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Novel materials for energy applications

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FP7: http://cordis.europa.eu/fp7/home_en.html

FP7 calls: <http://cordis.europa.eu/fp7/dc/index.cfm>

Find documents: http://cordis.europa.eu/fp7/find-doc_en.html

FP7 Helpdesk: <http://ec.europa.eu/research/enquiries>





Materials: an invisible revolution is becoming very visible and profitable

New and improved materials represent an ***invisible revolution*** that changes products and process in large extent. They introduce new functionalities and/or improved properties, and thus adding value to products/services

The engineered realization of *materials by design* will allow re-designing or re-conceiving products and/or processes under a really sustainable systemic approach: energy and primary raw materials consumption, added value, safety (REACH, ...), less components, less production steps, ...

Materials science and engineering are
a main and growing key factor for success



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Materials enable advances in
virtually all technological
sectors

**Technologies to cope with
global socio-economic challenges**

**sustainability
peace**

**Technologies to improve life and
increase the value of products/services**

**growth
jobs**



Many concerned factors

Availability of top-level infrastructures particularly for interdisciplinary R&D
Availability of suitable equipment

Lack of interdisciplinary education and training
Obstacles to researchers' mobility

Conservatory character of the science systems
Contrast between « easy acceptable » and « avant-garde »

Conservatory character of industry, lack of flexibility in the organisation of work
The emergence of global corporations and global competitiveness

Regulatory and non-technological bottlenecks
Difficulties in relationships amongst stakeholders

Conservatory character of financial bodies
Lack of marketing approach

... and good ideas ☺



Many medium-longer-term uncertainties and challenges ...and goals

Climate change

Scarcity of natural resources

Energy

→ substitution of energy-consuming, polluting or expensive materials

Water

Urban-rural dynamics

Future of work and future works

440 million undernourished people by 2030?

Slow growth in some world areas?

Ageing population

Demand for materials (2015-2020 and beyond)

Health

Chronic diseases, handicaps, lifestyles

Safety of food, environment, working conditions...

Transport challenges

Security

Remediation of disasters and recovery of polluted areas

...



Millennium Development Goals

- ***Progress in materials sciences can help:***
 - × **Water treatment and remediation (*and de-pollution*)**
 - × **Energy production, storage and conversion**
 - × **Disease diagnosis and screening**
 - × **Drug delivery systems (*AIDS*)**
 - × **Health monitoring**
 - × **Air pollution and remediation**
 - × **Food processing and storage**
 - × **Vector and pest detection and control**
 - × **Agricultural productivity enhancement**

Taken from "Innovation: applying knowledge in development", UN Millennium Project Report



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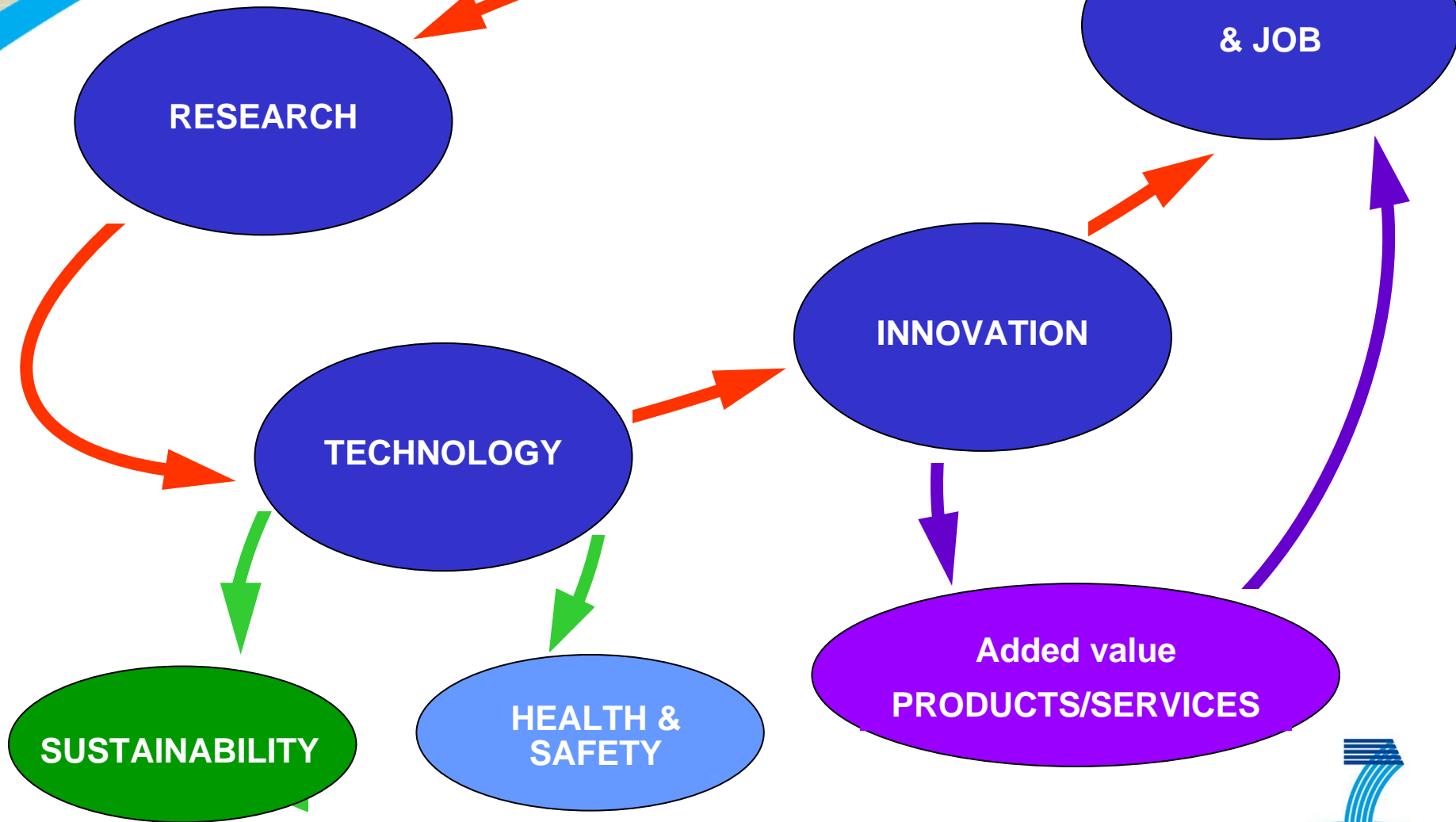
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Is there scope, advantage and mutual interest for fruitfully cooperating more intensively together at international level?



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The EU 7th framework Programme (FP7)

- **The Framework Programme is the strategic instrument for RTD policy (Chapter XVIII of the Treaty):**
 - ✓ General principles, objectives, financial means
 - ✓ Proposed by the Commission for co-decision by Council and Parliament
- **The FP is implemented by Specific Programmes:**
 - ✓ 4 SPs in FP7: Cooperation; Ideas; People; Capacities
 - ✓ Detailed research content
 - ✓ Types of activities and where they apply



Budget

FP7 Budget: more than 53 €billion

× CO-OPERATION	32413
• Health	6100
• Food, Agriculture and Biotechnology	1935
• Information and Communication Technologies	9050
• Nanotechnology, Materials & Production Technologies (NMP)	3475
• Energy	2350
• Environment (including Climate Change)	1890
• Transport (including Aeronautics)	4160
• Socio-economic Sciences and the Humanities	623
• Space	1430
• Security	1400
× IDEAS (European Research Council)	7510
× PEOPLE	4750
× CAPACITIES	4097
× JRC	1751
× Euratom (Fusion and Fission)	2751

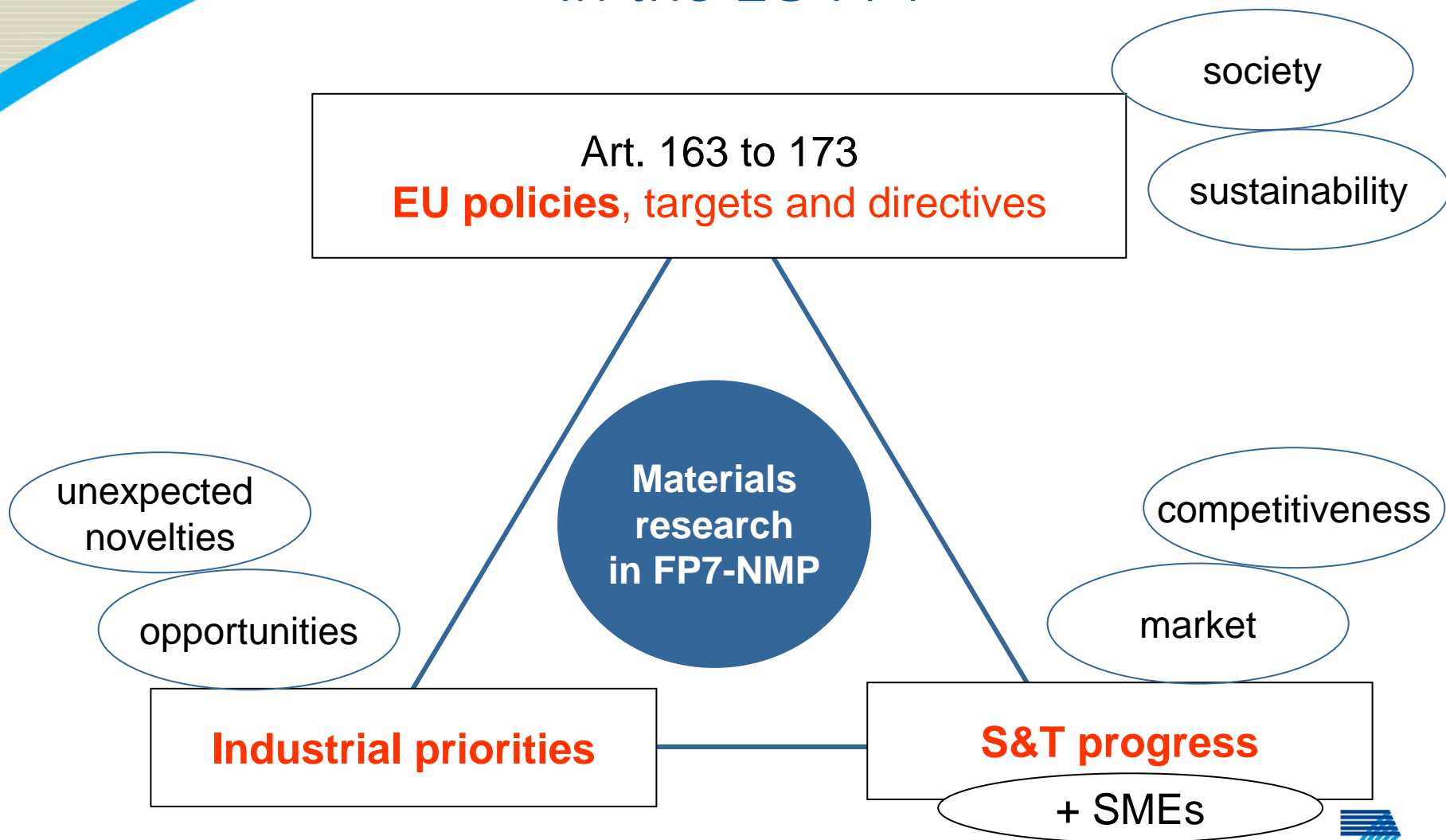


Participation open to the world

- **General rule**
 - 3 independent participants from 3 different MS or AC (Associated Countries)
- **Specific International Cooperation Actions**
 - 2 participants MS or AC and 2 participants ICPC (International Cooperation Partner Countries)
- **Coordination and support actions, Training of Researchers, “Frontier” research projects**
 - 1 participant



Positioning Materials R&D in the EU FP7





Several funding routes

- research funding
- education
- structuring / networking
- foresighting
- addressing non-technological bottlenecks

high technological risk → public funding

UNIVERSITIES

ERC (& FET)

Marie Curie Actions

COST

ERANET+

LIFE+

FP(NMP) calls

JTI

CIP

EIT

ERASMUS & E. MUNDUS

R&D for SMEs

RSFF

«lead markets»

National funds

EUREKA

ETPs

Non-technological bottlenecks: standards, norms, rules, capital...

high industrial and commercial risk → private funding





Various levels of action as the EU has 27 Member States

Policy level

- ✓ open method of coordination
- ✓ joint programming
- ✓ mapping, benchmarking, score boards

Programme level

- ✓ ERA-NET and ERA-NET+
- ✓ Article 169

Project level

- ✓ Collaborative research (FP)

Private-public partnership

- ✓ JTI

Enabling

- ✓ Infrastructures
- ✓ Marie Curie and Erasmus
- ✓ ERC, EIT



FP7 energy research areas

Hydrogen and fuel cells

Renewable energies for electricity, fuel production and heating and cooling

Electrical, including storage

Solar, including photovoltaics

Biofuel, biomass

Wind

Geothermal energy

Concentrated Solar Power

Ocean

Hydro

Other (heat exchange, catalysis ...)

CO2 capture and storage technologies for zero emission power generation

Clean Coal Technologies

Smart energy networks

Sustainable nuclear energy (fission and fusion) [EURATOM]

Energy efficiency and savings

Knowledge for policy making



EU Strategic Energy Technology Plan

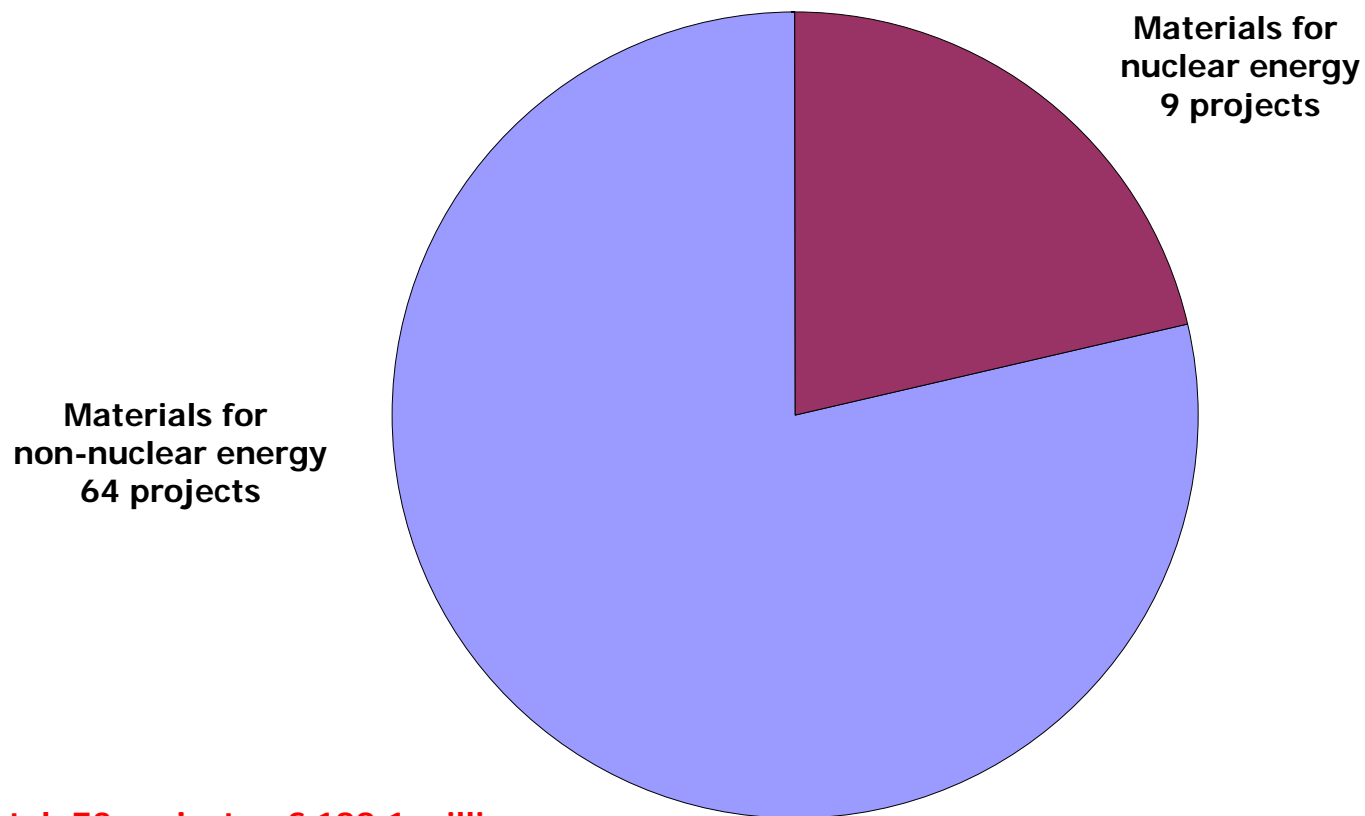
AN ENERGY POLICY FOR EUROPE

- **By 2020 – the three 20s:**
 - × **20% reduction in greenhouse gas emissions compared to 1990 levels (30% if global agreement)**
 - × **20% reduction in global primary energy use (through energy efficiency)**
 - × **20% of renewable energy in the EU's overall mix (minimum target for biofuels of 10% of vehicle fuel)**
- **By 2050 : indicative 60 to 80% reduction in GHG**

energy for a changing world



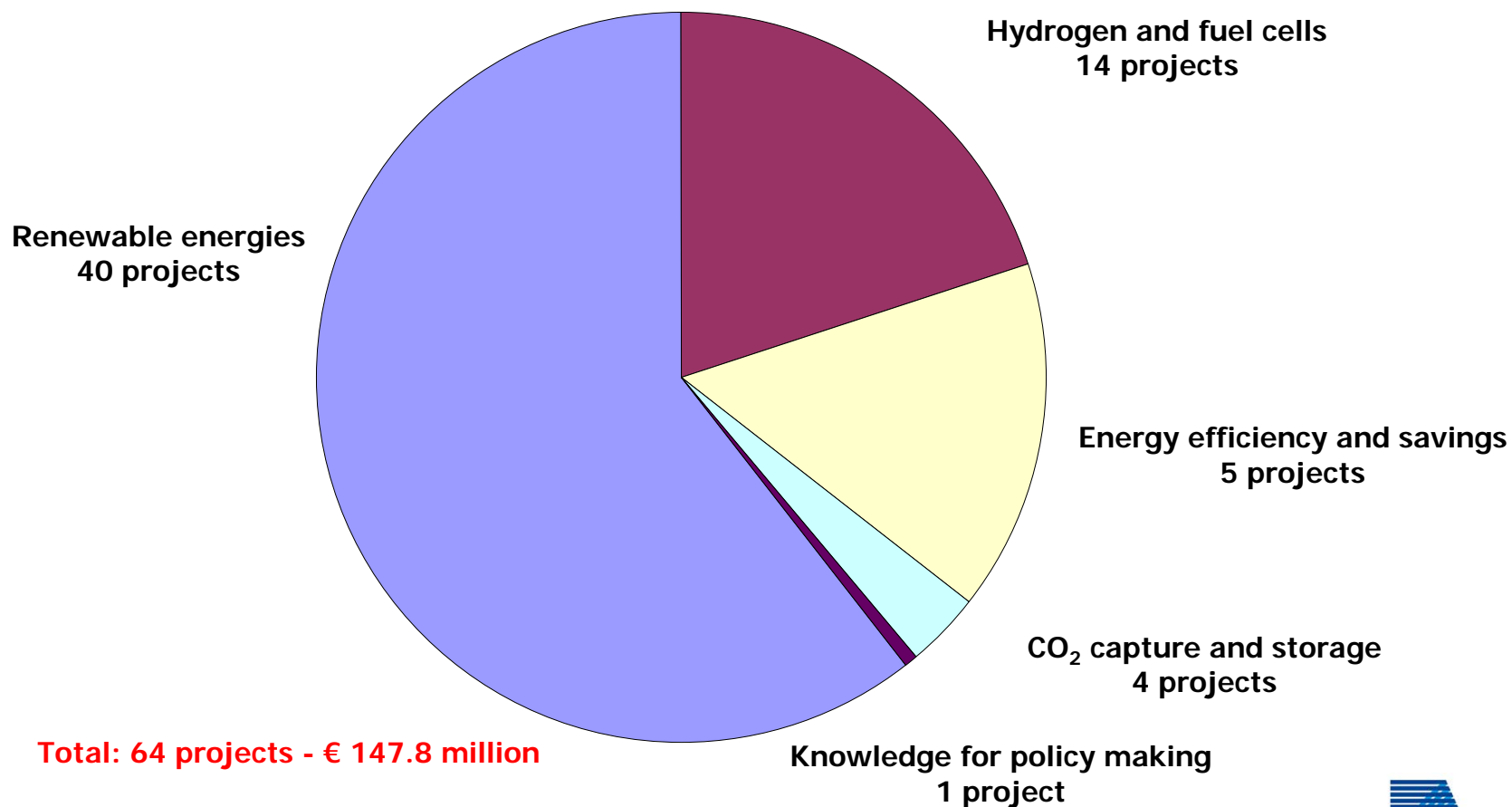
FP7 materials for energy: research areas



Total: 73 projects - € 188.1 million



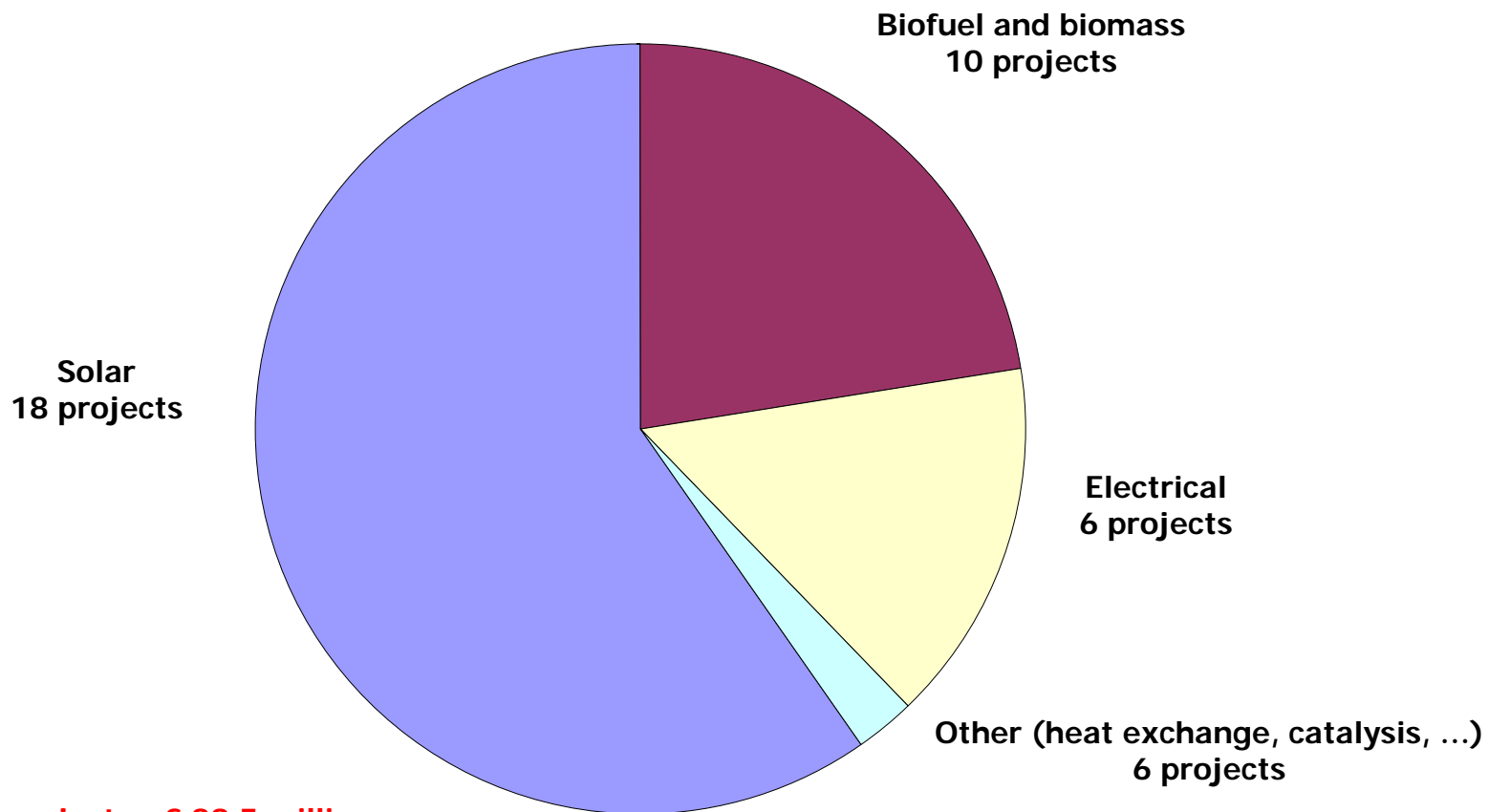
FP7 materials for energy: non-nuclear research areas



Total: 64 projects - € 147.8 million



FP7 materials for renewable energy



Total: 40 projects - € 89.5 million

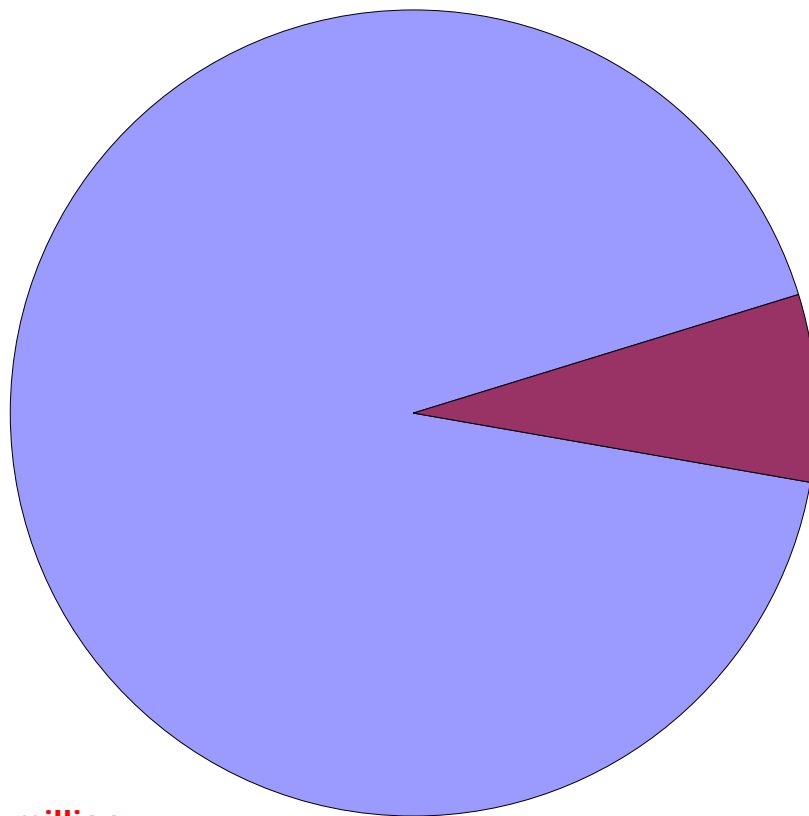


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EURATOM materials for nuclear energy

**Fission
7 projects**



**Fusion
2 projects**

Total: 9 projects - € 40.4 million

Data based on FP7 Grant Agreements 2007-2009.

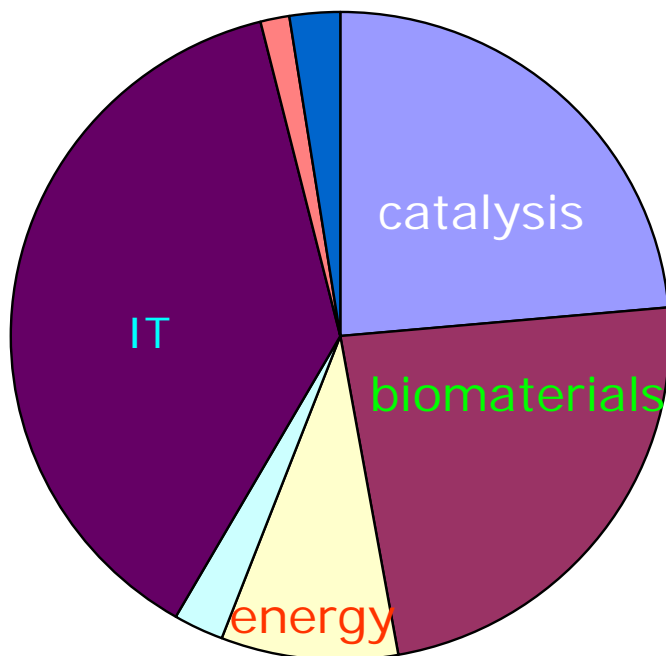




European Research Council portfolio

ERC Advanced Grants: Projects are related to materials for energy (total of €94.2 million)

ERC Advanced

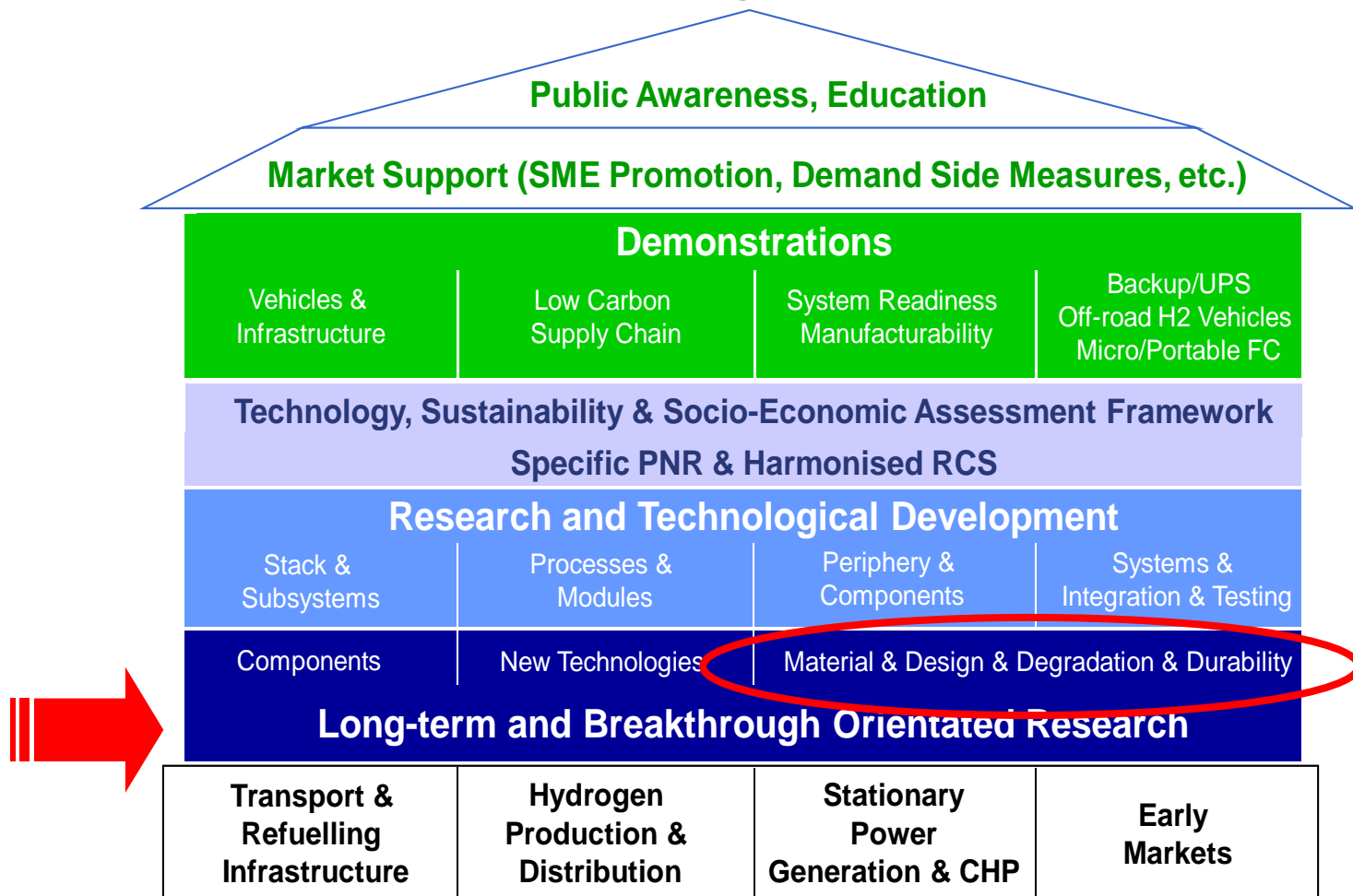


- A Catalysis and Chemical Technologies
- B Biomaterials and Medical Implants
- C Materials for Energy Applications
- D Surface Engineering and Coatings
- E Materials for Information Technologies
- F Materials with High Mechanical Performances
- G Polymers and their Composites



Fuel Cells and Hydrogen Joint Undertaking

Preliminary Structure of the Multi-annual Implementation Plan (total EC budget €470 million)





Fuel Cells and Hydrogen Joint Undertaking



First Call (2008) Evaluation outcome

Application areas	Proposals submitted to evaluators	Below thresholds proposals		Above thresholds proposals		
			%		%	Requested FCH-JU contribution (M€)
<i>Transportation & Refuelling Infrastructure</i>	4	1	25	3	75	12.10
<i>Hydrogen Production & Distribution</i>	7	4	57.14	3	42.86	4.54
<i>Stationary Power Generation & CHP</i>	15	6	40	9	60	19.50
<i>Early Markets</i>	5	3	60	2	40	3.23
<i>Cross cutting Issues</i>	1	0	0	1	100	0.27
TOTAL	32	14	43.75	18	56.25	39.64

• 16 proposals approved for negotiations on 15 May

available budget 28.1 mill €

Includes 2 projects on materials (available budget € 2.9 million)



Fuel Cells and Hydrogen Joint Undertaking

Overview of the Call - Indicative *FCH-JU-2009-1*



- ***Publication date: 15 June 2009***
- ***Deadline: 8 October 2009***
- ***Budget:***
 - **EUR 71.3 million**
- ***Topics in different areas:***
 - **Transportation & Refuelling Infrastructure : EUR 26.4 million**
 - **Hydrogen Production & Distribution : EUR 5.7 million**
 - **Stationary Power Generation & CHP : EUR 25.9 million**
 - **Early Markets : EUR 10.3 million**
 - **Cross-cutting Issues : EUR 3.0 million**



More information: <https://www.hfpeurope.org/>



European Institute of Technology (EIT)

EIT first action: the creation of the Knowledge and Innovation Communities (KICs)

A KIC ...

- is a high-profile, collaborative consortium
 - a “legally and financially structured and managed entity”
 - of geographically distributed but thematically convergent stakeholders
 - open to international participation

- will become a world leader in its field
 - encompassing the whole innovation chain from education to economic impact

- will deliver a measurable impacts on society
 - economic, scientific, educational and entrepreneurial

- will have a minimum life of 7 years



European Institute of Technology (EIT)

Selection Criteria:

A KIC needs to be an internationally distributed collaborative consortium which:

- is composed of elite centers from business, entrepreneurship, technology, research and education
 - each with a track record in excellence, international cooperation, knowledge dissemination and translation to business
- allows collaborative people to work together in “co-location centers”
- is a legally and financially structured entity with a motivating intellectual property rights (IPR) policy
- has top quality leadership, governance, structure and accountability
- attracts public and private funding, tripling the EIT funding over time
- can include excellent partners from non-EU countries



European Institute of Technology (EIT)

EIT first action: the creation of the Knowledge and Innovation Communities (KICs)

WHAT themes for the KICs?

- Climate Change Mitigation and Adaption
- Sustainable Energy
- Future Information and Communication
Society

KIC must principally address *one* theme



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European Institute of Technology (EIT)

How to be selected for a KIC

Publication date: **2 April 2009**

Deadline: **27 August 2009**

Submission of full proposals (max. 40 pages)

Selection of 2-3 KICs expected by **December 2009**

More information on the KIC call pages:

<http://eit.europa.eu/>



THE NMP WP 2010

Expected publication of NMP WP 2010: end of July 2009

- **Collaborative projects (Large, Small, SME)**
 - ✓ Closing date of first stage Submission: **08 DEC 2009**
 - ✓ 10 page proposal: S&T content + expected impact
 - ✓ 2 pages: consortium+estimated financial resources
 - ✓ Provisional closing date for Second Stage Submission (Large): **18 MAY 2010**
- **Coordination & Support Actions (CSA)**
 - ✓ Closing date of Single Stage Submission: **2 FEB 2010**



THE NMP WP 2010

- **Coordinated Calls with USA & Mexico**
 - ✓ **Publication: 1 SEP 2009**
 - ✓ **Deadline: 30 NOV 2009 (USA) – 15 DEC 2009 (MEX)**

- **Public-Private Partnership (PPP)**
 - ✓ **Publication: 30 JUL 2009 (single stage procedure)**
 - ✓ ***Provisional Deadlines:***
 - × **Factories of the Future (NMP): 4 NOV 2009**
 - × **Energy Efficient Buildings (NMP): 4 NOV 2009**
 - × **Green Cars (Joint call NMP-ENERGY-ENV-SST): 14 JAN 2010**
 - ✓ ***Additional funding in the ICT workprogramme/calls.***



THE ENERGY WP 2010

Expected publication of ENERGY WP 2010: end of July 2009

- **Energy Call part I (Collaborative Projects and Coordination & Support Actions)**
 - ✓ **Closing date of First Stage Submission (S&T quality): 15 OCT 2009**
 - ✓ **Provisional closing date for Second Stage Submission (S&T quality-Implementation - Impact): 11 MAR 2010**
- **Energy Call part II (Collaborative Projects and Coordination & Support Actions)**
 - ✓ **Closing date of Single Stage Submission (S&T quality-Implementation-Impact): 4 MAR 2009**



THE ENERGY WP 2010

Expected publication of ENERGY WP 2010: end of July 2009

- **Energy Future Emerging Technologies Call part I (Collaborative Projects)**
 - ✓ Closing date of First Stage Submission (S&T quality - Impact): **15 OCT 2009**
 - ✓ Provisional closing date for Second Stage Submission (S&T quality-Implementation - Impact): **11 MAR 2010**
- **Energy EU-India Coordinated Call (Collaborative Projects)**
 - ✓ Closing date of Single Stage Submission (S&T quality-Implementation-Impact): **30 NOV 2009**



THE ENERGY WP 2010

Expected publication of ENERGY WP 2010: end of July 2009

- **The Ocean of Tomorrow Joint Call**
with KBBE / Energy / Environment / Transport / Socio-economic Sciences & Humanities (Large-Scale Collaborative Projects)
 - ✓ **Closing date of Single Stage Submission**
(S&T quality-Implementation - Impact) : 14 JAN 2010
- **Energy efficient Buildings Cross-thematic call**
With NMP / ICT / Energy / Environment (Collaborative Projects and Coordination & Support Actions)
 - ✓ **Closing date of Single Stage Submission**
(S&T quality-Implementation-Impact): 3 NOV 2009



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As said...

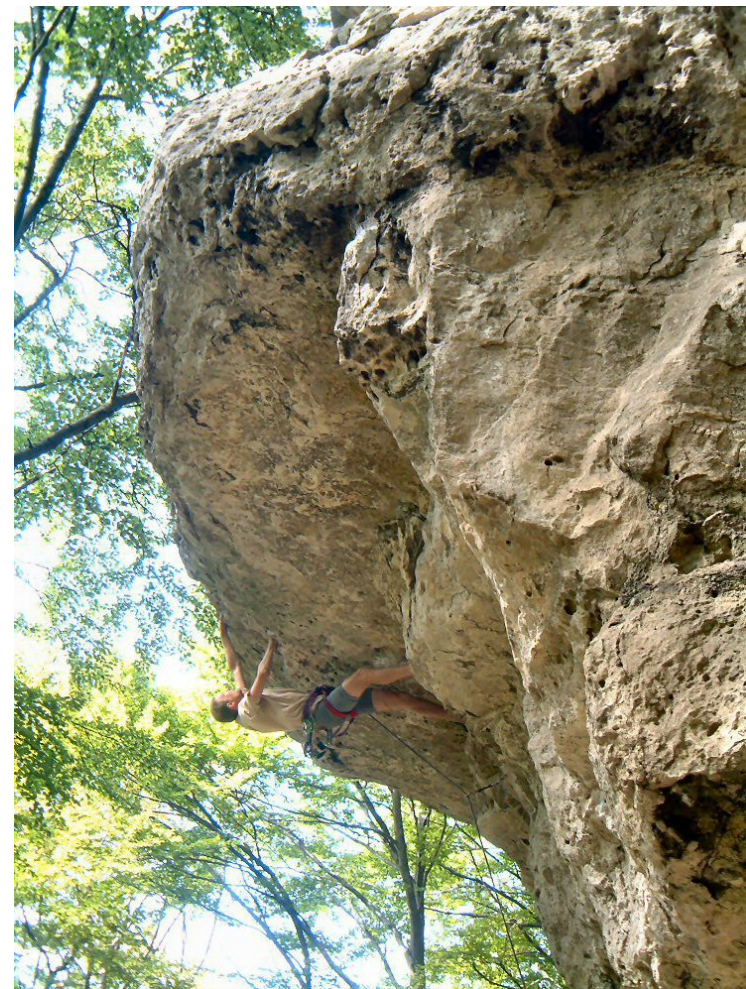
Is there scope, advantage and mutual interest for fruitfully cooperating more intensively together at international level?



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**It's a challenging way:
societally responsible,
economically profitable
and scientifically passionating**



Courtesy of S. Bøwadt

Thank you for your attention