

Learning the right lessons – a new paradigm to build a brighter future

Last month we talked about Fukushima two years on and focused our discussion on making sure we remember the real people whose lives continue to be severely impacted by this accident. This month, as we also remember Chernobyl on its 27th anniversary, I wanted to talk about the legacy of these events and focus on learning the lessons that are necessary to make the industry stronger and, most of all, improving its support amongst the public.

There have been a number of important positive reports recently that can lead to a better understanding of the consequences to the public of nuclear power.

The **first** being a study by Japanese researchers who found that internal radiation levels in the population around Fukushima are very low. *“Some 99% of residents of Fukushima prefecture and neighbouring Ibaraki have barely detectable levels of internal exposure to cesium 137, a group of Japanese researchers has found. Of the remaining 1%, all showed levels well below the government-set limit.”* Of interest, the levels are much lower than following the Chernobyl accident and indicate low levels of contamination in the food. This builds on the recent WHO study I reported on last month that says the risk of adverse health impacts from radiation to the Japanese population is very low.

Second, a study was published in the Journal of Environmental Science and Technology by Pushker A. Kharecha and James E. Hansen of the NASA Goddard Institute for Space Studies and Columbia University Earth Institute. They found that nuclear power has saved an estimated 80,000 lives annually – 1.84

million in all – since widely introduced in the 1970s and could save another 5 million if construction continues at a decent pace due to a reduction in air pollution. Nuclear power has also reduced carbon emissions by 64 Gt over the same period. This study is important because it quantifies the benefits of nuclear power being clean compared to burning fossil fuels. Its author, James Hansen is considered an environmental activist who has taken hard positions on a number of environmental issues.

And **finally** a new draft document by the US Environmental Protection Agency that *“would change its long-standing advice to state and local governments about how to limit long-term exposure to radiation after a reactor accident or a “dirty bomb” attack. By reducing the projections for how much radiation exposure is likely in the years after such an episode, the proposal could also reduce the amount of contaminated land that would have to be abandoned.”* This is critically important because finally there is starting to be a discussion on how to best respond in the event of an accident in addition to how to prevent accidents in the first place.

So why talk about reports such as these? Because I think they are a critical step to ensuring we learn the right lessons following Fukushima. This will lead to improving the response following accidents, and then ultimately starting a meaningful dialogue to reduce the public fear of nuclear power.

In the industry we often see the focus continuing to be on how to both reduce the risk of accidents in the first place and then ensure that even when there is an event there are no releases of radiation to the environment. These post-Fukushima lessons learned fall into three broad categories:

- Reducing the risk of an accident by building better protection against such hazards as earthquakes and tsunamis
- Ensuring continued cooling of the reactors following an

event through the use of portable accessible temporary power to replace safety systems that may have been damaged or destroyed on site; and

- Better Severe Accident Management Guidance (SAMG) so that even after a severe accident there would be no releases. This includes such protections as hardened vents and recombiners to lower the risk of hydrogen explosions and various sorts of strategies for in-containment retention of any melted core.

But while this is all good, it is not going to get us to the solutions we need as it only goes part of the way there. We also need to demonstrate that we have clear and effective strategies so that even if there are releases we can protect people and keep them safe. This means a better understanding of the real health risks of radiation exposure so there can be clear guidelines on when to evacuate and of even more importance when to allow people to return. And there also needs to be clear guidelines for remediation of land following any amount of contamination and how to go about it.

The latter is absolutely necessary because when it comes to public safety and hence public support, the real issue with nuclear power continues to be fear. While most people would probably accept that nuclear power provides safe and clean electricity under normal operating conditions; the real fear comes from the belief that even if the risk is small, the consequences of a nuclear accident are too severe to be tolerated by society. And as long as this belief holds, no matter what the industry does to reduce the risk of an accident, the fear will never change. The more emphasis we put on trying to make it almost impossible for there to be an accident with releases, the stronger the belief that we must do this because the consequences of releases are just too severe to even contemplate.

This makes nuclear a hard sell to the public because the consequence is seen as real while the risk is less relevant.

People evaluate risk by focusing on the severity of consequences and considering their perceived control over them. Some people are afraid of flying and not driving even though we all know the risk of dying in an auto accident is significantly higher than in a plane crash. Why? In part because we all believe that we are good drivers (control) and even if we have an accident we can survive because not all individual car accidents kill people (severity). Therefore we can convince ourselves that we likely won't have an accident and even if we do, it won't be a bad one. On the other hand, we may fear flying even though we know the risk is small because we also know that if we are the unlucky ones to be on the one plane that does go down, then we will surely die. And so it goes for nuclear. While safe most of the time, the public believes that IF there is an accident our communities will be destroyed by contamination and we will either die or even worse our children and grandchildren may also die from cancer in the future.

This is why need a change of paradigm. What studies such as the ones above actually show is that:

- Safely operated nuclear plants save lives every day by not polluting our environment as does burning fossil fuels. These are real lives saved and the numbers are big.
- Radiation is not as dangerous as most people think especially at low levels of exposure. While it is a carcinogen, it is a far less potent carcinogen than many others we see in our everyday lives from many forms of pollution. In fact we use radiation in medicine to save lives by both diagnosing illness and treating diseases such as cancer.
- Following really bad accidents such as Fukushima; where the entire area was devastated by a huge natural disaster that made it increasingly difficult to manage the nuclear accident at three reactors at the same site;

we have still been able to protect people from radiation. The result being that to date not even one person has died from it; and studies show the risk of dying in the future to be too low to measure.

But we also know that through extreme fear people have died being evacuated in haste; that people have had their lives disrupted with extreme fear of not knowing if they will have health impacts or not; and that governments do not have clear and effective guidelines for how to remediate following such an event leading to fear causing irrational decisions that actually further fuel the fear. And that is why we need more effort on managing consequences and improving accident response.

So let's learn the right lessons and start the hard work of changing the paradigm. Let's demonstrate to the public that they don't need to be afraid; that nuclear accidents are very rare; that even when the next accident happens (and it will) that we can effectively keep the public safe from health impacts and protect their homes and their families.

Let's explain to the public that while the risk of a nuclear accident is much lower than being in a plane crash (and air travel is very safe), so are the consequences. Because we also know that if we are in a plane accident we will most likely die. What we need to know is that even after the worst possible nuclear accident we will likely not die – and that our families and children will not suffer serious health impacts.

This is the big change. Understanding that the risk of a nuclear accident is low and the **consequences are indeed manageable** is essential to reducing the fear that is so strong amongst the public. And only without fear can nuclear power fully achieve its potential as the way forward to producing clean abundant energy for a better society. Now this would be a great lesson learned from Fukushima.