



U.S. NUCLEAR REGULATORY COMMISSION  
**ENVIRONMENTAL STANDARD  
 REVIEW PLAN**

## 8.2.1 POWER AND ENERGY REQUIREMENTS

### 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 analysis and evaluation of the historic and projected electricity consumption and peakload demands in the relevant service area or market. The scope of the review directed by this plan should include a detailed analysis and evaluation of the applicant's treatment of these projections and, where needed, an independent assessment of forecasts of growth in electricity consumption and peakload demand in the relevant utility service and market areas.

In performing this review, the reviewer may rely on the analysis in the applicant's environmental report (ER), and/or analysis performed by State or regional authorities, regional transmission operators (RTOs), or independent system operators (ISOs). The reviewer may also rely on relevant North American Electric Reliability Corporation (NERC) regional 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 need for power is a critical component of an EIS as it establishes a framework for evaluation of project benefits and for the geographic boundaries over which benefits and costs are distributed. This ESRP discusses demand and demand growth in the region and other factors affecting the need for new generating capacity. ESRP 8.2.2 discusses factors that underlay demand growth and how uncertainties in these factors were considered by the applicant.

The primary benefit of a new nuclear plant is the large quantity of baseload power it may provide. Consequently, analyses of need should focus primarily on energy, rather than peak demand requirements.

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### 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.

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These requirements can be met by the proposed project, potential competing projects, and other alternatives. New power plants may be needed to meet growing loads and to replace plants that are retired. The need for new plants also has a geographic component, as power may be needed at specific locations on the interconnected power grid to ensure reliability of the entire power grid or of subsections of the grid. The geographic scope for the need for power may be defined in the application by a utility service area, but it also exists in a larger geographic context because power from outside a utility service area boundary may also serve the load. This larger boundary is primarily a function of the way the transmission system is planned and managed. This has both electrical and economic features, which requires further description to facilitate evaluation of materials submitted by the applicant and other materials staff may consult.

Wholesale power supply continues to be deregulated nationwide. Firms that do not serve retail customers may build and operate power plants. Power from any power plant may be sold to utilities and others using the regional transmission system. Management and operation of utility transmission is performed on a regional basis to support regional power exchanges through competitive power markets. Some parts of the country have formed RTOs or ISOs to provide regional transmission planning and management and to operate wholesale power markets. Where these exist, they define the relevant market area for a proposed project. In addition to RTOs/ISOs, the United States is divided into unique regional electricity reliability councils by NERC. Each regional council has responsibility for managing system reliability within their respective region by monitoring the balance between customer demand and generation. As a result, the local NERC region may be the relevant market area where RTOs/ISOs do not exist. It should also be noted that high voltage transmission interties enable power exchanges between NERC regions and RTOs/ISOs, although these exchanges are primarily governed by sales contracts.

The determination of the need for new generation requires evaluation of both utility supplies compared to projected demand, and demand in the relevant utility service and market areas. The applicant may provide or NRC staff may obtain information from sources that encompass different geographic areas. Therefore NRC staff must be specific about what area they are referencing, such as utility service area, State, RTO/ISO area or regional market, NERC region, or other area if appropriate.

In performing this review, the reviewer may rely on the analysis in the applicant's environmental report (ER) after ensuring it is consistent with all available State or regional authorities' or RTO/ISO analyses, including appropriate regional NERC councils.

### Review Interfaces

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

- ESRP 8.1. Obtain a description of the power system in each of the relevant service and market areas as referenced by the applicant or other sources consulted by the staff. Special attention should be given to the status of retail power deregulation, functions of wholesale power markets, regional transmission reliability requirements and transmission constraints, and anomalies, such as extremely

large industrial customers or market conditions that may affect inter- and intra-regional power flows as each affects energy load forecasts.

- ESRP 8.2.2. Obtain data on power and energy alternatives and provide the historic and projected growth data that are considered appropriate for the relevant service area(s) to support the forecast analysis. This may or may not be the applicant's historical service area, even if the applicant is a traditional electric utility. For example, power production in excess of a traditional utility's needs can be readily sold to other utilities or retail power providers as a result of wholesale power market deregulation. Similarly, power from other projects can be purchased to satisfy the applicant's stated need. This makes the largest applicable regional power market a reasonable boundary for this study.
- ESRP 8.4. Provide the range of forecasts developed from this plan for assessing the need for baseload generating units of the proposed capacity.
- ESRPs 9.1 and 9.2.1. Provide the power and energy requirements as determined through this analysis.

#### 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 staff should review applicable evaluations and determine if each is (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. Forecasts should include demand scenarios for midrange, high, low, 75th percentile, and 25th percentile conditions that incorporate consumer response to power cost changes as new power plants are integrated into the power system. If the need-for-power evaluation is found acceptable, no additional independent review by the NRC is needed, and the analysis can be the basis for ESRPs 8.2 through 8.4.

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

- historical and projected electrical energy use by major categories in the relevant area. If the proposed plant will serve loads beyond traditional utility boundaries, such as a competitive wholesale power market, then this market area will be the relevant area. If the need for power is based solely on needs within a utility service area (no surplus will be produced for export) and there are no alternative plants proposed by competitors, then analysis can be confined to the utility service area. Data should cover the 10 to 15 years preceding the date of application through the 3<sup>rd</sup> year of commercial operation of all proposed units. Major categories are those that account for 5 percent or more of the relevant service area consumption, including residential, commercial, industrial, agricultural, large special loads (such as Federal installations or highly electricity intensive industries), street lighting, municipal systems and co-ops, other utilities, and rapid transit systems.

- evidence of wholesale power sales agreements for plant output for production that is expected to be surplus to traditional utility needs or projected competitive retail market sales. This power could offset projected energy and power requirements in the relevant area, or absent such requirements, indicate overbuilding of generating capacity.
- forecasts of all aggregate long-range consumption and system peakload demand made during the 10 to 15 years preceding the date of application with a description of the methodology used. This information will be used to evaluate the relative accuracy of previous energy and demand forecasts and/or demand variability.
- actual yearly increases in total kilowatt-hour (kWh) sales for the 15 years preceding the date of application and an average annual compound growth rate for this period.
- a normalized kWh sales growth rate that accounts for unusual changes (e.g., weather and fluctuations in major loads not representative of system growth), a list of the changes considered, and the method of normalization.
- a description of the methodologies used in forecasting (e.g., econometric, extrapolation, judgment, and surveys) showing all major factors considered in arriving at the forecast, how these factors were introduced to the forecast, and an estimate of their likely effect on the growth of kWh sales and peakload demand in the service area.
- the historic and projected relevant service area season of peakload demand (summer-winter) for the 10 to 15 years preceding the date of application through the 3<sup>rd</sup> year of commercial operation of all proposed units.
- the historic and projected relevant service area load factor (average load/peakload) for the 10 to 15 years preceding the date of application through the 3<sup>rd</sup> year of commercial operation of all proposed units; where shifts in load factor or load factor trends are evident, identification of the principal factors contributing to these shifts or trends.
- the yearly increase in regional system peakload demand for the 15 years preceding the date of application and an average annual compound growth rate for this period.
- a normalized regional system peakload rate that accounts for unusual changes (e.g., weather, interruptible contracts, and fluctuations in major loads not representative of system growth), a list of the changes considered, and the method of normalization.
- load duration curves for the current year and for the 1<sup>st</sup> year of commercial operation of the first proposed unit.
- the minimum hourly load for the current year and for the 1<sup>st</sup> year of commercial operation of the first proposed unit.

Evaluation of these forecasts and other data may provide staff with an appropriate range of energy and power growth rates to assess alternative forecasts and to provide a context for growth projections beyond those available in alternative forecasts.

## II. ACCEPTANCE CRITERIA

Acceptance criteria for the review of the power and energy requirements 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 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, combined licenses, construction permits, and operating 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 electrical demand and projections.

## Technical Rationale

The technical rationale for evaluating the applicant's power and energy requirements is discussed in the following paragraphs:

Section 4 of Appendix A to 10 CFR 51 specifically requires that the no-action alternative be discussed in an NRC EIS. ESRP 8.2.1 will aid this analysis by providing information to enable an analysis to be made in ESRP 8.4 of the need for power from the proposed power plant.

10 CFR 51.71(e) states that a draft EIS is to contain a preliminary recommendation respecting the proposed action "reached after weighing the costs and benefits of the proposed action and considering reasonable alternatives." ESRP 8.2.1 will aid this determination by providing input that can be used to evaluate the need for power and the potential benefits of the proposed action and the alternatives.

## III. REVIEW PROCEDURES

If an independent review of power and energy requirements is needed by NRC staff in lieu of using a review prepared by affected States and/or regions, 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.

These procedures assume that the applicant is a traditional utility. Industry best practice may evolve as a result of deregulation. The reviewer should be aware of, and use, industry best practice where possible. In this context, industry 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 in California, New York, and Wisconsin and the Northwest Power and Conservation Council.

- (1) Analyze the historical data and forecasts of demand factors for completeness and agreement with other forecasts, emphasizing the forecasted growth in kWh sales in the context of retail electricity prices. Growth rates during periods of flat or declining real retail power prices should be expected to be higher than during periods when prices are increasing.
- (2) Analyze the forecasting methodologies employed to the extent needed to reach conclusions regarding their acceptability. Relevant factors to consider include the following:
  - price of electricity and elasticity of demand
  - energy efficiency and energy substitution including on-site power production from renewables, combined heat and power, etc.
  - price of alternative fuels
  - income
  - economic activity
  - number of customers
  - weather
  - saturation levels of electricity using devices
  - treatment of uncertainty.
- (3) Consider how the demand influencing factors are taken into account. If scientific methodologies are employed, determine if they pass standard tests of acceptability (e.g., statistical tests of significance).
- (4) Analyze any parameter estimates (e.g., price and income elasticities) obtained by the applicant's methodologies to determine the degree to which they agree with other estimates that are generally available for the relevant region from federal (e.g., EIA), State, or regional sources. Compare the applicant's latest projections with those made earlier for the same or overlapping time periods. Consider the reasons forecasts for overlapping periods differ.
- (5) Evaluate the applicant's forecasts and the data and methodology used to make these forecasts and reach one of the following conclusions:
  - (a) The applicant's forecast and all data and methodologies are verified by the staff analyses, and the reviewer concludes that the methodology, underlying assumptions, and results are similar to those that would have been used and obtained by the staff.

- (b) The applicant's forecasts, methodologies, and data used cannot be verified by the staff using the stated review procedures. In this case, the staff should identify where problems in the review occurred and request additional information.

#### IV. EVALUATION FINDINGS

Input from analysis of this ESRP should be designed to accomplish the following objectives: (1) public disclosure of the applicant's forecasts of electrical energy demand, and (2) presentation of the staff's evaluation regarding the completeness and adequacy of these forecasts.

When the reviewer has determined that a forecast made by or for one or more State or regional agencies for the relevant service and market areas is complete and adequate, the following information should be included in the environmental impact statement (EIS):

- the forecast methodology used by the State or regional agency
- summaries of the data used
- forecasts made by the State or regional agency and the basis for the staff's determination of the adequacy of these forecasts.

If the reviewer determines that the State or regional forecast is complete and adequate, the reviewer should provide input to the EIS similar to the following:

The staff reviewed the information provided by the State or regional body, verified the forecast of electricity consumption, and concluded that the results are complete and adequate.

When the need for power analysis has been prepared by the applicant and the reviewer has determined that the applicant's forecasts are complete and adequate, the following information should be included in this section of the EIS:

- the forecast methodology used by the applicant
- summaries of the data used, together with the staff's evaluation of the data
- forecasts made by the applicant and the basis for the staff's evaluation of the adequacy of these forecasts.

In this case, the staff would provide input to the EIS similar to the following:

The staff reviewed the information provided by the applicant, verified the applicant's forecast of electricity consumption, and concluded that the results are complete and adequate.

## 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."

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

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### **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.

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