

6. Insufficient mitigation of short and long term risk associated with nuclear generation and waste disposal.

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Nuclear energy can and could competitively satisfy base-load electricity demand in most developed and developing countries without increasing carbon footprint. Yet, incidents such as Fukushima 2011, Chernobyl 1986, and Three Mile Island 1979 have highlighted the risks of nuclear energy. No long-term solution to the storage of highly-radioactive nuclear waste exists. No existing treaty or organization today can regulate nuclear weapons' proliferation without severely limiting or denying developing countries' access to civil nuclear power.

Can the environmental and security risks of nuclear power be adequately addressed, or will they outweigh the economic and climate benefits of nuclear power? Countries in a post-Fukushima world have to answer to an increasingly skeptical citizenry: Germany, Italy and Switzerland have decided to abandon nuclear power within the coming 10-15 years, and Japan's wealthiest man, Masayoshi Son, is making it his personal mission to incentivize replacement of nuclear energy with renewables. On the other hand, China, France, Russia and the United States have taken a clear stance in favor of nuclear energy. Whether or not we can mitigate the risks of nuclear energy has become a public debate and its answer will be determined not only by economic reality, but also by public opinion.

From an economic point of view, nuclear is the best viable alternative to fossil fuels (Bratt, 2011). Yet, inherent risks remain unaddressed, and in the case of Fukushima and Chernobyl, 'the risk is socialized; the taxpayer pays, not the company, not the electricity consumer' (Bryant, 2011). In addition, the risk of nuclear waste remains unsolved and is currently outsourced to future generations. Furthermore, switching from civil nuclear power to weapons production today is relatively easy.

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Risk assessment and management approaches to nuclear energy: A serious nuclear incident is statistically estimated to occur on average every 10,000 reactor years. At the current number of more than 400 nuclear reactors worldwide, this amounts to an incident every 25 years. Nuclear skeptics use this method of risk assessment to forecast increased risk from nuclear operations in the future, based purely on the fact that more reactors are likely to be constructed. However, Brownfield (2011) pointed out that such linear extrapolation does not account for new technologies, such as Thorium reactors which have the potential to significantly reduce operational risk, waste, and which are harder to be weaponized. The same applies to new methods of processing nuclear waste. Nuclear pragmatists point to the ability of nuclear energy to provide cost-effective energy security by reducing import dependence, a risk in its own right. At the end of the day, perspectives inevitably shape nuclear risk management and assessment approaches.

What now? As long as security concerns do not make it an international issue, whether nuclear energy is pursued or not remains a question for individual countries. The operation of nuclear plants involves undeniable risks, and byproducts of modern-day nuclear reactors are highly toxic and remain so for a long time. However, nuclear power can provide stable, carbon-neutral, long-term energy supply. The question of whether to prioritize operational risk, economic risk, supply risk, or climate risk will inevitably shape the outcome of any risk assessment. Public perception is and will continue to be a driving force in assessing the potential of nuclear energy. 'Nuclear power is fundamentally fairly safe, but people don't see it that way' (Rizov, 2011). Risk assessment will remain a complex affair, and should be focused on objective, multi-dimensional analysis of the risks and benefits of nuclear technology. This is particularly important when taking into account that public perception of nuclear energy is based on over 30 year old technology, and thus inherently negatively biased since new reactor types and safety measures are not yet deployed.