United States Energy Association

Coal in the U.S. Southwest: From Legacy Power Generation to Strategic Carbon-Based Materials, Minerals, and Industrial Resilience

OVERVIEW

Coal has played a foundational role in shaping the energy systems, industrial base, and regional economies of the Southwestern United States for more than a century and remains a strategically significant domestic resource, providing power and fuel security. This article examines coal's historical role in the Southwest, assesses its current status, and evaluates pathways to stabilize and optimize existing assets while expanding coal's contribution through non-power applications, including critical minerals, construction materials, and advanced carbon products.

HISTORICAL CONTEXT: COAL'S ROLE IN THE SOUTHWEST

Coal development in the Southwestern United States emerged later than in the Appalachian and Midwestern coal regions, shaped by geography, federal land ownership, and infrastructure constraints rather than early industrial demand. Commercial coal mining in the Southwest began in the late 19th and early 20th centuries, primarily to supply railroads, smelters, military installations, and local industries in Arizona, New Mexico, Utah, and Colorado (U.S. Geological Survey). Early production was modest and localized, reflecting limited transportation access and the region's sparse population compared with eastern coal basins.

The industry expanded significantly after World War II, driven by rapid population growth in the Southwest, large-scale federal infrastructure projects, and rising electricity demand. Major coal deposits were developed in the San Juan Basin of northwestern New Mexico and southwestern Colorado, the Black Mesa and Kayenta regions of northeastern Arizona, and coalfields in central and eastern Utah (U.S. Energy Information Administration; USGS). Southwestern coal production relied heavily on surface mining, benefiting from thick, laterally extensive coal seams and lower extraction costs.

From the 1960s through the 1990s, coal became a cornerstone of Southwestern power generation through the construction of large regional coal-fired power plants designed to serve fast-growing urban centers and energy-intensive water infrastructure. Facilities such as the Navajo Generating Station, Four Corners Power Plant, San Juan Generating Station, and Intermountain Power Project anchored long-term coal demand and supported the development of dedicated rail and conveyor systems linking mines to power plants (EIA). During this period, coal production in the region increasingly intersected with tribal lands, particularly within the Navajo Nation, making coal revenues and employment a significant component of local and regional economies.

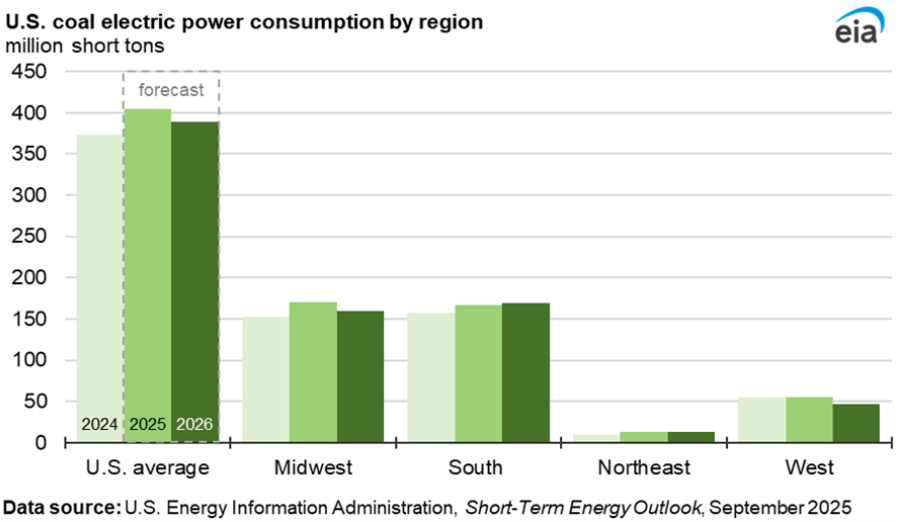
Beginning in the late 2000s, Southwestern coal entered a period of contraction as natural gas prices declined and environmental compliance costs increased. Power plant retirements and mine closures accelerated in the 2010s, reducing coal's role in electricity generation while leaving substantial reserves and industrial infrastructure in place (EIA Annual Coal Report). This historical trajectory (late development, rapid mid-century expansion, and recent contraction) has positioned coal in the Southwest as a mature resource base facing decisions regarding stabilization and repurposing.

CURRENT STATUS: COAL'S ROLE IN THE US AND THE SOUTHWEST

NATIONAL COAL PRODUCTION AND USE

In the United States, coal production and consumption have been in decline for more than a decade. In 2024, total U.S. coal production was approximately 512.5 million short tons, while total domestic coal consumption was 410.9 million short tons (U.S. Energy Information Administration, *Annual Coal Report 2024*). The electric power sector remained the dominant end-use market, accounting for roughly 87.6% of total coal consumption that year (*Annual Coal Report 2024*). Coal-fired power plants generated about 15% of total U.S. electricity in 2024. (U.S. Energy Information Administration).

Over the past year, coal has received renewed policy attention as concerns have grown over grid reliability, fuel security, and domestic resource availability. In 2025, federal energy policy placed greater emphasis on preserving existing coal capacity, citing its reliability value and reliance on domestically produced fuel (White House energy policy statements; U.S. Department of Energy). Administration officials have signaled support for extending the operational life of coal-fired power plants, reassessing environmental and permitting constraints, and expanding federal research into advanced coal technologies, and non-power uses of coal, including critical minerals and carbon-based materials (U.S. Department of Energy, Office of Fossil Energy and Carbon Management).



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, September 2025

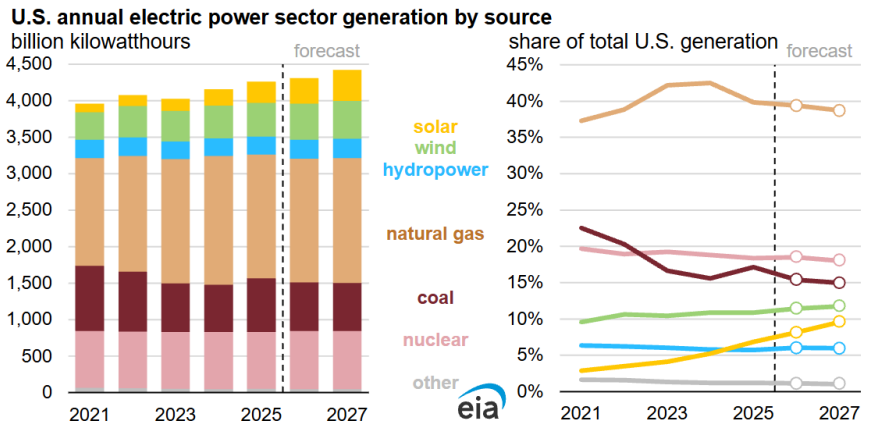
EPA announced on February 20, 2026, that it had finalized the repeal of specific 2024 amendments to the Mercury and Air Toxics Standards (MATS) for coal and oil-fired power plants, with the final rule published in the Federal Register on February 24 and effective April 27, 2026. The action reverts key compliance requirements to the 2012 MATS framework by removing the stricter 2024 filterable particulate matter standard for existing coal-fired EGUs, the tighter mercury standard for lignite-fired EGUs, and the requirement for PM continuous emissions monitoring systems. EPA framed the repeal as part of a broader effort to preserve baseload generation, support grid reliability, and reduce regulatory costs for coal and oil-fired power plants. The rule represents a material 2025-2026 policy development for the U.S. coal fleet and should be considered in forward-looking assessments of coal-plant operating costs, compliance strategy, and potential retirement timing.

These policy signals have contributed to slower than expected coal retirements, increased attention to coal stockpiles, and renewed interest in coal's role during periods of extreme weather and peak demand (U.S. Energy Information Administration, Electric Power Monthly; North American Electric Reliability Corporation). Collectively, these developments underscore that coal's future in the United States, particularly in regions such as the Southwest, is being shaped by a broader set of strategic considerations: grid reliability, fuel security, and the diversification of coal's industrial applications.

SOUTHWESTERN COAL TODAY

In the Southwestern United States, coal mining and coal-fired generation continue despite the retirement of several high-profile facilities over the past decade. While historic facilities such as the Navajo Generating Station and the San Juan Generating Station, and Cholla Power Plant have closed, a small number of coal-fired generators (most notably the Four Corners Generating Station) remain in operation. In this context, coal continues to function as a reliable generation resource, providing firm capacity and grid stability during periods of peak demand, extreme heat, and renewable variability, conditions that are increasingly common in the Southwest's power system.

Coal production also continues across the region primarily for domestic consumption and, in limited cases, export markets. Tribal entities, most notably Navajo Transitional Energy Company, continue to manage significant coal assets following recent power plant closures, sustaining employment and revenue streams in Native communities. These operations underscore coal's ongoing role not only as an energy input but as an economic anchor in parts of the Southwest.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, January 2026

The extensive domestic reserves of coal and its on-site storage ability continue to distinguish it from other fuels. Recent data indicate that U.S. coal-fired power plants maintained substantial fuel inventories in recent years, enhancing resilience against fuel supply disruptions and extreme weather events (Reuters energy reporting; U.S. Energy Information Administration). This stockpiling capability, combined with coal's reliability, reinforces its continued role in supporting system reliability in the Southwest, particularly as grid operators balance growing renewables with the need for firm generation.

PATHWAYS TO STABILIZE AND OPTIMIZE THE COAL INDUSTRY

To sustain coal's economic relevance, industry stakeholders and policymakers are increasingly focused on strategies that enhance the value of existing coal assets without relying exclusively on traditional power generation. This approach has gained renewed momentum under the Trump administration, which has emphasized preserving generation, extending the useful life of domestic energy infrastructure, and reducing regulatory barriers that accelerate premature retirements. Current policy signals favor optimization, modernization, and diversification, positioning coal assets to support grid reliability, industrial activity, and emerging non-power value chains.

3.1 Modernization of Existing Coal Infrastructure

Across the Southwest and nationally, coal plant operators are evaluating targeted modernization measures aligned with both market realities and recent federal policy. These measures include:

- **Digital optimization, advanced controls, and predictive maintenance** technologies to improve heat rates, reduce forced outages, and lower operating costs, thereby extending asset life without major costs.
- **Selective co-firing and emissions-control upgrades**, enabling plants to remain compliant under current standards while preserving optionality for future carbon utilization or capture pathways.

Consistent with the current administration's emphasis on domestic energy security and infrastructure resilience, these efforts treat coal plants not as legacy liabilities but as strategic industrial platforms.

3.2 Workforce Development

Stabilizing coal's role in the Southwest also depends on workforce strategies that align with the administration's broader focus on domestic manufacturing, skilled labor retention, and regional economic growth. Coal miners and power plant workers possess technical skills directly applicable to adjacent sectors, including advanced materials manufacturing, critical minerals processing, industrial operations, and carbon-based product fabrication.

Training and transition programs that build on existing expertise in extraction, mechanical systems, process control, and materials handling can facilitate movement into higher-value industrial roles without displacing communities or eroding local economic bases. Recent federal messaging has emphasized maintaining employment continuity, supporting regional industry clusters, and avoiding abrupt workforce displacement, an approach that reinforces coal industries.

BEYOND POWER GENERATION: EXPANDING COAL'S INDUSTRIAL VALUE

The coal industry is increasingly focusing on value-added pathways that use coal and its byproducts for non-combustion applications. These alternatives offer opportunities for industrial diversification while aligning with national priorities for domestic supply chains.

4.1 Critical Minerals and Rare Earth Elements

Coal and coal combustion byproducts (CCBs), such as fly ash and bottom ash, contain measurable concentrations of rare earth elements (REEs) and other critical minerals used in advanced electronics, defense systems, and clean energy technologies. Key REEs (including neodymium and dysprosium) are essential for permanent magnets, batteries, and industrial components. Because the United States currently produces only a limited share of global REEs, developing domestic sources has become a strategic priority.

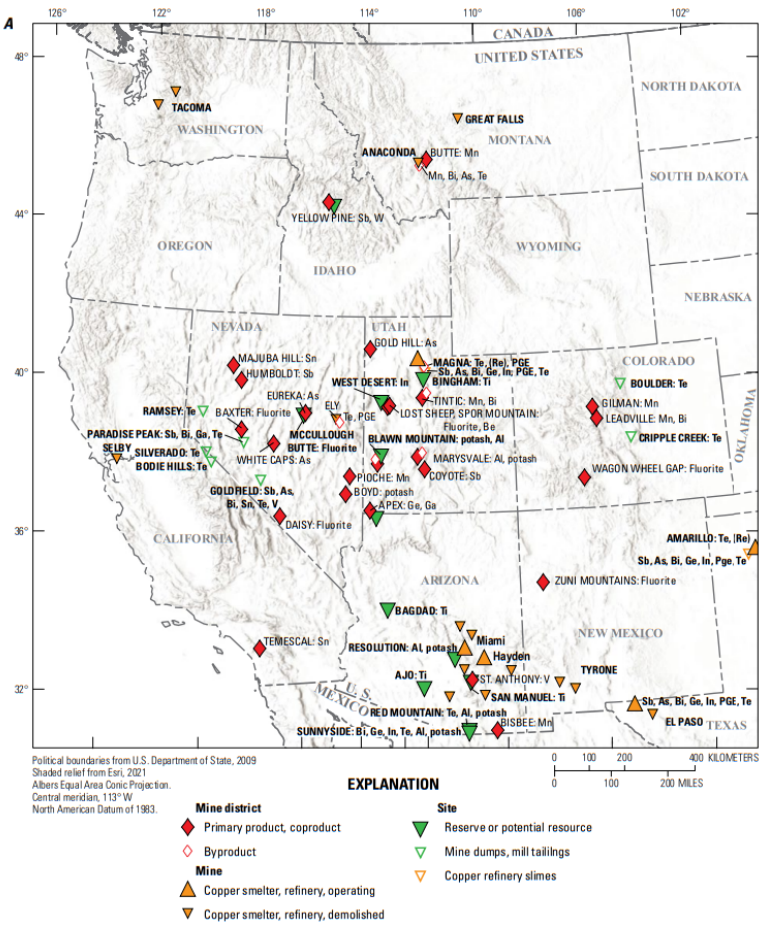


Figure 1. Maps showing locations of deposits and resources of critical minerals in Western States. *A*, Production (primary product; byproduct), reserves, and resources (including unmined deposits; mine, mill, and copper refinery interim products) of Sb, As, Bi, fluorite, Ga, Ge, In, Mn, potash, Te, Sn, Ti, and V in Western States (table 1). *B*, Porphyry copper-(molybdenum) (Cu-(Mo)) deposits in Western States. *C*, Porphyry Cu-Mo deposits and districts in Arizona and New Mexico. *D*, Porphyry Cu-Mo deposits and districts in Nevada. *E*, Tungsten deposits and resources in Western States and Alaska described in text and tabulated (open black diamonds; table 2).

In the Southwestern United States, several coal-producing regions and legacy power plants have been identified as promising candidates for critical mineral recovery. Research supported by the U.S. Department of Energy has found that coal ash from the San Juan Basin in New Mexico, including material associated with the San Juan Generating Station, contains REE concentrations suitable for pilot-scale recovery. Similar DOE-funded studies have evaluated coal ash and mine materials linked to facilities in Arizona and Utah, demonstrating the technical feasibility of extracting mixed rare earth concentrates at pilot scale from these existing waste streams. Because coal ash is already stored at centralized sites, recovering critical minerals from these materials offers a lower-impact alternative to developing new mines. These Southwestern examples show that coal byproducts can serve as secondary domestic sources of critical minerals, supporting supply-chain security while creating new industrial opportunities in regions historically dependent on coal (DOE; USGS).

4.2 Construction and Infrastructure Materials

Coal combustion products, particularly fly ash, have been used for decades in construction and infrastructure projects across the Southwestern United States. Fly ash functions as a supplementary cementitious material, improving concrete strength, durability, and resistance to heat and cracking while reducing the need for Portland cement, which is one of the most carbon-intensive construction inputs (U.S. Environmental Protection Agency; National Academies of Sciences). In the Southwest, fly ash from coal-fired power plants in Arizona, New Mexico, Utah, and Colorado has been routinely incorporated into highway construction, bridges, and large civil works projects, particularly in arid and high-temperature environments where durability is critical. State departments of transportation in the region have approved fly ash for use in concrete pavements and structural applications as it improves long-term performance under extreme heat and wide temperature swings common in the Southwest (Federal Highway Administration; EPA CCR reuse program).

Coal ash has also been used regionally in road base materials, structural fill, bricks, and wallboard. These applications are particularly relevant for fast-growing Southwestern metropolitan areas, where demand for roads, housing, and water infrastructure remains high and local material sourcing reduces transportation costs and environmental impacts (EPA Coal Combustion Residuals Beneficial Use Reports). Together, these established uses demonstrate that coal byproducts in the Southwest already support cost-effective and resource-efficient infrastructure, providing a practical example of how coal-related materials can continue to deliver value well beyond electricity generation.

4.3 Advanced Carbon and Material Products

Coal and coal-derived carbon materials also offer pathways into advanced, higher-value products that extend well beyond traditional energy uses. Coal and coal byproducts can serve as resources for solid carbon materials, including activated carbon used in water and air filtration, carbon fibers and composites for advanced manufacturing, and graphitic materials used in batteries and industrial applications (U.S. Department of Energy). In the Southwestern United States, this potential aligns closely with existing industrial and research capacity. DOE-supported research at national laboratories in the region (including Los Alamos National Laboratory and Sandia National Laboratories) has explored carbon-based materials for energy storage, filtration, and structural applications. In parallel, coal-derived activated carbon has been used in water treatment and industrial filtration systems in arid Southwestern states, where demand for water purification and reuse is especially high (DOE; EPA water treatment programs). By integrating coal source material into regional chemical, materials, and manufacturing supply chains, Southwestern coal can support industrial resilience, domestic production of advanced materials, and new revenue streams, while leveraging infrastructure and workforce skills already in place.

STRATEGIC GROWTH PATHWAYS: POLICY AND MARKET CONSIDERATIONS

Building on the industrial and non-power pathways outlined above, the expansion of coal and coal byproduct utilization in the Southwestern United States will depend less on new capacity development and more on targeted policy, investment coordination, and market integration. Growth opportunities are most likely to emerge through actions that convert existing assets and technical capabilities into commercially viable industries:

- **Recognition of coal's reliability attributes within state and regional market structures** can support both existing generation and emerging non-power value chains. In both regulated and competitive markets, policies that appropriately value fuel security, on-site fuel storage, and capacity accreditation (including through resource adequacy frameworks, capacity markets, or reliability-based compensation mechanisms) can help maintain economically viable coal assets. This, in turn, preserves critical infrastructure

and supply chains that underpin the development of coal-to-products, carbon materials, and critical mineral recovery industries.

- **Federal and state-supported demonstration projects** are essential to advancing technologies from pilot stages to early commercial deployment. In the Southwest, expanding DOE-supported efforts for rare earth and critical mineral recovery from coal ash (particularly at existing storage sites and retired plant locations) can reduce technical and financial risk.
- **Public-private partnerships** can accelerate commercialization by linking coal-derived materials with regional manufacturing and construction markets. The Southwest's concentration of national laboratories, universities, and industrial facilities provides a strong foundation for integrating research, processing, and end-use applications.
- **Clear and predictable regulatory frameworks** are necessary to enable investment in coal combustion product reuse. Streamlined permitting and consistent standards for construction materials, mineral recovery, and carbon-based products can reduce uncertainty while maintaining environmental safeguards.
- **Workforce alignment initiatives** that connect coal-sector skills (such as industrial operations, materials handling, and process control) to emerging industries including critical minerals processing and advanced manufacturing can support economic continuity in coal-dependent communities.

Together, these measures may translate emerging non-power coal applications into commercially viable, market-driven industries, strengthening regional resilience and supporting domestic supply-chain security without reliance on large-scale new coal generation capacity.

CONCLUSION

Coal in the Southwestern United States occupies an increasingly complex, strategic position shaped by reliability needs, industrial capabilities, and domestic supply-chain priorities. Coal's value as a reliable energy resource, a secure domestic fuel, and a versatile carbon and mineral source remains highly relevant in a region facing extreme weather, infrastructure stress, and growing material demand. By focusing on stabilization and optimization of existing assets, expanding non-power applications such as critical minerals, construction materials, and advanced carbon products, and aligning policy, workforce, and investment frameworks accordingly, the Southwest can preserve economic value while adapting to changing market realities. In this context, coal's future is less about restoring its past role and more about integrating it thoughtfully into a diversified, resilient, and strategically grounded industrial system.

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SOURCE LIST

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IMAGE SOURCES

Image 1: U.S. Coal Demand and Stock Trends
Source: *The Coal Hub*, "U.S. Coal 2025 Demand Up 7% as Stocks Draw Down Ahead of 2026 Retirements."
https://thecoalhub.com/u-s-coal-2025-demand-up-7-as-stocks-draw-down-ahead-of-2026-retirements.html

Image 2: Planned Coal Capacity Retirements by Region
Source: *CleanTechnica*, "Most of the Planned Coal Capacity Retirements Are in the Midwest or Mid-Atlantic Regions."
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Image 3: Critical Minerals in the Western United States
Source: U.S. Geological Survey (USGS), "Critical Minerals of the Western United States."
https://www.usgs.gov/media/images/critical-minerals-west