



Policy Brief

Stanford Institute for Economic Policy Research

Does the US Subsidize Nuclear Power Insurance?

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The US House of Representatives passed the "Price-Anderson Reauthorization Act of 2001" (HR2983) on November 27, 2001. It now waits for Senate action. The Price-Anderson Act (PAA) amendments to the Atomic Energy Act of 1954 will expire in August 2002. HR2983 extends this legislation through August 2017. The PAA places a cap on insurance liability for off-site damages at approximately \$10 billion for both Nuclear Regulatory Commission (NRC) licensees (including nuclear power plant owners and other nuclear power industry participants handling radioactive materials) and Department of Energy (DOE) contractors. This is done by

- (1) indemnifying all suppliers of goods and services to the nuclear industry by holding the licensees and contractors responsible for all off-site damages and
- (2) by indemnifying the licensees and contractors above the PAA cap.

While the current PAA covers existing licensees and contractors, new and renewed licensees and contractors (including environmental restoration contractors) would not be covered after August unless the Senate passes a reauthorization bill that can be harmonized with the House version. Much of the Senate action in the current Congress has been tied to broader (and more controversial) energy legislation, slowing action. Also, Senate Majority Whip Harry Reid (D-Nevada) strongly opposes PAA reauthorization because he believes that it would lead to more nuclear power plants and more spent nuclear fuel, which the DOE hopes to bury in Yucca Mountain, Nevada.

Similarly, opponents are attacking reauthorization as a "subsidy" to the nuclear power industry. They base their argument on the findings in Jeffrey Dubin and Geoffrey Rothwell, "Subsidy to Nuclear Power Through Price-Anderson Liability Limit," *Contemporary Policy Issues* (July 1990), and on later work (based on Dubin and Rothwell): Anthony Heyes and Catherine Heyes, "An Empirical Analysis of the Nuclear Liability Act (1970) in Canada," *Resource and Energy Economics* (2000).

It is time to reexamine the Dubin and Rothwell approach. There are several interrelated issues. First, does the US government provide a subsidy to the nuclear power industry? Second, if there is a subsidy, how large is it? Third, what might be the consequences of allowing the PAA to lapse?

January 2002

Does the PAA provide a subsidy?

The PAA has the dual purpose of "protect[ing] the public and ... encourag[ing] the development of the atomic energy industry" (42 USC 2012i). It protects the public by compensating for personal injury and property damage with two layers of insurance: The first layer is equal to \$200 million in private insurance provided by a consortium of insurers through the American Nuclear Insurers. The second layer is a form of industry self-insurance by which nuclear power plant owners would contribute up to \$88 million per reactor after an accident at any nuclear power reactor. With 103 operating units, these two layers provide \$9.3 billion in coverage. (This amount increases with inflation.) The PAA provides for the consolidation of all claims against the licensee or contractor in a federal court, which would compensate each victim in proportion to total losses. (PAA does not cover any on-site damage.) Above this amount, the PAA requires Congress to "take whatever action is determined to be necessary (including approval of appropriate compensation plans and appropriation of funds) to provide full and prompt compensation to the public" (Section 170i).

Dubin and Rothwell unfortunately accepted the language (and challenge) of the NRC's 1983 report, *The Price-Anderson Act: The Third Decade*. There, the NRC concludes in Appendix G, "the (PAA) subsidy is real but any estimate of its magnitude with respect to any period is open to criticism" (G-12). Dubin and Rothwell attempted to estimate the magnitude of the "subsidy" without questioning whether there was a "subsidy."

In economics, a subsidy is a "payment made by the government (or possibly by private individuals) which forms a wedge between the price consumers pay and the costs incurred by producers, such that price is less than marginal cost" (The MIT Dictionary of Modern Economics, 4th Edition, 1992). Here, the "consumers" (of insurance/indemnification) are firms in the nuclear power industry and the "producer" (of insurance/indemnification) is the federal government. However, there is no subsidy payment unless there is an accident

and damages are above the PAA liability limit. Because there is no payment, there is no "direct subsidy," although there is a potential (or expected) subsidy.

How large is the PAA potential subsidy?

Dubin and Rothwell attempted to calculate the size of this expected subsidy by modeling the probability of a large-scale nuclear accident with damages above the PAA cap, which stood at \$7 billion after the last renewal of the PAA. To calculate the expected subsidy, they relied on two sources of information: (1) the insurance premiums charged by the American Nuclear Insurers for the first layer of coverage and (2) an estimate of the probability of an accident with damages above \$10 billion. Using the logistic probability distribution, they concluded that the expected subsidy was \$22 million per reactor-year. Later, Heyes and Heyes (1998) corrected this calculation by including terms that Dubin and Rothwell omitted. This reduced the expected subsidy by a factor of 10 to \$2.3 million per reactor-year. However, both calculations depend crucially on assumptions concerning

- (1) the probability distribution,
- (2) the probability of a worse-case accident, and
- (3) the damages associated with a worse-case accident.

Opponents of the PAA have used these estimates to argue for the ending of the "PAA subsidy" to the nuclear power industry. Without questioning the probability distribution assumption, they have followed the advice in Heyes and Heyes (2000, p. 99): "The implications for how anti-nuclear lobbyists should go about persuading regulators and governments that the extent of the subsidy which current law confers is unacceptably high are that it is likely to be more fruitful to 'argue up' consequences rather than probabilities." This has been done by claiming that the costs of a Chernobyl-like accident in the US would be more than \$300 billion, without any discussion of the probability of such an accident in the US. See, for example, www.citizen.org/cmep. By focusing on one assumption (consequences) without considering other assumptions (probabilities), the anti-nuclear argument is incomplete.

What are the consequences of letting Price-Anderson expire?

Although representatives of the "fledgling" nuclear industry claimed in 1957, when Price-Anderson passed, that they would not get involved with nuclear power or weapons without indemnification, the problem with nuclear insurance is rooted in market failure. As the most recent Economic Nobel Laureates have argued, in markets with asymmetric information, price is not necessarily equal to marginal cost. There is no guarantee that private insurance markets will develop to cover all potential damages from hazardous activities. Firms that enter the industry (including those involved with the environmental restoration of DOE sites) will buy as much insurance as offered by private markets and self-insure for damages above their policy limits. In those sectors of the industry considered "ultra-hazardous," a strict liability rule would be applied, i.e., they would be responsible for off-site damages even if they were not negligent. However, without the PAA their monetary liability would be limited to insurance coverage plus the value of their firm. This could be far less than \$10 billion. Also, the assignment of liability and the compensation of victims could take years in multiple jurisdictions.

Under these circumstances, it is likely

- that DOE would be unable to clean up its waste sites (including sites in Nevada),
- that the nuclear power industry would be unable to decommission its plants, and
- that there would be no solution to the problem of managing spent nuclear fuel in the US.

While PAA is not a "first best" solution, no first best solution exists given insurance market failure.

Therefore, HR2983 should be introduced as a separate bill in the Senate. There should be a complete discussion of PAA reauthorization, including a discussion of the environmental consequences of no renewal.

While there is the potential of federal payments to nuclear accident victims, there has been no direct subsidy of the nuclear power industry through the PAA. The market for new energy technologies should determine whether new nuclear power

plants are economically viable. If nuclear opponents are convinced that nuclear power is not economically viable and no new plants will be built, they should be willing to support the PAA to assure the cleanup of past and present nuclear industry activities.

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About the author



Geoffrey Rothwell has been teaching at Stanford since 1986. He is a senior lecturer and director of the Honors Program in the Department of Economics and in the Public Policy Program.

He has published dozens of articles and reports on all aspects of nuclear power economics, including the front and back ends of the nuclear fuel cycle and nuclear power plant construction and operating costs, productivity, reliability, and decommissioning. His current research focuses on nuclear power competitiveness under electricity deregulation and industry restructuring.

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