photosynthesis device that uses sunlight to convert water and carbon dioxide into fuels and other chemicals, mimicking the action of plant leaves.

How?

- Theoretical and experimental studies of CO2/water reactions at surfaces to make fuels
- Optimisation of results and transfer to photo-electrochemical cells
- Scaling up results in a photoelectrocatalytic device
- Rare and/or expensive materials will be avoided



Impact on

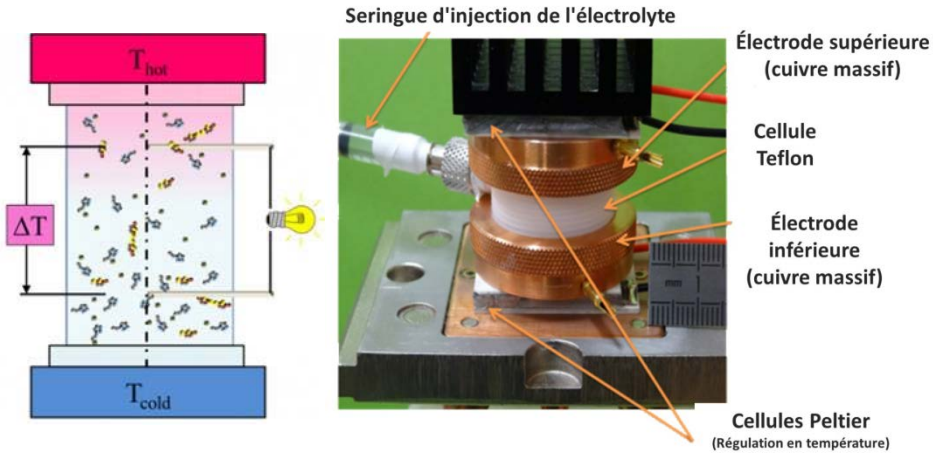
- **Science** – photovoltaic materials and surface chemistry
- **Technology** – photoelectrocatalytic devices for solar energy capture
- **Society** – potential for a carbon-neutral fuel cycle using conventional hydrocarbon fuels.

The project goal

Develop novel thermoelectric materials based on ionic ferrofluids for use in devices to convert waste heat produced by many aspects of daily life into more useful forms of energy (eg electrical).

How?

- Experiments and theory used to understand thermoelectric properties of various ionic ferrofluids
- Materials optimised to maximise the thermoelectric effect
- Construction of prototype thermoelectric cells and testing in realistic conditions



Power generating cell (MAGENTA / CEA)

Impact on

- **Science** – novel thermoelectric materials
- **Technology –** new devices for energy harvesting in "self powered" devices
- **Society –** more efficient use of energy resources

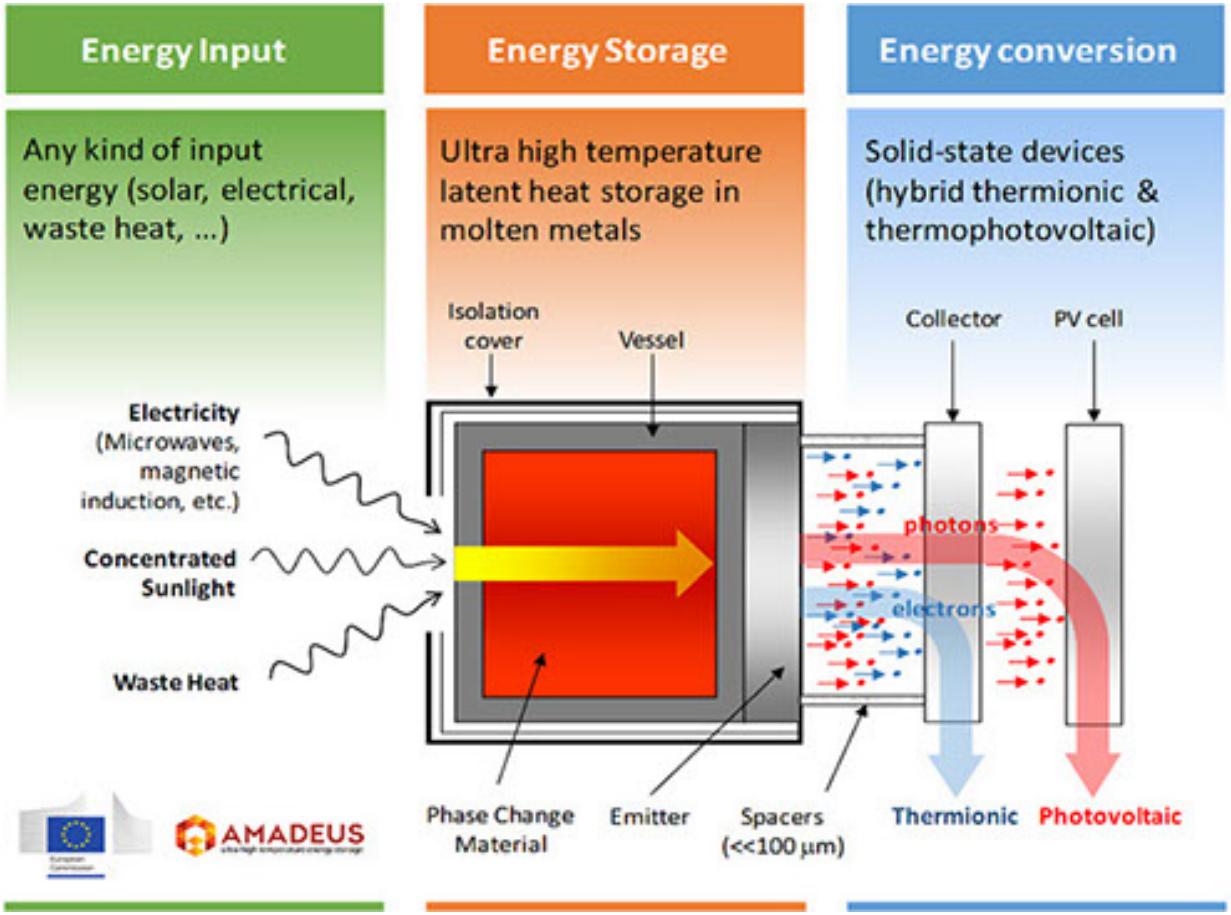
AMADEUS

Next generation Materials and Solid State Devices for Ultra High Temperature Energy Storage and Conversion

European Commission

The project goal

AMADEUS project will investigate the next generation of materials and devices for latent heat thermal energy storage (LHTES) at ultra-high temperatures of up to 2000ºC (well beyond today's maximum operation temperatures of ~1000ºC).



How?

- new phase change materials (PCMs) with latent heat in the range of 2-4 MJ/kg (>> salt-based PCMs);
- advanced thermal insulation and PCM casing designs,
- novel solid-state heat to power conversion technologies at temperatures up to 2000ºC.

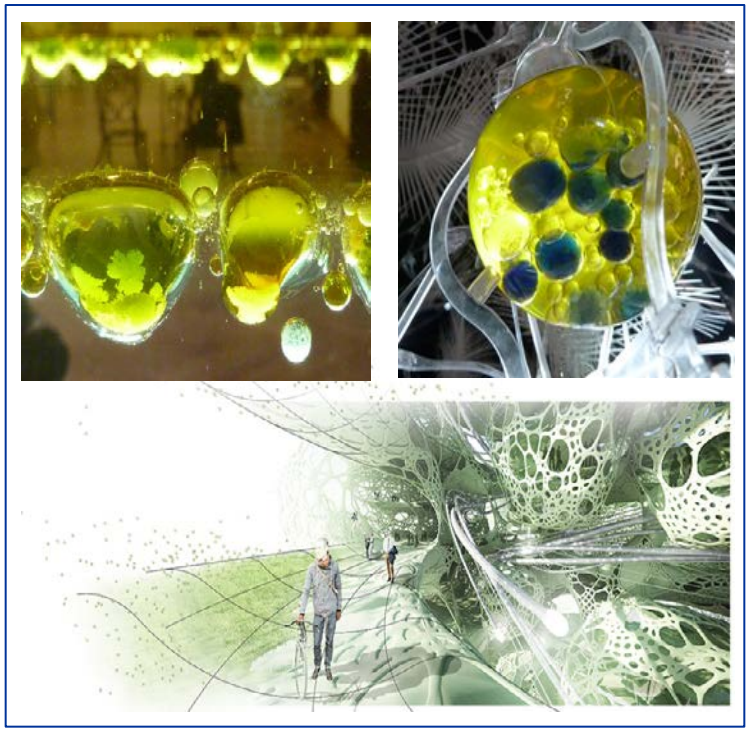
Proof of concept of a new kind of hybrid thermionic-photovoltaic (TIPV) device

The final goal of this project is to demonstrate the proof-of-concept of this idea and kick-starting an emerging research community around this new technological option.

LIAR - 686585
FET Open RIA - Start: 01/04/16

The project goal

Designing and developing a programmable modular **bioreactor-wall capable of extracting valuable resources from waste** water and air, generating oxygen, proteins and biomass for **energy production**.



How ?

- Based on the operational principles of **microbial fuel cells** as a programmable environment and its technical integration with **synthetic 'consortia' of microbes**.

Impact on

Environmental performance of **living spaces**, improving **health**, productivity and **ecosystems** impact.

Funding opportunities

in FET-Open and FET-Proactive

Call timing – FET-Open

Topic	Budget 2016 (€ Million)	Budget 2017 (€ Million)	Deadlines	Opening
FETOPEN-01-2016-2017 (RIA)	84.00	84.00 **84.00**	11 May 2016 17 Jan 2017 **27 Sep 2017**	8 Dec 2015
FETOPEN-02-2016 (CSA)	3.00		11 May 2016	8 Dec 2015
FETOPEN-03-2017 (CSA)		1.50	17 Jan 2017	20 Sep 2016
FETOPEN-04-2016-2017 (CSA)	1.20	1.80	29 Sep 2016 27 Sep 2017	1 Mar 2016
Total:	88.20	113.80		

Call - FET Proactive – 2018 – Draft!

FETPROACT-01-2018: FET Proactive: emerging paradigms and communities

cutting-edge ***high-risk / high-reward research and innovation projects*** *demonstrating a new technological paradigm within:*

- ***Artificial organs, tissues, cells and sub-cellular structures.*** *(15MEuro)*
- ***Time.*** *(13MEuro)*
- ***Living technologies.*** *(20MEuro)*
- ***Socially interactive technologies.*** *(15MEuro)*
- ***Disruptive micro-energy and storage technologies****. (15MEuro)*
- ***Topological matter.*** *(10MEuro)*

FET Proactive – 2018 – energy topic

Draft!

Disruptive micro-energy and storage technologies*. This initiative seeks radically new approaches to energy for embedded, personal or local use (including bio-mimicking, the use of soft or intelligent materials to generate, capture or store energy or the development of new types of batteries). Proposals could target in particular the lower end (i.e., micro-energy or nano-scale energy transfer, dissipation and conversion) and/or new technologies for optimal local (close to where-needed) energy storage/release and their integration within hybrid/distributed energy systems. Proposals should also address aspects of sustainability and environmental impact. (15MEuro)*

FET Proactive 2018 Call

Timing, Funding and Expected Impact

WP published 20 October 2017 (check final text!)

Call opens 17 April 2018, closes 18 September 2018

EU contribution of EUR 4 to 7 million with a duration of up to 5 years.

Expected Impact:

- *foundation and consolidation of a radically new future technology*
- *Potential for future returns in terms of societal or economic innovation or market creation.*
- *Spreading excellence and building leading innovation capacity across Europe.*
- *Build-up of a goal-oriented interdisciplinary community.*
- *Emergence of an innovation ecosystem around a future technology in the theme addressed from outreach to and partnership with high potential actors in research and innovation, and from wider stakeholder/public engagement.*

Thank you for your interest in FET

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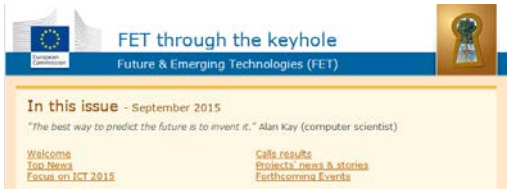

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