

Young people with passion – that is the future of nuclear power

We talk a lot about the merits of nuclear power in this blog. From economics and reliability to environment, we focus on why nuclear is now and should be an essential part of our future energy mix. But how do we get there? Again, we often talk about the challenges associated with public acceptance and how we can better position nuclear as the energy solution we all know it is.

But today we want to focus on something different. People.

We have been privileged to work in this industry for more than 35 years. Often it's hard to believe that this much time has passed since we were so excited to start our first jobs as a young engineers working on nuclear safety. Over the years there have been many challenges as the industry slowed, in part due to the accident at Chernobyl, in part due to the slowdown in energy demand growth in many industrialized countries, to the challenges of building capital intensive large projects into deregulated markets. But one thing has not changed; our passion for the industry – our passion for making the world a better place with clean reliable economic nuclear power. And we are not alone.

At a recent industry event, I spoke to many of our colleagues, many of whom have come out of retirement again and again simply because their passion for nuclear power as a solution to meeting our ever growing energy needs is simply impossible to extinguish. Some are well into their 70s and their enthusiasm is as strong as when they were in their 30s.

With nuclear power growing once again, it is time to ensure its continuity by instilling this passion into a new

generation of young people. It is the fuel that will ensure the industry continues to be innovative and reaches its full potential going forward. That being said it is important to focus on what is important to this new generation of engineers and scientists; what will keep them enthused and committed. It is hard to imagine millennials thinking of utilities or large industrial companies as the growth companies of the future. Rather they think of companies like Google, Facebook and Uber when it comes to large innovative exciting companies – or they believe in being entrepreneurs and starting their own tech start-up. This ad campaign by GE (one example below) is a brilliant one as it tries to show young people that it can indeed be exciting to be in this large industrial company – that not everyone has to be coding and developing the next app that puts hats on cats – but that to truly change the world, it is the future of things like transportation and energy that really matters.

I love it (There are a series of these ads, just go to YouTube and you can see more).

In the nuclear industry we have the problem of a gap in age. There are many people in their 50s through to retirement age that have been in the industry for decades, and then there is a new cohort of young people who have joined the industry in the last 10 years or less. This new young cohort has different work expectations than the older group. They expect to be able to find a place and make a meaningful contribution in a relatively short time. They are impatient and expect to change jobs many times in their career. They do not expect to join one company and stay there until they retire.

Yet we are an industry that believes that it takes years to learn and become an expert. We need people with 10 years plus experience and we need experts who continue to grow as they gain the experience needed to make a difference.

Therefore, as industry leaders we need to understand and address the desires and concerns of those just starting out. We need to remember that 30 years ago when we were younger we quickly developed into experts as new techniques were established and we did not have the benefit of people like us to show us the ropes. We were at the leading edge and we loved working in this exciting young industry. We learned on the job. We were excited with every opportunity and put our best into developing a product that we strongly believed in. These are the conditions we need to replicate for this next generation. We need to ensure they are actively engaged, play a strong role in new projects and in innovating as the industry moves forward. We need to provide them with the opportunities they crave to develop their passion for this exciting industry. Competition for these people will be fierce and we need to show that the nuclear industry is where they can truly make a difference in the world.

Sometimes as conservative engineers, or as some of the anti-nuclear activists may state – that it is not fair to leave problems for future generations to solve; we need to push back. As one quite learned colleague once said, why solve every issue – we need to leave some things for the bright young people following us to solve – because they will be smarter than we are and bring new thinking to old issues.

While many think the future of nuclear power depends on public acceptance, or solving the waste issue, or improving nuclear safety; it actually depends on building a passionate next generation of young people to take it in directions that none of us has even thought of yet. Life is about passion – so let's all work to bring out the passion in a new generation of nuclear people. The future is open to us – but only if we can attract the best and brightest people needed to make it happen.

If you are under 40 and have read this post – please comment explaining why you are passionate about working in the nuclear

industry.

It's not about being "advanced", it is ongoing innovation that will keep nuclear strong

This month in the United States, the Nuclear Energy Innovation Capabilities Act was passed to support federal research and development and stimulate private investment in advanced nuclear reactor technologies. All this good news about investment in the future made me think about how we use the words **advanced** and **innovation** in the nuclear industry. We first wrote about innovation in the nuclear sector two years ago. And what we said then still applies, in fact even more so, today.

When thinking about innovation in the nuclear industry, the discussion often centres around future reactor designs. However, this far too narrow focus tends to an argument that a so called **advanced** design is what is required to save the industry and implies that today's designs are just not good enough. When we have a technology that produces abundant economic and reliable electricity with very low carbon, all while being one of the safest on earth; what we have today is something worth celebrating. Yet it is not unusual for some supporters of nuclear power to use the idea that new advanced designs are the magic sauce that will make nuclear great again.



Futuristic Thorium Plant from the Norwegian series “Occupied”

I was recently at a meeting where it was noted by someone who had recently visited Havana Cuba, that without access to newer technology, cars in Cuba are stuck in the past. The Cubans have found ways to keep these old cars running well past their original lives as they had no access to anything newer. And while we may find these relics fun to look at, we certainly don't expect to be driving cars of this vintage. In fact, we know that while the cars of today basically look the same and operate in a similar manner to those of the 1950s, there is likely not one part that is the same as was made 50 years ago. Today's car is made up of different materials, is computer controlled, is way more efficient and much much safer. This is all due to years and years of innovation. The same applies to nuclear plants. What would have happened if back in 1955 or so people only talked about and invested in what would replace cars for individual transport (i.e. **“advanced”** cars meaning electric vehicles or even flying cars) instead of how to make them better? The thought of it is just ridiculous. Yet that seems to be a common view of nuclear – that all we are doing is keeping old outdated plants (like 1950's cars) operating until we get these shiny new plants of

the future ready for deployment. Nothing can be further from the truth.

While yes, it is important to research and develop new concepts based on specific needs, for example closing the fuel cycle or using new types of fuel such as thorium; it is not the case that this is what is required to continue to evolve safety, reliability and economics. For that we must continue to focus our efforts on improving what we have – innovating, taking the reactor designs available today – and making them better. Just like cars, there is abundant technology in any given nuclear plant that extends far beyond what kind of fuel we choose to burn. Implementing changes means using a large spectrum of new technologies that are being constantly developed as is necessary in every industry that wants to keep moving forward.

A great current example is the commitment in the US through the *“Delivering the Nuclear Promise: Advancing Safety, Reliability and Economic Performance”* initiative as the way forward to address falling prices of alternative generation options. As stated, this *“three-year program will identify efficiency measures and adopt best practices and technology solutions to improve operations, reduce generation cost and prevent premature reactor closure.”* Now this is what drives innovation.

Extending the lives of current reactors through better understanding of how materials age, first to 60 years and next possibly to 80 years, use of remote tooling to reduce dose and shorten outages, use of new technology in controls to improve reliability; all of these things require innovation.

When it comes to new build, there is innovation in methods to reduce construction time and improve quality such as computer engineering tools, modularization and even simple things such as moving platforms to replace scaffolding and on and on and on. This is innovation. And let's not forget about

commercial innovation. Innovative business models such as those used in Canada for refurbishment and in the UK for new build are critical to future industry success. This even includes models from places like Russia where they are working with foreign customers in ways thought not possible in the past. Will this all work? Some things will and some things wont, but this is innovation. It is messy, it takes time – and it continues to move the industry forward. And most of this innovation will apply to all reactor types, todays and those of the future.

I support the development of future designs– just not at the expense of making the public think our current designs have hit their ‘best before date’. I am concerned that the industry is risking too much on the importance of government money for advanced designs– i.e. here is a few hundred million dollars to study designs for the 2030s so shut up and focus on the future – then come back in 20 years or so when you have the next great thing. We cannot afford a mindset that says nuclear must stop until then as the world continues to build more and more gas plants and renewables. Every year these alternatives, wind and solar get better – and we need to do the same (and frankly we are).

The world needs abundant low carbon, economic and reliable electricity now if we are to replace coal and meet the needs of an energy hungry world. To meet the WNA target of 1,000 GW – 1000 new, 1000 MW nuclear plants by 2050 means we need to be building lots of new plants TODAY – not waiting until the next big thing comes around in a decade or two.

So, today’s nuclear technology must continue to move forward and demonstrate it is a technology of the future and that improvements are continuing to come that make every project better than the last. We need to better celebrate our achievements and we need to continue to invest in further innovation because there is no choice but to continue to get better.

Our strength is through our performance. And our performance continues to get better through innovation, each and every day.