International Conference on Fast Reactors and Related Fuel Cycles

PANEL 2: "International cooperation and education"

W. Maschek

Institute for Nuclear and Energy Technologies (IKET)

FR'09
December 7 - 11, 2009
Kyoto, Japan

Karlsruhe Institute of Technology

Germany, an example of a country, re-opening the nuclear option…..

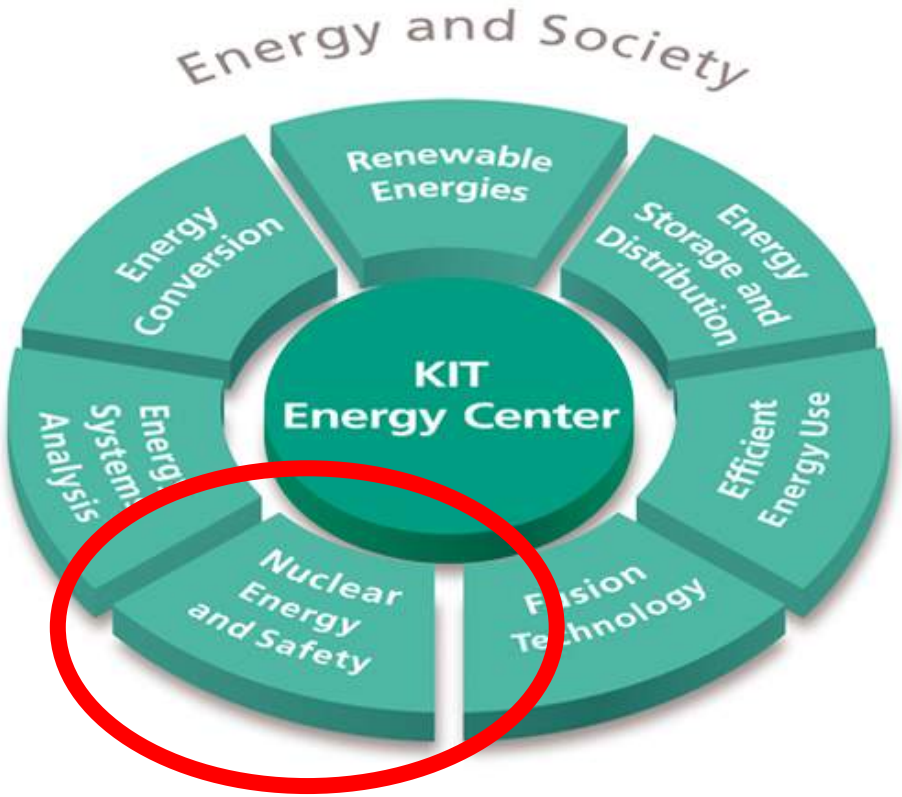
A country with experience in Fast Reactor technology….

- **KNK-II, SNR-300**

Potential contributions :

- **Cooperation and participation in international programs**
- **Education**

‘ Re-opening Nuclear in Germany '



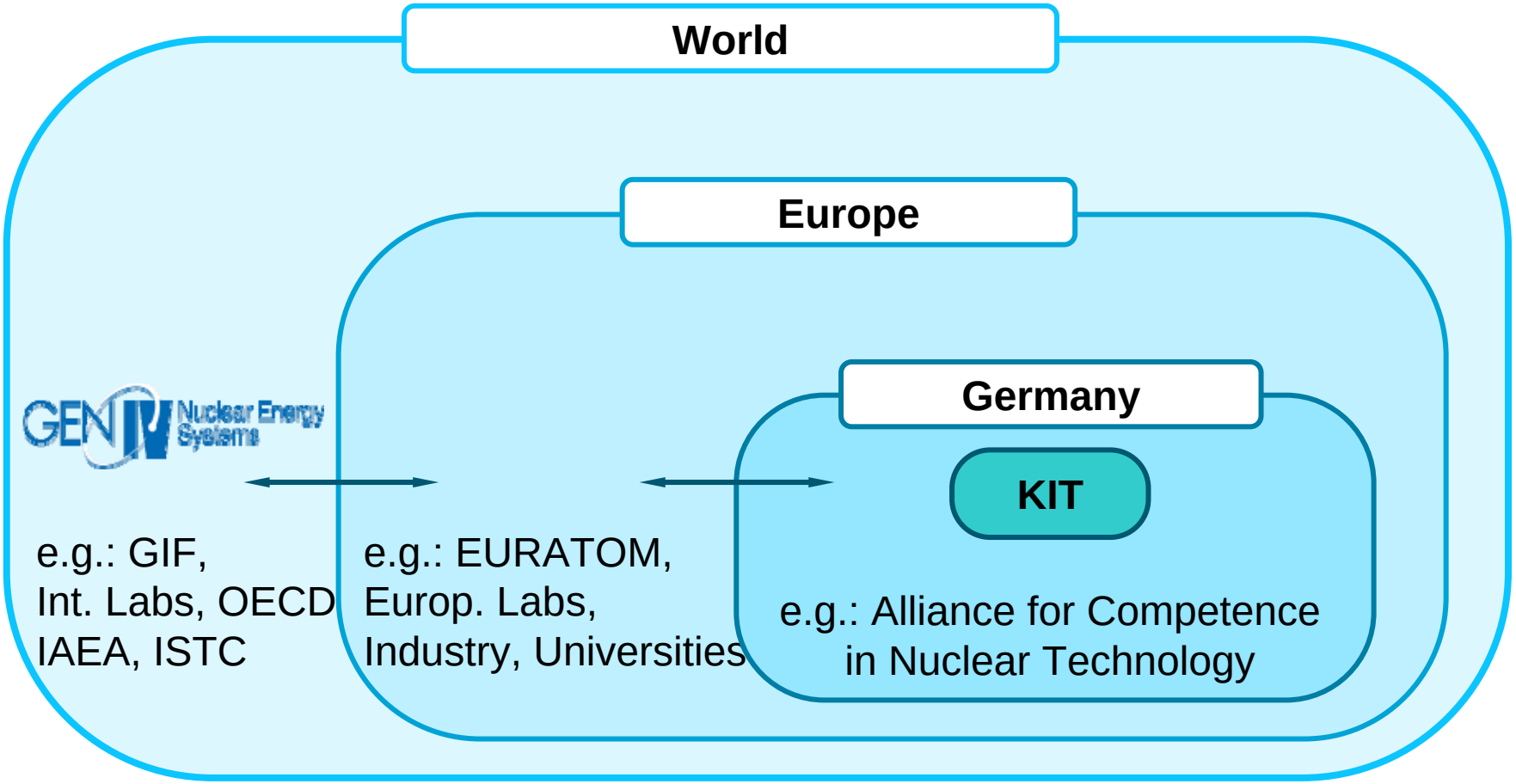
Founding of Karlsruher Institute of Technology (KIT)

- **Nuclear Energy is Part of KIT**
- **GEN-IV Systems**
- **School of Energy**

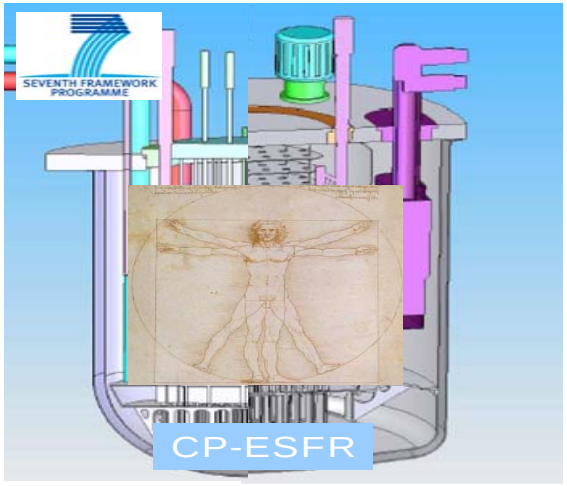
New facility : KASOLA – Karlsruhe Sodium Laboratory

FR related facilities : KALLA (Lead Laboratory), GESA (Material treatment)

Networking and Collaborations



Example of European Scale Collaborative Programme

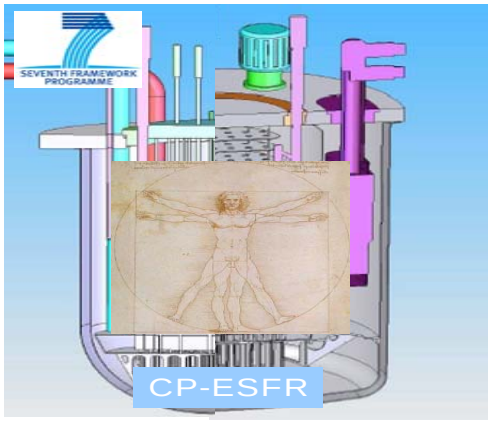


7th EU European Framework Program

CP-ESFR

- Address some among the key **viability and performances issues** to support the development of a fourth generation SFR to be deployed by 2040
- **Help rebuilding expertise in Europe gathering R&D organizations, universities, utilities and industrial partners**
- Sh**are methods and data** for the assessment of the feasibility of some innovations proposed by the participants
- Ensure **complementarity** between ESFR and R&D activities launched within the international context
  (e.g.: GEN-IV international Forum)

Example of European Scale Collaborative Programme



CP-ESFR Educational Program

(~ 5% of Budget)

Six Workshops (T&E):

1) Na and other coolants: in-reactor behavior and safety (CEA);
2) Courses SFR functional analysis and design safety (CEA);
3) Model Verification & Validation Principles & Application to ESFR (KIT);
4) Model Calibration & Predictive Estimation Principles & Application to ESFR (KIT);
5) ESFR Engineering Aspects (UNI Roma);
6) Workshop on ESFR Reactor Physics and Safety project results (UP Madrid)

Five Doctoral thesis: Thermal-hydraulics & neutronics (KIT); Sodium fire assessment (NRG); Radioactive mass transfer models (CEA); Severe accident phenomenology (CEA); NURESIM-NURISP applications core physics and safety analysis (UPM)

Exampel of FR Training Programme & Educational Needs

Karlsruhe Institute of Technology

Example of Recent Training and Education Activity:

The 2009

FREDERIC JOLIOT / OTTO HAHN
SUMMER SCHOOL ON NUCLEAR REACTORS
Physics, Fuels, and Systems

Jointly organized by the *Commissariat à l'Energie Atomique* (France) and the *Forschungszentrum Karlsruhe* (Germany)

Karlsruhe, Germany,
August 26 – September 4, 2009

Application deadline: May 1st

Towards Implementation of Fast Reactor Technology: The Challenges

Programme outline

- Principles and challenges for future fast reactor designs
- Fast reactor fuels and fuel cycles
- Innovative cladding and structural materials
- Coolant specific issues and challenges
- Fast reactor safety

Technical visits of Forschungszentrum Karlsruhe Facilities

Seminar: PHENIX and SUPERPHENIX operating experience

Lecturers

- Yves Kaluzny (CEA, France)
- Jacques Rouault (CEA, France)
- Massimo Salvatores (CEA, France)
- Wilfred van Rooijen (Georgia Institute of Technology, USA)
- Konstantin Mikityuk (PSI, Switzerland)
- Rudy J.M. Konings (European Commission, Germany)
- P. R. Vasudeva Rao (Indira Gandhi Centre, India)
- Rory Kennedy (INL, USA)
- Arnaud Courcelle (CEA, France)
- John Knott (University of Birmingham, UK)
- Akihiko Kimura (Kyoto University, Japan)
- Lance L. Snead (ORNL, Oak Ridge, USA)
- Christian Latgé (CEA, France)
- Georg Mueller (Forschungszentrum Karlsruhe, Germany)
- Richard Stainsby (AMEC NNC Limited, UK)
- Dankward Struwe (Forschungszentrum Karlsruhe, Germany)
- Shoji Kotake (JAEA, Japan)
- Jean-Francois Sauvage (EDF, France)

For more information on the detailed programme, registration procedure, fees, etc. please visit FJOHSS Website:
www.fjohss.eu

or contact Mrs I. Schwartz, Forschungszentrum Karlsruhe GmbH, Institut für Neutronenphysik und Reaktortechnik, 76344 Eggenstein-Leopoldshafen, Germany
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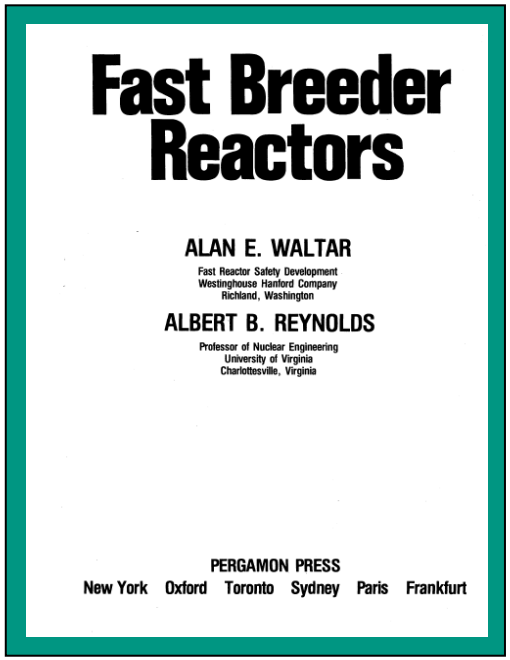
Forschungszentrum Karlsruhe in der Helmholtz-Gemeinschaft



Fast Breeder Reactors

ALAN E. WALTAR
Fast Reactor Safety Development
Westinghouse Hanford Company
Richland, Washington

ALBERT B. REYNOLDS
Professor of Nuclear Engineering
University of Virginia
Charlottesville, Virginia

PERGAMON PRESS
New York Oxford Toronto Sydney Paris Frankfurt

Great Text Book for Education, Training and Teaching

Update in design, fuels, safety …. include waste burning aspect (transmutation) …..

A lot has been learned since 1980…..

Work on Human Capital

Karlsruhe Institute of Technology

- **Euratom for Nuclear Research and Training Activities**
- **Embedded Training and Mobility Activities**
  - Networks of Excellence
  - Collaborative Projects
  - Training Courses (ENEN), Exchange of Research Workers, Doctoral Theses, Post-doctoral Positions
  - Mobility
- **Euratom Fission Training Schemes (EFTS)**
  - Life-long Learning and Career Development
  - European Passport for Continuous Professional Development
  - Co-authored Textbooks
- **Cooperation with Third Countries**

General Work on Human Capital

- Attract students and researchers into the field
- Restart of FR conference series
- Teach the nuclear community
- Active discussion in media and with politics
- Demonstrate spin-offs