



Ministry of Science, Education and Sports of Republic of Croatia

Regional Information Day on the Euratom Framework Programme for Nuclear Research and Training Activities (2012-2013)

Zagreb, 1 October 2012

"Indirect Actions on Nuclear Fission, Safety and Radiation Protection - Main Features and Strategic Orientation"

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European Commission

DG Research and Innovation (DG RTD)

Directorate K – Energy

Outline

- Introductory background
- Main features of the nuclear fission, safety and radiation protection (indirect actions) of the Euratom Framework Programme (2012-2013)
- On-going Fission Call of WP-2013
- Strategic orientation for 2014-2020



What is Euratom?

Paris 1957

The Treaty
establishing the
European Coal and
Steel Community
(ECSC)

Rome 1957

Treaty establishing the
European Economic
Community (EEC)

**Treaty establishing
the European Atomic
Energy Community
(Euratom)**

6 Member States

Maastricht 1992

Treaty on
European Union

12 Member States

Treaty of
Amsterdam

15 Member States



2001

Treaty of Nice

2009

Lisbon Treaty

Euratom Treaty

Euratom Treaty as legal framework [1/2]

- **Euratom Treaty is one of the EU foundations**
- **Article 4:**
- The EC is in charge of promoting and facilitating nuclear research activities in the MSs and to complement them through of a Community Research & Training programme
- **Article 7:**
- To encourage implementation of (national) research programmes the EC can:
 - bring financial support to research contracts,
 - provide to MSs, people or enterprises, facilities, equipments or expert assistance,
 - stimulate joint financing (from MSs, people, enterprises)

Euratom Treaty as legal framework [2/2]

- **Article 5:**
- For purposes of coordinating and complementing research undertaken in Member States, they shall communicate to the Commission their programmes relating to the research which it specifies in the request
- **Article 6:**
- Community research and training programmes shall be determined by the Council, acting unanimously on a proposal from the Commission, ...
- **Article 10:**
- The Commission may, by contract, entrust the carrying out of certain parts of the Community research programme to Member States, persons or undertakings, or to - third countries, international organizations or nationals of third countries...
- **Articles 101, 102:**
- Community may conduct agreements or contracts with a third State or national of a third State. It should be negotiated by the Commission in accordance with the directives of the Council



European
Commission

EC Nuclear Activities

(Source: RTD-K1.1, July 2012)

EEAS
European External
Action Service

**EUROPEAN
COMMISSION**

**33 General Directorates
and
11 Services**

MG.DEPT.VI
Global and
Multilateral
Issues

DG DEVC
EuropeAid
Development
& Cooperation

DG ELARG
Enlargement

DG ENER
Energy

DG RTD
Research and
Innovation

DG JRC
Joint
Research
Centre

**Department
K**

Security
Policy and
Conflict
Prevention

**Department
VI.B**

Multilateral
relations &
Global Issues

Directorate D

Human and
Society
Development

Directorate D

Financial
Instruments
and Regional
Programmes

**EURATOM
Supply
Agency**

Directorate D

Nuclear Safety
and
Fuel Cycle

Directorate E

Nuclear
Safeguards

Directorate D

International
Cooperation

Directorate K

Energy

- **Scientific Policy and Stakeholder Relations**
Brussels, BE; Ispra, IT
- **Institute for Reference Materials and Measurements (IRMM)**
Geel, BE
- **Institute for Transuranium Elements (ITU)**
Karlsruhe, DE
- **Institute for Energy and Transport (IET)**
Petten, NL; Ispra, IT
- **Institute for the Protection and the Security of the Citizen (IPSC)**
Ispra, IT
(plus other 3 institutes)

K3

Security
Policy
→ IfS

VI.B.1

Global
Issues
→ INSC

Unit D5

Instrument for
Stability and
Nuclear Safety

Unit D3

Regional
Programmes
- (Nuclear
Issues)

Unit D1
Nuclear safety and multilateral & international cooperation
Unit D2
Safe back-end of nuclear fuel cycle, governance, transport and innovation
Unit D3
Nuclear accountancy
Unit D4
Radiation protection

Unit E1
Design, planning and evaluation
Unit E2
Reprocessing Plants
Unit E3
Fabrication & enrichment plants
Unit E4
Reactors, storage and other facilities

Unit D1
Policy Coordination, EFTA, Enlargement, Russia, Asia, and Pacific
Unit D2
North America Latin America and Caribbean
Unit D3
European Neighbourhood, Africa and the Gulf

Unit K1
Horizontal aspects - (Euratom International Agreements)
Unit K4
Fission
Unit K5
ITER - (Broader Approach)
Unit K6
Fusion Association Agreements

**Research &
Innovation**

EU research: the story so far



- 
- **1957: Euratom Treaty**
 - Concept of Community Research programmes
 - Joint Research Centre established
 - **1984: 1st Framework Programme (1984-1987)**
 - **1987: 'Single European Act'**
 - science becomes a Community responsibility
 - 2nd Framework Programme (1987-1991)
 - **1990: 3rd Framework Programme (1990-1994)**
 - **1993: Treaty on European Union**
 - role of RTD in the enlarged EU
 - **1994: 4th Framework Programme (1994-1998)**
 - **1998: 5th Framework Programme (1998-2002)**
 - **2000: European Research Area (ERA) launched**
 - **2002: 6th Framework Programme (2002-2006)**
 - **2006: 7th Framework Programme (2002-2013)**
 - EC Framework Programme (2007-2013)
 - Euratom Framework Programme (2007-2011)
 - **2011: Euratom Framework Programme FP7+2 (2012-2013)**

7th Framework Programmes (FP-7)

The FP-7 is composed of:

- the 7th EC Framework Programme (2007-2013); and
- the 7th Euratom Framework Programme (2007-2011) continued by
- the Euratom Framework Programme (FP7+2) (2012-2013)
 - Fusion Programme
 - The nuclear part of the Joint Research Centre of the European Commission
 - Nuclear Fission, Safety and Radiation Protection

Euratom Framework Programme (2012-2013)

Council Decision on 19 December 2011

DG-RTD

indirect actions

Fusion Energy

€ 2209 million

DG-RTD

indirect actions

**Nuclear Fission,
Safety and
Radiation Protection**

€ 118 million

JRC

direct actions

**Nuclear Safety
and Security**

€ 233 million

Total budget: € 2560 million

Euratom Framework Programme 2012-13

General Objective:

The Framework Programme shall pursue the general objectives set out in Article 1 and Article 2(a) of the Treaty with special consideration of nuclear safety, security and radiation protection, while contributing towards the creation of the Innovation Union and building on the European Research Area.

Specific objectives of indirect actions

Fusion energy research – to develop the technology for a safe, sustainable, environmentally responsible and economically viable energy source

Nuclear fission, safety and radiation protection – to enhance the safety of nuclear fission and other uses of radiation in industry, in medicine and in improving the management of radioactive waste

Euratom FP7+2 'Nuclear Fission, Safety and Radiation Protection'

- *programme objectives*

- Establish a sound scientific & technical basis for the safe long-term management of hazardous radioactive waste
- Promote safer, more resource-efficient and competitive exploitation of nuclear energy
- Ensure a robust and socially acceptable system of protection of human and environment against the effects of ionising radiation.

Euratom FP7+2 'Nuclear Fission, Safety and Radiation Protection'

- *strategic priorities*

- Promote a true 'European Research Area' in nuclear science and technology
 - Establish 'Technology Platforms' and/or 'Joint Programming Initiatives' in key areas ... i.e. major stakeholders agree "Strategic Research Agenda" and coordinated "Deployment Strategy"
- Support key EU policy initiatives
 - Lisbon Agenda ... growth & jobs / knowledge-based economy / innovation
 - Energy Policy for Europe
- International cooperation
 - Bilateral (e.g. Russia, China, ...) / multilateral (e.g. GIF)

Strategic Energy Technology Plan (SET-Plan) & nuclear fission



Key EU technology challenges for the next 10 years

... to meet 2020 targets:

- *"Maintain competitiveness in fission technologies, together with long-term waste management solutions"*

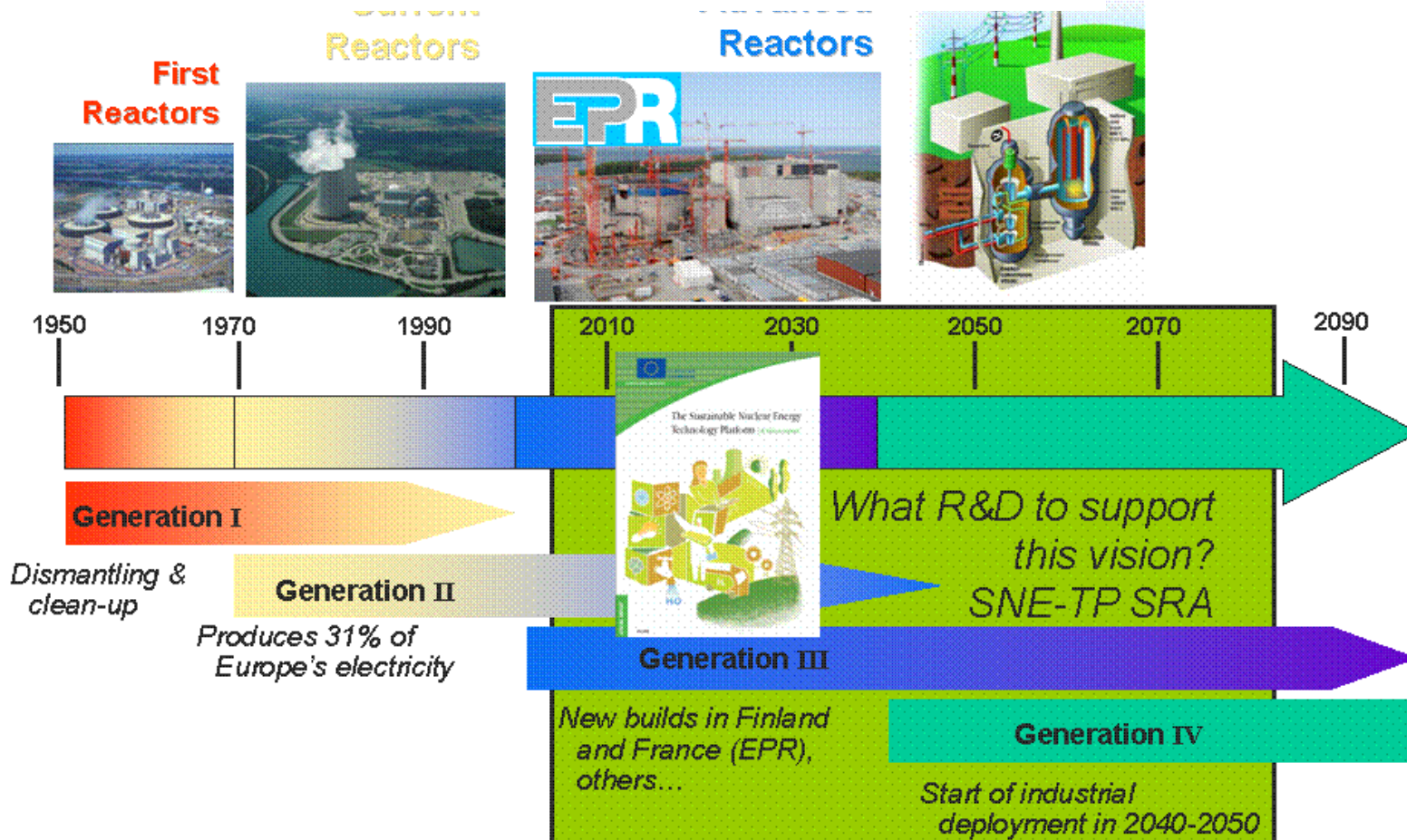
... to meet 2050 vision:

- *"Complete the preparations for the demonstration of a new generation (Gen-IV) of fission reactors for increased sustainability"*

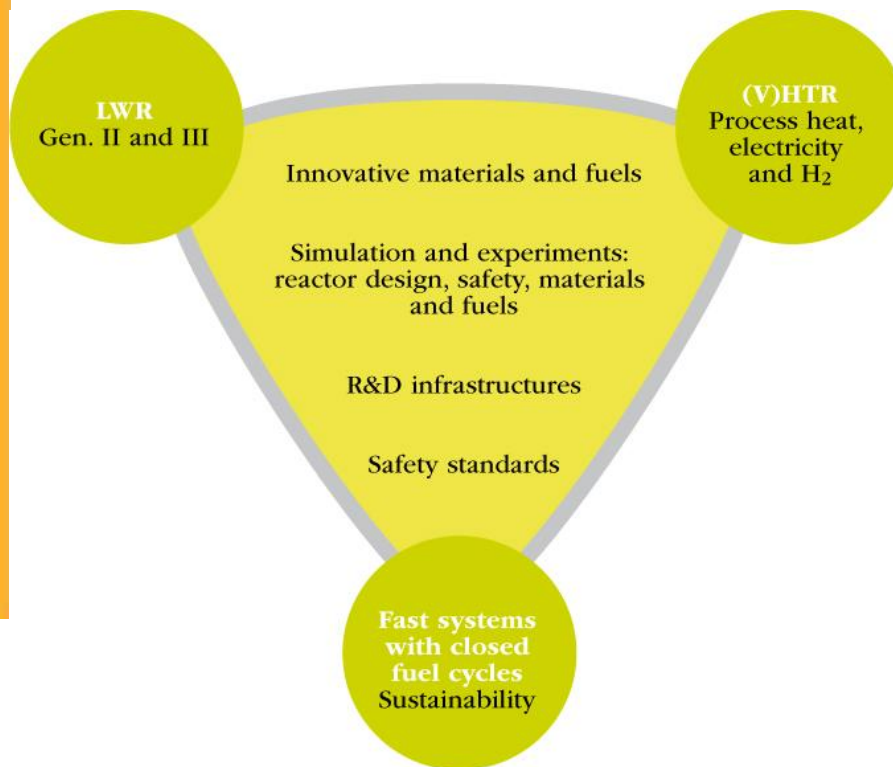
Priority European Industrial Initiatives:

- *"Sustainable nuclear fission initiative": focus on the development of Generation-IV technologies"*

Sustainable Nuclear Energy Technology Platform (SNETP)



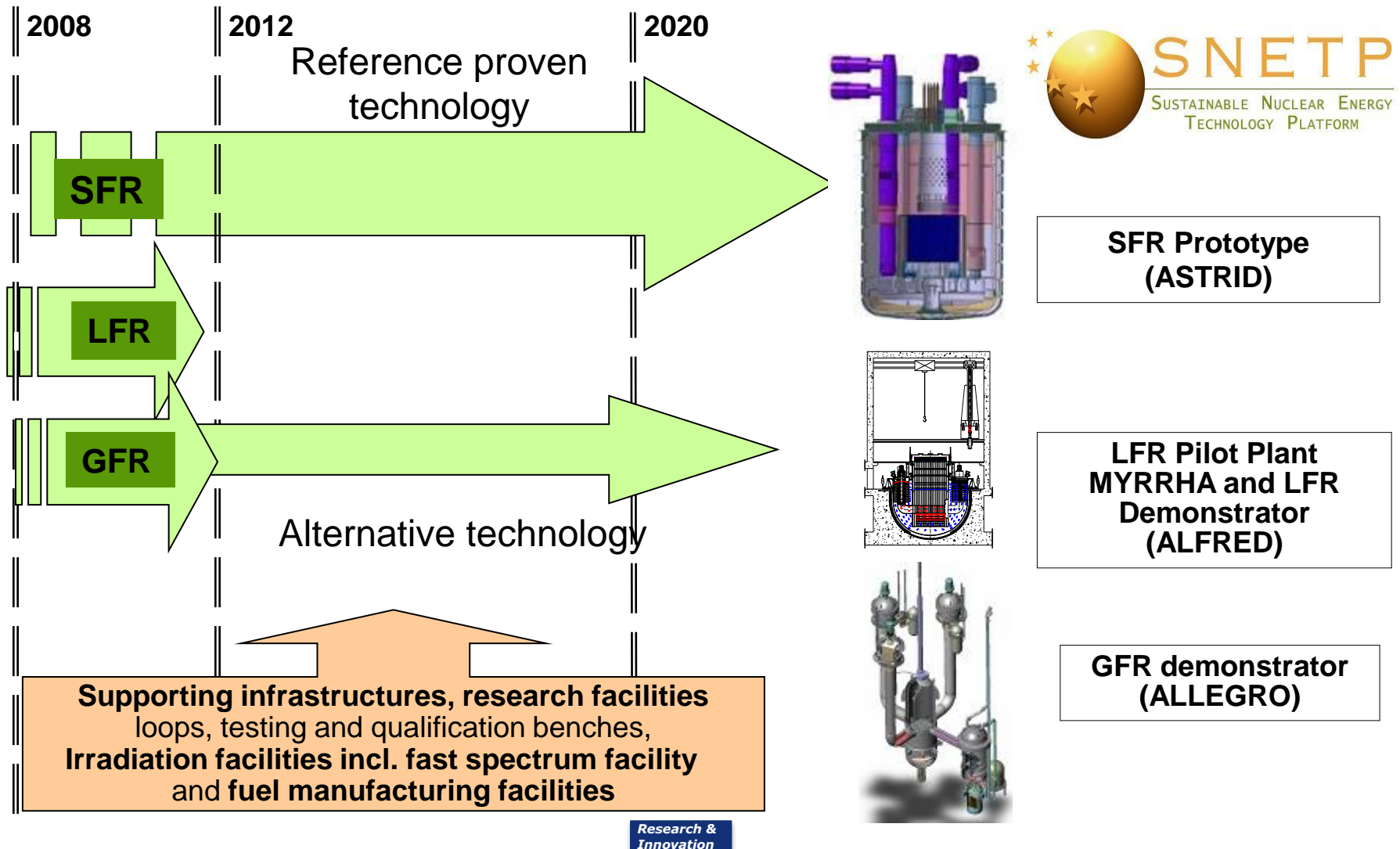
Technology platform: Three Pillars



ESNII
**ESNII = European Sustainable
Nuclear Industrial Initiative**

- NUGENIA: Maintain safety and competitiveness of today's technologies. Based on networks SARNET and NULIFE
- Enlarge applications beyond electricity production: H₂, industry, steelmaking, paper, etc.
- Develop advanced reactors with closed cycle to enhance sustainability → Gen IV Fast Reactors (through ESNII)
- Strategic Research Agenda (SRA) to be updated in 2013 and Deployment Plan (DP) issued in 2010

European Sustainable Nuclear Industrial Initiative (ESNII)



A selection of FP7 projects on Gen-IV systems

Project acronym and title	Key areas of R&D	<u>Coordinating organisation & no of partners*</u>	Start date & duration	Total budget / EU contribution
GETMAT – Gen-IV and Transmutation Materials http://nuklear-server.ka.fzk.de/getmat/	Structural materials for core and primary components of Gen-IV and ADS	<u>FZK (DE)</u> 24 partners (from 11 countries)	1/02/08 60 months	€13.9M / 7.5M
ACSEPT – Actinide Recycling by Separation and Transmutation http://www.acsept.org/	Advanced partitioning – chemical processes, aqueous and pyro-chemical	<u>CEA (FR)</u> 34 partners (from 14 countries)	1/03/08 48 months	€23.8M / €9.0M
F-BRIDGE – Basic Research for Innovative Fuel Design for Gen-IV systems http://www.f-bridge.eu/	Basic research on Gen-IV fuel-cladding systems	<u>CEA (FR)</u> 20 partners (from 8 countries)	1/03/08 48 months	€10.2M / 5.5M
FAIRFUELS – Fabrication, Irradiation and Reprocessing of Fuels and targets for transmutation http://www.fp7-fairfuels.eu/	Fuels and targets for partitioning with close links to Gen-IV	<u>NRG (NL)</u> 11 partners (from 6 countries)	1/02/09 48 months	€7.7M / €5.8M
CP-ESFR – Collaborative Project on European Sodium-cooled Fast Reactor http://www.project-cp-esfr.eu/	Key viability and performance issues supporting development of a Gen-IV European SFR	<u>CEA (FR)</u> 26 partners (from 9 countries)	1/01/09 48 months	€11.5M / €5.8M

* only partners from EU Member States and Euratom Associate Countries can normally receive EU funding

Implementing Geological Disposal-TP



IGD-TP coordinates the R&D effort in Europe in the lead up to operation of the world's first geological repositories for HLW - Initiative piloted by an executive group of SKB, Posiva, BMWi, Andra, NDA, Enresa ...

Vision Report (2009) based on broad stakeholders & public consultation, and endorsed by organisations (R&D, industrial suppliers)

Strategic Research Agenda (2011) with RD&D priorities for licensing and implementation

Deployment Plan (June 2012) with Master Plan and Joint Initiatives

Detailed information on www.igdtp.eu

Multidisciplinary European Low-Dose Initiative (MELODI)

- Multidisciplinary approach to resolving outstanding issues relating to risk from low and protracted exposure to ionising radiation: RP, (radio)biology, health physics, genomics, epidemiology, ...
- Main European RP research funding organisations
- 'Joint Programming Initiative' linking national and Euratom programmes → Strategic Research Agenda
- On-going project DoReMi (Network of Excellence)
- Euratom calls for proposal increasingly oriented towards MELODI requirements



Time schedule FP7-Fission-2013

Event	Date
Pre-information CCE-Fission WP2013	26.03.2012
Orientation paper WP2013	15.05.2012
Publication	10.07.2012
Deadline	13.11.2012
Evaluations	Dec./2012 – Jan./2013
Negotiations	Feb.-March/2013
Grant Agreement signature.....	June-July/2013
First projects launched	September/2013



Rules of participation

- Who can participate?
 - Any undertaking, university or research centre or other legal entity established in a member state (MS), associated country (AC) and candidate country. Also international organisations in addition to the minima.
 - In general, for cooperative projects (CP) **three** independent participants from three different Member States or Associated countries; JRC may participate. For Coordination & Support Actions (CSA) the minimum is **one** legal entity.
- Eligibility for funding
 - Legal entities from MS and AC (+JRC).
 - International organisations and third countries if provision is made to that effect in the programmes or their contribution is essential for carrying out the indirect action.
- Funding limits – reimbursement of costs according to the type of organisation, of action and/or activity
 - Demonstration activities up to 50%.
 - CSA up to 100%.

FP7-Fission-2013 Call

~ €5M

Geological disposal

~ €22M

Reactor systems

- Safety of existing nuclear installation
- Advanced nuclear systems for increased safety
- Cross-cutting aspects
- Advanced systems for non-electrical uses (Co-gen)

~ €12M

Radiation protection

~ €16M

Research infrastructures

Training and mobility

Cross-cutting and INCO

Policy support

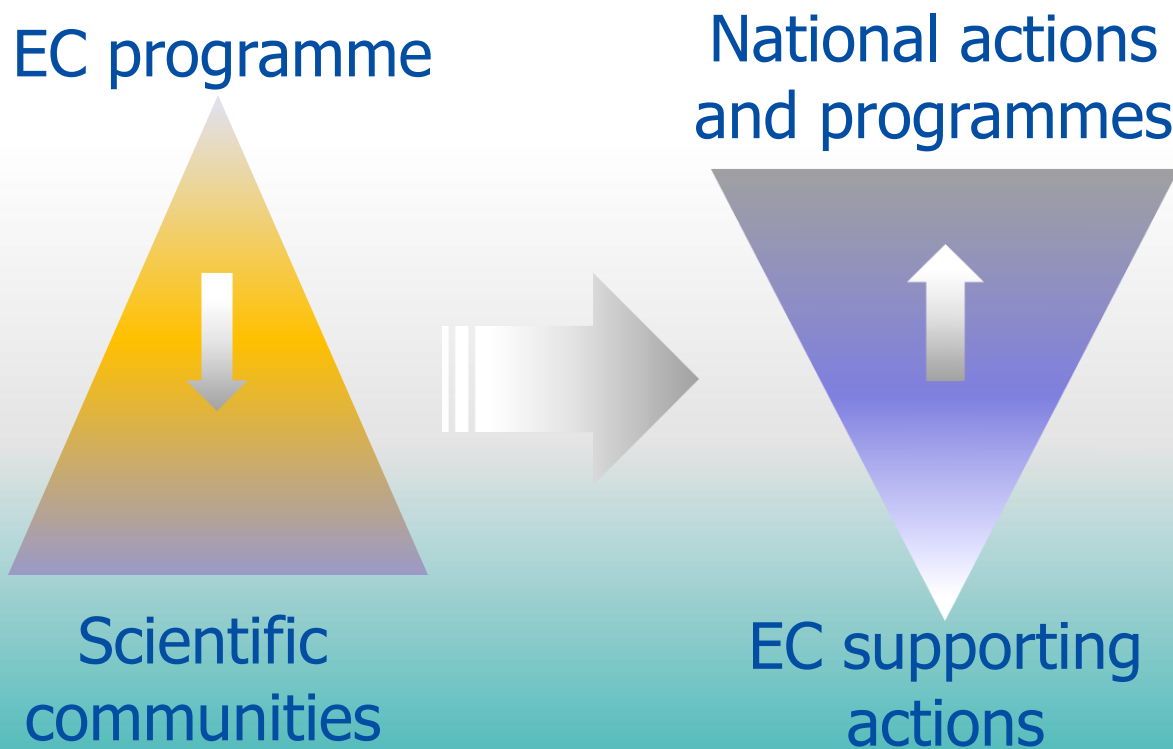
ETPs



Grand Total 2013:
~ 55 M€



From a project-related logic to a programme-related logic



Euratom Nuclear Fission Research and Training Activities WP2013

- In line with the Euratom Treaty and with the vision of Europe 2020, the purpose of the majority of the activities -to be supported in 2013- will be to provide catalytic and leveraging support for a transition to H2020, which should aim at optimal coordination, cross-border operation and possible integration of national research actions of pan-European interest in the field of nuclear fission, safety and radioprotection

- Towards Horizon 2020



European Research Area



Geological Disposal Expected impact

- Contribution to the strengthening of ERA
- Progress towards the development of geological disposal in line with the priorities of the Strategic Research Agenda (SRA) / Deployment Plan of IGD-TP and SET-Plan objectives
- EU 2011 directive on the responsible and safe management of spent fuel and radioactive waste as well as enhancement of basic knowledge.
- In particular, this should lead to increased confidence at international level in the safety case, while foster the joint strategic planning and implementation necessary to bring about such advances.



Geological Disposal

Topic: Fission-2013-1.1.1: Preparatory Phase (PP) for the implementation of new modes of operation of integrated research programmes at European level for the development of solutions related to the management of ultimate nuclear waste

Funding scheme: Maximum one CSA (coordinating)

Fission-2013-1.1.2: Support to the IGD-TP SRA and to advances and innovation research in the treatment and/or understanding of key basic and remaining scientific technical issues

Funding scheme: Maximum one Collaborative Project



Reactor systems Expected impact

- Contribution to the strengthening of ERA
- Increased safety through support to coordinated research between MS in plant life management and prevention and mitigation of severe accidents taking also into account Fukushima lessons
- Development of common strategies for plant safety at EU level for existing and advanced reactors and sharing of knowledge between Member States and towards ERA completion
- Support to European Energy Research Alliance (EERA) initiative for a joint programme on nuclear materials
- Enhanced safety and reliability of the non-electrical potential uses of nuclear energy (Cogeneration)



European Research Area



Reactor systems

Safety

Topic: Fission-2013-2.1.1: Preparatory Phase (PP) in support to an efficient EU integrated research programme on safety of existing nuclear installations

Funding scheme: Maximum one combination CP/CSA



Topic: Fission-2013-2.1.2 : Consequences of combination of extreme external events on the safety of Nuclear Power Plants (NPPs, Fukushima)

Funding scheme: Maximum one CSA (Coordinating)



Fission-2013-2.2.1: Preparatory Phase (PP) in support to the development of a federating body to ensure efficient EU coordinated research on Reactor Safety for the next generation of nuclear installations

Funding scheme: Maximum one combination CP/CSA



Reactor systems

Cross-cutting

Cross-cutting aspects for nuclear systems

Fission-2013-2.3.1: Support to the development of joint research actions between national programmes on advanced nuclear materials and EERA

Funding scheme: Maximum one combination CP/CSA



Advanced safety systems for non-electrical uses of nuclear energy

Support to the emergence of a possible European Research Initiative on co-generation

Funding scheme: Maximum one CSA (coordinating)



Radiation protection Expected impact

Better integration of national and international research efforts (ERA) in radiation protection and the low-dose risk, leading to significant optimisation of the protection afforded to the workforce, the public and the environment.

- Qualification of risks for low and protracted exposures
- Medical uses of radiation
- Emergency and post-accident management
- Research activities in other areas



Radiation protection

Fission-2013-3.1.1: Preparatory Phase (PP) in support to the Multi-disciplinary European Low Dose Initiative (MELODI) for its development as federating body to ensure cost-efficiency and high-performance of low-dose risk research in Europe
Funding scheme: Maximum one combination CP/CSA

Fission-2013-3.2.1: Medical uses of radiation

Actions in this area are within the scope of topic Fission-2013-3.1.1

Fission-2013-3.3.1: Towards best practices for emergency and post-accident management

Actions in this area in covered in Fission-2012 (project under negotiation)



Radiation protection

Fission-2013-3.3.1: Trilateral cooperation on Chernobyl studies

Independent assessment of the need to launch studies on the health effects of the Chernobyl accident shall be proposed. This cooperation should involve third countries such as Japan, the United States of America and MELODI association as European Member States research representative on low dose and international cooperation in this field

Funding scheme: Maximum one CSA (Coordinating)

Fission-2013-3.4.1: Support to the emergence of a possible European platform on the impact of radiation on the environment, including the food chain

Funding scheme: Maximum one combination CP/CSA



Infrastructures, HR, E&T Expected impact

- Optimised development and use of existing and future nuclear safety research infrastructures in Europe in all activities of the programme and facilitated access for researchers to these infrastructures throughout Europe.
- Effective implementation of ERA in the field of nuclear fission, and exploiting the full potential of institutes, universities and other organisations in these countries as regards their infrastructure, human resources and overall competences.
- International cooperation is to increase synergies and consistency with national actions through targeted coordination actions, as well as to increase the European visibility.



Infrastructures

Fission-2013-4.1.1: Support to the MYRRHA research infrastructure for its development as a pan-European and world-level facility

Funding scheme: Maximum one combination CSA (coordinating)



Fission-2013-4.1.2: Support to a pan-European Integrated Research Infrastructure Initiative for increased safety of nuclear systems at EU level

Funding scheme: Maximum one combination CP/CSA



Fission-2013-4.2.1: Access to scientific data

No specific activity foreseen. Nevertheless, researchers are encouraged to access the scientific database and library of codes managed by the Organisation for Economic Co-operation and Development - Nuclear Energy Agency



Human resources, training and NMS

Fission-2013-5.1.1: Euratom Fission Training Schemes (EFTS) in 'Nuclear Fission, Safety and Radiation Protection'

Funding scheme: Maximum of 3 CSA (coordinating)



Fission-2013-6.0.1: Widening involvement of Network Management Systems in the 'Fission, Safety and Radiation Protection' Programme

Funding scheme: Maximum 3 CSA (Coordinating)



Fission-2013-6.0.2: Education / training / information towards the public

Funding scheme: Maximum One CSA (coordinating)

Fission-2013-6.0.3: Towards a socio-economic analysis of Euratom actions under FP7

Funding scheme: Maximum One CSA (expert appointment letters)



Towards Horizon 2020 (2014-2020)

- Commission proposal of 29 June 2011 for a **€ 80 billion research and innovation funding programme (2014-2020)**
- As a core part of the Europe 2020, innovation Union and European Research Area
 - **Responding to the economic crisis** to invest in future jobs and growth
 - **Addressing people's concerns** about their livelihoods, safety and environment
 - **Strengthening the EU's global position** in research, innovation and technology
- Three priorities: excellent science, industrial leadership and societal challenges
 - *<http://ec.europa.eu/research/horizon2020/>*

The way forward



- **From FP7**
 - Basically Collaborative projects, Coordination & Support Actions
- **To Horizon 2020**
 - Activities shall strengthen R&I framework, **support to Integrated Research Programmes** and support to the **coordination of** Member States' research efforts
 - Specific activities may be **implemented** through Joint Undertakings, Public-Public Partnerships (P2Ps), contractual Public-Private Partnerships (PPPs), or cross-cutting actions (EU-Euratom WPs)
 - In order to **maintain the Union expertise**, the programme shall further enhance its role in training through the **support to training facilities of pan-European interest**

Proposal for Euratom Programme 2014-18 (as part of Horizon 2020 package) [1/2]

General Objective

to improve nuclear safety, security and radiation protection, and to contribute to the long-term decarbonisation of the energy system in a safe, efficient and secure way

- Stronger focus on **nuclear safety and nuclear training**
- Fusion research programme **will be restructured**

What is proposed?

- Scope of fission research has not been changed compared to FP7
- Programme complements Horizon 2020
- Possibility for actions cutting across Euratom Programme and Horizon 2020
- Support for Joint Programming

Proposal for Euratom Programme 2014-18 **(as part of Horizon 2020 package)** [2/2]

- Five years in line with Euratom Treaty (Art.7)
- Total budget (proposed) € 1789 million
 - JRC: € 724 million
 - Fusion: € 710 million
 - Fission: € 355 million
- Funding for ITER is presently outside the EU MFF - Multiannual Financial Framework (2014-2020), i.e. in a separate supplementary programme
 - ITER in 2014-2018: € 2573 million

Proposal for Euratom Programme 2014-18

Fission programme

Specific objectives for fission indirect actions

- support **safe operation of nuclear systems**
- contribute to efficient solutions for the **management of ultimate waste**
- Support development and maintain **nuclear competences**
- foster **radiation protection**
- ensure availability of **research infrastructures**





Euratom Fission 2014-2018

Geological disposal

Reactor systems

- Safety & competitiveness of nuclear installation
- Advanced nuclear systems for increased sustainability
- Advanced systems for non-electrical uses

Radiation protection

- Research infrastructures
- Training and mobility
- Cross-cutting and INCO

ETPs



Grand Total:
~60 M€/y

Summary



- **Importance of an efficient & solid organisation at EU level**
(SET-Plan, partnerships, international cooperation)
- **Importance of research at EU level**
(new technologies, system integration, large-scale demos)
- **Need for an energy mix** encompassing a wide range of low carbon energy technologies, **long term vision** (strategy 20-20-20, Energy Roadmap 2050, etc.)
- **Euratom Fission activities** shall strengthen R&I framework, **support to Integrated Research Programmes** and support to the **coordination of Member States' research efforts**

Cooperation Agreements of Euratom on/with nuclear research

	FUSION Agreements (FU-CA)	FISSION Agreements (FI-CA)	
	In force	In force	
Argentina		1997	- Peaceful uses of Nuclear Energy (NE)
Australia		1982	- Nuclear materials - <i>Peaceful uses of NE (under negotiation)</i>
Brazil	(2009 signed - ratification pending)		
Canada	(1995 – expired in 2005)	1959 1998	- Peaceful uses of NE - Nuclear research
China	2008 - R&D Cooperation in Peaceful Uses of NE		
India	2010		- <i>R&D in peaceful uses of NE (under negotiation)</i>
Japan	1988 2007 (Broader Approach)	2006	- Peaceful uses of NE - Nuclear safeguards and security (<i>under neg.</i>)
Kazakhstan	2004	2003 2009	- Nuclear safety - Peaceful uses of NE
Russia	2002	2002	- Nuclear safety
South Africa			- <i>Peaceful uses of NE (under negotiation)</i>
South Korea	2006		
Switzerland	1979 + amended in 1982		
Ukraine	2002	2002 2006	- Nuclear safety - Peaceful uses of NE
U.S. / DoE	2001	1996 2003 2010	- Peaceful uses of NE - Nuclear technology R&D * - Nuclear safeguards and security
U.S. / NRC		2009	- Nuclear safety research *
Uzbekistan		2003	- Peaceful uses of NE

(*) Technical Exchange and Cooperation Arrangements



Ministry of Science, Education and Sports of Republic of Croatia

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Zagreb, 1 October 2012

Many thanks for your attention!

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European Commission

DG Research and Innovation (DG RTD)

Directorate K – Energy