

Nuclear fission research in EU-competition and co-operation



ATS Syyseminaari 2018

Petri Kinnunen

Research Manager, Nuclear Safety

VTT Technical Research Centre of Finland Ltd.

European Atomic Energy Community EURATOM

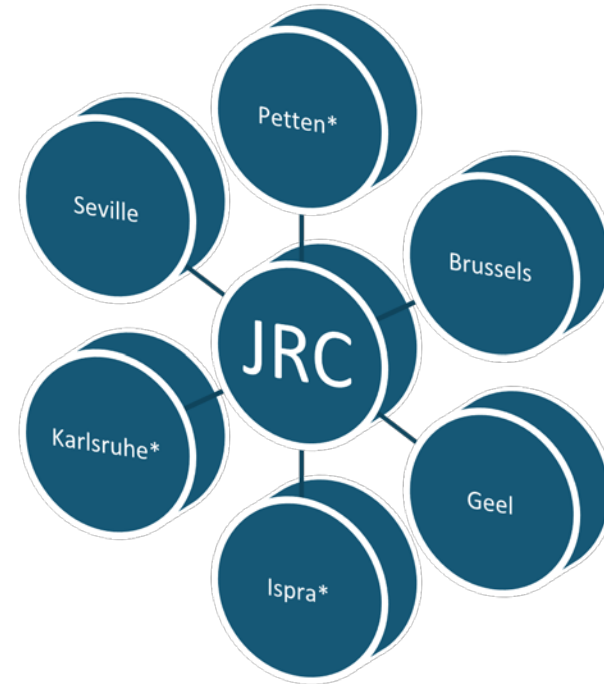


- Was established in 1957 at the same time with the European Economic Community (EEC).
- Euratom and EEC together with the European Coal and Steel Community (ECSC) were the foundation for EU
- Objective is to oversee the nuclear industry and promote nuclear research and technologies in EU
- Secures the health and safety of the personnel in nuclear industry and civil population with safety standards
- Focuses only on peaceful use of atomic energy
- Has direct and indirect actions.

The direct actions of the Euratom Programme via JRCs:



ACTIVITIES TO ACHIEVE THE PROGRAMME OBJECTIVES STIPULATED IN THE EURATOM REGULATION (2014-2018) FOR THE DIRECT ACTIONS OF JRC	JRC EVALUATION STRUCTURE: FIVE WORK PROGRAMME AREAS DISTRIBUTED OVER TWELVE SUB-AREAS OF ACTIVITY
<p>Improving nuclear safety including:</p> <ul style="list-style-type: none"> • Nuclear reactor and fuel safety • Waste management including final geological disposal as well as partitioning and transmutation • Decommissioning, and emergency preparedness 	<p>Area 1: Nuclear safety</p> <p>1.1 Nuclear reactor safety</p> <p>1.2.1 Safety of nuclear fuels and fuel cycle: Conventional nuclear fuels</p> <p>1.2.2 Safety of nuclear fuels and fuel cycle: Innovative nuclear fuels and fuel cycles</p> <p>1.3 Radioactive waste management</p> <p>1.4 Nuclear emergency preparedness and response</p> <p>1.5 Environmental monitoring & radiation protection</p>
<p>Improving nuclear security including:</p> <ul style="list-style-type: none"> • Nuclear safeguards • Non-proliferation • Combating illicit trafficking, and nuclear forensics 	<p>Area 2: Nuclear security</p> <p>2.1 Nuclear safeguards</p> <p>2.2 Non-proliferation</p> <p>2.3 Nuclear security and prevention of CBRN hazards</p>
<p>Increasing excellence in the nuclear science base for standardisation</p>	<p>Area 3: Standards for nuclear safety, security and safeguards</p>
<p>Fostering knowledge management, education and training</p>	<p>Area 4: Knowledge management, training and education</p>
<p>Supporting the policy of the Union on nuclear safety and security</p>	<p>Area 5: Non-energy applications of radionuclides and technologies</p>



*Nuclear research

Table 1 Mapping of the activities in the Euratom Regulation onto the JRC work-programme areas

The indirect actions of the Euratom Programme focus on two areas:

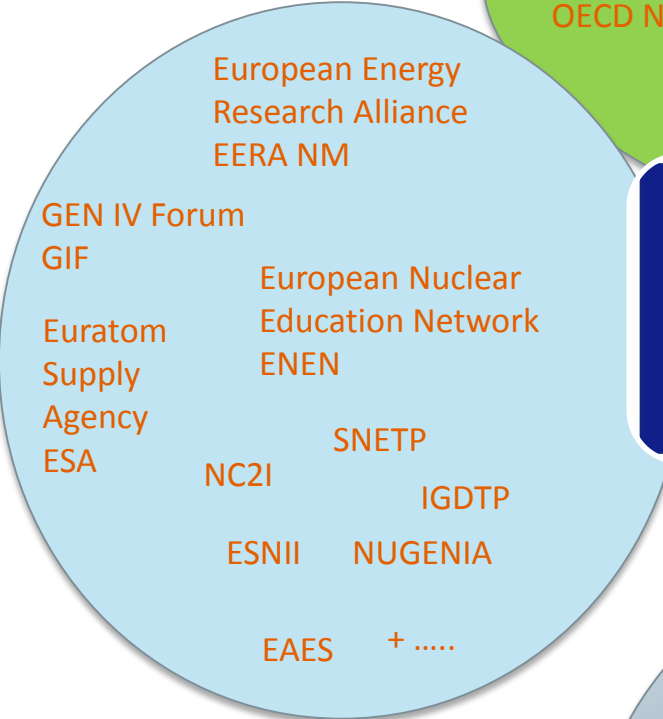


- nuclear fission and radiation protection
- fusion research aiming at developing magnetic confinement fusion as an energy source

The Euratom programme for nuclear research and training activities complements, but remains separate from, Horizon 2020, the EU framework programme for research and innovation.

OBJECTIVES:

- (a) supporting **safety** of nuclear systems;
- (b) contributing to the development of safe, longer term solutions for the management of ultimate **nuclear waste**, including final geological disposal as well as partitioning and transmutation;
- (c) supporting the development and sustainability of nuclear **expertise and excellence** in the Union;
- (d) supporting **radiation protection** and development of medical applications of radiation, including, inter alia, the secure and safe supply and use of radioisotopes;
- (g) promoting **innovation** and industrial competitiveness;
- (h) ensuring availability and use of **research infrastructures** of pan-European relevance.



SET Plan as a tool

Nuclear Action N:o 10

One of the 10 actions identified in the Integrated SET Plan.

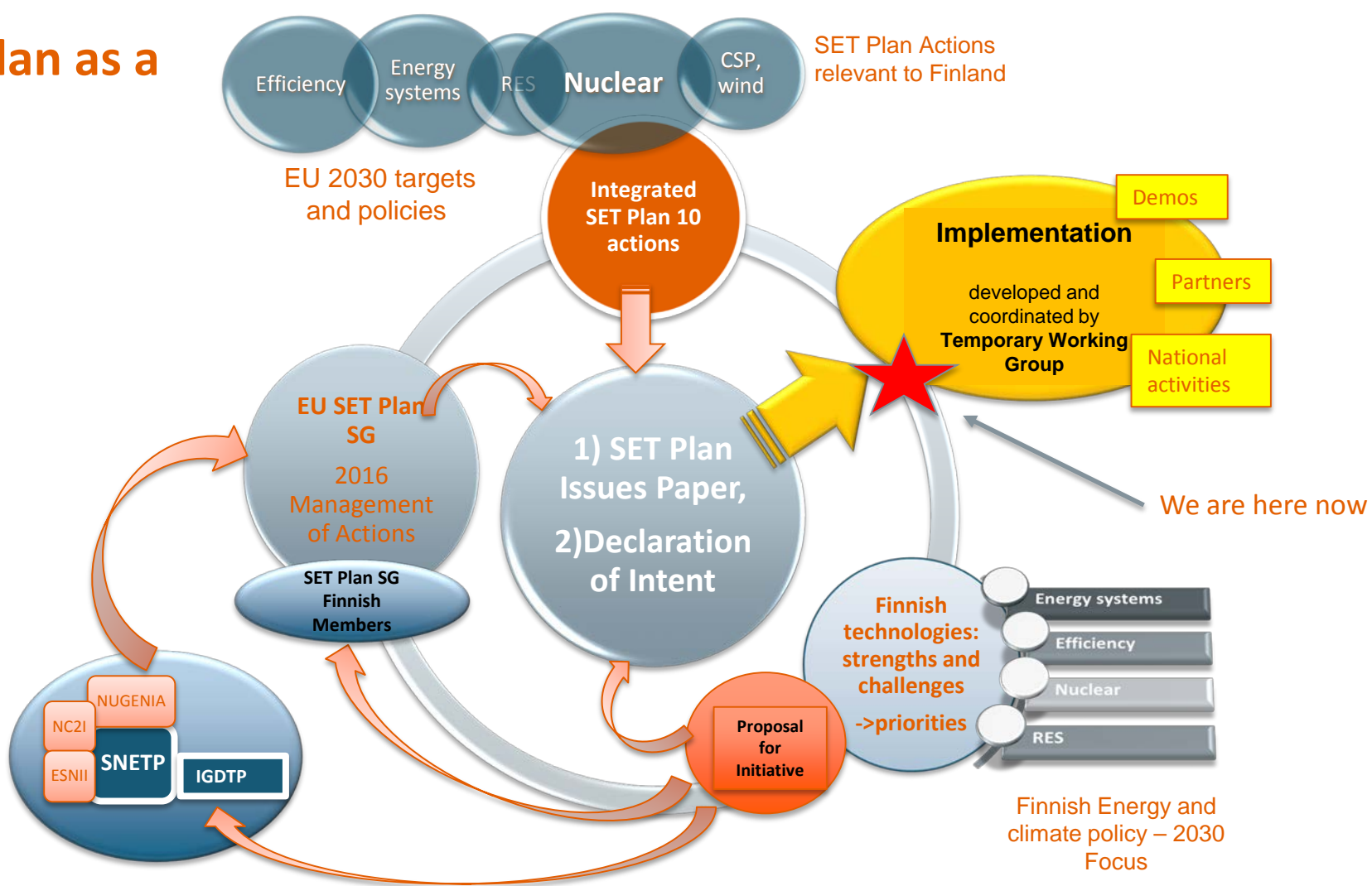
The main impact is to increase safety in the use of nuclear energy maintaining a high level of safety of nuclear reactors and associated fuel cycles during operation and decommissioning, while improving their efficiency.

In the short-term, cooperation in research and innovation between the EC and the interested MSs should focus on

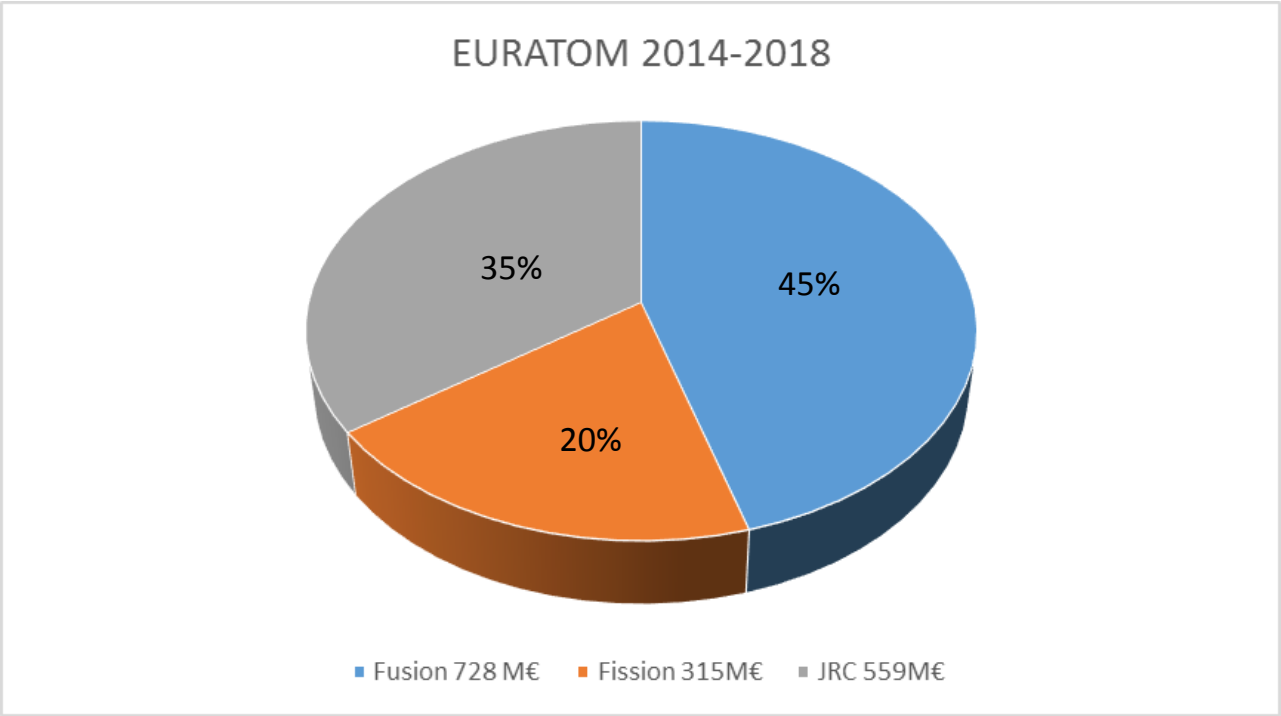
- maintaining a high level of safety through the most advanced technologies, while being cost-competitive, as well as
- in the overall management of radioactive waste, from operation to decommissioning and
- final disposal.

Extension of the safe operation of the current fleet is the most cost efficient way to reduce CO2 emission in Europe

SET Plan as a tool



Euratom Research and Training Programme 2014-2018: Total volume 1602 M€



EURATOM call 2018 (Total budget 68 M€):

Number of proposals

EU budget for the topic

NFRP-2018-1 Safety assessments to improve accident management strategies for Generation II & III reactors (RIA) - 8 proposals

6.4 M€

NFRP-2018-2 Model development and safety assessments for Generation IV reactors (RIA) - 8 proposals

3.5 M€

NFRP-2018-3 Research on the safety of Light Water Small Modular Reactors (RIA) - 1 proposal

3.5 M€

NFRP-2018-4 Improved nuclear data for energy and non-energy modelling applications (RIA) - 1 proposal

3.5 M€

NFRP-2018-5 Development of a roadmap for decommissioning research aiming at safety improvement, environmental impact minimisation and cost reduction (CSA) - 1 proposal

1.4 M€

EURATOM call 2018 (Total budget 68 M€):

Number of proposals

EU budget for the topic

NFRP-2018-6 European Joint Research Programme in the management and disposal of radioactive waste (COFUND-EJP) - 1 proposal

32.5 M€

NFRP-2018-7 Availability and use of research infrastructures for education, training and competence building (CSA) - 9 proposals

4.0 M€

NFRP-2018-8 Radiation protection research (RIA) - 18 proposals

7.0 M€

NFRP-2018-9 Strategy for the exploitation of research results funded under Euratom Research and training Programmes in the field of radiation protection (CSA) - 1 proposal

0.5 M€

NFRP-2018-10 Encouraging innovation in nuclear safety for the benefit of European citizen (IA) - 7 proposals

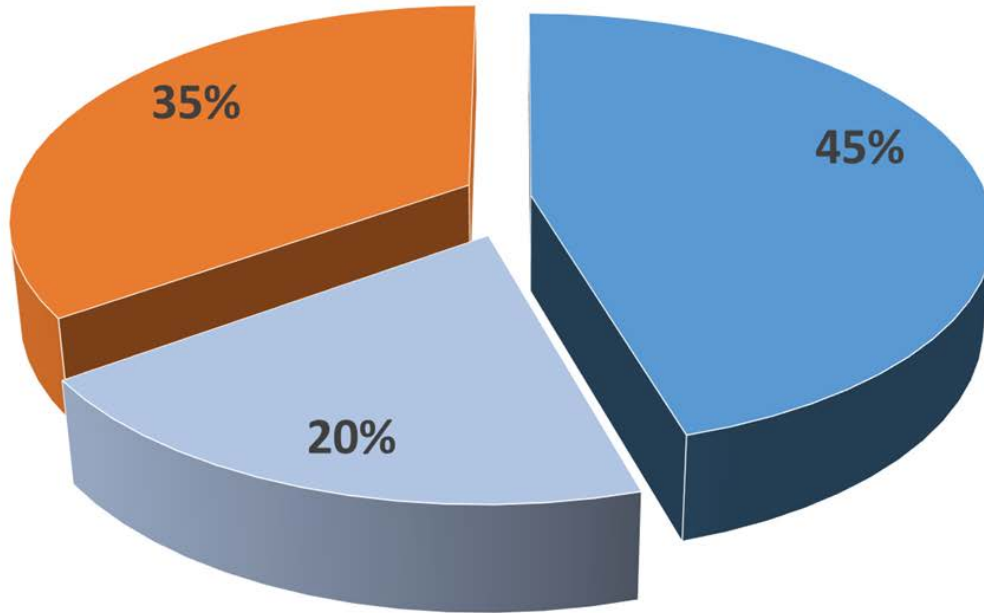
4.5 M€

NFRP-2018-11 Open data access for fusion research (CSA) - 1 proposal

2.0 M€

Euratom Research & Training Programme 2019 - 2020

Total Budget: € 770 million



■ DG RTD
Indirect actions
Fusion R&D Programme
€ 350 million

■ DG RTD
Indirect actions
Nuclear Fission, Safety & Radiation Protection
€ 152 million

■ DG JRC
Direct Actions
Nuclear Safety & Security
€ 269 million

Nuclear Fission & Radiation Protection Research NFRP 2019-20 DRAFT (Total budget 152 M€) 1/3

- A. NUCLEAR SAFETY
- B. DECOMMISSIONING AND ENVIRONMENTAL REMEDIATION
- C. RADIOACTIVE WASTE MANAGEMENT
- D. EDUCATION & TRAINING
- E. RADIATION PROTECTION AND MEDICAL APPLICATIONS
- F. RESEARCH INFRASTRUCTURE



Nuclear Fission & Radiation Protection Research

NFRP 2019-20 DRAFT

	Topic	Instrument	Indicative number of projects
NFRP-01	Increased safety and reliability of Generation II and III reactors	RIA – 100%	9
NFRP-02	Innovation for Generation II and III reactors	IA – 70%	4
NFRP-03	Support for safety research of Small Modular Reactors	RIA – 100%	2
NFRP-04	Safety Research and Innovation for advanced nuclear systems	RIA – 100%	2
NFRP-05	Safety Research and Innovation for Partitioning and/or Transmutation	RIA – 100%	2
NFRP-06	<u>Towards joint European effort in area of nuclear materials</u>	CSA – 100%	1

Nuclear Fission & Radiation Protection Research NFRP 2019-20 DRAFT

3/3

VTT

NFRP-07	Fostering innovation in decommissioning of nuclear facilities	IA – 70%	3
NFRP-08	Developing pre-disposal activities in the scope of the European Joint Programme in Radioactive Waste Management	RIA – 55%	1
NFRP-09	Innovation in nuclear education	CSA – 100%	2
NFRP-10	Further integrating Radiation Protection research in the EU	RIA – 100%	1
NFRP-11	Optimised fuels and targets for production of medical radioisotopes	RIA – 100%	1
NFRP-12	Research roadmap for medical applications of ionising radiation	CSA – 100%	1
NFRP-13	Improving radiation risk appraisal in medicine	RIA – 100%	1
NFRP-14	Roadmap for use of EURATOM access rights to Jules Horowitz reactor experimental capacity *	CSA – 100%	1
NFRP-15	Optimised use of European research reactors *	CSA – 100%	1

JOINT PROGRAMMING

- The target is to get industry more involved
- EU funding rate 70% -> 50%
- Piloted in the 2018 call in NFRP-2018-6 European Joint Research Programme in the management and disposal of radioactive waste (COFUND-EJP, 32 M€ budget) - 1 proposal targeted and 1 proposal obtained with **52 participants**
- *For Finland this was challenging: We have our own solutions for nuclear waste final disposal and not too willing to open up our knowledge base to outside. Finally, we are there along with others but with very focused work.*
- In the 2020 call Joint programming will be planned for nuclear materials to be realized in Horizon Europe 2021 ->

INFRASTRUCTURES

EU is involved in several European nuclear fission infrastructures

- Jules Horowitz Materials Testing Reactor JHR
- Multi-purpose hYbrid Research Reactor for High-tech Applications MYRRHA
- Sodium Fast Reactor (SFR) Prototype reactor ASTRID
- Lead-cooled Fast Reactor (LFR) ALFRED
- Gas-cooled Fast Reactor (GFR) ALLEGRO
- ...

-> NFRP-15 "Optimised use of European research reactors" is there for a good reason! Also the Halden reactor shutdown gives boost for this action.



BREXIT:

- *“The United Kingdom submitted on 29 March 2017 the notification of its intention to withdraw from the Union pursuant to Article 50 of the Treaty on European Union. This means that, unless a ratified withdrawal agreement establishes another date, all Union primary and secondary law will cease to apply to the United Kingdom from 30 March 2019, 00:00h (CET) ('the withdrawal date'). The United Kingdom will then become a 'third country'.”*
- *“Subject to any transitional arrangement that may form part of a possible withdrawal agreement, as of the withdrawal date, the overall set of Euratom provisions (i.e. the Euratom acquis) no longer applies to the United Kingdom”*

Reference: NOTICE TO STAKEHOLDERS WITHDRAWAL OF THE UNITED KINGDOM AND THE EURATOM ACQUIS, Brussels, 25 September 2018, https://ec.europa.eu/info/sites/info/files/notice_to_stakeholders_brexit_euratom_final.pdf

BREXIT is neither good for EURATOM nor for UK -> some agreement needs to be established, but very complicated situation (affects especially the use of infras)

After Horizon2020/EURATOM:

- Horizon Europe, planning has been started.
- EURATOM follows this Horizon Europe scheduling and planning
- The duration 7 years?

Summarising

- Outcome of an EURATOM programme is a result of very complex European wide communication in **various networks**
- Lots of **national interests** -> EU funding for research is very competed
- But in many cases we sit in the **same boat** with our rivals
- Finland being a small country needs to be very effective in its actions and find **internal consensus** in the big European carousel
- Lots of focus needed for **excellent proposals** and the **winning consortia**
- In the future the major challenges will be the **new ways of working by EU** and employment of those **infras** to which we are committed (e.g. JHR)

Thank you for your attention

