



European
Commission



European Union research activities and new approach on international cooperation

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Strategic Energy Technology Plan (SET Plan)

The SET-Plan is the TECHNOLOGY pillar of the EU's ENERGY & CLIMATE policy

- Objective is to accelerate the development of low carbon technologies leading to their market uptake
- A firm commitment to position the European industry in a leading role worldwide in the transition to a low-carbon economy

Key features

- Joint Strategic Planning:
 - Steering Group (EC + MSs)
 - Information System: SETIS
- Effective Implementation:
 - **European Industrial Initiatives**



CCS and CCT in Framework Research Programme FP 7 until 2013

Overall Aim:

- **To support R&D needed for**
successful demonstration projects in Zero Emission Power
Plants by 2015, and
for commercial adaptation from 2020 onwards

Prerequisites:

- Efficiency increase in coal combustion processes
- Development of value chains for by-products
- Definition of supportive policies / regulatory aspects
- Address public awareness

CCS and CCT Technologies under FP 7

- Area 5, CCS: capture technologies, storage site development and public awareness
- Area 6, CCT: efficiency increase in power production with a view on CCS
- Area 5&6, cross cutting: integrated concepts of highly efficient power plants with CCS

CCT and CCS latest projects - EU FP7 call 2011

5th Call (2011): focus on combustion & gasification and CCS with a budget of 36 M€ on topics:

- Optimisation of the integration of CO₂ capture into power plants
- Post-combustion solvent based CO₂ capture
- CO₂ storage
- IGCC for high ash coal content
- Support to the EU CCS demonstration project network
CCS- PNS (ccsnetwork.eu)

Projects: OPTIMASH; IOLICAP; CAPSOL; O2GEN; OCTAVIUS

All details on EU Cordis Webpage on Cleaner Coal Technologies:

http://ec.europa.eu/energy/technology/projects/cct_en.htm

CCT - Examples of FP7 current projects

H2-IGCC aims to develop a gas turbine capable of burning Hydrogen-rich Syngas. **17.2 M€**. Ends in Oct 2013. <http://www.h2-igcc.eu>

FlexiBurn CFB aims to develop highly efficient CFB technology to provide flexible air/oxy operation for power plant with CCS. **11M€**. Ends in Aug 2012. <http://www.vtt.fi/sites/flexiburncfb>

NextGenPower aims to demonstrate new alloys and coatings in boiler, steam turbine & the interconnecting pipework, for operation under ultra supercritical conditions, in combination with CCS, and still with a net efficiency of 45%. **10.3M€**. Ends in Apr 2014 <http://www.nextgenpower.eu/>

MACPLUS aims to demonstrate new strategies for increased efficiency, enhanced performance and reliability of critical components in power plants, operated under ultra supercritical conditions, with CO₂ capture integrated in the plant and also retaining fuel flexibility. **18.2 M€**. Ends in June 2015 <http://macplusproject.eu/home>

O2GEN aims to demonstrate the concept of the the second generation oxyfuel combustion that reduce significantly (50%) the the overall efficiency penalty of CO₂ capture. **11.2M€**, Start June 2012 – Ends in June 2015

RELCOM aims at reliable and efficient combustion of oxygen/coal/recycled flue gas mixtures - full-scale deployment of oxy-fuel firing. **6.7M€**, Ends in Nov 2015

Materials Roadmap Enabling Low-Carbon Technologies

Materials Research Roadmap for Fossil Fuel Energy technology including CCS - Commission Staff Working Paper published on 13 December 2011

- Focus on R&D and Innovation for 11 low-carbon energy technologies for the next 10 years
- Novel Materials for the fossil fuel energy sectors under Chapter 3.8. - http://setis.ec.europa.eu/activities/materials-roadmap/Materials_Roadmap_EN.pdf/view
- Based on scientific assessment – JRC report with in-depth analysis of the state of the art and future challenges for energy technology- related materials and needs for research activities- http://setis.ec.europa.eu/activities/materials-roadmap/Scientific_Assessment_CCS_Fossil_Fuels/view

Materials Roadmap – Fossil Fuel Energy Sector

- Development and optimisation of high temperature materials and protective and thermal barrier coatings with superior creep and oxidation resistance properties after log exposure at 800 C,
- Development of enhance research capabilities to study and mitigate the influence of the harsh operating conditions on materials, new materials such as refractory metals, metal composites, intermetallic and gradient materials, with superior performance at very high temperatures
- Puts forward up to 4 industrial pilots to validate processing and manufacturing routes and performance of high temperature materials and coatings under realistic operating conditions
- Up to 6 pilot projects to test advance separation processes at industrial scale and a series of research infrastructures to model, test and standardise material/component performance evolution and to validate the outcomes of the pilot projects

International Initiative-Materials for Energy

- US-EU Energy Council endorsed the prioritisation of four priority technology areas with added value for EU-US cooperation – Joint Action Plan of 2012 and 2013
- Advanced materials including critical for clean energy supply, smart grids including energy storage for grids, nuclear fusion, and hydrogen and fuel cell technologies.
- EU-US- Japan Trilateral Initiative on Critical Materials launched on 4-5 October 2011
- Organisation of Trilateral EU-Japan-US Conferences on Critical Materials: Washington (December 2010), Tokyo (March 2012), Brussels (tentatively June 2013)

International Initiative-Materials for Energy

- EU FP7 call NMP.2012.4.1.-3 focused on the development of advanced magnetic materials without, or with reduced use of, critical raw materials, thereby inviting explicitly the participation of US and Japanese research groups
- Coordinated EU-Japan calls:
 - **NMP.2011.2.2-6 Fundamental properties of novel superconducting materials** → currently 3 projects on-going:
 - LEMSUPER: <http://www.lemsuper.eu/>
 - SUPER-IRON: <http://www.super-iron.eu/>
 - IRON-SEA:
http://cordis.europa.eu/search/index.cfm?fuseaction=proj.document&PJ_RCN=12323510
 - **NMP.2013.4.1-1 Development of new materials for the substitution of critical metals** → CURRENTLY OPEN FOR PROPOSAL SUBMISSION!!

Coordinated projects are designed to foster robust EU-Japan research cooperation

EU FP7 call NMP 2012: Materials and new Production Technologies – CO₂ Utilisation

- Call FP7- NMP Small 2012 - 2.2.-3 Advanced materials for high temperature power generation including coal-fired plants
- Call FP7 – NMP Small 2012 – 2.1.-2 Fine Chemicals from CO₂ including further products from CO₂
- Two stage procedure - first stage 8 November 2011- second stage 5 May 2012 – in negotiation
- Budget for NMP SMALL 2012 – 124 M€

<http://ec.europa.eu/research/participants/portal/page/cooperation?callIdentifier=FP7-NMP-2012-SMALL-6>

International EU FP 7 Call Energy 2013

- *Topic ENERGY. 2013.6.1.1.: Combined Underground Coal Gasification and CCS with active participation of non-EU partners, in particular SA, Australia, U.S., India and China – Deadline 28 November 2012*
- *Topic ENERGY. 2013.5.1.2: New generation high-efficiency capture processes to promote international cooperation with Australia coordinated with Australian government – Deadline 28 November 2012 -*
- *Further topics on materials for advanced Ultra-Supercritical coal power plants and on coal gasification/polygeneration could follow*

New opportunities to target research and innovation on energy technologies to specific countries on common interest in the Horizon 2020 framework

Other funding instruments

Research Fund for Coal and Steel (RFCS)

- Budget of ~15 M€/year on industrial research
- Covers the entire value chain, from coal mining operation, conversion and processing, to CCT and CCS
- Open call for proposals, cut-off date 15th September every year
- Participants from third countries are welcome but not eligible for funding
- Flagship projects includes COMPTES700 (test facility for 700C power plant; 15M); ECLAIR (emission free chemical looping; 6.4M) and ENCIO (pilot to demonstration for 700 C technology)
- More details on: <http://cordis.europa.eu/coal-steel-rtd/>
- Evaluation of project proposals for 2011 finished in December

COMTES 700 (RFCS funded)

Component test facility for a 700° C power plant Flagship Project

- Project coordinated by VGB PowerTech with 5 European partners
- Total cost: 15,2 M€, RFCS contribution 6,1 M€
- Project from 2004 - 2011

Objectives

- To design, manufacture, erect and operate a Component Test Facility (CTF) to test high temperature resistant new materials needed to realise a 700 C° and 350 bars coal based power plant with efficiencies above 50%.
- COMTES 700 is considered as the last step before the actual demonstration of the 700 C° technology for pulverised coal power plants at industrial scale.

ENCIO (RFCS funded)

European network for component integration and optimisation – Flagship project

- Project coordinated by VGB PowerTech with 4 European partners
- Total cost: 24 M€, RFCS contribution 10 M€
- Project from 2011 – 2017

Objectives

- Transition from pilot to demo plant for 700°C technology, last step before construction of a 700°C power plant.
- To concentrate all scientific and technological efforts to make the 700°C technology ready for deployment in coal fired power plants.
- The project will focus on practical investigations, aiming at proving manufacturing, welding, repair and life-time concepts for thickwalled components. ENCIO can be seen as perfect transition from pilot towards demo features.

Horizon 2020

- Commission proposal for a 80 billion euro research and innovation funding programme (2014-20) adopted 30.11.2011 ~ 5. 8 b€ for Secure, clean and efficient energy
- Following and extending the ideas of FP7
- Fosters the EU's strategy for growth and job creation
- Innovation Union Flagship Initiative supports Horizon 2020
- Research and innovation are the key drivers
- A huge technology shift is necessary to meet the targets of 2020 and moreover 2050

Horizon 2020

- *New approach enhancing and focussing EU international cooperation in research and innovation*
- *Strategic choice of partner countries and regions with more targeted actions based on common interest and mutual benefit*
- *More strategic use of S&T agreements with key third countries*
- *Internationalisation of programmatic approaches*
- *Rationalised set of instruments like joint and targeted calls and co-funding of programmes*
- *Communication published on 14 September 2012*
<http://ec.europa.eu/research/internationalstrategy>
- ***Open for participation from third countries***

Horizon 2020 COM Proposals 30. 11. 2011

- ***Communication Horizon 2020 – The Framework Programme for Research and Innovation 2014- 2020 - COM(2011)808 final***
- ***Regulation Horizon 2020 establishing Horizon 2020 – COM (2011) 809 final***
- ***Regulation laying down the rules for the participation and dissemination in Horizon 2020- the Proposal Specific Programme Horizon 2020 – COM (2011)810 final***
- ***Council Decision establishing the Specific Programme Implementing Horizon 2020 – COM (2011) 811 final***

- Ongoing:** Parliament and Council negotiations on the basis of the Commission proposals
- Ongoing:** Parliament and Council negotiations on EU budget 2014-2020 (including overall budget for Horizon 2020)
- July 2012:** Final calls published under 7th Framework Programme for research to bridge gap towards Horizon 2020
- Mid 2013:** Adoption of legislative acts by Parliament and Council on Horizon 2020
- 1/1/2014:** Horizon 2020 starts, launch of first calls