Annual Energy Outlook 2026: Case Descriptions

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Overview

Our *Annual Energy Outlook 2026* (AEO2026), with projections through 2050, considers factors such as economic growth, the ultimate size of domestic energy resources, and technological changes that are often uncertain. We also consider select alternative policies cases. To illustrate some of these uncertainties, we run side cases, compared with our Counterfactual Baseline (CB) case, to show how the model responds to changes in key input variables. This document describes seven core cases and four alternative policy cases in AEO2026:

- Counterfactual Baseline
- High Economic Growth
- Low Economic Growth
- High Oil and Gas Supply
- Low Oil and Gas Supply
- High Zero-carbon Technology Cost
- Low Zero-carbon Technology Cost
- Alternative Electricity
- Alternative Transportation
- Combination: Alternative Electricity and Alternative Transportation
- High Electricity Demand

Table 1 provides formal case names, scenario names, and datekeys. Results for all AEO2026 cases are available in the AEO table browser.

Summary of Cases

Table 1. Summary of *Annual Energy Outlook 2026* cases (released April 8, 2026)

Case name	Scenario name	Datekey
Counterfactual Baseline	CB2026	d021826b
Low Economic Growth	lowmacro	d021826b
High Economic Growth	highmacro	d021826b
Low Oil and Gas Supply	lowogs	d021826a
High Oil and Gas Supply	highogs	d021826a
Low Zero-carbon Technology Cost	lowZTC	d021826b
High Zero-carbon Technology Cost	highZTC	d021826b
Alternative Electricity	AltElec	d021826a
Alternative Transportation	AltTrnp	d021826a
Alternative Electricity and Alternative Transportation	ElecTrnp	d021826a
High Electricity Demand	HighElDmd	d021526a

Data source: U.S. Energy Information Administration, *Annual Energy Outlook 2026* (AEO2026)

Counterfactual Baseline case

In the Counterfactual Baseline case, we assess how U.S. and world energy markets would operate through 2050 under laws and regulations as of December 2025, under evolutionary technological growth assumptions. Our key assumptions in the Counterfactual Baseline case provide a baseline, or experimental control, for exploring long-term trends.

In prior AEO editions, the Counterfactual Baseline case was known as the Reference case.

The analytic assumptions in the AEO2026 Counterfactual Baseline are described in the AEO2026 Assumptions Report. Key legislations and regulations are described in the Summary of Legislation and Regulations included in the Annual Energy Outlook 2026.

The assumptions and inputs in the Counterfactual Baseline form the basis of the AEO side cases. Differing assumptions in side cases are noted where they deviate from the Counterfactual Baseline.

Macroeconomic Growth Cases

We developed the Low Economic Growth case and High Economic Growth case to reflect the uncertainty in projections of economic growth. These cases show the effects of alternative economic growth assumptions that are lower than or higher than the Counterfactual Baseline case. Changes in assumptions for growth in population and nonfarm labor productivity yield changes in the growth in nonfarm employment, real disposable income, and real GDP, among other macroeconomic concepts. Table 2 shows the average compound annual growth rates of these model parameters in the Counterfactual Baseline case and in the macroeconomic side cases.

Table 2. Macroeconomic growth rates in the *Annual Energy Outlook 2026* Low Economic Growth, Counterfactual Baseline, and High Economic Growth cases (2025–2050)

Model parameter	Low Economic Growth case	Counterfactual Baseline case	High Economic Growth case
Population	0.1%	0.3%	0.4%
Nonfarm labor productivity	1.4%	1.9%	2.4%
Nonfarm employment	0.3%	0.4%	0.5%
Real disposable income per capita	1.7%	2.0%	2.1%
Real gross domestic product	1.2%	1.7%	2.2%

Data source: U.S. Energy Information Administration, *Annual Energy Outlook 2026* (AEO2026), National Energy Modeling System runs: cb2026.d021826b, highmacro.d021826b, and lowmacro.d021826b
Note: Minor discrepancies with published data are a result of independent rounding.

Oil and Gas Supply Cases

Estimates of technically recoverable resources (TRR) for tight oil and natural gas are inherently uncertain and fluctuate with new data from drilling, production, and technological advancements. Historically, as more tight oil and shale formations have entered production, TRR estimates have generally risen. However, these increases rely on assumptions that may not hold uniformly across an entire formation or over the long term. For instance, some estimates may extrapolate production rates from one segment of a formation to the whole, despite significant variations in well performance and geological characteristics (e.g., depth, thickness, porosity, carbon content, pore pressure, clay content, thermal maturity, water content) across a petroleum basin. While technological innovations can unlock undiscovered resources, these are not typically included in the Counterfactual Baseline case as they are not yet known.

AEO2026 includes two side cases—Low Oil and Gas Supply and High Oil and Gas Supply— to assess the sensitivity of projections to different assumptions regarding domestic crude oil and natural gas resources and technological progress. These cases provide a framework for analyzing the effects of varying domestic supply levels on energy demand, imports, and prices.

In the **Low Oil and Gas Supply case**:

- Estimated ultimate recovery (EUR) per well for unconventional resources in the Lower 48 states, undiscovered resources in Alaska, and offshore Lower 48 states is assumed to be 50% lower than in the Counterfactual Baseline.
- Rates of technological improvement that reduce costs and enhance productivity in the United States are also 50% lower than in the Counterfactual Baseline. These assumptions lead to higher per-unit crude oil and natural gas development costs in the United States.

In the **High Oil and Gas Supply case**:

- EUR per well for unconventional resources in the Lower 48 states, undiscovered resources in Alaska, and offshore Lower 48 states is assumed to be 50% higher than in the Counterfactual Baseline.
- Rates of technological improvement are also 50% higher than in the Counterfactual Baseline.
- The Liquid Fuels Market Module (LFMM) assumes increased crude oil pipeline and export capacity to accommodate higher domestic production in this case.

Zero-carbon Technology Cost Cases

To address the uncertainty in the future costs of power generation technologies that produce zero emissions, AEO2026 provides two cases: one assuming technology costs that are higher than those in the Counterfactual Baseline case and another assuming technology costs that are lower. We applied the changes in the cost assumptions to the following technologies:

- Electric power sector
  - Conventional hydropower
  - Geothermal
  - Biomass, with and without carbon capture and sequestration system
  - Solar photovoltaic, standalone and hybrid
  - Onshore and offshore wind
  - Diurnal storage
  - Advanced nuclear and small modular reactors
- End-use sector
  - Solar photovoltaic
  - Wind
- Other
  - Electrolyzers deployed in production of hydrogen

We include hydrogen electrolyzers in the case definition because the eligibility for the 45V Clean Hydrogen Production Tax Credit as established by the Inflation Reduction Act (IRA) of August 2022 and amended by One Big Beautiful Bill Act of 2025, implies zero carbon emissions.

In the High Zero-carbon Technology Cost (ZTC) case, the overnight capital cost is held constant at the first projection year level throughout the projection period for all of the technologies listed above. In the Low ZTC case, we assume overnight capital costs and fixed operating and maintenance (O&M) costs

decline more rapidly than in the Counterfactual Baseline case, falling 40% below their Counterfactual Baseline case equivalents by 2050 for all of these technologies. Other assumptions within these two cases remain the same as in the Counterfactual Baseline case.

Alternative Electricity

The AEO2026 Counterfactual Baseline case includes the implementation of the U.S. Environmental Protection Agency's (EPA) April 2024 revisions to standards set for Section 111 of the Clean Air Act (CAA) to regulate carbon dioxide emissions from existing coal, oil, and natural gas-fired steam generating units and new natural gas-fired combustion turbines. In June 2025, EPA proposed to repeal all greenhouse gas emissions standards for the power sector under Section 111 of the CAA, which would remove all requirements imposed by the 2024 rule. The Alternative Electricity case assumes that this proposed rule becomes final, and the requirements of the rules issued in April 2024 are not in place. The Alternative Electricity case allows existing coal plants to continue operation throughout the projection period without any modifications to reduce emissions. The Alternative Electricity case also allows new natural gas-fired combined-cycle units to be built and operated without restrictions on their operating hours and irrespective of any installed carbon capture equipment. Plants with carbon capture can still be built if economical, but new or existing power plants have no carbon capture requirements or federal emission standards. Any state or regional programs are modeled as they are in the Counterfactual Baseline case.

Alternative Transportation

The AEO2026 Alternative Transportation case captures the impact of removing the most recent light- and heavy-duty vehicle tailpipe GHG standards included in the AEO2026 Counterfactual Baseline case. Removal of the most recent tailpipe standards required adjustments to assumptions regarding vehicle manufacturer product plans and the anticipated rollout of charging infrastructure.

Policies removed for the Alternative Transportation case:

- EPA tailpipe greenhouse gas standards for light-duty vehicles in model year 2027+
- EPA Phase 3 tailpipe greenhouse gas standards for freight trucks and buses in model year 2027+
- EPA low nitrogen oxide requirements for freight trucks in model year 2027+

Behavioral response assumptions modified in the Alternative Transportation case for consistency with the policy change:

- Passenger vehicle manufacturers introduce new electric vehicle (EV) nameplates endogenously based on growth in EV sales, rather than based on plans announced in 2025.
- Charging infrastructure buildout is coupled with growth in EV registrations, rather than being exogenously determined based on private- and public-sector announcements.

High Electricity Demand

The AEO2026 High Electricity Demand case examines uncertainty about long-term computational requirements and data center server power draw across the commercial building stock. In this case, we make alternative assumptions about change in data center server Annual Energy Consumption (AEC) over time. We model increases in AEC based on historical estimates for average operational power draw, changes in the composition of installed server stocks, and operational characteristics of AI servers and conventional servers.[1] To develop this case, we now report data center server energy use separately from the broader category of commercial computing.

Across all cases, to estimate change in average data center server annual energy consumption over time, we assume:

- The market share of AI servers will be increasingly skewed toward more energy intensive, higher GPU server types.
- The installed stock of AI servers grows exponentially relative to historical trends through at least 2040.
- AI server power draw grows exponentially relative to historical trends through 2040, then reverts to a linear trend.

The energy intensity of cooling, ventilation, and IT equipment loads is higher across floorspace where data center servers operate relative to non-data center floorspace. In the Counterfactual Baseline case, we assume that historical growth trends do not continue through 2050. For example, assumed power draw reverts to a linear trend and begins to slow in 2040; we assume energy efficiency will improve such that average annual power draw will decrease 10% every three years. Growth in the installed stock of AI servers also reverts to a linear trend starting in 2040, and accounts for approximately 30% of all installed servers by 2050.

In contrast, in the High Electricity Demand case:

- Data center server average AEC increases to more than 15 times 2018 levels, compared with 8.5 times in the Counterfactual Baseline case.
- Growth in AEC expands in line with exponential increases in AI server installed stock, and assumptions about faster increases in operational power draw.
- We make no additional assumptions about increases in computational efficiency over time, beyond what is present in historical trends.
- Installed stock of AI servers grows exponentially, accounting for more than 60% of data center servers in 2050.
- By 2050, average operational power draw for the installed stock of AI servers is assumed to be 40% higher in 2050 than in the Counterfactual Baseline case.

[1]Guidehouse, Inc., and Leidos, Inc., Analysis and Representation of Miscellaneous Electric Loads in NEMS (Washington, DC: U.S. Energy Information Administration, April 2021)

- Cooling, ventilation, non-server computing, and other electricity use to support data center operations is as much as 3 times more intensive than we assume in our Counterfactual Baseline case.

Table 3. Select data center server modeling parameters in 2050

Case	Installed stock of data center servers (all types)	AI server share of installed stock (%)	Server Annual Energy Consumption (TWh/yr)	Change in AEC (index, 2018 = 1.0)
Counterfactual Baseline	60 million	30%	800	8.5
High Electricity Demand	113 million	60%	1,440	15.7

Alternative Electricity and Alternative Transportation Combination

The Alternative Electricity and Alternative Transportation Combination case further explores the impact of policy uncertainty by combining the assumptions in the Alternative Electricity and Alternative Transportation cases.