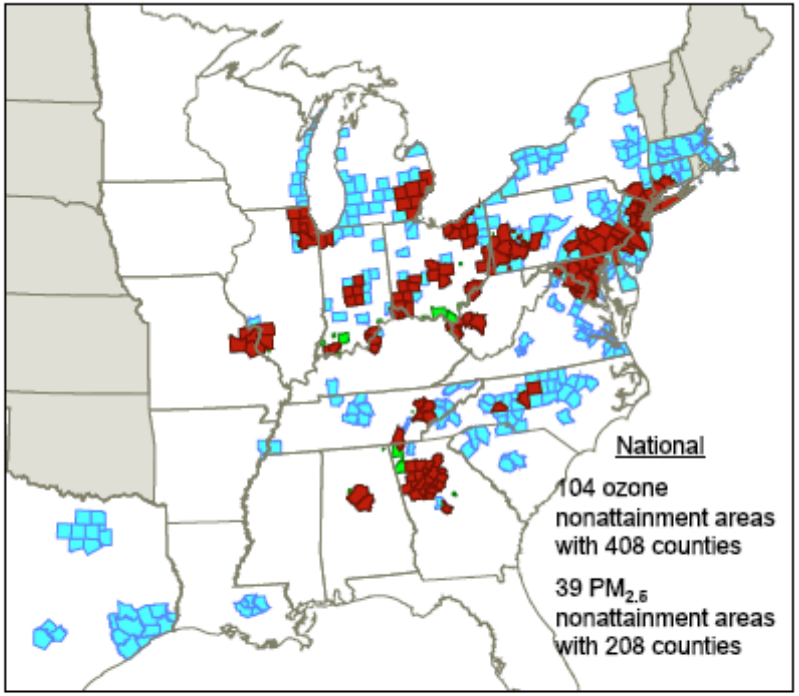
Myth – Wind energy will make US less dependent on oil

Amory Lovins wrote in 2003 that:

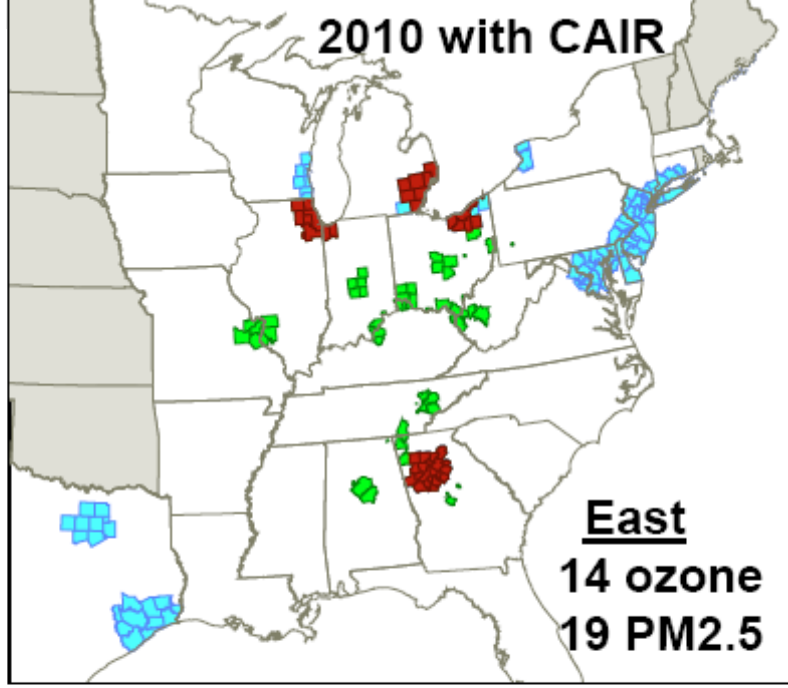
> **"Only 3% of all U.S. oil consumption makes electricity. Five-sixths of that usage is tarry residual oil or coal-like petroleum coke — both otherwise almost useless byproducts of refining. Only 0.4% of U.S. oil is distilled products made into electricity."**
>
> Source: page 3 in: http://www.rmi.org/images/other/EnergySecurity/S03-04_USESFtext.pdf

The US actually EXPORTS about twice as much oil each year as powerplants use annually to generate electricity. Consequently, the move to fund wind turbines by some energy monopolies like Shell is not going to cut into the demand for oil - which overwhelmingly is due to the transportation sector of our economy.

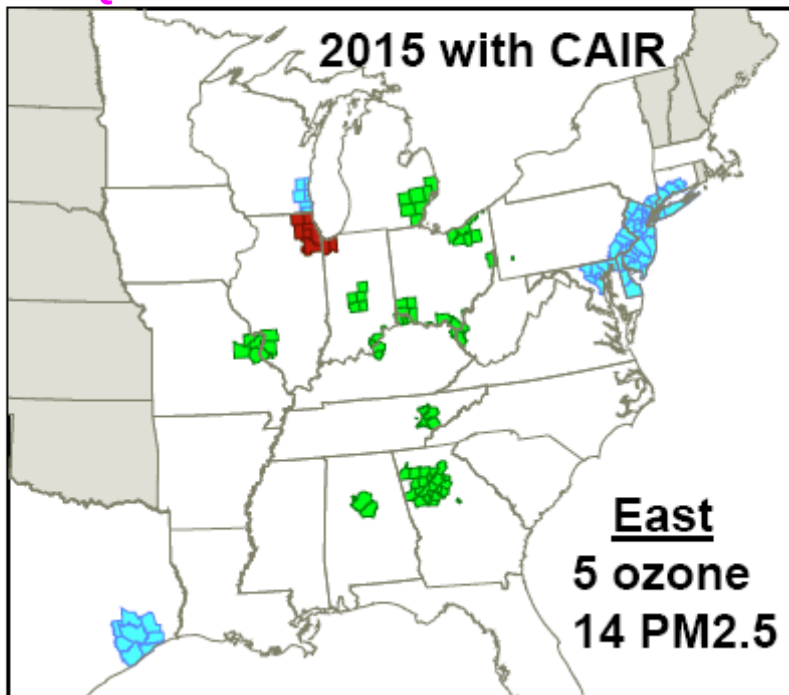


Ozone & Fine Particle Nonattainment (Apr. 05)

Projected Non-attainment Areas in 2010 & 2015 after reductions from Clean Air Interstate Rule (CAIR) and existing Clean Air Act (CAA) programs



AIR QUALITY IMPROVES IN NEAR FUTURE



CAIR and Other CAA Programs Will Help Bring Many Eastern Areas into Attainment - However, a number of areas are projected to not attain through 2010 and 2015

Nonattainment areas for 8-hour ozone pollution only

Nonattainment areas for fine particle pollution only

Nonattainment areas for both 8-hour ozone and fine particle pollution

Projections concerning future levels of air pollution in specific geographic locations were estimated using the best scientific models available. They are estimations, however, and should be characterized as such in any description. Actual results may vary significantly if any of the factors that influence air quality differ from the assumed values used in the projections shown here.

SOURCE:
http://cleanairinfo.com/modelingworkshop/presentations/PM2_5_Damberg.pdf

POTENTIAL AMOUNT OF ELECTRICITY THAT COULD BE GENERATED ANNUALLY FROM RENEWABLE SOURCES WITHIN MID-ATLANTIC STATES

STATE	RENEWABLE ENERGY SOURCES [1]			TOTAL OF RENEWABLE ENERGY SOURCES	% TOTAL FROM WIND	NUMBER OF UTILITY-SCALE WIND TURBINES TO GENERATE WIND POTENTIAL [3]
	Landfill Gas Potential (million kWh)	Clean Biomass Potential (million kWh)	Wind Potential [2] (on-shore) (million kWh)	(million kWh)		
DC	0	0	0	**0**	0	**0**
Delaware	123	561	4,806	**5,490**	88%	**1,219**
Maryland	515	2,333	5,640	**8,489**	66%	**1,431**
New Jersey	1,374	482	15,327	**17,182**	89%	**3,888**
Pennsylvania	1,748	9,969	67,894	**79,611**	85%	**17,223**
Virginia	1,098	11,669	13,366	**26,132**	51%	**3,391**
West Virginia	0	5,323	9,764	**15,087**	65%	**2,477**
TOTAL	**4,858**	**30,337**	**116,797**	**151,991**	**77%**	**29,629**

[1] Source information is from a national report entitled - **Generating Solutions: How States Are Putting Renewable Energy Into Action** - A Report of the U.S. PIRG Education Fund and the State Public Interest Research Groups. February 2002.

[2] Union of Concerned Scientists estimate - based on a state breakout of data developed for Doherty, Julie P., "U.S. Wind Energy Potential: the Effect of the Proximity of Wind Resources to Transmission Lines," Monthly Energy Review, Energy Information Administration, February 1995. Areas with Class 3 up to maximum of Class 7 winds are included in this estimate.

[3] Number of modern utility-scale wind turbines is calculated by dividing each state's Wind Potential by the average amount of electricity annually generated by a 1.5-MW turbine. A 1.5-MW turbine produces only about 1/3 of its rated capacity each year (i.e., Capacity Factor = .30), so its annual output is approximately 4 million kilowatt-hours (1,500 kW *.30 * 8760 hrs/yr). **May 31, 2005**

Tax Issues and Incentives for Wind Power

Keith Martin, *Partner*, CHADBOURNE & PARKE LLP

Federal tax benefits pay as much as 65% of the capital cost of wind power projects in the United States. State incentives cover on average another 10%. However, the problem with tax subsidies is developers without the tax base to use them fully are disadvantaged compared to their competitors who can use them. This presentation will cover the following:

- Current structures for transferring tax benefits to institutional equity participants who can use them
- "Haircuts" caused by state incentives, pre-1987 power contracts, and other overlooked issues with the production tax credit
- "Depreciation Bonus" issues

SOURCE: http://www.pmaconference.com/wind2_bro2_pma.pdf

A 1.5-MW wind turbine costs at least $2-million to purchase and erect – a very high capital cost ($1.33 per Watt). However, extensive federal tax subsidies allow wind energy developers to shelter vast amounts of otherwise taxable income, resulting in the LOSS OF OVER $1.3-MILLION in payment to the federal treasury PER TURBINE over the 1st 10 years of a project (65% of $2-million).

Number of Utility-Scale Wind Turbines needed to supply electricity demand in 2030 due to Renewable Portfolio Standards (RPS) planned for Mid-Atlantic Region states

STATE	Projected 2030 Electricity Consumption[1] (million kWh)	Enacted/ Proposed RPS Percentage[2]	RPS Share of Electricity Demand (million kWh)	NUMBER OF UTILITY-SCALE TURBINES TO GENERATE 75% RPS DEMAND[3+]
Delaware	24,368	10%	2,437	**464**
DC	13,453	11%	1,480	**282**
Maryland	130,019	7.5%	9,751	**1,855**
New Jersey	109,897	20% proposed	21,979	**4,182**
Pennsylvania	232,007	8%	18,561	**3,531**
Virginia	195,318	15% proposed	29,298	**5,574**
West Virginia	45,632	0%	0	
TOTAL	**750,693**		**83,506**	**15,888**

1 Each state's projected electricity consumption was based on 2002 level and the state-specific annual growth rate (1993-2002 average) to forecast future demand. 2002 level is from: http://www.eia.doe.gov/cneaf/electricity/st_profiles/ (Table 8)

2 Renewable Portfolio Standards (RPS) are state-legislated mandates governing the % of renewable energy that must be sold in each state – see: http://www.dsireusa.org/index.cfm. NJ's RPS level is currently 6.5%.

3 Number of modern utility-scale wind turbines is calculated by dividing each state's share of electricity consumption for RPS by the average amount of electricity generated from a 1.5-MW turbine. A 1.5-MW turbine produces only about 1/3 of its rated capacity each year, so its annual output is approximately 4 million kilowatt-hours (1,500 kW * .30 * 8760 hrs/yr).

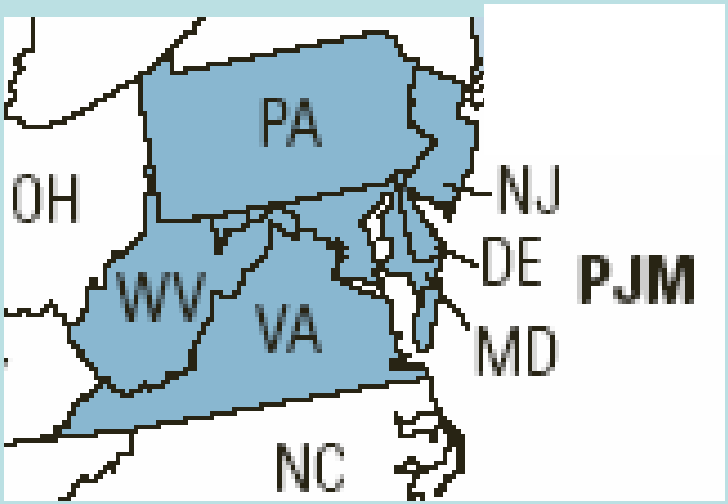
\+ Assumes that 75% of the renewably-generated electricity for which wind energy is a qualifying source (e.g., Tier 1) under a state's RPS law or official proposal will be supplied by utility-scale wind turbines.

D. Daniel Boone, May 31, 2005

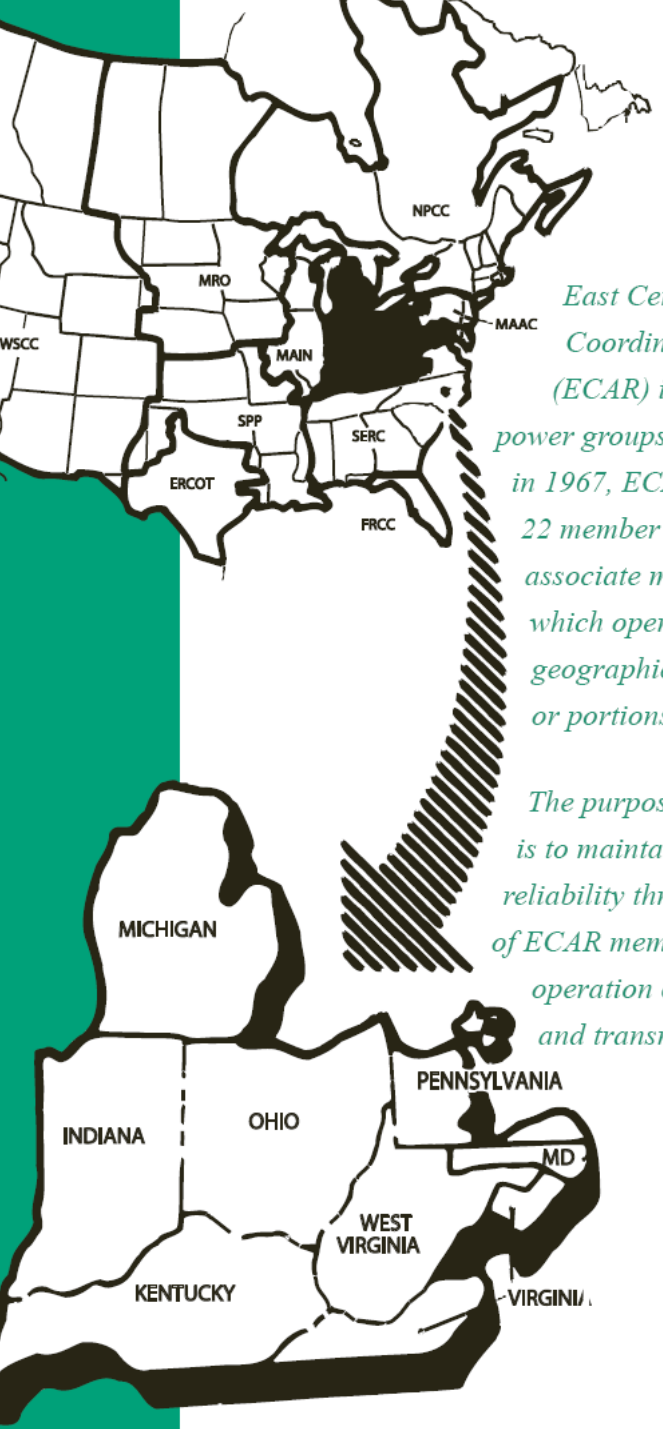
“If state RPS laws remain at current levels and are enforced over the forecast period, they will be a catalyst for about 80 percent of renewable power development.”

“Wind capacity in PJM will grow from only 195 MW today to 4,023 MW by 2016.”

Platts - *Renewable Power Outlook 2005*
http://www.esource.com/members/prc_rps/pdf/rps7.pdf

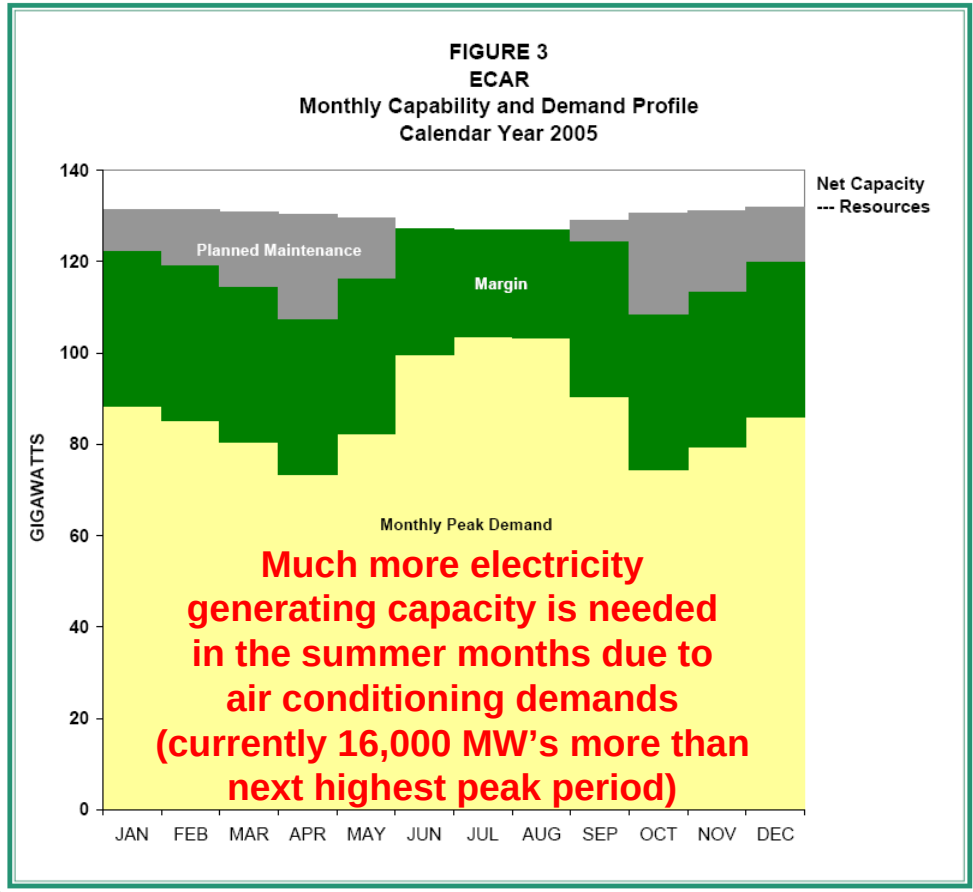


The installation of 4,000 MW of wind turbines in our region likely will cause the federal treasury to lose $3.5-billion in income tax revenue due to tax credits and shelters which large corporations will use to avoid paying taxes. However, much greater benefits to our region would result if instead this revenue were used to implement electricity conservation programs or power plant emissions reduction technologies.



East Central Area Reliability Coordination Agreement (ECAR) is one of ten regional power groups. Formed early in 1967, ECAR is made up of 22 member companies and 16 associate member companies which operate within a geographic area that covers all or portions of nine states.

The purpose of the organization is to maintain area-wide reliability through the coordination of ECAR members' planning and operation of their generation and transmission facilities.

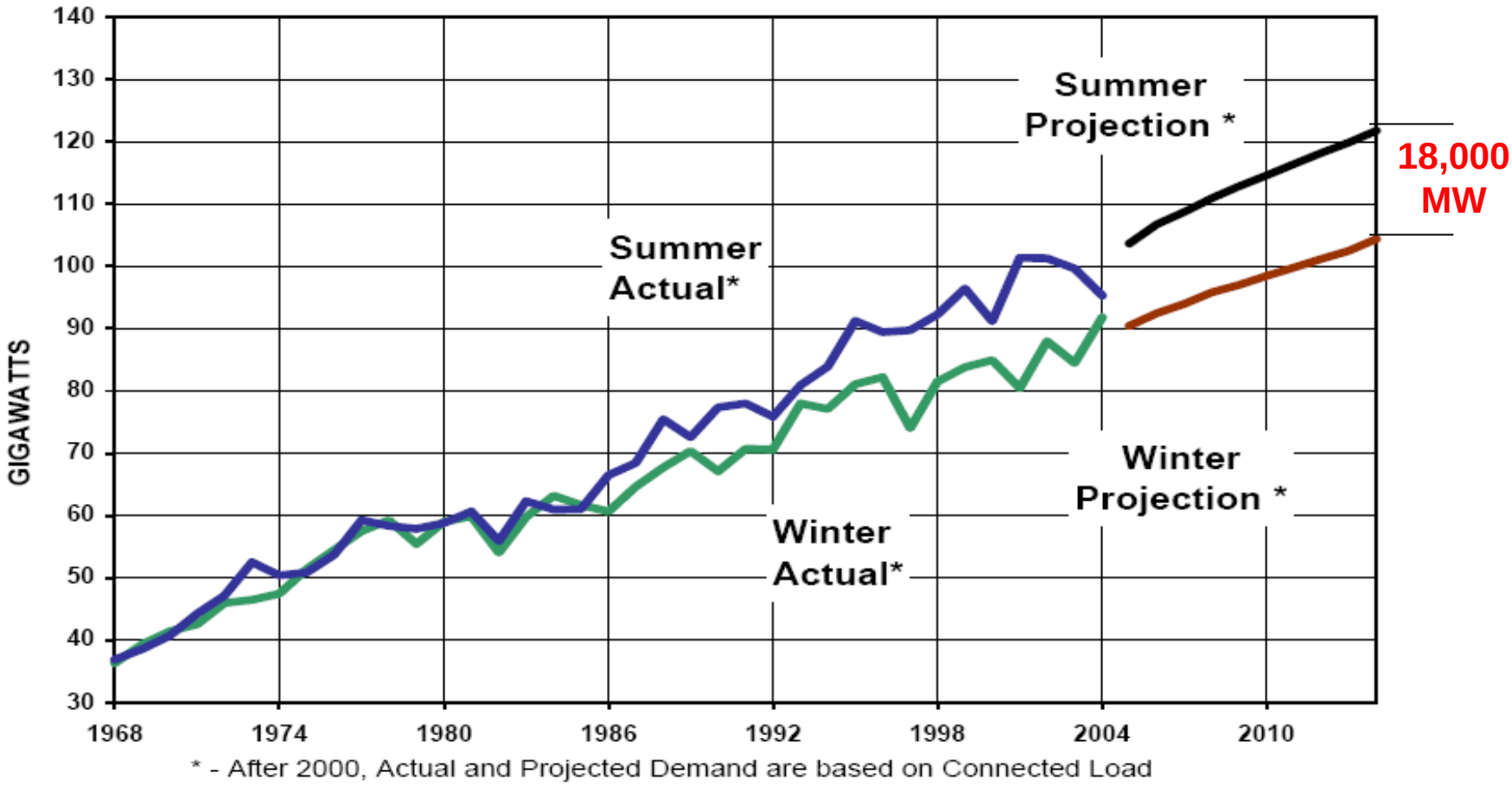


Note: the ECAR region includes western Highland County, VA

Source: Assessment of ECAR-wide Capacity Margins 2005-2014

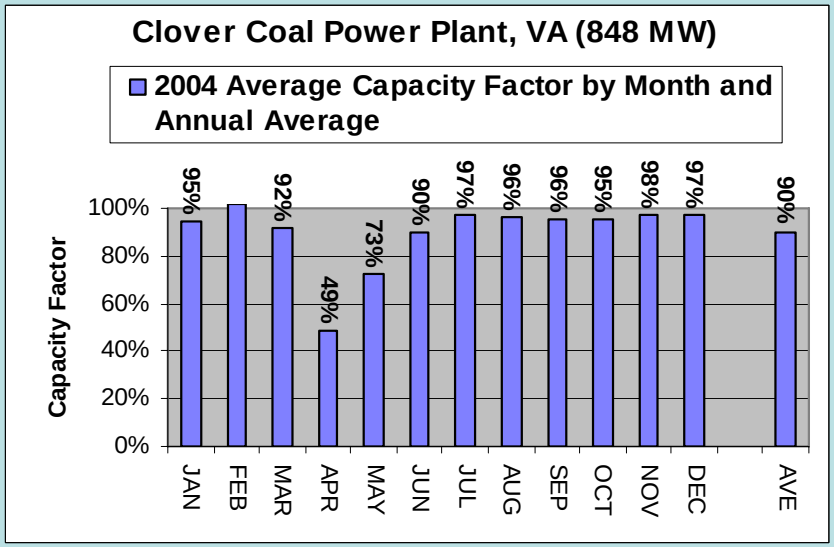
http://www.ecar.org/publications/GRP/2005-GRP-57.pdf

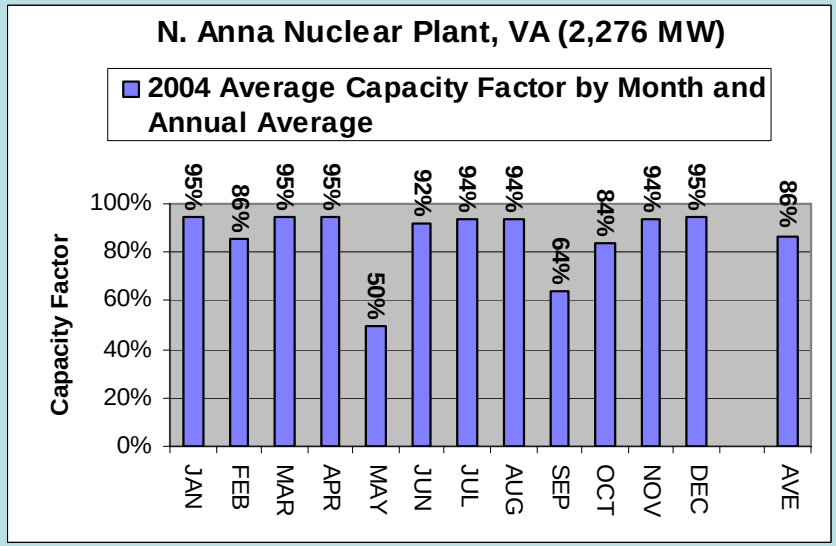
FIGURE 2
ECAR Total Internal Demand
1968 - 2014

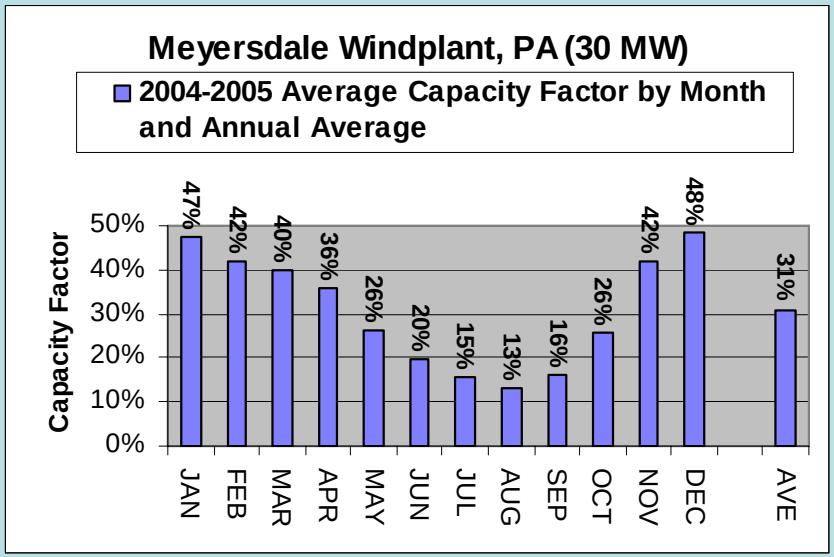


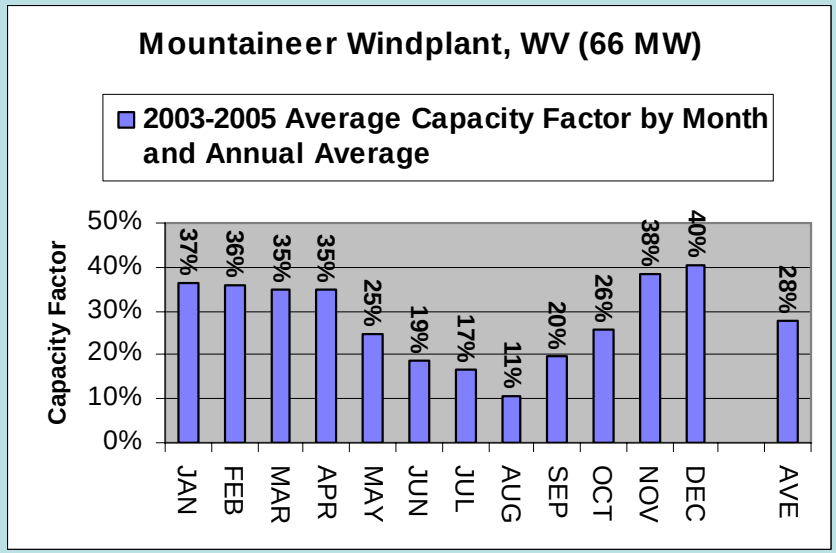
From: Assessment of ECAR-wide Capacity Margins 2005-2014
http://www.ecar.org/publications/GRP/2005-GRP-57.pdf

Average Monthly and Annual Capacity Factors for Coal and Nuclear Power Plants in Virginia, and for Windplants in Mid-Atlantic Region









Source: USDOE EIA's 906/920 Monthly Time Series data and FERC's EQR data; corrected for errors and omissions

Data summarized by Dan Boone, 5 March 2006

10 LARGEST POWER PLANTS IN VIRGINIA AND NUMBER OF WIND TURBINES NEEDED TO PROVIDE EQUIVALENT ANNUAL OUTPUT OF ELECTRICITY (kWh)

Facility Name	Capacity (MW)	Owner	Fuel Type	Annual Capacity Factor	# Wind Turbines To Equal Output*	# Miles Ridgecrest Covered+
North Anna	1,960	VEPCO	Nuclear	86%	3,752	469
Surry	1,695	VEPCO	Nuclear	91%	3,480	428
Chesterfield	1,353	VEPCO	Coal	60%	1,809	226
Clover	848	VEPCO	Coal	90%	1,693	212
Chesapeake	650	VEPCO	Coal	72%	1,040	130
Clinch River	713	Appalachian Power	Coal	63%	996	124
Yorktown	882	VEPCO	Waste Oil	40%	781	98
Yorktown	375	VEPCO	Coal	69%	574	72
Possum Point	348	VEPCO	Natural Gas	73%	562	70
Potomac River	514	MIrant Energy	Coal	46%	526	66

* Number of 1.5 MW wind turbines operating with 30% Annual Capacity Factor (the highest average efficiency in region)

+ Based on 8 utility-scale wind turbines per mile of ridgetop (typical spacing)

Note: # of kWh produced per year by facility = Capacity (in MW) x 1000 kW/MW x Annual Capacity Factor x 8760 hrs/yr; 8760 hrs per year based on: 24 hr/day x 365 day/yr

SOURCE: U. S. Department of Energy, Energy Information Administration (EIA) – 2004 December EIA-906/920 Monthly Time Series File

10 LARGEST POWER PLANTS IN VIRGINIA AND NUMBER OF WIND TURBINES NEEDED TO PROVIDE EQUIVALENT SUMMER OUTPUT OF ELECTRICITY (kWh)

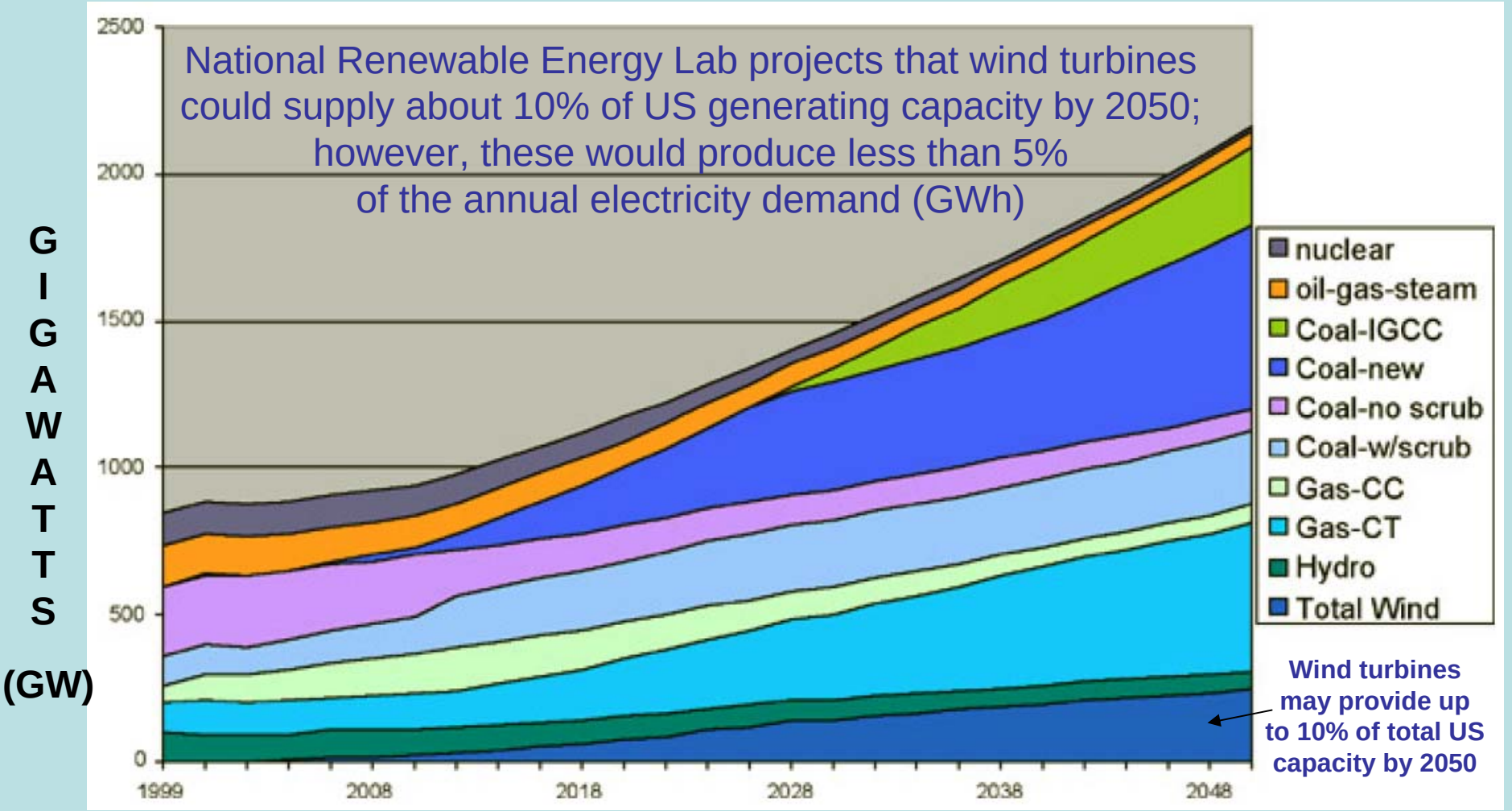
Facility Name	Capacity (MW)	Owner	Fuel Type	Summer Capacity Factor	# Wind Turbines To Equal Output*	# Miles Ridgecrest Covered+
North Anna	1,960	VEPCO	Nuclear	84%	7,316	914
Surry	1,695	VEPCO	Nuclear	96%	7,262	908
Chesterfield	1,353	VEPCO	Coal	79%	4,751	594
Clover	848	VEPCO	Coal	90%	3,640	455
Chesapeake	650	VEPCO	Coal	78%	2,242	280
Clinch River	713	Appalachian Power	Coal	64%	2,034	254
Yorktown	882	VEPCO	Waste Oil	46%	1,790	224
Yorktown	375	VEPCO	Coal	64%	1,071	134
Possum Point	348	VEPCO	Natural Gas	106%	1,644	206
Potomac River	514	MIrant Energy	Coal	42%	943	118

* Number of 1.5 MW wind turbines operating with 15% Summer Capacity Factor (average efficiency in region)

+ Based on 8 utility-scale wind turbines per mile of ridgetop (typical spacing)

Note: # of kWh produced during Summer = Capacity (in MW) x 1000 kW/MW x Summer Capacity Factor x 2208 hrs/yr; 2208 hrs per year based on: 24 hr/day x 92 day/Summer, and Summer is July 1 through September 30, 2004

SOURCE: U. S. Department of Energy, Energy Information Administration (EIA) – 2004 December EIA-906/920 Monthly Time Series File



Projected electricity generation capacity (in GW) for the U.S. by different generator types. Actual generation depends on amount of capacity, as indicated by the thickness of the section of the graph, and on annual capacity factor (efficiency) of each generation source. Due to wind intermittency, the annual capacity factor for wind energy projects is only about 30% - much less than for other utility-scale electricity generator types. (The graphic is from the National Renewable Energy Laboratory, DOE: http://www.nrel.gov/analysis/winds/qualitative.html **) NOTE: 1,000 MW = 1 GW & 1,000 kW = 1 MW**