

## Research and Development Activities at NEA following Fukushima

Dr. Brian Sheron, Chair  
Committee on the Safety of Nuclear Installations  
Nuclear Energy Agency  
16<sup>th</sup> February, 2015

## OECD/NEA Membership



- **Australia**
- **Austria**
- **Belgium**
- **Canada**
- **Chile**
- **Czech Republic**
- **Denmark**
- **Estonia**
- **Finland**
- **France**
- **Germany**
- **Greece**
- **Hungary**
- **Iceland**
- **Ireland**
- **Israel**
- **Italy**
- **Japan**
- **Korea**
- **Luxembourg**
- **Mexico**
- **Netherlands**
- **New Zealand**
- **Norway**
- **Poland**
- **Portugal**
- **Russia**
- **Slovak Republic**
- **Slovenia**
- **Spain**
- **Sweden**
- **Switzerland**
- **Turkey**
- **United Kingdom**
- **United States**

**OECD and NEA member**  
**OECD member, not NEA**  
**NEA member, not OECD**



## The NEA Mission

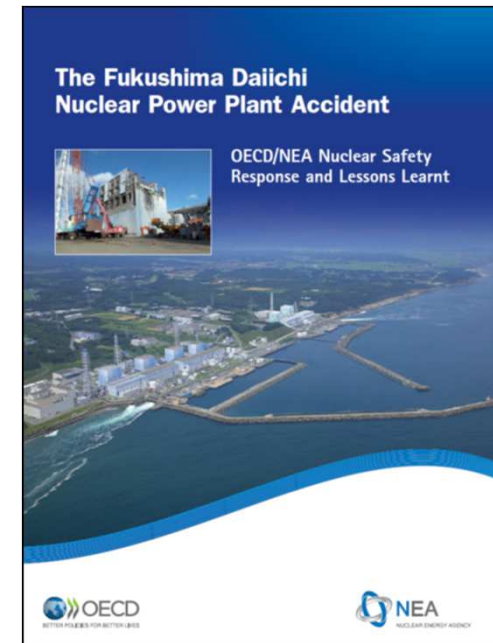


- To assist its member countries in maintaining and further developing, through **international co-operation, the scientific, technological and legal bases** required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes.
- To provide authoritative assessments and to forge **common understandings** on key issues, as **input to government decisions on nuclear energy policy**, and to broader OECD policy analyses in areas such as energy and sustainable development.

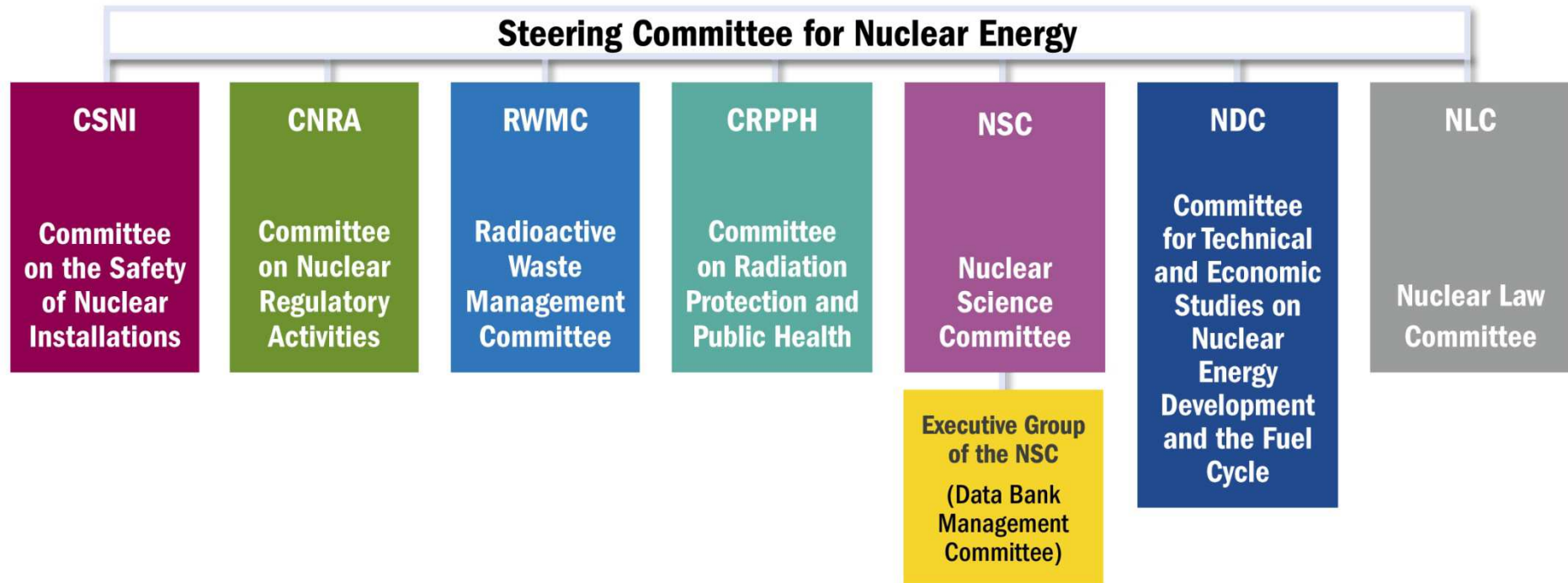
## NEA Follow-up to Fukushima

- The NEA has supported member countries in individual and collective responses to Fukushima.
- Actions were summarized in “The Fukushima Daiichi Nuclear Power Plant Accident *OECD/NEA Nuclear Safety Response and Lessons Learnt*”
- Includes R&D activities related to improving the management of and response to severe accidents

<http://www.oecd-nea.org/pub/2013/7161-fukushima2013.pdf>

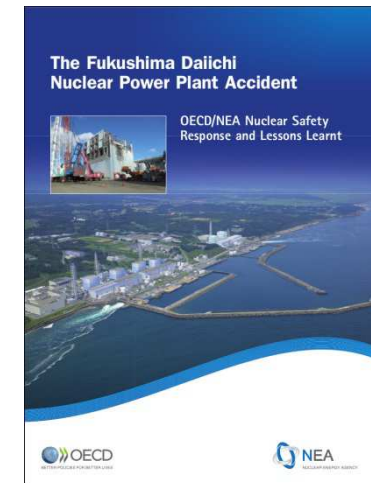


## NEA Committees



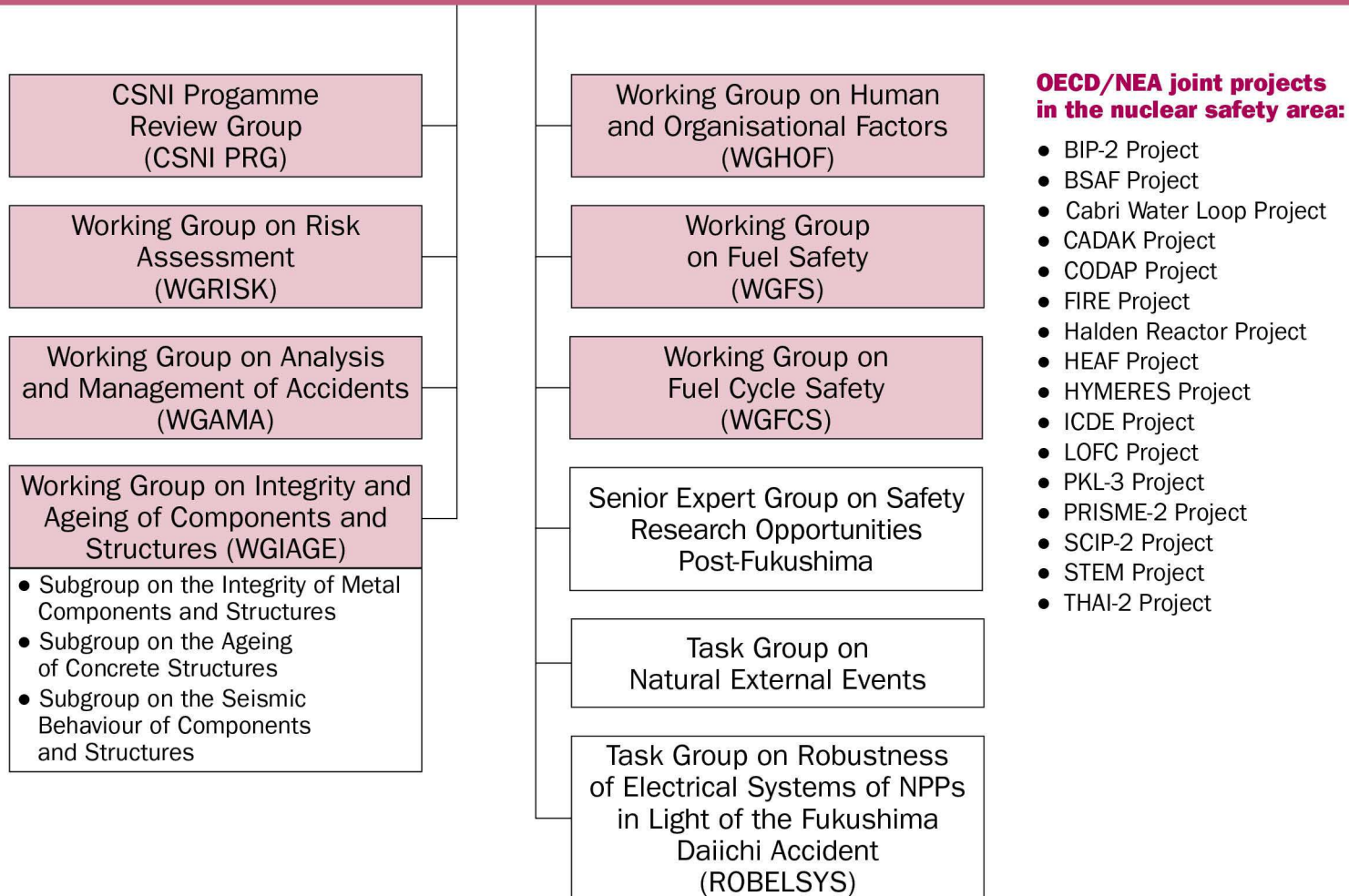
## The Fukushima Daiichi Nuclear Power Plant Accident: OECD/NEA Nuclear Safety Response and Lessons Learnt

- **NEA committees primarily involved in Fukushima follow-up:**
  - ✓ Committee on Nuclear Regulatory Activities (CNRA),
  - ✓ Committee on the Safety of Nuclear Installations (CSNI),
  - ✓ Committee on Radiation Protection and Public Health (CRPPH).
- **Areas covered:**
  - ✓ Immediate response by NEA member countries, key messages and conclusions,
  - ✓ NEA actions in follow-up to the Fukushima Daiichi accident,
  - ✓ Direct support to Japan by the NEA.





## Committee on the Safety of Nuclear Installations (CSNI)



## Activities related to Research and Development

- Committee on the Safety of Nuclear Installations (CSNI -primarily focussed on technical issues associated with Fukushima accident)
  - Filtered containment venting
  - Hydrogen behaviour
  - Spent fuel pools
  - Fission Product Release Tools
  - Human Performance under Extreme Conditions
  - Monitored as specific activities via FCAPs
- Joint Nuclear Safety Research Projects
  - Existed prior to Fukushima
  - Launched additional new projects and extended others
- Committee on Nuclear Regulatory Activities (CNRA -support for nuclear regulatory bodies)
  - Task Group on Accident Management



## Outline

- CNRA Request for CSNI Follow-up Activities  
(via Fukushima CSNI Activity Proposal Sheet - FCAPS)
- CSNI Response to Fukushima Daiichi
- Working Group activities
- Joint International Research Projects

## Status of the 8 FCAPS (1)

- **Technical Opinion Paper on Filtered Containment Venting (WGAMA - Analysis and Management of Accidents):**
  - Report approved in June 2014
- **Status Report on Hydrogen Behaviour (WGAMA - Analysis and Management of Accidents):**
  - Report approved in June 2014
- **Workshop on Natural External Events including Earthquake (WGRISK – Risk Assessment):**
  - Report approved in June 2014
- **Workshop on the Robustness of Electrical Systems of NPPs in Light of the Fukushima Daiichi Accident (Task Group):**
  - Workshop held in April 2014, and report approved in December 2014

## Status of the 8 FCAPS (2)

- **Status Report on Spent Fuel Pool under Loss of Cooling Accident Conditions (WGAMA and WGFS – Fuel Safety)**
  - Report approved in December 2014
- **Metallic Component Margins under High Seismic Loads (WGIAGE – Integrity and Ageing of Components and Structures)**
  - Report approved in December 2014
- **Human Performance and Intervention under Extreme Conditions (WGHOFF – Human and Organisational Factors)**
  - Workshop held in Feb 2014 and report now planned for June 2015
- **International benchmarking project of fast-running software tools for the estimation of fission product releases during accidents at NPPs (WGAMA)**
  - Additional calculations required – report planned for Dec 2015

## Post-Fukushima – Additional Activities

- **Senior Expert Group on SAfety REsearch Opportunities Post-Fukushima (SAREF):**
  - Identifying possible safety research projects that address knowledge gaps and support decommissioning.
  - Topic areas have been identified, and a summary ranking table is being developed
- **Task Group on Natural External Events:**
  - Transitioning to a working group
  - Initial focus is on severe weather events with high winds and a risk of flooding
- **Task Group on Electrical Systems:**
  - Discussing potential further work and organizational aspects
- **Benchmark Study on the Accident at Fukushima (BSAF) Project**
  - Phase 1 nearing completion, focussed on first 6 days and thermal hydraulic behaviour in reactor and containment vessels
  - Phase 2 to start in 2015, longer time frame (~21 days) and including fission product behaviour

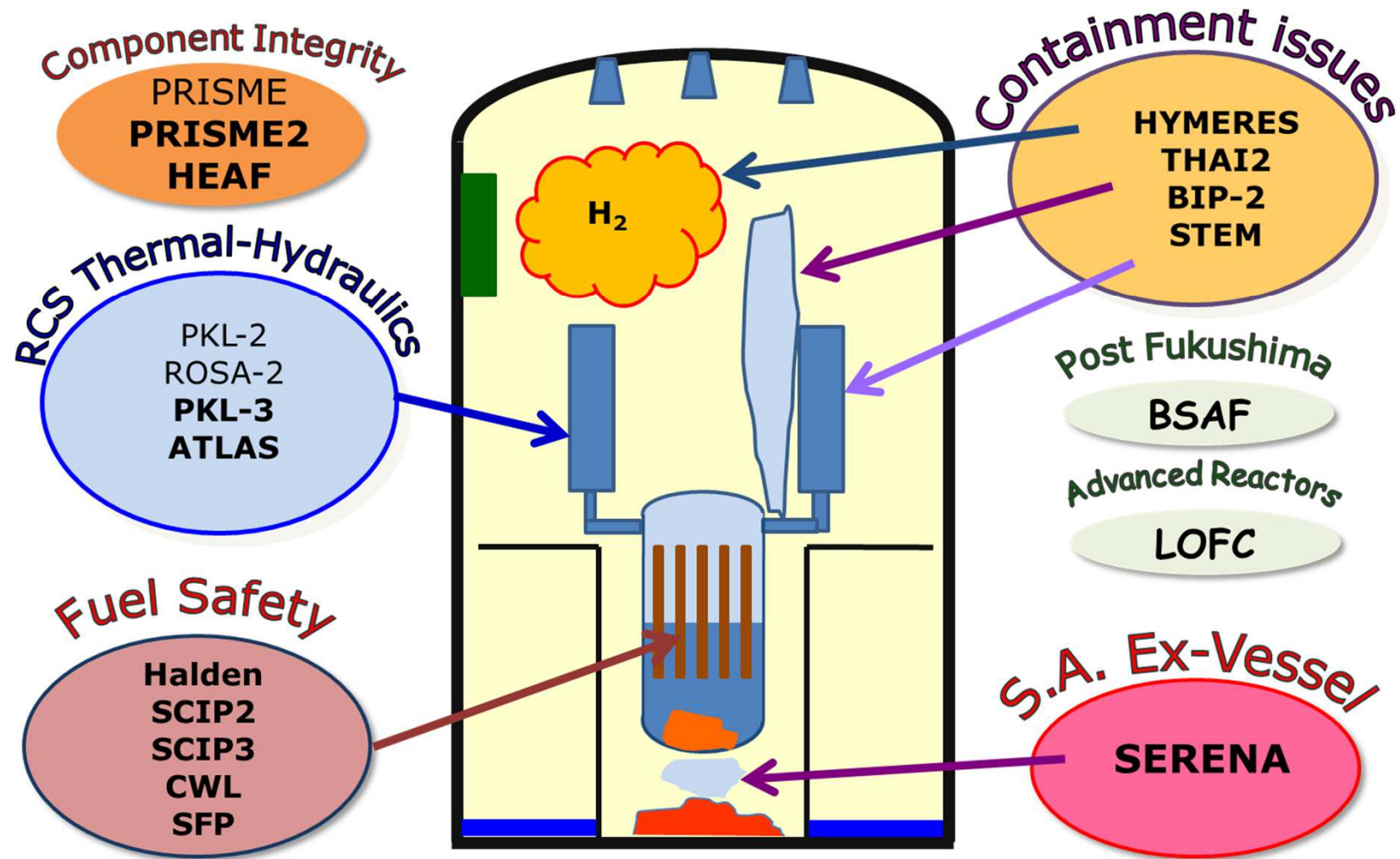
## Joint Safety Research Projects (JSRP)

- Collaborative research between Governments of OECD/NEA Member countries or bodies designated by such Governments, or OECD non-member countries or economies in compliance with the rules and regulations applicable to the OECD (see Article 5 of the Statute of the OECD/NEA)
- JSRP Status
  - 10 Active Projects and in progress
  - 5 Projects Closing
  - 1 Project starting
  - 4 Ongoing Databases
    - Total 20 Active Workstreams
  - Potentially 4 project follow-ups
  - 26 Closed Projects

## Two types of JSRP – Experimental & Database

- Experimental
  - Traditionally Host Country with Operating Agent (OA) proposes experimental work with others then participating with funds and agreeing to a mutually beneficial research work programme
  - Most recently we have begun to have multiple OA projects which have cost, scale and multiple aspect advantages
  - 3-5 year experimental programmes
- Database
  - There are 4 database projects
  - Ongoing projects with phases : No fixed end data
  - Membership share data for mutual analysis
  - Low cost annual fee

# Post-2011 OECD/NEA Safety Research Projects





## Post-Fukushima Related Research Work

- Progress on the Joint Projects specifically related to Fukushima Accident:
  - **BSAF** – Benchmark Study of the Accident at the Fukushima Daiichi Nuclear Power Station Project
  - **HYMERES** – Hydrogen Mitigation Experiments for Reactor Safety
  - **PKL3** – PWR Transient Tests Under Postulated Accident Scenarios
  - **ATLAS** – Advanced Thermal-Hydraulic Test Loop for Accident Simulation

## Conclusion

- The NEA has a broad programme of work that addresses lessons learnt from Fukushima
- Existing knowledgebase and good practises being collected for accident management technology
- Significant Coordinated International Research and Development both in evolving good practice and underpinning experimental needs