

2013

North American Young Generation in Nuclear



**2013 Professional Development
Conference Summary
Toronto, Ontario, Canada
June 9, 2013**

On behalf of North American Young Generation in Nuclear, we kindly thank our 2013 sponsor:



.....and the dedicated volunteers, speakers and the core committee who helped to make the event successful.



NAYGN PD Seminar – Toronto, ON, Canada - June 9, 2013

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1 Introduction

North American Young Generation in Nuclear is an organization for young nuclear professionals under the age 35 or with 10 years of experience or less in the nuclear industry. Established in 1999, NAYGN strives to provide opportunities for a young generation of nuclear enthusiasts to develop leadership and professional skills, create life-long connections, engage and inform the public, and inspire today's nuclear technology professionals to meet the challenges of the 21st century.

The 2013 NA-YGN Professional Development conference in Toronto, Ontario provided young nuclear professionals with the opportunity to interact with industry leaders and peers while learning about innovative and developing technologies in their field. This post-conference report provides an outline of the presentations and key messages from the day.

2 Welcome

To begin the day, Rahim Lakhani, Regional Lead for NAYGN Canada, provided opening remarks that focused on why professional development is important for young nuclear professionals:

“The ultimate outcome of well planned, continuing professional development is that it safeguards the public, the employer, the professional, and the professional's career. This is where NA-YGN comes in, as an institution that helps to ensure your capabilities keep pace with the current standards of others in the nuclear industry. In order to accomplish that, one needs to maintain an enhanced knowledge and skills needed to deliver a professional service to customers, clients and the community. Furthermore, NA-YGN is all about keeping knowledge relevant and up to date. We are all aware of the changing trends and directions in our industry. The pace of change is probably faster than it's ever been, and this is a feature of the new normal that we live and work in. To cope with this rapidly evolving scenario, NA-YGN is there to foster a professional's meaningful contribution to their team, becoming more effective in the workplace, and ultimately assists you to advance you in your career and move to new positions where you can lead, manage, influence, coach, and mentor others. As the name says, you are all the young generation, the leaders of tomorrow.”

After opening remarks, Mukul Shekhar from Candu Energy and Aubrey Au from Ontario Power Generation led all the attendees through a paper airplane icebreaker. Each participant was asked to write something unique about themselves on a piece of paper, transform this paper to an aerodynamic flying aircraft and glide it across the room. Everyone then picked up a random airplane, and attempted to locate the owner. It was a wonderful opportunity to meet new people and learn something different about someone new.

3 Aging Nuclear Population – How do you manage the Turnover?

Presenters:

- Jerry Hopwood, Vice President Marketing and Product Development, Candu Energy
- Sonia Qureshi, Business Manager, Product Development, Candu Energy

Facilitator:

- Mukul Shekhar, Candu Energy

Summary

Mr. Hopwood and Ms. Qureshi started their presentation on knowledge transfer in the nuclear industry by first discussing how the nuclear industry is evolving worldwide, claiming that 133 nuclear power plants are currently planned or are in construction in Southeast and Eastern Asia. This has the implication that in the future China and India could have more nuclear power plants in operation than the rest of the world combined.

While CANDU nuclear power plants have had an impressive history that has shaped the design of today's advanced reactors, they also have an important part to play in the future of the nuclear industry. Mr. Hopwood described the potential of using CANDU units in the United Kingdom to reduce and reuse used fuel in this area. As a result of the heavy water moderator in the CANDU units, they can be filled with spent fuel from light water reactors. This is an effective strategy to reduce the amount of radiological waste that is actively being pursued. There is also potential for nuclear build in Ontario, Argentina and Romania as well as several refurbishment projects that are already underway.

As young nuclear professionals, Mr. Hopwood and Ms. Qureshi recommended that we strive to receive the knowledge transfer required in order to be a part of the bright future for nuclear power. Ms. Qureshi discussed her career path, noting how she moved from a new graduate engineer from UofT to a Business Manager of Product Development at Candu Energy. Starting in a design role, Ms. Qureshi discussed how she focused on professionalism to gain the respect of senior leaders. She also indicated how volunteering for the United Way campaign with her organization helped her to gain exposure in the organization. When an opportunity arose to work in the cost engineering department, Sonia sought the advice of Mr. Hopwood and other peers to discuss whether this would be a good career move. Mr. Hopwood provided the following advice: "You will never lose what you've already gained in your design role, you'll only gain a new experience". With that, Ms. Qureshi jumped into this new opportunity.

Mr. Hopwood and Ms. Qureshi both agreed that obtaining diversified skills was important to a good career. Ms. Qureshi drew on her experience in her design role and built upon it in the cost engineering area. Both presenters also agreed that mentorship was the key to effective knowledge transfer. When asked about how to build relationships with senior leaders, both recommended being involved in extracurricular activities like charity campaigns, NA-YGN or other endeavors which may increase your exposure. If you're interested in learning about a

certain area, Ms. Qureshi recommended pursuing a rotation option or job shadowing. Ultimately, she indicated that “if you don’t enjoy getting up and going to work, then don’t do it”, or in other words you need to find something else.

Key Messages for the Young Nuclear Generation:

1. CANDU units have a bright future in many different areas around the globe
2. Becoming part of that future means ensuring effective knowledge transfer
3. Get to know your senior leaders by participating in extracurricular activities
4. Take risks and diversify your career with both hard (technical) and soft (leadership) type skills

4 Refurbishment of Nuclear Power Plants – An Update

Presenters:

- John MacKinnon, Vice President, Technical Support Services, AMEC-NSS
- Yung Hoang, Director, Owner Support Services, AMEC-NSS Summary

Facilitator:

- Rahim Lakhani, AMEC-NSS

Mr. MacKinnon began by recalling that major refurbishments of Nuclear reactors have been occurring for the last 7 years. This includes completion of Bruce 1 and 2, as well as planning for DNGS 1-4 and Bruce 3 and 4 refurbishments. These refurbishments would add approximately 30 years of extended life to the affected reactors. Also, following refurbishment there would be additional opportunities for future work due to the knowledge and relationships built during the refurbishment process.

Bruce 1 and 2 refurbishment was then discussed. Refurbishment activities began in 2005, and the units were restarted in 2012. Key critical path work was related to electrical installations. It was also noted that 6/7 of the Bruce refurbishment team were members of NAYGN, while 3 members of the team were former NAYGN chapter chairs.

Following a summary of the completed Bruce refurbishment, the upcoming Darlington Nuclear Generating Station (DNGS) 1-4 refurbishment was discussed. The initial plan is to complete construction for refurbishment from 2016-2020. This would follow a phased approach, with initial conceptual design being completed by 2014 and detailed design completed by 2015.

Lessons that worked well during the Bruce refurbishment campaign were discussed, including completing planning on time, controlled scope, being ready for technical changes, accessibility and constructability of work, safety, and the employment of an effective supply chain. Initially during the refurbishment project, there were many concerns about quality and responsiveness, which was truly internalized by AMEC-NSS. In order for refurbishment to be successful, every

cog in the machine had to work flawlessly. Bruce Power and all the required vendors had to work as a team. Once this was realized, the project turned a corner. Mr. MacKinnon also made a distinction about the use of the phrase “lessons learned”. These are meant to be items that have been addressed which will never happen again as a result. However, in some cases what people call “lessons learned” are more like “observations watched”. These are items which have been noted but happen again and again.

The initial Bruce refurbishment team was approximately 5 people on site, and this increased to approximately 100, with 80% of the workforce comprising of young employees less than 35 yrs of age.

Mr. MacKinnon and Mr. Hoang then discussed advice for the young generation in nuclear. Mr. Hoang suggested that the youth get involved with organizations like NAYGN. Mr. MacKinnon recommended taking initiative, asking for responsibility, and learning to recognize opportunities. Don't ask “what your company can do for you, think: what can I do for the company and communicate this to senior leaders?” Don't wait for opportunities to drop in your lap; you'll be waiting a long time.

For employers, the advice included having seniors mentor the junior staff to support knowledge transfer. AMEC-NSS, for example, hired approximately 100 graduates over a period of 10 years, and the average age of employees reduced from 47 to 40, with the largest group of employees in the 30-39 age category.

Finally, traits of a good leader were discussed. It was noted that “a good leader stands in front of the team when things go wrong, and stands behind the team when things go right”.

5 Small Modular Reactors

Presenter:

- Roger Humphries, Ph.D., Director Marketing and New Business Development, AMEC-NSS Summary

Facilitator:

- Sahil Gupta, AMEC-NSS

Mr. Humphries introduced Small Modular Reactors (SMRs), which have a great potential for the future. They are not a new concept, as they have been used on submarines at military bases. An SMR is defined as a reactor that is less than 200-300 MWe. They can replace plants that cannot be operated due to environmental concerns.

SMRs allow for mass production or conveyer belt construction which has the potential to decrease nuclear power capital costs. There is a potential for SMRs to supply power or steam to remote locations in the oil sands. Unlike other energy sources such as natural gas, electricity

prices for nuclear power are relatively stable as they are not typically subject to significant market fluctuations. For remote mining applications in the far North that have no access to energy, SMRs will provide an economic and reliable energy source in comparison to using a diesel generating unit. Most SMR designs have reactors installed underground, which calls for a radically different operations and maintenance scheme. In addition, SMR developers are looking for a risk-based approach to determine what security and exclusion area would be required

SMRs have many different useful applications, including:

- Powering remote communities (1 MW reactors)
- Powering military bases
- In-situ bitumen production (SAGD)
- Oil and gas – upgrading to higher value products
- Water purification

Mr. Humphries finally discussed the numerous challenges currently facing SMRs, many of which have not yet been resolved but need to be discussed and resolved to support their implementation. Some challenges discussed were as follows:

- Who would be the owner/operator?
- What would emergency response look like?
- Transport of spent core or modules back to factory for maintenance/re-fuelling
- Minimum staff complement
- What would security look like?
- Licensing
 - CNSC is currently developing regulatory models which would allow for the licensing of SMRs
 - Needs to involve a graded risk approach for requirements

6 Leadership and Goal Setting: What's the Connection?

Panelists:

- Diane Glebe, Department Manager, Human Resources, Bruce Power
- Sandy Stock, Director, Station Engineering, Ontario Power Generation
- Phil Smith, P.Eng. VP, Engineering, Design & Projects, AMEC NSS

Facilitator:

- Shobit Shanker, AMEC-NSS

This was an open panel discussion amongst the three noted panelists. The questions are identified here, with a response from each panelist.

Management vs. Leadership

Ms. Glebe advised that management is technical and about the work, including planning, controlling, directing, etc. Credibility is obtained based on what you know. Leadership includes having vision, a road map, and being a coach/mentor. Mr. Stock advised that an organization needs both managers and leaders to be successful. Leaders have high standards, and have followers that are not related to seniority. Mr. Smith advised that it is not necessarily true that people are born leaders. Leaders are people that others want to follow. Also, he noted that it seems that leadership and management blur into each other, and to be a successful leader/manager you need to blend seamlessly between managing and leading, and being a leader and a manager in the right situations.

Role of a Manager and a Leader

Mr. Smith advised that it is an evolutionary process, and he understood his own strengths and weaknesses and gained skill over time. Understanding one's strengths and weaknesses can help you arrange for others to support your weaker aspects. He advised that over time, he noticed his outlook began to look further into the future than was done early in his career. He also advised it was never too late in one's career to lead, and opportunities to lead should be found. Ms. Glebe advised that throughout her career she notices a significant change in focus from being a manager to being a leader. The focus used to be on management and being knowledge-centered, but following some re-organizing due to economic changes, the focus on leadership increased. The re-organization included removal of various layers of management, which meant that managers took on more responsibility, and in some cases for aspects they did not understand.

The next question asked for the panelists to discuss a time when their management and leadership skills were stress-tested. Mr. Stock advised to not let ego get in the way, and to learn and move on. Mr. Smith stated that when organizations are challenged, prescriptions are introduced and delegated high. Ms. Glebe indicated that when she was in a stress-tested situation, she ended up reverting to what she knew best which was managing in most cases. In some cases, she felt this was not appropriate and she needed to be a leader instead.

Another question for the panelists was how to balance tension between being yourself versus how others view you. Ms. Glebe stressed the importance of "being yourself", and that additional risk is introduced when you try to be how others view you. You're never going to be successful if you're trying to be another person. You need to be genuine to be an effective leader and manager. Mr. Smith commented on his experience being a shift manager, and working as a manager in Operations then switching to a Director of design. Since, he did not have the experience to get into the details of the design package. He had to confront challenges using a leadership approach in a lot of cases and manage more at a high level.

The panelists then provided leadership guidance and advise to the young attendees, including the following words of wisdom:

- Determine where you want to be in 5, 10 and 15 years. Then, determine the steps you'll need to take in order to get where you want to be. Sandy Stock mentioned that the development plan he created about 20 to 30 years ago has not changed significantly (i.e. he's followed his development plan fairly closely)
- Set goals. Use Smart, Measurable, Achievable, Realistic and Time-Bound goals.
- It's okay to copy shamelessly from good leaders. When you see good leadership, try to pick up on that person's traits. Also, in the same regard, learn from those who are bad leaders
- Be true to yourself.
- Look for leadership opportunities in your personal life and capitalize on these.
- A good leader responds to mistakes in the following manner:
 - If a mistake occurs, all eyes will be on you. It's how you respond to the mistake that everyone will remember.
 - Admit the mistake, internalize the lesson.
 - "You're always allowed to be smarter tomorrow than you are today".

7 Nuclear Energy: A Financial Discussion

Presenter:

- Fred Demarkar, Vice President, Engineering Strategy, Ontario Power Generation Inc.

Facilitator:

- Rahim Lakhani, AMEC-NSS

Summary

Mr. Demarkar presentation focused on the economic and environmental case for nuclear technology and other alternative energy sources which are available in Ontario (biomass, coal, natural gas, wind power, solar power and hydro). To start, Mr. Demarkar discussed the demand and generation make-up for Ontario. He noted that energy demand has been decreasing, with a sharp drop occurring in 2008. Since 2005, Ontario has minimized its coal use substantially, and increased generation in nuclear, natural gas and renewables. An increase in renewables is expected to occur in 2015 to offset the end to coal generation in the Ontario energy mix.

The presentation then went on to discuss the types of energy available in Ontario and the costs and benefits of each option. See summary table below:

Energy Option	Advantages	Disadvantages	Levelized Costs
Biomass	-Produces 90% less emissions than fossil fuels. -Produces carbon dioxide	-Biomass naturally decays to methane (large contributor to global warming)	-7 to 25 cents / kWh*

Wind Energy	<ul style="list-style-type: none"> -One large turbine reduces GHGs by 6000 t/year -Most easily assembled / removed energy source 	<ul style="list-style-type: none"> -Requires large open spaces -Maximum capacity factor about 40%, as a result back-up generation is required -Noise -Negative visual impact -Impacts wildlife 	9-13 cents / kWh (but higher if you include requirement for back-up generation construction)*
Solar Energy	<ul style="list-style-type: none"> -No fuel -No GHG -Availability very predictable -Can be setup anywhere 	<ul style="list-style-type: none"> -Expensive -Back-up generation is required 	41-47 cents / kWh (not including back up generation required)*
Hydro Energy	<ul style="list-style-type: none"> -Energy can be "stored" by pumping back to dam (can be used to smooth out fluctuations) -Long life for plants (can be operated for 80 years) -One of the cheapest energy options available 	<ul style="list-style-type: none"> -Results in significant environmental damage as it modifies wildlife habitats for damming 	-Levelized cost is 6-14 cents/kWh*
Coal Energy	<ul style="list-style-type: none"> -Can be built quickly at economic prices -Very abundant 	<ul style="list-style-type: none"> -Significant environmental impact -Top contributor to carbon dioxide worldwide 	-Levelized cost is 6.8-7.2 cents/kWh*
Oil/Gas	<ul style="list-style-type: none"> -Natural gas produces less CO2 than other fossil fuels -Produces no solid waste -Economic to build 	<ul style="list-style-type: none"> -Oil resources are depleting -pipe-line leaks, extraction and treatment cause additional emissions 	-Levelized cost is 7.9 - 9 cents/kWh*
Nuclear Power	<ul style="list-style-type: none"> -Built in 5-10 years and can last 60 years with refurbishment -No GHG -Small amount of high level waste 	<ul style="list-style-type: none"> -Politically controversial -Concerns over proliferation/terrorism -Spent fuel must be isolated and managed 	-Levelized cost is 5-7 cents/kWh (includes spent fuel management)*

*Subject to market conditions

The message of Mr. Demarkar's presentation became very clear that every energy option available has both advantages and disadvantages. As nuclear professionals, we can be advocates of nuclear energy by discussing energy options with our family and friends and by applying the safety values we learn at work in our everyday lives.

Key Messages for the Young Nuclear Generation:

1. Many different energy options are available and all have advantages and disadvantages. Financially, nuclear power compares favourably.
2. When asked what message he has for young nuclear professionals, Mr. Dermarkar noted the following:

“There are a small number of things that I keep at the forefront of my mind that I use to guide my actions on a day to day basis. One item that I use in making any decision is one of our 10 commandments of nuclear safety. That is to ensure all actions stand up to critical scrutiny. That includes all stakeholders, which includes a member of the public, a regulator, a finance person, a board of directors, my boss, my staff and my peers. I should be able to defend any decision I make to any of these important stakeholders. This forces you to make sure that you are very rigorous in your approach.”

8 Leadership and Self-Awareness – Discover the Leader Within

Presenter:

- Mark Bosley, Section Manager of Performance Improvement and Nuclear Oversight, Ontario Power Generation Inc.

Facilitator:

- Aubrey Au, Ontario Power Generation

Summary

Mr. Bosley started his presentation on leadership and self-awareness by sharing a personal experience where he had to demonstrate leadership in order to bridge a gap between two conflicting work groups. From this experience, Mr. Bosley started to describe how self-awareness becomes very important to being an effective leader. By knowing your strengths and weaknesses as a leader, you can build teams which make up for skills which you may not have. This becomes imperative to establishing highly productive working groups.

Mr. Bosley then asked conference participants to rank themselves (1-10) on the following questions:

1. How self-confident are you?
2. How aware are you of your moods and emotions?
3. When confronted with situations that are displeasing to you, how well do you take the time to think clearly about them before responding or reacting?
4. When you receive critical feedback, how well are you able to take that feedback and respond in a constructive manner?

5. How sensitive are you in relating to others' needs and helping them?
6. How skillful are you in building lasting relationships?
7. How well do you network with others and create networks of people with common interests?
8. How effective are you in leading teams?
9. Do others follow you voluntarily?
10. How persuasive are you in convincing others of your mutual interests?

In order to become more self-aware, Mr. Bosley challenged the audience to ask a colleague or a friend to perform the same ranking of you so that answers could be compared. In this way, your self-awareness and how you are perceived by others can be understood.

Key Messages for the Young Nuclear Generation:

1. Leaders manage people, Managers manage things.
2. Leaders know their strengths and use them, but they also know their weaknesses and build their teams to mitigate and confront those weaknesses. Without being self-aware, you won't know what skills you're missing and what people you need to fill the gaps.

9 Closing Remarks

To end the 2013 NA-YGN professional development conference, Mr. Bill Walker, Minister of Provincial Parliament for the Bruce – Grey – Owen Sound riding, provided closing remarks. Mr. Walker indicated the importance of nuclear power to his riding and to Ontario's energy future. Nuclear Power provides a significant amount of jobs to the Bruce area, but also plays a significant role in reducing electricity costs across Ontario. This is important for many local businesses that are relying on stable electricity prices to continue operation. Mr. Walker mentioned that Chapman's ice-cream has been able to stay in the same location since inception, but wondered whether this would be possible if electricity prices increased by 10, 20, or 25%. Mr. Walker concluded his discussion by encouraging all of the participants in the 2013 professional development conference to discuss their position on nuclear power with their own MPP. He mentioned that being active in provincial politics can make a difference.

10 Conclusion and Next Steps

In conclusion, the 2013 NA-YGN professional development conference provided all attendees with an opportunity to network with peers and leaders, and learn about new technologies in the industry. Professional development conferences such as the one held in Toronto, Ontario will continue to be organized such that further connections can be established amongst the young nuclear generation. NAYGN-Canada will be participating in 2014 Pacific Basic Nuclear Conference. Hope to see you all there!!



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