

# Shale and Other Energy Resources in the HBK Footprint



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As Director of HBK Energy, Mr. Franckhauser manages the firm initiatives and client processes directly related to energy opportunities and issues. Shale energy, renewable energy, alternative energy and sustainable energy comprise the multitude of energy options in existence today as the world and nation focus on energy from harvest to utilization.

Mr. Franckhauser is a member of the Board of Directors of Pittsburgh Region Clean Cities, Chair of the PR subcommittee of the Natural Gas Utilization Committee of the Pennsylvania Independent Oil and Gas Association, a member of the New Jersey CEP Renewable Energy Committee, and a member of the Pennsylvania SCPA Natural Resources Committee.

Mr. Franckhauser is an Adjunct Professor of Law at Duquesne University School of Law, a contributor to the Penn State Extension programs on shale development, an Adjunct Professor at Penn State University's Beaver campus in Monaca, PA, and has been a guest lecturer on shale energy and renewable energy.

As HBK expands, so does our footprint. HBK is fortunate to have clients who see our services as being an essential part of their success, and we have been fortunate to be able to attract talented professionals to fill our clients' needs. Success breeds success.

For a decade, the energy resources from the shale formations have helped fuel an economic renaissance in Appalachia and the regions served by those energy commodities. Here's a summary of how the regions HBK calls home harness the energy benefits.

## **APPALACHIAN BASIN: Lowering greenhouse gas emissions**

In August of 2016, the United States Environmental Protection Agency (EPA) released the 2016 greenhouse gas emissions report, which gives a thorough assessment of greenhouse gas emissions by a host of sources.

Over the past five years in the Appalachian Basin, natural gas production increased dramatically while carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) emissions have dropped dramatically<sup>1</sup>. This may be attributed to the conversion of many power plants from coal to natural gas as well as increased monitoring and technology efficiency.

From 2001 to 2006 in the Appalachian Basin, CO<sub>2</sub> levels fell from 2.7 million metric tons to 1.5 MMT, a decrease of 48 percent, and CH<sub>4</sub> levels decreased from 3.8 MMT to 3.0 MMT, or by 21 percent. These figures compare quite

favorably to the overall emission calculations for the entire United States where, CO<sub>2</sub> emissions increased 24 percent while CH<sub>4</sub> emissions decreased by 24 percent.

### **PENNSYLVANIA: A consumer's delight and tax policy conundrum**

The University of Pennsylvania has proclaimed the 10 years from 2007 to 2016 as the "Pennsylvania's Gas Decade."<sup>2</sup> Among the benefits during that span of time itemized by the Penn study are the following:

- Pennsylvania consumers enjoyed an electric power cost decrease of 79 percent.
- Nationwide, consumers paid 65 percent less for electricity and 34 percent less for natural gas.
- Pennsylvania consumers defied historical precedent and paid \$1.04 less per Mcf<sup>3</sup> than their national counterparts.
- Pennsylvania gas terminations (where gas is turned off due to debt) dropped by 4,000 and the customer assistance programs used to offset terminations saved \$72,500,000.
- Electric power generation from natural gas grew by 250 percent as natural gas power generation surpassed coal as the largest source of energy.
- In 2007, Pennsylvania imported 80 percent of the natural gas it consumed. By 2016, Pennsylvania exported 75 percent of the gas it produced and did so at a market price below the Henry Hub base price per Mcf.

- Catapulted by shale resources, the nation's electric power sector is the largest consumer of natural gas.

Contemporaneous to these other benefits, natural gas, natural gas liquids and shale oil are the driving forces behind the \$6 billion Shell ethane cracker on the eastern bank of the Ohio River in Beaver County, Pennsylvania. Shale resources also spawned the rekindling of the Marcus Hook facility in Delaware County into a natural gas and renewable energy mecca, and the evolution from coal burning energy power plants to natural gas-based power generation.<sup>4</sup>

By any paradigm, the economic impacts of shale resources on Pennsylvania are astounding. Lurking on the horizon is the large number of abandoned conventional wells and potential methane emissions from these and from unconventional well sites. Funding the environmental restoration of conventional well sites has spurred debate on the institution of an excise tax on production from unconventional wells. Unconventional (or "horizontal" wells) well production is currently subjected to an extraction fee, which apportions much of the fees toward infrastructure near the well site. An extraction tax<sup>5</sup> supports the general fund of the Commonwealth and theoretically can be used for any purpose within the legislature's spending authority.

### FLORIDA: Incubator of our energy future

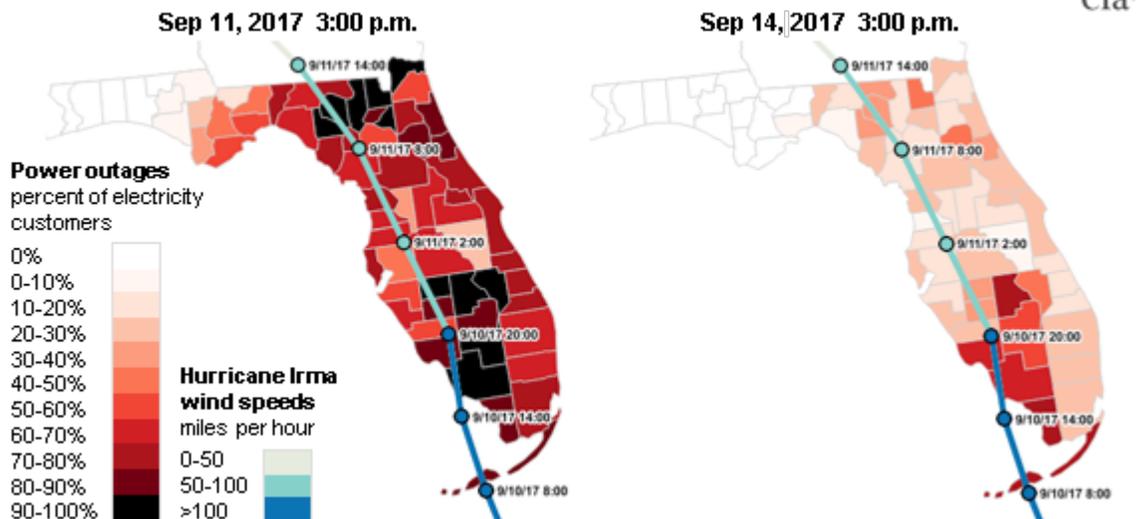
Unlike most other states in the Union, Florida wisely elected to harness the intellectual capital of all of its public universities under the umbrella of the FLORIDA ENERGY SYSTEMS CONSORTIUM (FESC)<sup>6</sup>. With 87 percent of the natural gas delivered to consumers in Florida used to generate electricity, and natural gas fueling two-thirds of Florida’s net electricity generation, energy policy and application is an absolute necessity. This is due to the meteoric projected rise in population over the next two decades.<sup>7</sup> Such an increase in population demands commensurate preparation for all infrastructure necessities. With energy at the core of infrastructure, Florida will prove to be the focal point of energy policy placed into practice.

By virtue of its dominant market share in energy generation, natural gas is proving to be the affordable energy bridge to Florida’s energy destiny.

Beset by hurricanes as well as rising ocean levels<sup>8</sup>, the state of Florida is highly vulnerable to energy infrastructure disturbance. As the aftermath of hurricanes Irma and Maria painfully proved, power generation is irrelevant if power cannot get to the customer. Hurricane Irma deprived 66 percent of Floridians of electricity.

For a starker contrast, nighttime satellite photos taken by NASA of Puerto Rico following Hurricane Maria offer sobering evidence of the capacity of a hurricane to render power grids useless.<sup>9</sup>

**Florida power outages by county during Hurricane Irma**



The key for Florida is to appreciate its future energy demands in line with expectations of weather induced power grid disruptions to the grid. Natural gas gives Florida the economic ability to pursue alternative/renewable sources of energy with vigor and to incorporate the alternative/renewable energy distribution efforts with a delivery system suitable for weather disruptions, load capacity and potential energy storage.

Florida understands that logistics is the critical element to a plenary energy solution. To that end, FESC completed a series of studies<sup>10</sup> devoted exclusively to energy delivery, micro grids and providing reliable and resilient electrical energy transmission and delivery. Inexpensive energy now allows FESC to anticipate the future needs while subsidizing the present.

The time has arrived to recognize Florida as an energy research titan. In 2016, four of Florida's state universities were among the top 50 universities worldwide in securing United States "utility" patents<sup>11</sup> with the University of South Florida ranked No. 11, the University of Florida Research Foundation No. 18, the University of Central Florida No. 41 and Florida State University No. 49.<sup>12</sup> A lengthy population boom combined with treasured landscape and wetlands places Florida in a unique position: how to balance the needs of its residents while

ensuring its landscape prospers.

### **OHIO: Foundation of an emerging industry**

Among the Appalachian states endowed with shale resources, Ohio is quietly building the infrastructure to become the leader in natural gas utilization. The majority of natural gas power plants are arising in Ohio; a necessity since two of the coal burning energy giants (First Energy and AEP) are Ohio-based and operationally centric. Stemming decades of economic decline is an inglorious task. Ohio<sup>13</sup> has taken it upon itself to do the groundwork in eastern Ohio and to reclaim the industrial sites lining the valleys the western banks of the Ohio River.

Strategic decisions made years ago now reap dividends as transportation agencies in Columbus (COTA), Cleveland, (GCRTA)<sup>14</sup>, Canton (SARTA) and Akron metro<sup>15</sup> are either fully or majority powered by CNG. Moreover, private industry had made the leap as well with companies such as waste disposal company Kimble of Dover, Ohio converting fleets to compressed natural gas.

Ohio boasts shale commodity production from its Utica deposits. The state is home to injection wells in which unconventional fracturing residue (brine) is disposed. There is little room for expansion of injection facilities as environmental, social and economic pressures

lead to brine recycling. To date, Ohio has not adopted an extraction tax on shale resources.

### **WEST VIRGINIA: A target for energy investment from Chinese energy giants**

Endowed with abundant riverfront industrial sites along the Ohio and Kanawha rivers, the Mountain State is emerging as a trailblazer in shale commodity utilization. Rig count is increasingly becoming a secondary economic indicator of energy opportunities as investment in utilization industries emerges.

Recently, the state of West Virginia signed an agreement with China Energy Investment Corporation for the company to invest \$83.7 billion in shale gas development and chemical manufacturing in West Virginia over 20 years. State Commerce Secretary Woody Thrasher and China Energy President Ling Wen signed the memorandum in Beijing as part of the U.S.-China trade mission during President Donald Trump's visit. Project planning will focus on power generation, chemical manufacturing and underground storage of natural gas liquids and derivatives.

This extraordinary investment in West Virginia energy and natural resources would not have been possible were it not for the massive shale energy deposits in the Appalachian Basin and the rail and riverfront access for logistical development. Further, West Virginia University

is jointly researching coal liquefaction with mining company Shenhua Group, which merged with Guodian Group to form China Energy.

### **NEW JERSEY: Renewable energy frontier**

As is the case in Florida, New Jersey traditionally looks outward for energy resources. In 2016, for the first time, natural gas provided more than half the electricity generated in New Jersey while nuclear power provided 39 percent. Together, the two fuels provided 95 percent of the state's net electricity generation. However, in 2019, the Oyster Creek nuclear reactor (the oldest operating nuclear power plant in the United States) will be decommissioned.

In 2016, solar power supplied 74 percent of New Jersey's renewable electricity generation from both utility and distributed (customer-sited, small-scale) sources. Nearly two-thirds of that solar electricity came from distributed solar panels. The state employs a renewable portfolio standard that by 2021 will require nearly one-fourth of net electricity sales to come from renewable energy resources with solar and offshore wind requirements embedded in the standards. New Jersey's Clean Energy Program (<http://www.njcleanenergy.com/>) tracks the renewable sector against the mandates and provides portals for solar applications. According to recent analysis by the NJCEP and outlined in the chart below, solar energy production in the state is on pace to exceed the mandates.

As New Jersey races toward the energy future, there is no doubt that renewable energy sources will fill the nuclear energy gap.

Energy policies continue to vary from state to state. The absence of a national energy policy, the abundance of shale energy resources and public desire for renewable energy options continue to push the nation toward its varied resource energy future. That future is bright in the HBK areas of influence.

1. For the Appalachian Basin in OH, PA and WV, gas production went from 1.8 BCF to 7.9 BCF, a 338% increase. Source, US EPA.
2. See October 27, 2017 University of Pennsylvania Kleinman Center for Energy Policy report. <http://kleinmanenergy.upenn.edu/paper/pennsylvanias-gas-decade>
3. Mcf equals Million cubic feet of natural gas
4. Anthracite coal creates 228.6 pounds of CO2 per BTU. Natural gas produces 117 pounds of CO2 per BTU. Source US Energy Information Agency. See <https://www.eia.gov/tools/faqs/faq.php?id=73&t=11>
5. States that have extraction taxes such as Texas, Oklahoma and West Virginia do not have 'extraction fees'.
6. See Florida Energy Systems Consortium: <http://floridaenergy.ufl.edu/>
7. Florida expects to gain 243,000 residents per year between 2020 and 2030 and 198,000 residents per year between 2030 and 2040. Source <http://www.fdot.gov/planning/trends/tc-report/Population.pdf>
8. Florida (1,350 miles) is second only to the state of Alaska (6,640) in miles of coastline.
9. See nighttime images of Puerto Rico before and after Maria for power delivery comparison. <https://weather.com/storms/hurricane/news/nasa-hurricane-maria-puerto-rico-satellite-images-power-outages>
10. See <http://floridaenergy.ufl.edu/energy-research/by-research-area/thrust-7-storage-delivery/>
11. A utility patent prohibits other individuals or companies from making, using or selling the invention without authorization.
12. Other patent stalwarts in the HBK footprint include University of Pennsylvania 17, Rutgers University 21, University of Pittsburgh 27, Case Western Reserve University 46, The Ohio State University 61, Drexel University 72, Penn State Research Foundation 76, and Carnegie Mellon University 83. See <http://www.academyofinventors.com/pdf/top-100-universities-2016.pdf> Academy of Inventors.
13. Jobs Ohio is a not for profit entity owned entirely by the state of Ohio. See <http://jobs-ohio.com/>
14. Cleveland uses a combination of CNG, biodiesel and biomass fuels, but the majority are CNG.
15. Of Akron METRO's 237-vehicle fleet, 38 percent is natural gas-fueled.