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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 3rd Meeting NEA NI2050 Advisory Panel

**20-21 June 2016
OECD Headquarters, CC6
2 rue André Pascal, 75016 Paris**

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NEA NI2050

Third Meeting of the Roadmapping Advisory Panel

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

OECD Headquarters CC 6
20 and 21 June 2016, Paris

SUMMARY RECORD

Main overarching outcomes/conclusions

1. Out of the presentations (by the Chairs of the Experts Meetings) and the discussions and brainstorming, there are two “time frames” to consider for NI2050: one for priority pre-competitive shared research and development to push innovative technologies to market for 2030, and another one for 2050 (and beyond for some technologies which will need more time).
2. At a first glance, the first timeframe applies to Gen II (LTO) and Gen III (new build) – for which issues as safety and economic performance, in particular, are crucial.
3. The second timeframe applies to Gen IV systems (GIF, including SCWR, but also possibly other systems) – for which the main driver, in addition to safety and economics, is also “sustainability” linked with the closing of the fuel cycle, i.e. partitioning and transmutation.
4. Waste management and decommissioning aspects are to be considered for both. R&D in these fields for the shorter time frame is rather close to industrial applications, but these aspects have to be integrated from a full lifecycle perspective for future reactors and systems.
5. This “division” in generations will have to be consolidated when focussing on R&D priorities since most of the research applying to Gen II and III also benefits Gen IV. In addition, there appear to be a number of crosscutting areas which, by nature, are covering the short and the long term perspectives (materials, modelling and simulation, etc.). This also applies to most of the necessary infrastructures which can fulfil the needs related to all generations.
6. In any case, it is necessary to cover, for both timeframes, large plants, SMRs, electric and non electric applications, in the perspective to have nuclear energy contributing to the low carbon energy future.
7. In order to progress in line with the ToRs agreed by the Advisory Panel, as recalled below,

The objective of the NI2050 roadmapping is to identify R&D strategies and associated priorities to achieve commercial readiness of innovative sustainable nuclear fission technologies in a fast and cost effective manner. For the 2050 perspective, the IEA ETP 2DS (2 Degree Scenarios of the 2015 Energy Technology Perspectives of the International Energy Agency) serves as the reference.

and to build on the substantial material developed by the NI2050 Experts Meetings of March/April, it has been decided to create two subgroups of the Advisory Panel to elaborate some priority list according to

strategic criteria to be defined and to look how innovation can accelerate the commercial readiness of technologies within the defined timeframes (2030/2050+).

8. The Secretariat has been tasked to propose names for these two subgroups, check the availability of possible members, discuss it with the Chair and Vice-Chairs (Fiona Rayment, Kathryn McCarthy, Frank Carre, and one more to be nominated (from Japan or Korea)). Then to circulate the proposal to the full Advisory Panel through silence procedure.

9. The task of these two subgroups would be to:

- List main high level issues/stakes to be tackled to ensure nuclear energy plays its role in the given timeframes (2030/2050+). The outcomes of the NI2050 Experts Meetings of March/April will serve as a basis, in addition to participants' knowledge on existing R&D and innovation roadmaps. A reflection will also take place on possible major "game changers" and interactions with non-nuclear R&D and innovation;
- Define which technology development or innovation needs to be done to tackle these issues leading to commercial applications in the given timeframes, and identify the scope of associated actions in the precompetitive domain, to be implemented through international cooperation;
- List what are the necessary major infrastructures and resources necessary for this to happen – existing, available, new, etc., and evaluate the potential for shared/pooled infrastructures. A particular aspect to cover is the verification/qualification steps for which either existing experimental data or new one needs to be available. Therefore databanks make full part of the "necessary infrastructures";
- Define and analyse the constraints that are hindering or slowing R&D and innovation and what can be done to remove these constraints – this should cover inter alia the cooperative actions that can ease regulatory processes;
- Evaluate the potential for cross-cutting/multipurpose approaches to increase efficiency in R&D and innovation;
- Analyse how working in parallel rather than in sequence is feasible to accelerate;
- Clarify what are the associated financial aspects/difficulties and how far can the burden be shared by international collaboration and/or public/private partnership;
- Etc.

10. As explained before, these two subgroups will have to work closely together, to reflect the "continuity" of research over time, even if the focus of the subgroup 2030 will be more on industry driven priorities (what needs to be done pre-competitively for industry to engage) and of subgroup 2050 on energy policy driven priorities (what needs to be done to ensure nuclear will be ready to be part of the low carbon energy mix – noting that what will really happen cannot be predicted since it depends on many factors and their associated uncertainties. But one needs to have solutions/options ready for industry to take up when appropriate). Therefore, the common works are as much important as the separate activities of the two subgroups, and need to lead to a single consolidated outcome, showing a smooth innovation process from now on to 2030, then 2050, and beyond.

11. It is proposed to have meetings of the two subgroups (in parallel and joined) over 3 days in the first full week of September. Ideally, the members should physically participate in the first meeting at the NEA in Paris. In case further meetings are needed, it would then be organised on the basis of ad-hoc video or tel conferences.

12. The objective of the first meeting will be to start with the list of items under point 3 above, define more precise issues and questions which may then be “tasked” to “ad-hoc expert groups”. These experts groups may be established based on the NI2050 March/April Experts Meetings (in particular their Chairs), but should also take account of existing working groups where they exists. In particular, a number of existing NEA Working Parties, Working Groups, Task Forces, Joint Projects, may bring much added value in their field of competence and also, in return, benefit from being integrated in the more global NI2050 perspective – as it appeared from the presentations made by the NEA Science, Safety and Waste Divisions during the 3rd NI2050 Advisory Panel meeting. “Outside” Groups may also be used, if appropriate, such as the GIF SSCs, existing Platforms or other frameworks such as NURESIM for numerical simulation, IGDTP for geological disposal.

Some Details

13. The meeting was opened by the Chair (Ms Fiona Rayment) and the Director General of the NEA. At the outset, it was proposed to nominated Vice Chairs. Ms Kathryn McCarthy (US INL) and Mr Frank Carré (FR CEA) were proposed and supported by the Advisory Panel. Japanese and Korean Members of the Advisory Panel were asked to nominate one Vice Chair (only one - for “Asia” - to provide a good geographical balance) in advance of the next meeting.

14. The Chair recalled the main central objective of the NI2050 Roadmapping as agreed by the Advisory Panel in the ToRs.

15. The Agenda for the meeting was presented and agreed. It can be found, as well as the list of participants, on the NI2050 website: www.oecd-nea.org/ndd/groups/ni2050ap.html

16. The website is now fully operational and accessible for all Members of the Advisory Panel as well as all experts who have participated in the NI2050 Experts Meetings. They all have been informed by email, with the procedure to get a password.

17. The Secretariat proposed to open the website for free consultation (without password). The Advisory Panel decided to reconsider the question at the next meeting.

18. The Agenda had been structured to offer the opportunity to the Chairs/CoChairs of the NI2050 Experts Meetings to report on the outcomes of the March/April meetings. But it also included presentations by the NEA Science, Safety and Waste Divisions on their activities (at Committee, Working Groups and Parties, Task Forces and Joint Projects level). This showed the wide scope of already ongoing R&D related activities happening within the NEA framework. This is to be further taken into account, besides the outcomes of the NI2050 Experts Meetings, for the next steps of NI2050. All presentations are available on the website.

19. The Secretariat gave a brief update on the NI2050 Survey process. Returns from some major “players” in fission R&D are still missing, but the analysis of the Survey return has been started with the US case. The outcomes of this analysis have been briefly presented, including in charts, but will not be distributed at this stage. This will be done later when more Member Countries returns will have been analysed.

20. The meeting ended with a two-hour discussion/brainstorming session which has been translated in the main overarching outcomes/conclusions presented above. The main message from the discussion is that the future of nuclear energy lies first (2030 perspective) in the safe and economic long-term operation of existing plants and on the ability to build new plants economically. This is much dependent on the evolving electricity market. R&D priorities need to be defined assuming the market will become more effective with time. For the longer term (2050 perspective and beyond), it is impossible to know, for the present time, what are the real prospects for the commercialisation of Gen IV systems. R&D priorities need to be focussed on providing viable options to allow industry to make commercial decisions at the appropriate time in the future (in function of diverse enabling conditions which will prevail at that time). Therefore, it seems reasonable to have some R&D priorities phased towards demonstration (as defined in the ToRs of the NI2050 Roadmapping). To reflect these two timelines and associated priorities, the Chair proposed to establish two subgroups of the Advisory Panel to analyse how R&D can be economically accelerated to bring innovative technologies to the market for commercial applications, in the 2030 and 2050+ perspectives, respectively.

DETAILED AGENDA

DAY 1 - 20 June 2016 (*REGISTRATION starts at 13h00; MEETING starts at 13h30*)

Slot 13h30 - 14h00

- Item 1. Opening by the Chair and the Secretariat; Objective of the Meeting; State of Play and Access to NI2050 Website
Fiona Rayment and Secretariat
- Item 2. Participants introduction, Proposal for Co-Chairs (Kathryn McCarthy and Franck Carré, in addition to Fiona Rayment)
All
- Item 3. Brief State of Play of the Survey (Step 1 of NI2050); Preliminary Presentation of outcomes for a few countries
Secretariat

Slot 14h00-16h00 (Each subgroup gets 30 minutes presentation time and 10 minutes for focussed discussion)

- Item 4. Presentation of the consolidated outcomes of the Experts Meetings on Advanced Reactors and Fuels (Subgroups 1.2 and 2.2), and on Emerging Energy Systems (Group 4)
Chairs/Co-Chairs: MM Baeten/Kamide, Mizuno/Lee, Tuomisto
Secretariat: D Henderson, S Cornet, M Deffrennes

Coffee Break 16h00 – 16h30

Slot 16h30 – 18h00

- Item 5. Information on possible NEA consolidated inputs for NI2050 (from Nuclear Science Division – Strategic Plan, Overview of Working Groups activities and reports, work in progress on consolidated perspective on R&D Infrastructures, Joint Projects in Science...)
Secretariat – Nuclear Science Division
- Item 6. Information on the NEA NEST Initiative (Nuclear Education in Science and Technology – Human Resources, Competence and Skills) and the link with NI2050
Secretariat – Daniel Iracane NEA CNO
- Item 7. Discussion on the outcomes of the Experts Meetings (Subgroups 1.2 and 2.2, and Group 4). Possible additional issues to be considered and way forward. Links with ongoing activities elsewhere (ia NEA).
All

Cocktail (The Atrium) 18h00 – 19h30

DAY 2 - 21 June 2016 (*MEETING Starts at 08h30; MEETING Ends at 16h00*)

Slot 8h30 – 10h30

- Item 8. Presentation of the consolidated outcomes of the Experts Meetings on Evolutionary Reactors and Fuels (Subgroups 1.1 and 2.1)
Chairs/Co-Chairs: Mr Bruna/Mrs Vernon, MM Napier/Song
Secretariat: Mrs Ivanova, Mr Massara
- Item 9. Information on possible NEA consolidated inputs for NI2050 (from Nuclear Safety Division: Strategic Plan, Overview of Working Groups activities and reports, Joint Projects in Safety...)
Secretariat – Nuclear Safety Division

Slot 10h30 - 12h30

- Item 10. Presentation of the consolidated outcomes of the Experts Meetings on Decommissioning and Waste (Subgroups 3.1 and 3.2)
Chairs/Co-Chairs: MM Pieraccini/Schneider, MM Lalieux/McKinney
Secretariat: Mrs Weber, Mrs Gillogly, Mr Lebedev
- Item 11. Information on possible NEA consolidated inputs for NI2050 (from Radioactive Waste Management Division: Strategic Plan, Overview of Working Groups activities and reports, Joint Projects in Waste Management/Decommissioning...)
Secretariat – Nuclear Waste Division

Slot 12h30 – 13h00

- Item 12. Discussion on the outcomes of the Experts Meetings (Subgroups 1.1 and 2.1, 3.1 and 3.2). Possible additional issues to be considered and way forward. Links with ongoing activities elsewhere (ia NEA).
All

Lunch Break 13h00 – 14h00

Slot 14h00 – 16h00

- Item 13. Brainstorming on the way forward and next steps for NI2050 to reach the ultimate goals. Need for additional dedicated “adhoc workshops”: scope and organisation.
Intro by Chairs and Secretariat + All
- Item 14. Conclusions. Planning of Activities. AOB.
Chairs and Secretariat

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