4 CSR 240-22.070 Risk Analysis and Strategy Selection

PURPOSE: This rule requires the utility to identify the critical uncertain factors that affect the performance of alternative resource plans, establishes minimum standards for the methods used to assess the risks associated with these uncertainties and requires the utility to specify and officially adopt a resource acquisition strategy.

(1) The utility shall conduct a risk analysis in its selection of a resource acquisition strategy based on the consideration of alternative planning futures and computation of probable values of the performance measures specified in 4 CSR 240-22.060(2). The risk analysis shall consist of the following phases, unless the utility specifies and documents an alternative method that achieves an equivalent analysis.

(A~~1~~) In phase one, ~~T~~the utility shall identify and consider distinct planning futures;

(B) In phase 2, the utility shall identify the top resource plans based on how each alternative resource plan performs in the planning futures; and

(C) In phase 3, the utility shall use methods of decision analysis to assess the risks associated with each of the top resource plans.~~use the methods of formal decision analysis to assess the impacts of critical uncertain factors on the expected performance of each of the alternative resource plans developed pursuant to 4 CSR 240-22.060(3), to analyze the risks associated with alternative resource plans, to quantify the value of better information concerning the critical uncertain factors and to explicitly state and document the subjective probabilities that utility decision-makers assign to each of these uncertain factors. This assessment shall include a decision-tree representation of the key decisions and uncertainties associated with each alternative resource plan.~~

(2) ~~Before developing a detailed decision-tree representation of each resource plan, t~~The utility shall conduct a preliminary sensitivity analysis of ~~to identify~~ the uncertain factors that may materially affect the outcome of resource planning decisions. ~~are critical to the performance of the resource plan.~~ This analysis shall:

(A) ~~a~~Assess at least the following uncertain factors:

1. ~~(A)~~ The range of future load growth represented by the low-case and high-case load forecasts;
2. ~~(B)~~ Future interest rate levels and other credit market conditions that can affect the utility's cost of capital;
3. ~~(C)~~ Future changes in environmental laws, regulations or standards;
4. ~~(D)~~ Relative real fuel prices;
5. ~~(E)~~ Siting and permitting costs and schedules for new generation and generation-related transmission facilities for the utility, for a regional transmission organization and/or other transmission systems;
6. ~~(F)~~ Construction costs and schedules for new generation and transmission facilities for the utility, for a regional transmission organization and/or other transmission systems;
7. ~~(G)~~ Purchased power availability, terms and cost;
8. ~~(H)~~ Price of ~~Sulfur dioxide~~ emission allowances, including at a minimum, sulfur dioxide, carbon dioxide and nitrogen oxides ~~prices~~;
9. ~~(I)~~ Fixed operation and maintenance costs for new and existing generation facilities;
10. ~~(J)~~ Equivalent or full- and partial-forced-outage rates for new and existing generation facilities;
11. ~~(K)~~ Future load impacts of demand-side programs; ~~and~~

12~~(L)~~ Utility marketing and delivery costs for demand-side programs, and

13. Any other uncertain factors that the utility determines may be critical to the performance of alternative resource plans;

(B) Identify and assess the relative impact of each uncertain factor to determine which uncertain factors are critical uncertain factors.

(3) Phase 1 – Specify planning futures. Based on its assessment of policy variables and the critical uncertain factors identified in section (2), the utility shall identify and consider distinct planning futures that reasonably describe a full spectrum of alternative futures that the utility judges to be reasonably probable. The characteristics comprising each alternative planning future shall be internally consistent within the planning future. If the utility uses an alternative method to identify and specify alternative planning futures, it must fully document that method, explain why it is superior to the method specified in this rule, and show that it results in the equivalent information that is required by this rule.

(4) Phase 2 – Select top resource plans. The utility shall analyze the expected performance of each of the alternative resource plans developed pursuant to 4 CSR 240-22.060(3) under the characteristics specified in each of the planning futures identified pursuant to section (3). The utility shall evaluate the performance of each alternative resource plan relative to the performance measures specified in 4 CSR 240-22.060(2) for each planning future. The utility shall select, in its judgment, the top resource plans; which will be further evaluated in phase 3. If the utility uses an alternative method to select its top resource plans, it must fully document that method, explain why it is superior to the method specified in this rule, and show that it results in the equivalent information that is required by this rule.

(5) Phase 3 – Decision analysis of risk. The utility shall use methods of decision analysis to assess the risks associated with each of the top resource plans, to quantify the value of better information concerning the critical uncertain factors and to explicitly state and document the subjective probabilities that utility decision-makers assign to each of these critical uncertain factors. This assessment shall include a decision-tree representation of the key decisions and uncertainties associated with each alternative resource plan. If the utility uses an alternative method to analyze the risk associated with the top resource plans, it must fully document that method, explain why it is superior to the method specified in this rule, and show that it results in the equivalent information that is required by this rule.

(A) For each top ~~alternative~~ resource plan, the utility shall construct a decision-tree diagram that appropriately represents the key resource decisions and critical uncertain factors which can materially ~~that~~ affect the outcome ~~performance of the~~ of resource planning decisions.

~~(4) The decision-tree diagram for all alternative resource plans shall include at least two (2) chance nodes for load growth uncertainty over consecutive subintervals of the planning horizon. The first of these subintervals shall be not more than ten (10) years long.~~

(B~~5~~) The utility shall use the decision-tree formulation to compute the cumulative probability distribution of the values of each performance measure specified pursuant to 4 CSR 240-22.060(2), contingent upon the identified critical uncertain factors and associated subjective probabilities assigned by utility decision-makers pursuant to section (1) of this rule. Both the expected performance and the risks of each of the top ~~alternative~~ resource plans shall be quantified.

1.~~(A)~~ The expected performance of each of the top resource plans shall be measured by the statistical expectation of the value of each performance measure.

2.~~(B)~~ The risk associated with each of the top resource plans shall be characterized by some measure of the dispersion of the probability distribution for each performance measure, such as the standard deviation or the values associated with specified percentiles of the distribution.

(6) The utility shall select a preferred resource plan from among the alternative resource plans that have been analyzed pursuant to the requirements of 4 CSR 240-22.060 and sections (1)--(5) of this rule.

(A) The preferred resource plan shall satisfy at least the following conditions:

1.~~(A)~~ In the judgment of utility decision-makers, ~~the preferred plan shall~~ strike an appropriate balance between the various planning objectives specified in 4 CSR 240-22.010(2); ~~and~~

2.~~(B)~~ Be compliant with all legal mandates including the renewable energy standard and all environmental regulations;

3. Invest only in smart grid technologies unless in the judgment of the utility decision makers, investing in smart grid technologies to upgrade transmission and/or distribution networks is not in the public interest;

4. Utilize energy efficiency and energy management resources to the maximum amount that in the judgment of the utility decision makers is consistent with the public interest and with stated Missouri policy in section 393.1040 RSMo and in section 393.1124.4 RSMo; and

5. The trend of expected unserved hours for the preferred resource plan must not indicate a consistent increase in the need for emergency imported power over the planning horizon.

(B) In the judgment of the utility decision-makers, the preferred plan, in conjunction with the deployment of emergency demand response measures and access to short term and emergency power supplies, has sufficient resources to serve load under extreme weather forecasts pursuant to 4 CSR 240-22.030(9).

(C) The utility shall specify the ranges or combinations of outcomes for the critical uncertain factors that define the limits within which the preferred resource plan is judged to be appropriate and explain how these limits were determined. If a preferred plan is replaced by a contingency plan as a result of the limits being exceeded or for some other reason, the utility shall specify the ranges or combinations of outcomes for the critical uncertain factors that define the limits within which that plan remains appropriate.

(7) The impact of the preferred resource plan on future requirements for emergency imported power shall be explicitly modeled and quantified. The requirement for emergency imported power shall be measured by expected unserved hours under normal-weather load conditions.

(A) The daily normal-weather series used to develop normal-weather loads shall contain a representative amount of day-to-day temperature variation. Both the high and low extreme values of daily normal-weather variables shall be consistent with the historical average of annual extreme temperatures.

(B) The supply-system simulation software used to calculate expected unserved hours shall be capable of accurately representing at least the following aspects of system operations:

1. Chronological dispatch, including unit commitment decisions that are consistent with the operational characteristics and constraints of all system resources;

2. Heat rates, fuel costs, variable operation and maintenance costs, and ~~sulfur dioxide~~ emission allowance costs for each generating unit;

3. Scheduled maintenance outages for each generating unit;

4. Partial- and full-forced-outage rates for each generating unit; and

5. Capacity and energy purchases and sales, including the full spectrum of possibilities, from long-term firm contracts or unit participation agreements to hourly economy transactions.

A. The utility shall maintain the capability to model purchases and sales of energy both with and without the inclusion of ~~sulfur dioxide~~ emission allowances.

B. The level of energy sales and purchases shall be consistent with forecasts of the utility's own production costs as compared to the forecasted production costs of other likely participants in the bulk power market; and

(C) The utility may use an alternative method of calculating expected unserved hours per year if it can demonstrate that the alternative method produces results that are equivalent to those obtained by a method that meets the requirements of subsection (7)(B).

(8) For the preferred resource plan, the utility shall determine if additional future transmission facilities will be required to remedy any new generation-related transmission system inadequacies over the planning horizon to include analysis pursuant to 4 CSR 240-22.045(3). If any such facilities are determined to be required and, in the judgment of utility decision-makers, there is a risk of significant delays or cost increases due to problems in the siting or permitting of any required transmission facilities, this risk shall be analyzed pursuant to the requirements of 4 CSR 240-22.070(2).

(9~~8~~) The utility shall quantify the expected value of better information concerning at least the critical uncertain factors that affect the performance of the preferred resource plan, as measured by the present value of utility revenue requirements.

(10~~9~~) The utility shall develop an implementation plan that specifies the major tasks and schedules necessary to implement the preferred resource plan over the implementation period. The implementation plan shall contain:

(A) A schedule and description of ongoing and planned research activities to update and improve the quality of data used in load analysis and load forecasting;

(B) A schedule and description of ongoing and planned demand-side programs, program evaluations and research activities to improve the quality of demand-side programs;

(C) A schedule and description of all supply-side resource research, engineering, acquisition and construction activities; and

(D) Identification of critical paths and major milestones for each demand-side resource acquisition project and for each supply-side resource acquisition project, including decision points for committing to major expenditures.

(11) The utility shall develop a set of at least two (2) contingency resource plan options to help ensure reliable and low cost service should the preferred resource plan no longer be appropriate either due to the limits identified pursuant to 4 CSR 240-22.070(6)(C) being exceeded or for some other reason. Each contingency resource plan option shall satisfy at least the conditions found in sections (6) through (10) of this rule should the contingency resource plan option become the preferred resource plan.

(12) The utility shall develop a process for monitoring the critical uncertain factors on a continuous basis and reporting significant changes in a timely fashion to those managers or officers who have the authority to direct the implementation of contingency options when the specified limits for uncertain factors are exceeded.

(13~~0~~) The utility shall develop, document, ~~and~~ officially adopt and implement a resource acquisition strategy. This means that the utility's resource acquisition strategy shall be formally approved by the utility chairman of the board of directors~~, a committee of senior management, an officer of the company or other responsible party who has been duly delegated the authority~~ to commit the utility to the course of action described in the resource acquisition strategy. The officially adopted resource acquisition strategy shall consist of the following components:

(A) A preferred resource plan selected pursuant to the requirements of section (6) of this rule;

(B) An implementation plan developed pursuant to the requirements of section (10~~9~~) of this rule; and

(C) A set of contingency resource plan options developed pursuant to the requirements of section (11) of this rule and the point at which the critical uncertain factors would trigger the utility to move to each contingency resource plan option as the preferred resource plan.

~~(C) A specification of the ranges or combinations of outcomes for the critical uncertain factors that define the limits within which the preferred resource plan is judged to be appropriate and an explanation of how these limits were determined;~~

~~(D) A set of contingency options that are judged to be appropriate responses to extreme outcomes of the critical uncertain factors and an explanation of why these options are judged to be appropriate responses to the specified outcomes; and~~

~~(E) A process for monitoring the critical uncertain factors on a continuous basis and reporting significant changes in a timely fashion to those managers or officers who have the authority to direct the implementation of contingency options when the specified limits for uncertain factors are exceeded.~~

(14~~1~~) Reporting Requirements. To demonstrate compliance with the provisions of this rule, and pursuant to the requirements of 4 CSR 240-22.080, the utility shall furnish at least the following information:

(A) A discussion of the planning futures considered and selected by the utility in conducting Phase 1 of the risk analysis, including:

1. A description of the uncertain factors and policy variables that were considered in the development of the planning futures;
2. An explanation of how the critical uncertain factors and policy variable were determined;
3. An explanation of the reasons that the utility selected its planning futures;
4. A description and expected probability of each planning future; and
5. If the utility utilized a different method for identifying planning futures, the documentation of the alternative method required pursuant to (3).

(B) A discussion of the selection of the top resource plans in conducting Phase 2 of the risk analysis, including:

1. The results of the performance measures for each alternative resource plan under each planning future;
2. An explanation of the reasons that the utility selected the top resource plans; and
3. If the utility utilized a different method for selecting the top resource plans, the documentation of the alternative method required pursuant to (4).

(C) A discussion of the probability analysis of risk associated with each top resource plan in conducting Phase 3 of the risk analysis. A decision-tree diagram for each of the ~~alternative~~ top resource plans along with narrative discussions of the following aspects of the decision analysis:

1. A discussion of the sequence and timing of the decisions represented by decision nodes in the decision tree and a description of the specific decision alternatives considered at each decision point; ~~and~~

2. An explanation of how the critical uncertain factors were identified, how the ranges of potential outcomes for each uncertain factor were determined and how the subjective probabilities for each outcome were derived;

3. If the utility utilized a different method for developing the cumulative probabilities of the performance measures for the top resource plans, the documentation of the alternative method required pursuant to (5).

(D~~B~~) Plots of the cumulative probability distribution of each performance measure for each alternative resource plan;

(E~~C~~) For each performance measure, a table that shows the expected value and the risk of each resource plan;

(F~~D~~) A plot of the expected level of annual unserved hours for the preferred resource plan over the planning horizon;

(G~~E~~) A discussion and documentation of the analysis of the value of better information required by section (8), a tabulation of the key quantitative results of that analysis and a discussion of how those findings will be incorporated in ongoing research activities;

(H~~F~~) A discussion and documentation of the process used to select the preferred resource plan, including:

1. The~~the~~ relative weights given to the various performance measures;

2. The ~~and the~~ rationale used by utility decision-makers to:

A. Judge~~judge~~ the appropriate tradeoffs between competing planning objectives and between expected performance and risk; and

B. Determine that the preferred plan will perform adequately under extreme weather conditions; and

3. The names and titles of the utility decision makers; and

(I~~G~~) The fully documented resource acquisition strategy that has been developed and officially adopted pursuant to the requirements of section (13~~0~~) of this rule.

AUTHORITY: sections 386.040, 386.610 and 393.140, RSMo 1986 and 386.250, RSMo Supp. 1991.* Original rule filed June 12, 1992, effective May 6, 1993. *Original authority: 386.040, RSMo 1939; 386.250, RSMo 1939, amended 1963, 1967, 1977, 1980, 1987, 1988, 1991; 386.610, RSMo 1939; and 393.140, RSMo 1939, amended 1949, 1967.ä