WM2017 Conference Panel Report

PANEL SESSION 03: Featured Country - Nuclear Overview & Development in Japan - Nuclear Fuel Cycle - (1/8)

Co-Chairs: **Paul Dickman**, *Argonne National Laboratory*
Kazuhiro Suzuki, *Tokyo Electric Power Company (TEPCO)/Nuclear Damage Liability Facilitation Fund (NDF) (Japan)*

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Panelists:

1. **Hirohide Hirai,** *Director-General for Nuclear Accident Disaster Response, Ministry of Economy, Trade and Industry (Japan)*
2. **Haruka Watanabe,** *Advisor, Japan Nuclear Fuel Limited (JNFL) (Japan)*
3. **Tadafumi Koyama,** *Deputy Associate Vice President, Planning Group, Nuclear Technology Research Laboratory, Central Research Institute of Electric Power Industry (CRIEPI)(Japan)*
4. **Stephane Bourg,** *Commissariat à l'Énergie Atomique CEA (France)*
5. **Sal Golub**, *Associate Deputy Assistant Secretary for Nuclear Technology Research and Development, US DOE*

This panel session provided an overview of all of Japan's activities and the status of its nuclear fuel cycle activities in the first of eight featured country panel discussions at the conference. Five panelists discussed perspectives of the nuclear fuel cycle. Three of the five panelists discussed efforts of the government and government entities in Japan, with others representing French and the Department of Energy collaborations in the fuel cycle.

The panel was attended by well over 80 technologists and policy makers spanning the globe, and was opened with **Mr. Hirai,** Director General for Nuclear Accident Disaster Response (Ministry of Economy, Trade and Industry), and speaker at this morning's opening Plenary Session opened the panel with an overview of Japan's progress on policy towards the energy landscape in Japan and the restart of three nuclear reactors under the reforms introduced following the shutdowns in response to reforms resulting from the Great East Japan Earthquake that devastated the Fukushima Daiichi Nuclear Power Station. **Mr. Haruka Watanabe** of the Japan Nuclear Fuel Limited followed with an in-depth discussion of the nuclear fuel cycle currently at the forefront of operation and research in the Japanese nuclear industry. **Dr. Koyama** with the Central Research Institute of Electrical Power Industry followed with an overview of progress of advances in the fuel cycle and how work in the area continues to foster young promising scientists. **Stephane Bourg** with the CEA in France reviewed French perspectives on a once-through cycle verses the option for twice-through cycles that would recycle material to achieve a sustainability model. **Sal Golub** ended the session with a brief overview of the progress of the Working Groups formed under the 2012 Bi-lateral Commission with an emphasis on the collaborations of the nuclear fuel cycle.

Summary of Presentations

Hirohide Hirai presented an overview of Japan's progress on policy towards the energy landscape in Japan and the restart of three nuclear reactors in the country. He described the country's 2030 targeted mix of energy sources. He also discussed the restart efforts on three nuclear power plants noting that 26 units have applied for review by the Japanese NRA. Highlights of fuel cycle work were cited in the areas light water reactor fuel cycle, non-proliferation, and establishment of measures for transparency. He discussed efforts on U.S. Japan cooperation for nuclear security and maintaining the nuclear fuel cycle policy while continuing research into fast reactor (FR) technology. He described a strategy to harness four principles; 1) domestic resources, 2) global knowledge, 3) cost efficiency, and 4) responsibility. He ended with brief comments on international collaboration discussing a Japan French endeavor on the Advanced Sodium Technological Reactor for Industrial Demonstration (ASTRID) in place since 2014, and US Japan efforts on industrial cooperation, decommissioning and government to government cooperation.

Haruka Watanabe discussed perspectives and work underway at various facilities related to the Nuclear Fuel Cycle. He discussed 1) Uranium enrichment, 2) Low Level Waste disposal, 3) the vitrification waste storage center, 4) the Rokkasho plant, and 5) the MOX fuel Fabrication plant. He provided the current status and capacities of each of the facilities, and ended the discussion outlining the impacts from the Great East Japan Earthquake and progress of reviews underway on design standards, seismic evaluations, and severe accident planning.

Tadafumi Koyama provided a detailed history and overview of the current status of the Tokai Reprocessing Plant. He then outlined improvements under investigation in Japan to address improvements for the Advanced Fuel Cycle. He discussed aspects of proliferation resistance, recovery of minor actinides, and economic sustainability relative to the fuel cycle. His discussion covered aspects of Fast Reactor fuel reprocessing, pyrochemical reprocessing and concluded with the notable progress in advancing the fuel cycle and the dedication of the resources to the mission despite "sharing" time to address Fukushima countermeasures.

Stephane Bourg discussed two French efforts to examine technical options for Spent Nuclear Fuel; a once-through fuel cycle and the twice-through fuel cycle option describing the major difference being the waste generated as a result of a single pass. He went further to explain the long-term benefits of recycling (the twice-through option). He also outlined work on Fast Neutron Reactors (FNR) and the benefits of FNRs compared to current reactor technology. He ended with the statement that recycling fuel is the cornerstone of any sustainable nuclear energy system.

Sal Golub described efforts of the US Japan Bilateral Commission that has been in place since April of 2012. He covered the formation of the five working groups under the commission, and specifically outlined the efforts of the three sub-working groups under the Civil Nuclear Energy Research & Development working group, which include: 1) Advanced Reactor R&D, 2) Light Water Reactor R&D, and 3) Fuel Cycle R&D and Waste Management. He covered the highlights of each of the sub-working groups that spanned collaborative work on materials, accident tolerant fuels, and advanced fuels and disposal. He concluded with announcing the next Joint Meeting will commence in May of 2017 in Idaho Falls.

Questions and Answers

In response to a question about the unlikelihood of Fukushima fuel debris being processable at Rokkasho, pyro-processing has been thought of as a possibility for collaboration. **Mr. Hirai** noted that there has been no decision on what will be done with the fuel debris after retrieval but noted other aspects and perspectives are welcome. **Mr. Koyama** replied by describing that pyro-methods were demonstrated in the US on TMI debris. **Stephane Bourg** spoke of French efforts looking at options as well.

The panel was asked how French efforts to integrate the FNR fuel cycle into a long-term management of fuel will be impacted with a decrease in the reliance of nuclear in France. **Stephane Bourg** described two ways to move the balance through maintaining the same level of nuclear while increasing other energy sources, or decrease nuclear which would likely be difficult and will need to consider political influences.