Global Supply Chain and Localization, Issues and Opportunities:
A Conference on the Customer Dialogue

Summary Conference Report
7-8 November 2017
Paris, France

IFNEC
INTERNATIONAL FRAMEWORK FOR NUCLEAR ENERGY COOPERATION

Global Supply Chain and Localization, Issues and Opportunities: A Conference on the Customer Dialogue

Summary Conference Report
7-8 November 2017
Paris, France

Nuclear Supplier and Customer
Countries Engagement Group (NSCCEG)

Foreword

This conference provided a unique opportunity for cooperation between nuclear power project suppliers and customer countries on two issues of critical interest.

- **The global supply chain**: The global supply chain serves as one of the essential cornerstones of success for every project while presenting challenges including impact to cost and schedule and placing quality assurance burdens on the customer country safety regulator. The conference explored the experience of suppliers and customer countries to better understand the full range of challenges presented by the global supply chain and how they can be effectively addressed.
- **Localization**: The customer country often will want to maximize the economic opportunities presented by a nuclear power project through the use of local resources. Localization presents challenges – the cost of qualifying new supply chains, and the risks that new supply chains present. There are a number of successful projects where localization was accomplished to the satisfaction of both the supplier and customer country. The conference explored how the opportunities presented by localization can be coordinated with the supplier and effectively realized.

This conference was designed to be of interest to all IFNEC member countries and provide the various stakeholders, including regulators, planning authorities, financial institutions and industry the opportunity to observe and participated in discussions of practical interest and value. The primary audience for the conference has been IFNEC members with future plans for developing nuclear power projects. In addition, IFNEC member supplier countries have benefited from the discussions that further clarified the interests of potential customer countries.

The agenda of this conference was developed by a Planning Committee of members of the IFNEC Nuclear Supplier and Customer Countries Engagement Group (NSCCEG), with the efficient support of the IFNEC Technical Secretariat, Mr Henri Paillère and Mr Robert Mussler.

The presentations from the conference can be downloaded from the IFNEC website, www.ifnec.org/ifnec/jcms/g_9673/ifnec-global-supply-chain-and-localization-issues-and-opportunities-november-7-8-2017.

NSCCEG co-chairs

Mr Hideo Shindo (Japan) and Ambassador Rafael Grossi (Argentina)

Table of contents

Agenda

Tuesday | 7 November 2017

8:30-9:00	**Registration and coffee**
9:00-9:10	**Welcome NSCCEG Co-Chairs Rafael Grossi and Hideo Shindo**
9:10-10:00	Session 1: **International perspectives on the key issues associated with the global supply chain and localization** *This session provides an overview of the issues to be addressed in the Conference, from the perspective of international organizations.* **WNA** – Greg Kaser, Senior Project Manager **IAEA** – Milko Kovachev, Head of the Nuclear Infrastructure Development Section **NEA** – Marco Cometto, Senior Energy Analyst
10:00-12:30	Session 2: **Key issues on localization from the customer perspective** *Customer countries have unique perspectives on the issues presented by the global supply chain and localization. The session discussions, following individual presentations, are moderated to elicit concerns and questions that customer countries have regarding the global supply chain and localization. The outcome will be a recorded list of issues, concerns, and questions that will be used to focus the following sessions.* *Country programs in planning:* **Poland** – Andrzej Sidło, Nuclear Energy Department, Ministry of Energy **Egypt** – Dr Nabil Mansoor, Executive Director of the Fuel Manufacturing Plant, Egyptian Atomic Energy Authority **Jordan** – Dr Kamel Araj, Vice Chairman and Commissioner for Nuclear Power Reactors, Jordan Atomic Energy Commission *Experienced country programs:* **United Arab Emirates** – Dr Mohamed Abdalla Chookah, Executive Nuclear Fuel Procurement and Analysis Director, ENEC **Finland** – Toni Hemminki, President and CEO, Fennovoima Oy **Turkey** – Dr Kadir Kaan Şekerciler, International Communication Director of Nuclear Industry Association of Turkey **United Kingdom** – Jon Halladay, Department for International Trade **Italy** – Oscar Mignone, Consultant (IAEA, Milan Polytechnic), Former ENEL VP ***Moderator***: Ahab Abdel-Aziz, Global Director, Nuclear Power Generation, Gowling WLG
12:30-2:00	**Lunch provided at the UIC Conference Centre**
2:00-5:00	Session 3: **Supplier perspectives and case studies** *Presenters address the challenges and opportunities presented by the global supply chain and localization in the context of their past experiences, identifying lessons learned and best practices.* **China** – Wang Xiaohang, Vice President, Global Markets and International Cooperation – SNPTC **Rosatom** – Yulia Chernyakhovskaya, Deputy Director General on Nuclear Infrastructure Competences Development **Areva** – Florence Tourneux, Project Purchasing and Claim Director, Areva NP Supply Chain **Westinghouse** – Jan Dudiak, Vice President and Chief Procurement Officer **Joint Canada/Argentina** – Diane Cameron, Director Nuclear Energy Division, NRCan; Talha Riaz, Manager of Strategic Sourcing and Supply Chain, SNC-Lavalin and Facundo Deluchi, Director of Nuclear Policies, Ministry of Energy and Mining ***Moderator***: Elina Teplinsky, Pillsbury Winthrop Shaw Pittman LLP
5:00	**End of day 1 program**

Wednesday | 8 November 2017

8:30-9:00	**Coffee and pastries**
9:00-9:10	**Welcome, review of previous day and plans for the day, NSCCEG Co-Chairs**
9:10-11:00	Session 4: **The role of the customer country regulator in the quality assurance of materials supplied** *This moderated session addresses an essential responsibility of the customer country safety regulator. Regulators with experience in successfully executing this responsibility provide an understanding of the challenges they have faced and how these challenges were addressed.* **FANR (United Arab Emirates)** – Ian Grant, Deputy Director General Operations **NRC (United States)** – Terry Jackson, Chief, Quality Assurance Vendor, Inspection Division **ONR (United Kingdom)** – Stuart Allen, Supply Chain Regulation Lead **CNSC (Canada)** – Pierre Lahaie, Director, Management Systems Division ***Moderator***: Ahab Abdel-Aziz, Global Director, Nuclear Power Generation, Gowling WLG
11:00-11:20	**Coffee Break**
11:20-12:20	Session 5: **Supplier panel discussion on specific key issues identified** *This concluding session is a moderated discussion panel that guides the participants in addressing remaining issues, concerns, and questions. There is an opportunity for participation by the session attendees to assure that the Conference objectives are achieved.* **Rosatom** – Yulia Chernyakhovskaya, Deputy Director General on Nuclear Infrastructure Competences Development **Westinghouse** – Jan Dudiak, Vice President and Chief Procurement Officer **SNC-Lavalin** – Justin Hannah, Senior Director, Marketing, Strategy and External Relations **Sessions 2 and 4 Moderator** – Ahab Abdel-Aziz, Gowling WLG **Session 3 Moderator** – Elina Tepinsky, Pillsbury Winthrop Shaw Pittman LLP ***Moderator*** – Greg Kaser, WNA
11:50-12:00	**Wrap up and closing comments** NSCCEG Co-Chairs – Rafael Grossi, Hideo Shindo
	End of conference

Summary report

Conference objectives and approach

The objectives of the conference as described in the program were:

1. to explore the experiences of suppliers and customers to better understand the challenges presented by the global supply chain and how they can be addressed;
2. to explore the opportunities presented for both the suppliers and customers by using local resources in a nuclear power project (localization).

The approach to achieving those objectives was to have four sessions that addressed the following questions related to the conference topic from different perspectives:

1. From an international perspective, what are the key issues associated with the global supply chain and localization?
2. From the customer perspective, what are the key issues related to localization?
3. From the supplier perspective, what are the challenges and opportunities presented by the global supply chain and localization?
4. From the safety regulator perspective, what is their role in the quality assurance of materials supplied?

The last session, session five, served as an opportunity for suppliers to address any remaining issues, concern and questions, and present their conclusions.

The summary conference report

This report provides a summary of the outcomes of each of the five sessions. Note that for those wishing to go beyond this summary, the PowerPoint presentations used by each participant can be found on the IFNEC website.

This report makes the outcomes of the conference more generally accessible to all IFNEC members whether they were able to attend the conference or not. The conference was sponsored by the IFNEC Nuclear Supplier and Customer Countries.

The Engagement Group hopes that the conference and report will contribute to understandings between suppliers and customers and encourage further dialogue directed to address the issues discussed.

Session 1: International perspectives on the key issues associated with the global supply chain and localization

Presenters:

- **WNA** – Greg Kaser, Senior Project Manager;
- **IAEA** – Mike Kovachev, Head of the Nuclear Infrastructure Development Section;
- **NEA** – Marco Cometto, Senior Energy Analyst.

Session summary:

a. Key supply chain issues identified:

- Supplier companies are having too few nuclear-related orders to have made it worthwhile to invest in upgrading their civil nuclear capability.
- This has resulted in an erosion of supplier/manufacturer capability. Even qualified suppliers are not delivering fully.
- Different total quality management systems have been adopted in the international market, and along with the high cost of enhanced quality control results in a deterrent to new entry.
- Nuclear power projects involve a particularly complex supply chain with quality control issues at different levels, and these issues are magnified with the technological changes inherent in generation II nuclear power plants being substituted for larger, more expensive and often more complex generation III+ plants.

b. Key localization issues identified:

- There is a lack of incentives to invest in capacity building for one-off nuclear power plant projects. Investment programs for a series of reactor units will incentivize local companies.
- Technical barriers to trade limit export potential for local companies. In many cases export controls need streamlining.
- There is a need to harmonize codes and standards to facilitate the involvement of local companies.
- There is a need to synergize efforts directed at building workforce and industrial capability with the national economic development strategy.

c. Nuclear power projects involve a typically strong pressure towards localization to maximize economic opportunities and technology transfer for the host country. This is because there are benefits for all of the parties involved:

Engineering, procurement and construction (EPC) contractor

- secure supply chain;
- efficient employment;
- effective logistics.

Host government

- job creation;
- support for high-skilled jobs;
- impact on GDP growth, retention of profit in country and creation of wealth;
- boost public acceptance of the project.

Local industries

- capacity building opportunities;
- technology transfer;
- strengthening partnerships;
- access to world market in nuclear and non-nuclear areas.

d. However, the qualification of new, local suppliers presents a challenge for the host government. The following activities are important to promote the use of local resources in a nuclear power project:

- Understanding the scope of commodities, components and/or services that will be needed for the project.
- Establishing a process for identifying which local suppliers can today reliably supply commodities, components and/or services, and which local suppliers could develop those capabilities (capacity surveys of local industries).
- Developing approaches and programs supported by national and local investments to support the upgrade of skills and capabilities that are realistic in the timeframe required to support the project, and establishing incentives to promote capacity building (establishing policies for developing industrial capacity; providing training in nuclear industrial standards and quality assurance mechanisms and requirements; establishing partnerships with experienced suppliers for technology transfer).
- Developing bid specifications through negotiations with the vendor and EPC contractors that include information about domestic industry capabilities and requirements related to technology transfer.

Session 1 panel. From left: Mike Kovachev, International Atomic Energy Agency; Greg Kaser, World Nuclear Association; Marco Cometto, Nuclear Energy Agency.

Session 2: **Key issues on localization from the customer perspective**

Moderator: Ahab Abdel-Aziz, Global Director, Nuclear Power Generation, Gowling WLG

Part 1: ***Countries with programs in planning***

Presenters:

- **Poland** – Andrzej Sidłio, Nuclear Energy Department, Ministry of Energy;
- **Egypt** – Dr Nabil Mansoor, Executive Director of the Fuel Manufacturing Plant, Egyptian Atomic Energy Authority;
- **Jordan** – Dr Kamal Araj, Vice Chairman and Commissioner for the Nuclear Power Reactors, Jordan Atomic Energy Commission.

Session summary:

a. Typically, for planned nuclear power projects the host government begins with expectations regarding the extent of localization that will be used, and those expectations can be expressed as a percentage of the total resources that will be required for the project. The percentage will be set as a target during negotiations for the project EPC contract and during project implementation. Along with setting certain expectations, the host government also undertakes the responsibility for implementation of industry-related activities in order to prepare companies for participation in the nuclear project.

b. These preparation activities involve beginning with a comprehensive assessment of existing national competencies. The range of competencies needed for the project are identified and then the results are matched with existing industry branches and sub branches with nuclear competencies as well as those that could obtain the necessary competencies within certain projected time periods.

c. This effort by the government is then followed by initiating industry-related activities in order to build up competences for the local companies that present the necessary potential. These activities can include trade missions, specialized conferences, informative specialized activities, and sponsoring training and promotion events. The government's localization policy will govern the level and allocations of costs associated with upgrading and building competencies. This policy will take into consideration the expected costs, benefits and volume of future work.

d. The host government will want to encourage the cooperation between vendor, owner and local suppliers to manage the local participation processes, promote a nuclear safety culture, and develop quality and safety procedures to meet vendor requirements. The government will work with the main supplier as appropriate to transfer the technology, expertise, and skills. This is expected to involve the training of local suppliers to assure that they follow the necessary quality and safety procedures and meet the requirements of the main supplier.

Part 2: ***Experienced country programs***

Presenters:

- **United Arab Emirates** – Dr Mohamed Abdalla Chookah, Executive Nuclear Fuel Procurement and Analysis Director, Emirates Nuclear Energy Corporation;
- **Finland** – Toni Hemminki, President and CEO, Fennovoima Oy;
- **Turkey** – Dr Kadir Kaan Şekerciler, International Communication Director of the Nuclear Industry Association of Turkey;
- **United Kingdom** – Jon Halladay, Department of International Trade;
- **Italy** – Oscar Mignone, Consultation (IAEA, Milan Polytechnic), Former ENEL VP.

Session summary:

a. According to the IAEA, states should be active with localizing projects. The recommended rate of domestic subcontractors ranges from 20% to 40%.

b. Local companies without nuclear experience will perceive limitations on their entry in a project that need to be overcome.

   The hurdles/enablers to entry include:

   - quality – a lack of knowledge of quality standards/partnering, coaching, training;
   - cost – cost base for participation is too high/grants, equity, tax breaks;
   - timing – there is a lack of visibility of opportunities/awareness of procurement timetable;
   - cash flow – there is a lack of available equity/loans, investment;
   - technical – there is a lack of experience in a nuclear power project/acquisition, partnering, training.

c. One approach used to understand localization is to list all of the commodities, equipment and services required for a project (this can be done on several levels but a manageable approach would end up with a list of about 40 items). Then place each item in one of three categories:

- no additional qualification needed;
- time and investment required for qualification;
- large scale investment required for qualification.

   with the assumption that the required number of reactors to justify investment in localization for category 1 is 2, for category 2 is 4, and for category 3 is 8. This approach recognizes that the localization level is dependent on the number of reactors, the technology level of the industry and government investments.

d. Regarding the Hinkley Project in the United Kingdom, EDF has confirmed that 64% of the project spend is going to the United Kingdom. This will be possible in part because EDF has worked very closely with the local community and local supply chain, in addition to supporting educational development and a range of community programs.

e. The presentation from Italy discussed in some detail the market survey they conducted to support local participation in the planned nuclear power project. The market survey was conducted to evaluate current local industry capabilities. The government developed an awareness and qualification process for Italian companies with the goal of progressing to 70% participation in the fourth unit built. The process targeted companies with capabilities in manufacturing, engineering, construction and management. Workshops were conducted with industry sectors and evaluations were completed. The results were the identification of highly quality candidates for work in the nuclear plant conventional island that included:

- civil works;
- turbine – generator;
- large water cooling pumps;
- valves;
- non-nuclear qualified electrical systems;
- high voltage transformers.

The survey also resulted in the identification of areas for development. The conclusions of the survey highlighted:

- the need for government incentive programs to realize the full potential for localization;
- the value of partnerships with qualified nuclear international suppliers;
- the value of involving national universities, technology centers and industrial experts.

Specific areas of improvements that were identified in the visits and meetings with manufacturers were:

- intensify management self-assessment;
- organization for nuclear safety and quality;
- integrated document management, configuration management, document control;
- material certification traceability;
- manufacturing innovative processes;
- qualification of special processes to nuclear standards;
- utilization of experience feedback and lessons learned systems.

Session 2 panel. From left: Ahab Abdel-Aziz, Gowling WLG; Toni Hemminki, Fennovoima Oy; Jon Halladay, UK Department of International Trade; Kamal Araj, Jordan Atomic Energy Commission; Mohamed Abdalla Chookah, Emirates Nuclear Energy Corporation; Andrzej Sidłio, Ministry of Energy; Nabil Mansoor, Egyptian Atomic Energy Authority; Kadir Kaan Şekerciler, Nuclear Industry Association of Turkey; Oscar Mignone, Consultant.

Session 3: **Supplier perspectives and case studies**

Moderator: Elina Tepinski, Pillsbury Winthrop Shaw Pittman LLP

Presenters:

- **China** – Wang Xiahang, Vice President, Global Markets and International Cooperation, SNPTC;
- **Rosatom** – Yulia Chernyakhovskaya, Deputy Director for General Competencies and Development of Nuclear Infrastructure, Rusatom Service JSC;
- **Areva** – Florence Tourneux, Project Purchasing and Claim Director, Areva NP Supply Chain;
- **Westinghouse** – Jan Dudiak, Vice President and Chief Procurement Officer;
- **Joint Canada/Argentina** – Diane Cameron, Director Nuclear Energy Division NRCan, and, Talha Rias, Manager of Strategic Sourcing and Supply chain, SNC-Lavalin, and, Facundo Deluchi, Director of Nuclear Policies, Ministry of Energy and Mining.

Session summary:

a. China

China has developed an integrated Gen-III nuclear power supply chain with the capability to support ten nuclear power projects a year. This is the result of a program begun in 2007 directed at promoting localization for Gen-III technology. The objective was to establish a complete supply chain by expanding manufacturing capabilities, promoting a nuclear safety culture, and have the capability to support localization at a level of 85%. Over the development of six units beginning with Samnen 1 that had localization of 31.5%, the localization portion of nuclear island equipment has gradually increased to 88%. Localization efforts are organized with responsibilities distributed across three entities:

- Government – establishes the national nuclear power program, safety requirements, and localization targets; provides funding to support the development of national Gen-III projects.
- SNPTC – provides for the overall organization of development of Gen-III nuclear power; manages the transfer of technology to the manufacturer; establishes supplier qualification procedures, improve quality assurance systems of suppliers and conduct audits and inspections; selects suppliers; and coordination of R&D work with manufacturing and construction.
- Manufacturers – participate in technology transfer; carry out R&D for manufacturing; expand capabilities to develop self-reliance.

b. Russia

The presentation from Russia noted that the level of localization depends on the local industry technical qualifications, the project finance model being used, the past performance of local suppliers, and applicable certifications. A number of national industry participation principles were presented:

- the higher level of local financing results in the higher level of local participation;
- local suppliers' prices need to be competitive to ensure economic benefit of both the owner and the vendor;

- the economy of scale effect achieved via serial NPP construction naturally increases the level of localization;
- local suppliers should be technically qualified to ensure safety, quality, sufficient human resources, manufacturing capacity and on-time delivery;
- there must be a readiness to comply with the vendor country norms and standards;
- confidentiality of data transfer is required and fulfilment of the export control regulations;
- royalty/technical collaboration fees are payable when applicable.

With respect to local supplier development, Rosatom provides:

- a training system in Russia: www.rosatom-academy.org, www.rosatomtech.com;
- industry seminars on major projects, suppliers forums;
- a distance training program "How to become a supplier for Russian nuclear power industry?" www.rosatom.ru – "section for suppliers".

c. *France*

Areva has a highly developed supplier qualification process with a threefold procurement strategy:

- Areva provide 100% of the primary loop;
- Areva and its global supply chain provide 50% of safety classified and auxiliary equipment + I&C (operational, safety and non-computerized);
- 50% is open to procurement with high nuclear qualification requirements.

Among the key success factors for localization presented by Areva were:

- on-site visits;
- assigning senior people;
- personal relationships;
- clarification meetings;
- providing time for a supplier to upskill;
- check supplier understanding of "unusual standards";
- local support;
- capitalize from one execution to another one.

d. *Westinghouse*

The Westinghouse global and regional approach to localization is to develop their global technologies and standards through local resources. They work to attain a high-performing supply chain that creates a competitive advantage on global, regional and local levels. Their localization efforts in France have resulted in having 450 employees in the country, 240 local suppliers, and a local spend of 70% on projects in France. In China they have 194 local employees that is expected to grow to 450 my 2021, 3 local suppliers expected to grow to 40 by 2021, and USD 10 million local spend with a forecast of USD 40 million by 2021. Westinghouse has a long-term goal of developing China suppliers for global export.

For lessons learned relative to localization, Westinghouse offered:

- overcome pre-conceived perceptions of local supplier capabilities;
- develop expertise on local regulations, requirements and expectations;

- exercise due diligence and risk management on customer directed suppliers;
- prioritize local engagement with suppliers;
- understanding nuances of local import/export laws, vat, etc.;
- optimize the blend of global, regional and local delivery.

e. Canada/Argentina

With respect to the Canadian CANDU-6 reactor in Argentina, Canada has qualified local companies to produce calandria tubes, pressure tubes, feeders, end fittings, channel closure plugs, steam generator tubing, and replacement steam generator cartridges. Further, Atomic Energy of Canada Limited, as part of the agreement for the CANDU-6 reactor, provided Argentina with technology transfer, meaning that Argentina would be able to replicate the reactor within its own borders.

Session 3 panel. From left: Elina Tepinski, Pillsbury Winthrop Shaw Pittman LLP; Jan Dudiak, Westinghouse; Talha Rias, SNC-Lavalin; Diane Cameron, Natural Resources Canada; Yulia Chernyakhovskaya, Rusatom Service JSC.

Session 4: **The role of the customer country regulator in the quality assurance of materials supplied**

Moderator: Ahab Abdel-Aziz, Global Director Nuclear Power Generation, Gowling WLG

Presenters:

- **FANR (United Arab Emirates)** – Ian Grant, Deputy Director General Operations;
- **NRC (United States)** – Terry Jackson, Chief, Quality Assurance Vendor Inspection Division;
- **ONR (United Kingdom)** – Stuart Allen, Supply Chain Regulation Lead;
- **CNSC (Canada)** – Pierre Lahaie, Director, Managements Systems Division.

Session summary:

a. The customer has responsibility to verify quality assurance and the regulators verify the customer's oversight of the supply chain. Supply chain oversight is critical to nuclear safety.

b. A key point emphasized was that international regulatory cooperation is important.

c. From the perspective of the regulatory, the nuclear supply chain is:

- complex;
- one element in a large project organization;
- involving multiple actors and interfaces;
- with suppliers at various locations worldwide.

d. The issues of counterfeit, fraudulent, and suspect items are not new, but becoming more sophisticated. This threat emphasized the need to have a good quality assurance program and to engage actively with others. Cybersecurity is a significant threat that operates in a very dynamic environment.

e. The responsibilities of the regulator includes verifying:

- conformance with applicable laws, regulations and license requirements;
- that the licensee's management system and quality assurance program provides adequate oversight and control of facilities;
- that equipment and work performance meet all necessary requirements;
- that the as-built facility can be operated safely in accordance with the assumptions and safety goals described in the safety analysis report and safety evaluation and regulatory requirements;
- that personnel possess the necessary competence;
- that the licensee's operating organization is ready to commence operation.

f. Key issues for the regulator related to the supply chain:

- the adequacy of licensee oversight of vendors: in both on-site construction and manufacturing plants outside of project site;
- different expectations between regulator, licensee and country-of-origin vendors;
- vendor and construction quality cannot be taken for granted;
- value of cooperation with the regulatory body in the country of origin and international cooperation generally;
- the adequacy of the commissioning organization, procedures and reporting to demonstrate facility built in accordance with requirements;
- the scope of capabilities for the operating organization – a challenge for a newly embarking country.

g. Targeted vendor inspections with a focus on high risk areas across the entire enterprise provide an important activity for regulatory oversight. An international initiative relative to addressing the issues regulators face with the global supply chain is the Vendor Inspection Cooperation Working Group of the Multinational Design Evaluation Program. The key objectives of this working group are:

- conduct joint, witnessed and multinational inspections;
- maximize results from regulator vendor inspections;
- share lessons learned and regulatory experience;
- harmonize best practice approaches;
- facilitate adoption of good vendor oversight practice.

Session 4 panel. From left: Terry Jackson, US Nuclear Regulation Commission; Stuart Allen, UK Office for Nuclear Regulation; Pierre Lahaie, Canadian Nuclear Safety Commission; Ian Grant, Federal Authority for Nuclear Regulation, UAE.

Session 5: **Supplier panel discussion on specific key issues identified**

Moderator: Greg Kaser, WNA

Participants:

- **Rosatom** – Yulia Chernyakhovskaya, Deputy Director General on Nuclear Infrastructure Competence Development;
- **Westinghouse** – Jan Dudiak, Vice President and Chief Procurement Officer;
- **SNC-Lavalin** – Talha Riaz, Manager of Strategic Sourcing and Supply Chain;
- **Sessions 2 and 4 moderator** – Ahab Abdel-Aziz, Gowling WLG;
- **Session 3 moderator** – Elina Tepinski, Pillsbury Winthrop Shaw Pittman LLP.

Concluding observations

The localization objectives of customer countries are driven by industrial economic policy objectives and public acceptance imperatives. Customer countries seek not only the power generation capacity of a nuclear project, but also the transformative economic, technical and cultural benefits of successfully implementing a national nuclear power program. This is part of the promise of nuclear power that helps to distinguish it from other technologies. Suppliers were more focused on effective project delivery, the need to establish stable and reliable supply from a global supply chain that meets QA and rigorous regulatory requirements, and to deliver nuclear power projects efficiently and economically.

While customers tend to think about percentage of overall project, suppliers think in terms of the scope of work for which local capabilities can be used. Certain safety classes of equipment, such as primary loop, are generally not available for localization, with some exceptions (e.g. CANDU). Certain balance of plant and auxiliary equipment can be open to procurement, but are subject to high nuclear qualification requirements. Non-safety related equipment is generally easier to localize.

It is important to recognize that different vendor business models, project risk absorption, and (especially) extent of financing influence the extent of the vendor's willingness and need to substantially support the development of local industrial capacity in the customer country and enabling the expansion of the scope of local participation. That is to say, where vendors provide substantially all of the funding and absorb substantially all of the project risk, it is likely that this will dictate the need to retain substantial scope for the vendor's national industry, whereas the requirement for substantial local investment and/or risk absorption will likely dictate the need for the vendor to support and help establish substantial local capacity to participate.

Session 5 panel. From left: Greg Kaser, World Nuclear Association; Elina Tepinski, Pillsbury Winthrop Shaw Pittman LLP; Jan Dudiak, Westinghouse; Ahab Abdel-Aziz, Gowling WLG; Talha Rias, SNC-Lavalin; Diane Cameron, Natural Resources Canada; Yulia Chernyakhovskaya, Rusatom Service JSC.

Final notes

Suppliers have robust procurement and qualification programs with multi-step processes that involve pre-selection, pre-qualification and qualification. Vendors invest their own resources both during the qualification process as well as in maintaining the supply chain. Because of this investment, suppliers are looking for long-term relationships.

Best practices for suppliers

- long-term relationships;
- well-tested process for qualification;
- appropriate level of oversight;
- establishing and growing local presence;

What can customer countries do to help?

- assist vendors with their early investment in the customer country – consultancy contracts;
- invest in local supplier education and qualification;
- invest in overall nuclear infrastructure development, including regulatory infrastructure;
- understand vendor qualification requirements, communication with vendors on areas where localization can be of benefit to the project.

Participants in the customer panel were divided in two groups: those still in the planning stages and those who had already engaged in varying stages of implementation. Those engaged in implementation demonstrated that they have implemented sophisticated approaches to supporting localization, largely consistent with the expectations expressed by the suppliers. By varying methods they have each:

- assessed national industrial capacity;
- considered the appropriate scope for localization;
- considered the need for specialized nuclear industry qualification;
- made provision through a combination of industry associations, government support, and imported nuclear industry expertise, for programs to support capacity development, training, and qualification;
- recognized the necessity for investment on both the national and enterprise levels.

Those in the planning stage demonstrated that they understand they have this task ahead of them.

Speakers

Ahab Abdel-Aziz, Global Director, Nuclear Power Generation, Gowling WLG

Ahab Abdel-Aziz is a partner and the Global Director of Nuclear Power Generation at Gowling WLG. He has been a leader in the global nuclear sector for over 25 years. Ahab has advised leading members of the Canadian and international nuclear energy sector and government agencies in policy and legislative development, nuclear project development and finance, licensing and compliance, and dispute resolution.

Stuart Allen, Supply Chain and Quality Regulatory Lead, UK Office for Nuclear Regulation

Stuart Allen works for the UK's Office for Nuclear Regulation and is their Supply Chain and Quality Regulatory Lead responsible for ONR's programme delivery and capability development. He has worked in the UK nuclear industry for over 30 years, and prior to joining ONR in 2013, held a variety of senior engineering, operational, assurance and commercial roles across the generation and decommissioning sectors. He is a chartered engineer who has focused much of his recent career on establishing arrangements to enhance supply chain performance enabling safe and reliable nuclear operations. He is also the Chairperson of the Multinational Design Evaluation Programme (MDEP) Vendor Inspection Cooperation Working Group, an international cohort of supply chain regulation specialists whose main objectives are to cooperate on vendor inspection activities, share related regulatory experience and pursue opportunities to harmonise best practice approaches.

Kamal Araj, Vice Chairman and Commissioner for Nuclear Power Reactors, Jordan Atomic Energy Commission

Before joining JAEC in March 2008 as Commissioner for Nuclear Power Reactor, Prof. Araj served as the Government Advisor for Nuclear Energy for about a year. Before that and since 2006, Dr Araj was the scientific advisor for King Abdullah Development Bureau (KADDB). Before returning to Jordan, Dr Araj worked as a senior advisor at the IAEA in Vienna for five years. Dr Araj received both his BS in physics and BSE in nuclear engineering from the University of Michigan, Ann Arbor. He obtained his PhD at MIT in nuclear engineering with a minor in energy technology and policy. Dr Araj has published widely and directed many national and international research study groups in nuclear physics, advanced nuclear power, laser technologies, renewable energy sources and global climate change.

Diane Cameron, Director, Nuclear Energy Division, Natural Resources Canada

Diane Cameron is Director of the Nuclear Energy Division at Natural Resources Canada. As Director, she heads up the division responsible for leading and coordinating federal policy on nuclear energy. Ms Cameron has ten years of experience in the government of Canada, working on environment, energy, and trade policy, including international negotiations. Prior to government, Diane spent seven years in the private sector specializing in global value chains and advising international transportation and logistics companies. She received a Master's Degree in Technology and Policy from the Massachusetts Institute of Technology (MIT), where she was named Alfred Keil Fellow for Wiser Uses of Science and Technology. Diane also holds a Bachelor of Applied Science in Systems Design Engineering from the University of Waterloo.

Yulia Chernyakhovskaya, Deputy Director General on Nuclear Infrastructure competences development at JSC "Rusatom Service"

After obtaining a PhD in Economics in 2006, Yulia Chernyakhovskaya worked as advisor to the President of JSC Atomstroyexport (ASE), from 2006 to 2011, and in 2008, became Deputy Director of the Marketing and Business Development Department. She participated in the development of tender documentation for nuclear power plants in the Czech Republic, Turkey, Jordan, etc. From 2010 to 2013, she was Deputy Director General for International Cooperation at the Russian Energy Agency of the Ministry of Energy of Russia. From 2013 to 2017, she held the position of Deputy Director at the International Business Department, Rosatom State Corporation, and as such, was responsible for international business planning, human capital development, nuclear infrastructure, state export support instruments and legal protection of intellectual property. Her current position is Deputy Director General on Nuclear Infrastructure competences development at JSC "Rusatom Service".

Mohamed Abdalla Ali Sultan Chookah, Executive Director Nuclear Fuel Procurement and Analysis, Emirates Nuclear Energy Corporation

Dr Chookah is the Executive Director of Nuclear Fuel Procurement and Analysis for the Emirates Nuclear Energy Corporation (ENEC). In this role, he is responsible for developing and maintaining the procurement plan for nuclear fuel assemblies which will ensure supplies for the Barakah Nuclear Energy Plant and the generation of electricity. His department continuously monitors the global uranium and nuclear fuel market, exploring various opportunities to enhance the supply portfolio and strengthen the security of supply. He manages the economical functioning of the portfolio of the nuclear fuel contracts and effective management of contracts to ensure that timely fuel fabrication and delivery remain the department's primary responsibility. Dr Chookah previously led the CPO-Licensing and Regulatory Affairs as the Executive Director for HSE and Regulatory Affairs. He is responsible for ensuring ENEC delivers all related permits and licenses required by the Regulatory Authorities (the Federal Authority for Nuclear Regulation and the Environment Agency – Abu Dhabi) to support major project milestones. Dr Chookah holds a PhD in Mechanical Engineering from the University of Maryland, College Park, Washington, DC.

Marco Cometto, Senior Nuclear Analyst at the Nuclear Energy Agency

Marco Cometto is a nuclear energy analyst at the OECD Nuclear Energy Agency, where he works on the economics of nuclear power. Recent and ongoing activities are system cost of nuclear energy and renewables, cost of nuclear accidents, financing and project structure of nuclear new build, projected costs of electricity generation and full cost of electricity. He graduated with a degree in Nuclear Engineering from the Politecnico of Torino and holds a PhD in physics from the EPFL in Lausanne. In addition to his engineering background, Dr Cometto has a strong interest in finance and economics and has earned the CFA (Chartered Financial Analyst) designation. Prior to joining the NEA, he worked as an investment advisor for an Italian bank and as a research engineer at EDF and at the French Atomic Energy Commission (CEA).

Facundo Deluchi, National Director on Nuclear Policy, Undersecretary of Nuclear Energy, Argentina

Facundo Deluchi is the National Director on Nuclear Policy, in the Undersecretary of Nuclear Energy, Ministry of Energy and Mining, of the Argentine Republic. Previously, Mr Deluchi was Head of the Bilateral Relations Department of the National Atomic Energy Commission and later, Manager of Institutional Relations of that Organization. Among his responsibilities are the relations of the Argentine organizations with foreign institutions and international organizations, as well the relations with local authorities and institutions. He holds a degree in International Relations and post-graduate specialization in social and economic studies of science and technology.

Jan "John" Dudiak, Vice President and Chief Procurement Officer Global Supply Chain Solutions, Westinghouse Electric Company

As head of Global Supply Chain Solutions (within the Global Enterprise Solutions business), Jan Dudiak is responsible for leading Westinghouse Electric Company's worldwide supply chain activities. Jan previously served as Vice President, New Plant Automation, where he led the Instrumentation and Control business for Westinghouse and was responsible for the design, fabrication, testing and commissioning of digital I&C systems for new plant projects. He has also held leadership positions in Westinghouse Strategic Operations and Field Services, including with the Pump and Motor and the Reactor Services businesses. He is a former manager of Sourcing and Logistics, with oversight for the supply management and materials management functions of the former Nuclear Services business.

Ian Grant, Deputy Director General for Operations, Federal Authority for Nuclear Regulation

Ian Grant leads the Operations Division at FANR and is charged with carrying out regulatory and advisory functions in the areas of nuclear and radiation safety, safeguards, and security in accordance with the UAE Nuclear Law. The division's responsibilities include establishing regulations and regulatory guides; carrying out reviews and assessments for licensing of nuclear activities and facilities; conducting inspections and enforcement; making arrangements for emergency response; maintaining laboratories; and training FANR staff. Previously, Mr Grant was the Director of Nuclear Safety at FANR between 2009 and 2015. Before joining FANR, he worked for the Canadian Nuclear Safety Commission from 1989 to 2009 where he held various senior management roles including Director General of Power Reactor Regulation. Mr Grant's experience at the international level includes participation in IAEA peer review missions to other regulatory bodies, and as the UAE delegate on the IAEA Nuclear Safety Standards Committee. He has also served as a national delegate on the OECD Nuclear Energy Agency committees for nuclear safety and regulation. Mr Grant holds a Bachelor of Science Degree in Mechanical Engineering with the Brown Prize from the University of Glasgow and a Master's Degree in Welding Technology with the British Oxygen Company Prize from Cranfield University.

Jon Halladay, Investment Specialist, Civil Nuclear, UK Department for International Trade

Jon Halladay joined the Department for International Trade, UK government in 2016 as an Investment Specialist within the Civil Nuclear Team. Mr Halladay has over 25 years' experience within the energy and defence markets, starting his engineering career with Strachan & Henshaw in the United Kingdom, becoming Nuclear Director for Weir Strachan & Henshaw in 2005. He has led nuclear businesses for such FTSE 100 organisations as Babcock International and Weir Group, with experience of both large capital and service related multi-disciplined programmes. Mr Halladay's focus is on bringing this experience to support inward investment opportunities, within the growing UK nuclear market, from China, France, the United States and Japan.

Toni Hemminki, President and Chief Executive Officer of Fennovoima Oy

Toni Hemminki has served as President and Chief Executive Officer of Fennovoima Oy since October 2014. Prior to joining Fennovoima, Mr Hemminki held various positions at SSAB (former Rautaruukki Oyj) from 2001 to 2014. During those years, he expanded his experience from expert and research and product development positions to leading positions as Vice President, Energy and Environment in 2007-2011; Senior Vice President, Technology, Energy and Environment in 2011-2013; Chief Strategy Officer in 2013-2014 and Deputy Chief Technology Officer and Head of Energy, Environment, Health and Safety from September 2014 on, until joining Fennovoima. In addition to wide management experience at SSAB, Mr Hemminki has held a few positions of trust as chairman of the board of directors at Raahen Voima Oy (2014) and ElFi Oy (2009-2011) and as a member of the board of directors at Manga LNG Oy (2014), FIMECC Oy (2013-2014), Fennovoima Oy (2013-2014) and Voimaosakeyhtiö SF (2012-2014). Mr Hemminki holds a Master of Science, Tech. (Energy and Environment) degree from Lappeenranta University of Technology, Finland. In addition, he has taken numerous leadership, economics and environmental business management courses.

Terry Jackson, Chief of Quality Assurance Vendor Inspection Branch 1 in the Office of New Reactors, US NRC

Terry Jackson currently serves as the Chief of Quality Assurance Vendor Inspection Branch 1 in the Office of New Reactors. Prior to this assignment, he served as the Chief of the Instrumentation, Controls, and Electronics Engineering Branch 1 in the Office of New Reactors, where his branch was responsible for the instrumentation and control system safety review for the AP1000, US EPR, and APR-1400 designs. He also served as the chair for the EPR I&C Technical Expert Subgroup within the Multinational Design Evaluation Program (MDEP). Prior to his current position, he served as Resident Inspector and Senior Resident Inspector at the Diablo Canyon Power Plant. Mr Jackson joined the US Nuclear Regulatory Commission in 1993 as a Digital Instrumentation and Control Engineer in the NRC's Office of Research. He is currently a licensed electrical engineer in the State of California.

Greg Kaser, Senior Project Manager – Supply Chain, World Nuclear Association

Greg Kaser has a degree in economics and politics from the University of Cambridge and began his career with the UK Atomic Energy Authority. During the 1990s, Mr Kaser worked with International Mining Consultants on restructuring projects in Central and Eastern Europe, Central Asia, China and Africa; later, as project director with the HTSPE consulting company, he managed international assignments on behalf of the development agencies and banks. He joined the World Nuclear Association in 2011 and has prepared its market report on the nuclear supply chain, including the latest one which was published in September 2016. He is currently supporting the association's New Build Lesson-learning Task Force.

Milko Kovachev, Head Nuclear Infrastructure Development Section of the International Atomic Energy Agency

Before joining the IAEA, Milko Kovachev worked as Vice President of Rusatom Oversees, in charge of business development activities and developing nuclear power infrastructure in a number of embarking countries. From 2010 to 2013, Mr Kovachev worked as Regional Director Nuclear for Asia and Middle East region for Worley Parsons with prime responsibilities for business development strategy in South East Asia and Middle East regions. From June 2007 to June 2010, Mr Kovachev was Senior Advisor to the Energy and Natural Resources Group at European Bank for Reconstruction and Development with operations in 33 countries of Central and East Europe and the Former Soviet Union. Mr Kovachev served as Minister of Energy and Energy Resources (2001-2005) and Minister of Economy (2005) of Bulgaria within the Government of Simeon Saxe-Coburg-Gotha (2001-2005). Prior to that, he headed the Safety and Operation of Nuclear Power Plant (NPP) Corporate Division of the National Electric Company of Bulgaria, managed the European Commission Nuclear Safety programme for Bulgaria and worked as Manager of the Training Centre at Kozloduy NPP.

Pierre Lahaie, Director, Management Systems Division, Canadian Nuclear Safety Commission

Pierre Lahaie has a Master's Degree in Chemistry, and is a Certified Technology Manager with 28 years' experience in the nuclear industry, of which 19 were with a manufacturer of bulk and finished radiopharmaceuticals and 9 with the Canadian nuclear regulator CNSC. He has expertise in operations, research and development, organizational and leadership development and management systems.

Nabil Mansour, Executive Director of the Fuel Manufacturing Plant, Egyptian Atomic Energy Authority

Nabil Mansour is Prof. Dr Assistant of Material Science in the Metallurgical Department of the Nuclear Research Centre of the Egyptian Atomic Energy Authority. An expert in metallography and mechanical testing, he was the head of the U_3O_8 powder production for the manufacturing pilot plant of the Egyptian Atomic Energy Authority, from 1996 to 2008, and is the author of many scientific publications.

Oscar A. Mignone, Consultant (IAEA, Milan Polytechnic), Former ENEL VP

Oscar Mignone is an expert in development, engineering, and construction of nuclear power plants. He is currently acting as Consultant for Milan Polytechnic Energy Department, Italy, in the development and construction management of nuclear projects, as well as to the IAEA. Prior to that, he joined the Enel Group in 2010 as Director/Project Manager for the Italian Nuclear Program, 4 x 1 650 MW Units, responsible for developing the program architect engineer organization in close interaction with partner Electricité de France. He was Vice President in the Enel Group from March 2012 to April 2015 as Head of Development and Construction of Nuclear Plants. Before joining the Enel Group, he worked during 37 years for leading international companies in development, feasibility studies, nuclear market research, contracting, engineering, procurement, construction, commissioning, and operational upgrades of nuclear projects in several countries, i.e. Argentina, Bulgaria, Canada, the Czech Republic, Egypt, Italy, Romania, the Slovak Republic and Sweden.

Elina Teplinski, Pillsbury Winthrop Shaw Pittman LLP

Elina Teplinsky is the lead member of Pillsbury's premier International Nuclear Projects practice. She advises companies worldwide on the development, financing and operation of nuclear power facilities. Her clients include nuclear power plant developers, owners and operators, equipment vendors, architect engineers, consultants and investors. She has worked on matters in more than 25 jurisdictions and speaks native Russian and fluent Spanish and Portuguese.

Ms Teplinsky provides legal and strategic advice in structuring and negotiating engineering, procurement and construction (EPC) contracts, equipment supply agreements, and nuclear fuel supply agreements. Ms Teplinsky regularly advises foreign governments, Nuclear Energy Programme Implementing Organizations (NEPIOs) and government-owned utilities on various aspects of developing domestic nuclear power programs, including assistance with structuring and executing nuclear procurement programs, attraction of financing, formation of nuclear legal and regulatory regimes and drafting of domestic nuclear legislation, and compliance with obligations under international conventions. Ms Teplinsky is a recognized expert on nuclear trade and export control issues and regularly assists clients in structuring their export compliance programs.

Talha Riaz, Manager of Strategic Sourcing and Supply Chain, SNC-Lavalin/CANDU

Talha Riaz is the Strategic Sourcing Manager for the Nuclear Business Units of SNC-Lavalin. Talha joined Candu Energy, a member of the SNC-Lavalin Group in 2012. His responsibilities include managing major proposals and projects. He brings over ten years of professional experience from a variety of positions and industries.

Kadir Kaan Şekerciler, Communication Director of Nuclear Industry Association of Turkey

In his post as the Communications Director of the Nuclear Industry Association of Turkey, Kaan Şekerciler is at the forefront of the localization efforts for the nuclear energy projects in Turkey since 2014. His main job is to connect global nuclear industry manufacturers with Turkish companies that wish to develop nuclear capabilities. He is also responsible from organizing business matchmaking meetings between potential suppliers and the main stakeholders of the NPP projects in Turkey. As a seasoned communication expert, Kaan works to manage relationships between buyers and suppliers from all tiers of the newly forming Turkish nuclear supply chain.

Andrzej Sidło, Chief Expert, Ministry of Energy, Republic of Poland

Andrzej Sidło currently works in the Ministry of Energy Republic of Poland, as Chief Expert for the supply chain and localization of the Polish nuclear programme within the Ministry of Energy (NEPIO of Polish nuclear program). He also oversees the industry-related activities for the Polish industry in order to build up nuclear competencies, such as the implementation of first training programmes, and specialized trade missions to other countries. Finally, he is involved in the development of technical regulations within the nuclear programme. Prior to these responsibilities, Mr Sidło worked for ten years as Project Manager and Project Director of overseas energy/industry projects of Polimex Mostostal (mostly in Europe). He holds a Master's Degree in Corporate Finance of the University of Economy in Cracow (Poland) and a post-graduate study DESS (Corporate management) from Université Lille I (France).

Florence Tourneux, Project Purchasing and Claim Director, Areva NP Supply Chain

Florence Tourneux began her career 27 years ago within the Areva group (back-end activities), as technical and commercial manager for international projects (mainly MOX fuel transport to Japan – return of high active waste to foreign countries). In 2005, she joined Areva NP as Risk Manager for OL3 and FA3 EPR projects and in 2007 she took the commercial manager position for FA3 EPR project. In 2012, Ms Tourneux joined the Supply chain organization as Order Management and Expediting Director for large projects. In 2016, she joined the Areva NP supply chain as Project Purchasing and Claim Director.

Wang Xiaohang, Vice President of International Cooperation, SNPTC

Dr Wang Xiaohang has over 30 years' experience in nuclear power technology. His areas of responsibility are nuclear power technology and small modular reactor technology development, project management and nuclear safety regulation of nuclear power projects, etc. In the past ten years, Dr Wang has been in many senior management positions, including deputy director of technology development department of SNPTC, deputy general manager of CPI Nuclear Company, responsible for technology management, deputy general manager of Shandong Nuclear Power Company, in charge of project management and plant operation preparedness of two AP1000 units in Haiyang, Shandong province. Before 2005, Dr Wang was engaged in CNNC, as deputy general manager of the main contractor of the Chashma NPP project in Pakistan. Previously, Dr Wang worked as a nuclear project officer of the National Nuclear Safety Administration of China.

Global Supply Chain and Localization, Issues and Opportunities:

A Conference on the Customer Dialogue

The International Framework for Nuclear Energy Cooperation (IFNEC) is an international forum gathering 65 member countries and 4 observer organisations. IFNEC's Nuclear Supplier and Customer Countries Engagement Group (NSCCEG) organised a conference on 6-7 November 2017 to examine issues and opportunities associated with nuclear supply chains, addressing both globalisation and localisation aspects and the way supplier countries and customer countries engage discussions, as well as cooperation on these topics. The conference included presentations from international organisations, from supplier countries and vendors, from customer countries and from regulators, highlighting both success stories and best practices.

www.ifnec.org

NEA
NUCLEAR ENERGY AGENCY

Printed by the OECD Nuclear Energy Agency for the International Framework for Nuclear Energy Cooperation