

## EXECUTIVE SUMMARY



COAL POWER  
Smart Policies in Support of  
**CLEANER**  
**STRONGER**  
**ENERGY**



**COAL POWER**  
**Smart Policies in Support of Cleaner, Stronger Energy**

**EXECUTIVE SUMMARY**

**July 2020**

The National Coal Council (NCC) is a Federally chartered advisory committee that provides advice to the Secretary of Energy on coal policy, technology and markets. Members of the NCC are appointed by the Secretary of Energy and serve in a voluntary capacity. The findings and recommendations from this report reflect a consensus of the NCC membership, but do not necessarily represent the views of each NCC member individually or of their respective organizations.

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## **COAL POWER**

### **Smart Policies in Support of Cleaner, Stronger Energy**

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# **COAL POWER**

## **Smart Policies in Support of Cleaner Stronger Energy**

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<sup>1</sup> The full COAL POWER report can be accessed at <https://www.nationalcoalcouncil.org/studies/2020/COAL-POWER-Cleaner-Stronger-Energy.pdf>.



July 24, 2020

The Honorable Dan Brouillette  
U.S. Secretary of Energy  
U.S. Department of Energy  
1000 Independence Ave., SW  
Washington, DC 20585

Dear Mr. Secretary:

On behalf of the members of the National Coal Council (NCC), we are pleased to submit to you the report “COAL POWER: Smart Policies in Support of Cleaner, Stronger Energy.” The report’s primary focus is on assessing Federal and state policies and initiatives that would support the accelerated deployment of advanced technologies for coal-based power generation. In the report:

- We provide an overview of the current status of advanced coal technologies – including carbon capture, utilization and storage (CCUS), high efficiency-low emissions (HELE) and transformational technologies – with applications for both the existing coal fleet and new coal power plants.
- We detail Federal regulatory and legislative initiatives that would advance each of these technologies. Included are policies and initiatives to advance U.S. Department of Energy research and development programs, minimize costs and risks associated with technology deployment, reduce regulatory burdens and reform energy markets.
- We identify policies and initiatives in support of coal technology deployment that could be undertaken by state policymakers, state energy regulators and tribal entities, highlighting as well the value of regional and intra-state collaboration among state governments, universities, industry and non-profit organizations.
- We cite energy infrastructure initiatives that are critical for the deployment of CCUS, HELE and transformational technologies, including power generation/transmission, CO<sub>2</sub> pipelines and storage sites, and pilot and demonstration projects.

As you are aware, a growing number of states and utilities have established mid-century carbon reduction goals. Meeting these goals with affordable, reliable energy will require deployment of low-carbon technologies. Three critical objectives will need to be met over the next 20 years if we are to achieve these objectives:

- By 2030, retrofit a critical mass of existing coal power plants with carbon capture and efficiency enhancing technologies, more fully demonstrating the viability and maturity of these technologies and their availability through competitive bid from multiple vendors.

- By 2035, establish a growing network of CO<sub>2</sub> storage sites and pipelines approximately five times larger than what exists today.
- By 2040, a variety of new coal plant technologies will need to be commercially available, cost competitive and have a near-zero emissions profile.

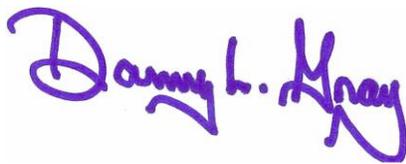
These objectives are achievable if the U.S. is willing to pursue an aggressive agenda that acknowledges the urgency of the need and the economic-environmental implications of not meeting these goals, both in the U.S. and globally. Existing energy policies are insufficient to incentivize deployment of advanced coal generation technologies at scale and in a timely manner.

As detailed in NCC's COAL POWER report, there is an abundance of policy options and initiatives available that could support Department of Energy and private sector efforts to accelerate deployment of advanced coal generation technologies. An integrated suite of policy tools and incentives will allow the U.S. to lead the technology development required to enable use of coal with improved efficiency and a lower emissions profile.

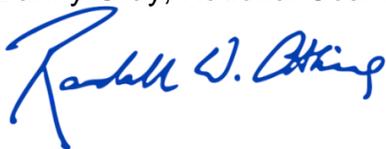
As you have stated, coal is essential to this nation. The U.S. coal fleet plays an indispensable role in providing reliable and resilient electric power. Fuel-secure coal generation is a critical component of the U.S. power grid, which is strengthened through a diversity of electricity sources. The U.S. must maintain a readiness, both in technology and human resources, to utilize the most abundant resources under this nation's control to supply critical energy needs. A strong coal future will power not only our electric generation needs, but a renaissance in U.S. advanced manufacturing industries that are dependent on reliable, affordable energy.

Thank you for the opportunity to prepare this report. The Council stands ready to address any questions you may have regarding its findings and recommendations.

Sincerely,



Danny Gray, National Coal Council Chair 2019-2020



Randall Atkins, National Coal Council Vice Chair 2019-2020



Janet Gellici, National Coal Council CEO



**The Secretary of Energy**  
Washington, DC 20585

July 3, 2019

Mr. Danny Gray  
Chairman  
National Coal Council, Inc.  
1101 Pennsylvania Avenue, NW, Suite 300  
Washington, DC 20004

Dear Chairman Gray:

I am writing today to request the National Coal Council (NCC) develop a white paper assessing smart policies in support of advanced coal-fired power-generation technologies.

The white paper should focus on an industry perspective on the future of advanced coal technologies in the power sector, including carbon capture, utilization, and storage (CCUS); advanced energy systems to enhance energy efficiency and flexibility; high efficiency-low emissions technologies; small modular coal power plant technologies; and transformational technologies, such as supercritical CO<sub>2</sub> cycles and pressurized oxy-combustion.

The report would address how various regulatory and legislative policies could be employed to enhance and accelerate the deployment of these technologies. The prospective policies would include, but are not limited to:

- For CCUS: 45Q Federal Tax Incentive, USE IT Act, Master Limited Partnerships, Private Activity Bonds
- EPA's New Source Review Regulation
- Public Utility Regulatory Policies Act
- EPA Regulations on Coal Combustion Residuals and Effluent Limitation Guidelines
- Wholesale Electricity Markets
- State Initiatives and State Public Utility Commission Regulatory Oversight
- The newly-authorized U.S. International Development Finance Corporation
- Energy Infrastructure

Key questions to be addressed include:

- What regulatory and legislative initiatives could be advanced to help accelerate the deployment of coal-fired power-generation technologies?
- What coal-fired power-generation technologies would benefit from regulatory and legislative reforms?
- What energy infrastructure initiatives would support the deployment of advanced coal-fired power-generation technologies?



Printed with soy ink on recycled paper

The white paper should be managed under the auspices of the Executive Advisory Board within the NCC. I ask that the white paper be completed by March 31, 2020.

Upon receiving this request and establishing your internal working groups, please advise me of your schedule for completing the white paper. The Department looks forward to working with you in this effort.

Sincerely,

A handwritten signature in black ink that reads "Rick Perry". The letters are cursive and fluid, with a prominent "R" and "P".

Rick Perry



## **COAL POWER**

### **Smart Policies in Support of Cleaner, Stronger Energy**

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## NCC Overview – 1984|2020

In the fall of 1984, Secretary of Energy Don Hodel announced the establishment of the National Coal Council (NCC). In creating the NCC, Secretary Hodel noted that “The Reagan Administration believes the time has come to give coal – our most abundant fossil fuel – the same voice within the federal government that has existed for petroleum for nearly four decades.”

The Council was tasked to assist government and industry in determining ways to improve cooperation in areas of coal research, production, transportation, marketing and use. On that day in 1984, the Secretary named 23 individuals to serve on the Council, noting that these initial appointments indicate that “the Department intends to have a diverse spectrum of the highest caliber of individuals who are committed to improving the role coal can play in both our Nation’s and the world’s energy future.”

Throughout its over 35-year history, the NCC has maintained its focus on providing guidance to the U.S. Secretary of Energy on various aspects of the coal industry. NCC has retained its original charge to represent a diversity of perspectives through its varied membership and continues to welcome members with extensive experience and expertise related to coal.

The NCC serves as an advisory group to the Secretary of Energy chartered under the Federal Advisory Committee Act (FACA). The NCC is incorporated as a 501c6 non-profit organization in the State of Virginia. Serving as an umbrella organization, NCC, Inc. manages the business aspects of running the Council.

The Council’s activities include providing the Secretary with advice on:

- Federal policies that directly or indirectly affect the production, marketing and use of coal;
- Plans, priorities and strategies to address more effectively the technological, regulatory and social impact of issues relating to coal production and use;
- The appropriate balance between various elements of Federal coal-related programs;
- Scientific and engineering aspects of coal technologies, including coal conversion, utilization or environmental control concepts; and
- The progress of coal research and development.

The principal activity of the NCC is to prepare reports for the Secretary of Energy. Over the past 35 years, the NCC has prepared nearly 40 report for the Secretary. All NCC reports are publicly available on the NCC website.

## COAL POWER

### Smart Policies in Support of Cleaner, Stronger Energy

***“ ... we can't get rid of coal. It is essential to this nation.”<sup>2</sup>***

***Dan Brouillette, U.S. Secretary of Energy***

Energy Secretary Brouillette's words underscore the imperative the United States must address in order to ensure the continued availability of coal-based power generation. The nation's coal fleet plays an essential and indispensable role in providing reliable and resilient electric power. Fuel-secure coal generation is a critical component of the U.S. power grid, which is strengthened through a diversity of electricity sources.

The unprecedented economic challenges we face as a result of the COVID-19 pandemic elevate the urgency of initiating recovery efforts to restore the economic health of our nation's citizens and businesses. The pandemic's consequences have impressed upon us the urgent need to re-evaluate the reliability and resilience of critical sectors of our nation's economy, including our energy system and supply chain. This evaluation must include an assessment of the value of all our domestic energy resources, detailing the benefits and challenges each possess and acknowledging the merits of a diversified portfolio.

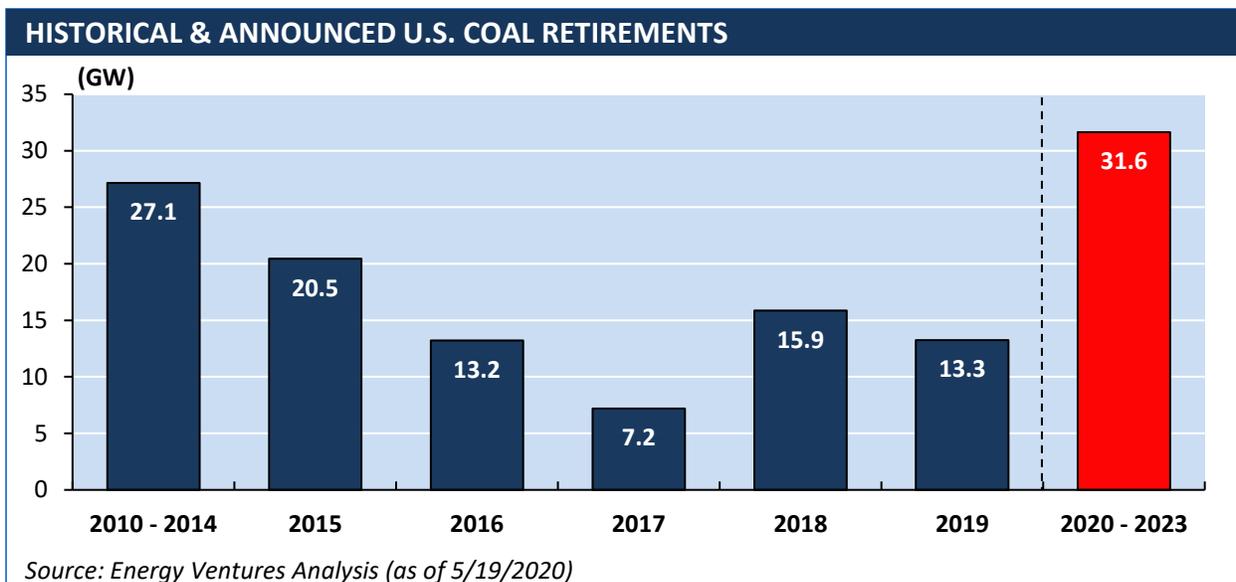
A growing number of states and utilities have established low-carbon or carbon reduction requirements and goals to be met by mid-century if not earlier. These goals are often being achieved through shuttering of existing coal power plants and through initiatives that effectively eliminate the option to deploy new coal generation. These actions have increased power prices, threatened electricity grid reliability and curtailed deployment of advanced generation technologies with beneficial environmental profiles.

Since 2010, more than 40% of the nation's coal fleet has been or is planned to be retired. Today, coal provides about 24% of U.S. electricity. Further reductions in coal generation availability jeopardize grid reliability as well as the economic and price-stabilizing values of resource diversity.

The U.S. power system benefits from an electric grid that is not only reliable, but resilient. A reliable electric system minimizes the likelihood of disruptive electricity outages, while a resilient system is designed with the understanding that outages will occur, is prepared to deal with them, is able to restore service quickly and draws lessons from the experience to improve performance in the future. Reliability and resilience are both critical to maintaining the nation's power grid.

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<sup>2</sup> U.S. Secretary of Energy Dan Brouillette, "Clean coal is essential to America," Penn Live/Patriot-News, June 25, 2020, <https://www.pennlive.com/opinion/2020/06/clean-coal-is-essential-to-america-us-energy-secretary-dan-brouillette.html>



**Figure ES-1: Annual coal plant retirements 2010–2023 (GW)**  
**Source: Energy Ventures Analysis**

Maintaining a diversified, dispatchable energy portfolio allows the U.S. to maintain low electricity rates which, in turn, enhance the nation’s competitiveness in international markets. Countries that predominantly rely upon fossil fuels for electricity enjoy lower power costs. Conversely, those countries with the highest residential and commercial electricity prices are typically imposing costs on consumers such as taxes to subsidize renewable energy and advance energy policies designed to eliminate baseload generation.

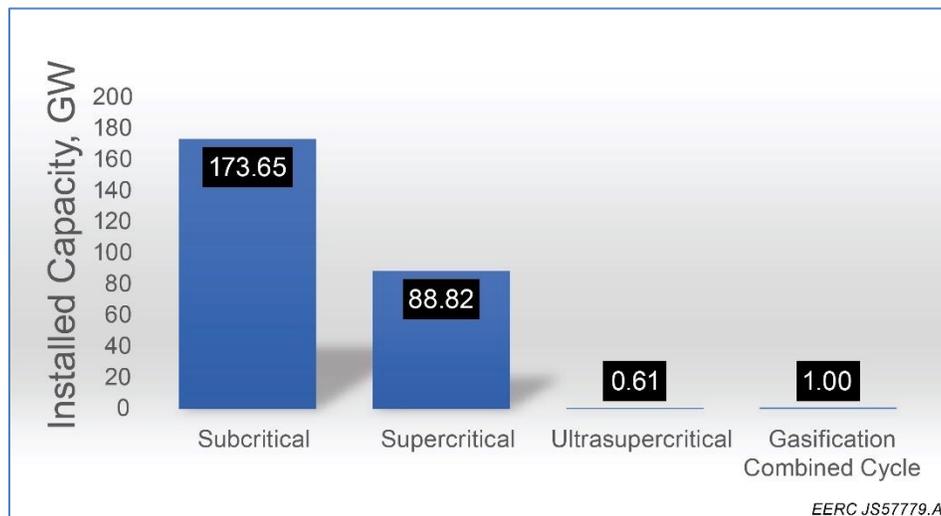
All energy systems in the U.S. are subject to a mix of stringent Federal, state and local environmental performance requirements that limit impacts to air, water and land, as well as exposures to humans and wildlife. To date, improvements in coal-based energy systems have ensured that they are capable of continuing to meet all applicable environmental requirements pertaining to atmospheric emissions of criteria and hazardous air pollutants, water utilization and discharge, and management of solid and hazardous wastes.

In recent years, international, Federal and state environmental policies have targeted reductions in emissions of greenhouse gases (GHG), including carbon dioxide (CO<sub>2</sub>) and methane. Incentivized with effective low-carbon and related policy instruments, advanced coal technology can help power companies meet their GHG commitments and obligations under international, Federal and state requirements in the decades to come while continuing to deliver reliable, low-cost power.

## The Potential of Advanced Coal Generation Technologies

As the electricity sector in the U.S. evolves, technological innovation will be crucial to meeting the goals of ensuring energy security and affordability, while minimizing environmental impacts. Most of the generation capacity installed in the U.S. today consists primarily of conventional steam boilers (subcritical) with some higher-efficiency supercritical steam boilers. Supercritical steam boilers achieve higher efficiencies than conventional boilers by operating the steam cycle at higher pressure.

Ultra-supercritical (USC) steam boilers and gasification systems represent advanced, highly efficient technologies that are commercially available. There has, however, been very limited deployment of these technologies in the U.S. today. Limited installation of advanced technologies is primarily due to a recent lack of interest in installing new coal capacity because of stringent regulations and low-cost natural gas. Fortunately, considerable technology exists, and more is under development, that can be retrofitted to the existing fleet of coal power plants to improve efficiency and comply with future environmental regulations. Additionally, novel advanced power generation systems are under development that will have high efficiency, low emissions, and the ability to ramp up and down quickly to meet current electric grid demands.

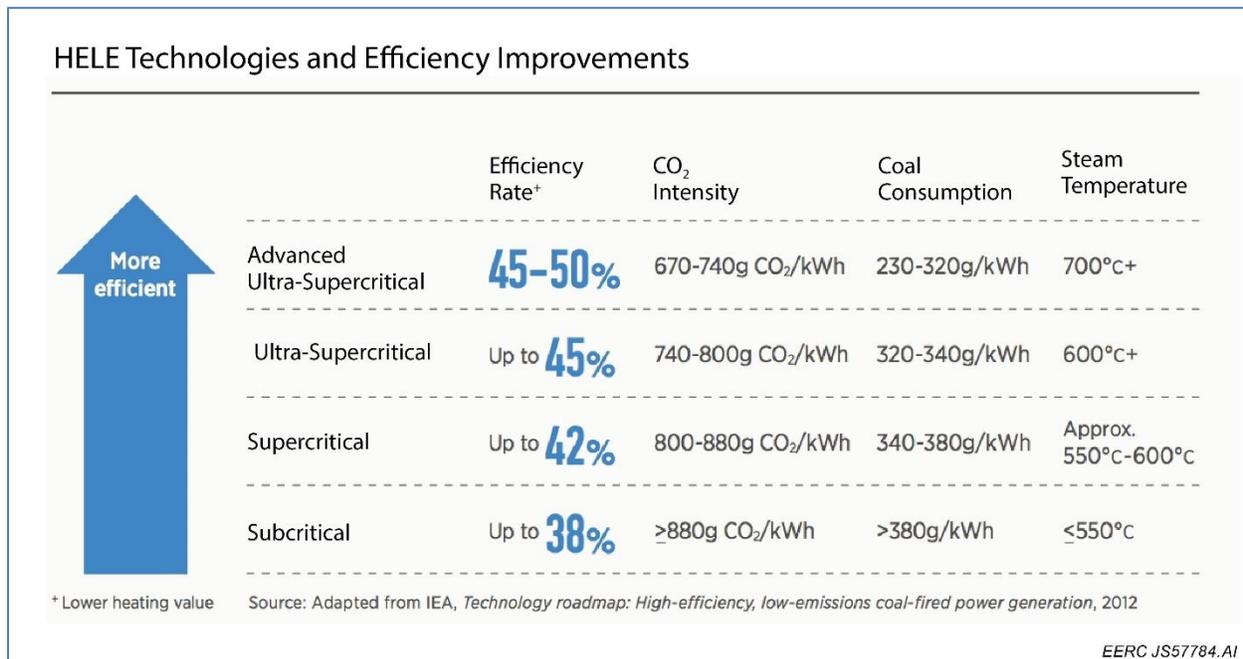


**Figure ES-2: Installed generation capacity in the United States**

**Source: U.S. Energy Information Administration 2018**

**Note: Includes electric utility generation as well as heat and power for industrial users.**

High efficiency-low emissions (HELE) technologies exist today that can reduce coal power plant emissions by more than 20%. A 1-percentage-point improvement in efficiency of a standard coal plant results in a 2%–3% reduction in CO<sub>2</sub> emissions.



**Figure ES-3: Efficiency improvements from HELE technologies**  
**Source: EERC Adapted from IEA Technology Roadmap**

Table ES-1 summarizes advanced energy technologies and indicates their ability to meet national energy objectives. Advanced coal technologies that are currently deployed include USC steam cycles, integrated gasification combined cycle (IGCC) systems and selective post-combustion CCUS<sup>3</sup> technologies. Advanced coal technologies that are in various stages of development include advanced ultra-supercritical (AUSC) steam cycles; supercritical CO<sub>2</sub> cycles (sCO<sub>2</sub>); additional post-combustion carbon capture, utilization, and storage (CCUS); oxygen-fired combustion (oxy-combustion); pressurized oxy-combustion; pressurized fluid bed combustion (PFBC); and chemical looping.

<sup>3</sup> Deployment of commercial-scale CCUS post-combustion technologies has been limited; many post-combustion CCUS technologies are still under development. Nothing included in this NCC report should be construed to support a conclusion of “adequately demonstrated” for Clean Air Act (CAA) purposes.

Technology	Retrofit	New Plants	Flexible	Innovative	Resilient	Small	Trans-formational
<b>Currently Deployed Technology</b>							
USC	X	X	X	X	X	X	X
IGCC	X	X	X	X	X	X	X
Post-combustion CCUS	X	X	X	X	X	X	X
<b>Technologies Under Development</b>							
AUSC	X	X	X	X	X	X	X
sCO <sub>2</sub>	X	X	X	X	X	X	X
Post-combustion CCUS	X	X	X	X	X	X	X
Oxy-Combustion	X	X	X	X	X	X	X
Pressurized Oxy-Combustion	X	X	X	X	X	X	X
PFBC	X	X	X	X	X	X	X
Chemical Looping	X	X	X	X	X	X	X

**Table ES-1: Matrix of Technologies as Related to Coal FIRST Energy Objectives**  
 Red indicates likely not applicable, yellow potentially applicable, green highly applicable.  
 Source: Applicability rankings developed by Josh Stanislawski, EERC/University of North Dakota and Holly Krutka, SER/University of Wyoming

Unfortunately, the U.S. lags behind most of the rest of the world in deploying advanced coal generation technologies. One of the primary reasons for this is the absence of Federal policies and financial support to align low-carbon incentives with those given to renewables. Federal financial support for fossil energy in recent years has significantly lagged that for conservation/efficiency and non-fossil energy as noted in a recent analysis conducted by the U.S. Energy Information Administration (EIA) and summarized in Table ES-2.

REGION	IN OPERATION
	2018
Asia	224203
Europe	19208
Middle East	0
Eurasia	300
North America	665

**Figure ES-4: Ultra-Supercritical Coal Capacity Worldwide (MW)**  
 Source: International Energy Agency<sup>4</sup>

<sup>4</sup> International Energy Agency webinar “Coal Utilization Policy and Technology Trends,” Dr. Andrew Minchener, OBE, November 2019.

**Table ES-2: Federal Financial Interventions & Subsidies in Low-Carbon Energy  
FY 2010, FY 2013 and FY 2016 (millions of of 2016 dollars)**

<https://www.eia.gov/analysis/requests/subsidy/pdf/subsidy.pdf>

<b>FY 2010</b>	conservation & efficiency	non-fossil energy (renewables & nuclear)	fossil energy (coal, oil & gas)	total
direct expenditures	\$3,881	\$5,804	\$82	\$9,767
r&d expenditures	\$1,366	\$1,020	\$325	\$2,711
tax expenditures	\$4,684	\$9,913	\$477	\$15,074
loan guarantees	\$1,139	\$588	\$0	\$1,727
<b>total</b>	<b>\$11,070</b>	<b>\$17,325</b>	<b>\$884</b>	<b>\$29,279</b>
<b>percent of total</b>	<b>37.8%</b>	<b>59.2%</b>	<b>3.0%</b>	<b>100.0%</b>

<b>FY 2013</b>	conservation & efficiency	non-fossil energy (renewables & nuclear)	fossil energy (coal, oil & gas)	total
direct expenditures	\$984	\$8,753	\$405	\$10,142
r&d expenditures	\$1,593	\$1,063	\$264	\$2,920
tax expenditures	\$2,955	\$6,838	\$575	\$10,368
loan guarantees	\$0	\$0	\$0	\$0
<b>total</b>	<b>\$5,532</b>	<b>\$16,654</b>	<b>\$1,244</b>	<b>\$23,430</b>
<b>percent of total</b>	<b>23.6%</b>	<b>71.1%</b>	<b>5.3%</b>	<b>100.0%</b>

<b>FY 2016</b>	conservation & efficiency	non-fossil energy (renewables & nuclear)	fossil energy (coal, oil & gas)	total
direct expenditures	\$271	\$949	\$64	\$1,284
r&d expenditures	\$435	\$621	\$389	\$1,445
tax expenditures	\$3,313	\$5,476	\$770	\$9,559
loan guarantees	\$0	\$0	\$0	\$0
<b>total</b>	<b>\$4,019</b>	<b>\$7,046</b>	<b>\$1,223</b>	<b>\$12,288</b>
<b>percent of total</b>	<b>32.7%</b>	<b>57.3%</b>	<b>10.0%</b>	<b>100.0%</b>

<b>AVERAGE</b>	conservation & efficiency	non-fossil energy (renewables & nuclear)	fossil energy (coal, oil & gas)	total
direct expenditures	\$1,712	\$5,169	\$184	\$7,064
r&d expenditures	\$1,131	\$901	\$326	\$2,359
tax expenditures	\$3,651	\$7,409	\$607	\$11,667
loan guarantees	\$380	\$196	\$0	\$576
<b>total</b>	<b>\$6,874</b>	<b>\$13,675</b>	<b>\$1,117</b>	<b>\$21,666</b>
<b>percent of total</b>	<b>31.7%</b>	<b>63.1%</b>	<b>5.2%</b>	<b>100.0%</b>

## The Imperative for Deploying Advanced Coal Generation Technologies

Meeting environmental goals with affordable, reliable energy will require deployment of low- or decarbonized power systems. While other nations have made strides in deploying cost-effective low-carbon technologies, U.S. efforts have been hindered on many fronts.

- High capital costs and stringent regulations have disincentivized efficiency upgrades at existing plants and plans for new, efficient coal generation.
- Financial and insurance institutions have imposed policies restricting funding and services for coal projects.
- Competitive challenges from low-cost natural gas and natural gas-based generating facilities.
- Shareholder and investor Environmental, Societal and Governance (ESG) initiatives that enhance the perception of coal as an unwelcome fuel source.
- Lack of long-term policy certainty and consistency.
- Historically insufficient U.S. Department of Energy (DOE) research and development (R&D) funding for fossil energy technologies commensurate with the value of the associated GHG reduction potential.
- Insufficient government support for large-scale pilot and demonstration projects to verify technology performance and reduce investment risks.
- Lack of energy infrastructure in support of advanced coal generation technologies, new sources of electricity and distribution networks.
- Insufficient public engagement of key stakeholders in the deployment of advanced coal generation technology projects.

The critical attributes of the coal fleet and its supply chain have been demonstrated in extreme weather events and acknowledged during the recent pandemic. Regulatory uncertainties, risks and burdens have a significant effect on business decisions, most notably contributing to recent decisions to retire coal power plants and/or reduce investments in plant maintenance and technology upgrades. These decisions, in turn, have led to increases in the price of electricity as detailed in a recent report by DOE's National Energy Technology Laboratory (NETL) presenting four scenarios assessing the impact of coal retirements.<sup>5</sup>

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<sup>5</sup> National Energy Technology Laboratory, U.S. Department of Energy, "Reliability, Resilience and the Oncoming Wave of Retiring Baseload Units," Volume II, February 20, 2020, <https://netl.doe.gov/node/9516>.



**Figure ES-5: Cost of Electricity (\$billions)**

**Source: America's Power**

**Based on National Energy Technology Laboratory Report Data**

NETL found that the expected cost of electricity would increase by almost 11% (\$9 billion) due to higher electricity demand during extreme winter weather. If weather conditions are extreme and coal plant retirements accelerate, electricity costs would increase by 35% (\$29 billion). On the other hand, if neither announced or at-risk coal plants were to retire, demand during extreme weather would only increase electricity costs by 2.5% (\$2 billion).

### **The Need for Smart Policies for Advanced Coal Generation Technologies**

Existing energy policies are insufficient to incentivize deployment of advanced coal generation technologies at scale and in time to achieve U.S. and global energy, economic and environmental objectives.

An integrated suite of policy tools and incentives – Federal, state, regional and tribal – are needed to ensure technology deployment on a cost-effective and timely basis.

There is an abundance of policies and initiatives available that could be employed to:

- Lower the cost of carbon capture, utilization and storage (CCUS) and advanced coal generation technologies through learning by doing at large-scale demonstration and commercial projects.
- Eliminate deployment bottlenecks created by lack of carbon dioxide (CO<sub>2</sub>) pipelines and storage sites.
- Foster commercialization of next generation near-zero emission coal power plants that can compete on cost and environmental performance with low-carbon energy resources.

Time is of the essence. In order to meet mid-century state and utility industry carbon reduction targets, three critical objectives will need to be met over the next 20 years. These objectives are achievable if we are willing to pursue an aggressive agenda that acknowledges the urgency of the need and the economic-environmental implications of not meeting these goals, both in the U.S. and globally.

- **By 2030**, retrofit a critical mass of existing coal power plants with carbon capture and efficiency enhancing technologies, more fully demonstrating the viability and maturity of these technologies and their availability through competitive bid from multiple vendors.
- **By 2035**, establish a growing network of CO<sub>2</sub> storage sites and pipelines approximately five times larger than what exists today. The network will need to expand over time to meet 2050 needs of the power and industrial sectors.
- **By 2040**, a variety of new coal plant technologies will need to be commercially available, cost competitive and have a near-zero emissions profile to meet power sector commitments to reduce/eliminate their CO<sub>2</sub> emissions by 2050.

The following initiatives are most urgently needed to achieve these objectives:

#### **Retrofit Existing Coal Fleet with Advanced Technology by 2030:**

- Enhance Utilization of 45Q Tax Credits: 1) extend the “under construction” deadline to at least 2030; 2) extend the credit period from 12 years to 20 years; 3) expedite Class VI permits issued by EPA to states; 4) extend 48A tax credits to existing power plants; 5) pass Master Limited Partnership (MLP) and Private Activity Bond (PAB) legislation to complement 45Q; and 6) secure 100% relief from Base Erosion and Anti-Abuse Tax (BEAT) for CCUS technology through the duration of the 45Q tax credit.
- Government must take an active role in risk-sharing with and incentivizing private sector investors to support the deployment of advanced generation technologies. This could be accomplished through reforms to the DOE Loan Guarantee Program that would lower fees and lift restrictions for projects receiving Federal grants. Consideration might also be given to establishing an independent Federal development corporation or authority chartered to accelerate the deployment of clean energy technologies developed in the U.S.

### **Deploy Infrastructure Supporting Advanced Technology by 2035:**

- Include CCUS infrastructure – storage sites and pipelines – in post-pandemic economic revitalization initiatives.
- Support research, development and characterization of geologic storage at the level of \$400 million per year for 10 years as recommended by the National Petroleum Council (NPC).
- Support passage of the USE IT Act (Utilizing Significant Emissions with Innovative Technology Act) to streamline permitting of storage projects and pipelines and the INVEST CO<sub>2</sub> Act (Investing in Energy Systems for the Transport of CO<sub>2</sub>), providing low-interest Federal loans to finance extra CO<sub>2</sub> pipeline capacity.

### **Deploy Commercially Available, Cost Competitive, Near-zero Emissions Advanced Technology by 2040:**

- Enhance Federal funding support for Front End Engineering Design (FEED) studies to reduce technology performance and cost risks.
- Make Federal funding available for demonstration and commercial-scale projects and make it available at enhanced levels (\$300 million per year over 10 years as recommended in the 2018 CURC-EPRI Roadmap<sup>6</sup>).

## **Policy Initiatives Support Post-Covid Economic Stimulus**

The economic downturn triggered by the COVID pandemic presages the need for an economic stimulus initiative of epic proportions. The deployment of advanced coal generation technology demonstration and commercial-scale plants, along with associated infrastructure and advanced manufacturing facilities fueled by reliable, affordable electricity, can support U.S. economic stimulus efforts in the post-pandemic environment. These projects can drive economic growth and employment, creating and sustaining jobs, advancing clean energy industries and infrastructure, and making effective use of existing energy assets.

Economic stimulus projects can be supported through funds authorized but as yet unreleased from DOE's Loan Guarantee Program, through reversal of financial and insurance institutions' 'coal exclusion' policies, and through support for regulatory and legislative policies at the Federal, state, regional and tribal levels as follows.

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<sup>6</sup> Carbon Utilization Research Council & Electric Power Research Institute, "CURC-EPRI Advanced Fossil Energy Technology Roadmap," July 2018 <http://curc.net/curc-epri-advanced-technology-roadmap-1>

## Recommendations

NCC supports the following policies and initiatives that would provide a pathway toward cleaner, stronger energy.

### A. Enhanced Support for U.S. Department of Energy Research and Development

Continued and enhanced support for R&D is critical to advancing the next generation of coal technologies. Of greatest need is support for technology projects that extend beyond basic research and the pursuit of niche market applications for small-scale modular coal power units.

#### Support for Research & Development

- Continued R&D efforts detailed in the Department's Coal FIRST initiative and Transformational Coal Pilots Program.
- R&D to accelerate deployment of (thermal) energy storage to accommodate increased demand on coal plants to cycle operations while backstopping intermittent renewable energy (IRE).
- Enabling carbon capture to facilitate deployment of CCUS technologies. R&D efforts must continue to reduce the cost of carbon capture and promote policies that reduce the financial and non-technology risks associated with CCUS.



#### Support for Technology Projects

- Federal support for advanced coal generation technologies should not be restricted to basic research only. Demonstration projects are critical to expedite deployment of these technologies. Federal funding should be made available for demonstration and commercial-scale initiatives to support projects that bridge the gap between First-of-a-Kind (FOAK) and Nth-of-a-Kind (NOAK) initiatives. NCC supports recommendations in the 2018 CURC-EPRI Roadmap for public-private funding for these projects.

To enhance the opportunity for success of these efforts, DOE should ensure that staff experienced in managing large-scale projects are in place to oversee the management of demonstration projects.

- Efforts should be undertaken to assess opportunities to repurpose retired coal power plants for deployment of new advanced coal power generation, CO<sub>2</sub> utilization and coal-to-products advanced manufacturing. These endeavors must take into consideration the benefits associated with the existing grid configuration, transmission interconnections, fuel transportation capacity and building/land infrastructure.
- DOE should enhance Federal funding support for FEED (Front End Engineering Design) studies to aid in reducing technology performance and cost risks.

- DOE should reform the DOE Loan Guarantee Program to lower fees and lift restrictions for projects receiving Federal grants.
- DOE should employ contracts-for-differences (CfDs) initiatives to advance large-scale pilots and commercial demonstrations supporting a diverse set of technologies in a variety of circumstances and locations.
- DOE funding awards should take into consideration support for U.S. owned companies with the aim of building domestically based capacity in power sector R&D competency, technical expertise and manufacturing capability.
- Consideration might be given to establishing an independent Federal development corporation or authority chartered to accelerate the deployment of clean energy technologies developed in the U.S.

### Small-scale Modular Coal Power Plants

- NCC encourages the pursuit of niche market applications for small-scale modular coal power plants with the aim of advancing the concept, substantiating the economic and environment benefits, and validating applicable technology performance of small-scale modularity. Niche market applications would include:
  - Small capacity combustion and gasification units for co-fueling coal and biomass/waste.
  - Replacement of more costly diesel-fueled plants.
  - On-site coal mining operations for mining equipment, coal preparation plants, coal drying and other localized applications.
  - Remote, off-grid locations, including those with limited access to or potential for use of other energy resources, i.e., natural gas or renewables.
  - Captive power plants at industrial facilities, including coal-to-products advanced manufacturing facilities (i.e., for production of carbon fibers, graphene, etc.).
- Export market potential exists for small-scale modular coal units in developing countries. U.S. pursuit of technology R&D for small modular coal units should include an assessment of both the technology export potential and the opportunity to enhance exports of U.S. coal to supportive markets in Asia and Africa.

Additionally, NCC encourages DOE to work to reinstitute a Congressional Office of Technology Assessment to provide Congress with new and effective means for securing competent, unbiased information concerning the physical, biological, economic, social and political effects of technological applications.

**Federal Policy Recommendations**  
**Summary Matrix of Technologies-Policies**

<u>Technology</u>	CCUS	HELE	USC/AUSC	Allam Cycle	Oxy-	Other Transformation	Small Modular	Energy Infrastructure	Other	Coal Conversion & Utilization	Coal Exports & Technology
<u>Policy</u>											
<b>Initiatives to Advance R&amp;D</b>											
Coal FIRST	X	X	X	X	X	X	X				X
EFFECT Act	X	X	X	X	X	X	X			X	X
Fossil Energy R&D	X		X	X	X	X	X				
Technology Transitions Act	X	X	X	X	X	X	X				
<b>Initiatives to Minimize Cost &amp; Risk</b>											
45Q	X										
Master Limited Partnerships	X								X		
Private Activity Bonds	X										
BEAT Tax Relief	X										
48A	X	X	X								
Technology Neutral Tax Credit	X	X	X	X	X	X	X				
USDA RUS Leg.	X									X	
Contracts for Differences	X	X	X	X	X	X					
LPO Reforms	X	X	X	X	X	X					
Development Finance Corp	X	X	X	X	X	X	X	X	X		X
<b>Initiatives to Bolster Emissions Abatement</b>											
Clean Energy Standard	X	X	X	X	X	X	X				
Affordable Clean Energy	X				X						
<b>Initiatives to Address Regulatory Risk &amp; Burden</b>											
USE IT Act	X							X			
NSR/Gain Act	X	X									
Coal Combustion Residuals								X	X	X	X
Effluent Limitation Guidelines									X		
<b>Initiatives to Reform Energy Markets</b>											
PURPA	X	X	X	X	X	X					
Capacity Market Reforms	X	X	X	X	X	X					
<b>Initiatives in Support of Energy Infrastructure</b>											
LIFT America Act								X			
INVEST CO <sub>2</sub> Act								X			
FAST Act								X			

## **B. Support for Federal Legislative and Regulatory Policies**

NCC encourages support for Federal legislative and regulatory initiatives that minimize investor cost and risk, reduce regulatory burdens and reform energy markets. The matrix on the preceding page, summarizes policies and initiatives in support of the noted advanced coal generation technologies and energy infrastructure.

### **Initiatives to Advance Research & Development**

- EFFECT Act (Enhancing Fossil Fuel Energy Carbon Technology) – updates and strengthens DOE Fossil Energy’s CCUS RDD&D programs.
- Fossil Energy Research and Development Act – funds a new program for advanced fossil energy systems with the goal of reducing power generation emissions by 50%.
- Technology Transitions Act – establishes a DOE Office of Technology Transitions to enhance commercialization of energy technologies.
- Enhance DOE participation in the United Nations Economic Commission for Europe to facilitate funding of international fossil energy projects.

### **Initiatives to Minimize Cost & Risk**

- 45Q Tax Credits
  - Ensure effective implementation of 45Q by the U.S. Treasury. Extend the “under construction” deadline from January 1, 2024 to at least January 1, 2030 and extend the credit period from 12 years to 20 years. Allow CCUS projects to access American Energy Bonds to provide an additional source of capital for project implementation.
  - 45Q Class VI permits issued by EPA to states should be expedited.
  - Enact a broader portfolio of Federal CCUS polices to complement 45Q:
    - ✓ 48A – extend 48A tax credits to existing power plants, allowing retrofits of carbon capture systems to be eligible for the tax credit. Carbon Capture Modernization Act.
    - ✓ Master Limited Partnerships – Financing Our Energy Future Act – makes CCUS projects eligible for MLPs. Analyze potential advantage of using a single MLP for each installation in support of the capital structure of coal generation projects.
    - ✓ Private Activity Bonds – Carbon Capture Improvement Act – authorizes use of tax-exempt PABs in financing CCUS projects.
    - ✓ Secure 100% relief from BEAT (Base Erosion and Anti-Abuse Tax) for CCUS technology development/deployment, like the 80% tax exemption afforded to the wind and solar industries. Extend BEAT relief through the duration of the 45Q tax credit availability.
  - Encourage the Treasury Department to clarify what measures are required to demonstrate “secure geologic storage” of CO<sub>2</sub> through enhanced oil recovery; allow use of ISO 27916 to demonstrate secure storage through third party certification or state regulatory agencies – such as state oil and gas regulatory authorities.

### Initiatives to Minimize Cost & Risk (continued)

- Technology Neutral Tax Credits – Investment Tax Credits (ITC) and Production Tax Credits (PTC) would encourage technological innovation for a range of advanced coal technologies integrated with carbon capture.
- The U.S. Department of Agriculture’s Rural Utilities Service (RUS) programs should be expanded to enable loans and loan guarantees to CCUS and coal-to-products facilities in rural U.S. communities.
- In furtherance of enhancing integration of advanced coal generation technologies in international markets, NCC recommends that the International Development Finance Corporation (DFC) work to update and reform its Environmental and Social Policy Statement to end the practice of discriminating against energy sources when considering investment opportunities.



### Initiatives to Bolster Emissions Abatement

- Clean Energy Standards – several legislative initiatives introduced in the U.S. House of Representatives would qualify coal plants equipped with CCUS as clean energy technology.
- Affordable Clean Energy (ACE) Rule – remove permitting barriers to efficiency improvement projects and enable states to tailor CO<sub>2</sub> performance standards unique to their resident electric generating units.

### Initiatives to Address Regulatory Risk & Burden

- Utilizing Significant Emissions with Innovative Technologies (USE IT Act) – streamlines the permitting process for CO<sub>2</sub> storage and pipelines projects among Federal, state, tribal and non-government parties, making them eligible for review under the FAST Act.
- Growing American Innovation Now (GAIN) Act – reforms the New Source Review (NSR) program under the Clean Air Act providing greater regulatory certainty for facility upgrades and efficiency improvements.
- Coal Combustion Residuals (CCRs) – In compliance with the Resource Conservation & Recovery Act (RCRA) goals, regulatory programs should quantify environmental emissions and cement import reductions realized through CCR utilization; EPA should reinstate its C2P2 industry partnership program to increase the beneficial use of CCRs; Federal and state agencies should strengthen purchasing commitments for CCR materials; Federal research efforts should be renewed to advance technical improvements in construction materials.
- Effluent Limitation Guidelines (ELG) – Support EPA revisions to the 2015 rule for Flue Gas Desulfurization (FGD) and bottom ash transport water, including extension of the compliance deadline.

## Initiatives to Reform Energy Markets

- PURPA Reform – The Public Utility Regulatory Policies Act imposes burdens on U.S. utilities to purchase electricity that is not needed, for contract terms that are beyond what generators can secure in the market, and for contract prices far in excess of market costs. These financial liabilities are documented on utility financial statements and evaluated by ratings agencies, effectively adding more debt and increasing utility risks and cost of capital. This, in turn, potentially impacts a utility's willingness and ability to expend capital for technology adoption/deployment.
- Wholesale Markets – In support of Congressional and Federal Energy Regulatory Commission (FERC) initiatives to value fuel security and resilience attributes of the nation's energy resources, DOE should continue to develop evaluative tools to assess and report on threats and vulnerabilities regarding fuel security and resilience.

## C. Support for State, Regional and Tribal Policies

Most notably, support for policies that expand eligibility for and incentivize deployment of low-carbon energy technologies in compliance with state emissions reduction goals, and that recognize the value of coordinated state-regional-tribal initiatives.

## State Recommendations

- Support continuation and expansion of the Regional Carbon Sequestration Partnerships through the four Regional Initiatives to further commercialize CCUS.
- Support enhanced participation of states in the State Carbon Capture Work Group initiative and the Regional Carbon Capture Deployment Initiative.
- Federal and state energy policies that are intended to incentivize investments in low-carbon energy technologies must include support for advanced coal generation technologies. Expand eligibility for low-carbon generation technologies, including CCUS/HELE, under state electricity portfolio standards.
- Employ market mechanisms to compensate coal power plants for “resiliency” attributes, including unit flexibility, dispatchability, resource availability, on-site fuel supply and other resilient parameters. This is especially crucial in those North American Electric Reliability Corporation (NERC) regions with high concentrations of IRE, such as ERCOT (Texas) and the Southwest Power Pool (SPP).
- Offer a selective/temporary waiver or reduction in severance tax rates for CCUS projects and oil produced using capture CO<sub>2</sub>.
- Encourage state governments and public utility commissions to:
  - Implement low-carbon credit programs to include CCUS, requiring utilities to purchase capacity and/or energy from fossil units with CCUS.
  - Allow periodic adjustment mechanisms for CCUS projects to recover environmental compliance costs on a timely basis, rather than requiring utilities to go through a general rate case.

- Pre-approve project siting and environmental criteria.
- Grant certificates of public convenience and necessity.
- Allow pre-approvals for emissions controls at specific plants, thereby reducing uncertainty that an investment will be recovered through rate base treatment.
- Issue guidance requiring consideration of carbon capture in Integrated Resource Plans (IRPs).
- Pursue a comprehensive regulatory framework for CCUS similar to that of the RCRA's "cradle to grave" framework for generation, transportation, treatment, storage and disposal of hazardous waste.
- Enable CCUS projects to participate in state Private Activity Bond markets.
- Secure from EPA, on an expedited basis, state authority to permit Class VI Underground Injection Control (UIC) wells, reducing regulatory barriers to carbon storage.
- Pursue state assumption of liability for CO<sub>2</sub> storage sites following a certain amount of time.

### **Tribal Recommendations**

The nation's tribes own significant energy resources and are actively engaged in development and management of those resources. Among the most critical tribal issues that need to be addressed in relation to coal and deployment of advanced coal technologies:

- Requests by states for full waivers of sovereign immunity undermine tribal rights and should be curtailed.
- DOE guidance is needed on how the Loan Guarantee Program might be used to assist tribes looking to undertake a Tribal Energy Resource Agreement (TERA).
- Loan Guarantee Programs should be amended to allow Tribal Energy Development Organizations to interact with TERA amendments.

### **D. Support for Energy Infrastructure Projects that Enable Deployment of Advanced Coal Generation Technologies**

NCC encourages support for the following policies and programs to advance deployment of energy infrastructure, including CCUS pipelines and commercial-scale power plant technology projects.

### **Energy Infrastructure Policies**

- INVEST CO<sub>2</sub> Act – Investing in Energy Systems for the Transport of CO<sub>2</sub> – would provide low-interest Federal loans to finance extra pipeline capacity and key regional hubs. Would provide for state and local government support for CO<sub>2</sub> pipelines as "pollution control devices" – enabling tax abatement. The scale of CO<sub>2</sub> pipelines must increase to facilitate widespread implementation of CCUS.
- Leading Infrastructure for Tomorrow's America (LIFT America Act – H.R. 2741) – supports modernization of energy infrastructure (\$16 billion over 5 years).

- The Utilizing Significant Emissions with Innovative Technologies (USE IT) Act would help to accelerate the deployment of CCUS by streamlining the permitting process of storage projects and CO<sub>2</sub> pipelines by making the issues applicable to the Fixing America Surface Transportation (FAST ACT) Act. Under the FAST Act, the Federal Permitting Improvement Steering Council (FPISC) would be responsible for leading ongoing government-wide efforts to modernize the Federal permitting and review process for major infrastructure projects.
- Incorporate CO<sub>2</sub> pipeline infrastructure into national infrastructure policy initiatives, notably those associated with post-pandemic economic recovery.

### Energy Infrastructure Programs

- Advance a “hubs and clusters” approach for CCUS infrastructure development, providing an opportunity for aggregation of emissions from numerous industrial and power generation sources.
- Continue support for the Regional Carbon Sequestration Partnerships under the newly launched Regional Initiative to support the continued buildout of value-added regional solutions to carbon management.
- CarbonSAFE – continue public-private support to facilitate deployment of geologic storage sites for CO<sub>2</sub>, advance efforts to secure state primacy for permitting of injection sites, and address other regulatory and legal issues associated with CO<sub>2</sub> storage.
- Demonstrate secure geologic storage through CO<sub>2</sub>-EOR, exploring the potential applicability of ISO 27916 (International Organization of Standardization).
- The U.S. government should undertake characterization of CO<sub>2</sub> storage sites. NCC supports the National Petroleum Council (NPC) recommendation of \$400 million per year for 10 years for research and development of geologic storage.
- Engage the support and expertise of the oil and gas industry in support of CCUS deployment related to CO<sub>2</sub> transport and utilization for EOR.

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### Conclusion

The vast coal resources of the U.S. provide a reliable, resilient, flexible and affordable energy source, enhancing our nation’s national, economic and energy security. The U.S. must maintain a readiness, both in technology and human resources, to utilize the most abundant resources under this nation’s control to supply critical energy needs. A strong coal future will power not only our electric generation needs, but a renaissance in U.S. advanced manufacturing industries reliant on reliable, affordable energy.