

Overview of NEA related activities

EGATFL Meeting
23-25 September 2014, NEA HQ

Links with other NEA Nuclear Science activities

Nuclear Science Committee (NSC)

Expert Group on Integral Experiments for Minor Actinide Management

Working Party on International Nuclear Data Evaluation Co-operation (WPEC)

- High Priority Request List for Nuclear Data
- Methods and Issues for the Combined Use of Integral Experiments and Covariance Data
- Co-ordinated Evaluation of ^{239}Pu in the Resonance Region
- Scattering Angular Distribution in the Fast Energy Range
- Evaluation of Experimental Data in the Resolved Resonance Region

Working Party on Scientific Issues of the Fuel Cycle (WPFC)

- Heavy Liquid Metal Technologies
- Fuel Recycling Chemistry
- Advanced Fuel Cycle Scenarios
- Innovative Structural Materials
- **Innovative Fuels**
- Task Force on Benchmarking of Thermal-hydraulic Loop Models for Lead-alloy-cooled Advanced Nuclear Energy Systems

Working Party on Multi-scale Modelling of Fuels and Structural Materials for Nuclear Systems (WPMM)

- Validation and Benchmarks of Methods
- Multi-scale Modelling Methods
- Structural Materials Modelling
- **Multi-scale Modelling of Fuels**
- Primary Radiation Damage

Working Party on Nuclear Criticality Safety (WPNCs)

- Advanced Monte Carlo Techniques
- Criticality Safety Benchmarks
- Burn-up Credit
- Criticality Excursions
- Assay Data of Spent Nuclear Fuel
- Uncertainty Analyses for Criticality Safety Assessment

Working Party on Scientific Issues of Reactor Systems (WPRS)

- **Reactor Physics and Advanced Nuclear Systems**
- Uncertainty Analysis in Modelling
- **Reactor Fuel Performance**
- Radiation Transport and Shielding

Executive Group of the NSC
(Data Bank Management Committee)

Databases and Scientific Services

The Scientific Co-ordination Group of the Joint Evaluated Fission and Fusion (JEFF) Data Project

Expert Group on Accident Tolerant Fuels

Expert Group on Experimental Data, Benchmarking and Validation for Coupled Multi-Physics Simulations

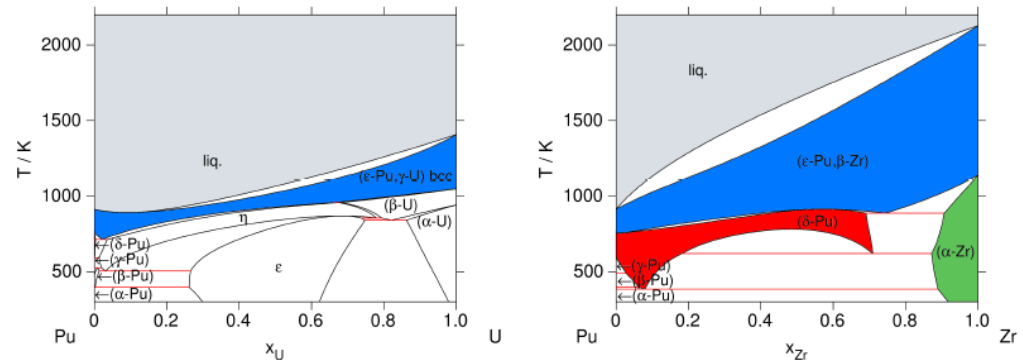
OECD-NEA activities related to EGATFL

- OECD-NEA [Nuclear Science Committee \(NSC\)](#):
 - [Working Party on Multiscale Modelling of Fuels and Structural Materials for Nuclear Systems \(WPMM\)](#), on the issue of advanced modelling techniques;
 - [Working Party on Reactor Systems \(WPRS\)](#), for nominal and accidental behaviour, fuel modelling ([EG on Reactor Fuel Performance, EGRFP](#));
 - [Working Party on Scientific Issues of the Fuel Cycle \(WPFC\)](#), [Expert Group on Innovative Fuels \(EGIF\)](#), for innovative fuels and cladding;
 - New [Expert Group on Multi-Physics, Experimental Data, Benchmark & Validation \(EGMPEBV\)](#), for severe accident codes and validation issues
- OECD-NEA [Committee on the Safety of Nuclear Installations \(CSNI\)](#):
 - [Working Group on Fuel Safety \(WGFS\)](#);
 - [Working Group on Analysis and Management of Accidents \(WGAMA\)](#), for accidental scenarios modelling;
 - [Benchmark Study of the Accident at the Fukushima Daiichi Nuclear Power Station \(BSAF\) Project](#), for the accidental sequences on Fukushima Units 1-3
- OECD-NEA [Joint Project on Thermodynamics of Advanced Fuels – International Database \(TAF-ID\)](#)

Joint Project on 'Thermodynamics of Advanced Fuels – International Database (TAF-ID)'

- **Objective:** to make available a comprehensive, internationally recognised thermodynamic database (Gibbs energy, phase diagrams) on nuclear fuel materials for:

- Fuel fabrication
- Fuel behaviour under normal and off-normal operative conditions



- **Participants:** 9 Signatories from 6 member countries: Canada (AECL, RMCC, UOIT), France (CEA), Japan (JAEA, CRIEPI), Rep. of Korea (KAERI), The Netherlands (NRG), US DoE (ORNL, LLNL, INL), with the OECD-NEA acting as project coordinator
- **Budget:** 280 000 EUR for 3 years (2013-2015)

<https://www.oecd-nea.org/science/taf-id/>

**New NSC Expert Group on
Multi-Physics, Experimental Data, Benchmark & Validation
(EGMPEBV),
Started 1 Sept. 2014**

<https://www.oecd-neo.org/science/egmpebv/>

NSC Discussions on New Expert Group MPEBV

- Informal meetings with USDoE & USNRC July 2013
 - Focus was on validation for coupled multi-physics modelling methods
- Proposal to NSC Bureau December 2013
 - Bureau recommends establishment of new NSC Expert Group
 - Agreed to hold further discussions with linked NEA Technical Groups, ahead of consideration of formal mandate at June 2014 NSC meeting
- Informal discussions with EGUAM participants in February 2014
 - Agreed to arrange for further discussions with UAM-LWR participants (this workshop)
- NSC Approval for EGMPEBV June 2014 (see Mandate)
- Start-up Meeting 1-2 Sept. 2014 (NEA HQ)
- Recruitment of new NEA Staff member Oct. 2014.

New NEA Expert Group on Multi-Physics, Experimental Data, Benchmark, and Validation (EGMPEBV)

Phillip Finck

1 September 2014 7

Motivation

- 1. We are all developing “high fidelity” multi-physics codes**
 - 2. Validating these codes to their optimal level is critical to bring on their potential, but also extremely challenging:**
 - Validation techniques; uncertainty quantification
 - Enhanced use of existing experiments
 - Definition of new experiments
 - 3. On the experimental side:**
 - Partial loss of knowledge (memory and competencies)
 - Loss of large-scale facilities
 - 4. On the theoretical side:**
 - We know how to validate single physics code
 - We have never fully validated a broad reactor multi-physics code (neutronics; TH; fuel performance; structural)
- [Work underway, including at the NEA, demonstrates the complexity of the task]

Strategic Objectives

- 1. Continue collecting (international) relevant experimental data in a high-quality fashion:**
 - **Completeness**
 - **Relevancy**
 - **Documentation**
 - **Address new needs**

- 2. Continue creating from these data high-quality benchmarks:**
 - **Documentation**
 - **Uncertainty**

- 3. Collect lessons learned and provide guidance on V&V of complex multi-physics codes**

Major Outcomes

- 1. Broaden current NEA activities to preserving and creating “certified” data to be used for validating multi-physics codes**
- 2. Create consensus guidance on validation of multi-physics codes**
- 3. Stimulate the creation of national “validation centers”**

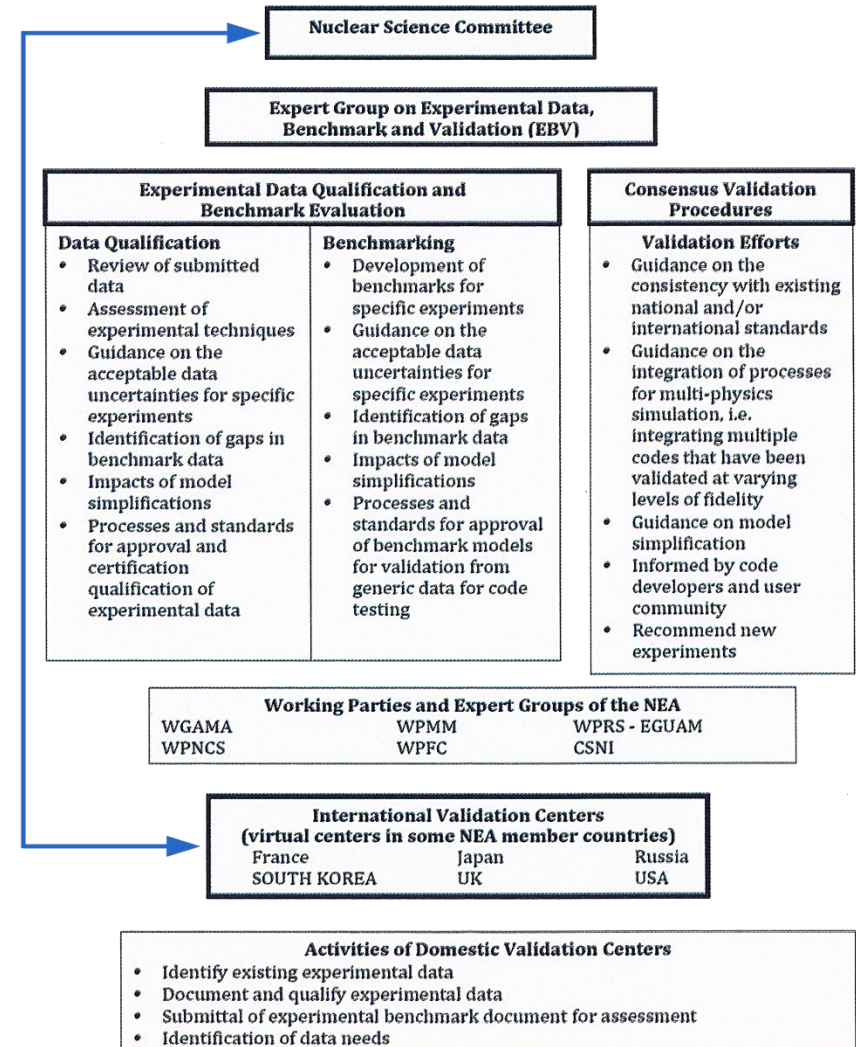
Expert Group Objectives

Activity	National Role	NEA Role
Experimental Data	Owns the data Submits the data Define applicability → Provides experts ←	Certifies the data Data Repository
	----- → Define data gaps ↔	----- Creates framework for new experiments
Benchmark Creation	Proposes data Executes creation → Provides experts ←	Directs benchmark creation Certifies Benchmark repository
	----- →	
Validation Process	Provides best practices ↔	Creates guidelines
	Provides experts	Provides support

Proposed Organization

EBV expert group of the NSC

- Close coordination with other NSC expert groups and CSNI
- Two task forces for the expert group
 - Data qualification and benchmark evaluation
 - Validation recommendations/guidance
- Data qualification and benchmark evaluation contributions through member countries
- Benchmark data and evaluations to be archived and maintained by the NSC
- Recommendations for identifying gaps in existing database by expert group participants
- Consensus validation guidance reported by the group



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