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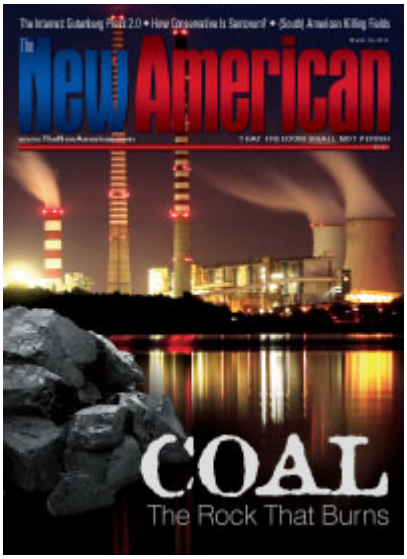
Coal: The Rock That Burns



Coal is not the most pristine mineral in the world. Yet, more than any other mineral on Earth, this ugly, dirty little rock deserves credit for the greatest material prosperity mankind has ever known.

Coal and the Industrial Revolution

The Industrial Revolution marked a great leap forward in the human condition. In the years preceding 1760, circumstances of the English peasantry were appalling: infrequent and inadequate hygiene, poor diet, rampant disease from poor sanitation and close quarters, and a life expectancy of fewer than 35 years. While social reformers such as Charles Dickens have criticized the conditions in factories, the Industrial Revolution gets credit for the unprecedented population boom of the 18th and 19th centuries. *The Encyclopædia Britannica* reports Europe's population quadrupled from 100 million in 1700 to 400 million in 1900. Infant mortality decreased, birth rates and life expectancies increased, and food became more plentiful, all from an improvement in living conditions brought on by wealth the factory system created.

Heat from coal refined the iron ore that made the boilers, which in turn made steam for James Watts' "fire-engine" (so named because it was not powered by water, animals, or humans), and it was first used to pump water from coal mines. The coal mining industry in England and Wales was the equivalent of our oil and natural-gas business today.

In the 1800s, coal became the source of heat for residences and buildings, the energy that powered locomotives and mechanized looms, and the fuel that allowed ships to travel without vagaries of the winds. For long voyages cargo holds were filled with thousands of tons of coal and the distance to the nearest "coal station" was a major consideration for all warships. It wasn't until the *Queen Elizabeth*-class battleship debuted in 1916 that coal began to be replaced by fuel oil.

Our little personal contact with this "rock that burns" could easily make us believe it has lost its impact on our lives. Not so. In fact, if you are reading this by an electric source of light, there is nearly a 50-percent chance the energy that allows you to see the printed page comes from a coal-burning power plant. Coal is also essential in iron production and has become a major product of U.S. export.

Electric Power Generation

According to the Energy Information Agency (EIA) of the Department of Energy, approximately 94 percent of coal in the United States is used as boiler fuel for electric power generating plants. Forty-five percent of the country's annual four trillion kilowatt-hours of electricity are fueled by coal. EIA reported that in 2009, 934 million tons of coal were used to stoke power plant furnaces. Most of this was pulverized to the consistency of flour and blown into the fireboxes using preheated air recovered from flue gases to drive out moisture. When pulverized, coal weighs 38 pounds per cubic foot. This translates into 49.2 billion cubic feet of pulverized coal per year.

Anything with nine zeros is difficult for the mind to comprehend. We know, however, what a pickup truck looks like, and a yardstick will show the typical vehicle to have 55 to 65 cubic feet of load capacity. Dividing 49.2 billion cubic feet by the average pickup bed capacity gives us yet another baffling number: 820 million pickup truck loads per year. On a daily basis, this is about 2.2 million pickup trucks. How far would such a line of trucks extend?

Let's start our line up of pickups in Bangor, Maine, and take them down through New York City, Detroit, and Chicago, and then on to Des Moines and Denver. There are no spaces between these 18-foot-long trucks, bumper-to-bumper into Salt Lake City, Boise, and turning south at Seattle. They extend down the West Coast to San Diego before turning back east though Phoenix, Houston, New Orleans, and finally ending in the charming Atlantic beach town of Fort Pierce, Florida. A total line-up of bed-level pickup truck loads stretching 7,536 miles. And that is for *one day's* coal for our coal-fired generating plants.

Fortunately for drivers who don't care to be behind a 7,536-mile line of pickups, most coal is delivered by train. One rail car carries about 100 tons of coal, and each train pulls 100 to 120 cars. Daily about a hundred of these trains leave Wyoming, the largest coal-producing state in the country. A 1,000-megawatt plant consumes the coal from a single car in about 15 to 20 minutes. The train load provides about one day of electricity production.

Iron Making

Coal is good for more than energy production. There is no economical way to make iron from ore other than with the use of a coal product: coke. Today coke is made from a special pulverized bituminous coal (coking or metallurgical coal) that is sealed in a furnace without air and heated to about 1,950 oF for 12 to 36 hours. This drives out the volatile products and results in a hard, porous material that can be cooled and stored, or sent directly to a blast furnace.

In the furnace coke serves two purposes. First it supplies heat to melt the iron ore. Then the carbon in coke reacts with the oxygen in iron oxide, transforming the latter into pig iron, the raw material for iron production. This process, known as reduction, releases the carbon and oxygen as carbon dioxide.

Export

Having had a long-running reputation as an energy-importer, it is comforting to know the United States is an exporter as well, and a growing one at that. EIA estimates the United States exported some 100 million tons of coal in 2011. Most of this is metallurgical coal for steelmaking in developing countries that don't have an anti-business government with an enforcement arm like our EPA. Often, these countries ship the finished product back to us, much to the chagrin of our few remaining steel mills. "Steam coal" is also being shipped from Illinois and Colorado to Asia and Western Europe. With these monumental volumes used in power production, coking, and exports, we should be rapidly running out of coal. But we're not.

The Energy Information Agency reports the United States has a Demonstrated Reserve Base of 496 billion short tons of coal, of which 272 billion tons are considered recoverable with current technology. With U.S. usage at 1.1 billion tons per year, we have about 250 years' supply at the present rate of consumption. But as with other energy resources — though we use millions of tons of coal — reserves rise each year as new coal seams are located.

The War on Coal

Coal is a mineral that produces half our electricity, is essential for reducing iron ore, and is a rising source of export dollars. Yet there is a war on coal in this country based on environmental and health claims. Consider candidate Obama's January 2008 comment to the *San Francisco Chronicle*: "So if somebody wants to build a coal-powered plant, they can. It's just that it will bankrupt them because they are going to be charged a huge sum for all that greenhouse gas that's being emitted."

Obama originally planned to keep this promise through cap-and-trade legislation, a scheme to tax companies for their so-called greenhouse-gas emissions. Lacking congressional approval, the President has turned to his Environmental Protection Agency to kill coal by way of crippling new regulations just put into effect this year. Political commentator Mark Whittington noted in a January syndicated column in *Voices:*

> The effects on the price of electricity of the new regulations will be about the same as the effects on the price of gasoline of the administration's restrictions on oil drilling. The president possesses the charming idea that he can change the way the United States generates energy by government fiat. Unfortunately attempting to supplant the market place with central planning always results in economic dislocation that rarely affects the policy makers who institute the plans to start with.

The regulation Whittington refers to is the EPA-proposed Clean Air Transport Rule now being implemented as the Cross-State Air Pollution Rule. Why is this expensive measure being proposed suddenly in this period of economic malaise? Have power plants abruptly increased their emissions, with people dying in the streets? Quite the contrary.

According to the American Legislative Exchange Council (ALEC), between 1980 and 2008, sulfur dioxide ambient levels decreased by 71 percent and overall emissions dropped 56 percent nationwide. Over the same period, the levels of oxides of nitrogen dropped 46 percent. Yet even with these historic lows, the EPA rule that took effect on January 1, 2012 requires an additional decrease in power plant sulfur dioxide by 73 percent from 2005 levels and a 54-percent decrease in the oxides of nitrogen. As a boy I coughed and choked walking to school since most people in my neighborhood heated with coal. Now, even a hint of a pollutant from a power plant would be very unusual. To see pollution, go to China, India, or any of the Eastern European nations still recovering from the environmental catastrophe once known as the Soviet Union.

Despite the increasing cleanliness of the air in the United States, Obama's EPA is implementing extremely burdensome regulations, purportedly to clean up air pollution. However, the implementation requirements of the Cross-State Air Pollution Rule reveal its purpose of punishing coal-fired generation: The modifications required for any power plant are tremendous in terms of engineering man-hours, design of site-specific control devices, and lengthy shutdowns for construction purposes. Years of planning and ordering capital equipment are necessary for even seemingly minor projects. Again from the ALEC:

> Utilities are being required to plan for standards in 2012 with only six months' notice of the

> details of the final rule. As a result, the industry only recently discovered specifically what rule EPA was implementing, much less what the final requirements would be.

In a nutshell, the EPA passed new emission regulations that had to be complied with by utility companies within six months — in the past, utilities were given years to comment on the workability of the rules, plan the implementation of new rules, and adjust their budgets for the adoption of the regulations, because adding air scrubbers or other major implements to a coal-fired power plant is not as easy as adding a new deck to one's house. Obviously, the new regulations were designed to lead to the closure of certain utilities, mainly coal-fired power plants.

How will this affect our citizenry? When utilities cannot afford to do the bidding of bureaucrats with respect to their generation facilities, they shut them down. According to the February 12 *Wheeling* (WV) *News-Register*, "It was revealed at least 32 coal-fired power plants in 12 states, including West Virginia and Ohio, would be closed so utility companies could comply with the Obama administration's air pollution regulations." Up to 55 million households will be in danger of outages, brownouts, or, at the least, higher rates due to this unnecessary EPA rule. Already financially strapped Americans will be thrust into what is known in Europe as "energy poverty."

Obama's Out-of-control EPA

This is not a single instance of a shortsighted action by the EPA that can be written off as a mistake. An online article by the American Legislative Exchange Council entitled "EPA's Regulatory Train Wreck" lists proposals Obama's EPA has been working toward implementing that would have a disastrous effect on America's ability to produce economical power, or power at all:

• The EPA has been considering making many fossil-fuel and nuclear power plants add cooling towers. Says ALEC, "Most plants heat water into a steam to turn a turbine and generate electricity, and many then using cooling water from a natural water body to condense the steam back to water and repeat the process." The cooling towers would do the same job that the natural water sources now do. Such a retrofit would be very costly: It would affect up to 1,201 fossil-fuel units and one-third of nuclear generation, initially costing up to $64 billion.

• Also under consideration is the designating of coal ash as a hazardous waste, despite the EPA having twice in the past deemed it not to be hazardous. If implemented, storage costs for wastes (estimated at as much as $20 billion annually) could put small electric providers out of business; otherwise, the costs will be transferred to consumers.

• "EPA is poised to regulate all hazardous air pollutants (HAPs), including mercury and acid gases, for coal and oil power plants." All power plants would have to reduce emissions to a level equal to the top 12 percent of power plants. This action would be taken even though most mercury Americans are exposed to comes from foreign sources. ALEC quotes former EPA assistant administrator for air and radiation Jeff Holmstead as stating, "Even if you could eliminate all the mercury emissions in the U.S. completely, from every source of mercury pollution, you would have almost no impact on people's exposure." Costs have been estimated from $261 to $358 billion to comply with the regulation.

• In Appalachia, the EPA has halted 150 permits for coal mining that were already approved by state and federal officials and is refusing to consider almost 100 more, purportedly because one study claimed that water in close proximity to coal mines negatively affected mayfly populations — yes mayflies. This decision would derail tens of thousands of jobs, both in mining and in servicing miners.

• Greenhouse gases released by coal-fired plants are also being targeted by the EPA. By threatening

states with construction bans on large industrial and manufacturing sources, the EPA has been twisting the arms of state lawmakers to enact strict statutory thresholds for greenhouse gases. This is estimated to lead to millions fewer jobs.

It's Not Pretty, But Is It Really So Ugly?

What is the problem with coal, according to Obama's acolytes?

Carbon dioxide emissions: Environmental extremists claim greenhouse gases are destroying Mother Earth. The truth, however, is their "evidence" has little to do with real science. Scientists in droves have publicly stated that the idea of anthropogenic (human-caused) global warming is nonsense and a political gimmick to levy new taxes. Ignored by a leftist media enamored of "cap and trade" extortions, the NIPCC (Nongovernmental International Panel on Climate Change) hosted a two-day "counter-conference" in December 2009, challenging the UN Climate Change Conference in Copenhagen on every issue.

Proof that the climate-change "skeptics" are correct was provided in abundance. Only weeks before the conference, e-mails of "Climategate I" showed without question that the climate record had been irreparably compromised by global-warming alarmists. Raw temperature data of the world's temperature stations had been deleted and replaced by "adjusted" temperatures. (The original data had been conveniently discarded for "lack of storage space.") Alarmists had also trivialized urban heat island effects and ignored the elimination of low-temperature reporting stations from global temperature records. The "official" temperature records have thus been rendered totally worthless.

Being based on GIGO (Garbage In, Garbage Out) data, none of the predictions about climate catastrophe made so confidently in the 1990s and 2000s came true. Increasingly, IPCC "researchers" either leave the alarmist fold or, as in the case of chief-climate-manipulator-in-charge, Phil Jones, back away from predictions of climate Armageddon. No doubt the new revelations in "Climategate II" have Jones worried about another few thousand e-mails (written at the expense of taxpayers but hidden from them) that are lurking out there just waiting to further expose him and his colleagues and their nefarious mis-informational activities.

The *coup de gras* to alarmist claims came last summer when 11 years of data from NASA's Advanced Microwave Scanning Radiometer was reported by research scientist Dr. Roy Spencer of the University of Alabama in Huntsville to show that the Earth's atmosphere is allowing far more heat to escape into space than all 22 computer models used by the IPCC assumed. The models were all based on "positive feedback" for effects of atmospheric CO_2, while precision satellite measurements showed the feedback to be negative, thus disproving years of IPCC prop-aganda. (Note that "positive feedback" would cause each increase in CO_2 to have a greater effect, causing temperatures to skyrocket — something that is not happening today, nor has been seen to happen in the geological record.) Of course, environmentalists bent on sending Earth's population back to the days of the mule and plow never let science get in the way of their ideology.

Pollution: Coal-fired power plants emit various noxious products, from fly ash (ash too small for filters both in the smoke stack and in our bodies), sulfur and nitrogen oxides, mercury, and many others. There is little doubt that these emissions can have a deleterious effect on the human body. The EIA predicts that for every terawatt-hour (TWh) of electricity production in the United States, there are 15 early deaths of those subjected to the plant emissions. Most of these deaths are elderly individuals who have chronic lung problems and would have life expectancies in the range of five to 10 years longer

were it not for the pollutants they inhale. This is tragic for those who die or see a loved one die from distress caused by power plant emissions, even though they likely would not realize emissions caused the problem.

But the lost lives aren't reason enough to prematurely shut down the power plants, because that action would cause a greater death toll. The effect of depriving a population of reliable sources of electricity is catastrophic. This can be quantified by examining the average national use of electricity in watts per person, compared to life expectancy in those nations.

In the tables to the right, the life expectancies of those living in countries with the highest use of electricity are compared to life expectancies for those living in nations with very limited electrical generation resources. Using the U.S. death rate of 15 per TWh attributed to pollution from coal-fired power plants, and a 10-year decrease in life for the early deaths, there are 150 person-years of life lost from current effects of emissions per TWh. With 2,000 TWh annually generated by coal, the early death toll is about 30,000 people — about 0.01 percent of our population.

Ten Highest	W/Person	Life Expectancy
Iceland	3152	80.90
Norway	2812	80.20
Canada	1910	81.38
Sweden	1692	81.07
Luxembourg	1549	79.61
Kuwait	1540	77.09
United States	1460	78.37
UAE	1335	76.51
Australia	1244	81.91
Bahrain	1195	78.15
AVERAGE	**1788.9**	**79.52**

Ten Lowest	W/Person	Life Expectancy
Chad	1.0	48.33
Cambodia	1.7	62.52
Burundi	2.4	58.78
Rwanda	2.5	58.02
Comoros	2.7	64.20
Central Africa	2.9	50.07
Afghanistan	3.1	45.02
Somalia	3.5	50.40
Tanzania	3.6	52.85
Niger	3.6	53.40
AVERAGE	**2.7**	**54.36**

This is certainly a tragic drawback of coal. But what of its advantages? The availability of clean water; sewage removal and treatment; medical facilities that require electric power, electric heat, and air conditioning — these are just a few of the benefits our "top 10" nations enjoy that are unknown in countries such as Chad and Cambodia with little electricity consumption and average life expectancy less than 55 years.

Working through the math, we find while 15 people lose an estimated 10 years of life from a TWh of pollution, the benefits of electricity cause 78 people to gain 24 years of life due to a healthier environment and freedom from a lifestyle of drudgery. So we trade each 150 years of life lost for 1,800 of extended years.

Under the Gun, or Not

Coal is not the only energy source that has been targeted by the Obama administration. It seems our government blacklists any energy resource that is viable. Examples abound.

Prohibitions have been placed on drilling for oil in the Gulf of Mexico and other federally controlled sites, and previous prohibitions have been kept in place in the Arctic National Wildlife Refuge (ANWR). Past roadblocks have been kept in place that effectively ban the construction of new nuclear power plants (though now that it's a campaign year, the administration is relenting slightly in this area).

There has also been obstruction of the development of coal-to-oil and gas-to-oil technology, and an urgency on the part of the EPA to find a link between hydraulic fracturing (fracing) — cracking shale rock formations deep underground to access natural-gas deposits — and groundwater contamination. And Obama decided against construction of the Keystone XL pipeline, which would deliver crude from Alberta (Canada) oil sands to Texas refineries.

On the other hand, if an energy source is inefficient, such as ethanol and other biofuels; unreliable, as is wind power; or intermittent, in the manner of solar and tidal power, leftists and environmentalists in the Obama administration are all in favor of spending tax dollars to find out what second-year engineering students could advise them for nothing: These power sources will not fulfill the energy requirements of an industrial nation.

The elimination of reliable power sources such as coal generation seems insane, unless you understand the philosophy of those such as Maurice Strong, who was a mentor of Al Gore and Hillary Clinton, as well as the primary instigator of the global-warming hoax, conceived while he was Secretary-General of the 1992 Rio De Janeiro UN Conference on Environment and Development — the so-called Earth Summit. Strong summed up his philosophy in an interview with *National Review* in September 1997: "Frankly, we may get to the point where the only way of saving the world will be for industrial civilization to collapse."

Denying or severely hindering our access to energy is a guaranteed method to bring about the collapse of our industrial civilization. And it is happening right before our eyes — all in the name of saving the Earth or "sustainability."

Our Energy Future

The United States is considered by many geologists as the "Saudi Arabia" of coal. This resource provides life-saving and life-enhancing energy for America, but it is under attack for this very reason by those who would take us back to an earlier era that was infinitely dirtier, deadlier, and with fewer opportunities to move civilization to new levels of freedom and prosperity. Government should not pick winners and losers to subsidize or regulate out of existence but should get out of the way and allow the free market come up with solutions to provide our energy needs.

In the future coal should probably be a feedstock for liquid fuels and for production of iron and steel, with nuclear energy providing our electrical base load. Coal is a resource that is proven and available. We should be very thankful for this energy miracle that provides us comfort, improves our health, and gives us more years to enjoy the blessings of life.