
Rethinking nuclear energy



The terrible and devastating earthquake and tsunami in Japan did not just take a toll on human lives, it also took a toll on our future in terms of energy development, particularly with nuclear power. Paul Kleindorfer, INSEAD Professor of Sustainable Development discusses the implications with INSEAD Knowledge.

Knowledge: Obviously the human toll was by far the worst part of this disaster, but looking forward a little bit, there's the immediate problem of radiation and the impact on alternative energy. Can we look at what the impact is of any radiation clouds and the ensuing problems for the world?

Kleindorfer: The problems resulting at the Fukushima reactor site are going to be, I think, fairly significant. They are classed currently as a 'level 6' on the International Atomic Energy INES Scale of nuclear incidents. The only class 7 incident that we have had was the 1986 blowout at Chernobyl so it's a very serious matter. This is an extremely rare event – perhaps one of five such events that we've had in history, in which paleoseismologists – that is people who go after ancient events - can track and go back 5000 years. It's difficult to find very many 9.0 earthquakes. Remember that this is 100 times more significant in terms of ground shaking motion than a 7.0 earthquake - and 7.0 earthquakes do a lot of damage. We saw the 1999 earthquake in Taiwan, the 7.3 earthquake in May in China – those do a lot of damage. This

is 9.0, which is somewhere between 50 and 100 times greater than that earthquake and that's a very rare event.

Knowledge: Japan actually did have state-of-the-art technology. Earthquakes are not unknown here – they must have been prepared. Could they have been more prepared?

Kleindorfer: There were reactors that were put into place in the 1960s, and what will be said and what has been already exhaustively said, is that the containment procedures were not as robust, as resilient as later containment procedures were. The original tradeoffs that were made in terms of cost vs. safety were made more in the direction of cost. It will now be asserted at least and should have been (before). In response to your question, Japan has a very advanced state of readiness, knowledge and ability to respond to nuclear accidents and incidents and it is certainly one of the best in the world. The ability to respond to a 9.0 earthquake, the ability to respond to an ensuing tsunami and to do so with technologies, will now be asserted as having not been 'up to snuff' with respect to the proper safety cost tradeoffs. Those are the issues that are going to be examined in some detail.

Knowledge: Going forward, looking at alternative energy sources to fossil fuels – nuclear energy had been touted as the thing that could actually be the economy of scale for the amount of energy that's needed in the world. What is this accident going to have for the future development of nuclear energy?

Kleindorfer: I certainly think that up until the Japan earthquake there was a huge renaissance – a belief that the nuclear industry all over the world was going to have a significant increase. The number of installations started in the United States and elsewhere was growing, but nonetheless the whole spirit of it was a renaissance in this area. You saw it in the stocks of the companies that were involved in these areas; you saw it in the risk management. That's pre-Fukushima, I think post-Fukushima we're going to have a very interesting discussion and it's going to involve questions, first about safety and whether indeed the cost and safety margins were sold short in terms of safety. We now see ourselves with a real problem as to indeed whether nuclear technology is just too complicated for normal mortal man to control over a period of fifty years which is the life of one of these institutions, on an ongoing basis without giving rise to huge risks for third parties. My own belief is that there are regions of the world, e.g. France and many parts of the United States, where that argument has considerable

sway because of the problems of failing to attend to climate change issues and fossil fuel dangers, all of the problems of mining coal and all of the rest of it, that have their own mortality indices. All of those problems have to be put on the scale, and you put them on the scale, and I think that nuclear power does have a proper place as part of an efficient portfolio of energy technologies.

Knowledge: This gives a whole new meaning to risk management – I see that industry is changing a great deal – not just in tending to the risk but in paying for the risk – can you make any kind of comment about how that industry is likely to change, both in management of the risk and paying for the risk?

Kleindorfer: This is all giving rise, I think, to a healthy reassessment of how it is that strategic risk management for companies should take place against a new tone of humility given the complexities and interdependencies of the global economy. That’s what I think is in front of us, and I think the risk management parts of that are going to be put through a real scrutiny as we start to look at some of these events of the past year and ask ourselves the direct question ‘what do we really know about how able we are as a company (I’m thinking from a company’s perspective) or as a society?’, ‘what do we really know about our resilience and the ability to respond to events that we haven’t really expected until now but that we are reminded of very forcefully through the processes and events that are taking place in Japan before our very eyes these days?’

Knowledge: Going forward now, let me end by asking you for your assessment of the outlook for nuclear energy as part of a portfolio of alternative energy to fossil fuel?

Kleindorfer: I expect Japan, China and the Far East to continue on their path of nuclear power development to make the case that the mark one, or the earlier versions of those reactors, are not as the later versions of those reactors, that they are much more resilient and robust, and that this is in fact an important part of their energy portfolio going forward. I expect that in the US where there is already considerable resistance in certain parts of the country, that anywhere approaching a seismic zone (that includes the mid-west, the great Memphis area - which had one of the greatest earthquakes around 1811, 1812 - California - any area which is seismically active), we’re going to see a halt for a while (perhaps for a long while) to new reactors and even to the use of nuclear power in the portfolio. But we’re at a level of less

than five percent production of global energy through renewable energies at this point so it's going to be a long while before we're in a position to replace the prospect of nuclear as low carbon production as a facility, so this is an area of great uncertainty going forward. Regionally there will be big differences and some very difficult questions involved in this both for business people and for regulators, but also for the citizens of the planet to come to grips with this huge trade-off that we have between, on the one side, the risks of the carbon producing fossil fuel plants and of the steady rundown of our fossil fuel supplies, and on the other side the evident dangers of relying on very complicated technologies such as nuclear. How that is to be resolved is yet to be seen but it's of course going to be, if not the major topic of the energy area, certainly one of the crucial energy topics and policies for the next five years.

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For more on the subject of the response and impact of the earthquake and tsunami, please [click here](#) to view INSEAD's Humanitarian Research Group's review.

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