



# U.S. NUCLEAR REGULATORY COMMISSION

## ENVIRONMENTAL STANDARD REVIEW PLAN

### 8.4 ASSESSMENT OF NEED FOR POWER

#### REVIEW RESPONSIBILITIES

Primary— Organization responsible for the review of need for power information

Secondary— None

#### I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's review and assessment of the need for new baseload generating capacity. This review should include an assessment of the timing of the need for the additional capacity.

The scope of the review directed by this plan should include a comparison of baseload capacity with baseload demand, a reserve margin assessment, projected cost of power, a comparison of total capacity in relation to peakload demand, a schedule evaluation, and an ultimate conclusion regarding the need for the electrical-production capability of the proposed facility. As such, it will draw on ESRPs 8.2 and 8.3.

In performing this review, the reviewer may rely on the analysis in the applicant's environmental report (ER) and/or State or regional authorities' or Independent System Operators' (ISOs') analyses concerning the need for power and energy supply alternatives after ensuring that the analysis of the need for power and alternatives is reasonable and meets high quality standards.

The reviewer of ESRP 8.4 should consider that substantial amounts of electricity are now bought and sold in competitive wholesale markets by utilities, non-utility power producers, and power marketers and brokers within and between regions across the country and even between U.S. markets and markets in Canada and Mexico. As a result, the relevant area of analysis for this ESRP is likely to include the relevant utility service area, if the proposed project is expected to primarily serve the demand of a specific utility and service area, and a larger market area comprising trading partners of that utility and others in the regional wholesale market area surrounding and/or abutting the utility or power plant site. This larger area may coincide with the area covered by a regional transmission organization (RTO),

Revision 1 - July 2007

8.4-1

NUREG-1555

---

#### USNRC ENVIRONMENTAL STANDARD REVIEW PLAN

This Environmental Standard Review Plan has been prepared to establish guidance for the U.S. Nuclear Regulatory Commission staff responsible for environmental reviews for nuclear power plants. The Environmental Standard Review Plan is not a substitute for the NRC's regulations, and compliance with it is not required.

These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Individual sections of NUREG-1555 will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience. Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of New Reactors, Washington, D.C. 20555-0001.

Requests for single copies of ESRP sections (which may be reproduced) should be made to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Reproduction and Distribution Services Section, or by fax to (301) 415-2289, or by email to [DISTRIBUTION@nrc.gov](mailto:DISTRIBUTION@nrc.gov). Electronic copies of this section are available through the NRC's public Web site at <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1555/> or in the NRC's Agencywide Documents Access and Management System (ADAMS) at <http://www.nrc.gov/reading-rm/adams.html>, under Accession number ML071810034.

---

independent system operator (ISO), power pool, or North American Electric Reliability Corporation (NERC) regional reliability council, or multiples of these. The reviewer should also consider the fact that distributed and self-generation by customers is increasing as power costs increase and the cost of distributed generating systems decrease. Finally, the reviewer should consider that dramatic improvements in electricity use have occurred recently and are projected to continue due to energy efficiency codes for equipment and appliances as well as buildings. As a result, new customers, on average, may have very different usage rates than previous generations of customers.

### Review Interfaces

The reviewer for this ESRP should obtain input from or provide input to the reviewers for the following ESRPs, as indicated:

- ESRP 8.1. Obtain information and data on the power system context for the proposal.
- ESRPs 8.2.1 and 8.2.2. Obtain data on power and energy requirements and factors affecting growth of demand.
- ESRP 8.3. Obtain data on power supply.
- ESRPs 9.2.1 and 9.2.2. Provide information to assist in the consideration of alternative sources of energy that might provide the baseload generating capacity.
- ESRPs 10.4.1 and 10.4.2. Provide a summary of the benefit-cost balancing dealing with the consequences of not having sufficient baseload capacity or of adding this capacity too soon.

### Data and Information Needs

Affected States and/or regions, NERC reliability councils, and regional transmission organizations may prepare need-for-power evaluations for proposed generation and transmission facilities. The NRC will review the evaluation of the proposed facility and determine if it is (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. If the need-for-power evaluation is found acceptable, no additional independent review by NRC is needed and the analysis can be the basis for ESRPs 8.2 through 8.4.

As part of their analyses, States and/or regional authorities would normally collect data for the need for power. These data may be supplemented by information sources such as the Energy Information Administration, FERC, NERC and member reliability councils, and others.

If an analysis meeting the preceding criteria is not available or satisfactory, the following data or information should be obtained and/or prepared by NRC staff for review of the applicant's need-for-power analysis:

- projected baseload demand from the present to 3 years after initial commercial operation of all proposed units. Prepare a table showing baseload demands, baseload capacities, and resulting deficit or surplus (see Table 8.4-1 for an example) and a table showing peakload responsibilities, accredited generating capacities, and resulting reserve margin (see Table 8.4-2 for an example). Reliability assessments prepared by each NERC reliability council should be used as a starting point.
- reserve margin criteria for the service area. Briefly describe the reserve margin deemed desirable by the staff based on its evaluation of the applicant's analysis and supplementary sources of information including the requirements of the regional reliability council and regional transmission operator at a minimum.
- the applicant's calculated reserve margins extending from the present to the first 3 years after initial operation of all proposed units. Merchant plants may not have reserve requirements similar to those for regulated utilities, however, wholesale power suppliers are increasingly required to provide RTOs, ISOs, or reliability coordinators with assurances of reliability. (Merchant plants are not dedicated to a specific customer or load but sell solely to wholesale markets instead.)
- historical data on installed and actual reserve margins at the time of summer and winter peak hourly demand for the 15 years preceding the date of application
- the relationship between reserve margin (expressed as percent) and system reliability level (expressed as 1 day's outage in 10 years, 5 years, etc.) or other industry accepted measure.

## II. ACCEPTANCE CRITERIA

Acceptance criteria for the review of the staff's assessment of the need for power are based on the relevant requirements of the following:

- 10 CFR 51, Appendix A(4), with respect to discussion of the no-action alternative in NRC environmental impact statements (EISs)
- 10 CFR 51.71(d) with respect to analysis of alternatives and to weighing the costs and benefits of the proposed action and reasonable alternatives
- 10 CFR 51.75(b) and (c) with respect to applications for early site permits and combined licenses, respectively.

Regulatory positions and specific criteria necessary to meet the regulations identified above are as follows:

- Regulatory Guide 4.2, Rev. 2, *Preparation of Environmental Reports for Nuclear Power Stations* (NRC 1976), with respect to the need for new capacity.

## Technical Rationale

The technical rationale for evaluating the applicant's assessment of the need for power is discussed in the following paragraphs:

The Atomic Energy Act states that licenses for a nuclear power plant can only be issued when the plant will serve a useful purpose proportional to the quantities of special nuclear material or source material to be utilized. A demonstration of the need for electricity from the proposed plant is necessary to satisfy the "useful purpose" requirement.

NRC's regulations implementing the National Environmental Policy Act (NEPA) in 10 CFR 51 include Appendix A, containing the format for presentation of material in EISs. Section 4 of Appendix A specifically requires that the no-action alternative be discussed in an NRC EIS. ESRP 8.4 will assist in this analysis.

NRC's regulations implementing NEPA also include 10 CFR 51.71, which specifies the content requirements for draft EISs. It is stated in 10 CFR 51.71(d) that a draft EIS is to include "a preliminary analysis which considers and balances the environmental and other effects of the proposed action and the alternatives available for reducing or avoiding adverse environmental and other effects." In addition to providing input for analysis of the no-action alternative, the review conducted under ESRP 8.4 will aid this analysis by providing as input to ESRP 9.1 information to assist in the consideration of alternative sources of electric energy.

It is stated in 10 CFR 51.71(e) that a draft EIS is to include a preliminary recommendation respecting the proposed action "reached after weighing the costs and benefits of the proposed action and considering reasonable alternatives." The review conducted under ESRP 8.4 will aid this determination by evaluating the need for power and the potential benefits of the proposed action and the alternatives.

### III. REVIEW PROCEDURES

If an independent review of need for power is to be conducted by NRC staff in lieu of using a review prepared by affected States and/or regions or other independent third-party, the procedures discussed below should be followed. These procedures also may be used by the reviewer as an aid in evaluating forecasts prepared by others. The procedures assume a traditional utility. Industry best practice may evolve in response to deregulation of the utility industry. The reviewer should be aware of, and use, industry best practice where possible. In this context, best practice is defined by methods used by leading consultants in the field, the Energy Information Administration (EIA), federal power marketing administrations such as the Bonneville Power Administration and including the Tennessee Valley Authority, and leading state and regional power planning organizations, such as California, New York, and Wisconsin and the Northwest Power and Conservation Council. Current best practice includes development of resource supply curves that rank from low to high prospective supply options (including energy efficiency as a supply option) on the basis of cost (typically net present value) with respective potential quantities of energy and power (see Northwest Power and Conservation Council power plans

for a detailed description). Supply curves should facilitate staff comparison of supply options because some resources are inherently limited in terms of capacity and may, therefore, not be adequate substitutes for large central baseload generating plants.

- (1) Calculate baseload demand as that portion of forecasted kilowatt-hour (kWh) sales occurring at loads equal to or less than average load.
  - (a) Forecasted growth in the relevant region(s) as a range:
    - The forecasted growth rates of kWh sales in this analysis should include at least the applicant's mid-range, high, low, 75th percentile, and 25th percentile forecasts, and the forecast ranges developed by the affected State and/or region or NRC staff (ESRP 8.2.1).
    - If the range of reasonable forecasts developed or adopted by the staff (the 25th percentile to 75th percentile range) encompasses the applicant's forecasts of the 25th to 75th percentile range, perform the analysis using the NRC range.
    - If the range of relevant regional forecasts developed or adopted by the NRC staff is encompassed by in the applicant's 25th percentile to 75th percentile range, perform the analysis using the applicant's range.
    - If the two ranges partially overlap or one is lower, use the lower of the two ranges.
  - (b) In any case, analyze
    - reasons for differences between the applicant's forecast and the forecast developed or adopted by the staff
    - the implications for baseload demand of the extreme value forecasts.
- (2) Analyze the power supply data (e.g., capacity factors, variable costs, and redesignations) and estimate the baseload capacity of the system using the evaluation of ESRP 8.3.
- (3) Compare the supply of baseload capacity with the demand for baseload capacity for the first 3 years of commercial operation of all proposed units.
- (4) Identify the reserve margin<sup>(a)</sup> requirements currently in acceptance for the service area and identify the organization responsible for establishing this requirement.

---

(a) Reserves are defined in this ESRP as the difference between accredited net generating capacity and peakload responsibility; the reserve margin is this difference divided by the peakload responsibility.

- (a) Determine if the reserve margin requirements at the time the proposed units are scheduled to begin operation are different from the current reserve margin requirements.
  - (b) Contact the appropriate regional reliability council, other regional bodies, power pools, and FERC to compare this reserve margin requirement with requirements recommended by these organizations.
- (5) Calculate the region's accredited generating capacity (i.e., total installed capacity plus nonfirm purchases and less nonfirm sales) for the period extending from 1 year preceding commercial operation of the proposed first unit to the 3<sup>rd</sup> year of commercial operation of the proposed last unit.
- (6) Calculate peakload<sup>(a)</sup> responsibility based on the growth rates for peakload demand calculated for ESRP 8.2.1.
- (7) For reviews requiring additional staff analysis, calculate peakload responsibility based on forecasted growth rates for peakload demand.
- (a) Determine these by contrasting the applicant's projected range of growth rates for system peakload with the range of growth rates developed or adopted by the staff for the system peak.

The same rules for comparison apply as for annual kWh sales:

- If the range of reasonable forecasts developed or adopted by the staff encompasses the applicant's forecast, the reviewer should perform the analysis using the developed or adopted forecast.
  - If the range of forecasts falls below the applicant's forecast(s), the reviewer should use the staff forecasts.
- (8) For each estimate of peakload responsibility<sup>(b)</sup> and for each year under consideration, calculate reserve margin as

$$\text{Reserve Margin} = \frac{\text{Accredited Generating Capacity} - \text{Peakload Responsibility}}{\text{Peakload Responsibility}}$$

Based on the reserve margins and the projections for baseload demand, determine the timespan representing the probable dates when plant capacity will initially be needed.

- 
- (a) For each growth rate used, calculate system peakload for the relevant years and adjust for firm purchases and sales and interruptible contracts to obtain peakload responsibility.
  - (b) Peakload responsibility is defined as system load plus firm sales and less firm purchases.

- (9) Prepare an analysis of the costs and benefits of not having sufficient and timely capacity additions and also the costs and benefits of adding capacity too soon.
- (a) For these purposes, assume the applicant's proposed date of commercial operation of all proposed units and consider the effects of the load materializing 3 years earlier than this date and 3 years later than this date.
- (b) The 6-year timespan may be shifted if conditions specific to the service area suggest this to be appropriate.

Treatment of this subject should include, at a minimum, participation by the socioeconomic and benefit-cost reviewers.

- (10) If a need-for-power analysis conducted by or for one or more relevant regions affected by the proposed plant concludes there is a need for new generating capacity, that finding should be given great weight provided that the analysis was systematic, comprehensive, subject to confirmation, and responsive to forecast uncertainty. This source may be the most appropriate if the proposed plant is not planned to serve a traditional utility load or as a retail power supplier in a specific region, but is expected to provide power as a merchant plant to a regional wholesale power market. In this case, the analysis of the relevant market should include an assessment of competitors to the proposed plant.

If no such analysis is available, determine whether the projected peakload responsibility plus the reserve requirement exceeds the total accredited generating capacity and, absent special circumstances, these findings justify the conclusion that new capacity is warranted.

Although this criterion does not show a need for baseload capacity, it does demonstrate a need for new capacity that is independent of type. This criterion, coupled with an affirmative indication that there is a need for baseload capacity, justifies a baseload addition within the timespan determined by the reviewer's forecast analysis.

- (11) If these criteria cannot be met, it may still be possible that the proposed facility will be needed on some other basis. The analysis should be summarized in a table similar to Table 8.4-3. Additional considerations include the following:
- the relevant region's need to diversify sources of energy (e.g., using a mix of nuclear fuel and coal for baseload generation)
  - the potential to reduce the average cost of electricity to consumers
  - the nationwide need to reduce reliance on imported petroleum

- the case of a significant benefit-cost advantage being associated with plant operation before system demand for the plant capacity develops. (This will require the reviewer's benefit-cost evaluation of the consequences of not having sufficient baseload capacity or of adding this capacity too soon.)

If none of the above criteria can be satisfied, it may be concluded that there is no need for additional baseload generating capability on the scale represented by the applicant's proposal during the timespan considered.

#### IV. EVALUATION FINDINGS

This section of the environmental impact statement should be planned to document the following: (1) public disclosure of the applicant's forecast of need for the proposed project, (2) a presentation of the staff's analysis of the applicant's forecast, and (3) a presentation of the staff's conclusion of whether additional capacity is needed within the timespan developed by the staff.

The following information should be included in the EIS:

- a table showing baseload demands, baseload capacities, and resulting deficit or surplus (see Table 8.4-1 for an example)
- a table showing peakload responsibilities, accredited generating capacities, and resulting reserve margin (see Table 8.4-2 for an example)
- a brief description of the reserve margin deemed desirable by the staff based on its evaluation of the applicant's analysis and supplementary sources of information
- the staff's conclusion as to whether additional capacity (represented by the proposed plant) is needed within the timespan developed by the staff
- a tabulation of costs and benefits associated with bringing the proposed plant online as scheduled, but not having the electrical demand materialize as projected.

#### V. IMPLEMENTATION

The method described in this ESRP should be used by the staff in evaluating conformance with NRC requirements, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the requirements.

#### VI. REFERENCES

10 CFR 51, Appendix A(4), "Purpose and need for action."



10 CFR 51.71, “Draft environmental impact statement—contents.”

10 CFR 51.75, “Draft environmental impact statement—construction permit, early site permit, or combined license.”

Atomic Energy Act of 1954, as amended, 42 USC 2011 et seq.

U.S. Nuclear Regulatory Commission (NRC). 1976. *Preparation of Environmental Reports for Nuclear Power Stations*. Regulatory Guide 4.2, Rev. 2, Washington, D.C.

---

**PAPERWORK REDUCTION ACT STATEMENT**

The information collections contained in the Environmental Standard Review Plan are covered by the requirements of 10 CFR Part 51, and were approved by the Office of Management and Budget, approval number 3150-0021.

**PUBLIC PROTECTION NOTIFICATION**

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

---

**Table 8.4-1.** Baseload Demand, Capacity, and Capacity Surplus (Deficit)

	Year			
	2000	2005	2010	--
Baseload Demand by Scenario				
High				
25th Percentile				
Midrange				
75th Percentile				
Low				
Baseload Capacity				
Surplus (Deficit)				
High				
25th Percentile				
Midrange				
75th Percentile				
Low				

**Table 8.4-2.** Peakload Responsibilities, Generating Capacities, and Reserve Margin

Year	Accredited Generating Capacity (MW)	System Peakload Responsibility (MW)			Reserve Margin (% of Peakload Responsibility)		
		25th Percentile Forecast	Midrange Forecast	75th Percentile Forecast	25th Percentile Forecast	Midrange Forecast	75th Percentile Forecast
2000							
2005 <sup>(a)</sup>							
2010							
2015							
...							
(a) year unit is expected to come online.							

**Table 8.4-3.** Example of Summary Page of Staff Assessment of Need for Power

<b>Forecast Demand Year =</b>	<b>Net Needed Baseline Capacity</b>	<b>Net Capacity Needed for Peak Power</b>	<b>Net Capacity Needed for Source Diversity</b>	<b>Reduction in Average Cost of Power</b>	<b>Amount and Type of Fossil Fuel Displaced</b>	<b>Net Benefit of Early Availability</b>
High						
25th Percentile						
Midrange						
75th Percentile						
Low						
Net Benefit If 3 Years Earlier						
Net Benefit If 3 Years Later						