

10 Finances

10.1 How much does it cost to decommission a nuclear power plant?
The total cost of decommissioning is dependent on the sequence and timing of the various stages of the program. The minimum amounts that are required for reasonable assurance of funds for decommissioning are \$105 million for large pressurized-water reactors and \$135 million for large boiling-water reactors in 1986 dollars. These costs are required to be escalated to current-year dollars using an escalation formula contained in 10 CFR 50.75(c)(2). This escalation formula includes the three major factors contributing to cost increases -- labor, energy, and low-level waste disposal burial costs. When escalated using these factors, decommissioning costs in 1998 dollars range from \$188 million to \$490 million depending upon the assumed type of reactor and type of low-level waste disposition. These are minimum amounts to show reasonable assurance, rather than site-specific estimates, of what it would cost to decommission a specific nuclear reactor.

Actual site-specific costs incurred and estimated costs of decommissioning give a better indication of what the process costs. [Note: The information given for decommissioning costs per reactor would be easier to read if presented in table format.] The Fort St. Vrain nuclear plant, which was a 330-megawatt-electric high-temperature gas-cooled reactor, ceased power operations in 1989 and underwent immediate decontamination and dismantlement. The decommissioning effort was completed in late 1996, and the license was terminated. The total cost of decommissioning was \$189 million. The cost for decommissioning the Trojan nuclear plant (an 1130-megawatt-electric pressurized-water reactor) is estimated to be on the order of \$210 million in 1993 dollars, which does not include \$42 million for non-radioactive site remediation or \$110 million for the independent spent fuel storage installation (ISFSI) and related fuel management. The Trojan nuclear plant is also planning an immediate decontamination and decommissioning from shutdown in 1993 to license termination in 2002. The estimated cost for decommissioning the Haddam Neck nuclear plant, a 619-megawatt-electric pressurized-water reactor is \$344.4 million in 1996 dollars, not including \$82.3 million in spent fuel storage costs (for a total of \$426.7 million). The estimated cost for decommissioning Maine Yankee, an 830-megawatt-electric pressurized-water reactor, is \$274.9 million in 1997 dollars. This does not include costs for spent fuel management (\$53.4 million) or for site restoration (\$49.2 million), for a total of \$377.6 million. The estimated cost for

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The regulations also require a site-specific cost estimate, within 2 years following permanent cessation of operations, if one has not already been submitted.

Finally, at the time that the license termination plan is submitted (at least 2 years before the date when the license terminates), an updated site-specific estimate of any remaining decommissioning costs is required.

10.4 If the first estimate of decommissioning costs is made at the time that the facility is licensed, are there methods for adjusting for inflation?

NRC regulations provide an adjustment factor for cost escalation that takes into account escalation factors for labor, energy, and waste burial. The labor and energy escalation factors are obtained from regional data issued by the U.S. Department of Labor's Bureau of Labor Statistics. The waste burial cost escalation factor is taken from an NRC report, NUREG-1307, "Report on Waste Burial Charges."

10.5 How does the NRC ensure that the licensee will have the money when it is needed for decommissioning?

Financial assurance is provided by one of the following methods:

Prepayment. In this case, at the start of operations, the licensee deposits into an account enough funds to pay the decommissioning costs. The account is segregated from the licensee's other assets and remains outside the licensee's administrative control. Prepayment may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities.

External sinking fund. An external sinking fund is a fund established and maintained by setting funds aside periodically into an account segregated from licensee assets and outside the licensee's administrative control. The total amount of these funds would be sufficient to pay decommissioning costs at the time that it is anticipated that the licensee will cease operations. An external sinking fund may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities. Only licensees that recover their decommissioning costs through rates established by "cost of service" or similar ratemaking regulation, or that have access to a non-bypassable wires charge for decommissioning, are eligible to use an external sinking fund by itself.

Surety method, Insurance, or other guarantee method. A surety method may be in the form of a surety bond, letter of credit, or line of credit. Any surety method or insurance used to provide financial assurance must be

decommissioning Big Rock Point, a 67-megawatt-electric boiling-water reactor, is \$290 million in 1997 dollars. The estimated cost for decommissioning Rancho Seco, a 913-megawatt-electric pressurized-water reactor is \$441 million in 1995 dollars. The estimated cost for decommissioning Yankee Rowe, a 175-megawatt-electric pressurized-water reactor is \$306.4 million in 1995 dollars.

10.2 Who makes the estimates of the decommissioning costs?

The licensee makes the estimates of the decommissioning costs, or hires a contractor who has extensive experience in making these estimates. The estimates are reviewed by the NRC.

10.3 When are the estimates of the decommissioning costs made?

The NRC has regulations regarding the methods used to reasonably assure that funds will be available to decommission the facility. The NRC has specified formulas to calculate minimum amounts required to demonstrate reasonable assurance of funds for decommissioning by reactor type and power level (See answer to question 10.1). Licensees may also perform site-specific estimates that could result in cost estimates that are higher than the generic formula amounts specified in 10 CFR 50.75 (c).

At or about 5 years preceding the projected end of operations, power reactor licensees shall submit a preliminary decommissioning cost estimate, which includes an up-to-date assessment of the major factors that could affect the cost to decommission. If the amount of money available is inadequate, the licensee has approximately 5 years to adjust the money in the decommissioning trust fund to ensure that appropriate funds are available for decommissioning.

An estimate is also submitted at the time that the post-shutdown decommissioning activities report (PSDAR) is submitted (no later than 2 years following permanent cessation of operations). This estimate may be (1) a site-specific cost estimate that is based on the activities and schedule that are also discussed in the PSDAR, (2) an estimate based on actual costs at similar facilities that have undergone similar decommissioning activities, or (3) a generic cost estimate. The NRC recommends that licensees planning an immediate decontamination and dismantlement submit a site-specific cost estimate in the PSDAR; however, a more generic one would be acceptable for facilities that are submitting their PSDAR in advance of the 2-year requirement. If a storage period is planned during decommissioning, the licensee should provide a method of adjusting the cost estimate and funding throughout the duration of the storage.

open-ended, or if written for a specific term, such as 5 years, must be renewed automatically unless, 90 days or more preceding the renewal date, the issuer notifies the Commission, the beneficiary, and the licensee of its intent to not renew. The surety or insurance must also provide that the full face amount be paid to the beneficiary automatically preceding the expiration date without proof of forfeiture if the licensee fails to provide a replacement acceptable to the Commission within 30 days after receipt of notification of cancellation. In addition, the surety or insurance must be payable to a trust established for decommissioning costs, and the trustee and trust must be acceptable to the Commission. The surety method or insurance must remain in effect until the Commission has terminated the license. Parent-company and self guarantees are also allowed when the guarantor is able to pass a financial test specified in NRC regulations.

Contractual obligations. Certain contractual obligations on the part of a licensee's customers are allowable as financial assurance if they meet conditions specified in NRC regulations.

Another mechanism or combination of mechanisms. Any other mechanism or combination of mechanisms that provides, as determined by the NRC upon its evaluation of the specific circumstances of each licensee submittal, assurance of decommissioning funding equivalent to that provided by the mechanisms discussed above.

10.6 Do the financial assurance regulations apply for Federal Government licensees?

Federal Government licensees whose obligations are guaranteed by and supported by the full faith and credit of the United States Government may use a statement of intent containing a cost estimate for decommissioning, and indicating that funds for decommissioning will be obtained when necessary. However, no power reactor licensees currently meet this criterion.

10.7 Is there any way to ensure that the licensee does not just spend all of the money in the first few years of decommissioning and have nothing left to complete the job?

The NRC has instituted regulations regarding the amount of money that can be used from the decommissioning fund at various stages of the decommissioning process. The licensee is allowed to use 3 percent of the generic amount of funds that are specified in the regulations for power plants based on their size and type for decommissioning planning that may occur, even while the facility is still operating. Appropriate activities include engineering design, work package preparation, and licensing activities.

After submitting the certification of permanent cessation of operations and the certification that the fuel has been removed from the reactor vessel, the licensee may use an additional 20 percent of the funds for any legitimate decommissioning activities. The licensee is prohibited from using the remaining 77 percent of the generic decommissioning funds until a site-specific cost estimate is submitted to the NRC. This cost estimate must be submitted within 2 years following permanent cessation of operations.

10.8 What would happen if the cost of decommissioning exceeds the amount of money in the trust fund?

The various cost estimates (at the time of licensing, 5 years before anticipated shutdown, with the PSDAR submittal, 2 years following shutdown, and 2 years preceding the anticipated termination of the license) are a method of reevaluating the decommissioning costs at various times and stages in the facility's life to ensure that there will be adequate funds available to complete the decommissioning process. If there is insufficient money in the trust fund, a licensee would be required to obtain the funds using one of the methods described in the answer to question 10.5. The NRC is also seeking legislation to require that decommissioning costs are given priority in any bankruptcy proceeding involving a licensee.

10.9 What would happen if the plant has an accident and there is not enough money in the decommissioning trust fund to complete decommissioning and cleanup after the accident?

Licensees are required to carry insurance, which is separate from the decommissioning funding requirements, in an amount that would allow cleanup of the site to such a level that decommissioning could be completed with the full amount of the decommissioning trust fund. Currently, \$1.06 billion per operating unit is required for such insurance coverage.

10.10 Who pays for decommissioning?

The particular licensee that holds the license for the facility pays for decommissioning. Subject to the public utilities commission that regulated the utility, the money for decommissioning is collected as part of the price of electricity; thus the funds for decommissioning are ultimately paid by the ratepayer.

10.11 What contingency plans are in place to assure that decommissioning and long-term radioactive material storage will be properly performed in the event of financial default of the licensee? Who finances decommissioning if the licensee becomes bankrupt or insolvent?

The Atomic Energy Act contains provision for the Federal Government to assume responsibility for decommissioning if public health and safety are jeopardized because of inability on the part of the licensee. Bankruptcy does not necessarily mean that a power reactor licensee will liquidate. To date, the NRC's experience with bankrupt power reactor licensees has been that they have filed under Chapter 11 of the Bankruptcy Code for reorganization, not liquidation (e.g., Public Service Company of New Hampshire, El Paso Electric Company, and Cajun Electric Cooperative). In these cases, bankrupt licensees have continued to provide adequate funds for safe operation and decommissioning, even as bondholders and stockholders suffered losses that were often severe. Because electric utilities typically provide an essential service in an exclusive franchise area, the NRC staff believes that, even in the unlikely case of a power reactor licensee liquidating, its service territory and obligations, including those for decommissioning, would revert to another entity without direct NRC intervention. The NRC has also sought prioritization of decommissioning costs in bankruptcy proceedings as discussed in the answer to question 10.8.

10.12 What will happen if deregulation becomes a reality? How will deregulation affect anticipated revenue and the ability to decommission?

The NRC has issued a final policy statement on its expectations and intended approach to nuclear power plant licensees as the electric utility industry moves from an environment of rate regulation toward greater competition. This policy statement was issued on August 19, 1997, and published in the *Federal Register*. The policy statement addresses NRC concerns about the adequacy of decommissioning funds. The statement indicates that the NRC believes that its current regulatory framework is generally sufficient to address the expected changes, but in order to remove any ambiguities in its regulations and address situations that may not be adequately covered, the Commission has also revised its decommissioning funding assurance requirements. This final rule was published in the *Federal Register* on September 22, 1998.

Deregulation may force some licensees to separate their systems into functional areas, with their NRC-licensed nuclear plants potentially no longer being rate regulated. If this occurs, the NRC will require such licensees to meet the more stringent decommissioning funding assurance requirements that apply to licensees that do not have cost-of-service or equivalent regulation. Licensees that are regulated in this way are

permitted to accumulate funds for decommissioning over the remaining terms of their operating licenses. NRC regulations require most other licensees to provide funding assurance for the full estimated cost of decommissioning, either through full up-front funding or by some allowable guarantee or surety mechanism. In addition, the policy statement emphasizes that the NRC retains the right to assess the timing of decommissioning trust fund deposits and withdrawals and the liquidity of decommissioning funds for licensees that no longer are subject to rate regulatory oversight.