

Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures

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General

The guidance document was developed because EPA supports and wishes to promote the testing of promising new pollution reduction strategies such as energy efficiency (E2) and renewable energy (RE) measures within the air quality planning process. The guidance document should be used following the procedures outlined in EPA's, "Incorporating Voluntary and Emerging Measures in a SIP".

EPA acknowledges that it can be difficult to accurately measure emissions reductions from E2 and RE measures, and only Dallas-Ft. Worth and Washington, DC have proposed explicit emission reductions in SIP submissions (as of 8/2004).

The potential for SIP credit occurs when a measure is expected to reduce the emissions of an EGU below its projected emission level in the SIP. The reduction in emissions could be as a result of E2 actions to reduce the amount of energy that would have otherwise been used, or RE projects used to generate energy with fewer overall emissions.

Examples of projects possible for SIP credits:

- Demand side management E2 projects – replace existing electrical devices; design, construction, or reconstruction energy savings programs
- Supply-side measures – new and innovative initiatives to increase efficiency or decrease electricity generation emissions – CHP; fuel cells; renewables (wind, solar, biofuels)

Emission source categories:

- Fossil fuel fired EGUs
- Small distributed GUs
- Emergency/standby generators

CAA requirements for crediting emissions reductions in a SIP:

- Quantifiable – evaluate and verify over time the level of emissions reductions achieved; standard evaluation criteria and alternative protocols are allowed.
- Surplus – useable if they are relied upon in other areas related in the SIP. Important requirements in areas subject to cap and trade.
- Enforceable – enforceable directly, enforceable against another party responsible for the activity, or included in EPA's voluntary measures policy. Most measures in the guidance fall into the last 2 categories. The State is responsible for enforcement of the third category.
- Permanent – throughout the term of the SIP.

Difficulties in calculating emissions reductions from E2 and RE:

Because electricity originates from numerous generators, there is rarely a direct connection between a specific facility generating electricity and the end user of that electricity. There can be considerable uncertainty where the reduced demand from E2 or displaced energy from a renewable source will show up as reduced electrical generation and reduced EGU emissions. The uncertainty is, however, not insurmountable. The estimation of where the energy generation changes will take place will affect the overall emission reductions of the measure: base load, age of units, fuel types, process type, electric grid operation, etc. Even if the E2 saving itself is clearly shown to occur in a nonattainment area, one needs to determine where the displacement of electrical generation will be likely to occur as a result of the

measures – downwind vs. upwind. Additionally, an area can identify small projects that may seem undeterminable or insignificant, but added together may provide substantial AQ benefits.

Other complicating factors: the nature of the integrated electric grid, deregulation of production, pollution control requirements which can lower future EGU emissions, such as the NO_x SIP Call, and cap and trade programs. Retirement of allowances or clear demonstration of emissions reductions despite cap and trade programs and exporting electricity to other areas may be ways to put E2 or RE measures into the SIP. Using conservative assumptions and appropriate discount factors or verification techniques is critical.

Quantification steps:

1. Estimate the energy savings that an E2 measure will produce, or, for a RE project, the amount of energy generation that will occur. Examples – require all government buildings to switch to high efficiency air conditioning or determine how much energy is displaced by a RE project. Baseline numbers must be determined, and an analysis of possible double counting in production assumptions is necessary. Analytical tools and resources are listed.
2. Convert the energy impact in Step1 into an estimated emissions reduction. Estimate which facilities will likely reduce their energy output as a result of the measure, and then determine the emission rate in pound per kilowatt-hour of those facilities. Subtract line losses (or use EPA's estimate of one kilowatt-hour of energy demand savings reducing electricity generation by the same amount of energy). For RE projects, account for emissions that occur at the RE source. This is often, but not always done by models that assess how the energy sector will react to the displaced energy. Several models are explained and data input sources mentioned – varying by project, existing and future requirements on emissions from the EGU, air pollution control presence or absence at a facility, fuel type, electricity generation process of an EGU, unit efficiency, and whether there are multiple outputs. Consider NO_x SIP Call impact on emissions reductions baseline numbers. If no allowance set-asides exist, a mechanism for allowance retirement must be established, or a rigorous technical analysis to quantify a measure's benefit to the nonattainment area can be performed assessing the electricity and allowance market's function. Base-loaded applications of distributed energy (vs. peaking) tend to have better efficiencies and lower emissions rates, e.g. CHP, wind, solar. Calculations must also consider exporting or importing energy from the grid and the emissions reductions for the air shed.
3. Determine the impact from the estimated emission reduction on AQ in the nonattainment area. Evaluate the extent to which reductions will improve the AQ meeting basic programmatic statutory and regulatory requirements in order to use for SIP credit. Emissions reduced in an area may be credited with no additional analysis. The credits must meet the basic CAA requirements, be part of the area's emissions inventory and the benefits may be from upwind areas (generally established using dispersion and photochemical models).
4. Provide a mechanism to validate or evaluate the effectiveness of the project or initiative. This may be by monitoring, record keeping and reporting to evaluate the energy impact of reductions or AQ improvements. Monitoring and verification guidance will be available on EPA's website for E2 and RE set aside programs. Departure from estimated reductions must be addressed in the SIP when the results are too low, and additional credit may be submitted if actual reductions are higher than that first projected.

SIP submission process:

A list of supporting documentation is included, as well as contact information, tools, resources, and example quantifications.