



# Assumptions to the Annual Energy Outlook 2026: Coal Market Module

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## Coal Market Module

The National Energy Modeling System's (NEMS) Coal Market Module (CMM) projects U.S. coal production, consumption, exports, imports, distribution, and prices. The CMM consists of three functional areas: coal production, coal distribution, and coal exports. You can find a detailed description of the CMM in our publication, [Coal Market Module of the National Energy Modeling System: Model Documentation 2025, DOE/EIA-M060 \(2025\)](#) (Washington, DC).

### Key assumptions

#### *Coal production*

Domestic coal supply is represented by supply curves, where the price of coal affects the quantity of coal supplied annually. The supply curves are positive and upward sloping, indicating a direct correlation between price and quantity supplied. As the price increases, coal production also increases. As a non-homogenous commodity, coal produced at two different mines will have different chemical properties, so consumers may want different types of coal based on their different energy needs. For modeling purposes, the CMM generates 14 annual supply curves (Figure 1) grouped by:

- Six geographic regions
- Five coal classification types (representing coal type, thermal grade, and end use)<sup>a</sup>
- Two mining techniques (underground or surface)

EIA derived the coal supply curves by econometric formulation of annual coal production that relates the price level of coal supply to independent variables driving production cost. Changes to cost may shift the curves up or down, but changes to productive capacity may shift the curves out or back. Other factors help determine the shape and elasticity of the curves, such as:

- Historical average capacity utilization for each curve
- Projected available mining capacity for each curve
- Labor productivity for each curve
- Capital cost of mining equipment (nationally)
- Cost of variable factor inputs, such as miner wages, electricity, and petroleum fuels (regionally and by mining technique)
- *Other mining costs*

The modeling mechanism allows additional production capacity to be added if capacity utilization rises above a predetermined level, typically about 80%. Likewise, if capacity utilization of a supply curve falls, mining capacity can be reduced. This change in capacity represents coal mines opening, closing, expanding, or reducing operations. The amount of capacity the module can add or retire in a projection year depends on the supply curve, but for most curves, utilization rates below 50% in a year will reduce capacity by 3% in the following year, while utilization above certain thresholds will increase production capacity.

Regional coal mine wages used to construct labor cost, are exogenous inputs based on state-level data compiled by the U.S. Department of Labor. The annual wage for U.S. coal miners averaged \$110,023 in 2024.<sup>1</sup> Our *Annual Energy Outlook 2026* (AEO2026) assumes miner wages in the future remain flat in real terms (that is, increase at the general rate of inflation) starting at the 2024 wage level.

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<sup>a</sup> Coal supply regions are no longer grouped according to sulfur content of the coal.

Figure 1. Map of U.S. coal supply regions

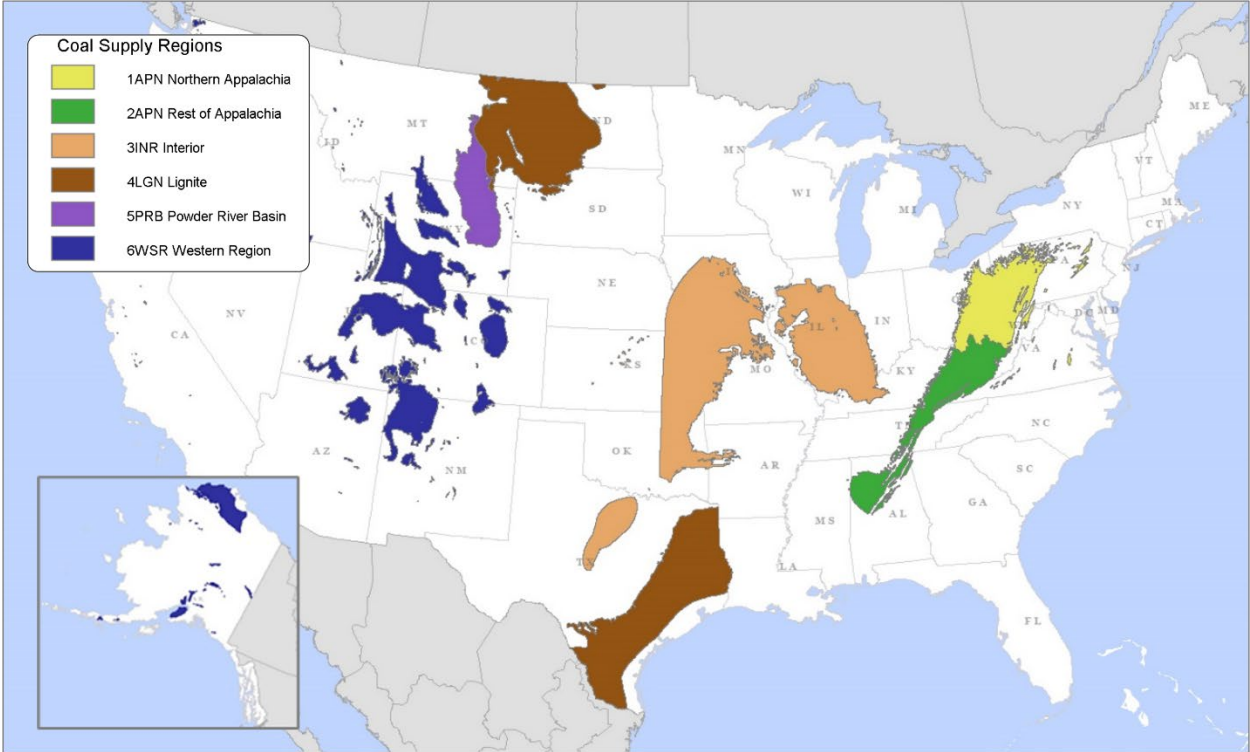


Table 1. U.S. coal supply regions by mine type and coal rank

| Supply curve | Supply region | Supply region name  | Mine type   | Coal rank      |
|--------------|---------------|---------------------|-------------|----------------|
| 1            | 1APN          | Northern Appalachia | Surface     | Bituminous     |
| 2            | 1APN          | Northern Appalachia | Underground | Bituminous     |
| 3            | 1APN          | Northern Appalachia | Surface     | GOB/Waste Coal |
| 4            | 1APN          | Northern Appalachia | Underground | Premium        |
| 5            | 2APR          | Rest of Appalachia  | Surface     | Bituminous     |
| 6            | 2APR          | Rest of Appalachia  | Underground | Bituminous     |
| 7            | 2APR          | Rest of Appalachia  | Underground | Premium        |
| 8            | 3INR          | Interior            | Underground | Bituminous     |
| 9            | 3INR          | Interior            | Surface     | Bituminous     |
| 10           | 4LGN          | Lignite             | Surface     | Lignite        |
| 11           | 5PRB          | Powder River Basin  | Surface     | Subbituminous  |
| 12           | 6WSR          | Western Region      | Underground | Bituminous     |
| 13           | 6WSR          | Western Region      | Surface     | Subbituminous  |
| 14           | 6WSR          | Western Region      | Surface     | Bituminous     |

Source: U.S. Energy Information Administration

*Other mining costs* are represented in the curves by producer price indexes for things like construction equipment, mining machinery, iron and steel products, and explosives. Like wages and productivity, *Other mining costs* we used as dependent variables in the regression that forms the supply curves. We build two separate indexes, one for underground mines and another for surface mines.<sup>2</sup> The current assumption is that these *Other mining costs* remain constant at 2022 levels.

Each of the 14 coal supply curves have different regional rates of labor productivity (Table 1). In 2024, mine labor productivity averaged 5.3 tons per miner-hour in the United States. EIA compiles data from individual coal mines and preparation plants for historical years. Labor productivity base year values use the quarterly and annual data from U.S. Department of Labor, Mine Safety and Health Administration (Form 7000-2, *Quarterly Mine Employment and Coal Production Report*), and our Form EIA-7A, *Annual Survey of Coal Production and Preparation*.

**Table 2. Coal mining production and labor productivity by coal supply region for 2024 base year**

| No. | Supply region       | Sulfur grades | Mine type   | Coal type     | Sulfur grades | Production (million tons) | Productivity (tons per miner hour) | Mine labor hours (million) |
|-----|---------------------|---------------|-------------|---------------|---------------|---------------------------|------------------------------------|----------------------------|
| 1   | Northern Appalachia | All           | Surface     | Bituminous    | All           | 1.7                       | 1.7                                | 1.2                        |
| 2   | Northern Appalachia | All           | Underground | Bituminous    | All           | 69.9                      | 4.1                                | 13.3                       |
| 3   | Northern Appalachia | All           | Surface     | Waste Coal    | All           | 3.9                       | 1.7                                | 4.9                        |
| 4   | Northern Appalachia | All           | Underground | Premium       | All           | 25.7                      | 4.1                                | 5.8                        |
| 5   | Rest of Appalachia  | All           | Surface     | Bituminous    | All           | 18.4                      | 2.1                                | 9.6                        |
| 6   | Rest of Appalachia  | All           | Underground | Bituminous    | All           | 4.9                       | 1.7                                | 4.4                        |
| 7   | Rest of Appalachia  | All           | Underground | Premium       | All           | 46.0                      | 1.7                                | 28.0                       |
| 8   | Interior            | All           | Underground | Bituminous    | All           | 50.1                      | 5.2                                | 2.4                        |
| 9   | Interior            | All           | Surface     | Bituminous    | All           | 15.9                      | 4.8                                | 11.7                       |
| 10  | All Lignite         | All           | Surface     | Lignite       | All           | 22.7                      | 9.3                                | 4.3                        |
| 11  | Powder River Basin  | All           | Surface     | Subbituminous | All           | 211.5                     | 24.7                               | 7.7                        |
| 12  | Western Region      | All           | Underground | Bituminous    | All           | 7.8                       | 4.4                                | 1.2                        |
| 13  | Western Region      | All           | Surface     | Subbituminous | All           | 16.4                      | 8.8                                | 2.0                        |
| 14  | Western Region      | All           | Surface     | Bituminous    | All           | 3.6                       | 8.8                                | 2.8                        |
|     | U.S. total          | All           | All         | All           | All           | 498.5                     | 5.3                                | 99.2                       |

Data source: U.S. Energy Information Administration, *Annual Energy Outlook 2026*, National Energy Modeling System run cb2026.d012226a

Historically, coal mining labor productivity has improved in some regions, while declining in other regions. Driven by the decline in coal use in electricity generation, coal production capacity has been

reduced as the mining sector contracts from mines closing. It is unclear whether assuming productivity improvement in any of the 14 newly reconfigured supply regions is justified.

For AEO2026 the coal mining labor productivity growth rate is set using the three-year moving average between 2011 and 2022. For curves where labor productivity declined historically, we adopted that negative growth rate. For curves where labor productivity increased historically, we capped the productivity growth at 1% per year. Table 2 shows the mining labor productivity for selected years and the annual growth rate for the projection period. Labor productivity improving or declining has no impact on whether a supply area continues to produce coal. The utilization rate shifts the supply curves outward or backward, while productivity affects the shape and cost of the supply curve.

**Table 3. Coal mining productivity by supply curve**

short tons per miner hour

| Supply region                                  | 2024  | 2025  | 2030  | 2040  | 2050  | Average annual growth<br>2025–2050 |
|--|-------|-------|-------|-------|-------|------------------------------------|
| Northern Appalachia - Surface - Bituminous     | 1.73  | 1.71  | 1.60  | 1.42  | 1.25  | -1.2%                              |
| Northern Appalachia - Underground - Bituminous | 4.13  | 4.17  | 4.38  | 4.84  | 5.35  | 1.0%                               |
| Northern Appalachia - Surface - Waste Coal     | 1.73  | 1.73  | 1.73  | 1.73  | 1.73  | 0.0%                               |
| Northern Appalachia - Underground - Premium    | 4.13  | 4.17  | 4.38  | 4.84  | 5.35  | 1.0%                               |
| Rest of Appalachia - Surface - Bituminous      | 2.11  | 2.07  | 1.87  | 1.52  | 1.23  | -2.0%                              |
| Rest of Appalachia - Underground - Bituminous  | 1.69  | 1.68  | 1.64  | 1.56  | 1.48  | -0.5%                              |
| Rest of Appalachia - Underground - Premium     | 1.69  | 1.68  | 1.64  | 1.56  | 1.48  | -0.5%                              |
| Interior - Underground - Bituminous            | 5.16  | 5.21  | 5.48  | 6.05  | 6.68  | 1.0%                               |
| Interior - Surface - Bituminous                | 4.80  | 4.81  | 4.83  | 4.89  | 4.95  | 0.1%                               |
| All Lignite - Surface - Lignite                | 9.28  | 9.37  | 9.85  | 10.88 | 12.02 | 1.0%                               |
| Powder River Basin - Surface - Subbituminous   | 24.72 | 24.37 | 22.68 | 19.65 | 17.02 | -1.4%                              |
| Western Region - Underground - Bituminous      | 4.38  | 4.39  | 4.42  | 4.49  | 4.56  | 0.2%                               |
| Western Region - Surface - Subbituminous       | 8.76  | 8.82  | 9.16  | 9.87  | 10.64 | 0.8%                               |
| Western Region - Surface - Bituminous          | 8.76  | 8.64  | 8.09  | 7.08  | 6.20  | -1.3%                              |
| U.S. average                                   | 5.34  | 5.52  | 4.42  | 3.32  | 3.01  | -2.4%                              |

Data source: U.S. Energy Information Administration, AEO2026, National Energy Modeling System run CB2026.D0122226a

### *Coal distribution*

The CMM's Domestic Coal Distribution Submodule determines the least-cost solution for coal delivered to each demand sector using a linear programming algorithm. Delivered costs include the cost of producing coal (mine price) plus the cost of transporting coal between 14 supply regions (Figure 1) and 16 demand regions (Figure 2).

The Industrial Module projects demand for industrial steam coal and coking coal activity, the Commercial Demand Module projects commercial and institutional coal demand. Coal-to-liquids (CTL) was previously modeled in NEMS and the CMM can allocate coal to this end use if required. The CTL technology remains uneconomical given the large investment in the Permian Basin shale oil formations in the last 10 years, which has bolstered U.S. oil supply. The current version of the refining model has disabled the ability to create synthetic crude or distilled petroleum from coal and therefore passes no CTL demand to CMM.

The Electricity Market Module (EMM) projects coal demand from the electric power sector. The 2026 Reference case assumes the EPA 111 New Source Performance Standards will take effect in the projection in 2032. Under EPA 111, existing steam generation using coal must either a) convert to burning 40% natural gas and continue to operate until 2038, or b) install carbon capture and storage technology and continue to operate. Those coal plants that choose neither option must retire. The EPA 111 rule causes a significant decline in coal demand in the Counterfactual Baseline case and most side cases after 2032. The Alternative Electricity case assumes EPA 111 rule is not implemented as specified in the rule published in 2024.<sup>b</sup>

The United States is an exporter of metallurgical and steam coal. We project coal exports and imports in the International Coal Distribution Submodule of the CMM based on:

- Export levels for U.S. coal based on metallurgical and steam coal trade from EIA modeling of international coal demand
- Price and availability of coal supply outside the United States
- Endogenously determined U.S. demand for coal imports
- Exogenously determined world (non-U.S.) coal import demands

### *Coal distribution*

EIA staff determine transportation rates between coal supply and demand regions by applying an annual projected national transportation price index to a two-tier rate structure. The first tier represents the historical average transportation rate estimated for a base year using our recent survey data. The second tier captures costs associated with changing patterns of coal demand for electricity generation. We updated our approach to coal transportation rate escalation several years ago based on our assessment of the current methodology and independent contractor recommendations.<sup>3</sup>

We calculate base-year domestic coal transportation rates as the average transportation costs for each supply origin-to-demand destination pair, but we don't differentiate by transportation mode (rail, truck, barge, and conveyor). We compute these rates (by demand sector and for export) as the difference between the average delivered price for coal in each demand region, and either the reported commodity price or the average minemouth price for each available coal supply curve. We define these rates by region, coal rank, and mine type. We derive delivered prices from these sources:

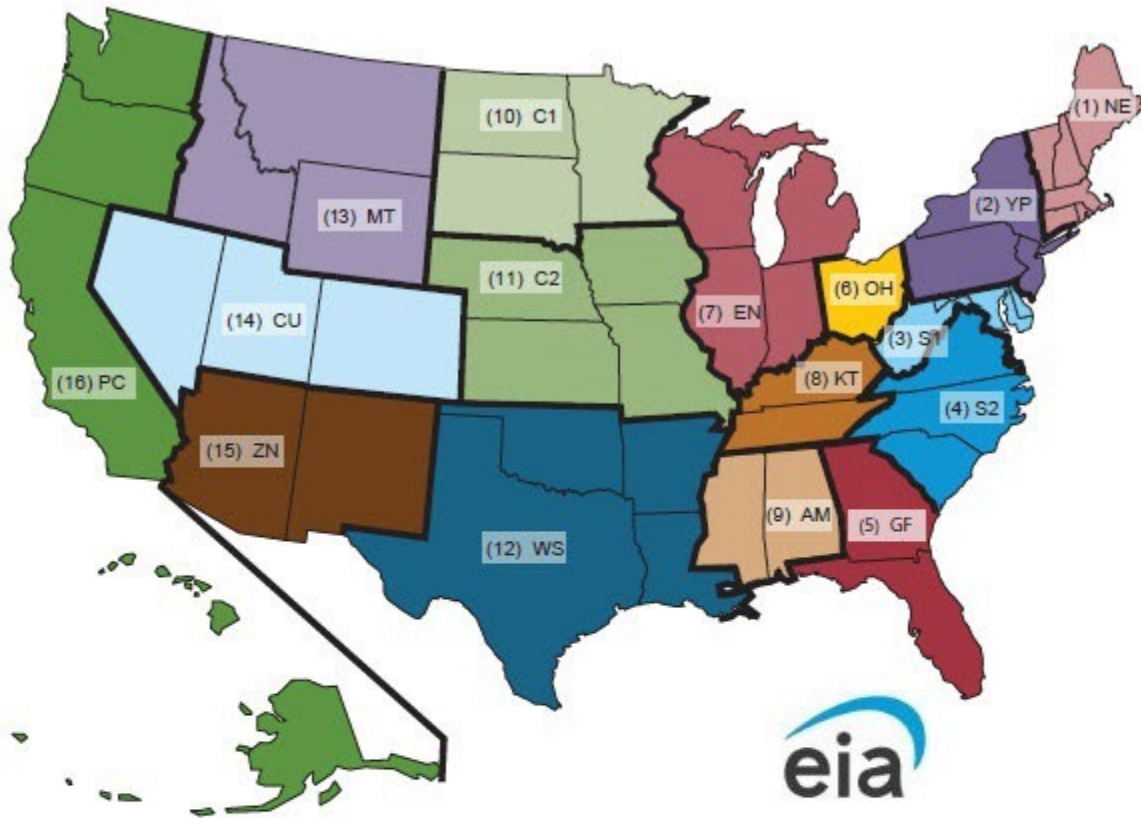
- Survey Form EIA-3, *Quarterly Survey of Industrial, Commercial & Institutional Coal Users*
- Survey Form EIA-923, *Power Plant Operations Report*
- The U.S. Census Bureau, *Monthly Report EM-545*

We derive minemouth prices from survey Form EIA-7A, *Annual Survey of Coal Production and Preparation*. We updated the base-year coal transportation rates in the CMM for AEO2026 based on data from 2021 to 2023 for paths that have been active in recent years. As a result of the transportation rate update, some paths we used historically are now inactive because regional coal demand has disappeared, coal mines have shuttered, or coal trade along the path has become uneconomical.

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<sup>b</sup> In February 2026, EPA announced a final rule rescinding the GHG Endangerment Finding that was the basis of the EPA 111 rule discussed here. The policy assumptions for AEO2026 were finalized in December of 2025 and based on laws and regulations in effect as of that date.

Figure 2. Map of coal demand regions



| Region | Code | Content                |
|--------|------|------------------------|
| 1      | NE   | CT, MA, ME, NH, RI, VT |
| 2      | YP   | NY, PA, NJ             |
| 3      | S1   | WV, MD, DC, DE         |
| 4      | S2   | VA, NC, SC             |
| 5      | GF   | GA, FL                 |
| 6      | OH   | OH                     |
| 7      | EN   | IN, IL, MI, WI         |
| 8      | KT   | KY, TN                 |

| Region | Code | Content            |
|--------|------|--------------------|
| 9      | AM   | AL, MS             |
| 10     | C1   | MN, ND, SD         |
| 11     | C2   | IA, NE, MO, KS     |
| 12     | WS   | TX, LA, OK, AR     |
| 13     | MT   | MT, WY, ID         |
| 14     | CU   | CO, UT, NV         |
| 15     | ZN   | AZ, NM             |
| 16     | PC   | AK, HI, WA, OR, CA |

Data source: U.S. Energy Information Administration

For the electricity sector, we applied a two-tier transportation rate structure to those regions that, in response to changing patterns of coal demand, may expand their market share beyond historical levels. The first-tier rate represents the historical average transportation rate. The second-tier transportation rate captures the higher cost of expanded shipping distances in large demand regions. The second tier also captures costs associated with using subbituminous coal at units that were not originally designed for that use.

**Table 4. Coal transportation rate multipliers**

constant dollar index, 2024=1.000

| Case                             | 2024  | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|----------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Counterfactual Baseline          | 1.000 | 1.078 | 1.094 | 1.052 | 1.074 | 1.078 | 1.095 |
| Low Economic Growth              | 1.000 | 1.102 | 1.097 | 1.058 | 1.057 | 1.046 | 1.038 |
| High Economic Growth             | 1.000 | 1.067 | 1.076 | 1.040 | 1.063 | 1.063 | 1.076 |
| Low Oil & Gas Supply             | 1.000 | 1.078 | 1.117 | 1.086 | 1.095 | 1.103 | 1.135 |
| High Oil & Gas Supply            | 1.000 | 1.078 | 1.079 | 1.038 | 1.062 | 1.065 | 1.087 |
| Low Zero-Carbon Technology Cost  | 1.000 | 1.078 | 1.094 | 1.050 | 1.074 | 1.079 | 1.100 |
| High Zero-Carbon Technology Cost | 1.000 | 1.078 | 1.094 | 1.051 | 1.071 | 1.075 | 1.092 |
| Alternative Electricity          | 1.000 | 1.078 | 1.095 | 1.062 | 1.085 | 1.101 | 1.126 |
| Alternative Transportation       | 1.000 | 1.078 | 1.095 | 1.055 | 1.075 | 1.078 | 1.095 |
| Alternative Elec/Trans Combined  | 1.000 | 1.078 | 1.096 | 1.066 | 1.085 | 1.100 | 1.124 |
| High Electricity Demand          | 1.000 | 1.078 | 1.094 | 1.052 | 1.073 | 1.074 | 1.090 |

Data source: U.S. Energy Information Administration, *Annual Energy Outlook 2026*, National Energy Modeling System runs cb2026.d021826b, lm2026.d021826b, hm2026.d021826b, lowogs.d021826a, highogs.d021826a, lowZTC.d021826b, highZTC.d021826b, altelec.d021826a, alttrnp.d021826a, electrnp.d021826a, higheldamd.d021826a.

The CMM adjusts the base-year coal transportation rates, both first and second tier, over time by applying an annual projected index for the national coal transportation rate. The index measures the change in average transportation rates for coal shipments on a tonnage basis by applying a rail cost adjustment factor (RCAF) approach, following the cost breakouts in the Surface Transportation Board's (STB) All-Inclusive Index (STB\_A-II). The index makes an additional adjustment for railroad productivity improvements. Table 3 shows the coal transportation rate escalation cumulative multipliers in selected years for each of the AEO2026 side cases.

To create the transport rate multipliers, the model uses relevant annual indexes available within the NEMS modeling framework. The indexes represent annualized change to other factors that affect coal transportation cost, like depreciation, interest rates, rail wages, fuel, and other factor input costs. The [Association of American Railroads](#) calculates cost by major category and a Rail Cost Adjustment Factor (RCAF) and files it quarterly with the STB. The CMM normalizes the NEMS indexes used in the RCAF approach to the year corresponding to the latest shares in the STB\_A-II. Under this approach, the CMM applies the 2021 shares to the rate of change from 2020 to 2021 of the corresponding indexes from NEMS to create the weighted-average escalation factor for 2021. The CMM then adjusts the RCAF share weights to reflect their contribution to the escalation factor in 2021 and uses these weights to create the escalation factor for 2022 and so on for each projection year. Table 4 shows the factor input cost component shares for 2024 and lists which NEMS indexes are used to project each cost component. The model will then adjust these escalation factors to account for railroad productivity improvements being shared with coal shippers.

**Table 5. Rail cost adjustment factor (RCAF) shares for factor inputs**

| RCAF variable          | 2024 share | AAR short-term escalator basis   | NEMS macroeconomic indexes and prices  |
|------------------------|------------|--|--|
| Labor                  | 32.4%      | Sector analysis of subcomponents for rail sector   | Employment cost index. Private wages and salaries adjusted to remove inflation and convert base year (2021=1.00)           |
| Fuel                   | 14.6%      | Ultra-low sulfur diesel fuel referenced, but otherwise, based on a survey of rail purchasers and petroleum experts   | Transportation sector diesel fuel price in 1987 dollars per million British thermal units indexed to base year (2021=1.00) |
| Materials and supplies | 4.9%       | References change in prices for metal products and miscellaneous products  | Index for railroad materials and supplies based on producer price index of metals and metal products (2021=1.00)           |
| Equipment rentals      | 4.4%       | Producer price index for industrial commodities excluding the cost of fuel, power, and related products (PPI-LF)   | Index for equipment rentals based on producer price index of industrial commodities excluding energy (2021=1.00)           |
| Depreciation           | 16.6%      | Producer price index for railroad equipment (PPI-RE)   | Index for depreciation based on railroad equipment from the producer price index of transportation equipment (2021=1.00)   |
| Interest               | 2.4%       | Interest rates for 10- and 30-year U.S. Treasury Bonds are referenced, but the latest historical value based on annual reports from railroads is carried forward | Index for borrowed debt by the railroads based on real AA utility bond rates (2021=1.00)                                   |
| Other                  | 24.7%      | Producer price index for industrial commodities excluding the cost of fuel, power, and related products (PPI-LF)   | Index for other costs based on producer price index of industrial commodities excluding energy (2021=1.00)                 |

Data source: Association of American Railroads (AAR), [Rail Cost Indexes](#), RCAF Quarterly Filings & Decisions, [STB RCAF 2025Q4 Decision 09-08-2023](#), Docket No. EP 290 (Sub-No. 5) (2023-4); U.S. Energy Information Administration, National Energy Modeling System (NEMS)

While it is generally expected that transportation cost will increase along with the cost of factor inputs, it is not uncommon for the railroads to improve productivity. We therefore assume that railroad productivity will improve by 1.4% per year, but the shipping rates the railroads charge to its customers will not always reflect these improvements. We based this assumption on the independent contractor analysis described in our assessment of coal transportation rate methodology<sup>3</sup>. If total U.S. annual coal production on a three-year moving average basis is declining, then we assume railroad companies share a portion of the rail productivity improvements with its customers to help maintain coal's competitiveness. If coal production decreases by more than 5.0% from one year to the next, we assume rail companies share half of their productivity improvement, or 0.7%, with rail shippers. This is applied to the computed escalation factor using the RCAF methodology. For example, if we project the RCAF to increase by 1.0% from one model year to the next, but coal production is set to decline by more than 5.0%, coal transportation rates would increase by only 0.3% overall. The extent to which shippers will benefit from rail productivity improvements when coal production declines by less than 5.0% decreases to zero exponentially from 5.0% as the decline in coal production approaches zero. We do not assume that railroads will share rail productivity improvements with consumers if coal production is either flat or increasing from one year to the next.

In addition, coal contracts in the CMM represent the minimum demand for a specific electricity coal that must be met by a unique coal supply source before the CMM considers any alternative supply sources. This is not a cost adjustment but rather represents a floor on coal usage at the plant level. We estimate base-year (2024) coal contracts between coal producers and electricity generators based on receipts data reported by generators on the Form EIA-923, *Power Plant Operations Report*. We categorize coal

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contracts by CMM supply region, coal type, demand region, and whether a unit has flue gas desulfurization equipment. We reduce coal contract quantities over time, based on:

- Contract duration data from information reported on Form EIA-923
- Historical patterns of coal use
- Information obtained from various coal and electric power industry publications and reports

### *Coal imports and exports*

Before AEO2022, we modeled coal imports and exports as part of the CMM's linear program that projects annual U.S. steam and metallurgical coal exports in the context of world coal trade. The CMM projects steam and metallurgical coal trade flows from 17 coal-exporting regions of the world to 20 coal-importing regions for two coal types (steam and metallurgical), including 5 U.S. export regions and 4 U.S. import regions. After we adopted a new model, called the [International Coal Market Module \(ICMM\)](#) in *the International Energy Outlook 2021 (IEO2021)*, international coal production, coal trade, and coal prices for coal produced throughout the world are now exclusively solved for in the ICMM based on international coal demands from our World Energy Projection System (WEPS) modules. The CMM matrix of 17 exporting and 14 importing regions for international coal transport (while still active) is now constrained so that U.S. exports of coal in all the cases roughly match our international outlook for coal trade.

For AEO2026 Counterfactual Baseline case (and all side cases) coal exports will roughly match the [IEO2023 Reference case U.S. coal exports](#), and near term exports in 2025 and 2026 will match exports published in the [EIA Short Term Energy Outlook](#) release (within a 2% tolerance), while coal exports through 2024 match historical coal trade leaving the United States, as collected by EIA and U.S. Commerce Department surveys. Detailed international coal trade is not available in any AEO2026 tables.

### *Coal quality*

For each AEO cycle, we calibrate the base-year coal production to survey Form EIA-7A, *Annual Survey of Coal Production and Preparation*. In addition, to reflect the coal quality of each modeled coal source, we calculate the average values for:

- Heat content (MMBtu per ton)
- Sulfur content (pounds per MMBtu)
- Mercury content (pounds per trillion British thermal units [TBtu])
- Carbon dioxide (CO<sub>2</sub>) emissions, when the coal is burned (pounds per MMBtu)

We use Form EIA-923 (which collects the quantity, origin point, cost, and quality of fossil fuels delivered to generating facilities) and Form EIA-3 (which collects the quantity, origin point, cost, and quality of coal delivered to U.S. commercial and institutional users and domestic coke plants) to calculate these average values. Coal quality for the export sector is based on data collected on Form EIA-7A for domestic production and matches export shipments collected by the U.S. Census Bureau's *Monthly Report EM-545*. Mercury content data for coal by supply region and coal type, in units of pounds of mercury per trillion British thermal units, are derived from shipment-level data reported by electricity generators to the EPA in its 1999 *Information Collection Request*. CO<sub>2</sub> emission factors for each coal type, based on data published by EPA, are shown in Table 4 in pounds of CO<sub>2</sub> emitted per million British thermal units.<sup>4</sup>

**Table 6. Production, heat content, sulfur, mercury, and carbon dioxide (CO2) emission factors by coal region, rank, and mine type**

| Coal supply No | region              | States  | Coal rank                 | Mine type | 2024 production (million short tons) | 2024 heat content (million British thermal units per short ton) | 2024 sulfur content (pounds per million British thermal units) | Mercury content (pounds per trillion British thermal units) | CO <sub>2</sub> (pounds per million British thermal units) |
|----------------|---------------------|---|---------------------------|-----------|--------------------------------------|---|--|---|--|
| 1              | Northern Appalachia | Pennsylvania, Ohio, Maryland, and West Virginia (North)                               | Bituminous                | Surface   | 2.1                                  | 23.5  | 2.6  | 19.7  | 206.5  |
| 2              | Northern Appalachia | Pennsylvania, Ohio, Maryland, and West Virginia (North)                               | Bituminous                | Deep      | 55.0                                 | 25.6  | 2.1  | 12.8  | 206.5  |
| 3              | Northern Appalachia | Pennsylvania, Ohio, Maryland, and West Virginia (North)                               | Waste coal (gob and culm) | Surface   | 8.4                                  | 11.6  | 4.1  | 27.6  | 206.5  |
| 4              | Northern Appalachia | Pennsylvania, Ohio, Maryland, and West Virginia (North)                               | Premium                   | Deep      | 24.2                                 | 28.7  | 0.6  | NA  | 206.5  |
| 5              | Rest of Appalachia  | Kentucky (East), West Virginia (South), Virginia, Alabama, and Tennessee              | Bituminous                | Surface   | 20.3                                 | 24.8  | 0.7  | 8.1   | 204.6  |
| 6              | Rest of Appalachia  | Kentucky (East), West Virginia (South), Virginia, Alabama, and Tennessee              | Bituminous                | Deep      | 7.4                                  | 24.5  | 0.5  | 7.0   | 204.6  |
| 7              | Rest of Appalachia  | Kentucky (East), West Virginia (South), Virginia, Alabama, and Tennessee              | Premium                   | Deep      | 47.4                                 | 28.8  | 0.4  | NA  | 204.6  |
| 8              | Interior            | Illinois, Indiana, Kentucky (West), and Mississippi                                   | Bituminous                | Deep      | 56.2                                 | 23.0  | 2.4  | 7.0   | 203.8  |
| 9              | Interior            | Illinois, Indiana, Kentucky (West), and Mississippi                                   | Bituminous                | Surface   | 11.5                                 | 22.3  | 2.5  | 7.0   | 203.8  |
| 10             | Lignite             | Texas, North Dakota, Montana, Mississippi, and Louisiana                              | Lignite                   | Surface   | 39.5                                 | 13.7  | 1.3  | 10.0  | 215.0  |
| 11             | Powder River Basin  | Wyoming and Montana   | Subbituminous             | Surface   | 189.9                                | 17.5  | 0.3  | 7.4   | 214.3  |
| 12             | Western Region      | Arizona, Colorado, Montana (non-PRB), Utah, New Mexico, Wyoming (non-PRB), and Alaska | Bituminous                | Deep      | 17.3                                 | 22.8  | 0.5  | 4.6   | 214.5  |
| 13             | Western Region      | Arizona, Colorado, Montana (non-PRB), Utah, New Mexico, Wyoming (non-PRB), and Alaska | Subbituminous             | Surface   | 24.5                                 | 18.9  | 0.5  | 5.5   | 213.9  |
| 14             | Western Region      | Arizona, Colorado, Montana (non-PRB), Utah, New Mexico, Wyoming (non-PRB), and Alaska | Bituminous                | Surface   | 5.3                                  | 18.2  | 0.9  | 2.8   | 214.5  |

Note: N/A=not available

Data source: U.S. Energy Information Administration, Form EIA-3, *Quarterly Survey of Industrial, Commercial & Institutional Coal Users*; Form EIA-7A, *Annual Survey of Coal Production and Preparation*; and Form EIA-923, *Power Plant Operations Report*. U.S. Department of Commerce, U.S. Census Bureau, *Monthly Report EM-545*. U.S. Environmental Protection Agency, Emission Standards Division, Information Collection Request for Electric Utility Steam Generating Unit, Mercury Emissions Information Collection Effort (Research Triangle Park, NC, 1999). U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009 ANNEX 2 Methodology and Data for Estimating CO<sub>2</sub> Emissions from Fossil Fuel Combustion, EPA 430-R-10-006 (Washington, DC, April 2011), Table A-37

## Legislation and regulations

We base AEO2026 on current laws and regulations in effect as of December 2025. The EMM implements nearly all of the legislation and regulations that apply to coal-fired electric generating units; however, we use the CMM to model certain aspects of the Clean Air Act Amendments of 1990's (CAA90) emissions limits in certain instances, including:

### *Cross-State Air Pollution Rule*

The CMM accounts for the Cross-State Air Pollution Rule (CSAPR),<sup>5</sup> finalized in 2015 and updated in 2021, which required 12 states to update their emissions budget for nitrogen oxides.

The CMM sets regional limits (constraints) throughout the projection period for sulfur dioxide (SO<sub>2</sub>) based on annual allowance set by EPA under CSAPR. The sulfur content for U.S. coal produced in 2020 is displayed in Table 5 along with heat content, mercury content, and average CO<sub>2</sub> emissions.

### *Mercury and Air Toxics Standards*

The CMM considers the Mercury and Air Toxics Standards (MATS), finalized in December 2011.

Retrofit decisions in the EMM are the primary means of compliance for MATS, but the CMM also includes transportation cost adders for removing mercury using activated carbon injection.

A full discussion of the legislation and regulations affecting the use of coal in power generation and industrial applications such as making coal coke appears in the *Summary of Legislation and Regulations included in the Annual Energy Outlook 2025* document located on our [Assumptions website](#). We assume that any coal-fired electricity generating plants that would be built comply with applicable current regulations. We also include a three-percentage-point adder to the cost-of-capital for coal and natural gas-fired combined-cycle plants to represent observed market behavior of a reluctance to finance or invest in technologies that are at significant risk of being subject to future controls on carbon emissions.

## Notes and Sources

<sup>1</sup> U.S. Department of Labor, Bureau of Labor Statistics, Quarterly Census of Employment and Wages, NAICS 2121. Coal mining for all states and U.S. supply region as well as U.S. average weighted by production and labor hours from Form EIA-7A, [Annual Survey of Coal Production and Preparation](#).

<sup>2</sup> U.S. Department of Labor, Bureau of Labor Statistics, Series: Producer Price Index by Industry: Mining Machinery and Equipment Manufacturing (PCU333131333131) and Producer Price Index by Industry: Construction Machinery Manufacturing (PCU333120333120).

<sup>3</sup> U.S. Energy Information Administration, [Improving the Method for Coal Transportation Rate Escalation in the NEMS Coal Market Module](#) (Washington, DC, August 2020).

<sup>4</sup> U.S. Environmental Protection Agency, [Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009](#), Annex 2 Methodology and Data for Estimating CO<sub>2</sub> Emissions from Fossil Fuel Combustion, EPA 430-R-10-006, Table A-37 (Washington, DC, April 2011).

<sup>5</sup> U.S. Environmental Protection Agency, [“Overview of the Cross-State Air Pollution Rule”](#) (Washington, DC, September 7, 2016).