Improving Regional Air Quality with Wind Energy

Wind Powering America Fact Sheet Series

This fact sheet provides an overview of how electricity generated from zero-emission wind energy can help states and municipalities improve air quality, achieve attainment of Clean Air Act standards, and reduce pollution control costs for taxpayers.

States and municipalities are required to comply with the standard for ground-level ozone established under the Clean Air Act.[1] Wind energy can help states and municipalities improve air quality. Electricity generated from zero-emission wind power can displace electricity generated from coal, oil, and natural gas plants, which reduces conventional air pollutants, such as nitrogen oxides (NO_x), and greenhouse gas emissions (such as carbon dioxide).

Alden Hathaway/PIX13965

The Montgomery County, Maryland buying group purchases wind energy from the Mountaineer Wind Energy Center in West Virginia.

Wind energy is often less expensive than other control measures in achieving emission reductions. As a result, wind energy can help a state or municipality that does not meet the air quality standard reduce the pollution control costs paid by taxpayers.

Wind Energy in State Implementation Plans (SIPs)

Under guidance issued by the U.S. Environmental Protection Agency (EPA) in August 2004, states and municipalities can receive emission reduction credit in their State Implementation Plans (SIPs) for wind power purchases that reduce air emissions and help achieve attainment of the National Ambient Air Quality Standard for ozone.[2] The National Renewable Energy Laboratory (NREL) provides model SIP documentation to assist states in achieving this objective.[3] In states with NO_x emissions "cap and trade" programs, the EPA guidance generally requires the state to retire NO_x allowances when the renewable generation comes online. As a result, the EPA guidance is particularly relevant to states that have adopted renewable energy set-asides as part of their NO_x emissions trading programs. These states include Indiana, Maryland, Massachusetts, New Jersey, New York, and Ohio.[4] The renewable set-asides allow NO_x allowances to be assigned to wind developers, states, or municipalities, thus providing a pool of NO_x allowances that can be retired to achieve SIP credit.

The EPA guidance and NREL documentation are also relevant to states that have not adopted renewable energy set-asides but are interested in promoting clean air with wind energy purchases. These states should implement mechanisms, such as new enforcement approaches or modifications to their NO_x emissions trading regulations, to achieve SIP credit. Regulatory changes may be needed because most of the current state emission trading regulations only allow the assignment of NO_x allowances to fossil fuel generating sources. As a result, these states often do not have a pool of allowances to assign to renewable energy generators.

States seeking to gain NO_x emission reduction credit for wind energy purchases in their SIPs must demonstrate that the emission reductions are:

- **Quantifiable.** The emission reductions must be subject to measurement.
- **Surplus.** The emission reductions cannot be included in both the baseline emissions inventory and a SIP control measure. The reductions must also be deemed in excess of requirements imposed by the state's NO_x emissions trading program.
- **Enforceable.** Properly structured wind energy purchases should be treated as enforceable under EPA's voluntary measures policy.
- **Permanent.** The wind purchase should be permanent throughout the term of the SIP, unless necessary emission reductions can be secured from other actions later in the term.[5]

The state can ensure that air quality improvements are achieved by requiring the retirement of NO_x allowances from future use from its renewable energy set-aside in an amount commensurate with the size of the wind energy purchase. This can be accomplished by: (1) the direct retirement of the NO_x allowances by the state, or (2) the award of the allowances to a municipality or wind developer on the condition that the allowances be retired from future use.

Case Study: Montgomery County, Maryland Wind Energy Purchase

The metropolitan Washington area was designated a "severe" ozone non-attainment area under the 1-hour standard. In February 2004, Maryland, Virginia, and the District of Columbia approved SIPs to improve air quality in the Washington metropolitan area to meet the National Ambient Air Quality Standard for ground-level ozone. These SIPs include the first state EPA submissions of wind energy purchases as control measures in regional air quality plans required under the Clean Air Act. The EPA issued a Federal Register notice in December 2004 proposing the approval of these measures.[6] The wind purchase measures are designed to reduce dangerous ozone transport caused by fossil fuel generation in upwind areas.

The wind purchases were spearheaded by Montgomery County and the State of Maryland through their joint membership in the Metropolitan Washington Council of Governments (MWCOG) Air Quality Committee. Montgomery County and its partners committed to purchase 5% of their total energy consumption through wind energy, which equals 38,400 megawatt-hours (MWh) per year. This represents the largest wind purchase by a local government group. In its regional wind purchase initiative, Montgomery County successfully built a consortium of green power users by recruiting purchases from neighboring Prince George's County, numerous cities and towns within the county, local schools and colleges, the local water and wastewater agency, several local housing authorities, and the local park authority to enhance the county's ability to secure a cost-competitive bid.

Based on information provided by electric utilities, the wind energy purchase by the Montgomery County buying group impacts electric generation from coal-fired units in the PJM West electric grid. This wind purchase results in the reduction of air emissions of NO_x (as well as other pollutants and greenhouse gases) from these coal-fired units. Displacement occurs among a set of plants that are on a variable dispatch schedule so that the actual generation rises and falls with the demand.

The total emissions reduction credited in the SIP for the wind purchase is 2.9 pounds of NO_x per MWh of wind electricity generated – equivalent to 9.2 tons during the summer ozone season.[7] The Maryland Department of Environment plans to retire NO_x allowances from its renewable energy set-aside commensurate with this reduction.

According to Montgomery County, the cost of the wind purchase compared favorably with other control measures considered by the MWCOG, including compressed natural gas (CNG) refueling stations, CNG bus purchases, and bike lockers.

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[1] Ground-level ozone is formed when volatile organic compounds combine with nitrogen oxides in the presence of sunlight on hot, stagnant, summer days

[2] EPA guidance can be found at www.epa.gov/ttn/oarpg/t1/memoranda/ereseerem_gd.pdf

[3] Model documentation can be found at www.windpoweringamerica.gov/sips

[4] See www.eandeclearinghouse.com for the state regulations implementing the NO_x renewable energy set-aside in each of these states

[5] Refer to EPA guidance at www.epa.gov/ttn/oarpg/t1/memoranda/ereseerem_gd.pdf for a more complete description of these requirements

[6] 69 Fed. Reg. 76889, December 23, 2004

[7] This estimate is conservative for several reasons, including the fact that the participants in the buying group and the MWh ultimately purchased increased substantially following the SIP submission

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