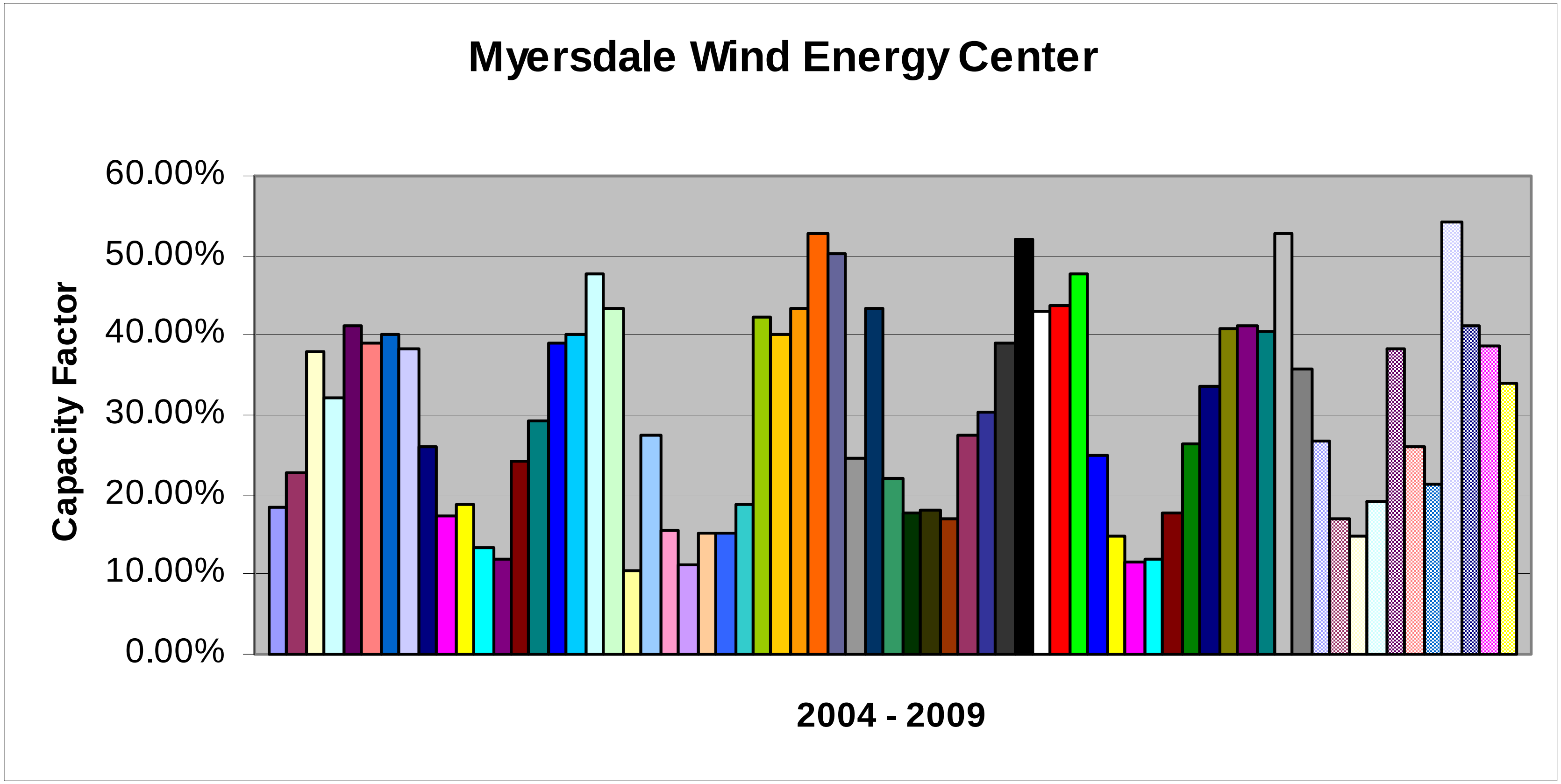
EVA grossly miscalculates Wind's Capacity Factor:

Typical Pennsylvania Wind Capacity Factor:

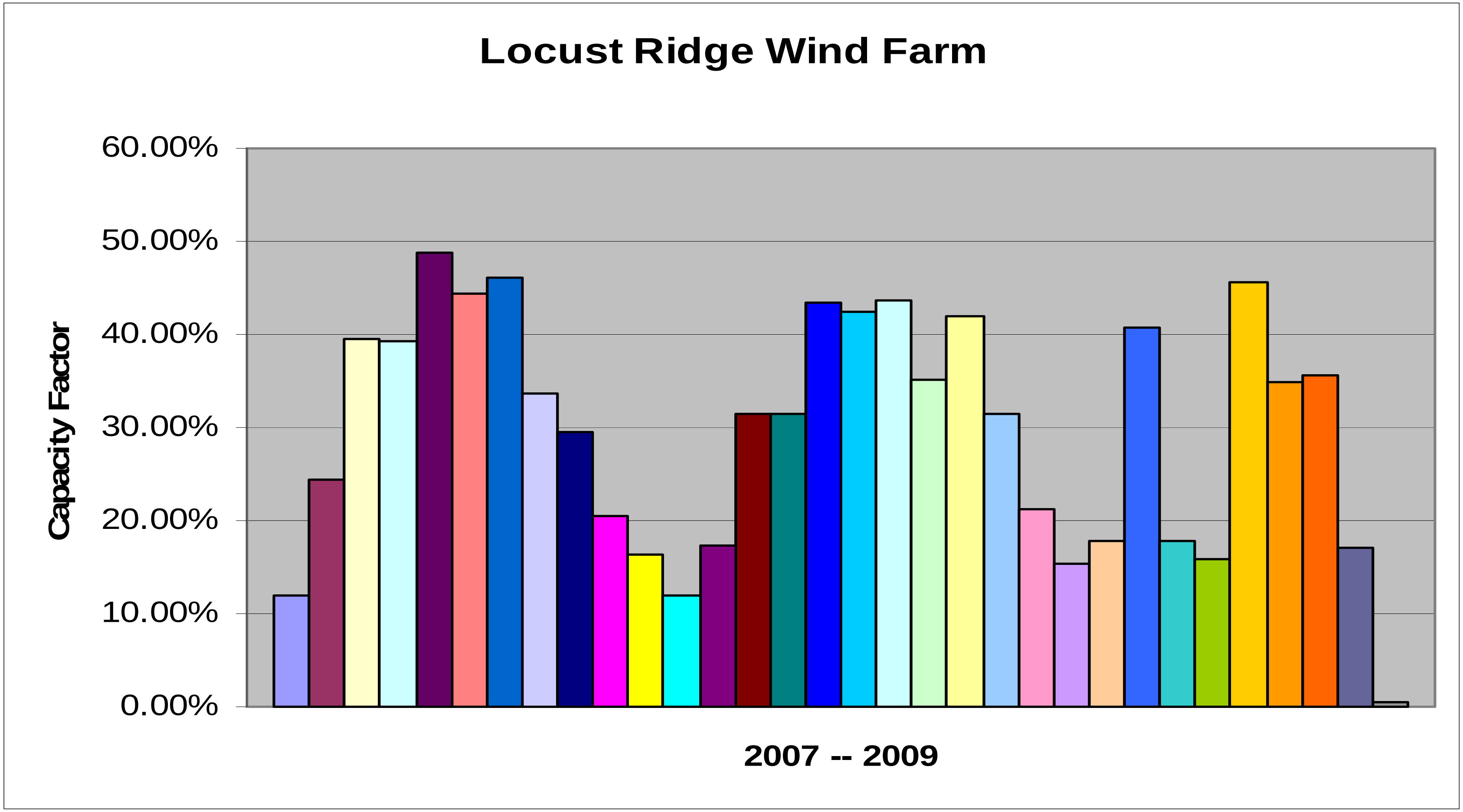


Source: FERC filing

<u>Average annual CF:</u>
(2004-2009) – 30.35%

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

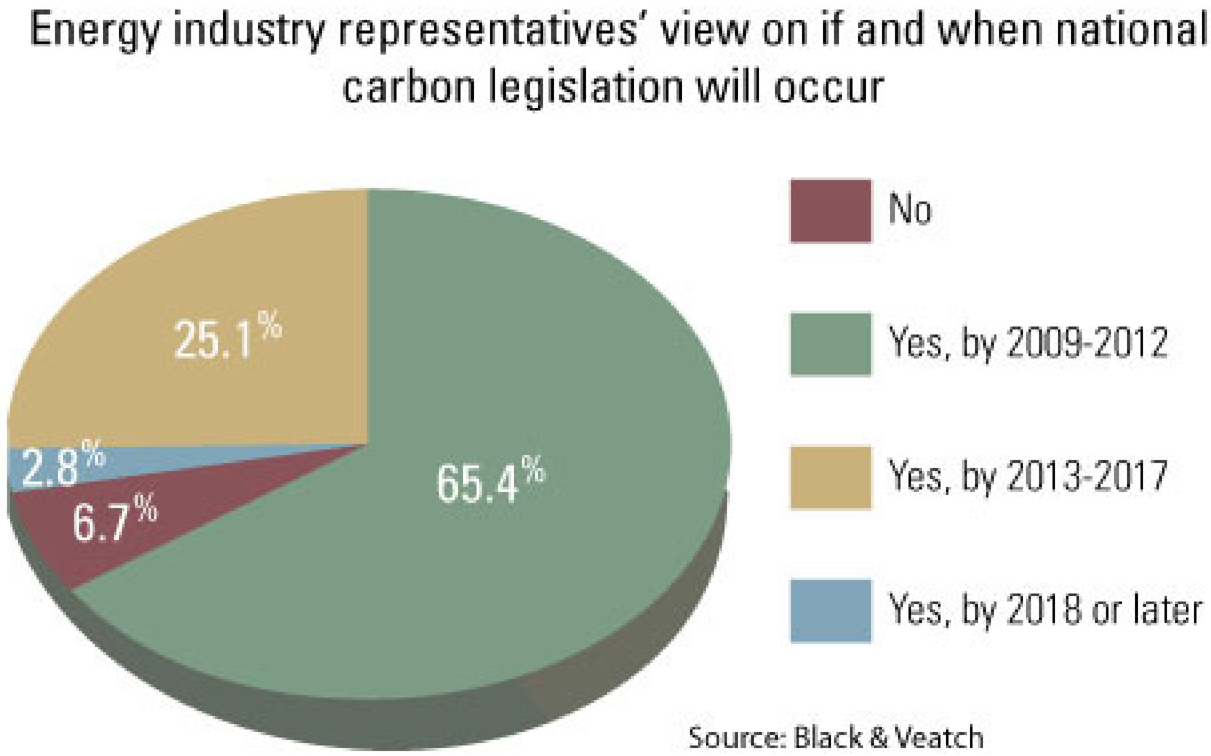
Typical Pennsylvania Wind Capacity Factor:



Source: FERC filing

<u>Average annual CF:</u>
(2004-2009) – 31%

A price on carbon is prudent and expected by the utility industry:

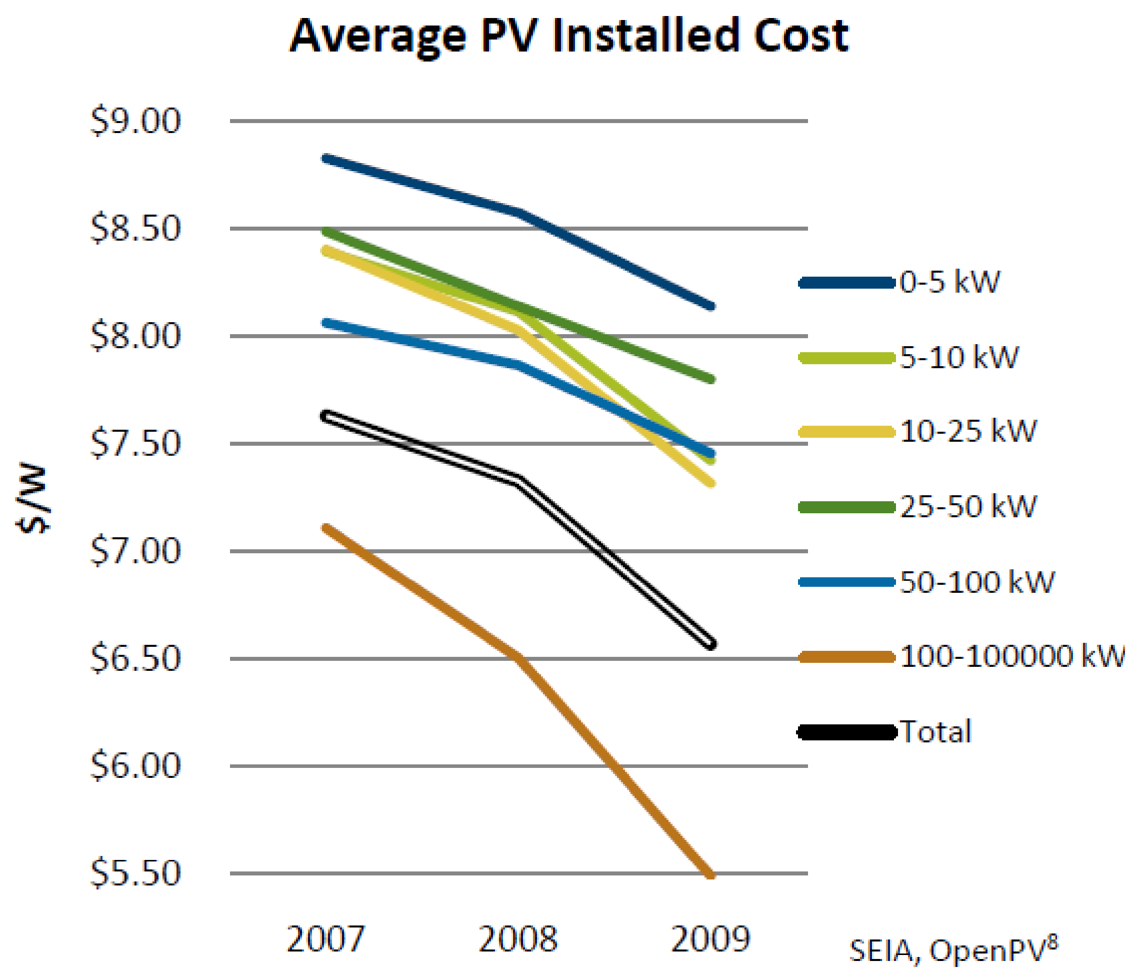


Black & Veatch – 2009/2010 Electric Utility Industry Survey Results*

* A total of 329 utility industry participants responded

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Solar Costs are declining materially:



The B&V installed solar cost numbers were developed based on the following series of reports over the last year:

- California Public Utilities Commission - Renewable Energy Transmission Initiative – http://www.energy.ca.gov/reti/documents/phase2B/RETI_Phase_2B_Draft.pdf. See pg 4-7. The estimate is $3600-4000/kW. (This estimate was reviewed and accepted by many industry stakeholders including utilities, developers, technology suppliers, the California PUC and the California Energy Commission.)

- DOE / NREL - Western Renewable Energy Zones. The estimate was $4500/kW; however, this was prepared near the start of 2009. See: http://www.nrel.gov/docs/fy10osti/46877.pdf. (The estimate was reviewed and accepted by industry stakeholders including utilities, developers, technology suppliers, state representatives and DOE / NREL.)

- B&V have follow-on work in progress for EPRI, NREL, and the California PUC which validate these estimates.

- Additionally, B&V has been involved as the lender's engineer on <u>all</u> of the larger scale Ontario solar projects. These "real-life" projects provided additional validation of the cost estimates.

EVA fails to account for the Price Suppression Effect:

Black & Veatch argue that "…the net present value of the price suppression benefit over the life of the (bill) could be $3.5 to $6.2 billion …. Notably this savings is much higher than the direct electricity cost impacts … ($1.6 billion increase for AEPS).

A **2009 PJM study** of the impacts of adding wind generation to the market concluded that "…15,000 MW of wind offers wholesale market price reductions of $4.50-6/MWh, translating to **reductions in annual market-wide expenditures** of $3.55 billion to $4.74 billion versus not having that wind in place."

A **2009 PECO/Exelon** study of the market impact of adding 400 MW of capacity to the Pennsylvania Peach Bottom Nuclear – "We estimate conservatively that these benefits would average **$137 million** per year in Pennsylvania, and more than **$425 million** per year in all of PJM-East."

A **New York State Energy Research and Development Authority** analysis of New York's AEPS estimates that the **reduction in wholesale electricity prices** from the addition of renewable energy resources in 2010 is likely to be approximately $2/MWh (0.2 cents/kWh).

A 2009 study by Tudor, Pickering, Holt, & Co., Energy Investment & Merchant Banking, of the impacts of wind generation estimated the addition of 6,500 MW of wind **reduces the marginal price of peak power** by $20/MWh (24%), and $15 off-peak (25%).

A 2008 academic study, "**The merit-order effect: A detailed analysis of the price effect of renewable electricity generation on spot market prices in Germany**," published in the peer reviewed journal Energy Policy, quantified the magnitude of the suppression effect in Germany as $1.3 Billion in 2001 and $6.5 Billion in 2006. More importantly, the study reported that the value of the suppressive effect exceeded the cost of the renewable energy subsidy – "In the case of the year 2006, **the volume of the (suppressive) effect exceeds the volume of the net support payments** for renewable electricity generation…."

A 2008 academic study, "**Analyzing the impact of renewable electricity support schemes on power prices: The case of wind electricity in Spain**," also published in the peer reviewed journal Energy Policy, argues that "…The case of wind generation in Spain shows that this reduction is greater than the increase in the costs for the consumers arising from the (renewable energy) support scheme (the feed-in tariffs), which are charged to the final consumer. Therefore, **a net reduction in the retail electricity price results**, which is positive from a consumer point of view. This provides an additional argument for RES-E support and contradicts one of the usual arguments against RES-E deployment: the excessive burden on the consumer.

B&V’s Net Job Impacts are in broad agreement with the economic literature:

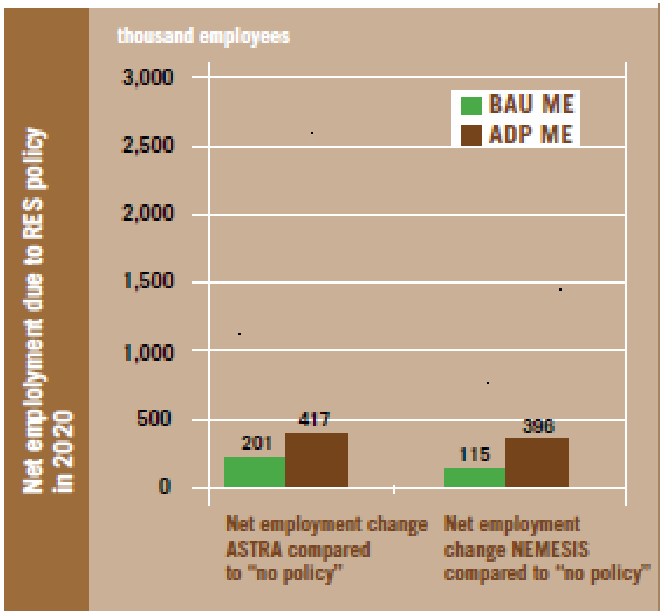
Black & Veatch – 129,000 net job-years

Energy Policy (2010) – *Putting renewables and energy efficiency to work: How many jobs can the clean energy industry generate in the US?* – **“**The model synthesizes data from 15 job studies covering renewable energy (RE), energy efficiency (EE), carbon capture and storage (CCS) and nuclear power. **We find that all non-fossil fuel technologies (renewable energy, EE, low carbon) create more jobs per unit energy than coal and natural gas.”**

European Commission – *The impact of renewable energy policy on economic growth and employment in the European Union.* Economy wide net increase in jobs (figure at right).

Energy Policy (2008) -- *Renewable energy and employment in Germany* “Overall net employment is positive even at the maximum of the (negative) budget effect. This result also holds through several sensitivity analyses:

- variation of the exports,
- higher fossil fuel prices resulting in lower additional costs,
- higher domestic investment in RES,
- low energy prices, no exports.



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Contrary to EVA's assertion, B&V reasonably accounts for non-Pennsylvania expenditures.

Table 6-4. Estimated Percent of Expenditures Made in Pennsylvania.

Technology	Construction Expenditures	Operation Expenditures
AEPS Portfolio		
Hydro	55%	71%
Biomass Cofiring	50%	57%
Landfill Gas	34%	57%
Digester Gas	47%	65%
In-State Wind	50%	66%
Out of State Wind	9%	2%
Solar	15%	50%
Coal with CCS	50%	65%
CMM	50%	50%
Biomass Direct	50%	66%
FFO Portfolio		
Coal	45%	84%
Combined Cycle Gas	33%	24%
Simple Cycle Gas	32%	16%

Contrary to EVA's assertion, B&V accounts for impacts on fossil employment

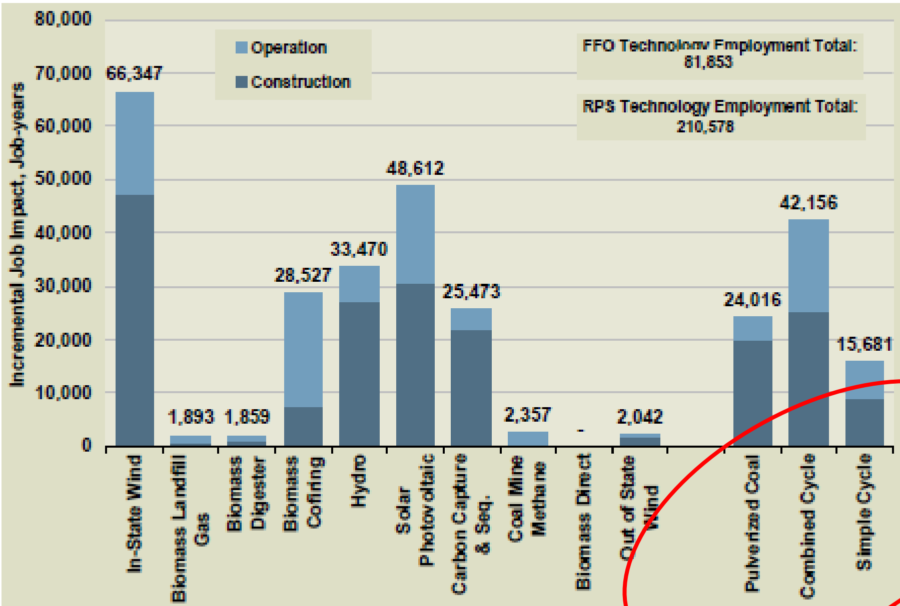


Figure 6-5. Cumulative Employment Impacts, AEPS and FFO Scenarios.

Table 6-10. Cumulative Impacts For Jobs and Output, AEPS Versus FFO Portfolios.

Portfolio	Output Impact ($ million)	Earnings Impact ($ million)	Employment Impact (job-years)
AEPS Portfolio	37.5	9.2	211,000
FFO Portfolio	11.3	3.8	82,000
Difference	26.2	5.5	129,000

Additionally, B&V accounts for the indirect employment impacts in fossil energy extraction.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

B&V uses a reasonable and economically sound impact multiplier:

EVA states the indirect job impacts are “unclear”, then states that B&V’s numbers are “dramatically overstated”; however, B&V’s multipliers are calculated from the Regional Input-Output Modeling System, developed and maintained by the U.S. Department of Commerce’s Bureau of Economic Analysis

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

The B&V study is not biased against coal or existing generation sources. In fact:

B&V identifies three "coal-enabled" technologies as cost competitive: <u>biomass cofiring with coal, coal mine methane use, and coal with carbon capture and sequestration</u>. These three technologies actually comprise about 40 percent of the economically optimum portfolio that Black & Veatch identified to meet the expanded AEPS. **Notably, B&V assumes significantly more coal-enabled resources would be built than wind (24 percent) and solar (17 percent).**

Additionally, approximately <u>50 percent</u> of the economically optimum portfolio that B&V identified to meet the expanded AEPS consists of **existing generating plants modified to produce eligible alternative energy or capture carbons emissions**.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION