

CLIMATE AND ENERGY ECONOMICS DISCUSSION PAPER | APRIL 25, 2016

**BUILD A BETTER FUTURE FOR COAL WORKERS  
AND THEIR COMMUNITIES**



**ADELE C. MORRIS**  
Brookings



# **BUILD A BETTER FUTURE FOR COAL WORKERS AND THEIR COMMUNITIES**

APRIL 25, 2016

**ADELE C. MORRIS**

Brookings

*The Brookings Institution is a private non-profit organization. Its mission is to conduct high quality, independent research and, based on that research, to provide innovative, practical recommendations for policymakers and the public. The conclusions and recommendations of any Brookings publication are solely those of its author, and do not reflect the views of the Institution, its management, or its other scholars. Support for this publication was generously provided by the Linden Trust. Brookings recognizes that the value it provides is in its absolute commitment to quality, independence and impact. Activities supported by its donors reflect this commitment and the analysis and recommendations are not determined or influenced by any donation. The author is deeply grateful for support from the Linden Trust for Conservation and for the insights shared by attendees at a November 2015 workshop at Brookings. She also acknowledges helpful comments from Noah Kaufman, Robert Godby, and Noah Kirsch and research assistance by Nicholas Montalbano.*

## I. INTRODUCTION

---

Some politicians call climate or other environmental policies a “war on coal,” framing the measures as an attack on the well-being of hardworking Americans. Others chafe at such rhetoric, arguing it is aimed at derailing sensible measures to reduce the risks of global climatic disruption and harmful air pollution. Whatever the merits in each side’s arguments, it is increasingly clear that owing to both market-driven trends and environmental policies, workers in the coal industry and their communities are rightly concerned about their future.

The coal sector is already changing dramatically, particularly but not only in Appalachia. Job losses are mounting. Longstanding firms are in bankruptcy, and retiree benefits are under threat. Some communities are experiencing deteriorating fiscal conditions, and many residents in the coalfields have important unmet healthcare needs. In addition, even while coal improved countless lives by fueling affordable, reliable electricity, many decades of coal production have scarred landscapes and impaired waterways, and reclamation liabilities could be underfunded. Federal policies to control carbon dioxide emissions, if they are implemented as planned, will decrease coal consumption further, exacerbating all of these challenges.

Addressing these concerns is urgent. A well-designed well-funded package of federal policies could help hard-hit communities and families make the necessary transitions to a more diverse economic base, to new careers, and through retirement. A truly effective set of measures could also assure policymakers that environmental protection doesn’t have to kick people when they’re down, and if done well may even make them better off than they would have been absent climate policy.

This paper reviews the challenges facing the coal workforce and the case for significant federal investment in those workers and the areas in which they live. Section 2 examines recent trends and the outlook for the industry under current and alternative policies with an eye to understanding the implications for the associated workforce. Section 3 explores the specific needs of the affected individuals and communities and summarizes literature on previous transition programs. Section 4 reviews current legislative and budget proposals. It concludes that they include promising approaches, but their funding levels are unlikely to be sufficient to address appropriately the myriad needs outlined in Section 3. Section 5 argues that replacing Clean Air Act regulations with a tax on the carbon content of fossil fuels and other greenhouse gas emissions could provide ample resources to advance the well-being of coalfield workers and communities, while at the same time producing superior environmental and macroeconomic outcomes.

The paper draws on insights from a November 2015 workshop at Brookings that gathered a high level group of experts and stakeholders. The conclusions are strictly those of the author.

## 2. TRENDS AND OUTLOOK FOR COAL AND ITS WORKFORCE

### Trends

Coal has been a critical energy source in the United States for the past century. From the late 1800s through 2008, U.S. coal production increased along with the country's growing demand for electricity. However, as shown in Figure 1, U.S. coal production peaked in 2008 and is now in decline. In 2015, coal production in the United States totaled 890 million short tons, 24 percent below its high of 1.172 billion short tons in 2008.

**Figure 1: United States Coal Production 1970-2015**

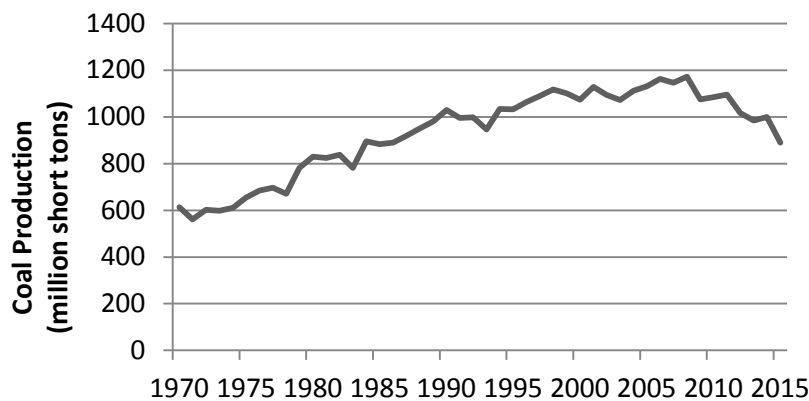
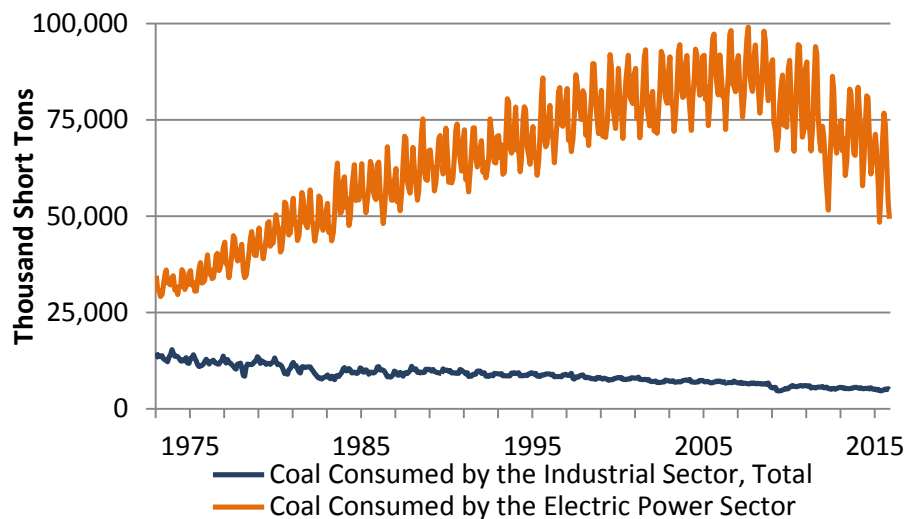


Figure 2 shows that this recent downturn relates directly to a decline in coal use in the electric power sector.

**Figure 2: United States Coal Consumption by Sector**



Source: U.S. Energy Information Administration, Coal Data Browser<sup>1</sup>

<sup>1</sup> <https://www.eia.gov/beta/coal/data/browser/>

Recent declines have been especially sharp. Total U.S. weekly coal production fell by 39 percent from early April 2015 to early April 2016. The decline was particularly acute in Appalachia, where weekly coal product fell by 43 percent in that one-year period.

A number of factors are at work in these trends: slow growth in U.S. electricity demand; competition from natural gas at historically low prices; declining exports; and state and federal environmental and clean energy policies. Some factors may be transitory, such as reduced coal demand from power plants owing to a relatively warm winter. Others, such as low natural gas prices, are more likely to reflect long-term structural changes in the industry. To illustrate the competition from natural gas, Figure 3 below shows the inflation-adjusted price of natural gas from 1996 at the well-head and to distributors (a.k.a. citygate prices). The citygate price fell from a spike of \$13.42 (in 2015\$) in July 2008 to \$3.67 in October of 2015, a decrease of about 73 percent.

**Figure 3: Natural Gas Prices**

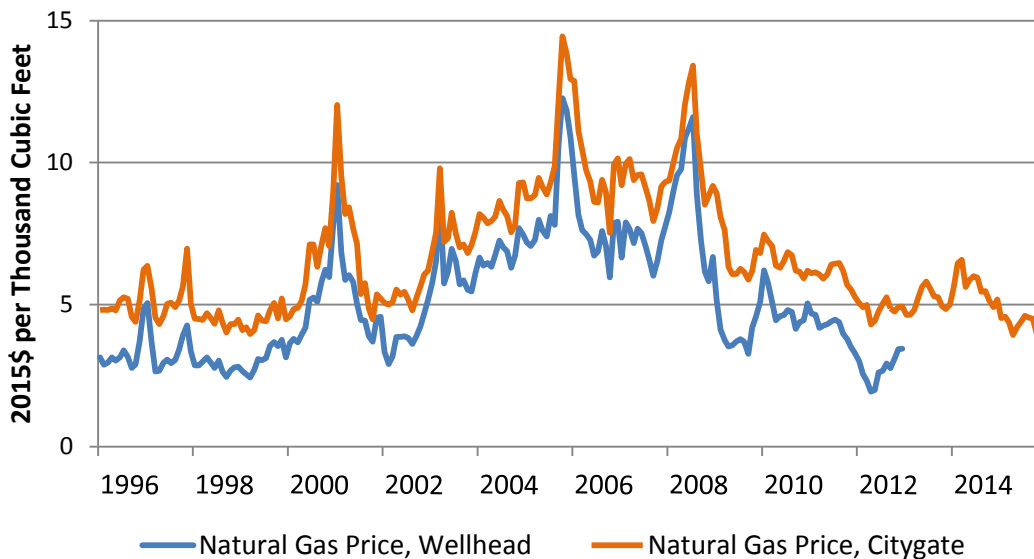
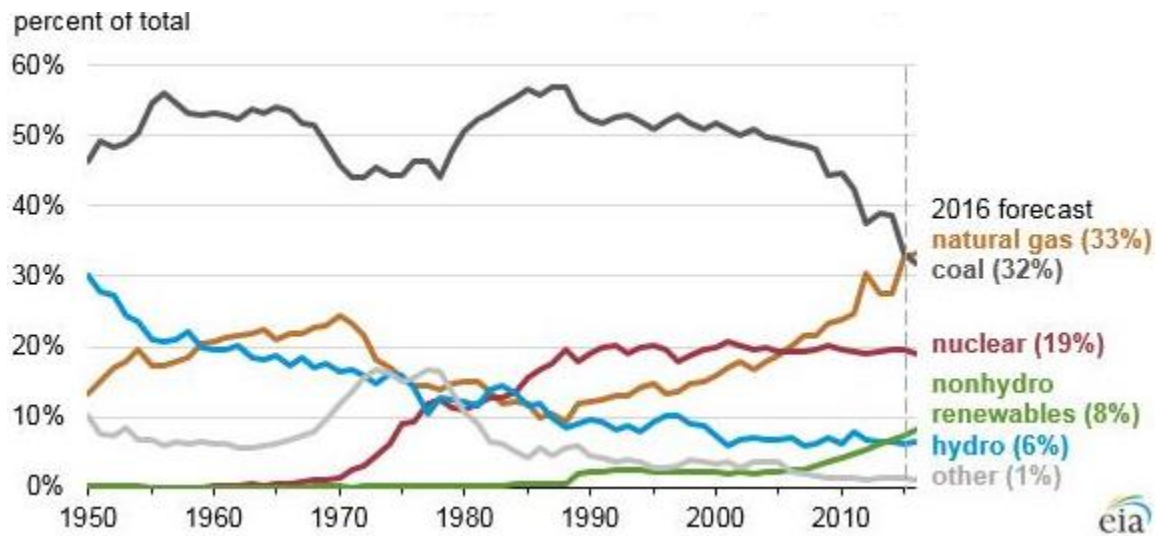


Figure 4 below shows the consequence of those lower natural gas prices: the displacement of coal in the electricity sector. In 2016, the Department of Energy’s Energy Information Administration (EIA) reported that gas surpassed coal as the leading fuel on an annual basis for the first time on record.<sup>2</sup>

<sup>2</sup> <http://www.eia.gov/todayinenergy/detail.cfm?id=25652>

**Figure 4: Annual Share of Total U.S. Electricity Generation by Source, 1950-2016**



**Source:** U.S. EIA, [Monthly Energy Review](#), and [Short-Term Energy Outlook](#) (March 2016)<sup>3</sup>

To be sure, if natural gas prices rebound, so might the share of coal in power generation. However, it is unlikely return to its prior levels; coal made up more than 80 percent of the retired electricity generating capacity in 2015 (about 4.6 percent of the nation's coal capacity at the beginning of that year), and no new coal plants are planned or under construction in the United States.

*Projections: Reference and Clean Power Plan Policy Scenarios*

Recent projections suggest coal production could well lose more ground owing to recent policy changes. The Environmental Protection Agency (EPA) projects that its final Clean Power Plan (CPP) rule would reduce carbon emissions from existing fossil-fueled electric power plants by 32 percent relative to 2005 levels, or about 17 percent relative to 2012 levels.<sup>4</sup> In February 2016, the U.S. Supreme Court issued a stay of the implementation of the rule pending proceedings later in the year. Notwithstanding the stay, some states are continuing their compliance planning. Whether the rule survives in its original form or not, it appears that long term planning in the electricity sector in many areas is leaning heavily away from coal.<sup>5</sup>

The potential effect of the CPP on coal use appears in Figure 5 below. It reports data from a 2015 modeling study by the EIA of the EPA's slightly less ambitious proposed version of the CPP. Without the CPP (the reference scenario), EIA's projected coal production rises slightly

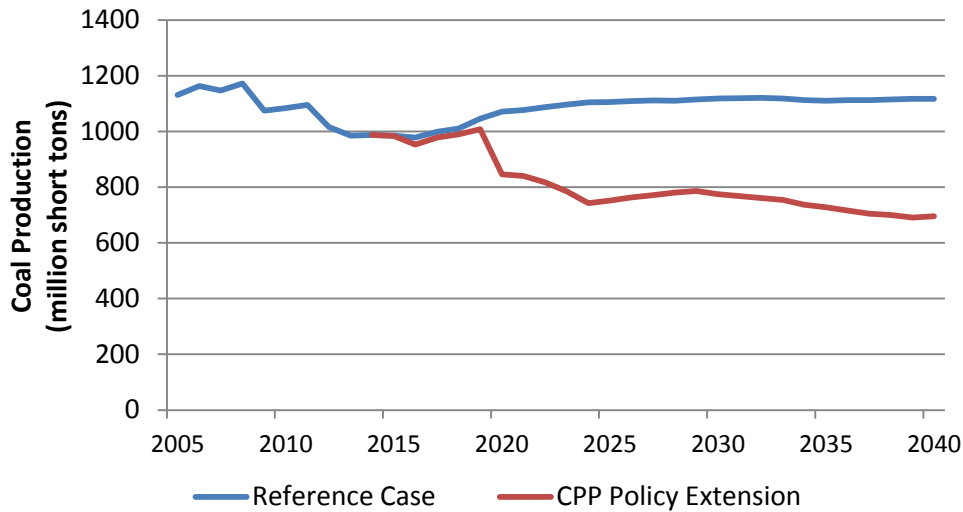
<sup>3</sup> <http://www.eia.gov/todayinenergy/detail.cfm?id=25392>

<sup>4</sup> [www.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf](http://www.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf), Table ES-4.

<sup>5</sup> <http://midwestenergynews.com/2016/03/18/miso-projects-additional-coal-retirements-under-clean-power-plan/>

through about 2021 and remains level thereafter. Under the CPP scenario, EIA projects the CPP would reduce U.S. coal production in 2020 and 2025 by 20 percent and 32 percent, respectively, relative to baseline levels in those years.<sup>6</sup> The extended CPP scenario, which assumes that EPA ramps up the stringency beyond 2030, would further decrease U.S. production of coal to its lowest level since 1978 by 2040.

**Figure 5: U.S. Coal Production: Actual and Projected, 2005-2040**



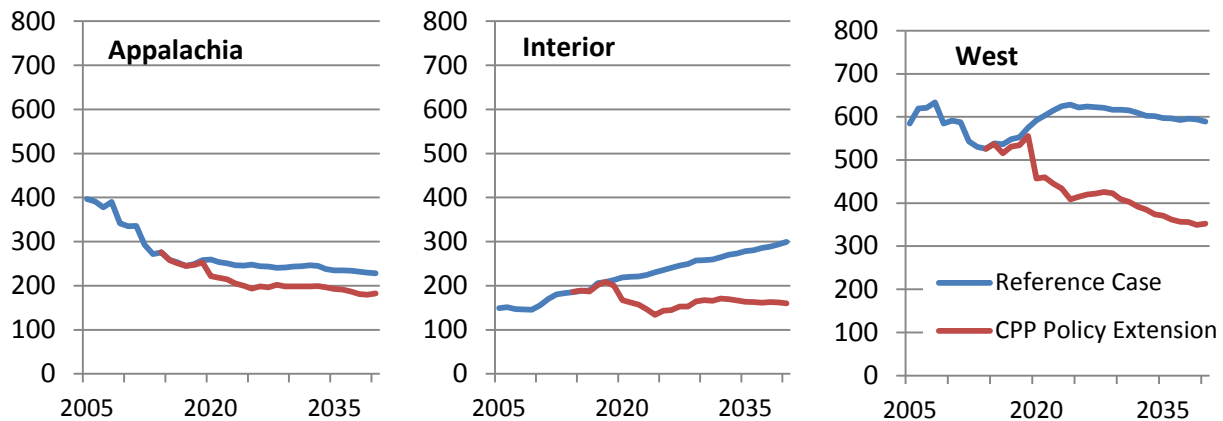
Source: U.S. Energy Information Administration, AEO2015 National Energy Modeling System

EIA partitioned its projections across the three major U.S. coal-producing regions: the West, Interior, and Appalachia. Figure 6 below shows the anticipated policy effects are concentrated in the Interior and West, where coal production would have risen in the absence of the climate policy.

<sup>6</sup> The extended CPP policy would reduce carbon emissions from the power sector by 45 percent below 2005 levels in 2040. <http://www.eia.gov/analysis/requests/powerplants/cleanplan/>



**Figure 6: Projections of Regional Coal Production (million short tons), 2005-2040**



Source: U.S. Energy Information Administration, Analysis of the Impacts of the Proposed CPP<sup>7</sup>

Some analysts have criticized EIA’s forecasts as consistently overestimating the costs of renewables such as wind and solar and therefore overestimating projections for coal use.<sup>8</sup> Whether or not the critics are right, a number of factors have evolved since EIA did its 2015 forecasts that suggest that even without the CPP, coal faces increasingly strong headwinds. First, unsubsidized costs of wind and solar power have indeed declined,<sup>9</sup> a trend amplified further by Congress in December 2015 when it extended production tax credits for wind power through 2019 and investment tax credits for solar power through 2021.<sup>10</sup> Second, natural gas prices have remained low, providing a low cost way for utilities to comply with mercury emissions standards.<sup>11</sup> For instance, about 30 percent of the coal capacity that retired in 2015 occurred in April, which is when the U.S. Environmental Protection Agency’s Mercury and Air Toxics Standards rule went into effect.<sup>12</sup>

#### *Projections: Carbon Tax Scenarios*

The effects of climate policy on coal as discussed above are not unique to the approach in EPA’s Clean Power Plan. Barring a technological leap and a radical change in relative fuel prices, any ambitious, cost effective carbon control policy will disproportionately reduce coal use relative to other fuels. Shifting out of coal is one of the least-cost abatement strategies for the foreseeable future for two reasons. First, coal is the most carbon intensive fuel (with about

<sup>7</sup> <https://www.eia.gov/analysis/requests/powerplants/cleanplan/pdf/powerplant.pdf>; pp. 49-51.

<sup>8</sup> <http://www.greentechmedia.com/articles/read/EIA-Continues-to-Lowball-Renewable-Energy-Forecast>

<sup>9</sup> For example, see Lazard’s *Levelized Cost of Energy Analysis 9.0*, <https://www.lazard.com/perspective/levelized-cost-of-energy-analysis-90/>

<sup>10</sup> <http://energy.gov/savings/renewable-electricity-production-tax-credit-ptc>; <http://www.seia.org/research-resources/impacts-solar-investment-tax-credit-extension>

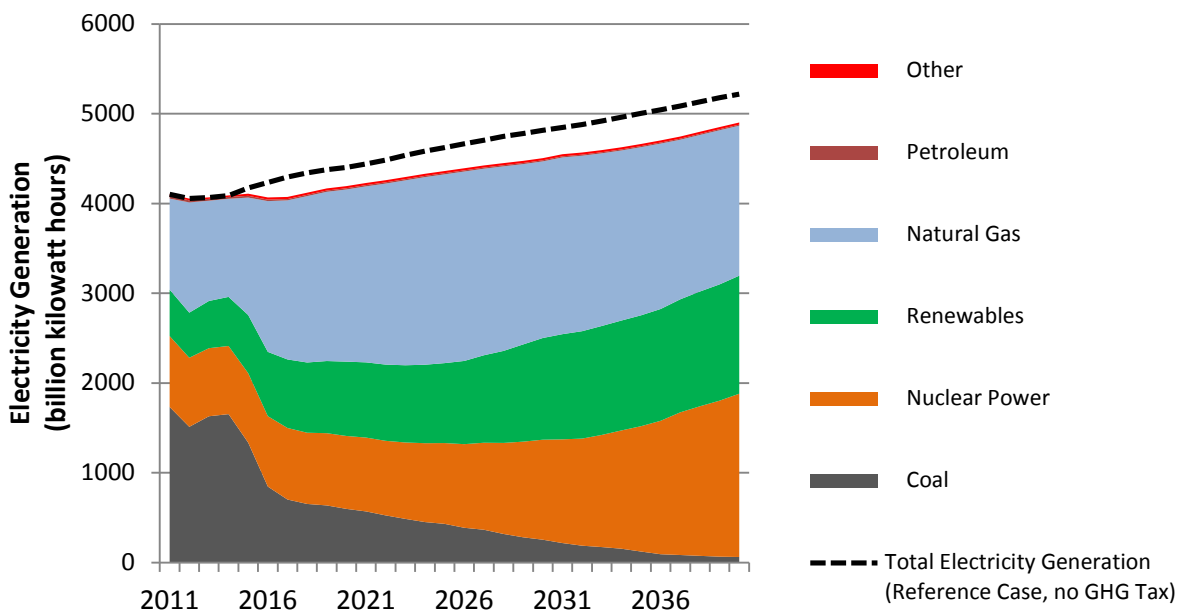
<sup>11</sup> [http://www.eia.gov/forecasts/steo/pdf/steo\\_full.pdf](http://www.eia.gov/forecasts/steo/pdf/steo_full.pdf)

<sup>12</sup> <http://www.eia.gov/todayinenergy/detail.cfm?id=25272> ; <https://www3.epa.gov/airquality/powerplanttoxics/index.html>

twice the carbon per unit of energy than natural gas), so switching to alternatives has relatively high climate benefits. Second, as shown in Figure 2, coal is used predominantly in the electricity sector and in that sector, coal faces a number of lower-carbon substitutes, including renewables, nuclear power, and natural gas. Under a wide variety of assumptions about the availability and price of those other technologies, economic models predict dramatic reductions in coal use under many climate policy scenarios.

To illustrate, consider a carbon fee policy that puts a carbon charge on each fuel in proportion to its carbon intensity. As shown in Figure 7 below, in its 2014 *Annual Energy Outlook (AEO)*, EIA projects that a fee of \$25 per metric ton of CO<sub>2</sub>, rising by 5 percent above inflation each year to \$85 in 2040, would virtually eliminate coal's role in electricity generation in the United States. Coal-fired power would fall from 42 percent at the start of the modeling period to about one percent of the electricity generation in the United States in 2040.<sup>13</sup> EIA estimates that the policy would lower U.S. coal consumption by about 90 percent in 2040 relative to the reference case (which EIA has already revised downward).<sup>14</sup>

**Figure 7: U.S. Electricity Generated by Fuel:  
\$25 per metric ton carbon fee scenario, 2011-2040**



Source: U.S. Energy Information Administration, AEO2014 National Energy Modeling System

Even a more modest carbon pricing policy would greatly affect the U.S. coal industry. In another side case in the *AEO 2014*, EIA estimated that an economy-wide CO<sub>2</sub> emissions price

<sup>13</sup> EIA Annual Energy Outlook 2014, Page D-11, Table D5.

<sup>14</sup> EIA Annual Energy Outlook 2014, Page MT-32, GHG10 and GHG25 side cases.

[http://www.eia.gov/forecasts/aeo/pdf/0383\(2014\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf)

of \$10 per metric ton of CO<sub>2</sub> (in 2012 dollars) in 2015, rising to \$34 per ton in 2040, would decrease U.S. coal consumption by 40 percent relative to reference levels in 2040.

Some, less ambitious, climate policy scenarios leave more room for coal. For example, Paul et al. (2013) modeled a set of carbon taxes applied to the U.S. electricity sector that match the range of estimates the federal government uses to value the benefits of reducing a ton of CO<sub>2</sub> emissions.<sup>15</sup> In their least stringent policy case in which the tax rises to \$18 per ton in 2035, coal use declines by 22 percent relative to baseline projections in that year.

### *Exports?*

In principle, one possible bright spot for the industry would arise if decreases in U.S. coal consumption were offset by increased exports to other countries. For a time, booming growth in China and strong exports made that seem promising. However, according to EIA, third quarter 2015 U.S. coal exports fell 14.4 percent from second quarter 2015 and were down 25.6 percent from third quarter 2014. As of the third quarter of 2015, coal exports from the United States had declined for ten quarters in a row.<sup>16</sup>

Projections suggest continued downward pressure on exports. In their March 2016 *Short-Term Energy Outlook*, EIA analysts wrote: “Slower growth in world coal demand and lower international coal prices have contributed to a decline in U.S. coal exports. Lower mining costs, cheaper transportation costs, and favorable exchange rates are expected to continue to provide an advantage to mines in other major coal-exporting countries compared with U.S. producers over the next few years.”<sup>17</sup> This means that even if India and other major developing countries continue their coal consumption, U.S. exporters still face stiff competition from lower cost coal exports from other countries.

Successful international climate efforts could shrink overseas markets even further. For example, China intends to halt the growth of its CO<sub>2</sub> emissions around 2030 and to “make best efforts” to peak early.<sup>18</sup> It also intends to increase the share of non-fossil fuels in primary energy consumption to around 20 percent by 2030.

The dimming of export growth projections is reflected in the recent stumbles of proposed expansions to coal export capacity in California, Washington, and Oregon. On the west coast, coal export growth is controversial for several reasons, including impacts on salmon habitat and Native American fishing rights, air pollution from coal dust and train exhaust, and the potential

---

<sup>15</sup> Anthony Paul, Blair Beasley, and Karen Palmer, “Taxing Electricity Sector Carbon Emissions at the Social Cost,” Resources for the Future, Discussion Paper 13-23-REV, November 2013.

<http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-13-23-REV.pdf>

<sup>16</sup> <http://www.eia.gov/coal/production/quarterly/>

<sup>17</sup> <https://www.eia.gov/forecasts/steo/report/coal.cfm>. For more on where the U.S. sends its coal, see this EIA report from June 2013: <http://www.eia.gov/todayinenergy/detail.cfm?id=11791>

<sup>18</sup> <https://www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change>

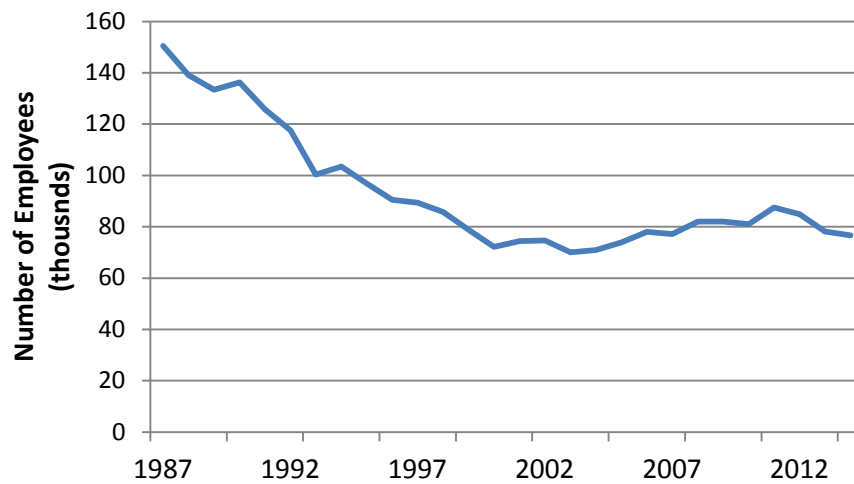
for greater coal supplies to increase CO<sub>2</sub> emissions in Asia.<sup>19</sup> However, new doubt about the return on investment may be a critical factor weighing against some new terminals. According to news reports, only two of six coal export facilities that were originally proposed for the Northwest are still in play. Many of the energy companies backing them have gone bankrupt or sold off their interests as the overseas markets for U.S. coal and oil products have deteriorated.<sup>20</sup>

Thus, barring a radical reversal of global economic trends and technology, extant market forces and new environmental policies will dramatically reduce coal as a U.S. fuel source by mid-century. To be sure, the impacts of these reductions will be felt differently in different parts of the United States, with the steepest declines expected in the least productive coalfields. As of 2014, the state with the highest productivity was Wyoming, with an average of over 28 short tons of coal produced per employee hour worked. In contrast, in central Appalachia the average was about 2.2.<sup>21</sup> We now turn to what this means for the workforce in the industry.

### Jobs

Even before the decline in U.S. coal production starting in 2008, the industry workforce declined significantly. As Figure 8 below shows, the number of employees in the sector fell from about 151,000 workers in 1987 to about 71,000 workers in 2004, a drop of more than half.

**Figure 8: Number of Employees in U.S. Coal Mining, 1987-2014**



Source: Bureau of Labor Statistics, NAICS 2121<sup>22</sup>

<sup>19</sup> <http://www.opb.org/news/article/puget-sound-coal-port-backers-pause-environmental-review/>

<sup>20</sup> <http://www.kplu.org/post/fat-lady-about-sing-gateway-pacific-export-terminal-near-bellingham>

<sup>21</sup> EIA, Annual Coal Report, March 23, 2016. <http://www.eia.gov/coal/annual/pdf/table21.pdf>

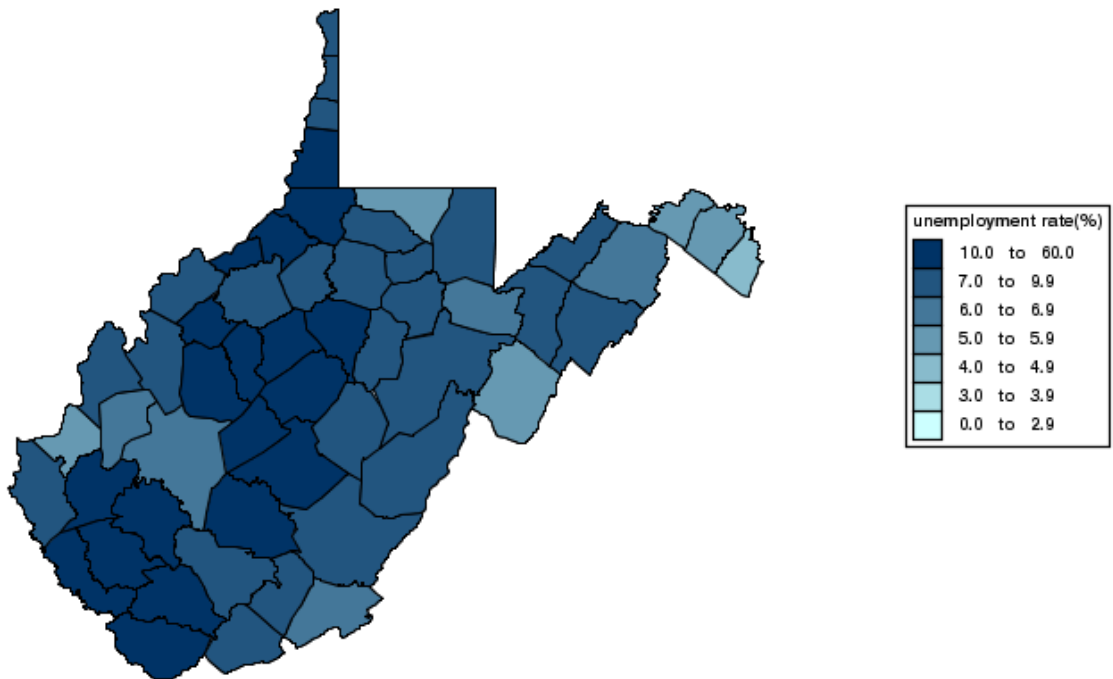
<sup>22</sup> [http://www.bls.gov/oes/current/naics4\\_212100.htm](http://www.bls.gov/oes/current/naics4_212100.htm)

The coal-related employment picture since 2014 has been bleak, with recent layoffs even in the most productive Wyoming operations. In March 2016, Peabody Energy announced cuts of 235 people, or 15 percent of the workforce, at its flagship North Antelope Rochelle mine, south of Gillette.<sup>23</sup> It is the nation’s largest coal mine. Arch Coal said it was cutting about 230 people, also about 15 percent, at its Black Thunder Mine near Wright, Wyoming. This follows layoffs in Illinois,<sup>24</sup> West Virginia, Ohio, and Kentucky,<sup>25</sup> some of which occurred in industries complementary to coal mining, such as rail operations.

As shown in Figure 9 below, as of February 2016, unemployment rates were above 10 percent in 19 of 55 counties in West Virginia and in 27 of 120 counties in Kentucky. The hardest hit in each state were Mingo County, West Virginia, with an unemployment rate of nearly 15 percent, and Magoffin County, Kentucky, where unemployment reached 21.6 percent – the 2nd highest such rate in the continental United States.<sup>26</sup>

**Figure 9: Unemployment Rates by County**  
**Panel A: West Virginia**

Unemployment rates by county, not seasonally adjusted, West Virginia February 2016



<sup>23</sup> [http://trib.com/business/energy/things-to-know-sweeping-layoffs-at-wyoming-coal-mines/article\\_elb7e696-6861-5bda-b860-c9fafb4ecca7.html](http://trib.com/business/energy/things-to-know-sweeping-layoffs-at-wyoming-coal-mines/article_elb7e696-6861-5bda-b860-c9fafb4ecca7.html)

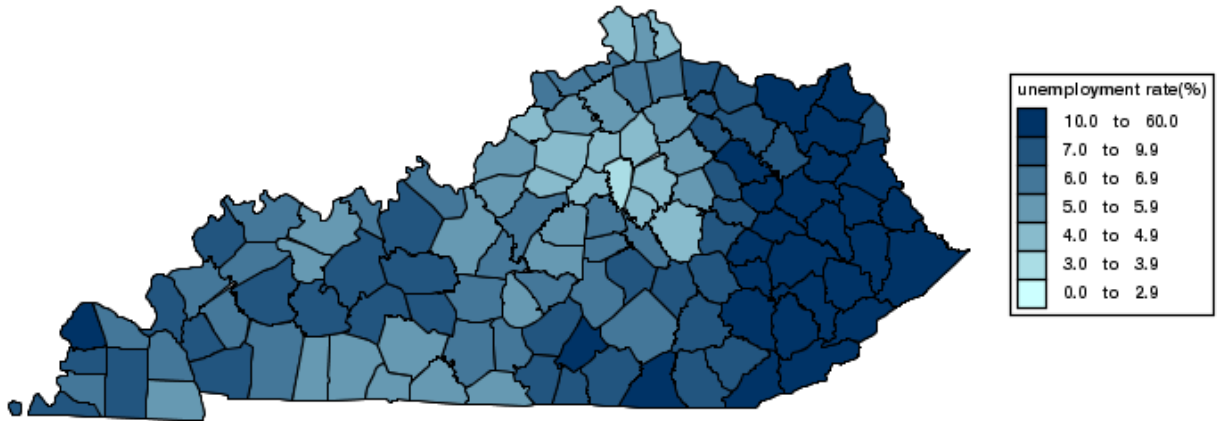
<sup>24</sup> [http://thesouthern.com/news/local/mine-issues-continue-as-peabody-announces-layoffs-at-two-mines/article\\_4303c0cd-2a40-5f6e-b52b-b5705b5063bd.html](http://thesouthern.com/news/local/mine-issues-continue-as-peabody-announces-layoffs-at-two-mines/article_4303c0cd-2a40-5f6e-b52b-b5705b5063bd.html)

<sup>25</sup> <http://wvpublic.org/term/coal-mining-layoffs>

<sup>26</sup> <http://www.bls.gov/lau/>

## Panel B: Kentucky

Unemployment rates by county, not seasonally adjusted, Kentucky February 2016



Source: U.S. Bureau of Labor Statistics<sup>27</sup>

Demographic data suggest that unemployed coal miners may find re-employment with equivalent compensation difficult; according to National Mining Association, less than 3 percent of coal miners have a bachelor's degree or higher, their average weekly earnings are \$1,492, and their median age is 45.<sup>28</sup> In contrast, according to the U.S. Bureau of Labor Statistics, overall U.S. median weekly earnings of workers with a high school diploma and no college is \$678 per week.<sup>29</sup>

Finally, the employment picture is not only about jobs directly involved in coal production. By some estimates, the broader economic base generated by coal can amount to three times the total employment and double the labor income as the levels tied directly to mining.<sup>30</sup> This means that a loss of high-paying coal jobs can result in significant losses in retail, services, and other sectors, even public schools.<sup>31</sup>

<sup>27</sup> <http://data.bls.gov/map/MapToolServlet>

<sup>28</sup> <http://www.nma.org/index.php/coal-statistics/coal-workforce>

<sup>29</sup> [http://www.bls.gov/emp/ep\\_chart\\_001.htm](http://www.bls.gov/emp/ep_chart_001.htm)

<sup>30</sup> Godby, Robert, Roger Coupal, David Taylor, and Tim Consodine, "The Impact of the Coal Economy on Wyoming," Center for Energy Economics and Public Policy, Department of Economics and Finance, University of Wyoming, February 2015. p. 25. [http://www.eenews.net/assets/2016/04/13/document\\_gw\\_11.pdf](http://www.eenews.net/assets/2016/04/13/document_gw_11.pdf)

<sup>31</sup> <http://weheartwv.com/2016/03/03/west-virginia-school-layoffs/>

### 3. COAL COUNTRY CHALLENGES

---

Coal-related layoffs come at a steep cost, not just to the workers themselves but also to the communities that depend on the salaries of those workers for their economic activity. Pensions and retiree healthcare benefits are also important resources channeled to these areas; union-related benefits deliver more than \$1 billion per year in pension payments and medical spending into coalfield communities each year.<sup>32</sup> The tax revenues associated with coal production, wages, property values, and ancillary business activities are also important to the fiscal health of state and local governments. When the pillar of coal production falls out from under these economies, a cascade of problems can result. At the same time, abandoned mines leave a cleanup liability that will fall on taxpayers if bankrupt operators don't meet their obligations. This section reviews the breadth of these challenges and some of the options for meeting them.

#### *Jobs and Economic Development*

A long literature connects climate policy with a need for assisting adversely affected workers, and it notes the potential multiplicity of regulatory pressures, technology changes, and market forces. Barrett (2001) surveys the literature and presciently describes how “[e]mployment in the coal mining industry has been declining for the past two decades due to increased mechanization. Thus, it may often be difficult to attribute particular job losses to climate change policy, rather than a combination of factors, of which climate policy may be only one.”<sup>33</sup> The author concludes that if the goal of an assistance program is to return workers to employment at or near their layoff wages, a successful program must make considerable training a viable option. Barrett writes that on average, it could take two years of full-time training to bring workers' wages back to their pre-layoff levels, and a comprehensive assistance program should involve income support, health benefits, and carefully matching training to labor market demands. For those workers nearing retirement age, the author concludes that “training for a new job or occupation does not appear to be a productive use of time or resources. The program should thus provide a bridge to retirement that maintains the standard of living of workers as well as retirement and insurance benefits.”

One more recent question is whether, when coal is displaced by other fuels, employment rises in other sectors, in principle offsetting the labor force impacts. However, maps created by Haerer and Pratson (2015) demonstrate that job increases in the natural gas, solar and wind industries generally did not occur where there were significant job losses in the coal industry,

---

<sup>32</sup> <http://www.umwa.org/?q=content/umwa-health-and-retirement-funds>

<sup>33</sup> Barrett, Jim, “Worker transition & global climate change,” Pew Center on Global Climate Change, December 2001. <http://www.c2es.org/publications/worker-transition-global-climate-change>

particularly in West Virginia and Kentucky.<sup>34</sup> Godby et al. (2015) review the impact of the coal industry on the Wyoming economy and the implications of the Clean Power Plan.<sup>35</sup> The authors show that employment losses the regulation produces in the state's coal industry are not offset by employment increases caused by increased natural gas production, the negative impact from reduced coal production is about two to four times larger than the positive natural gas employment effects, depending on the year and scenario considered. The authors note that the way in which Wyoming implements (or not) federal climate regulation will ultimately have less effect on the Wyoming economy than actions taken by the rest of the nation. That is because only 7 percent of Wyoming coal output is used by utilities in the state. They conclude that the ultimate solution is to diversify Wyoming's economy to create jobs outside the volatile energy sectors.

Similar themes infuse other studies that link current and projected declines in coal with reductions in employment. Richardson et al. (2014) document the role of coal in West Virginia's economy and argue for federal assistance to offset the negative employment implications for the state of a shrinking industry.<sup>36</sup>

#### *Retirement benefits*

Pension payments play an important role in smoothing the local economic jolt. They ease the decisions by individuals and their families about whether to stay in coalfield areas and or move elsewhere. They also help fund migration and retraining costs, living expenses for those who cannot move, and retain sources of income for the local community when jobs disappear. Retiree health care benefits also support the market for healthcare services in coal field areas, importantly improving care availability for others in their communities.

One might wonder why, when companies set money aside during employees' tenures, pensions end up underfunded. One answer is that actuaries calculate the amounts contributed by estimating the investment returns on the assets in the pension funds. In recent years, returns on investments have proven lower than actuarial estimates, leaving fewer funds than expected. Another reason is that employers are leaving the industry, and the remaining employers cannot afford to make up the shortfall arising from employees of other firms.

The federal government offers two approaches to preserve plans. When multiemployer plans run out of money, the Pension Benefit Guaranty Corporation (PBGC) will step in and pay benefits. However, PBGC guarantees don't cover all benefits; in particular, miners on disability

---

<sup>34</sup> Haerer, Drew, Lincoln Pratson. "Employment trends in the U.S. Electricity Sector, 2008–2012," *Energy Policy*, 82 (2015), pp. 85-98.

<sup>35</sup> *op. cit.*

<sup>36</sup> Richardson L.J., R. Cleetus, S. Clemmer and J. Deyette, "Economic impacts on West Virginia from projected future coal production and implications for policymakers," *Environ. Res. Lett.* 9 (2014) 024006 (9pp).

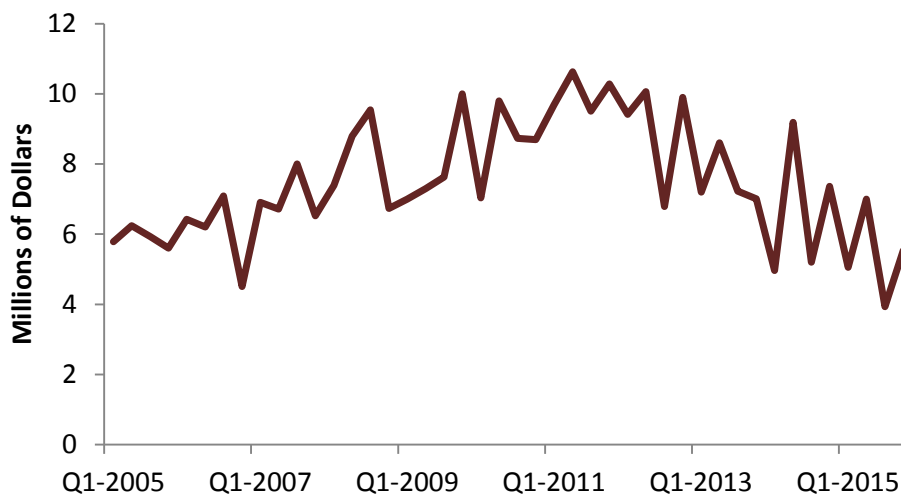


pensions would take severe cuts. An alternative to PBGC is to reallocate funds from federal mine reclamation funds to cover the shortfall or to fund it with other federal appropriations. Either requires an act of Congress, one that thus far has not been enacted.

#### *Fiscal conditions for state and local governments*

As coal prices and production volumes fall, so do tax and royalty revenues to state and local governments. Most directly affected are revenues from severance taxes, which are state-level excise taxes on minerals extracted from private lands. In some states, these taxes are an important source of revenue for local governments. For example, West Virginia distributes 75 percent of its net state coal severance tax to coal-producing counties. The rest goes to all counties and municipalities in the state based on population. Figure 10 below shows how those transfers have eroded over the past few years and hints at the potential fiscal problems facing local governments as coal production falls.

**Figure 10: West Virginia Coal Severance Tax Paid to Counties, Quarterly<sup>37</sup>**



In Wyoming, coal provides four direct sources of revenue: severance taxes, Federal mineral royalties, assessed valuation taxes (effectively property taxes), and coal lease bonus payments. These provide significant revenues to the state and to local counties with mining operations. In addition, extractive industries provide wages, which generate sales tax revenues and other revenue-producing spillovers. As a result of the downturn in coal, as well as low prices for oil and natural gas, the Wyoming government is projecting significant declines in revenues.<sup>38</sup>

<sup>37</sup> <http://www.wvtreasury.com/Banking-Services/Revenue-Distributions/Coal-Severance-Tax>

<sup>38</sup> [http://eadiv.state.wy.us/creg/Revenue\\_Update\\_April2016.pdf](http://eadiv.state.wy.us/creg/Revenue_Update_April2016.pdf)

### *Ecological restoration of mined areas*

The Surface Mining Control and Reclamation Control Act (SMCRA) requires mine operators to restore the affected land (federal or private) to a condition capable of supporting the uses it could support before mining, or better. The law also governs the reclamation of abandoned mines. In principle, reclamation activities can create jobs and develop the disturbed sites into areas that attract other economic activity. However, it is increasingly doubtful that financially-troubled firms have appropriately planned for their cleanup liabilities. SMCRA requires that mining companies post a bond sufficient to cover the cost of reclaiming the site, but a number of states have allowed firms to “self-bond,” that is to underwrite the reclamation guarantees with the assets of the firm rather than through third-party contracts. Recent press articles chronicle at least \$2.5 billion in self-bonded reclamation costs by just three firms, all of which are now in Chapter 11 bankruptcy.<sup>39</sup>

According to Conrad (2014), these situations are of particular concern to the states because they create a thorny dilemma: if a state insists on alternative bonding or collateral, it would increase the threat to the company’s solvency. The state could then find itself saddled with the liability for the reclamation.<sup>40</sup> This is a particular threat in cases where a mine actually closes and no new owner emerges to assume the cleanup liability.

### *Policy Precedents in Other Sectors*

A search for successful precedents for the kind of economic transition that will be necessary in coalfield areas comes up wanting. Although policymakers have targeted federal assistance to a number of abrupt economic transitions, the most successful examples are quite different than the challenges facing coal country. For example, the Servicemen’s Readjustment Act of 1944, a.k.a. the GI Bill, offered an extraordinary opportunity for soldiers returning from World War II to get an education, buy a home, start a business, and build a new future. The program was a major political and economic success and arguably set the course for strong post-war economic growth. The program’s incentives for education and other human capital accumulation could be a model for how to assist younger displaced workers in coal-reliant areas, but the example is only partly applicable. The opportunities available to healthy twenty-somethings who can move

---

<sup>39</sup> [https://www.washingtonpost.com/business/economy/can-coal-companies-afford-to-clean-up-coal-country/2016/04/01/c175570c-ec73-11e5-a6f3-21ccdbc5f74e\\_story.html](https://www.washingtonpost.com/business/economy/can-coal-companies-afford-to-clean-up-coal-country/2016/04/01/c175570c-ec73-11e5-a6f3-21ccdbc5f74e_story.html);  
<http://www.usnews.com/news/business/articles/2016-04-14/peabody-chapter-11-helps-draw-attention-to-coal-reclamation>

<sup>40</sup>Conrad, Gregory E., “Mine Reclamation Bonding – from Dilemma to Crisis to Reinvention: What’s a State Regulator to Do?” Energy and Mineral Law Foundation Winter Workshop on Energy Law, February 11, 2014. <http://www.imcc.isa.us/EMLF%20Bonding%20Presentation%20Final.pdf>

anywhere to promising work or study are not the same as those facing small rural towns and older families that have had the whole economic rug pulled out from under them.

One might look to how communities affected by the closure of manufacturing facilities resulting from trade competition or offshoring have coped. Started in 1974 and recently reauthorized to 2021, the federal Trade Adjustment Assistance (TAA) Program provides assistance for those negatively affected by freer trade. It consists of separate programs for workers, farmers, and firms. After a lengthy certification process, the worker program offers eligible participants income support (linked to unemployment insurance benefits), training, a health coverage tax credit, wage supplementation for those 50 or older who earn less than \$50,000 annually at a new job; employment services; and relocation allowances.

The results of TAA assistance are mixed. Certainly, success stories abound. However, some data suggest that program participants who leave the labor force for extended training (particularly older workers) can lose ground relative to otherwise similar non-participants. For example, one study matched TAA participants with a comparison group and found that it took TAA participants two to four years to catch up with the comparison group that had not been out of the labor force.<sup>41</sup> After four years, fewer than half of trainees had jobs in the fields in which they'd trained, and when TAA participants returned to work, they had lower wages and were less likely to have fringe benefits than the comparison group members. Although a number of factors can explain these results, such as the fact that some participants were reentering the job market in a deep recession, this research suggests that job training programs must be carefully designed and delivered to ensure they truly benefit their participants.

Another possible model arises in the way the U.S. Department of Defense (DoD) assists local economic transitions when it closes military bases, makes major adjustments in workforce levels, or ends large defense contracts. The DoD's Office of Economic Adjustment (OEA) helps state and local governments and other regional authorities plan and carry out adjustment and diversification programs.<sup>42</sup> Some of the agency's work provides technical assistance to communities for planning and some involves direct financial support. One important element of this work is that in most instances communities have advance notice of the major DoD changes and can plan ahead to minimize the economic dislocation. Also, unlike with most abandoned mines, in many cases the DoD leaves behind buildings, airports, and other infrastructure that communities can convert to commercial purposes. Nonetheless, technical and financial support

---

<sup>41</sup> Ronald D'Amico and Peter Z. Schochet, "The Evaluation of the Trade Adjustment Assistance Program: A Synthesis of Major Findings," Final Report Prepared as Part of the Evaluation of the Trade Adjustment Assistance Program, Mathematica, December 2012. [http://www.mathematica-mpr.com/~media/publications/PDFs/labor/TAA\\_Synthesis.pdf](http://www.mathematica-mpr.com/~media/publications/PDFs/labor/TAA_Synthesis.pdf)

<sup>42</sup> <http://www.oea.gov/>

for local economic diversification planning appears to be a useful coordinating role for the federal program.

## 4. CURRENT POLICIES AND PROPOSALS

---

For some time, legislative and Administration budget proposals have recognized the need to help dislocated coal workers and to protect retirees, but at this writing Congress has not yet provided broad support to meet the range of needs described above. This section offers a snapshot of the federal policy processes in motion; a number of state and regional initiatives are also in various stages of development.

A number of federal programs, not specifically targeted to problems associated with declines in the coal industry, fund job training and other assistance in cases of mass layoffs.<sup>43</sup> Arguably, none of these is sufficiently broad or deep to address the unique challenges in the coal fields. The Obama Administration has proposed a number of measures targeted to help dislocated coal economy workers.<sup>44</sup> Bundled as the Power+ Plan, the proposals would channel resources to support economic diversification, workforce retraining, and other activities. Some of these proposals are funded and underway; others are not. Some of the proposals also have legislative counterparts under consideration by Congress.

### *Existing programs targeted to coal workers and their communities*

The Appalachian Regional Commission and the U.S. Economic Development Administration have made \$65.8 million in grants available through the Obama Administration's Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative. The initiative aims to boost economic growth and worker advancement in communities that have historically relied on the coal economy.<sup>45</sup> It is set up as a multi-agency effort, and it prioritizes projects and activities that sponsors believe will produce multiple benefits, such as regional economic diversification, job creation, capital investment, and re-employment for displaced workers. It also targets activities that local and regional economic development plans have identified as promising. The grants will fund both technical assistance to planning organizations and implementation of projects ready for deployment.<sup>46</sup>

---

<sup>43</sup> For example, Wyoming is deploying the U.S. Department of Labor's Rapid Response Services for Laid Off Workers in response to two recent large coal mine layoffs. <https://www.doleta.gov/layoff/workers.cfm>; [http://trib.com/business/energy/wyoming-s-two-largest-coal-mines-announce-layoffs/article\\_0d217a3a-5a9d-5b1d-8d0d-8a5081724bb2.html](http://trib.com/business/energy/wyoming-s-two-largest-coal-mines-announce-layoffs/article_0d217a3a-5a9d-5b1d-8d0d-8a5081724bb2.html).

<sup>44</sup> [https://www.whitehouse.gov/sites/default/files/omb/budget/fy2017/assets/fact\\_sheets/Investing%20in%20Coal%20Communities.pdf](https://www.whitehouse.gov/sites/default/files/omb/budget/fy2017/assets/fact_sheets/Investing%20in%20Coal%20Communities.pdf)

<sup>45</sup> <https://www.eda.gov/power/files/2016/funds-announcement.pdf>

<sup>46</sup> <http://www.arc.gov/images/grantsandfunding/POWER2016/FFOs/POWER-2016-Grants-FFO.pdf>

### *Administration Budget Proposals and Draft Legislation*

Another Administration budget proposal would ensure health and pension benefits for retired union coal miners by adding federal funds to the United Mine Workers of America (UMWA) health and pension plans to prevent insolvency. A similar measure, called the Miners Protection Act of 2015, is under consideration in the Senate.<sup>47</sup> Although the bill has bipartisan support, its progress through the chamber has been slow.<sup>48</sup>

A third Administration proposal and a similar bill under consideration in Congress (called the RECLAIM Act) would accelerate the use of unused funds in the Abandoned Mine Reclamation Fund for projects in which reclamation can be linked to job-creating economic development strategies. Both measures would make \$1 billion over five years available to coal communities that “have traditionally relied on the coal industry for employment or have recently experienced significant coal job losses,” according to a release from bill sponsor Hall Rodgers (R-KY).<sup>49</sup> In principle, this approach offers the dual benefits of accelerating reclamation (and the jobs these activities create) and delivering rehabilitated property and infrastructure that can support new economic activity. The challenge will be to identify projects that serve both objectives.

A fourth Administration proposal would offer a tax credit for carbon dioxide that is stripped from combustion gases and stored to avoid an increase to atmospheric concentrations of the gas. In principle, this could allow continued use of coal without violating emissions caps and allow for more continued coal production. In practice, the technology remains costly relative to other ways of reducing CO<sub>2</sub> emissions from electricity generation.<sup>50</sup>

### *Other proposals*

A number of other pertinent House and Senate bills and proposals have emerged. A detailed review is outside the scope of this paper, but an illustrative sample would include a bill sponsored by Representatives David B. McKinley (R-WV) and Peter Welch (D-VT) that would assist coal workers who have lost their jobs due to a downturn in the coal industry. The Healthy Employee Loss Prevention Act (HELP Act) would provide retraining and job search assistance to displaced workers in coal communities across the country. They modeled it after the Trade Adjustment Assistance Act. Also, Senator Sanders and others sponsored a measure called the Clean Energy Worker Just Transition Act that would provide a similar range of benefits.<sup>51</sup>

---

<sup>47</sup> <https://www.govtrack.us/congress/bills/114/s1714/text>

<sup>48</sup> <https://www.washingtonpost.com/news/wonk/wp/2016/02/09/a-huge-coal-miners-pension-plan-is-on-the-brink-of-failure-one-senator-is-blocking-a-fix/>

<sup>49</sup> <http://halrogers.house.gov/news/documentsingle.aspx?DocumentID=398544>

<sup>50</sup> <http://www.c2es.org/technology/factsheet/CCS>

<sup>51</sup> <https://www.govtrack.us/congress/bills/114/s2398/text>

In her Presidential campaign platform, Secretary Hillary Clinton proposed a broad \$30 billion plan to “ensure that coal miners and their families get the benefits they’ve earned and respect they deserve, to invest in economic diversification and job creation, and to make coal communities an engine of U.S. economic growth in the 21st century as they have been for generations.” The plan includes assurances of retiree benefits, reform of black lung benefits, school funding, mine reclamation, infrastructure, training, and other measures to help displaced workers and encourage economic development in areas hit hardest by a decline in coal production. The plan is comprehensive, but does not specify how to pay for the full package of benefits. We turn to this issue next.

#### *Potential revenue sources*

Whatever the nature of the assistance policies, Congress must find a source of revenue. Strickland et al. (2015) offer two ideas.<sup>52</sup> First, Congress could raise the royalty rate that mine operators pay on the value of surface-mined coal they extract from federal lands. This would only apply to new leases since the government can’t force new royalty rates on existing leases. The authors argue that, in addition to being cheaper to produce, this coal, produced mostly in the Powder River Basin in Wyoming, enjoys a distorting advantage over privately-held Appalachian coal because federal leases are issued well below their true market value. Alternatively, Congress could require mining companies pay royalties based on the price of coal at its final point of sale rather than at the first arms-length transaction, thus more closely tying the royalty basis to the true market value of the coal. This change could apply to both new and existing leases.

Both proposals arguably have the advantage of making coal markets more competitive, perhaps with the appearance of picking on Western producers to benefit depressed areas in Appalachia. The challenge with the first approach is that the Obama Administration has halted new coal leases, so it is unclear to which, if any, leases the new royalty rates would apply.<sup>53</sup> The second challenge, which applies to both ideas, is that they require legislation. That said, if Congress fails to act, Secretary of the Interior can use the agency’s authority to modernize the royalty system in a way that increases royalty revenues at least to some extent.

Krupnick et al. (2015) offer another option.<sup>54</sup> Their legal analysis concludes that the Department of the Interior’s Bureau of Land Management (BLM) has the statutory and

---

<sup>52</sup> Strickland, Ted, Greg Dotson, and Matt Lee-Ashley, “Revitalizing Appalachia: How Congress Can Correct Distortions in the Coal Market and Invest in Struggling Coal Communities,” Center for American Progress, February 2015. <https://cdn.americanprogress.org/wp-content/uploads/2015/02/CoalCommunities-report2.pdf>

<sup>53</sup> The Administration says the suspension on new leases will allow the U.S. Department of Interior to conduct a thorough review of its leasing procedures.

[http://www.blm.gov/wo/st/en/info/newsroom/2016/january/nr\\_01\\_15\\_2016.html](http://www.blm.gov/wo/st/en/info/newsroom/2016/january/nr_01_15_2016.html)

<sup>54</sup> Krupnick, Alan, Joel Darmstadter, Nathan Richardson, and Katrina McLaughlin, “

regulatory authority to impose a carbon charge on coal produced on federal lands. Again, this would apply to new or renewed leases, not existing leases. To make their case, they describe how the law requires BLM to consider the environment when making multiple use decisions for public land, and explain how BLM's leasing statutes offer the agency considerable discretion to set the financial terms of coal leases. However, the authors rightfully observe that the economic case for this approach is weakened to the extent that it would drive coal production away from federal lands toward state, private, and tribal lands (now 60 percent of total production).

#### *Assistance provisions in illustrative carbon tax legislation*

The likely effects of a carbon tax on the coal industry are well known, and a number of bills that would price carbon would reserve some revenues to help coal workers and their communities. For example, the "Tax Pollution, Not Profits" bill,<sup>55</sup> sponsored by Congressman John Delaney, would reserve up to two percent of revenues from a carbon tax over ten years for assisting coal workers. Senators Whitehouse and Schatz sponsored a carbon fee bill that grants up to \$20 billion of the revenue each year to states, in part for assisting workers and former workers in fossil-fuel related industries.<sup>56</sup>

And in their carbon fee proposal, Senators Sanders and Boxer reserve \$1 billion in revenues per year for 10 years for "job training, education, and transition assistance for individuals employed by the fossil fuel industry seeking to transition to clean energy jobs."<sup>57</sup> This provision appears not to support workers who wish to transition to non-energy industries, retirement benefits, or measures that could diversify coal-reliant economies. Such constraints could significantly reduce the value of the benefits because, as discussed above, clean energy jobs are not necessarily created in areas where coal jobs are lost.

#### *Needs versus available resources*

A striking disconnect arises between the urgent needs in coal country and the level of funding currently available or under consideration. A very rough aggregate of the resources that will be necessary to protect retiree benefits (at least \$2.3 billion<sup>58</sup>), reclaim mines owned by bankrupt companies (perhaps \$3 billion), and provide job training, infrastructure, and redevelopment and

---

Putting a Carbon Charge on Federal Coal: Legal and Economic Issues," Resources for the Future Discussion Paper DP-13, March 2015. <http://www.rff.org/research/publications/putting-carbon-charge-federal-coal-legal-and-economic-issues>

<sup>55</sup> <http://delaney.house.gov/news/press-releases/delaney-introduces-legislation-to-reduce-carbon-pollution-reduce-taxes-and-boost>; <https://www.govtrack.us/congress/bills/114/hr2202/text>

<sup>56</sup> <http://www.whitehouse.senate.gov/download/?id=0fd52394-9832-4bba-8f49-491a71d558fa&download=1>; See Section 204, State-Based Cost Mitigation Grant Program.

<sup>57</sup> <https://www.govtrack.us/congress/bills/113/s332/text/is>

<sup>58</sup> Testimony of United Mine Workers of American International President Cecil Roberts before the U.S. Senate Committee on Finance on March 1, 2016. <http://www.finance.senate.gov/imo/media/doc/03012016%20Roberts%20Testimony%20SFC%20Testimony%20Multi-employer%20Pensions.pdf>

fiscal support for coalfield communities concludes the total is easily in the tens of billions of dollars over a decade. Thus, the needs are far larger than the \$66 billion in federal grants available in the POWER program or the funding contemplated in the RECLAIM Act, even if some of the reclamation costs can eventually be recovered by the liable mine operators. Moreover, the resources tallied here cannot feasibly come directly from the governments of the affected states because their budgets are already in shortfall as a result of the downturn in the coal industry.<sup>59</sup> Only the federal government could underwrite a transition package that truly gives a fresh start to coal workers and their communities. The next section describes a way forward.

## 5. A WAY FORWARD

---

This paper has shown that for many reasons the future of coal in the United States is unpromising. The industry's downturn to date has already created acute hardships, and the burdens on coalfield families will only grow as policymakers on both sides of the aisle take the risks of climatic disruption more seriously. This section argues that there is a clear opportunity available to policymakers who are concerned about the future of coal-reliant areas: they can craft policies that meet environmental goals in a way that can offset disproportionate burdens.

Economists widely argue that the most efficient and effective way to reduce greenhouse gas emissions is to put a price on them, either through a cap-and-trade system or through a tax.<sup>60</sup> Some experts believe that a carbon tax is particularly promising in the context of a broader tax reform package that lowers rates on other taxes; it funds pro-growth fiscal reforms that help offset the burdens of a new tax and create it creates a path for a legislative deal that doesn't involve a standalone climate measure.<sup>61</sup>

Analysis shows that carbon tax could raise enough revenue to simultaneously lower other tax rates, ensure that low income households are held harmless, and fund the economic transition in coalfields.<sup>62</sup> The current regulatory approach under the Clean Air Act in which states are given emissions targets for specific sectors offers no way to fund transfers coal states to ease the burdens of the new rules and existing market trends on their residents. While a carbon tax would accelerate the current decline of U.S. coal production driven by low natural gas prices,

---

<sup>59</sup> <http://www.governor.wv.gov/media/pressreleases/2015/Pages/Governor-Tomblin-Announces-Reduction-in-Fiscal-2016-Budget.aspx>; <https://www.multistate.com/insider/2016/02/which-states-have-a-budget-deficit-that-question-is-harder-to-answer-than-you-think/>

<sup>60</sup> <http://www.brookings.edu/blogs/up-front/posts/2013/02/07-carbon-tax-morris>

<sup>61</sup> Morris, Adele and Aparna Mathur, "A U.S. Carbon Tax in the Context of Broader Fiscal Reform," Center for Climate and Energy Economics, May 2014. <http://www.brookings.edu/research/papers/2014/05/22-carbon-tax-in-broader-us-fiscal-reform-morris>

<sup>62</sup> Marron, Donald and Adele Morris, "How to use Carbon Tax Revenues," Urban-Brookings Tax Policy Center, February 2016. <http://www.brookings.edu/~media/Research/Files/Papers/2016/02/23-carbon-tax-revenue/howtousecarbontaxrevenue/marronmorris.pdf?la=en>



declining costs of renewables, shrinking exports, and other factors – just as a regulatory approach would -- it is uniquely suited to advancing of the well-being of coalfield residents in a lower-coal future.<sup>63</sup>

#### *What a carbon tax package might include*

A carbon tax can be a simple excise tax on the carbon content of fossil fuels combusted in the United States and on select other greenhouse gas sources. An upstream tax could cover 85 percent of U.S. emissions by imposing tax liabilities on fewer than 2500 entities.<sup>64</sup> An illustrative carbon tax policy package that may appeal to both parties could have several key features.<sup>65</sup>

- It would impose a predictable economy-wide price signal that grows over time.
- It would include a vigorous diplomatic initiative to leverage U.S. action into equivalent action by other countries.
- To avoid significantly disadvantaging American energy-intensive trade-exposed industries—industries like metals, chemicals, glass, pulp and paper, and cement—relative to their counterparts in economies with less-ambitious climate policy, the policy would allow narrowly tailored and temporary “border carbon adjustments” that impose tariffs on imports of the most intensely energy-intensive trade-exposed goods.
- The package could also repeal or modify inefficient and redundant environmental and energy regulations. It could also eliminate billions of dollars of energy-related subsidies each year.
- The policy would reserve enough revenue to hold the poorest households harmless. Estimates suggest that about 11 percent of the revenue could offset the burden on the poorest 20 percent of households and 18 percent of the revenue could do so for the poorest 30 percent.<sup>66</sup> A traditional regulatory approach cannot protect low income households against bearing disproportionate burdens of emissions mitigation costs.
- Some of the revenue would fund a permanent reduction in other distortionary taxes, for example by reducing the top corporate income tax rate from 35 to 28 percent or below.<sup>67</sup> This tax swap approach improves the likely macroeconomic performance of

---

<sup>63</sup> Also see: David Bookbinder and David Bailey, “Why the Coal Industry should Embrace a Carbon Tax,” Niskanen Center, January 27, 2016. <https://niskanencenter.org/blog/news/niskanen-report-why-the-coal-industry-should-embrace-a-carbon-tax/>; Noah Kaufman, “Help for Coal Country from a Carbon Fee?” World Resources Institute, April 8, 2016. <http://www.wri.org/blog/2016/04/help-coal-country-carbon-fee>

<sup>64</sup> Ramseur, Jonathan L., Jane A. Leggett, and Molly F. Sherlock. 2012. “Carbon Tax: Deficit Reduction and Other Considerations.” Congressional Research Service, Report R42731, September 17, 2012.

<sup>65</sup> For one example of a carbon tax package proposal, see Morris, Adele C. 2013. “Proposal 11: The Many Benefits of a Carbon Tax.” In Michael Greenstone, Max Harris, Karen Li, Adam Looney, and Jeremy Patashnik (eds.), *15 Ways to Rethink the Federal Budget*. Washington, DC: The Hamilton Project, 63–69. [www.brookings.edu/research/papers/2013/02/benefits-of-carbon-tax](http://www.brookings.edu/research/papers/2013/02/benefits-of-carbon-tax)

<sup>66</sup> Mathur, Aparna, and Adele C. Morris. 2014. “Distributional Effects of a Carbon Tax in Broader U.S. Fiscal Reform,” *Energy Policy* 66: 326–334.

<sup>67</sup> Donald Marron and Eric Toder discuss this sort of swap in their 2013 paper here: <http://www.taxpolicycenter.org/publications/carbon-taxes-and-corporate-tax-reform>

the policy; some models even show a net pro-growth result of the swap, not even counting the environmental benefits.<sup>68</sup>

- The policy would channel enough revenue to offer appropriate transition relief for coal workers and their communities.

#### *How much revenue a carbon tax could raise*

As Marron et al. (2015) note, for legislative purposes, the estimates of the Congressional scoring agencies, the Joint Committee on Taxation (JCT) and the Congressional Budget Office (CBO), are paramount.<sup>69</sup> In late 2013, the CBO estimated the revenue effects of a tax on most greenhouse gas emissions that starts at \$25 per ton of CO<sub>2</sub>-equivalent emissions and increases by two percent above inflation each year.<sup>70</sup> The total revenue projection for the ten years from 2014 to 2023 was \$1.06 trillion. Updating those numbers, Marron et al. (2015) estimate the policy would produce net revenue of about \$90 billion in the tax's first complete year and about \$1.2 trillion over its first decade.

The tax trajectory analyzed by CBO and Marron et al. is significantly below the ones in the bills by Congressman Delaney (which starts at \$30 per ton) and Senators Whitehouse and Schatz (which starts at \$45 per ton), so it would be reasonable to expect that \$1.2 trillion is lower than the likely score for those bills.

This means that a carbon tax can raise enough revenue in the first ten years to fund a generous transitional assistance package for coal workers and communities and still provide resources for fiscal reform and other objectives that could motivate a legislative deal. For example, just three percent of the tax analyzed by JCT and CBO could provide \$36 billion over ten years for worker and community transition. The set-aside formula could front load the funding for the assistance package towards the early years of the program when it would be most needed.

Of course, it would be important to ensure any earmarked funds are treated with appropriate accountability and many questions arise. Who should be helped? Who should do the helping? Should the focus be on workers and communities, or should federal funds also help state and county governments through their fiscal transitions? Policymakers and community organizations must work out the details of how to ensure the money is spent wisely and to the genuine benefit of those who need it, how to measure results, and how to strike tradeoffs across competing uses and destinations for the funds. This paper leaves this exercise to future

---

<sup>68</sup> McKibbin, Warwick, Adele Morris, and Peter Wilcoxon, "Carbon Taxes and U.S. Fiscal Reform" *National Tax Journal*, March 2015, 68(1), pp. 139-159.

<sup>69</sup> Donald Marron, Eric Toder, and Lydia Austin, "Taxing Carbon: What, Why, and How," Urban-Brookings Tax Policy Center, June 2015. <http://www.taxpolicycenter.org/sites/default/files/alfresco/publication-pdfs/2000274-Taxing-Carbon-What-Why-and-How.pdf>

<sup>70</sup> CBO, Options for Reducing the Deficit: 2014-2023, November 2013. Option 35, P. 176  
<https://www.cbo.gov/sites/default/files/cbofiles/attachments/44715-OptionsForReducingDeficit-3.pdf>

research while emphasizing the critical role such work will have in supporting successful policy design.

### *Why to fund coal economy transition with a carbon tax*

In addition to raising ample revenue, a carbon tax approach offers several distinct advantages over other ways to fund transitional assistance for coalfield economies or lower emissions. First, a carbon tax would apply to all sources and sectors of emissions that threaten the earth's climate in direct proportion to the carbon intensity of the fuels. Thus it would not introduce distortions across different fossil fuels (other than as a result of their emissions-intensities), kinds of resource owners, lease tenures, location of fuel extraction or consumption, emitting sources, industrial sectors, or other factors not directly germane to the environmental damages of concern.

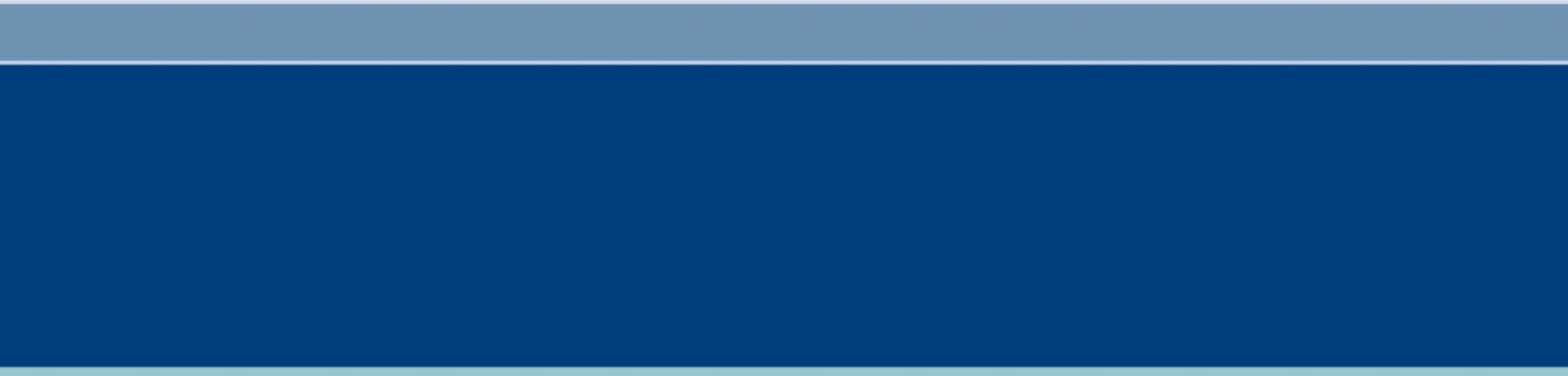
Also, a carbon tax could be rebated upon fuel export so as not to harm the export competitiveness of U.S. coal producers; and emissions intensive fuels and other goods can be taxed upon import. EPA has no authority for such measures under the Clean Air Act.

In addition, as a new authority designed specifically to reduce greenhouse gas emissions, a carbon tax would not be subject to the same litigation, uncertainty, agency discretion, and delay as regulations under the Clean Air Act. It would immediately start raising a predictable level of revenue. These resources, codified in law, would be far less subject to revision with each new resident of the White House than existing grant programs. This predictability is important environmentally, too, because a consistent, gradually increasing price signal reduces the risks of low-carbon investments, gives innovators a clear market for cleaner technologies, and prevents inadvertent stringency that could undermine support for the program.

A carbon tax is also a far more powerful diplomatic tool than regulations under the Clean Air Act because it would demonstrate a clear level of economic ambition and provide a more straightforward way to compare U.S. efforts with those of other countries. Successful carbon pricing coordination with major trading partners and competitors is the ultimate solution to concerns about environmental policy-related trade distortions.

### *Conclusion*

Coal-reliant communities across the United States are suffering from a dramatic economic downturn, and it would be imprudent to count on a rebound in coal production to improve their conditions. Current and prospective federal resources fall far short of sufficient means to finance rebuilding of coalfield economies and creating a better future for coal workers and their children. Policymakers can replace inefficient regulatory measures with an approach that channels resources to those who need them most, doing better by their constituents and the environment.



THE BROOKINGS INSTITUTION  
1775 MASSACHUSETTS AVE., NW  
WASHINGTON, DC 20036  
[WWW.BROOKINGS.EDU](http://WWW.BROOKINGS.EDU)