NEA joint projects: *nuclear safety, radioactiv*

NEA joint projects and information exchange programmes enable interested countries, on a cost-sharing basis, to pursue research or the sharing of data with respect to particular areas or issues in the nuclear energy field. The projects are carried out under the auspices, and with the support, of the NEA. All NEA joint projects currently under way are listed below.

Project	Participants	Budget
Behaviour of Iodine (BIP) Project Contact: carlo.vitanza@oecd.org Current mandate: July 2007-June 2010	Belgium, Canada, Finland, France, Germany, Japan, Korea, Netherlands, Spain, Sweden, Switzerland, United Kingdom, United States	≈€ 1 million
Cabri Water Loop Project Contact: carlo.vitanza@oecd.org Current mandate: 2000-2010	Czech Republic, Finland, France, Germany, Hungary, Japan, Korea, Slovak Republic, Spain, Sweden, Switzerland, United Kingdom, United States	≈€ 60 milion
Computer-based Systems Important to Safety (COMPSIS) Project Contact: jean.gauvain@oecd.org Current mandate: January 2005-December 2007	Chinese Taipei, Finland, Germany, Hungary, Japan, Korea, Slovak Republic, Sweden, Switzerland, United States	€ 100 K /year
Co-operative Programme on Decommissioning (CPD) Contact: patrick.osullivan@oecd.org Current mandate: January 2004-December 2008	Belgium, Canada, Chinese Taipei, France, Germany, Italy, Japan, Korea, Slovak Republic, Spain, Sweden, United Kingdom	≈€ 60 K /year
Fire Incidents Records Exchange (FIRE) Project Contact: jean.gauvain@oecd.org Current mandate: January 2006-December 2009	Canada, Czech Republic, Finland, France, Germany, Japan, Korea, Netherlands, Spain, Sweden, Switzerland, United States	≈€ 91 K /year
Halden Reactor Project Contact: carlo.vitanza@oecd.org Halden contact: Fridtjov.owre@hrp.no Current mandate: January 2006-December 2008	Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Hungary, Japan, Korea, Norway, Russia, Slovak Republic, Spain, Sweden, Switzerland, United Kingdom, United States	≈€ 15 million /year
Information System on Occupational Exposure (ISOE Programme) Contact: brian.ahier@oecd.org Current mandate: 2002-2007	Armenia, Belgium, Brazil, Bulgaria, Canada, China, Czech Republic, Finland, France, Germany, Hungary, Italy, Japan, Korea, Lithuania, Mexico, Netherlands, Pakistan, Romania, Russia, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States	≈€ 370 K /year
International Common-cause Data Exchange (ICDE) Project Contact: jean.gauvain@oecd.org Current mandate: April 2005-March 2008	Canada, Finland, France, Germany, Japan, Korea, Spain, Sweden, Switzerland, United Kingdom, United States	≈€ 140 K /year

e waste management, radiological protection

At present, 14 joint projects are being conducted in relation to nuclear safety, two in support of radioactive waste management and one in the field of radiological protection. These projects complement the NEA programme of work and contribute to achieving excellence in each of the respective areas of research.

Objectives
• Provide separate effects and modelling studies of iodine behaviour in a nuclear reactor containment building following a severe accident. • Provide data and interpretation from three radioiodine test facility (RTF) experiments to participants for use in collaborative model development and validation. • Achieve a common understanding of the behaviour of iodine and other fission products in post-accident reactor containment buildings.
• Extend the database for high burn-up fuel performance in reactivity-induced accident (RIA) conditions. • Perform relevant tests under coolant conditions representative of pressurised water reactors (PWRs). • Extend the database to include tests done in the Nuclear Safety Research Reactor (Japan) on BWR and PWR fuel.
• Define a format and collect software and hardware fault experience in computer-based, safety-critical NPP systems in a structured, quality-assured and consistent database. • Collect and analyse COMPSIS events over a long period so as to better understand such events, their causes and their prevention. • Generate insights into the root causes of and contributors to COMPSIS events, which can then be used to derive approaches or mechanisms for their prevention or for mitigating their consequences. • Establish a mechanism for efficient feedback of experience gained in connection with COMPSIS events, including the development of defences against their occurrence, such as diagnostics, tests and inspections. • Record event attributes and dominant contributors so that a basis for national risk analysis for computerised systems is established.
• Exchange scientific and technical information amongst decommissioning projects on nuclear facilities.
• Collect fire event experience (by international exchange) in the appropriate format and in a quality-assured and consistent database. • Collect and analyse fire events data over the long-term with the aim to better understand such events, their causes and their prevention. • Generate qualitative insights into the root causes of fire events which can then be used to derive approaches or mechanisms for their prevention or for mitigating their consequences. • Establish a mechanism for the efficient feedback of experience gained in connection with fire including the development of defences against their occurrence, such as indicators for risk-based inspections. • Record characteristics of fire events in order to facilitate fire risk analysis, including quantification of fire frequencies.
Generate key information for safety and licensing assessments and aim at providing: • extended fuel utilisation: basic data on how the fuel performs, both under normal operation and transient conditions, with emphasis on extended fuel utilisation in commercial reactors; • degradation of core materials: knowledge of plant materials behaviour under the combined deteriorating effects of water chemistry and nuclear environment, also relevant for plant lifetime assessments; • man-machine systems: advances in computerised surveillance systems, virtual reality, digital information, human factors and man-machine interaction in support of control room upgradings.
• Collect and analyse occupational exposure data and experience from all participants to form the ISOE databases. • Provide broad and regularly updated information on methods to improve the protection of workers and on occupational exposure in nuclear power plants. • Provide a mechanism for dissemination of information on these issues, including evaluation and analysis of the data assembled and experience exchanged, as a contribution to the optimisation of radiation protection.
• Provide a framework for multinational co-operation. • Collect and analyse common-cause failure (CCF) events over the long term so as to better understand such events, their causes and their prevention. • Generate qualitative insights into the root causes of CCF events which can then be used to derive approaches or mechanisms for their prevention or for mitigating their consequences. • Establish a mechanism for the efficient feedback of experience gained in connection with CCF phenomena, including the development of defences against their occurrence, such as indicators for risk-based inspections. • Generate quantitative insights and record event attributes to facilitate the quantification of CCF frequencies in member countries. • Use the ICDE data to estimate CCF parameters.

Project	Participants	Budget
Melt Coolability and Concrete Interaction (MCCI) Project Contact: carlo.vitanza@oecd.org Current mandate: April 2006-December 2009	Belgium, Czech Republic, Finland, France, Germany, Hungary, Japan, Korea, Norway, Spain, Sweden, Switzerland, United States	€ 0.9 million /year
Piping Failure Data Exchange (OPDE) Project Contact: alejandro.huerta@oecd.org Current mandate: July 2005-July 2008	Belgium, Canada, Czech Republic, Finland, France, Germany, Japan, Korea, Spain, Sweden, Switzerland, United States	≈ € 54 K /year
PRISME Project Contact: carlo.vitanza@oecd.org Current mandate: January 2006-December 2010	Belgium, Canada, Finland, France, Germany, Japan, Korea, Netherlands, Spain, Sweden	€ 7 million
Rig of Safety Assessment (ROSA) Project Contact: carlo.vitanza@oecd.org Current mandate: April 2005-December 2009	Belgium, Czech Republic, Finland, France, Germany, Hungary, Japan, Korea, Netherlands, Spain, Sweden, Switzerland, United Kingdom, United States	€ 0.7 million /year
SESAR Thermal-hydraulics (SETH-2) Project Contact: jean.gauvain@oecd.org Current mandate: March 2007-December 2010	Czech Republic, Finland, France, Germany, Japan, Korea, Slovenia, Sweden, Switzerland	€ 0.8 million /year
Steam Explosion Resolution for Nuclear Applications (SERENA) Project Contact: carlo.vitanza@oecd.org Current mandate: October 2007-September 2011	Canada, Finland, France, Germany, Japan, Korea, Slovenia, Sweden, United States	€ 2.6 million
Stress Corrosion Cracking and Cable Ageing (SCAP) Project Contact: akihiro.yamamoto@oecd.org Current mandate: June 2006-June 2010	Belgium, Canada, Czech Republic, Finland, France, Germany, Japan, Korea, Mexico, Norway, Slovak Republic, Spain, Sweden, United States	€ 480 K /year
Studsvik Cladding Integrity Project (SCIP) Contact: carlo.vitanza@oecd.org Current mandate: July 2004-June 2009	Czech Republic, Finland, France, Germany, Japan, Korea, Spain, Sweden, Switzerland, United Kingdom, United States	€ 1.4 million /year
Thermal-hydraulics, Hydrogen, Aerosols, Iodine (ThAI) Project Contact: carlo.vitanza@oecd.org Current mandate: January 2007-December 2009	Canada, Finland, France, Germany, Hungary, Korea, Netherlands, Switzerland	€ 2.8 million
Thermochemical Database (TDB) Project Contact: nea.tdb@oecd.org Current mandate: February 2003-January 2008	Belgium, Canada, Czech Republic, Finland, France, Germany, Japan, Spain, Sweden, Switzerland, United Kingdom, United States	≈€ 400 K /year

Objectives

- Provide experimental data on melt coolability and concrete interaction (MCCI) severe accident phenomena.
- Resolve two important accident management issues:
  – the verification that molten debris that has spread on the base of the containment can be stabilised and cooled by water flooding from the top;
  – the two-dimensional, long-term interaction of the molten mass with the concrete structure of the containment, as the kinetics of such interaction is essential for assessing the consequences of a severe accident.

- Collect and analyse piping failure event data to promote a better understanding of underlying causes, impact on operations and safety, and prevention.
- Generate qualitative insights into the root causes of piping failure events.
- Establish a mechanism for efficient feedback of experience gained in connection with piping failure phenomena, including the development of defence against their occurrence.
- Collect information on piping reliability attributes and influence factors to facilitate estimation of piping failure frequencies, when so decided by the Project Review Group.

- Answer questions concerning smoke and heat propagation inside a plant, by means of experiments tailored for code validation purposes.
- Provide information on heat transfer to cables and on cable damage.

- Provide an integral and separate-effect experimental database to validate code predictive capability and accuracy of models. In particular, phenomena coupled with multi-dimensional mixing, stratification, parallel flows, oscillatory flows and non-condensable gas flows are to be studied.
- Clarify the predictability of codes currently used for thermal-hydraulic safety analyses as well as of advanced codes presently under development, thus creating a group among OECD member countries who share the need to maintain or improve technical competence in thermal-hydraulics for nuclear reactor safety evaluations.

- Generate high-quality experimental data that will be used for improving the modelling and validation of computational fluid dynamics (CFD) and lumped parameter (LP) computer codes designed to predict post-accident containment thermal-hydraulic conditions (for current and advanced reactor designs).
- Address a variety of measured parameters, configurations and scales in order to enhance the value of the data for code applications.
- Study relevant containment phenomena and separate effects, including effects of jets, natural convection, containment coolers and sprays.

- Provide experimental data to clarify the explosion behaviour of prototypic corium melts.
- Provide experimental data for validation of explosion models for prototypic materials, including spatial distribution of fuel and void during the pre-mixing and at the time of explosion, and explosion dynamics.
- Provide experimental data for steam explosions in more realistic, reactor-like situations to verify the geometrical extrapolation capabilities of the codes.

- Establish two complete databases on major ageing phenomena for stress corrosion cracking (SCC) and for degradation of cable insulation.
- Establish a knowledge base by compiling and evaluating collected data and information systematically.
- Perform an assessment of the data and identify the basis for commendable practices which would help regulators and operators to enhance ageing management.

- Assess material properties and determine conditions that can lead to fuel failures.
- Improve the general understanding of cladding reliability at high burn-up through advanced studies of phenomena and processes that can impair fuel integrity during operation in power plants and during handling or storage.
- Achieve results of general applicability (i.e. not restricted to a particular fuel design, fabrication specification or operating condition).

- Address outstanding questions concerning the behaviour of hydrogen (combustion and removal using recombiners), iodine and aerosols (wall deposition, wash-out and interaction) in severe accident situations.
- Improve understanding of the respective processes for evaluating challenges to containment integrity (hydrogen) and for evaluating the amount of airborne radioactivity during accidents with core damage (iodine and aerosols).
- Generate data for evaluating the spatial distribution of hydrogen in the containment, its effective removal by means of equipment such as passive autocatalytic recombiners, and slow hydrogen combustion.

Produce a database that:

- contains data for elements of interest in radioactive waste disposal systems;
- documents why and how the data were selected;
- gives recommendations based on original experimental data, rather than on compilations and estimates;
- documents the sources of experimental data used;
- is internally consistent;
- treats all solids and aqueous species of the elements of interest for nuclear waste storage performance assessment calculations.