



Financing Nuclear Innovation



Roger GARBIL
European Commission
DG Research and Innovation
Euratom Research
Head of the Fission sector
Roger.Garbil@ec.europa.eu
Panagiotis.Manolatos@ec.europa.eu



GEMINI+ workshop, from research project towards demonstration, zoom meeting, 25 November 2020

Content

1. Euratom Research and Training and Horizon Europe (2021-27)
2. EU Enabling Framework for a 2050 Carbon-neutral economy
3. SET-Plan, SNETP and International Partnerships
4. ERDF, Cohesion and Structural funds
5. EIB, European Investment Bank lending

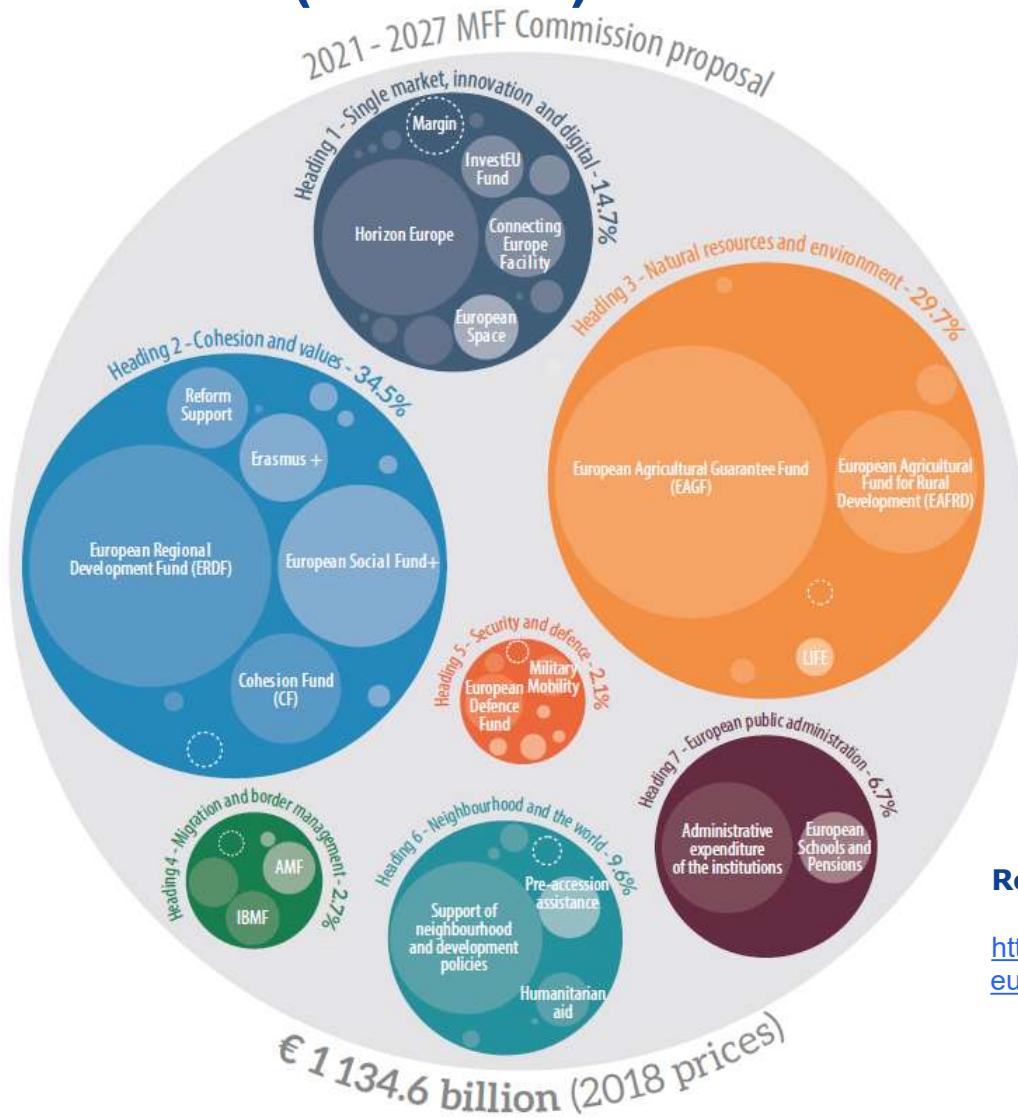
Conclusion



FP9 (2021-27) Horizon Europe Budget: €100 → 94 billion*

2018 proposal... July 2020 update

Euratom R&D Budget (7 years) EUR billion 2.4 → 1.98



Euratom Research and Training (7 years)

Indirect RTD

EUR million

- Fusion R&D 1,040 → 809
- Fission R&D Safety and radiation protection 475 → 370

Direct JRC

- Fission Safety and safeguards 885 → 802

ITER (7 years, a dedicated EC Decision)

EUR billion 6.1 → 5.6

Research and Innovation (including Horizon Europe, ITER and Euratom) legal texts and factsheets (2018 Proposal)

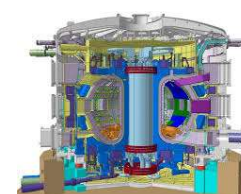
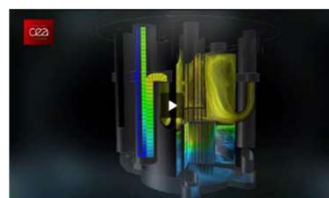
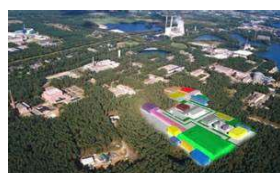
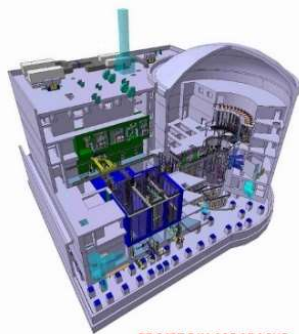
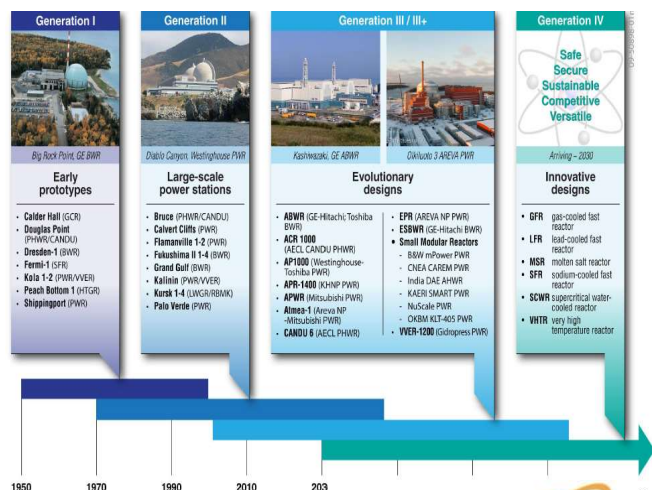
https://ec.europa.eu/commission/publications/research-and-innovation-including-horizon-europe-iter-and-euratom-legal-texts-and-factsheets_en



European Commission

EU/EURATOM Research and Training

ToGether®
SINCE 1957



9th European Commission Conference on EURATOM Research and Training in Safety of Reactor Systems
Pitesti, Romania, 4-7 June 2019

Conferences' Proceedings FISA 2019 / EURADWASTE '19 ... available!



FISA 2019 Proceedings

<https://op.europa.eu/en/publication-detail/-/publication/9cfc43f8-cbc7-11ea-adf7-01aa75ed71a1/language-en/format-PDF/source-140481060>



EURADWASTE '19 Proceedings

<https://op.europa.eu/en/publication-detail/-/publication/fe1b968b-cbc8-11ea-adf7-01aa75ed71a1/language-en/format-PDF/source-140505052>

Keep in touch



ec.europa.eu/



europa.eu/



[@EU_Commission](https://twitter.com/EU_Commission)



[@EuropeanCommission](https://www.facebook.com/EuropeanCommission)



[European Commission](https://www.linkedin.com/company/european-commission/)



[europeancommission](https://www.instagram.com/europeancommission)



[@EuropeanCommission](https://medium.com/@EuropeanCommission)



[EUTube](https://www.youtube.com/EUTube)



[EU Spotify](https://open.spotify.com/EU_Spotify)

edp open

EPJ N Nuclear Sciences & Technologies

EPJ N Topical issues

- TOPICAL Edition
- AWARDS Selection

<https://www.epj-n.org/>

<https://www.epj-n.org/component/toc/?task=topic&id=1234>

<https://www.epj-n.org/component/toc/?task=topic&id=1169>



Romanian Presidency of the Council of the EU in 2019 Conferences <http://fisa-euradwaste2019.nuclear.ro/>

FISA 2019 Presentations

<http://fisa-euradwaste2019.nuclear.ro/fisa/>

EURADWASTE '19 Presentations

<http://fisa-euradwaste2019.nuclear.ro/euradwaste/>



romania2019.eu

RAIEN
ICN PITESTI
INSTITUTUL DE CERCETARI NUCLEARE

9th European Commission Conference on EURATOM Research and Training in Safety of Reactor Systems
Pitesti, Romania, 4-7 June 2019

EU/EURATOM Fission RTD Work Programmes

25%

Geological disposal and waste management

- Decommissioning

40%

Reactor systems

- Safety of existing nuclear installation
- Advanced nuclear systems for increased safety
- Partitioning, Transmutation and closed fuel cycle
- Cross-cutting aspects (e.g. fuels, materials, simulation, nuclear data)
- Other applications (e.g. cogeneration, support to Research Reactors)

20%

Radiation protection

- Non-power applications

15%

Research infrastructures

Training and mobility

Cross-cutting INCO

Grand Total:

Euratom Fission RTD ~ 50 Mi€ / Year

Euratom Fission JRC ~ 50 Mi€ / Year

Total ~ 10 % EU Public&Private Fission R&D

Euratom FP projects related to NC2I

● H2020

- GEMINI+ (2017 – 2021)



● FP7

- NC2I-R (2013 – 2015)
- ARCHER (2011 – 2015)
- EUROPAIRS (2009 – 2011)
- CARBOWASTE (2008-2013)
- F-BRIDGE (2008-2012)



● FP6

- RAPHAEL (2005 -2010)
- EXTREMAT (2004-2010)
- PUMA (2006 - 2008)



● FP5

- HTR-M, HTR-N, HTR-E, HTR-F
- INNO-HTR
- MICANET



R&D Area

Computer codes

Components

Tribology and corrosion

Fuel

Material R&D

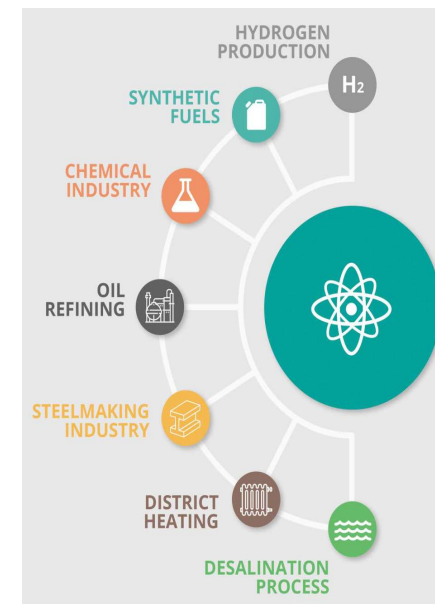
Safety analysis and demonstration

Multi-purpose plant

Design and System Integration

Development of a licensing framework

Fuel/Graphite waste minimization and recycling

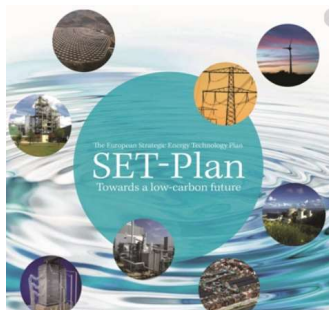


<https://cordis.europa.eu/projects/en>

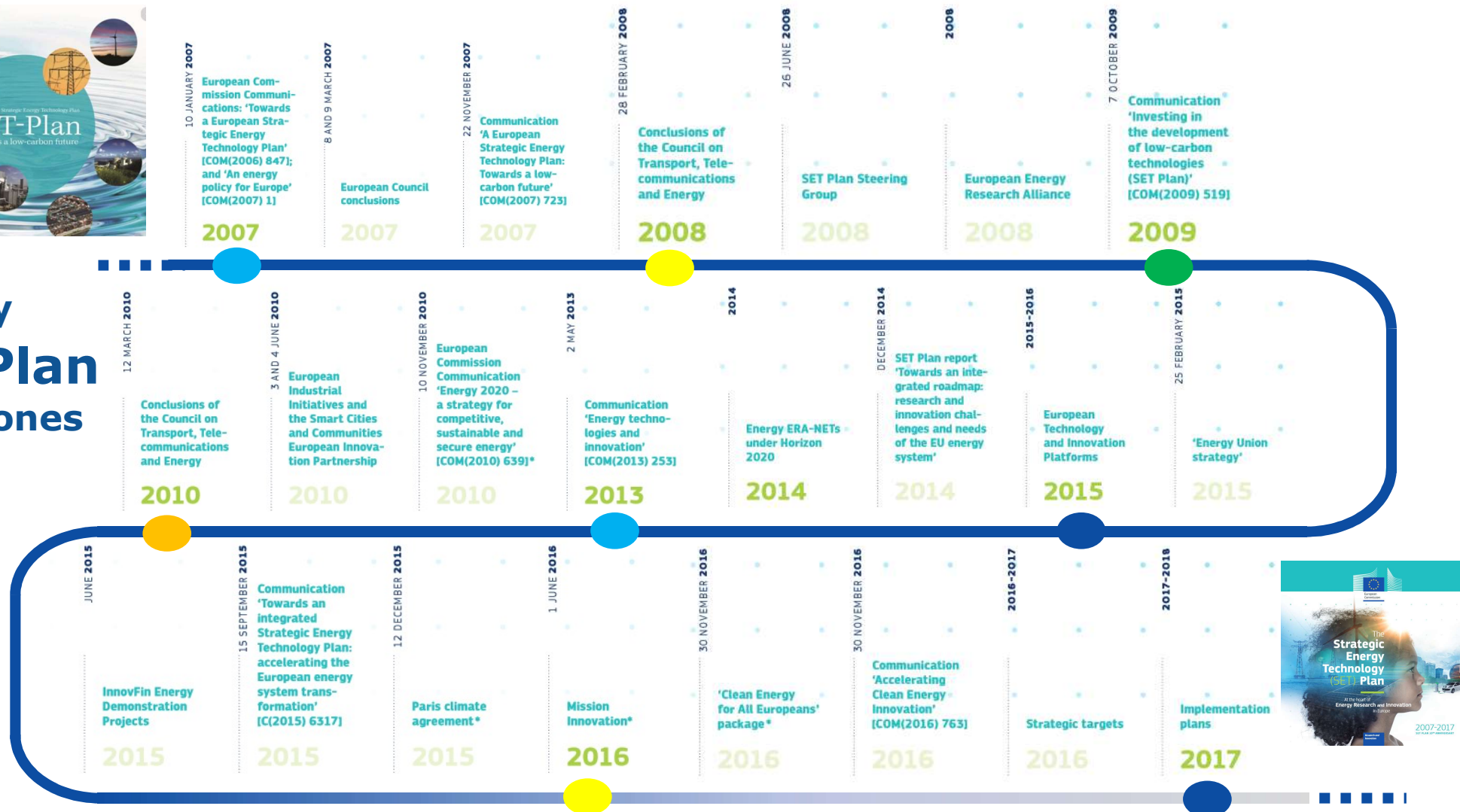


EU Enabling Framework for a 2050 Carbon-neutral economy





Key SET-Plan milestones



https://ec.europa.eu/energy/topics/technology-and-innovation/strategic-energy-technology-plan_en

SET PLAN DELIVERING RESULTS

ACCELERATING EUROPE'S TRANSITION
TO A NET-ZERO ENERGY SYSTEM

Let's work together for making
Europe the first climate-neutral
continent!

Contact SET-PLAN-SECRETARIAT@ec.europa.eu

INVESTMENTS TO BE MOBILISED

Technological
leadership in
renewables

€3.6
BILLION

Smart consumer-centric
energy system

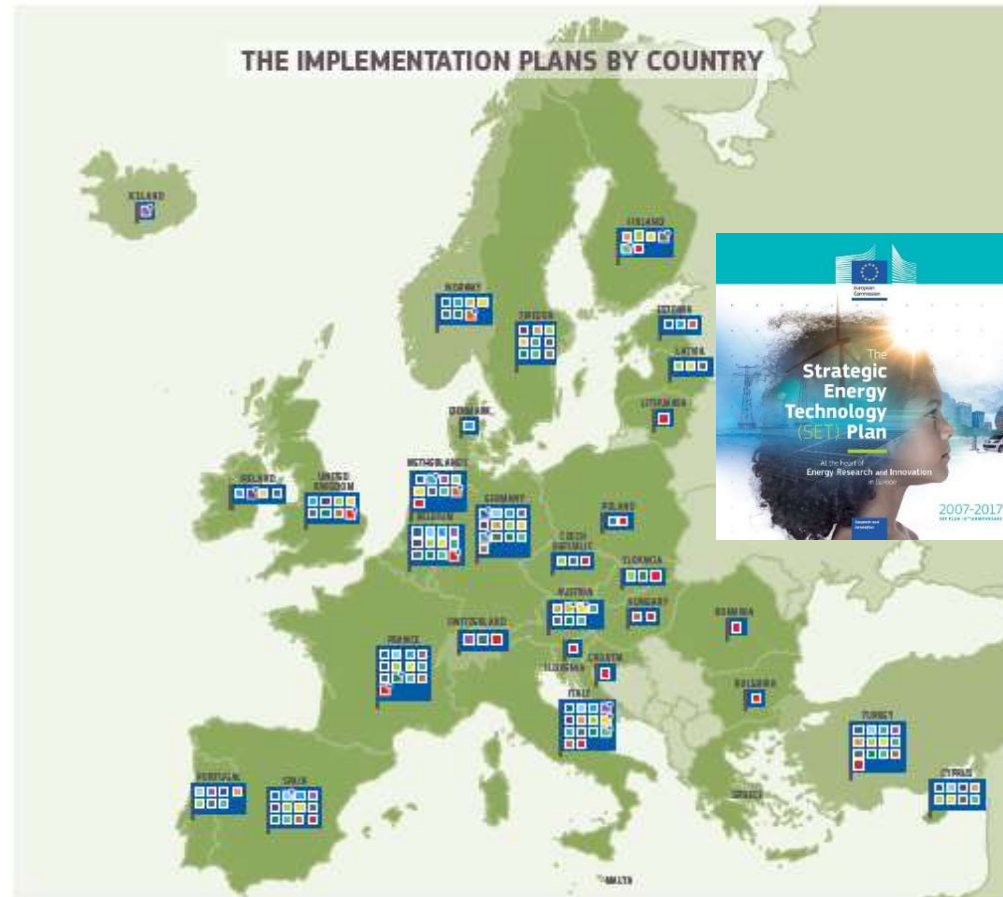
€105
BILLION

Strengthening
energy-efficient
systems

€4.5
BILLION

Decarbonising
transport
systems*

€2.9
BILLION



Non-exhaustive list of stakeholders, including:

BEUC (European Consumer Organisation), Bouygues, European Chemical Industry Council (CEFIC), European Association for the Promotion of Cogeneration (COGEN Europe), European Energy Research Alliance (EERA), ESMIG (European Smart Energy Solution Providers), ETIP Photovoltaic Solar Energy (PV), ETIP District Heating and Cooling (DHC), European Turbine Networks (ETN), European Platform of Universities in Energy Research and Education (EUA-EPUE), European Technology and Innovation Platform on Wind (EUREC / ETIP PV), European Confederation of Iron and Steel Industries (EUROFER), Fuel Cells and Hydrogen Joint Undertaking (FCH JU), KIC Innoenergy, ETIP Smart Networks for Energy Transition (SNET), Northvolt and ETIP Sustainable Nuclear Energy Technology Platform (SNETP).

SUSTAIN TECHNOLOGICAL LEADERSHIP IN RENEWABLES (1 AND 2)

- Solar Photovoltaics (PV) IP
- Concentrated Solar Power / Solar Thermal Electricity (CSP/STE) IP
- Offshore Wind Energy IP
- Deep Geothermal Energy IP
- Ocean Energy IP

A SMART CONSUMER-CENTRIC ENERGY SYSTEM

- Smart Solutions for Energy Consumers IP (3.1)
- Towards Positive Energy Districts for Sustainable Urbanisation IP (3.2)
- Energy Systems IP (4)

DEVELOP AND STRENGTHEN ENERGY EFFICIENT SYSTEMS

- Energy Efficiency in Buildings IP (5)
- Energy Efficiency in Industry IP (6)

ENERGY OPTIONS FOR SUSTAINABLE TRANSPORT SYSTEMS

- Batteries for E-Mobility and Stationary Storage IP (7)
- Renewable Fuels and Bioenergy IP (8)

CCUS

- Carbon Capture Utilisation and Storage IP (9)

Key Action n.10
18 Countries signed up!

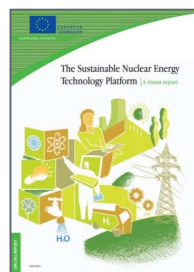
SET-Plan <https://setis.ec.europa.eu/> and https://ec.europa.eu/energy/topics/technology-and-innovation/strategic-energy-technology-plan_en



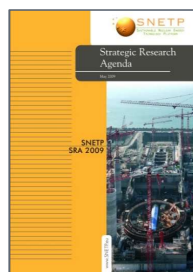
European
Commission



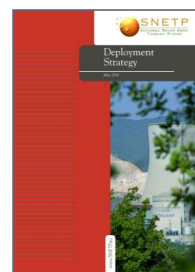
Key SNETP milestones



Sept. 2007: SNETP launch with Commissioners for Research and Energy, publication of the *Vision Report*



May 2009: Strategic Research Agenda



May 2010: Deployment Strategy

Feb. 2013: Updated Strategic Research & Innovation Agenda



Nov. 2010: Launch of ESNII

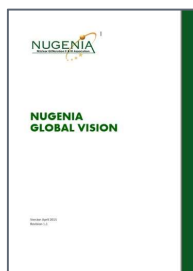


Oct. 2011: Launch of NC2I

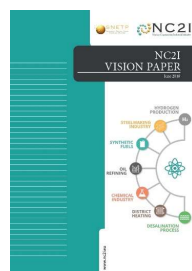
Jan. 2013: Publication of "Identification of Research Areas in Response to the Fukushima Accident"



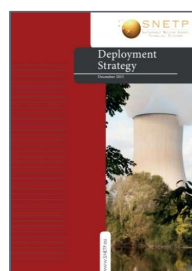
March 2012: Launch of NUGENIA



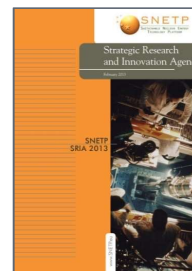
2014-2015: NUGENIA Global Vision



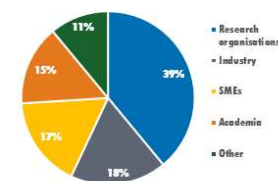
Dec. 2017: NC2I Vision Paper



2015: SNETP Deployment Strategy



Categories of membership

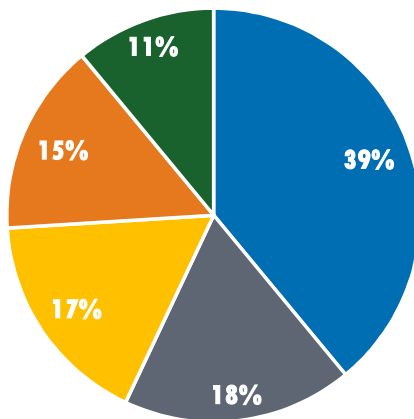


June 2019: SNETP Evolution towards a legal entity

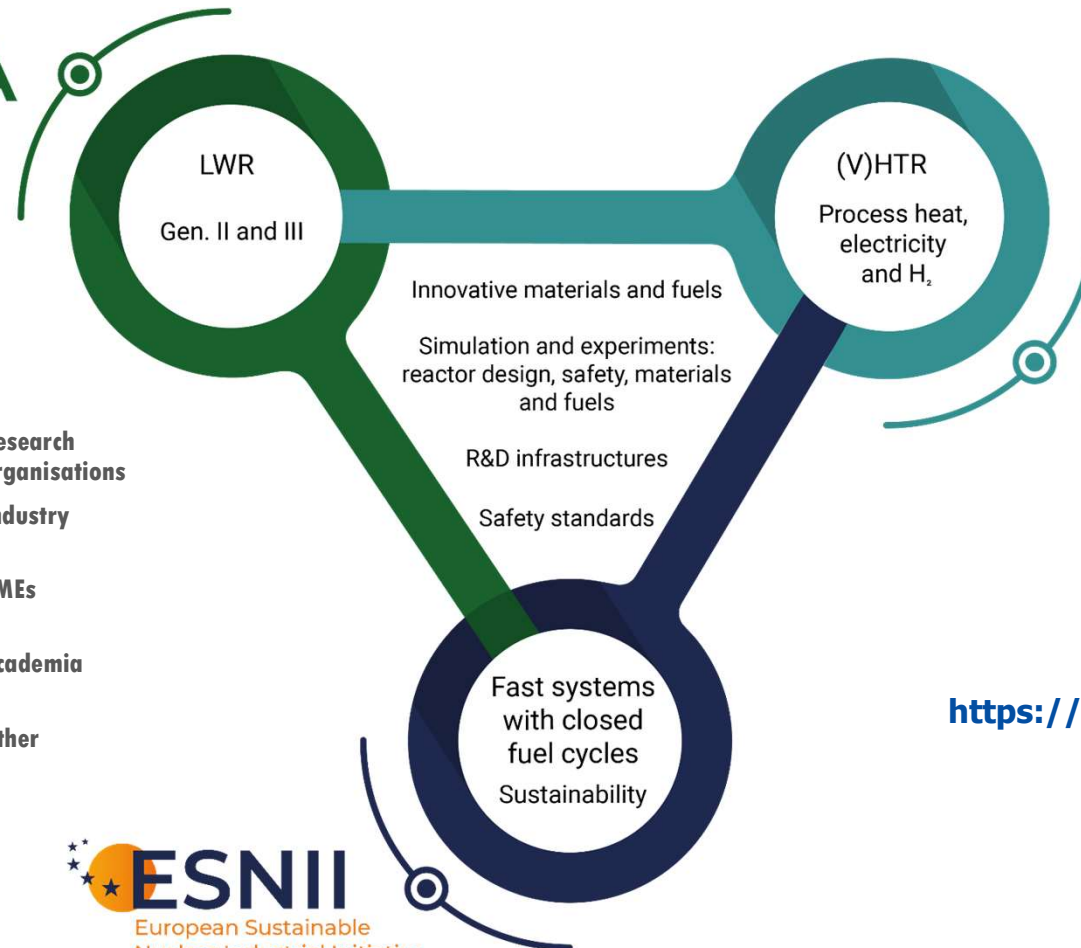
SNETP Three Pillars



Categories of membership



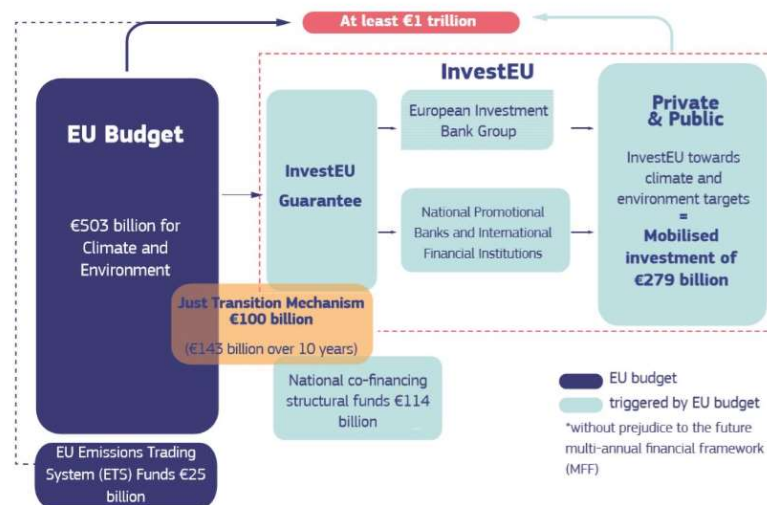
- Research organisations
- Industry
- SMEs
- Academia
- Other



<https://snetp.eu/>

Sustainable Europe Investment Plan - European Green Deal

WHERE WILL THE MONEY COME FROM?



*The numbers shown here are net of any overlaps between climate, environmental and Just Transition Mechanism objectives.



THE EUROPEAN GREEN DEAL INVESTMENT PLAN

Mobilising at least **€1 trillion** of investments over the course of 10 years, thanks to the combined:

- capital from EU and national budgets;
 - public and private investments;
 - additional measures to facilitate and boost green public and private investment;
 - attractive investment conditions;
 - technical assistance to help investors in selecting sustainable projects.
- 25% of all European Union funding for climate measures
- 30% of InvestEU to projects that fight climate change
- Stimulating green investments with support from the EIB Group

6. The European Council acknowledges the need to ensure energy security and to respect the right of the Member States to decide on their energy mix and to choose the most appropriate technologies. Some Member States have indicated that they use nuclear energy as part of their national energy mix.

EU Council Conclusions 12 Dec. <https://www.consilium.europa.eu/media/41768/12-euco-final-conclusions-en.pdf>

EU Council meeting 12-13 December 2019 <https://www.consilium.europa.eu/en/meetings/european-council/2019/12/12-13/>

Green Deal Docs https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en



ERDF Cohesion funds - SUSEN in the Czech Republic



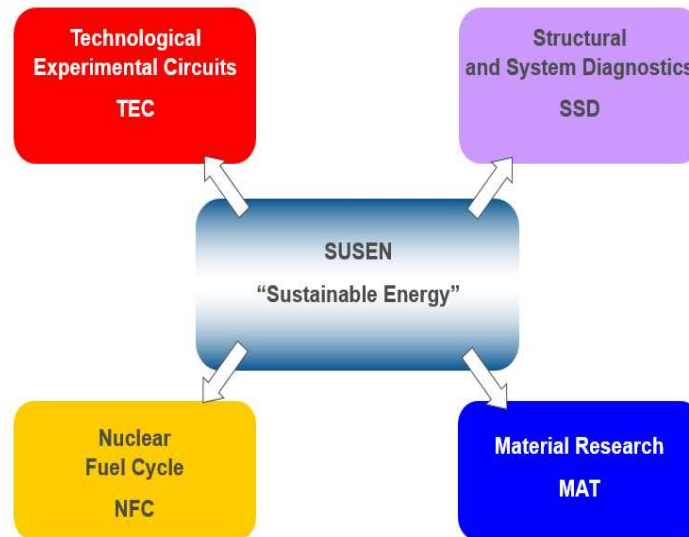
SUSEN



EVROPSKÁ UNIE
EVROPSKÝ FOND PRO
REGIONÁLNÍ ROZVOJ
INVESTICE DO VAŠÍ BUDOUCNOSTI

MS
MT
MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY

OP Výzkum a vývoj
pro inovace



Within the **framework of the Czech Republic Operational programme 'Research and Development for Innovations'** of the European Regional Development Fund to support Czech participation on European effort for **safe and efficient energy generation in Europe in the 21st century**, Gen II-III-IV and Fusion

Project: EUR 100 million, **EUR 85 million ERDF contribution (85%)**

DG REGIO https://ec.europa.eu/regional_policy/en/projects/Czechia/new-sustainable-energy-research-and-development-infrastructure-in-the-czech-republic

SUSEN <http://susen2020.cz/en/automaticky-vytvoreny-koncept/introduction/>



European
Commission

ERDF Cohesion funds – ELI in Romania 2012, 2016



ELI Extreme Light Infrastructure is be the world's first **international laser research infrastructure**, pursuing unique science and research applications for international users.

ELI ESFRI project was implemented as a distributed research infrastructure based on **3 specialized and complementary facilities** located in the **Czech Republic, Hungary and Romania**.

Extreme Light Infrastructure-Nuclear Physics project (**ELI-NP**) **total investment EUR 310 million** benefitting from **EUR 116 million (2007-13)** and **EUR 139 million (2014-20)** Romanian ERDF Competitiveness Operational Programme. 150 researchers from 26 countries are now working with a view to reaching 300 employees by 2020.

DG REGIO https://ec.europa.eu/regional_policy/en/projects/Romania/cutting-edge-laser-and-nuclear-physics-research-facility-to-open-in-romania

ELI Nuclear Physics <http://www.eli-np.ro/>

Poland EFSI+InnovFin dated 6/09/2017

EIB supports energy and science with almost EUR 1bn



EUR 250m for modernisation of Energa's distribution network under Juncker Plan
EUR 730m for research and development in Poland under InnovFin financial instrument

In line with its aim of promoting competitive and secure energy, the EIB has provided **EUR 250m** of financing to Energa for the **upgrading and extension of its electricity distribution network in northern and central Poland.**

A further two EIB loans are providing Poland with **EUR 730m for research, development and innovation activities in research institutes, universities and enterprises.** The latter operations are the first to be supported by InnovFin Science, a facility with the financial backing of the European Union under Horizon 2020, its research and innovation programme.

<http://www.eib.org/infocentre/press/releases/all/2017/2017-226-eib-supports-polish-energy-and-science-with-almost-eur-1bn.htm>



EIB EFSI - Juncker Plan in Italy to ENEA 19/09/2019

Juncker Plan in Italy: **European Investment Bank lends EUR 250 million to ENEA**
Italian agency for research into clean fusion energy

DIVERTOR TOKAMAK TEST FACILITY DTT

Agreement signed with the Lazio Region will help develop the new international scientific hub in Frascati

1,500 new jobs expected, including 500 for scientists and technicians, with an impact of EUR 2bn for the Italian

This forms part of **a total investment of EUR 500m for the facility which will be hosted in Frascati near Rome** thanks to the agreement signed with the Lazio Region. The project will also receive funding from EUROfusion, the European Union's programme to produce safe, clean nuclear energy, launched in 2014.



<https://www.eib.org/en/press/all/2019-223-italy-juncker-plan-eib-lends-eur-250m-to-enea-for-research-into-clean-fusion-energy>



EIB Group Climate Bank Roadmap 2021-25

dated 13/11/2020



EIB Group
Climate Bank Roadmap
2021-2025

Version discussed by the EIB Board of Directors
on 11 November 2020



La Banque européenne d'investissement (BEI) a rendu publique, le vendredi 13 novembre 2020, sa feuille de route climatique 2021-2025. En cohérence avec son ambition de devenir une véritable « banque du climat », la BEI continuera de soutenir les projets de recherche dans l'énergie nucléaire

Innovation

- Research, development, demonstration, and commercialisation of innovative low-carbon energy technologies, including renewables, carbon capture and storage (CCS), nuclear fission and fusion, renewable energy conversion and storage and all related ICT solutions.

https://www.eib.org/attachments/strategies/eib_group_climate_bank_roadmap_en.pdf

Conclusion ROLE OF THE EU



European Research Area

- To support **Excellence**
- To play a more **catalyzing and leveraging** role
- To develop an efficient **European Research Area**
- To support to a **EU Climate and Energy policy**
 - the implementation of such a policy implies **constant dialogue and concerted actions** between stakeholders notably for the support of methodological & technical developments
 - role of **European Technology Platforms**, of Industrial Alliances, International cooperation and partnerships
 - also of **better support to coordination and cooperation between Member States**



Thank You!



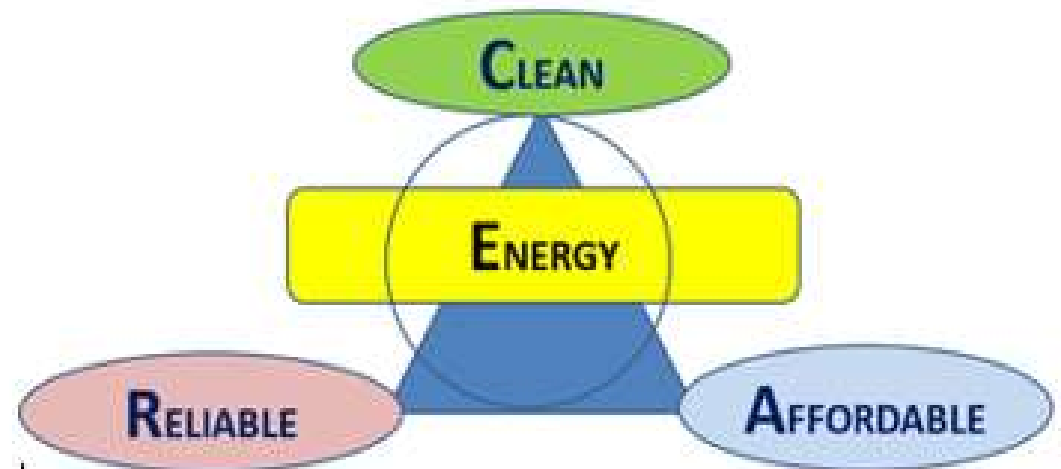
GEMINI+ Final Workshop

25 Nov 2020

FINANCING NUCLEAR INNOVATION

Marc Deffrennes

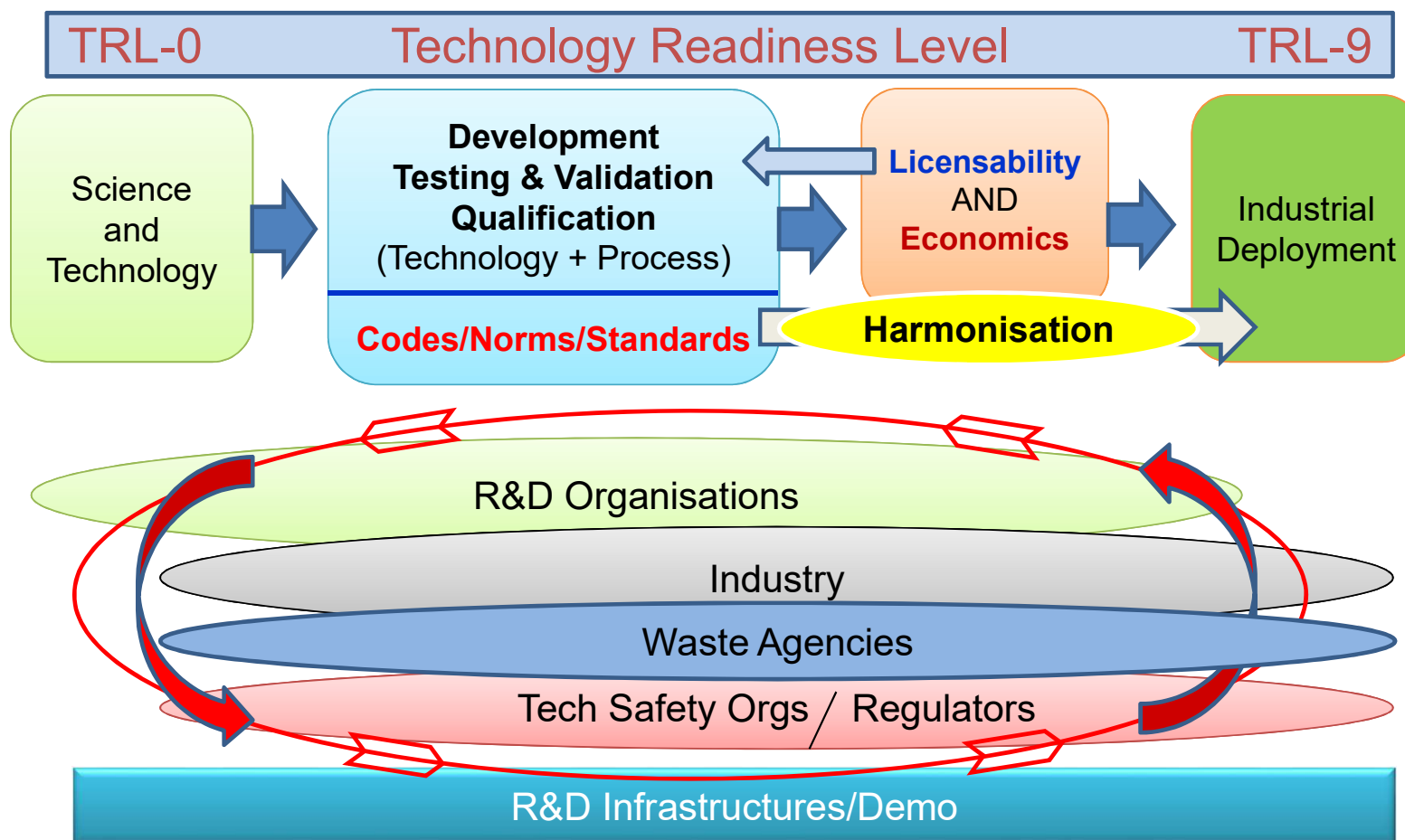
weCARE



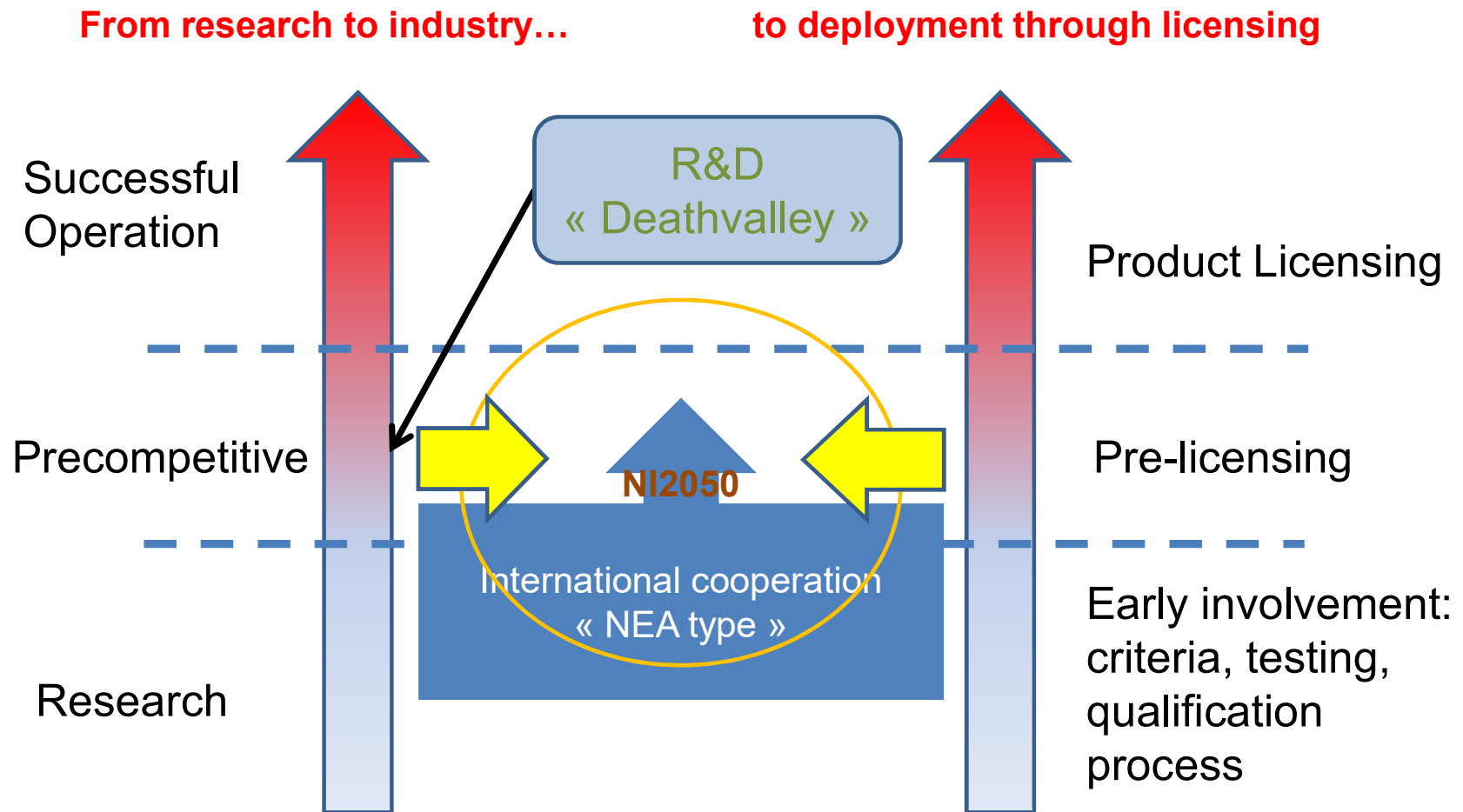
Boosting Nuclear Innovation : NEA NI2050...

- Launched 2015 – boost nuclear innovation through international (multilateral) cooperation
- Revisited the **conditions for innovation**:
 - need to involve all stakeholders at early stages
 - improve parallelism TRL/LRL
 - foster harmonisation to open markets for the products of innovation
 - need public sector (policy makers) engagement: conducive stable environment and... financing schemes...
- Developed **Roadmaps** for selected areas: ia Accident Tolerant Fuels, **High Temperature Reactors**, Partitioning and Transmutation,...
- Promoted the need to build **DEMONSTRATORS** (noting GIF, HTTR, HTR-PM,...)
- Multilateral cooperation frameworks can help: NEA « ad-hoc » Joint Undertakings...

NI2050 CONCEPT: From Science to Market Deployment

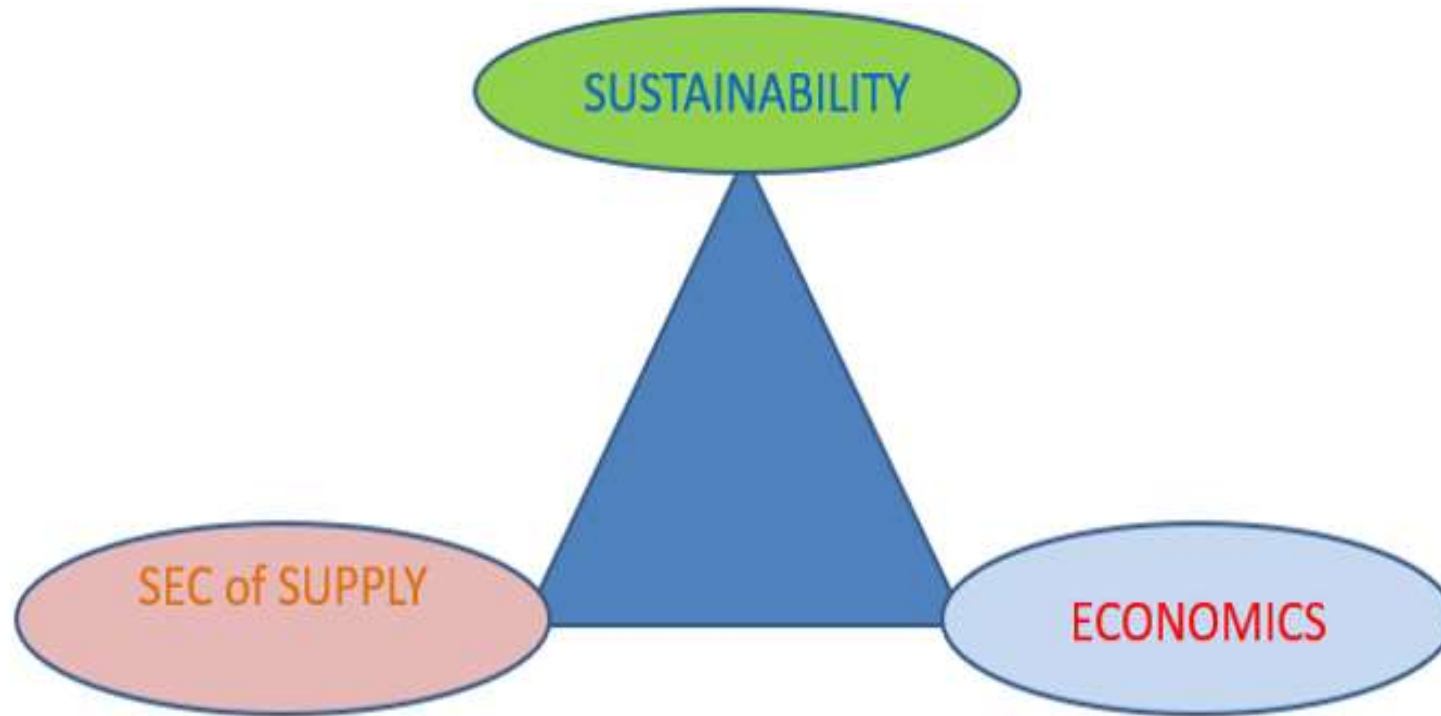


Technology and Licensing Readiness



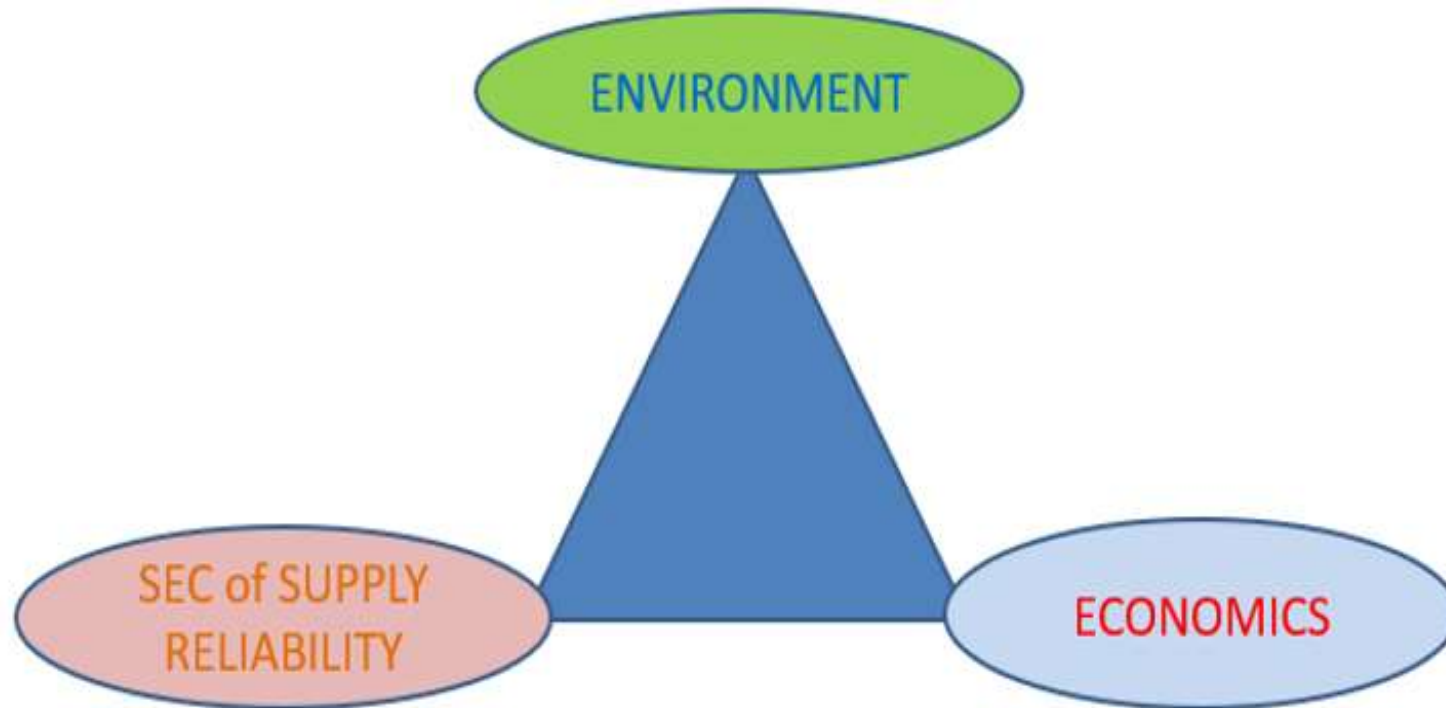
A RED FLAG: « Sustainable Financing »...

- The standard BUT wrong approach for energy policy...



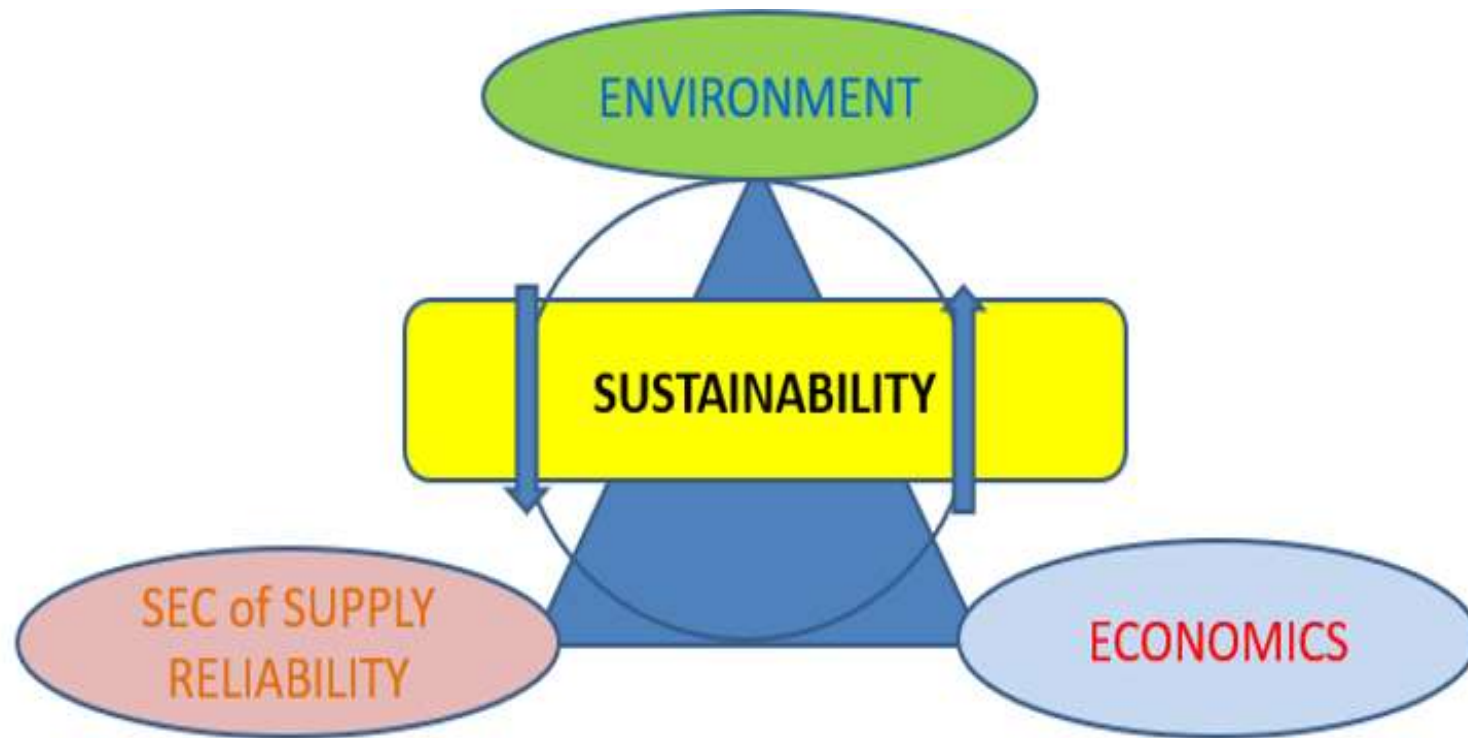
A RED FLAG: Sustainable Financing...

- A better approach for energy policy...



A RED FLAG: Sustainable Financing...

- The approach for a sustainable energy policy...



A RED FLAG: Sustainable Financing...

- weCARE for societal sustainability of the **ENERGY SYSTEM**

