

Five years ago today, Japan was hit by a huge earthquake and tsunami, resulting in the Fukushima reactor meltdowns. Where do things stand today? Here's a quick wrap-up:

Compensation. TEPCO, the utility operating the reactors, now [estimates](#) that it will pay \$56 billion in compensation to victims.

Clean-up. The plant has been stabilized, according to the [Washington Post](#). TEPCO has a plan to construct a 1500 foot frozen ice dam around the plant to keep radioactive water from contaminating the groundwater. Government regulators have rejected the plan and are considering other options. No one knows what to do with the highly radioactive reactor itself, or even with the 700 million cubic feet of contaminated soil that has been collected around the area. The full clean-up may take forty years.

Nuclear industry. In August, Japan restarted its first nuclear reactor since the accident. By the beginning of this month, the third reactor had been restarted.

Cost-Benefit Analysis of Nuclear Safety. How much would it have been worth spending to prevent the accident? The answer is: a lot. A conservative estimate would be \$200 million extra at the affected facilities.

Here's a very rough calculation: It looks like total costs, including clean-up, are going to be in the neighborhood of \$100 billion. Suppose we consider the earthquake and tsunami to be a one in 10,000 year event. (The risk was probably ten or twelve times higher, but I'm being conservative.) Then it would have been worth spending \$10 million per year of reactor operation, or figuring a 40-year reactor life, \$400 million more to protect the reactor against the risk, or maybe around half of that with discounting. In retrospect, I'm sure TEPCO wishes it had spent the money then, rather than paying the piper now.

One lesson is that even risks that seem tiny can be worth spending serious money to address if the consequences are large enough. A problem in the U.S. is that the companies running reactors benefit from liability caps, so almost all the tab will be picked up by the government. This obviously decreases their safety incentives. That puts more of the burden of assuring safety on the NRC, which hasn't been the most vigilant of regulators.