ENSREG Conference

Choosing the key topics for research, a regulator's perspective

Juan Carlos LENTIJO, President

Spanish Nuclear Safety Council (CSN)

Brussels, 20-21 June 2022

INDEX

1 Some principles for good regulation

A good regulator:

- Increase effectiveness.
- Increase efficiency.
- Progress and decide in a transparent and consistent manner.
- Bring order.
- Manage knowledge.

2 Strategic challenges linked to R&D at the regulatory level

- Establishment of a strategy for the selection of R&D projects, to prioritise those with an impact on issues related to the functions and competences of the CSN and those which may provide support for regulatory decision-making.
- Streamlining the processes for allocating resources to R&D projects, in coordination with other involved entities, especially those in the public sector.
- Ensuring the applicability of the results obtained from R&D into returns to the regulatory activities.
- Defining communication and dissemination plans of R&D results.
- Cooperation at both the national and international levels.

3 Entities with which the CSN collaborates in the R&D identified fields of interest (1/2): National R&D partner organizations

- National research organisations: R&D Centres/University/public and private entities.
- Nuclear industry: public (ENUSA, ENRESA, ENSA, ...) and private (CEN-Nuclear Forum, TECNATOM, IDOM, EEAA, SEA, NFQ...) companies.
- Professional and scientific societies.
- Technological platforms: CEIDEN and PEPRI.

CEIDEN
Plataforma Tecnológica Española de Energía Nuclear de Fisión

PEPRI
PLATAFORMA NACIONAL I+D EN PROTECCIÓN RADIOLÓGICA

4 Entities with which the CSN collaborates in the R&D identified fields of interest (2/2): International organisations and entities

- International organisations:
  - Nuclear Energy Agency (NEA).
  - International Atomic Energy Agency (IAEA). Coordinate Research Programs.
  - European Union (EU). In particular, the 2021-2025 Euratom research and training programme.
  - UNSCEAR, ICRP, etc.
- R&D activities and plans of other regulators and technical support organisations (USNRC, Swedish SSM, French IRSN, German GRS, ETSON, etc.)
- Relevant international public and private entities in nuclear and radiological R&D (US's Electric Power Research Institute, UK's National Nuclear Laboratory, Japan Atomic Energy Agency, US's National Labs and National Institute of Health, etc.)
- European technological and scientific platforms:
  - European Platforms for Low Dose Effects Research (MELODI), for Radioecology (ALLIANCE), for Research into Radiological and Nuclear Emergencies (NERIS), for Social and Human Activities linked to Radiation (SHARE)
  - European Radiation Dosimetry Group (EURADOS), European Alliance for Medical Radiation Protection Research (EURAMED).
  - Sustainable Nuclear Energy Technology Platform (SNETP) and its associated groups (NUGENIA,...)
  - Joint European Program for the Integration of Radiation Protection Research (EJP-CONCERT).
- Regulators' networks and associations (ENSREG, WENRA, HERCA, ENSRA, INRA, Iberoamerican FORO, etc.)

5 CSN framework for establishing a R&D strategy and specific programs (1/3):

At the institutional and strategic level

- Spanish Law.

  CSN function: "to establish and monitor research plans regarding nuclear safety and radiation protection"

- National strategies and regulations.

- CSN R&D&i Plan 2021-2025.

  Strategic lines

  in nuclear safety (9)

  in radiation protection (12) and

  cross-cutting (4)

  broken down in related research areas.

STRATEGIC LINES RELATING TO NUCLEAR SAFETY (section 4.1)		
CSN PROCESSES	**STRATEGIC LINES**	**RESEARCH AREAS**
NUCLEAR FACILITY EVALUATION AND CYCLE NUCLEAR FACILITY SUPERVISION AND CONTROL AND CYCLE	**1.1. Analysis and simulation methods and tools. Fire simulation codes.**	1.1.1. Experimental thermal-hydraulic programmes, verification/validation and development of simulation tools.
		1.1.2. Development of MELCOR models to support Level 1 and Level 2 PSAs.
		1.1.3. Use of CFD (Computational Fluid Dynamics) codes, in accordance with the current international trend.
		1.1.4. Validation of fuel burn-up calculation codes. Improved nuclear data libraries in the new higher burn-up ranges.
		1.1.5. Methods and tools for severe accident analysis and simulation.
		1.1.6. Fire simulation techniques and codes for various scenarios and different fire sources (FDS / Fire Dynamics Simulator computational fluid dynamics models).
	1.2. Safety assessment methodologies.	1.2.1. Development and validation of realistic security analysis methodologies. Techniques for quantifying safety margins and their uncertainties, combining probabilistic and deterministic methods.
		1.2.2. Development of new capacities and updating of PSA models.
		1.2.3. Human and organisational factors: Update on human reliability analysis in PSAs.
		1.2.4. Human behaviour, and human and organisational factors, under accidental conditions.

6 CSN framework for establishing a R&D strategy and specific programs (2/3):

At the practical level – developing research projects

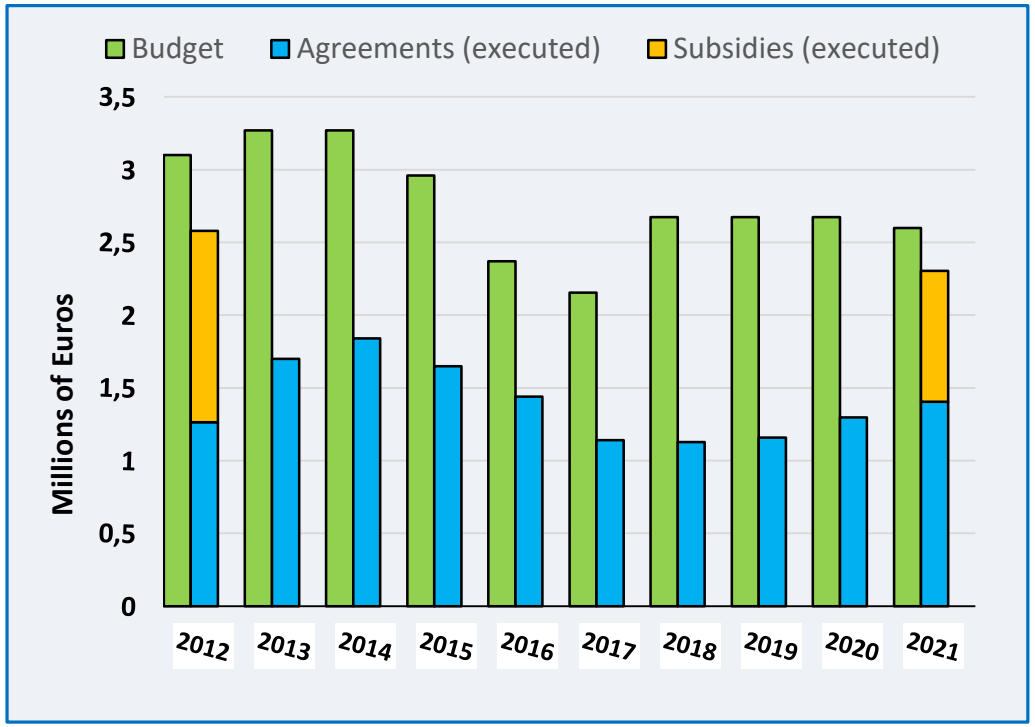
- Two main instruments
  - Collaboration **Agreements** with other entities.
  - Open calls for the granting of **subsidies** for R&D&I projects
- Financing of Chairs in Spanish universities with R&D and training activities related to nuclear safety and radiation protection.
- Participation of CSN experts in various national and international R&D-related groups and projects.

7 CSN framework for establishing a R&D strategy and specific programs (3/3):

2021

- 4 new agreements related to R&D projects with national research entities were approved.
- 3 specific agreements with the NEA/OECD for CSN participation in international projects were signed.
- Subsidies were awarded for 15 R&D&i projects through open calls for proposals.
- CSN finances 3 chairs in Spanish universities (period 2021-2023).

Financial resources and expenditures for R&D at the CSN



8 Addressing the challenges related to R&D at the regulatory level

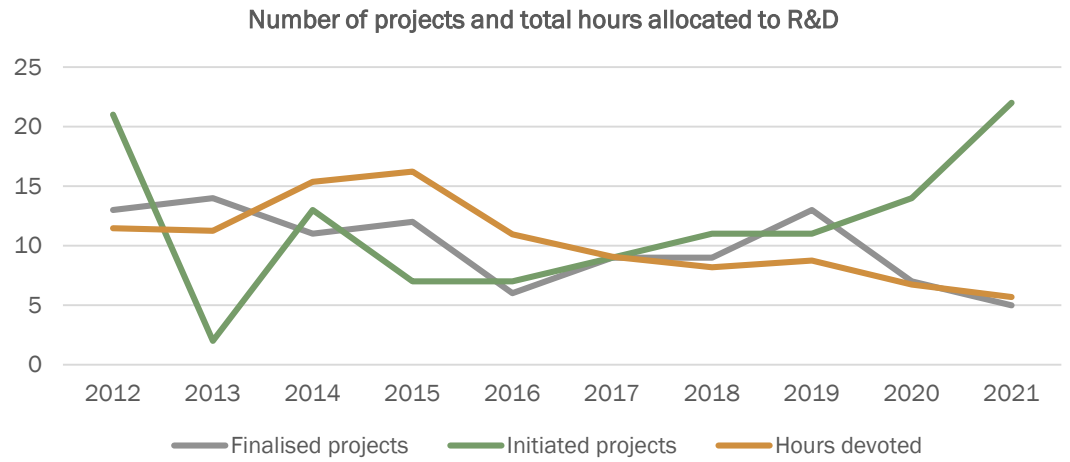
- Identification and exploitation of the returns:

  Adequate identification of potential returns, reporting (evaluation reports) and implementation.

- Continuous revision of the internal processes to be more efficient launching and promoting the new lines of work.
- Seeking for external and independent advice, not only for the management of the projects, but in the definition of the strategy and even in the decision-making process.
- As regards national and international cooperation:
  - high-level strategy groups with influence in the definition and the oversight of R&D policies and programs.
  - encourage the active participation of other Spanish entities and institutions in research activities, along with our own experts.
- As regards communication and dissemination of project results:
  - Internal communication: sessions or seminars, documentation platform and knowledge management related actions.
  - External dissemination: CSN's annual R&D&I Workshop, CSN website, CSN magazine (alfa), collaboration in articles and monographs, participation at workshops and conferences, etc.

Thank you for your attention

CSN framework for establishing a R&D strategy and specific programs (3/3):



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
FINALISED PROJECTS	13	14	11	12	6	9	9	13	7	5
INITIATED PROJECTS	21	2	13	7	7	9	11	11	14	22
TOTAL HOURS (thou.)	11,477	11,256	15,377	16,221	10,95	9,075	8,201	8,753	6,732	5,679

R&D activities at the CSN website

- Much more detailed information on the characteristics and objectives of the CSN R&D programme and plan is available on the CSN website www.csn.es

- Route: www.csn.es → CSN → R&D

  (Each of the current projects has a link to the basic information about it, available in Spanish)

Strategic lines of the R&D Plan 2021/2025

NUCLEAR SAFETY	RADIATION PROTECTION
• Analysis and simulation methods and tools. Fire simulation codes.	• Detection and measurement: metrology and dosimetry.
• Safety assessment methodologies.	• Risk prevention in situations of planned exposure situations (occupational risk prevention).
• Operation, storage and transportation of fuel and spent fuel management.	• Assessment of the radiological impact on the public and the environment. Radioecology.
• Material behaviour/ageing management.	• Dismantling of facilities and restoration of sites.
• Performance against conditions beyond the design basis (including Severe Accidents).	• Existing exposure situations in relation to natural radiation.
• Safety in socio-technical systems (technology, people and organisations).	• Radiobiology
• Operational experience: Databases.	• Radiological protection of the patient.
• Emergency support methods and tools (analysis, diagnosis and prognosis of emergency situations).	• Radioactive waste (very low, low and intermediate level). Disposal systems
• External risk management.	• Environmental Radiological Surveillance.
	• Emergency management.
	• Physical protection
	• Development and improvement of RP-related calculation codes.

Strategic lines of the R&D Plan 2021/2025

CROSS-CUTTING

- Effects of climate change.
- Organizational culture. Governance, transparency and participation.
- Agenda 2030. Sustainable development.
- Others to be determined.