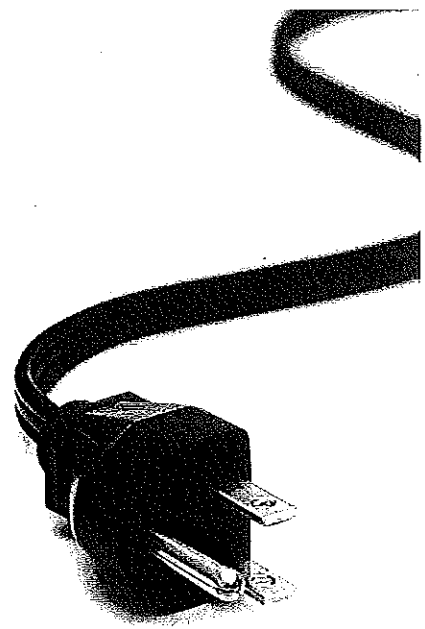


Charging the Nation



West Virginia is a net exporter of energy, particularly coal, oil, natural gas and electricity.

BY KEITH DODRILL & STEVEN BOSSART

West Virginia's Vast Power Portfolio

WEST VIRGINIA is aptly named "Almost Heaven" because of its breathtaking landscapes, rolling rivers, abundant natural beauty, wildlife and fauna. When others think of the state, they may quickly turn to mountain hiking, skiing and whitewater rafting. While these recreational activities generate substantial revenue for the state, West Virginia's abundance of natural resources supplies energy through fuel and electricity to the American economy, playing a key role in maintaining our quality of life.

In addition to its offerings of outdoor recreation and scenic vistas, West Virginia produces quality hardwoods from the spans of timber across the state

and provides fuel to the region from the production of coal and natural gas, as well as clean renewable power from hydroelectric power plants, wind farms and geothermal units. West Virginia is a net exporter of energy, particularly coal, oil, natural gas and electricity. These energy exports help meet daily national, regional and local energy demands and can be relied upon to supply energy during emergencies. Nearly 4,500 trillion British thermal unit (BTU) of energy from coal, natural gas, petroleum products, electricity and renewable energy that are produced in or transported into West Virginia create a supply chain where 81 percent of this energy is exported beyond the state's borders.

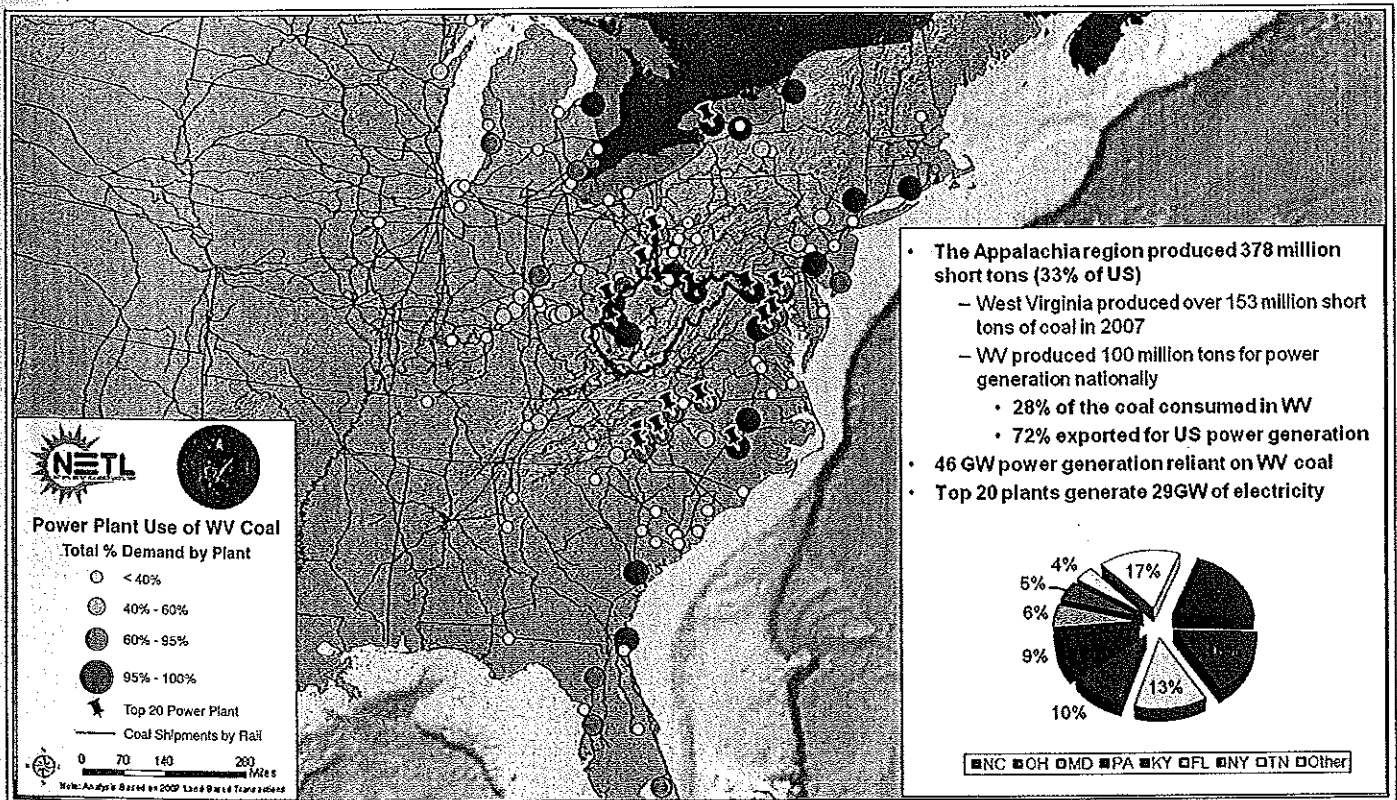


Figure 1: Reliance of West Virginia-produced coal.

Coal

According to the U.S. Energy Information Administration, West Virginia is second only to Wyoming in recoverable coal reserves and produced 40 percent of all the coal mined in Appalachia in 2009. West Virginia's coal is delivered to power plants to generate electricity, fueling more than 25 percent of all coal-fired generators east of the Mississippi River. These plants, from states as far away as Michigan and Florida, have more than 46 gigawatts (GW) of generation capacity. In fact, many of the power plants serving the densely-populated East Coast states are more than 90 percent reliant on coal from West Virginia where the largest 20 power generators produce more than 29 GW of electricity (see Figure 1).

The National Capitol Region is highly dependent on West Virginia coal as well with almost 50 percent of its electricity derived from coal mined in West Virginia (see Figure 2).

Figures 1 and 2 were derived from the Regional Energy Systems Analysis Portal software developed by National Energy Technology Laboratory (NETL) and West Virginia University. This software was developed to visually describe the condition, outages and restoration during

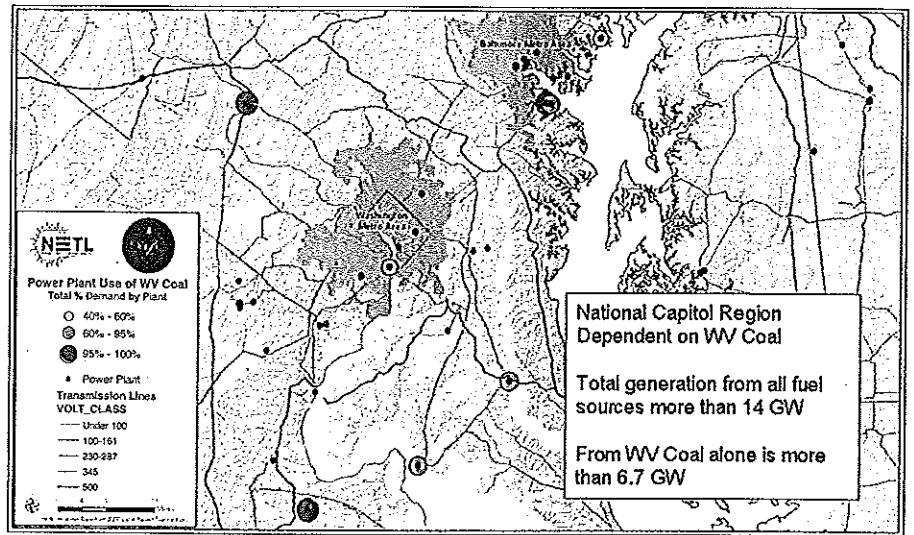


Figure 2: The reliance on West Virginia coal for electricity generation to the National Capitol Region.

emergencies, as well as vulnerabilities of energy supply and infrastructure.

Electric Power

West Virginia is second only to Pennsylvania in net interstate electricity exports with two-thirds of its electric generation, or approximately 58 million megawatts-hours (MW), exported annually to neighboring regions.

Natural Gas

On average, West Virginia's interstate pipelines transport more than 3.9 billion cubic feet of natural gas per day with more than 90 percent of this natural gas being imported into the state. West Virginia produces only 1 percent of the nation's natural gas, adding 0.4 billion cubic feet per day of natural gas to its interstate pipeline. The state has a well established network of

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gathering and transmission pipelines that is rapidly expanding and has a natural gas storage capacity that accounts for 6 percent of the nation's storage capacity.

Unconventional production from the Marcellus Shale play is rapidly being developed and is believed to contain more than 50 trillion cubic feet of recoverable natural gas. Production from the shale play is believed by some to become a major contributor to meeting future environmental standards for carbon restrictions associated with the generation of electricity. When considering these attributes, West Virginia is prepared to expand its production and should be seen as a key natural gas region.

Clean Energy Resources

West Virginia is aggressively developing clean renewable energy resources that include the largest wind farm on the East Coast, bio-fuels from vast forests, wood and agricultural waste, hydroelectric power from waterways and geothermal energy. More than 1,000 MW of wind power are in service or under development. Virtually all of the state's hydroelectric power resources are in use or under development with 264 MW of operating hydroelectric power plants

and 127 MW more in the Federal Energy Regulatory Commission permit process.

To reduce the carbon footprint from its fossil fuel power plants, the state has abundant locations for underground storage of carbon dioxide. In addition, 18 percent of carbon dioxide emissions from West Virginia's power plants are consumed naturally by its forests.

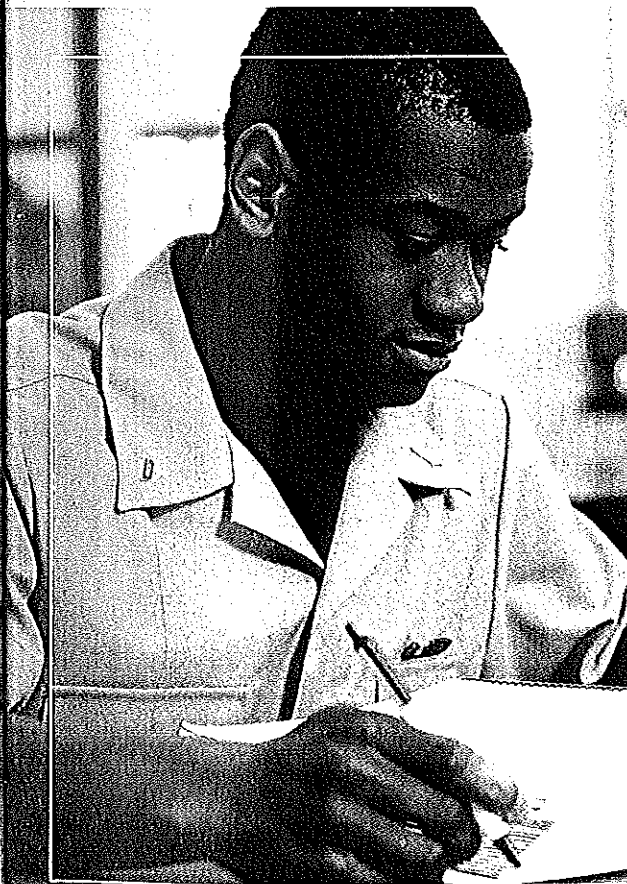
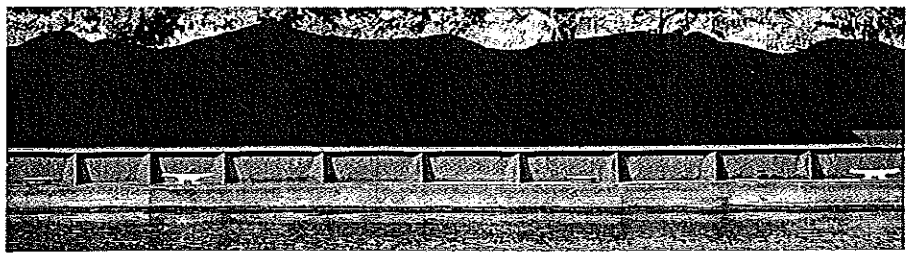
Transportation of Energy Commodities

West Virginia plays a key role in the transportation of energy commodities using its roads, rails, waterways, pipelines and electric transmission lines. The rail system crisscrossing the state delivers coal and other goods produced in the state and transports various commodities from neighboring regions. Complementing the rail system, the Port of Huntington is the largest inland river port in the nation both in terms of total tonnage and ton-miles. Of the 77

million tons of cargo that move through the port annually, 60 percent is coal and 30 percent is petroleum or chemical products.

The energy produced in West Virginia exports about four times more than it consumes and transports the energy by road, rail, waterways, pipelines and transmission lines. Its predominant energy exports are coal, natural gas and electricity. Many power plants east of the Mississippi River are reliant on coal from West Virginia with many designed to operate on it. The PJM Interconnection, the electric transmission operator for West Virginia and 12 other states, relies heavily on electricity exports from West Virginia to provide power to states in its service territory. The Marcellus Shale underground rock formation will boost an already thriving natural gas industry in West Virginia. ■

Photography by NETL



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