

## **Part Four Exploring the Share of Employment in Key Sectors in the Wind and Solar Energy Sectors, States in the Appalachian Region**

As a final step in this initial assessment, we isolated nine four-digit industries producing inputs for the wind energy and photovoltaic industries and examined the fraction of their employment found in ARC states. This was compared with the fraction of total national employment accounted for by the 13 states (Table 13). The results indicate that Appalachian states account for, on average, more than 35% of total employment in the sectors (Table 14). Assuming that an increase in the production of energy employing wind and solar technologies would produce demand for inputs from existing suppliers, states in Appalachia would be expected to experience growth of demand and expansion of employment in response to this development. Given that states in the region already account for more than a third of total national employment in key sectors supplying these two energy industries, we can expect that in the short term the region will gain a proportionate share of job growth due to increases in the utilization of solar and wind energy for the generation of electricity (Table 15). Biofuels production including storage and distribution embodies many of the same attributes as oil and gas production. States in the ARC region are parts and equipment suppliers to the oil and gas industry. Given that the biofuels industry utilizes many of the same inputs to produce, store and transmit energy as the solar and wind and oil and gas industries (Table 14), growth in output of this sector can be expected to generate jobs in the region.

**Table 15. Key Sectors in the Wind and Solar Energy Sectors**

<b>NAICS Code</b>	<b>Description</b>
3324	Boiler manufacturing
3325	Hardware manufacturing
3336	Engine, turbine, & transportation equipment manufacturing
3353	Electrical equipment manufacturing
3345	Measuring devices
3334	Ventilation
3315	Foundries
3326	Plastic and rubber products
3359	Other electrical and communications equipment manufacturing

**Table 13. Employment in Key Sectors in the Wind and Solar Energy Sectors, States in the Appalachian Region**

State	3324	3325	3336	3353	3345	3334	3315	3326	3359	Total
AL	1,357	843	1,307	773	2,176	2,045	7,932	17,341	2,683	36,457
MD	714	278	1,749	750	12,123	2,042	175	7,791	984	26,606
GA	2,535	1,214	2,158	4,981	3,120	7,014	1,778	27,749	6,681	57,230
KY	1,607	2,077	1,842	3,941	899	4,405	4,302	19,833	2,775	41,681
MS	1,916	1,431	965	4,967	795	4,036	620	9,849	750	25,329
NY	4,167	2,085	6,191	4,817	14,371	6,022	3,314	29,692	7,995	78,654
NC	1,535	2,719	4,198	8,636	4,012	5,577	1,448	39,870	10,559	78,554
OH	10,383	3,459	4,512	9,220	12,316	7,590	19,642	87,554	7,663	162,339
PA	4,963	2,409	1,962	5,359	14,371	5,851	11,038	45,927	11,959	103,839
SC	1,071	534	6,263	3,569	2,669	1,750	928	22,316	4,027	43,127
TN	2,205	3,669	1,562	5,101	3,544	9,543	4,175	32,391	3,207	65,397
VA	1,396	375	687	4,990	9,014	5,152	3,250	24,329	2,055	51,248
WV	455	55	55	347	522	55	375	3,826	375	6,065
<b>US</b>	<b>87,234</b>	<b>56,766</b>	<b>91,856</b>	<b>146,860</b>	<b>403,693</b>	<b>152,354</b>	<b>171,769</b>	<b>921,392</b>	<b>161,228</b>	<b>2,193,152</b>

Source: Compiled by the authors

**Table 14. % of US Employment in Key Sectors in the Wind and Solar Energy Sectors, States in the Appalachian Region**

State	3324	3325	3336	3353	3345	3334	3315	3326	3359
AL	1.56	1.49	1.42	0.38	0.54	1.34	4.62	1.88	1.66
MD	0.82	0.49	1.90	0.37	3.00	1.34	0.10	0.85	0.61
GA	2.91	2.14	2.35	2.44	0.77	4.60	1.04	3.01	4.14
KY	1.84	3.66	2.01	1.93	0.22	2.89	2.50	2.15	1.72
MS	2.20	2.52	1.05	2.43	0.20	2.65	0.36	1.07	0.47
NY	4.78	3.67	6.74	2.36	3.56	3.95	1.93	3.22	4.96
NC	1.76	4.79	4.57	4.23	0.99	3.66	0.84	4.33	6.55
OH	11.90	6.09	4.91	4.51	3.05	4.98	11.44	9.50	4.75
PA	5.69	4.24	2.14	2.62	3.56	3.84	6.43	4.98	7.42
SC	1.23	0.94	6.82	1.75	0.66	1.15	0.54	2.42	2.50
TN	2.53	6.46	1.70	2.50	0.88	6.26	2.43	3.52	1.99
VA	1.60	0.66	0.75	2.44	2.23	3.38	1.89	2.64	1.27
WV	0.52	0.10	0.06	0.17	0.13	0.04	0.22	0.42	0.23
<b>Total</b>	<b>39.32</b>	<b>37.25</b>	<b>36.42</b>	<b>28.12</b>	<b>19.80</b>	<b>40.09</b>	<b>34.34</b>	<b>39.99</b>	<b>38.28</b>

Source: Compiled by the authors

## Summary and Concluding Comments

Centrally located within the Nation's traditional industrial heartland, Appalachian states stand to gain significantly and for the foreseeable future from the expansion of energy and electrical power sources. Demand for non-renewable resources such as coal, natural gas, and oil is expected to expand assuming energy prices remain high. At the same time, job growth in the fossil fuel sector may be limited by the application of more productive mining practices at existing operations. There is some evidence that Appalachian coal may be at a disadvantage vis a vis western coal due to the higher sulfur content of Appalachian coal, lower production costs of western mines and reductions in the benefit of transportation costs which are becoming an ever smaller share of the delivered cost of coal, especially in instances where imported coal can reach recipient power plants along the Mississippi River. While there are certain limits to job growth due strictly to electrical power generation, the region's coal reserves are an important feedstock for the production of metals, gases, and other industrial products. Sectors producing hardware for the energy industry are likely to experience growth of output in response to new demand for both renewable and non-renewable energy sources.

It remains to be seen how the Nation addresses the challenges of carbon sequestration to limit CO<sub>2</sub> emissions and how this will impact employment. While there will be growth of employment in technical fields associated with identifying and developing alternative means of sequestering CO<sub>2</sub>, there also are likely to be job losses associated with the decommissioning of aging production equipment, power plants, and reductions of other sources of CO<sub>2</sub>. Since the science of sequestration is presently in its infancy, estimates of impacts are limited at present. While federal initiatives to examine a range of short, medium and long term options, none of them are at the point of commercialization.

The creation of new energy supplies associated with renewable energy sources is likely to generate substantial new employment. Appalachia's industrial base contributes major inputs to wind, solar, biofuels, and other non-fossil fuel sources. Estimates of future growth in these sectors are significant and some research suggests thousands of new jobs will be created as these sectors expand in and outside of the region.

The research conducted for this report suggests Appalachia has a significant opportunity to contribute to both national energy independence and to the achievement of regional import substitution in the area of energy. There are significant opportunities for regional and community-scaled industrial development, especially in the areas of bio-fuels. Significant choices exist in the selection of a minimum scale of production for many of the new technologies and energy sources. Technologies in these fields are changing rapidly and dramatically. Thus planning for Appalachia's energy future is dynamic and subject to change.

This report is a first cut at an understanding of the energy potential of the Region. More sophisticated and more cumulative analyses are in order as part of the implementation of an energy blue print. All the evidence suggests Appalachian communities stand to gain from high energy prices, the development of new energy sources and technologies and the creation of solutions to reduce the nation's CO<sub>2</sub> emissions.

## References

Energy Information Agency. 2006. *Annual Energy Outlook 2006 with Projections to 2030*. <http://www.eia.doe.gov/oiaf/aeo/coal.html>

Environmental Protection Agency. 2006. *Climate Leaders*.  
<http://www.epa.gov/stateply/partners/partners/generalmotorscorporation.html> Accessed 7/12/06

Renewable Energy Policy Project. 2001. *The Work That Goes into Renewable Energy*.  
[http://www.repp.org/articles/static/1/binaries/LABOR\\_FINAL\\_REV.pdf](http://www.repp.org/articles/static/1/binaries/LABOR_FINAL_REV.pdf)

General Accounting Office. 2004. *Renewable Energy: Wind Power's Contribution to Electrical Energy Generate and Impact on Farms and Communities*. <http://www.gao.gov/new.items/d04756.pdf>

Renewable Energy Policy Project. 2001. *The Work That Goes Into Renewable Energy*.

Renewable Energy Policy Project. 2004. *Wind Turbine Development: Location of Manufacturing Activity*.

Renewable Energy Policy Project. 2005. *Solar PV Development: Location of Economic Activity*.

Union of Concerned Scientists. 2004. *Renewing America's Economy*.

### 12 State-Specific Reports.

The Apollo Alliance. 2004. *New Energy for America*. The Apollo Jobs Report: Good Jobs and Energy Independence

US PIRG Education Fund. 2005. *Redirecting America's Energy: The*

*Economic and Consumer Benefits of Clean Energy Policies.*

The Council of State Governments. May 2003. *Renewable Energy and State Economies*

[http://www.irecusa.org/articles/static/1/1140213597\\_987094287.html](http://www.irecusa.org/articles/static/1/1140213597_987094287.html)

### **State-Specific Reports**

Daniel M. Kammen, Kamal Kapadia & Matthias Fripp. April 2004. *Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?* The Renewable and Appropriate Energy Laboratory at University of California, Berkeley.

Environment California Research & Policy Center. 2003. *Renewable Energy and Jobs: Employment Impacts of Developing Markets for Renewables in California* .

Renewable Energy Policy Project State Report (REPP). 2005. *Component Manufacturing: Ohio's Future in the Renewable Energy Industry.*

Renewable Energy Policy Project State Report (REPP). 2006. *Component Manufacturing: Wisconsin's Future in the Renewable Energy Industry.*

University of Illinois at Chicago. 2005. *The Economic and Environmental Impacts of Clean Energy Development in Illinois*

Policy Matters Ohio and the Apollo Alliance. 2005. *Generating Energy, Generating Jobs*

Regional Economics Applications Laboratory for the Environmental Law & Policy Center. 2001. *Job Jolt: The Economic Impacts of Repowering the Midwest.*

Dave Algosio and Emily Rusch. 2004. *Renewable Work: Job Growth from Renewable Energy Development in the Mid-Atlantic.* NJPIRG Law and

Policy Center,

Center for Energy, Economic and Environmental Policy at Rutgers. 2004. *Economic Impact Analysis of a 20% New Jersey Renewable Portfolio Standard.*

Global Insight . 2003. *Economic Impact Analysis of the Cape Wind Off-Shore Renewable Energy Project*, for Cape Wind Associates.

Black & Veatch. 2004. *Economic Impact of Renewable Energy in Pennsylvania.* The Community Foundation for the Alleghenies.

Virtus Energy Research Associates. 2002. *What Renewable Energy Means to Texas.*