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**NUCLEAR ENERGY AGENCY
COMMITTEE FOR TECHNICAL AND ECONOMIC STUDIES ON NUCLEAR ENERGY
DEVELOPMENT AND FUEL CYCLE**

**Final Summary Record of the 1st Meeting
NEA NI2050 Advisory Panel**

**5-6 October 2015
IEA Headquarters, Room 2
9, rue de la Fédération, 75015 Paris**

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NEA NI2050

First Meeting of the Roadmapping Advisory Panel

NEA Roadmap for R&D Priorities fostering Nuclear Fission Innovation for a low carbon sustainable future

**IEA Conference Room 2
5-6 October 2015, Paris**

FINAL SUMMARY RECORD

Objective of the Meeting

1. Following the recommendation of the NI2050 Launching Workshop held in Paris on 7/8 July, it has been decided to launch the *top down Roadmapping* of long term fission R&D priorities (NI2050 Phase 2), without waiting the outcome of the *bottom up Survey* providing the picture of the actual situation (NI2050 Phase 1). Figure 1 presents the overall scheme of the NI2050 Initiative.
2. For the Phase 2 (Roadmapping) to be successful, it was considered necessary to establish an Advisory Panel, to first design the roadmapping and then proceed with the selection of fission R&D priorities (for programmes and infrastructures, both aspects of people/skills and plants/facilities).
3. The primary objective of the Meeting of 5/6 October was to focus on this design of the roadmapping, agreeing on the objective, scope, methodology and organisational process. This should then be consolidated in ToRs for the Roadmapping and for the Advisory Panel, to be presented as appropriate to the relevant NEA Committees.

Overall organisation of the Meeting

4. The first part was dedicated to learn about the objectives, scopes, methodologies and processes of a number of existing roadmaps which may serve as examples and inputs for the NI2050 roadmapping.
5. Following this, the second part took the form of a brainstorming, leading to the clarification of the objective, scope, methodology and process for the NI2050 Roadmapping of fission R&D priorities to enable nuclear energy to contribute to the low carbon energy future (using as a reference the IEA ETP 2DS scenario). As a result of the brainstorming, elements of ToRs were developed for the Roadmapping, covering also the role and “membership” of the Advisory Panel, as well as the planning of activities.

Main outcomes of the Meeting

6. There was consensus on placing the roadmapping within the long term low carbon energy perspective: 2050 (ETP 2DS 930GWe) and beyond (2100), to focus properly on the concept of sustainability (enabling the possible deployment of fast reactors and closed fuel cycles).

7. There was extensive discussion on the objective of the NI2050 roadmapping. The aim is, within the allocated period of 1.5 year, to produce a list of fission R&D (Research and Development¹) priorities enabling further innovation to support the sustainable role of nuclear energy in a low carbon future. This led to a proposed “full” title for the roadmapping: *NEA Roadmap for R&D Priorities fostering Nuclear Fission Innovation for a low carbon sustainable future (covering aspects of safety, security, environment protection, waste minimisation, effective use of resources, economics)*. From this list of priorities, after comparison with the actual R&D programmes resulting from the survey, it should be possible to define some gaps, for which cooperation might help in enabling innovation to deliver commercial readiness in an accelerated manner and more cheaply. This will include areas where shared intellectual and facility infrastructures bring added value, together with innovation in securing financing. Initiating the discussion on such cooperation would constitute a concrete outcome of the 1.5 year of work (Step 3 – see figure 1).

8. The broad scope proposed by the Secretariat, focussing on 5 “categories”, was discussed and supported as a good initial basis for the roadmapping (the 5 categories are: Reactor, Front End Fuel Cycle, Back End Fuel Cycle/Recycling and Waste Management, Emerging Energy Systems and Technologies, Cross Cutting Issues – see figure 2). For each of the categories, subcategories may have to be defined. For each, main R&D programmes and infrastructures should be listed and then consolidated, leading to priorities and timelines.

9. There was recognition that in order to reach concrete results for the end of 2016, the methodology to follow needs to stay at a high global level of roadmapping. It is necessary to use existing roadmaps to the maximum extent. The broad categories proposed by the Secretariat for the roadmapping are appropriate to ensure enough compatibility with a number of existing roadmaps and also with the categories proposed for the NI2050 survey. Relying on existing roadmaps has consequences in terms of the experts to involve in the roadmapping process.

10. After further discussion the following concrete organisational process was agreed: the roadmapping will be led by the Advisory Panel. The first task will be to define more precisely the methodology for the roadmapping (e.g. which “rule/criteria” to use for the prioritization). Following this, expert meetings will be organised to compare existing R&D roadmaps and propose priorities for the categories of the NI2050 roadmapping. The Advisory Panel will consolidate the outcomes, cross check with the priorities for the cross cutting issues, and look for duplications and synergies. A final list of priorities should then be elaborated and compared with the outcome of the survey, leading to potential gaps, for which cooperation may be proposed if there is interest and willingness.

11. The proposal for the membership of the Advisory Panel (essentially the participants of the first meeting, complemented by an invitation to the chairs of the main NEA Committees, and the IAEA as observer) did not raise objections. Also the proposal to ask Dame Sur Ion, with, in particular, her experience as chair of the UK NIRAB, to chair the Advisory Panel was not objected.

1. There was extensive debate on R&D (Research and Development) vs RD&D (Research, Development and Demonstration). R&D will be further used, but “demonstrators” are fully part of the scope of the roadmapping. As a result of the discussion it was decided to propose an ad-hoc clarification of the notion of demonstrator vs prototype/FOAK (First-of-A-Kind). A Demonstrator is an experimental facility designed to prove the technical and industrial feasibility, as well as the safety case (licensability), of a technology in its integrality (e.g. a demonstrator reactor). The aim is not to produce energy (e.g. electricity) in an economic way, but such production might be part of the scope of the demonstration. Such “demonstrators” are flexible tools, allowing diverse configuration and experiments to take place (e.g. on materials and fuels), and may be associated with additional specific support facilities and labs (i.a. hot cells for PIE). The next stage, after the demonstrator, is the prototype, for which the aim is to produce energy (e.g. electricity) and prove the economic viability of the technology. A FOAK is the first fully commercially operated plant based on the given technology.

12. Each expert meeting should be chaired by a member of the Advisory Panel to ensure the global consistency of the overall process. The Secretariat will call for volunteers and propose the list of chairs (possibly also co-chairs) for discussion at the next meeting of the Advisory Panel. Members of the Advisory Panel (as of now including representatives of the NEA Committees) will nominate experts for the expert meetings. The experts will need to have a global long term vision of R&D perspectives and needs, a deep technical expertise in terms of programmes and infrastructures, and a good knowledge of existing roadmaps used as basis.

13. There has been confirmation on the need to invite China to participate to the NI2050 process, and to the roadmapping in particular. The Secretariat is charged to initiate the links. IAEA will also be invited as observer, as well as the EC as member (both had been participating in the Launching Workshop).

14. To fit with the overall timeline of 1.5 years, the next meeting of the Advisory Panel (to finalise its ToRs and agree on the mandate, task, methodology for the expert meetings) is scheduled for 14 and 15 January 2016 in Paris. The first expert meetings should take place between February and April. The Advisory Panel should further meet in May/June and September/October, to deliver proceed towards a final “roadmap” and lists of priorities/gaps for a Final Workshop towards the end of 2016 or early 2017. This Final Workshop would have the same format as the Launching Workshop. The Secretariat will provide support for the preparation, recording and reporting of all the meetings. Unless otherwise proposed, meetings will be organised in Paris.

15. All the elements discussed and agreed will be translated into Terms of Reference for the NI2050 Roadmapping (objectives, scope, methodology and process). These ToRs will be finalised at the next Advisory Panel in mid-January and be presented at the NDC (end January 2016) and at the NEA Steering Committee.

DETAILED AGENDA OF THE MEETING

5 October

- 14.00-14.15 Welcome, Proposed Chair (Mrs Fiona Rayment), Tour de Table
- 14.15-14.45 Recap of what NI2050 is and outcomes of the Launching Workshop (NEA Secretariat and Chair of the Launching Workshop Dr Eric van Walle)
- 14.45-18.00 *Presentations of existing roadmaps which may serve as examples and inputs.*
- 14.45: GIF Roadmaps – Jean-Claude Bouchter GIF Policy Director
- 15.15: SNETP Roadmap (EU Strategic Research Agenda and Deployment Strategy): Enrique Gonzales Chair SNETP Executive Committee

This presentation was be further complemented by:

- 15.45: NUGENIA (EU Gen II and III) Roadmap: Giovanni Bruna – ETSON (Safety Organisations Network)
- 16.00: ESNII (EU Gen IV) Roadmap: Noel Camarcat – Chair of ESNII
- 16.15: NC2I (EU Cogeneration/HTR) Roadmap: Grzegorz Wrochna – Chair of NC2I
- 16.30: US DOE/INL ongoing Innovation Workshops process and INL Study on Hybrid Systems – Kemal Pasamehmetoglu
- (at 17.15: US INL Summary of US Fuel Cycle Evaluation Study – Roald Wigeland by tel conference)

6 October

9.00: National roadmaps

Japan (Kiyoshi Ono), Russia (Sergei Vorobyev), Korea (Ik Jeong), Canada (Robert Speranzini),

10:00: UK NIRAB Roadmap – Fiona Rayment

10.30: Brainstorming on the objectives, (technical) scope, methodology and (organisational) process for the NI2050 Roadmapping of fission R&D priorities (programmes and infrastructures), using the lessons learned collected from the previous presentations.

12.00-13.30 *Lunch*

13.30-15.00 Continuation of brainstorming and Drafting elements for the ToRs for the NI2050 Roadmapping, including the role, membership and operational mode of the Advisory Panel/Experts Groups.

LIST OF PARTICIPANTS

UNITED KINGDOM:	Fiona Rayment, UK NNL and NIRAB (Chair of the Meeting)
BELGIUM:	Eric van Walle, BE SCKCEN (Chair of the Launch Conference)
CANADA:	Robert Speranzini, CA NCL AECL
FRANCE:	Sylvestre Pivet FR CEA Fanny Bazile CEA
JAPAN:	Ono Kiyoshi, JP JAEA; Shigeaki Okajima, JAEA; Tomoyasu Mizuno JAEA
KOREA:	Ik Jeong, KR KAERI
POLAND:	Grzegorz Wrochna PO NCBJ and Chair of EU NC2I roadmap
RUSSIA:	Sergei Vorobyev RF Rosatom Ludmylla Andreeva Rosatom
UNITED STATES:	Kemal Pasamehmetoglu USA DOE/INL + Roald Wigeland INL (by tel conf)
GIF	Jean-Claude Bouchter Policy Director
EU:	Enrique Gonzales Chair EU SNETP roadmap Noel Camarcat Chair EU ESNII roadmap Giovanni Bruna ETSON for EU NUGENIA roadmap
WNA (observer)	Jonathan Cobb (nominated by DG Agneta Rising)
Advisor	Thierry Dujardin in advisory role for NEA processes
NEA Secretariat DEV	Jaejoo Ha, Marc Deffrennes, David Henderson, Vladislav Sozionuk, Jaeman Noh
NEA NSC	Jim Gulliford, Tatiana Ivanova
Support	Helene Déry

Figure 1: General scheme of the NI2050 Initiative

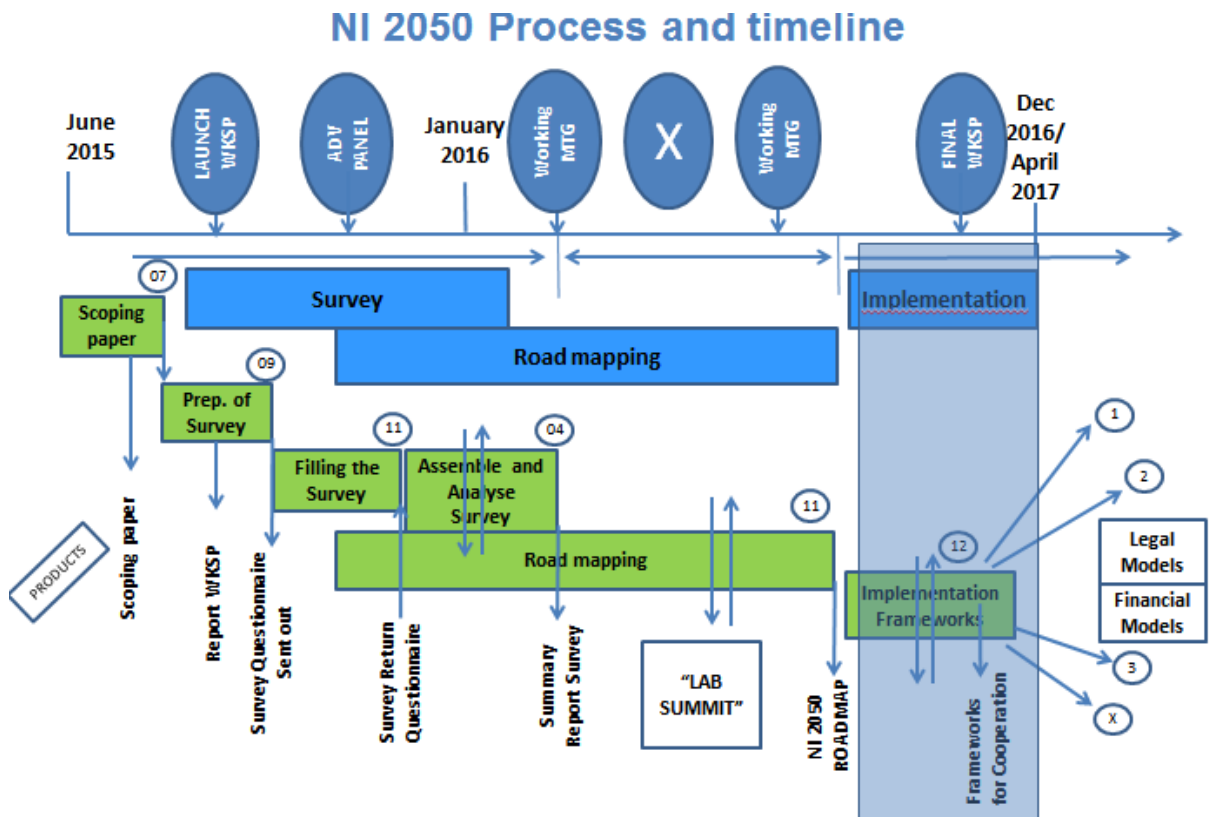


Figure 2: Global Scope for the NI2050 Roadmapping

