Market Efficiency Process Scope and Input Assumptions

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Contents

Scope

Market Efficiency analysis is performed as part of the overall Regional Transmission Planning process to accomplish the following objectives:

- Determine which reliability-based transmission projects, if any, have an economic benefit if accelerated or modified.
- Identify new transmission projects that may result in economic benefits.
- Review costs and benefits of economic-based transmission projects included in the Regional Transmission Expansion Plan (RTEP) to ensure that they continue to be cost-beneficial.
- Identify economic benefits associated with modification of reliability-based transmission projects already included in the RTEP that when modified would relieve one or more economic constraints. Such projects, originally identified to resolve reliability criteria violations, may be designed in a more robust manner to provide economic benefits as well.

Market Efficiency analysis is conducted using market simulation software, which models the market conditions and the hourly security-constrained commitment and dispatch of generation over a future annual period. Economic benefits of transmission upgrades are determined by comparing results of simulations with and without the proposed transmission enhancement or expansion. For the 2026/2027 Market Efficiency cycle, market simulations will be performed for the following years: 2027, 2031, 2034 and 2037. A forecast of annual benefits for years beyond 2037 will be based on an extrapolation of the years 2027, 2031, 2034 and 2037 simulation results. Market simulations may be performed for year 2041 to validate the extrapolation results.

Market Simulation Model and Input Assumptions

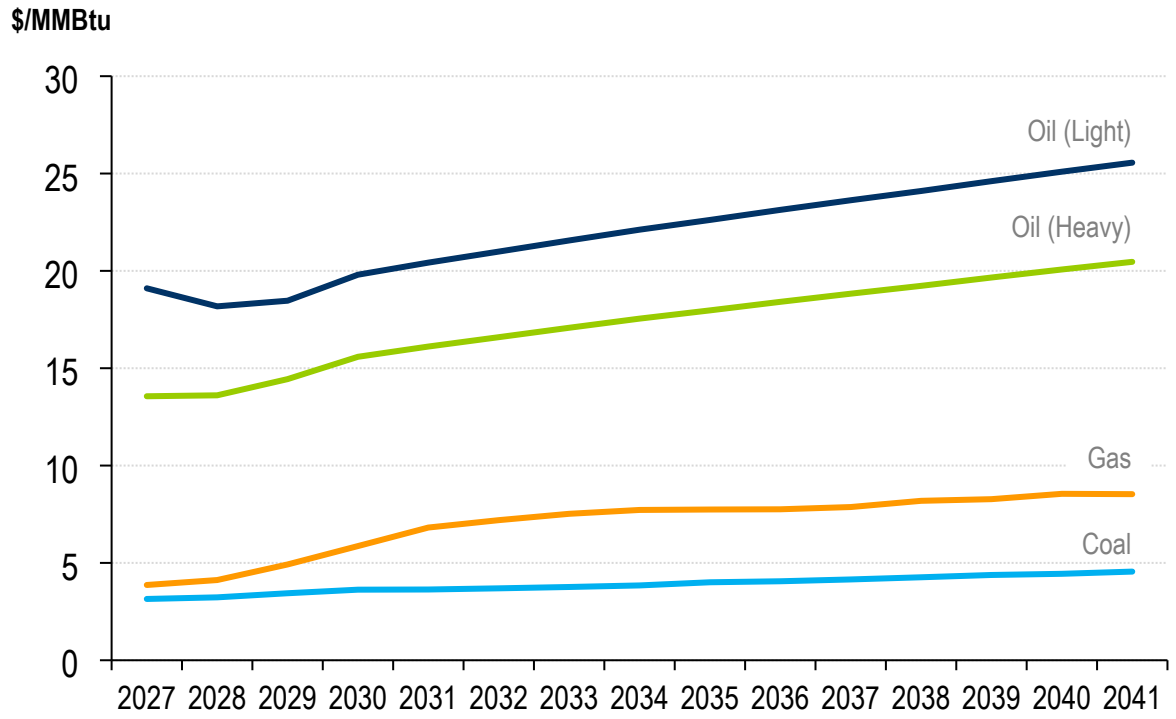
The primary analytical software used by PJM to determine potential Market Efficiency benefits is PROMOD V from Hitachi Energy. PROMOD V is a production-costing software application that simulates the hourly commitment and dispatch of generation to meet input load while recognizing and maintaining transmission system security limits. The underlying source of the initial PROMOD V input database is the Simulation Ready Data from Hitachi Energy. Data includes generating unit characteristics, fuel costs, emissions costs, load forecasts and a power flow case. The Simulation Ready Data for the 2026/2027 Market Efficiency cycle is from the fall 2025 base case release with Hitachi Energy fuel and emission updates consistent with the spring 2026 release. PJM does tailor key aspects of the base release for RTEP Market Efficiency evaluation. These items would include an update of the power flow case, a generation modification because of additional queued units and announced retirements, and the utilization of the most recent load forecasts.

Fuel Cost

The PROMOD database contains a fuel cost forecast for each fuel type. The forecast prices for each fuel are developed by the Hitachi Energy Fuels Group. For gas and oil, the prices are derived from a combination of NYMEX forward prices and a fundamental forecasting model. The coal forecasting model uses numerous factors, such as mining costs, transportation routes and pricing, and coal quality to derive a coal forecast. The resulting coal price forecast is on a plant-specific delivered basis.

0 shows the average annual forecast values for light oil, heavy oil, natural gas and coal. The natural gas prices depicted are representative of the commodity cost. PROMOD uses basis adders to capture the gas transportation costs of the commodity to the different PJM zones. The oil prices are representative of burner tip prices and are the same throughout the PJM region. The coal price included is the average of each PJM coal plant's burner tip price. The coal price forecast is on an individual plant-specific delivered basis.

Figure 1. Fuel Price Assumptions



Peak Load and Annual Energy

Peak load and annual energy forecasts for the PJM RTO were developed by PJM's Resource Adequacy Planning Department and released in the 2026 PJM Load Forecast Report. **Table 1** shows the annual PJM peak and annual energy forecast that provides the basis for load input into the simulation.

Table 1. 2026 PJM Peak Load and Energy Forecast

Load	2027	2031	2034	2037	2041
Peak (MW)	160,451	191,017	211,882	228,100	241,416
Energy (GWh)	898,163	1,170,946	1,348,192	1,479,300	1,580,537

Demand Response

Table 2 shows the level of demand response resources available for each of the Market Efficiency study years. The values are consistent with the 2026 Load Forecast Report.

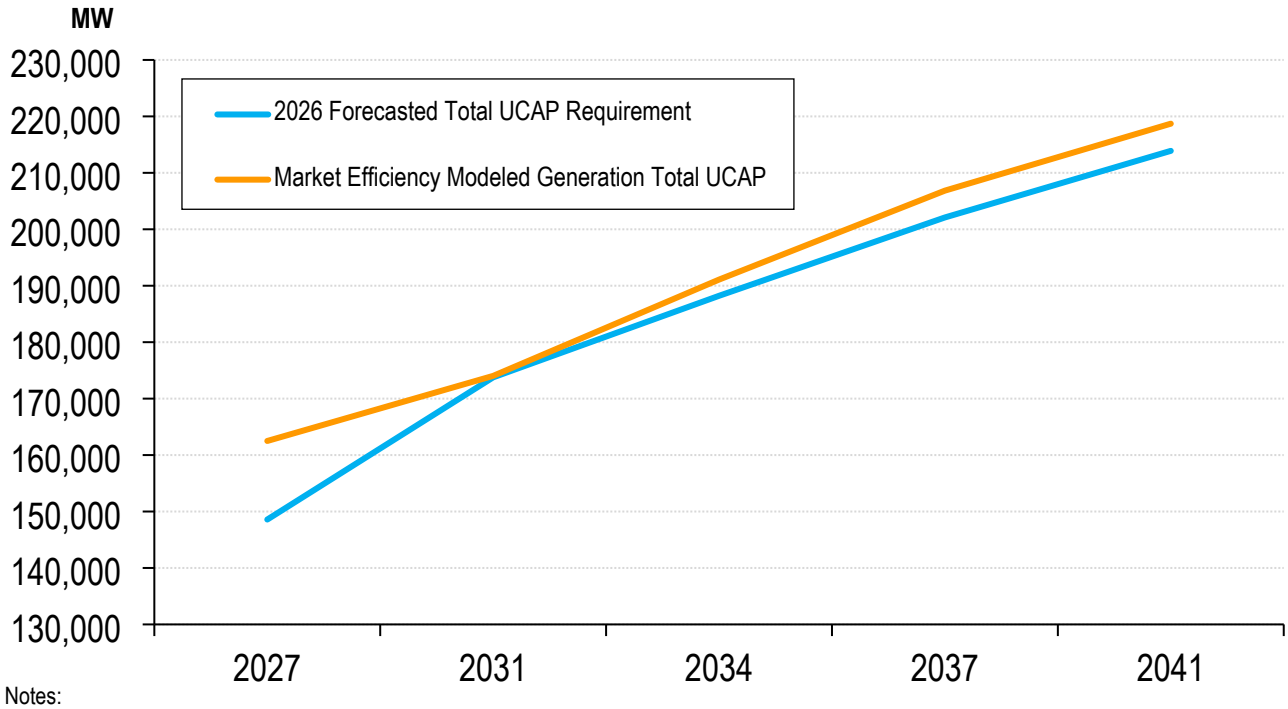
Table 2. 2026 PJM Demand Response Resources Forecast

	2027	2031	2034	2037	2041
Demand Response Resources (MW)	8,147	9,733	10,762	11,501	12,024

PJM Generation

Figure 2 shows a comparison of the modeled generation unforced capacity (UCAP) within PJM's footprint to the forecasted UCAP requirement for PJM. The UCAP requirement (blue line) is derived from information included in the 2026 PJM Load Forecast Report and the 2025 PJM Effective Load Carrying Capability and Reserve Requirement Study (PDF). The forecasted UCAP requirement is calculated from 2026/2027 to 2035/2036 based on the Forecast Pool Requirement (FPR) values from the Eleven-Year Reserve Requirement Study posted in 2025 and extrapolated for the study years beyond 2036. The modeled unforced capacity (red line) includes capacity that is modeled in the current 2031 and 2034 RTEP cases. Additional generation is modeled in any year that the reserve requirement is not met. The Market Efficiency generation total UCAP is calculated using the published Preliminary ELCC Class Ratings for 2027/28 to 2035/36 (PDF). The ELCC Class Ratings for 2035/2036 are assumed to remain constant for study years beyond 2036. The ELCC class for each existing PJM unit is informed by the 2028/29 RPM Existing Resource List (PDF).

Figure 2. PJM Market Efficiency Reserve Requirement



Notes:

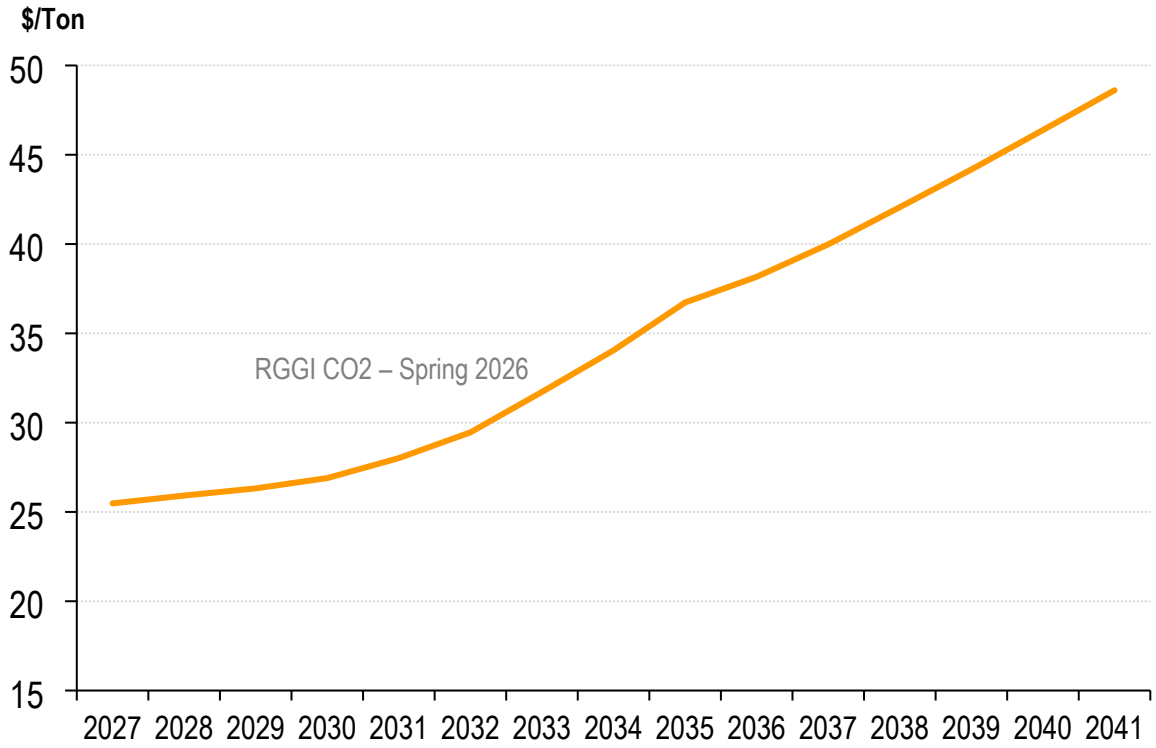
- Generation includes existing and projected PJM internal capacity resources.
- Model informed by the 2031 and 2034 RTEP power flows.
- Forecasted Total UCAP Requirement informed by the 2025 PJM Effective Load Carrying Capability and Reserve Requirement Study (PDF).
- Market Efficiency Generation Total UCAP informed by the Preliminary ELCC Class Ratings (PDF).

Emission Allowance Price

The PROMOD database models three major effluents: CO_2, NO_x and SO_2. Effluents (by trading program) are assigned to generators based on generator location, and release rates are from a variety of sources, including EPA CEMS data and the forecasted fuel used. Hitachi Energy uses a proprietary Emission Forecast Model (EFM) to simulate emission control decisions and simultaneously results in the three cap-and-trade market price forecasts (NO_x Annual, NO_x Seasonal, SO_2). Hitachi Energy uses a CO_2 emission forecast based on analysis associated with regional legislative proposals.

The spring 2026 forecast has Maryland, Delaware, New Jersey and Virginia participating in the Regional Greenhouse Gas Initiative (RGGI). Forecast prices for RGGI CO_2 are shown in **Figure 3**.

Figure 3. CO_2 Emission Price Assumption



Forecasts for NO_x and SO_2 reflect legislation associated with the Cross-State Air Pollution Rule (CSAPR). **Figure 4** and **Figure 4** show graphs of NO_x and SO_2 prices assumed in the Market Efficiency base case.

Figure 4. NO_x Emission Price Assumptions

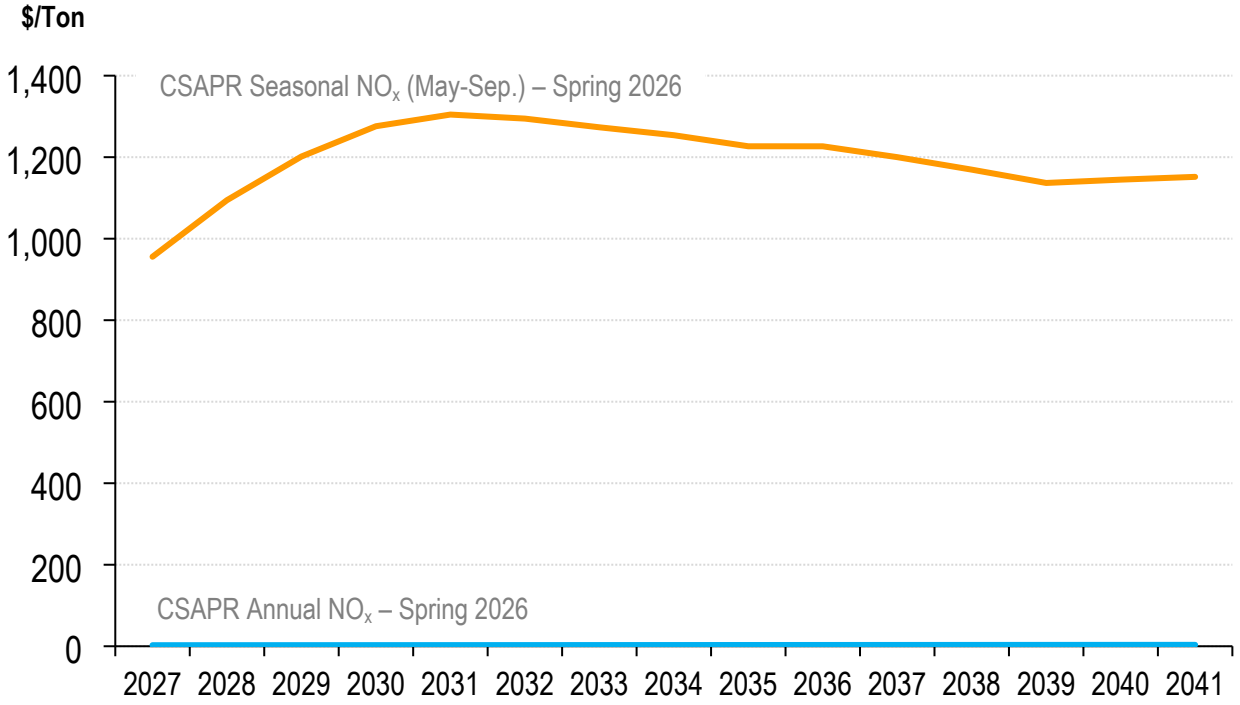
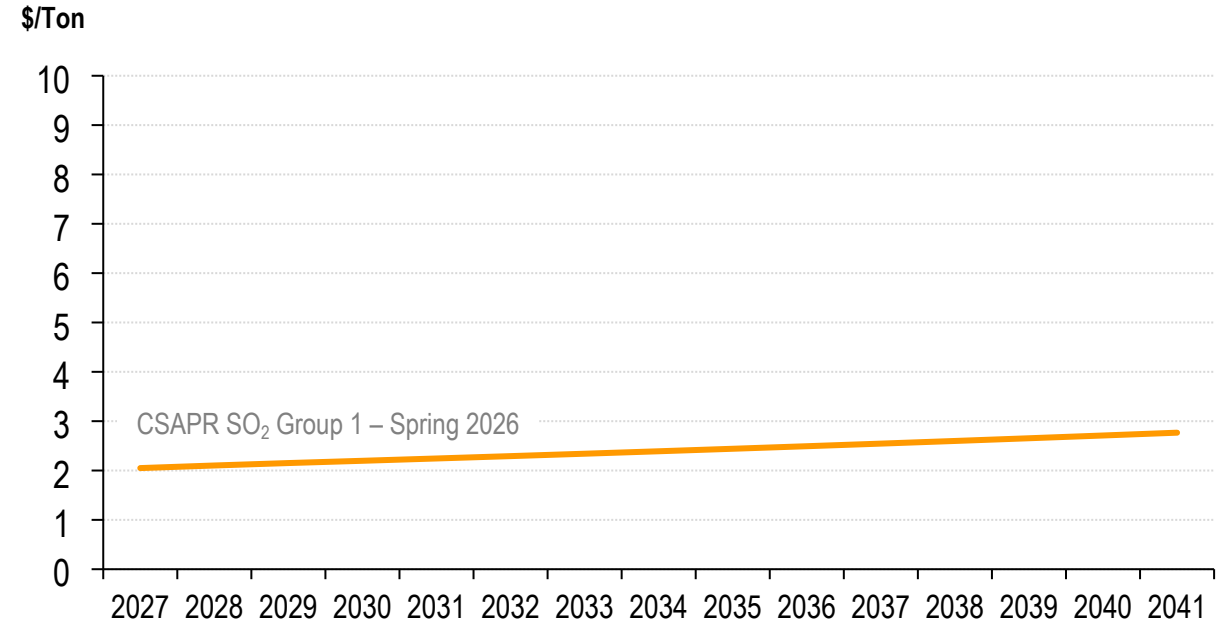


Figure 5. SO_2 Emission Price Assumption



Financial Parameters – Carrying Charge Rate and Discount Rate

Evaluation of proposed Market Efficiency projects requires a benefit-to-cost analysis. As part of this evaluation, the present value of annual benefits projected for a 15-year period starting with the RTEP year are compared to the present value of the annual cost for the same period. If the benefit-to-cost ratio exceeds a threshold of at least 1.25:1, then the project can be recommended for inclusion in the PJM RTEP. The annual cost of the upgrade will be based on the total capital cost of the project multiplied by a levelized annual carrying charge rate. A discount rate will be used to determine the present value of the project's annual costs and annual benefits. The annual carrying charge rate and discount rate are developed using information contained in the transmission owners' formula rate sheets and incorporated in the Transmission Cost Planner (TC Planner) tool. The annual carrying charge rate and discount rate for this year's analysis will be 12.08% and 7.28%, respectively.

Input Assumption Sensitivities

Consistent with Schedule 6 of the PJM Operating Agreement, sensitivities of future assumptions are considered within the Market Efficiency project selection process in order to mitigate the potential for inappropriately including or excluding Market Efficiency projects. PJM typically will evaluate the impacts of load forecast, fuel cost assumption and generation expansion variation.

With the advent of recent large load forecast changes and policies that are driving generation portfolio shifts, it is important that the sensitivities consider input from other PJM Reliability Planning processes. The Market Efficiency load, fuel, demand resource and generating capacity sensitivities will be determined before opening of the 2026/2027 Long-Term Window.