

## The Fukushima Challenge: Shaping a Sound Response

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*At the IAEA's post-Fukushima ministerial conference, the nuclear industry was represented by WANO Chairman Laurent Stricker and WNA Director General John Ritch. Stricker outlined WANO's global safety agenda. Ritch spoke on Fukushima's larger significance.*

Ladies and gentlemen:

Thirty-two years ago, an American movie called “The China Syndrome” popularized the image of a nuclear power plant as a catastrophe waiting to happen. The actor Jack Lemmon won an Academy Award as a whistle-blower saving the world from a dangerous technology controlled by a gang of moral and environmental thugs. Unfortunately, time and events have done too little to diminish that dire impression in the public mind.



### ***The Real China Syndrome***

Since then, our world has become increasingly aware of another China Syndrome that is both more real and far more serious. It can be seen in a satellite photo of the world's most populous nation and its burgeoning economy under a vast cloud of pollution.

That cloud and others like it – a symbol of the consequences of world economic development today – signify both severe health damage to citizens below and a dangerously thickening canopy of greenhouse gases above. These clouds now hover over our planet's future.



The world's response to this menace has been slow. But in the past decade, we saw the beginnings of action as dozens of nations, representing much of humankind, reviewed their policies and came inexorably to the same conclusion. For reasons of energy independence, human health and environmental responsibility, they determined that nuclear power must play a central role in their national energy strategies for the 21st Century.

Against that background, the calamity at Fukushima compels us to assess three questions:

- What have we learned from this event?
- How should the custodians of nuclear power – in government and in industry – respond?
- Has Fukushima significantly changed the prospect of a worldwide expansion in nuclear power?

## *What We Have Learned: Known Truths Underscored*

Fukushima has been educational primarily in reinforcing truths we knew already – about nuclear technology and public perceptions.

1. Inevitability of Nuclear Events. First and most elementally, nuclear accidents happen. This is not a trivial observation. Even as we strive for impeccable management of nuclear facilities, we can never have confidence that we will succeed absolutely. Nor can we expect the public to believe that we have. We must concede that human beings make mistakes, individually and collectively.

This in itself is not debilitating. Our problem lies in how this reality is construed. Right now, most people continue to assume that nuclear power carries the low probability of a highly lethal event. While Fukushima may offer strong evidence to the contrary, few in the public have perceived it thus. The future of nuclear energy will rest on fragile foundations as long as the perception of heavy risk to human well-being remains. Our aim must be to explain to the public that even worst-case nuclear events are not only extremely low in probability but also increasingly small in consequence as nuclear technology continues to advance. This is true and must be presented believably.

2. The Universal Necessity of Reliable Backup Cooling. Second, every nuclear reactor requires reliable post-shutdown cooling. Some advanced reactor designs will soon accomplish this using the natural physical principle of convection; others, equally advanced in safety and efficiency, will not. Thus, for as far into the future as we can see, post shut-down heat removal for much of the world's reactor fleet will continue to depend on external power. Backup cooling systems are a critical non-nuclear aspect of nuclear technology, and Fukushima has imprinted on us indelibly how essential this function is to the safety and future of nuclear power. Our commitment to ensuring its reliability – in every reactor everywhere – must be absolute.
3. The Essential Safety of Nuclear Power. Third, despite widespread impressions to the contrary, Fukushima underscores the essential safety of nuclear power. This was truly a worst-case nuclear event. Yet, even with substantial releases, so precautionary are Japan's safety standards and evacuation policies that it is still reasonable to predict that not a single radiation fatality will result from Fukushima, even amidst a natural disaster that has claimed some 25,000 lives. This is not a statement of complacency or indifference, but of simple fact.

Nor should this come as a surprise. If Fukushima were to produce a radiation fatality, it would be the first ever to occur in the nuclear power history of Japan, America, or France – nations that account for half the world's power reactors. Indeed, apart from Chernobyl, WNA is not aware of a single radiation fatality that has occurred in the entire history of nuclear power, spanning some 14,500 reactor-years of nuclear electricity generation in some 30 nations worldwide. This impressive truth remains colossally unappreciated by the public and the media.

Meanwhile, we know that in the three months since Fukushima several thousands of people have died worldwide either in the mining of fossil fuels or from the health consequences of fossil combustion. Viewed in that context of real, large-scale and ongoing lethality, what is now commonly called the “nuclear disaster” at Fukushima invites a less hyperbolic description.

4. Media Frenzy is Today’s Norm. A fourth truth from Fukushima is that present-day media coverage is more inclined to frenzy than to balance in any event involving nuclear energy. In a world of competitive, round-the-clock, televised news, there is clearly a compulsion to cover any nuclear story as the industrial equivalent of a sex scandal. In today’s context, the terms “melt-down” and “radiation leak” are too titillating to resist, and we must expect this tendency to persist so long as we have failed to demythologize nuclear energy. Achieving that would mean creating much wider public understanding of radiation as a ubiquitous natural phenomenon and of the limited consequences of radioactive release likely to result even from worst-case events.
5. Weak Support Where Nuclear is an Ideological Issue. A fifth reality underscored by Fukushima is the bizarre weakness of support for nuclear power in a few technologically advanced European countries. As Europe’s leading economic power, Germany is particularly remarkable. Acting in the name of environmentalism, Germans will now begin to burn more lignite, coal, and gas, while reverting when necessary to importing nuclear power. As the German government retreats into a fuzzy cloud of fantasy about the future potential of renewables, one may reasonably ask how Germany intends, realistically, to fulfil its environmental obligations to its EU partners and to the world.
6. Solidity of Support in Many Key Nations. A sixth truth is the solidity of policy support for nuclear power in most countries now using it. This is especially true in those countries planning major programs of nuclear new-build, led by China, India, Russia, Britain, South Africa, and South Korea. In other major nations too, including Brazil, France, Poland, Ukraine, Canada, and the USA, we see little evidence of lost momentum.
7. Thinness of Public Understanding. A seventh and countervailing reality is that public understanding of nuclear power in many countries remains thin and readily susceptible to misimpression. Where we see constancy in policy support for nuclear power, it relies mainly on consensus among policymakers and on nuclear power not becoming, in the country’s politics, an ideological litmus-test and political football as it has in Germany.

Nonetheless, Fukushima has plainly cast a far-reaching negative effect. In nations around the world, the common impression that Japan’s natural catastrophe was compounded by a manmade disaster has weakened public confidence in nuclear power. Once again we have learned that “radiation” ranks high as one of the most potent and evocative words in any language

8. Continuing Power of the Chernobyl Myth. A closely related truth, vividly underscored by media coverage of Fukushima, is that the myth of Chernobyl retains a powerful hold on public consciousness and remains a main journalistic reference point with respect to the perceived dangers of nuclear power. I refer to the “myth” of Chernobyl because so few people understand that the Chernobyl reactor that exploded and caught fire in 1986 bears little relevance to any reactor now operating and because the real, scientifically analyzed consequences of Chernobyl differ so drastically from the public impression.

In truth, there is a strong scientific consensus that the radiation fatalities from Chernobyl are strictly limited – to several dozen “liquidators” severely irradiated while fighting the reactor fire and to a small number of public persons in the Chernobyl vicinity, statistically thought to be some 16 in number, who should be assumed to have died from thyroid cancer caused by radioactive iodine emitted by the burning reactor.

As many Chernobyl authorities will attest, the allegation of any other radiation fatalities depends solely on the so-called “collective dose” hypothesis, which is scientifically unfounded and also defies common sense. Those able and willing to say so include the chairman of the UN Scientific Committee on the Effects of Atomic Radiation and the head of the Chernobyl Tissue Bank in London. But little of this is commonly understood.

Also misunderstood are the ratings on the International Nuclear Event Scale. When Fukushima reached level 7 as a “Serious Accident” on the INES Scale – a number theretofore assigned only to Chernobyl – these misunderstandings coalesced, and millions around the world concluded they were witnessing a human catastrophe of immense proportions.

9. Nuclear Economics Remain Paramount. A final truth, underscored as we contemplate the potential worldwide policy and regulatory response to Fukushima, is that the economics of nuclear power remain crucial to its future. It is well known that, compared to other major power technologies, nuclear is expensive to build and cheap to operate. In the past decade, even amidst growing confidence in nuclear power’s worldwide future, we have seen the industry struggle to limit capital costs while venturing to build the next generation of reactors. In this context, it is crucially important that regulatory actions taken in response to Fukushima have demonstrable benefit arising from any increased costs.

## *Response by Government and Industry: Using the Institutional Tools at Hand*

How shall government and industry respond? In a climate rife with the impulse to “do something”, we can identify several principles against which to gauge any proposed response.

1. Sound Institutional Framework for Response. First, we should recognize that we stand well-equipped institutionally to examine the event at Fukushima and to apply lessons from it. At the national level, nuclear regulators are already at work, and internationally the Agency and WANO represent precisely the mechanisms we need.

For its part, WNA will do all possible to support these lead actors. With a membership including not only utilities but also the companies that design, equip and build reactors, we stand ready to coordinate participation by experts from these companies in any Fukushima-response by the Agency or by WANO.

2. Focus Solely on Substantive Measures. Second, Fukushima-response should focus solely on substantive measures promising real safety gain. Several essential topics now bear analysis.

Top among these is maintaining, at every reactor, a defense-in-depth backup system to sustain post-shutdown cooling under all possible circumstances. This includes measures to regain AC power in the event of blackout, to flood-proof diesel generators, to ensure adequate battery coping times, and to secure fall-back water sources and pumping systems.

Fukushima also requires a new focus on how best to optimize safety and efficiency in spent fuel management.

On emergency response, a proposal worth deliberation comes from the head of the Institute of Nuclear Power Operations in Atlanta, who envisages an international emergency response unit, geared to rapid, expert-led action using pre-staged interoperable equipment. This concept will undoubtedly meet skepticism. But the very act of exploring the question of international assistance could serve as a valuable stimulus to need-analysis and to emergency preparations at the national level.

As to implications for reactor technology, Fukushima may conceivably produce new insights. While reactor design has advanced considerably since the Daiichi plant was built, it is well possible that analyzing the dynamics of what occurred in the hydrogen explosion, fuel melt and loss of full containment will inform reactor designers as they plan for the future.

3. Avoid Purely Symbolic Gestures. Third, Fukushima-response should avoid symbolic steps offering little real gain. A case in point is the initiative whereby the UN Secretary General will convene various UN agencies this September in Manhattan to engage on the subject of preventing another Fukushima. Given the IAEA’s pre-eminence as the UN’s well-established means to bring expertise to bear on such objectives, it is difficult to see how this vaguely conceived conference can be more than an invitation to public posturing and political mischief.

In contrast, the “stress tests” now being promoted, both in Europe and beyond, can combine symbolism with substance. This initiative has already served to broaden safety consciousness

to include new emphasis on natural disasters, and it also represents a potentially constructive step toward harmonizing international standards for power plant design. We must aim to ensure that, in practice, the outcome of these stress tests is genuinely effective safety gain.

4. Review and Restart on Public Perception. Finally, we should re-think the question of public perception of nuclear energy. In the quarter-century since Chernobyl, industry and government have operated on the paradigm that ever tighter standards on nuclear safety and an ever longer record of safe nuclear performance would build public confidence in nuclear power.

This was not misguided, and was to a considerable degree successful. But it was incomplete. Fukushima revealed in harsh light that both the media and the public have gotten only part of the message. The nuclear industry is still, in essence, regarded as safely managing Doomsday machines. In that concept, the word “Doomsday” will always trump the assertion of safe management.

Indeed, regulators and industry have arguably played into the image of nuclear power as uniquely dangerous by applying radiation standards that tend to be far more restrictive on nuclear power than those applied in medicine, in non-nuclear industry, and even in determining where people may live. While some take pride in this practice, its implication is that the radiation from nuclear power, no matter how limited, is somehow different and more deadly.

We must act to change this widespread conception. If electricity is a vital public service and not simply a market commodity, if the issue of how we generate electricity now bears urgently on the future of our Earthly environment, and if our scientists and policymakers share conviction that nuclear power must play a central role if we are to avert radical climate change, then there exists a compelling public interest and a policy of *laissez-faire* will not suffice. We need to focus rigorously, in a cooperative effort involving government and industry, on the question of public understanding.

Facts favour nuclear power. The challenge is how best to use facts to alleviate fears, instil confidence and enhance awareness of nuclear power’s environmental value.

In this quest, WNA has value to offer and would willingly partner with others. Our Public Information Service offers an encyclopedic range of up-to-date papers, including a portfolio of short papers specifically designed for schools. These offerings are hit at the encouraging rate of once every 5 seconds. Their limitation is that they are delivered passively, reaching only those in search of knowledge and only in English.

Building real public awareness will require focused educational projects in countries where energy ministries and nuclear enterprises are prepared to commit resources to strengthen the foundations on which nuclear power operates. Such projects could prove supremely cost-effective, especially by employing the multiplier effect of educating educators. Each project would begin with a careful look at what students are learning, not learning and mis-learning about nuclear power. For any such project, WNA can provide reliable resource material, but others must adapt and apply it in diverse social, cultural and educational settings.

## *An Unchanged Reality: The Urgent Worldwide Need for Nuclear Power*

As we shape a response to Fukushima, a basic truth is that this event has done nothing to alter the stark realities that led so many different nations in recent years to a common nuclear path.

- Global population will continue its explosive growth – from 3 billion in 1960, to almost 7 billion today, and now upward toward 9 billion by 2050.
- World electricity demand will continue to grow even faster, tripling by 2050.
- Earth-systems science will continue to warn that we must cut carbon emissions by 80% – or risk radical changes in Earth's climate posing a threat to all civilization.
- And it will continue to be true that our world can achieve a clean-energy revolution only with a vastly expanded use of nuclear power.

These realities remain as momentous and fundamental as they were before Japan's historic natural disaster. Thus, for the custodians of nuclear power, our duty too remains as it was – to find the means that will enable this immensely valuable technology to play its central and necessary global role.

The lesson of Fukushima, from the event and its worldwide reverberations, is that our response must combine ever safer practice with ever better public education. Without both, the foundations of nuclear power will remain dangerously fragile, and so too will the prospects for the worldwide clean-energy revolution on which our planet's environmental future so crucially depends. Thank you.