NSC/WPRS Activities on Reactor Fuel Performance (EGRFP) and IFPE database

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Presentation to EGATFL-03
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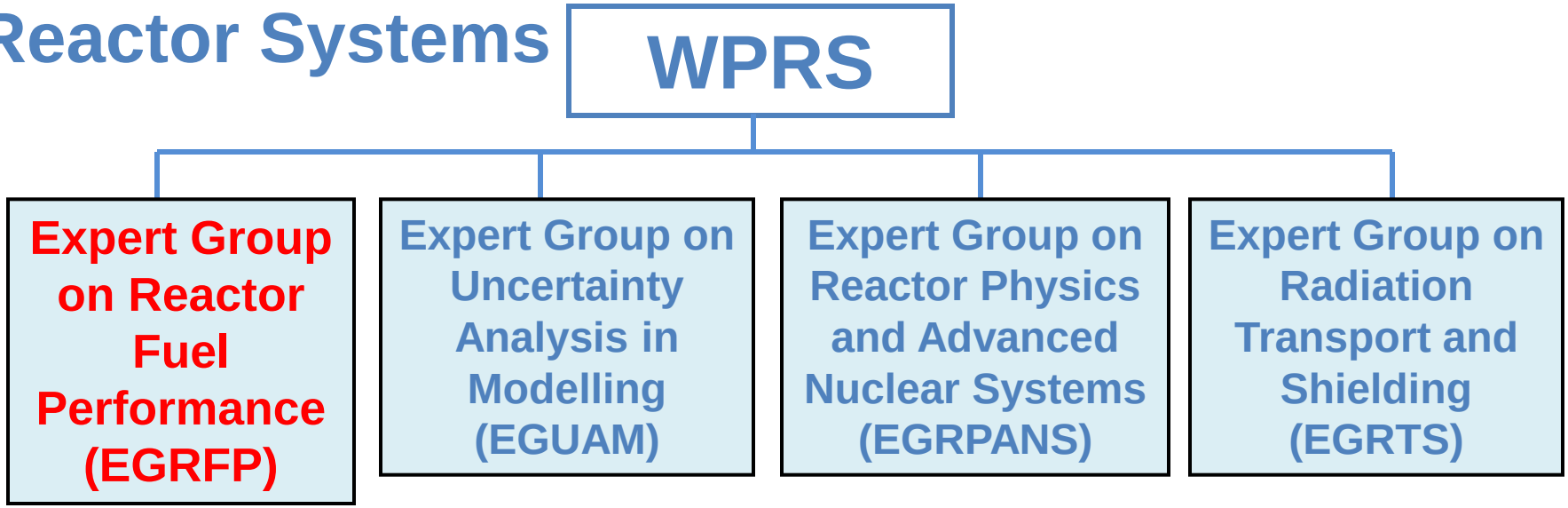
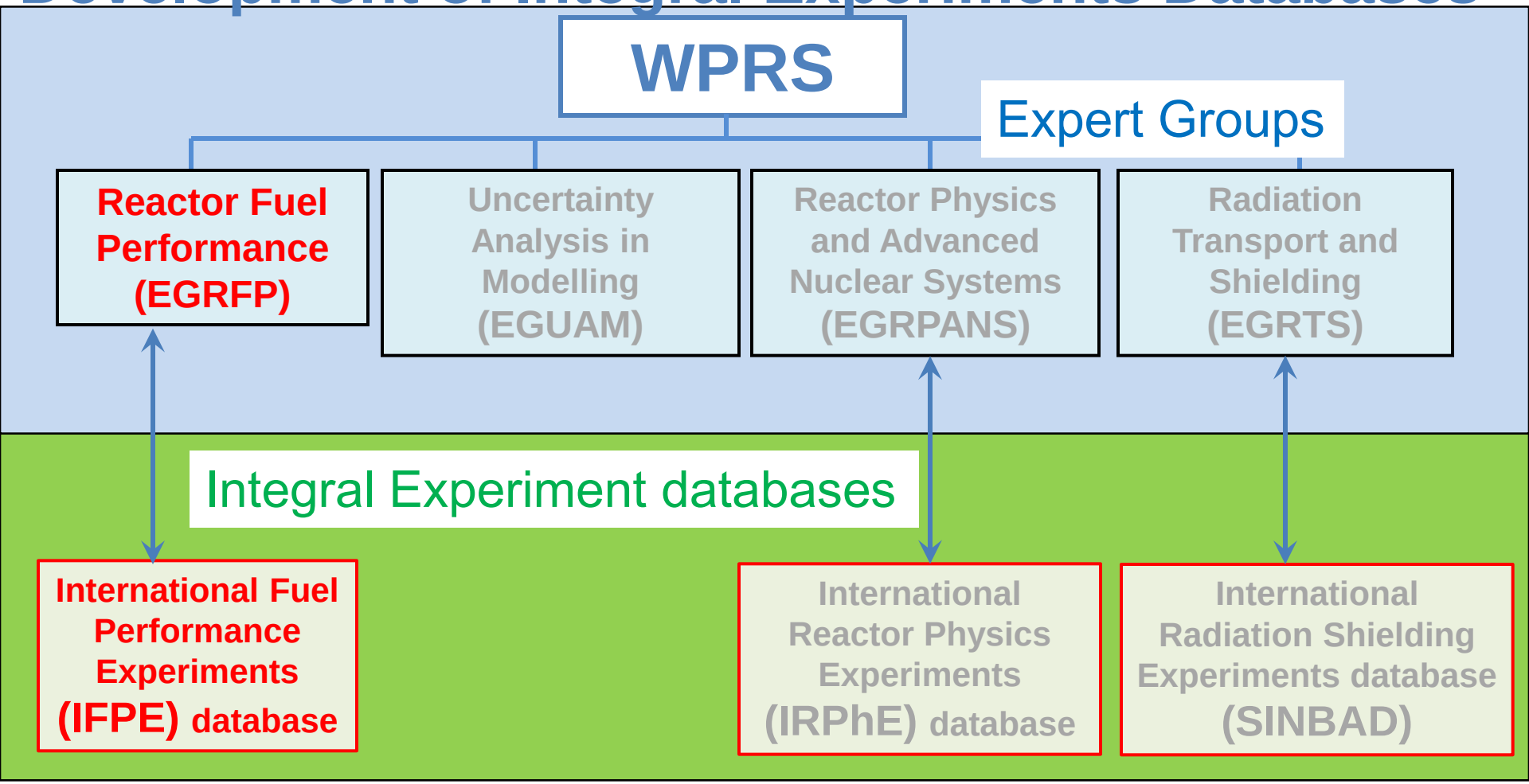
NSC Working Party on Scientific Issues of Reactor Systems



- Chair: K. Hesketh (NNL, UK)
- Secretariat: Y. Nakahara (NEA)
- Scope
  - Reactor physics, radiation transport & dosimetry and fuel performance for present and future nuclear power systems.
  - Modelling of reactor systems and the uncertainties associated with such analyses.

Development of Integral Experiments Databases



WPRS: Monitor, steer and support the development of Integral Experiment databases

IFPE History and Overview

- IFPE: International Fuel Performance Experiment database
- IAEA/FUMEX Programmes (1993-2012)
- OECD/NEA Taskforce setup 1993
- OECD/NEA Report, *prepared by J. A. Turnbull* (1995)
- Creation of IFPE with data from Halden + Studsvik and Risø (1995)
  - The public domain database
  - Thermal reactor fuel performance, principally for Zry + UO_2
  - Addition of advanced products with fuel and clad variants is not ruled out
  - Today, about 1452 rods/samples from various sources encompassing BWR, CAGR, PHWR, PWR, and VVER

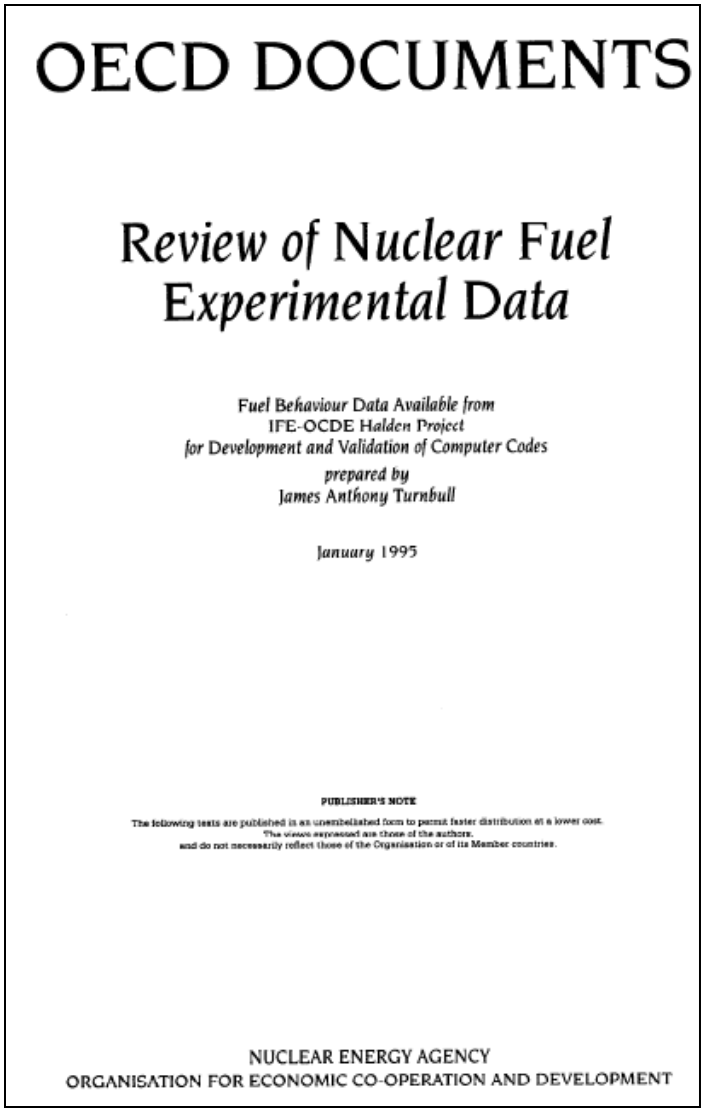
IFPE webpage http://www.oecd-nea.org/science/wprs/fuel/ifpelst.html

The Turnbull Report (1995)

Need for data in the following topic areas considered:

- *Radial Flux Depression*
- ***Thermal Performance***
- *Fuel Densification and Swelling*
- *UO_2 Grain Growth*
- ***Fission Product Release***
- *Clad Properties*
- ***Pellet Clad Mechanical Interaction (PCMI)***
- ***Integral Behaviour***
- *High Burnup Effects*

➡ Creation of IFPE database


OECD DOCUMENTS

Review of Nuclear Fuel Experimental Data

Fuel Behaviour Data Available from
IFE-OCDE Halden Project
for Development and Validation of Computer Codes
prepared by
James Anthony Turnbull

January 1995

PUBLISHER'S NOTE

The following texts are published in an unembellished form to permit faster distribution at a lower cost.
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NUCLEAR ENERGY AGENCY
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Expert Group on Reactor Fuel Performance (EGRFP)

- Created in 2011 under the guidance of WPRS
- Chair: G. Rossiter (NNL, UK)
- Secretariat: S. Massara (from March 2015), Y. Nakahara (NEA)

Objectives

- To provide expert advice on the development needs (data and methods, validation experiments, scenario studies) for **existing and future fuel designs**
- To provide specific technical information regarding:
  - National / international programmes, experimental capabilities
  - The provision of experimental data for model development and validation from the **IFPE Database**
  - Methods for code verification

EGRFP: Key Activities & Deliverables

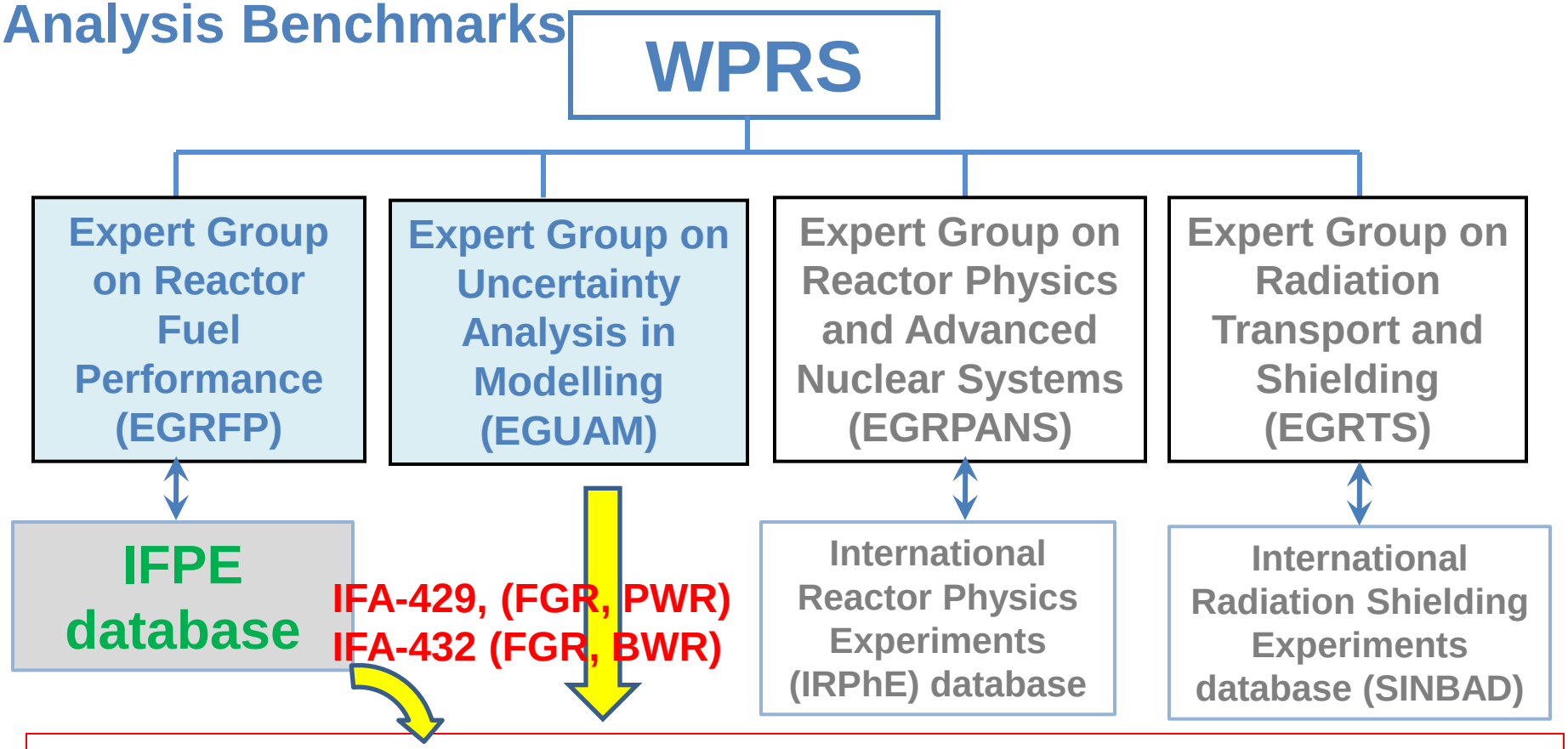
- Identification and preservation of appropriate experimental data (currently focusing on LWR fuels)
  - State of the art report "Experimental Data Requirements for Fuel Performance Modelling"
    - Review & development of IFPE database
    - Update to "Turnbull report" (Review of Nuclear Fuel Experimental Data, 1995)
  - Collaborations with IAEA/FUMEX programmes and post-FUMEX programmes (FUMAC)
  - Power/temperature benchmark being initiated using Halden Reactor data (supported by J. C. Killeen)

EGRFP: Meetings

- 5th Expert Group meeting (Feb. 2015, NEA, Paris)
  - attended by experts from 12 countries (Belgium, Czech Rep, Finland, France, Germany, Italy, Japan, Poland, Russia, Spain, UK, USA)
- Next meeting: 15-19 February 2016 at NEA in conjunction with WPRS meeting

Contact: wprs@oecd-nea.org

Links: Use of IFPE database for LWR Uncertainty Analysis Benchmarks



- UAM-LWR Benchmark, Exercise II-1 – Fuel Modelling: Fuel thermal properties relevant to steady-state and transient performance of LWRs

EGRFP Links

- OECD/NEA/NSC
  - WPRS Expert Group on Uncertainty Analysis in Modelling (EGUAM)
  - WPFC Expert Group on Innovative Fuels (EGIF)
  - WPMM Expert Group on Multi-scale Modelling of Fuels (M2F)
  - Expert Group on Accident Tolerant Fuel for LWRs (EGATFL)
- OECD/NEA/CSNI
  - Working Group on Fuel Safety (WGFS)
- OECD Halden Reactor Project (HRP)
- IAEA
  - Technical Working Group on Fuel Performance and Technology (TWG-FPT)
  - FUMAC (Fuel Modelling in Accident Conditions)
- World Nuclear Association (WNA) working group on Safety Criteria for New Fuel Technologies

Thank you for your attention.

Expert Group on Reactor Fuel Performance

https://www.oecd-nea.org/science/wprs/egrfp/

IFPE

https://www.oecd-nea.org/science/wprs/fuel/ifpelst.html