

Illinois – High-Level Commitment Key to Air Quality Success

State agencies evaluate benefits of energy plan initiated by governor

How did the state of Illinois measure air emissions reductions from a renewable portfolio standard (RPS) and an energy efficiency portfolio standard (EEPS)? A state-initiated Sustainable Energy Plan became a catalyst for implementing programs that could improve the state's air quality and lead to a more energy-efficient future. The Sustainable Energy Plan, proposed by the governor in early 2005, consists of an RPS, which requires use of renewable energy such as wind, biomass, solar, and other sources; and an EEPS, which requires progressive reductions in load growth using demand-side conservation measures.

In an effort to estimate the benefits of the plan's provisions, the U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) created a pilot project, the Illinois Air-Energy Integration Initiative. This fact sheet outlines how this unique pilot project estimated air emissions reductions associated with Illinois' Sustainable Energy Plan using detailed modeling.

Approach

The goal of this initiative was to develop preliminary estimates of the emissions impact of the Sustainable Energy Plan, with the ultimate intent of incorporating the reductions into the state implementation plan (SIP) for air quality. The DOE-EERE pilot project illustrates the use of detailed dispatch modeling of the electricity system to estimate air emissions reductions from statewide renewable and efficiency portfolio standards.

Under this initiative, state officials from the Illinois Department of Commerce and Economic Opportunity (DCEO) and Illinois Environmental Protection Agency (EPA) collaborated on the federal level with the U.S. EPA and the DOE-EERE, including the National Renewable Energy Laboratory (NREL). These government groups worked with Shaw Environmental Inc., the University of Illinois at Chicago Energy Resource Center (UIC ERC), PowerWorld Corporation, and Western Illinois University. DOE-EERE contracted with Shaw Environmental Inc. and provided an additional grant to DCEO to implement the initiative.

The pilot project focused on collaboration, energy savings, emissions reduction, and state integration, specifically:

- Determining the amount, type, and location of electric generation that would be displaced by RPS/EEPS measures stipulated in the Sustainable Energy Plan.
- Determining the impact on air emissions for sulfur dioxide (SO₂), nitrogen oxides (NO_x), mercury (Hg), and carbon dioxide (CO₂).
- Incorporating reductions into state air quality and energy planning.

Supporting Analysis

In June 2005, the UIC ERC released a report, *The Economic and Environmental Impacts of Clean Energy Development in Illinois*, which estimated the economic and environmental benefits of the governor's proposed plan. It can be accessed at www.illinoisbiz.biz/dceo/Bureaus/Energy_Recycling/Energy/Clean+Energy/03-UIC_Study.htm. PowerWorld Corporation, an Illinois group under contract from Shaw, completed a regional analysis using a dispatch model for the study period 2007 through 2013. PowerWorld's model estimated generation impacts in Illinois; in seven adjacent states, called the "Seven State Area" (Iowa, Indiana, Kentucky, Michigan, Missouri, Ohio, and Wisconsin); and in other states outside the immediate region.



The Illinois RPS requires use of renewable energy sources such as wind.

Warren Greiz, NREL/PIX 07318

Results

Results from UIC ERC found that renewable energy (RE) and energy efficiency (EE) goals consistent with Illinois' 2005 Sustainable Energy Plan could achieve significant benefits to state employment, income, and economic output, as well as fuel displacement and air emissions reductions.

The simpler emissions analysis from the UIC ERC report suggested that analysis using a regional economic dispatch model was needed to estimate emissions impacts with a comfortable degree of certainty, leading the project team to initiate the PowerWorld analysis.

Fuel Displacement

The analysis from PowerWorld showed that the RE and EE measures of the Sustainable Energy Plan will displace significant fossil fuel generation within Illinois and the Seven State Area. It also showed that:

- The majority of fuel displaced in Illinois will come from coal-fired power plants, with 13,897 GWh being displaced for the period between 2007 and 2013.
- The output from natural gas-fired power plants will increase slightly, because they relieve localized transmission congestion during peak wind output.

Emissions Impacts

Shaw's analysis showed that the Sustainable Energy Plan will produce significant and measurable environmental benefits. As shown in the table, the plan could reduce emissions of NO_x, SO₂, Hg, and CO₂. However, for capped pollutants, this effect would likely reduce allowance costs while emissions stayed the same. Less than half of the emission reductions would occur in Illinois, but much of the electric generation displaced out-of-state would be located up-wind of Illinois (Iowa, Missouri, Wisconsin), possibly contributing toward improved air quality in the state.

Cumulative Estimated Emissions Decrease, 2007 – 2013				
Area	SO ₂ (tons)	NO _x (tons)	Hg (lbs)	CO ₂ (tons)
Illinois	51,020	4,909	238	16,155,650
Rest of study area	53,062	5,704	168	8,695,001
Seven State Area	51,670	7,334	354	18,821,400
Total	155,752	17,947	760	43,672,051

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The analysis shows that implementation of the Illinois Sustainable Energy Plan will have emissions benefits in Illinois and the broader study area, reducing emissions of pollutants that are not capped and reducing control costs for pollutants subject to cap and trade. The analysis is described in full in *Emissions Impact Assessment of the Sustainable Energy Plan for Illinois*, which can be accessed at www.illinoisbiz.biz/dceo/Bureaus/Energy/Recycling/Energy/Clean+Energy.

Next Steps

On August 28, 2007, the governor signed legislation creating an RPS and EEPS for Illinois based on the Sustainable Energy Plan—but with even more aggressive goals, which should lead to even greater air emissions reductions. The methods developed through this pilot program could be applied to those new policy goals. In addition, other states in the region may be taking action to advance the use of clean energy policies that would address air emissions regionwide. This could result in opportunities for air-energy analysis with regional policy implications.

Lessons Learned

This initiative demonstrated that state energy and environment officials could collaborate on RE and EE technologies—and policies—that reduce air emissions while addressing energy goals. This pilot demonstrated that EPA and DOE technical assistance can help states use detailed modeling of the effect of RE and EE technologies on the electric sector to estimate air emissions reductions. The analysis also verified that sustainable energy measures result in air emissions, energy, and economic benefits. Other states interested in quantifying the benefits of RE and EE policy initiatives may be able to learn from the Illinois approach.

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A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

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