

THE LEGACY OF EXTRACTION:
READING PATTERNS AND ETHICS IN
PENNSYLVANIA'S LANDSCAPE OF ENERGY

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*W*e are used to seeing propeller blades spin, whether they are attached to the chassis of a helicopter or an airplane. Nevertheless, it is unnerving today to see the ridges of Pennsylvania's Allegheny Mountains lined with some of the largest propellers humans have ever constructed: Will they be strong enough to lift the long, slight, tree-covered ridges? Is that the intention? Of course not. But the history lessons embodied in Pennsylvania's energy landscapes are not lost on the people who live and work there. For the past 150 years, ground zero for Americans' harvest and management of energy resources has been the Commonwealth of Pennsylvania.

The extraction of coal, oil, and natural gas has been a source of power and wealth, but also unintended consequences that have undermined the previously unquestioned faith in technological progress. An important role for historians—and particularly environmental historians—is to find the critical common theme to this story of humans' most integral relationship with the natural environment, to mine the story for its important lessons about the past that will surely inform the nation's energy future. In the case of each energy source, the intellectual patterns

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that governed past choices do not necessarily hold true today, which makes Pennsylvania's story all the more interesting. In fact, upon closer inspection of these stories, we find that a clear ethic ties most energy landscapes together even as it gives a wide berth to others, such as the wind turbines topping many of the Commonwealth's broad ridges.¹

In its use by humans in Pennsylvania and elsewhere, energy harvest has taken many forms, beginning with the use of fire and the agricultural revolution. Industrialization changed everything for the Commonwealth. By the second half of the nineteenth century petroleum had become America's fuel of choice—minerals that could be extracted from the earth and burned to generate power and profits. No longer treated as an obstacle, the mountains of Pennsylvania were now viewed as a great vault for carbon. Acquiring these fuel resources in sufficient quantities took time and required a complete reorganization of human activities and living patterns. This shift toward industrialization represents one of the great technological undertakings of human history. Although remarkable innovations converted inanimate energy into products of all types, at the most basic level industrialization was constructed on a foundation of shifting priorities and ethics. In addition to the remarkable social and commercial accomplishments of this era, the transformation of the Appalachians in Pennsylvania into the nation's greatest energy landscape also came with significant residual costs attached.² This article explores this energy landscape as one of the clearest expressions of a specific American environmental ethic: extraction.

The reality, of course, is that extractive energy resources are neither sustainable nor renewable. As the choices of the industrial era expanded to shape an overall pattern of resource use, their product—extraction—became the common approach that overwhelmed many other considerations, including human health and ecological sustainability. Although this approach to resource harvest appears throughout the United States wherever energy resources are found, there can be no doubt that Pennsylvania has a unique role to play in defining the history of extraction. In short, development through extraction comes with clear costs and the Commonwealth has shown a clear willingness—even a propensity—to tolerate those costs.

Unstated but clearly apparent, energy landscapes are a product of choices by a society. Over generations, Pennsylvania's economy has been supported by the decision to harvest energy resources. But all land use is *not* created equal. Similar to a biologist, environmental historians must study human society in order to see the larger patterns and systems at work around us.

Energy systems are one of the most critical spheres with which humans interact with the natural world. During the industrial era, the human relationship with energy became expansive. Prior to this era, virtually all energy was renewable—a recurring, inexhaustible power source. In many cases, these sources of energy were transformed into relatively complex forms of work and applied by humans to many activities. These societies were defined by what they asked of the sources of power that they knew.³

Environmental historians have studied these patterns in the mid-Atlantic and elsewhere and we will reference much of their work below; however, this article begins with a basic approach to understanding land use. Environmental ethics are typically viewed as deriving from practices that aid nature; however, an ethic is also present in exploitative practices.⁴ The governing principle behind much of the Commonwealth's energy history might best be described as an "ethic of extraction." Briefly, this ethic governs the process in which a resource is completely harvested, at which time the search for new sources moves on. One key feature of this ethic is transience.⁵

Boomtowns and the "Drawing Board City"

The concept of the ethic of extraction evolved in Brian Black's work in *Petrolia: The Landscape of America's First Oil Boom*, which was one of the first works of environmental history to look at patterns of industrialization. In the world's first oil boom, Black found a template for much of the industrial development that would occur in Pennsylvania and elsewhere. His analysis grew partly from the work of cultural geographer John Brinckerhoff Jackson who wrote that "no group sets out to create a landscape. . . . What it sets out to do is to create a community, and the landscape as its visible manifestation is simply the by-product of people working and living, sometimes coming together, sometimes staying apart, but always recognizing their interdependence." He continued, "it follows that no landscape can be exclusively devoted to the fostering of only one identity."⁶ Under Jackson's logic, it would seem that a community is incapable of existing where it is organized under a single motivation. No built landscape better exemplifies this logic than boomtowns, particularly those so completely dependent on the single commodity for which they have been organized that they cease to exist when the resource is exhausted.

Although many extractive communities fit into this category, the oil boomtown—particularly a Pennsylvania town known as Pithole—may best demonstrate the transience of a place based on the ethic of extraction. Like all boomtowns, the community developed in a backwards fashion. Whereas many towns settled in the American West put the infrastructure in place first and then developed out of and around it, these oil boomtowns postponed setting up the infrastructure in case the town did not last. For instance, no sanitation existed in Pithole. “The whole place smells like a camp of soldiers with diarrhea,” observed a correspondent for the *Titusville Morning Herald*.⁷ Privies were insufficient and poorly maintained. Residents simply tossed garbage out of back doors to decompose. Many observers complained of the rank smell from carcasses of mules and horses discarded in the brush along the edge of roads.

Any symbols of the formation of a standard community, however, were always counterbalanced by the reality that Pithole existed as an oil camp,

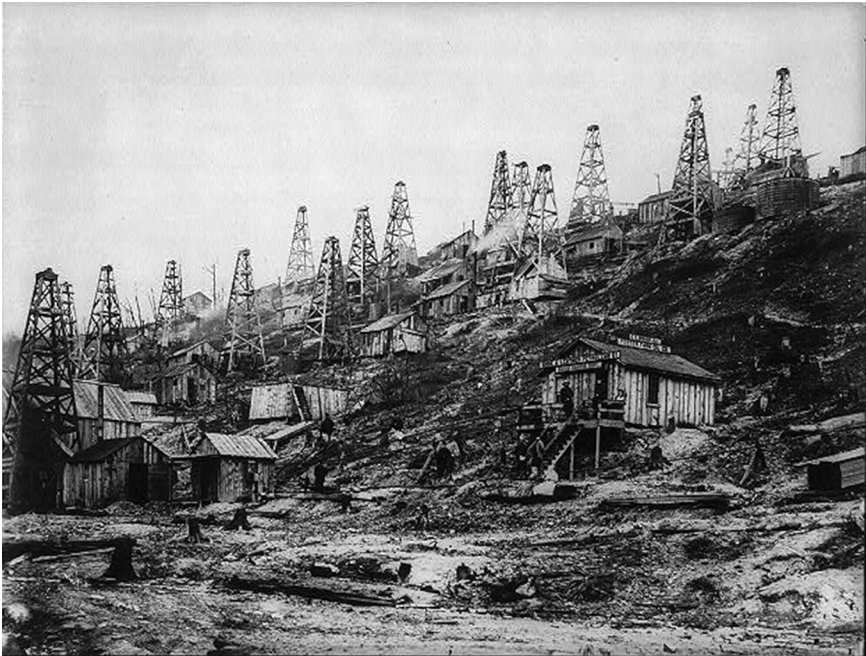


FIGURE 1: Hillside development of petroleum wells began near Oil Creek outside Titusville, Pennsylvania, in the 1860s. This nineteenth-century image shows the Shoe and Leather Petroleum Company and the Foster Farm Oil Company on lower Pioneer Run, a tributary of Oil Creek. (Courtesy U.S. Library of Congress.)

exceedingly dependent on the oil laborers and the crude that they would generate for lubrication and refinement into kerosene for illumination. At the peak of Pithole's production in October 1865, it supplied at least 6,000 of the 9,000 gallons produced in the entire Pennsylvania oil region. Of this supply, over half came from just two wells. In a place where the product was the only rationale for development, these two wells sustained the largest town in the oil region, and yet few voiced concern about wells running dry. But supply would be only one of the problems confronting Pithole. From December 1865 through January 1866, Pithole experienced one fire per week. Even a lynch law failed to deter arsonists, who set most of the fires. Finally, more than a thousand people gathered in Murphy's Theater to demand the installation of hydrants and the formation of a fire brigade. Their call went unheeded.⁸ Pithole had no ability to cope with a large fire or even to notify its occupants in the event of one's occurrence.

In the end, local apathy and the inability to rally any sort of community sentiment thwarted attempts to stabilize the town. By spring 1866 the fire company had disbanded due to lack of support and interest. Throughout the rest of 1866, Pithole experienced one fire after another. One June blaze claimed twenty buildings in the heart of town. Another fire in early August swept through the oilfields. Total losses were estimated to as high as \$3 million.⁹ It seemed impossible that the town could continue—and indeed it could not. By January 1866, the population had fallen to barely 4,000. Then the oil supply began giving out as well. In February 1867 another fire destroyed almost all of the remaining businesses in Pithole. Under the model of the ethic of extraction, this was a job well done.

The Complex Landscape of Coal

Petroleum may strike readers as an unexpected chapter in Pennsylvania's energy story. Coal is the resource most identified with the region and its supplies are more persistent and bountiful. Two major coal regions lay under Pennsylvania, distinguished by the different types of coal they contain—anthracite or hard coal, found in a small area of northeastern Pennsylvania, and bituminous or soft coal, underlying an extensive area in northern and western parts of the state. Anthracite coal is composed of more than 90 percent carbon. During Appalachian mountain building, coal seams were folded and compressed under great heat and pressure, which eliminated volatile impurities and left the carbon. Anthracite coal burns longer, hotter, and cleaner than bituminous coal,

but it is more difficult to ignite. Beginning before the Civil War, anthracite was used in forges, locomotives, steamboats and blast furnaces, and eventually for home heating. Bituminous coal, formed under conditions of less heat and pressure, averages about 55 percent carbon. It was used for fuel at Fort Pitt as early as 1760, and the Pittsburgh coal seam “has yielded more mineral value than any single mineral deposit in the world.”¹⁰ The history of coal reveals a great deal about the ethic of extraction, and it also includes many stories about efforts to recover. The history of the opposition to surface mining, for instance, is relevant to current attempts to legislate environmental protection.

In *To Save the Land and People: Grassroots Opposition to Coal Surface Mining in Appalachia*, Chad Montrie documents twentieth-century popular opposition to surface or strip mining. The grassroots opposition to coal surface mining grew from ordinary people who were defending their own property rights, and who had made the connection between surface extraction and poverty. The history of stripping refutes the contention of coal companies and coal



FIGURE 2: Coal defined many social and environmental patterns into the early 1900s. Children, such as the “Breaker boys” shown here, often served critical roles in the mines. The safety of young workers as well as environmental hazards to mining communities were rarely questioned during this era of extraction. (Courtesy U.S. Library of Congress.)

state legislators that the industry is necessary for the prosperity of the region. Surface mining actually made Appalachian poverty worse. An interesting point about the farmers, housewives, and ex-miners who spearheaded opposition to stripping is their difference from the more usual middle-class, college-educated environmental activists. They were conservative in a particularly republican sense—their fight was in defense of the American ideal of the sanctity of private property.¹¹

Montrie describes another unlikely case of environmental activism in the involvement of the United Mine Workers in the battle to regulate surface mining in Pennsylvania after World War II and up to the early 1970s. Union leadership was aligned with the coal interests to weaken proposed regulation, favoring resource extraction over environmental concerns, arguing as usual for the importance of economic development. But the majority of rank-and-file union members were deep miners, who of course objected to surface mining because the highly mechanized practice eliminated so many deep mining jobs. However, they also objected because stripping ruined the hunting and fishing (this is Pennsylvania, after all). In this interesting case of “labor environmentalism,” conservationists and industrial workers formed an alliance in the early 1960s that linked the United Mine Workers of America, at least temporarily, with groups such as the Allegheny County Sportsmen’s League pushing for tougher controls on surface mining in the state.¹²

Montrie’s concluding chapter speaks directly to the overriding role of a cultural ethic in determining the fate of communities and resources. Activist Mary Beth Bingman articulated the daunting realization that “you can’t try to fight on an issue like this without having to fight the whole system, and you can’t successfully organize the community to fight such an issue without trying to change the whole system.”¹³ Coal culture is firmly imbedded in the larger cultural ethic of extraction and consumption, and the 1977 Surface Mining Control and Reclamation Act, the legislative result of so much mining reform effort, has not fully succeeded in controlling strip mining. In fact, in recent decades, coal companies have intensified their extraction practices to keep pace with Americans’ growing demand for energy. In the United States, one hundred tons of coal are extracted every two seconds and the residual effect can be seen very clearly on the energy landscape of Pennsylvania, and other Appalachian states as well. Around 70 percent of that coal comes from surface mines, which tear away vegetation and soil to access layers of the earth’s crust. Entire mountains are leveled through a process called mountaintop removal (MTR).¹⁴

In *Bringing Down the Mountains: The Impact of Mountaintop Removal on Southern West Virginia Communities*, Shirley S. Burns documents in text and photographs the moonscape created by mountaintop removal, and the environmental impact of this most extreme example of surface mining: “soil depletion, sedimentation, low success rate of reforestation, lack of successful revegetation, displacement of native wildlife, and burial of streams.” Beginning about where Montrie ends his study, Burns continues the narrative of coal extraction into the present. Her findings confirm the fears and convictions of the activists in Montrie’s work—Burns also concludes that the poverty and depopulation of the Appalachians is the result of MTR, despite the jobs rhetoric of coal interests. Revenue from extraction went to outside interests, which controlled a large percentage of the land; it was not available to build the kind of infrastructure that would have allowed the coal regions to “diversify and prosper.”¹⁵

Burns provides a detailed case study of the ethic of extraction, with not much changed since the demise of Pithole. The impact of MTR and other activities has transformed the Appalachians even as critics have become more vocal in their efforts to control the destruction. Social and environmental groups, such as the organization Mountain Justice, worked hard to expose the social costs of these new technologies that require fewer workers. In addition, they endeavored to show the lengths to which coal companies are willing to go to circumvent or even break existing laws. One of the issues that most concerned Mountain Justice was the residue left from washing the coal, stored in huge lagoons, which formed another portion of the energy landscape.¹⁶

Particularly in the nature of coal’s lifecycle, we find the full implications of a region’s administration through the ethic of extraction. Despite the clear historical examples of cause and effect provided by coal and oil extraction, a new boom based on this ethic has begun to construct its own huge artificial lakes of polluted water in the Appalachian regions of Pennsylvania and the surrounding mid-Atlantic states—natural gas drilling in the Marcellus shale. One writer does give evidence that the lessons embodied in the energy landscape of Pennsylvania are not altogether lost on residents: “As an industry leader put it in the early days of the Marcellus rush, ‘My biggest challenge is convincing people in Pennsylvania that we’re not coal.’”¹⁷

The New Boom: Natural Gas in the Marcellus Shale

The latest boom in the continuum of energy extraction in Pennsylvania is the drilling for natural gas contained in the Marcellus shale formation.

Just as new extraction, transportation, and refining technologies made the commodification of oil and coal feasible, new drilling techniques have tapped another compartment of the Appalachian carbon vault. The boom didn't exist ten years ago. Only seven such wells were drilled in Pennsylvania in 2007, but 1,386 were drilled in 2010. McKean County alone has more than 4,000 gas-well permits issued.¹⁸

Marcellus shale, and the methane gas it contains, was formed from the mud and anaerobically decomposed plants of shallow Devonian seas about 400 million years ago. The Marcellus formation, or play, found 4,000–9,000 feet beneath major parts of Ohio, West Virginia, New York, and two-thirds of Pennsylvania, is the largest shale gas formation in the country. The characteristics of shale limit the flow of gas that can be extracted by conventional drilling. Two technologies developed in western gas fields make the extraction of gas from shale practical—horizontal drilling, which is bending a well bore from vertical to horizontal to follow the seam of shale, and hydraulic fracturing, known as “fracking,” which means pumping liquid into the well under very high pressure, fracturing the rock and releasing more gas.¹⁹

In some ways natural gas is a cleaner fossil fuel than oil or coal. Less surface area is disturbed than during coal mining. Burning gas produces little or no soot, smog, or acid rain, and less than half the carbon dioxide of burning coal. Ninety percent of new electrical power plants are designed for gas. Natural gas could help bridge the transition from imported or dirtier fossil fuels to cleaner domestic energy sources. In *The Natural Gas Industry in Appalachia: A History from the First Discovery to the Maturity of the Industry*, David Waples stresses these positive features of natural gas. The problems of the past, which he sees as lessons for the future, include the wastefulness of early drillers and customers, “clumsy” and “shortsighted” price and antitrust regulation by the federal government, and the supply shortages that resulted. He characterizes gas as “generally benign to the environment,” and concludes that meeting future demand for this clean-burning fuel will require the federal government to lift restrictions on drilling. Waples provides a wealth of detail about the industry's development over the past 150 years. His history follows the conventional narrative arc of American progress: a small and undervalued “stepchild industry” grew and matured to its present size and national importance through the efforts of skilled and determined men.²⁰ However, since it was published in 2005, this history does not address the unconventional shale gas drilling that was just about to begin in Pennsylvania.

In contrast, writing in 2009, Joel Tarr summarizes the early history of conventional gas drilling that Waples covers in depth, but uses the region's history to illustrate the boom and bust nature of that first gas rush, and to look for lessons applicable to the regulation of the current boom.²¹ From this more contemporary vantage, it is clear that gas drilling could easily become another environmental disaster. Like oil and coal extraction, drilling for gas has a negative impact on the atmosphere, surface biota, water supplies, and the human community. Natural gas is mostly methane, a potent greenhouse gas that traps seventy times the amount of atmospheric heat as an equal mass of carbon dioxide. Therefore, small leaks of methane can eliminate any climate change benefits gained by the reduction of carbon dioxide emissions from burning gas instead of oil or coal. The roads and pipelines needed for drilling and extraction cause forest fragmentation and habitat loss, threatening sensitive wildlife. People near drilling sites deal with noise, dust, vibration, and traffic. Hundreds of trucks haul water for fracking. High-pressure water pumps run constantly. Frequent seismic explosions are used like sonar to locate the shale seam. Small municipalities face demands for housing, schools, health care, police and fire protection for temporary residents, and, as of 2011, receive no direct gas revenue to mitigate these problems.²²

The impact of fracking on surface and ground water is also cause for great concern. Approximately 5 million gallons of water are needed per well to make hydrofracking fluid—a mixture of water, sand, and combinations of many other chemicals, including such hazards as benzene, formaldehyde, arsenic, and diesel fuel. Underground, the water accumulates higher concentrations of salts and minerals, and sometimes radioactive contamination, returning to the surface as so-called flowback. Wastewater treatment plants—whose managers often do not know what is in the water—cannot remove many of these pollutants. Some flowback is reused for fracking, but more is stored in huge artificial ponds. Spills occur during water transport and storage, and improperly cased wells can leak frack water and methane into the water table, polluting public and private wells. Stormwater erosion carries increased silt loads from dirt roads and drill sites into Pennsylvania waterways, including the Susquehanna and Potomac river basins. These drain into the Chesapeake Bay, adding to the bay's pollution problems. Minerals from frack water discharged into streams and rivers increase total dissolved solids in the bay.²³

Unlike the days of the oil boom and king coal, no new places like Pithole or the coal company towns have sprung up around gas drilling sites.

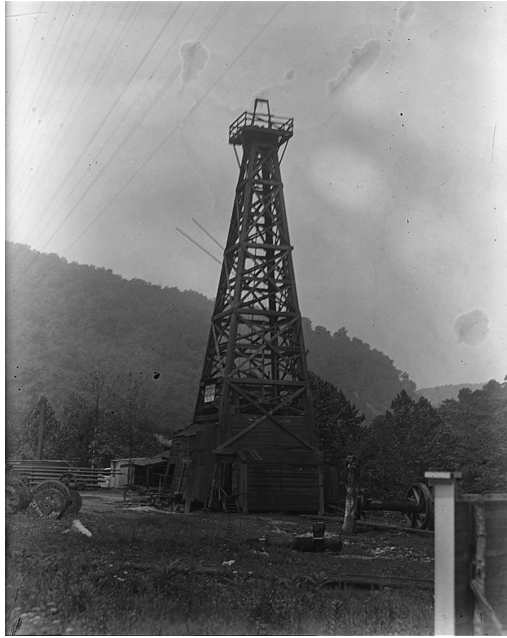


FIGURE 3: The current natural gas boom is not the first in which Pennsylvania played a major role. In 1926 this derrick in Greensburg sat above the deepest natural gas well in the world. (Library of Congress Prints and Photographs Division, LC-DIG-npcc-15441.)

However, indicators suggest that existing towns will be similarly affected by the boom-and-bust cycle. Billions of dollars' worth of coal mining did not leave the remnants of Pennsylvanian coal towns rich, and now much of the gas wealth is leaving Pennsylvania. The residents of counties with shale drilling own only about half the land, so a large portion of gas income leaves the vicinity immediately to people living elsewhere. Indeed, ownership of mineral rights is not public record, so it is often difficult to track what proportion of lease and royalty money is compensating the people affected by the disruptions of drilling, and how much is simply leaving. Even for residents, most royalties are paid in the first few years of drilling, because production then decreases sharply. Income tax revenue has increased in only 18 percent of municipalities with shale gas wells. Also, based on a 2010 survey of drilling companies, close to 40 percent of their employees are nonresident temporary

workers, who don't pay local tax, and send a significant portion of the money they earn out of state. Job creation, in any case, is not long-term. Labor needs are initially high during drilling, when each well requires the equivalent of thirteen full-time workers. But afterwards, only one person is needed to cover the operation of five wells.²⁴

Perhaps the biggest difference between the earlier energy booms and today's shale gas boom comes from a perceptible change in public attitude toward ecological problems caused by the ethic of extraction. Unlike the free-for-all of Petrolia's oil-boom days, at least some regulations are in place to reduce the environmental problems caused by drilling for shale gas. Current laws require drillers to acquire permits, submit plans, post bonds, establish setbacks between gas wells and water sources, case wells through the groundwater table, notify nearby landowners, and comply with local zoning. Senator Robert Casey Jr. acknowledged for the record that Pennsylvanians should have learned something from their experience of coal and oil extraction and its aftermath, and should apply the lesson to form gas-drilling policies.²⁵ Nevertheless, the Energy Policy Act of 2005 exempts the natural gas industry from complying with parts of key federal laws, including the Safe Drinking Water Act, Clean Water Act, National Environmental Policy Act, and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Superfund law. In fact, one new aspect of the ethic of extraction today might be a boom driven less by specific economic opportunity, and more by the race between corporations to sew up leases prior to regulative notice.²⁶

In 2011 Seamus McGraw published a highly personal account of the gas boom from the epicenter of the rush for leases. His book, *The End of Country*, records the experiences of his mother and her neighbors in northeastern Pennsylvania as the drilling companies competed for control of the unbelievably rich gas reserves. He describes unlikely alliances and new enmities among neighbors with different ideas about land use. McGraw details the unexpectedly terrific impact of drilling on the environment and people nearby, and notes the unequal compensation received by people equally affected. Still, he does not demonize the drilling companies, and acknowledges the shared cultural values between the drillers and the landowners who sign the leases. Like Waples, he respects the practical ingenuity and gambling spirit that, among other things, initiates new energy technologies. At the same time, he is aware that his story is unfolding as he writes it, and the ultimate price to be paid for the new energy is for now unknown.²⁷

Eventually, the gas contained in the Marcellus shale will, of course, be used up. Viewed in the framework of the ethic of extraction, natural gas is part of the series of fuels that have powered human endeavors for a shorter or longer time, like wood, whale oil, coal, and petroleum. As John R. McNeill describes the historic process of energy transitions: “human history since the dawn of agriculture is replete with unsustainable societies, some of which vanished but many of which changed their ways and survived. They changed not to sustainability but to some new and different kind of unsustainability.”²⁸

But unprecedented levels of growth in population and energy consumption around the world have combined with a new awareness of resource limits to make this process a very shaky plan to depend upon. As additional models organized by alternative ethics vie for America’s energy future, Pennsylvania continues to have an important role to play.

Beyond the Ethic of Extraction

During the industrial era, Pennsylvania produced millions of tons of coal and introduced the world to petroleum. The extraction of these resources helped to define the Appalachian mountain range and much of the Commonwealth as a complex landscape of energy. Today, Pennsylvania remains one of the nation’s largest producers of anthracite or hard coal, and, although its petroleum production has dwindled, Pennsylvania sits above a major natural gas reserve. But the scene is complicated further by the emergence of yet another energy form in the landscape. Hundreds of wind turbines have been built throughout the state and a number of international manufacturers of wind turbines have made Pennsylvania their U.S. headquarters. One university, surrounded on every side by the Appalachians, has begun the nation’s first degree-granting program in “wind smithing” to train the professionals who oversee the turbines. Of course, wind has been used to produce mechanical energy from antiquity into the present. In the late nineteenth and early twentieth centuries, windmills were designed and built to generate electricity, but were eclipsed by other sources as problems of reliability and distribution retarded efforts to generate power from wind.²⁹

The simultaneous development of shale, a model of an earlier mode of development and driven by the ethic of extraction, alongside new ridge-line



FIGURE 4: Drilling for gas in the Marcellus shale: this is a contemporary well site in northern Pennsylvania. Note the frack-fluid holding tanks. (Carol A. Loveland, Energy Development and Special Projects, Penn State Extension/Lycoming County.)

wind turbines makes Pennsylvania a symbolic battleground for America's transition from fossil fuels. Robert Richter, in *Windfall: Wind Energy in America Today*, describes the development of wind-sourced electricity since 1980, clearly outlining the environmental advantages and disadvantages of wind-generated electricity. He also writes "to speculate on the future of wind energy from a cultural perspective: that is, how will we react emotionally and psychologically to a transformed landscape."³⁰ Richter believes that people can, and indeed must, learn to alter their ideas about what constitutes scenic landscape, and this, along with responsible planning and siting of wind farms, can overcome much of the not-in-my-backyard (NIMBY) reaction to wind-farm development. The turbine-decked mountains provide evidence that help to prove a fact about 2011: Americans are fully engaged in a significant and potentially seminal energy transition.

This energy transition, which was largely initiated in the 1970s, did not immediately change American attitudes regarding renewable energy. For many observers, this represents an American cultural failure to pursue

softer energy paths. While correct on one level, this perspective fails to appreciate the cultural nuance of energy transitions. From a historical standpoint—that speaks in terms of centuries and even millennia—such an intrinsic shift in the habits of the human species can drag on for decades and even centuries. Clearly, we are in the midst of an energy transition that very likely began thirty years ago. And it may continue for decades longer. The primary impetus for the energy transition has been rising energy prices driven by scarcity, particularly for petroleum. Unlike earlier energy crises, the concerns over scarcity grow not from temporary political instability abroad, but from the geological limits of “peak oil,” and an increasingly competitive marketplace as China and India emerge as energy-hungry aspirants to industrial development. High fuel prices have made shale development a viable cost-effective option (similar to deepwater drilling for petroleum), but options such as wind power have also become cost-effective as Pennsylvania and other states begin to manage the emerging new regulatory order of “carbon accounting.”³¹

These recent transitions are clearly reflected in Pennsylvania’s energy landscape, and our histories must tell these important stories as well. The paradigm of cheap energy that forced the title “alternative” on renewables decades ago has been shaken to the point of fracture. Our future energy paradigm, most experts agree, is in play and possesses the potential to shift the playing field considerably. Pricing carbon emissions promises to make the energy playing field much less favorable for the fossil fuels that have been extracted out of Pennsylvania since the 1800s. Higher prices for traditionally cheap fuels, combined with the increasing likelihood that carbon accounting in future years will raise prices even further, make renewable energy sources likely to become even more competitive in the energy marketplace.

We have learned a great deal from the ethic of extraction and its impact on the Commonwealth and other locales. The serious development of the Appalachians as a wind field is one outcome of these lessons. It is true that some regional residents, worn by residual pollution from mining, have found reasons, such as visual blight and bird deaths, to suspect the turbines’ impact on their ridges. However, even proud residents of Pennsylvania must admit that, unlike some other mining techniques deriving from the ethic of extraction, wind development leaves the ridges intact, allowing them to become a vital component of a revolutionary new landscape of energy.

NOTES

Portions of this article have appeared in Brian Black, "A Legacy of Extraction: Ethics in the Energy Landscape of Appalachia," in *Mountains of Injustice: Social and Environmental Justice in Appalachia*, ed. Michele Morrone and Geoffrey L. Buckley (Athens: Ohio University Press, 2011), and in Brian Black, "Energy and Transportation," in *A Companion to American Environmental History*, ed. Douglas Sackman (Malden, MA: Wiley-Blackwell, 2010). The authors appreciate the permission of the publishers of these works to include them in this synthetic essay.

1. Geographer Martin Pasqualetti has written generally about energy landscapes as an artifact of past cultural ethics and decisionmaking. The importance of energy landscapes does not stop there. They help us to create and organize a continuum of past decisions that might influence future alternatives. "Energy landscapes," he writes, "... will continue to be compelling and in places dominating components of the earth's surface, and our reactions to them will continue coloring and steering our energy decisions, the direction and support of our technological research, the degree of land disruption we accept, and to some degree the nature of how we live our lives. The visibility of these landscapes, their scale and spread, and the frustration and intimidation we can feel in their presence has had a growing influence on our future energy decisions." As such, the Appalachians are closely tied to a broad swath of American energy history. They also hint at an energy future—but it is clearly contested. Pasqualetti argues that the policy choices we make as a nation are often partly a "response to the landscape changes we see." Martin Pasqualetti, "Energy Landscapes and the Growth of Arizona," in *Building to Endure: Design Strategies for Arid Landscapes*, ed. Paul Lusk and Alf Simon (Albuquerque: University of New Mexico Press, 2008), 43.
2. For an overview of these issues, see John Alexander Williams, *Appalachia: A History* (Chapel Hill: University of North Carolina Press, 2002).
3. See for example, David Nye, *Consuming Power: A Social History of American Energies* (Cambridge, MA: MIT Press, 1998).
4. Originally published in 1949, the classic work exploring these issues is Aldo Leopold, *A Sand County Almanac, and Sketches Here and There* (New York: Oxford University Press, 1987). See p. 240 for an explicit discussion of environmental ethics.
5. As noted below, this relationship between transience and the ethic of natural resource extraction is explored in greater detail in Brian Black, *Petrolia: The Landscape of America's First Oil Boom* (Baltimore: Johns Hopkins University Press, 2003).
6. J. B. Jackson, *Discovering the Vernacular Landscape* (New Haven, CT: Yale University Press, 1984), 12. The natural environment bears little pertinence in Jackson's landscape hierarchy unless it is set off by human boundaries for some cultural reason such as preservation or conservation.
7. *Titusville Morning Herald*, July 29, 1865.
8. *Pitbole Daily Record*, throughout early January 1866.
9. *Ibid.*, April 4 and August 3, 1866.
10. Carmen DiCicco, *Coal and Coke in Pennsylvania* (Harrisburg: Pennsylvania Historical and Museum Commission, 1996), 10, 11, 12.
11. Chad Montrie, *To Save the Land and People: A History of Opposition to Coal Surface Mining in Appalachia* (Chapel Hill: University of North Carolina Press, 2003).

12. Ibid., 57–58, 43.
13. Ibid., 205.
14. Shirley S. Burns, *Bringing Down the Mountains: The Impact of Mountaintop Removal on Southern West Virginia Communities* (Morgantown: West Virginia University Press, 2007), 5.
15. Ibid., 140, 8, 11.
16. For examples of past Mountain Justice actions protesting the impoundment of coal sludge, see “Non-violent Civil Disobedience in Coal River Valley, WV: Seventeen Arrested in Three Separate Actions—5/23/09,” <http://www.mountainjustice.org/actions/2009-05-23/index.php>.
17. Seamus McGraw, *The End of Country: Dispatches from the Frack Zone* (New York: Random House, 2011), Kindle edition, 94.
18. Sandy Thompson, “Testimony on the Local Impact of Marcellus Shale Drilling,” McKean County Conservation District, January 26, 2011, <http://pacd.org/webfresh/wp-content/uploads/2011/01/McKean.pdf> (accessed March 12, 2012).
19. Pennsylvania Department of Environmental Protection, “Marcellus Shale,” revised October 2011, <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-85899/0100-FS-DEP4217.pdf> (accessed March 24, 2012).
20. David A. Waples, *The Natural Gas Industry in Appalachia: A History from the First Discovery to the Maturity of the Industry* (Jefferson, NC: McFarland, 2005), 3, 224, 225.
21. Joel A. Tarr, “There Will Be Gas: A Look at Western Pennsylvania Natural Gas Drilling Booms and Busts,” *Pittsburgh Post-Gazette*, August 2, 2009, B-7. See also the interview with Joel Tarr in this volume.
22. The Northeast Regional Center for Rural Development, “Boomtowns and Natural Gas: Implications for Marcellus Shale Local Governments and Rural Communities,” ed. Jeffrey Jaquet, Pennsylvania State University: NERCRD Rural Development Paper no. 43, Pennsylvania State University, January 2009, <http://www.nercrd.psu.edu> (accessed March 25, 2012).
23. For a discussion of Pennsylvania Department of Environmental Protection concerns regarding increased total dissolved solids (TDS) from discharged Marcellus shale drilling water, see Penn State Extension, “Water Currents,” Winter 2010, <http://extension.psu.edu/water/news/2010/winter-2010> (accessed March 25, 2012).
24. Timothy W. Kelsey et al., “Economic Impacts of Marcellus Shale in Pennsylvania: Employment and Income in 2009,” Marcellus Shale Education and Training Center, August 2011, www.msetc.org/docs/EconomicImpactFINALAugust28.pdf.
25. Robert P. Casey Jr. “Marcellus Shale: A Gas Rush,” <http://casey.senate.gov/issues/issue/?id=ce690501-bb77-4195-a6d1-87152b9ae298> (accessed September 16, 2012).
26. U.S. House of Representatives Committee on Oversight and Government Reform, Rep. Henry Waxman, Chairman, “Hearing Summary: Hearing on Oil and Natural Gas Exemptions in Federal Environmental Protections,” <http://democrats.oversight.house.gov/images/stories/documents/20080602114913.pdf> (accessed March 25, 2012).
27. McGraw, *The End of Country*.
28. John R. McNeill, *Something New Under the Sun: An Environmental History of the Twentieth Century World* (New York: W. W. Norton, 2001), 358.
29. Nye, *Consuming Power*, 110–11, 189.

30. Robert W. Righter, *Windfall: Wind Energy in America Today* (Norman: University of Oklahoma Press: 2011), Kindle edition, 154–55.
31. A comparable example of new technologies and higher prices making the extraction of even marginal deposits of natural resources economical viable is Timothy LeCain, *Mass Destruction: The Men and Giant Mines that Wired America and Scarred the Planet* (New Brunswick, NJ: Rutgers University Press, 2009).