Mandate (1/2)

The following items may be included in the programme of work:

• Data and characteristics of candidate materials, including:
  – Advanced claddings: coated Zr-based alloys, SiC/SiC ceramic composites, advanced steels, refractory metals (e.g. molybdenum), etc.;
  – Advanced Fuels: doped UO$_2$ for enhanced thermo-mechanical properties, high density fuels such as U-silicide and U-nitride, dispersion fuels with coated particles, etc.;
  – Non-fuel core components such as fuel channels, control rods and blades, and fuel assembly hardware;

• Issues related to the modelling of the advanced materials (fuel/cladding behaviour in normal and transient conditions, including DBA and BDBA, etc.);

• A review of the needs related to an experimental validation of the most promising materials: available facilities, opportunities of joint experiments (including out-of-pile and in-pile experiments), identification of gaps, etc.

• The establishment of appropriate metrics to help prioritise between the ATF candidates;

• The definition and evaluation of reference scenarios to evaluate the effectiveness of ATF candidates;
Mandate (2/2)

It is anticipated that the Expert Group may organise the programme of work through activities carried out by individual Task Forces dedicated to specific technical issues such as:

• Identification and evaluation of candidate materials;
• Development of fundamental properties for the candidate materials;
• Evaluation of metrics for ATF;
• Development of modelling and simulation methods, identification of accident scenarios;
• Experimental needs and facilities.
Organization/Implementation

Overall Scope to be discussed and reviewed During the meetings (Information Exchange and Technical Discussions are the main Focus)

Task Force 1
Task Force 2
Task Force 3

Deliverable 1
Deliverable 2
Deliverable 3

Roughly 2 year scope for task forces and deliverables
Possible Task Force/Deliverable Structure

- Metric Report – International Version
- Reference scenario development for evaluation
- Parametric studies on materials behavior under the evaluation scenario
  - Evaluation of different materials of interest
  - Impact on enrichment and fuel forms
- Fuel matrix concepts evaluation under the reference scenario
- Data on oxidation kinetics of various cladding materials
- SiC applications on in-core materials (cladding, channels, control blades)
  - Available data for the desired applications
  - Data gaps
- Technology Readiness Levels definition and evaluation of different concepts
  - Testing needs
  - Modeling needs
- Assessment of severe accident codes with respect to modeling the new fuel/cladding concepts
- Benchmark of proposed concepts against U-Zy system under normal operations
## Task Forces

### Task Force 1
**Systems Assessment**
- **Metrics**
  - Economics
  - Fuel cycle (SNF, ...)
  - Operations
  - DBAs
  - BDBAs
  - Etc..
- **TRL definition**
- **Illustrative Scenario** (to feed TF1 and TF2)
- **Parametric studies**
- **Systems Codes**

### Task Force 2
**Cladding/Core Materials**
- **Properties**
- **Evaluation under normal operations (incl. fretting)**
- **Evaluation under illustrative scenario**
- **PCI**
- **Testing needs – data gaps (to be linked to RTFDB)**
- **Modeling needs – modeling gaps**
- **Experimental infrastructure**

### Task Force 3
**Fuel Concepts**
- **Properties**
- **Evaluation under normal operations (incl. fretting)**
- **Evaluation under illustrative scenario**
- **PCI**
- **Testing needs – data gaps (to be linked to RTFDB)**
- **Modeling needs – modeling gaps**
- **Recommendations on priorities**

### Deliverables
**Task Force 1**
- **Definition of the illustrative scenarios and first parametric studies**
- **Status report + Recommendations and priorities**

**Task Force 2**
- **Status report + Recommendations and priorities**

**Task Force 3**
- **Status report + Recommendations and priorities**