

Ohio EPA Guidance Manual

Energy Efficiency/Renewable Energy and Innovative Technology Projects (NOx Budget Trading Program in Ohio)

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INTRODUCTION

In response to U.S. EPA's NOx SIP Call, Ohio EPA finalized rules in July 2002 to establish the NOx Budget Trading Program in Ohio. These rules are found in Ohio Administrative Code ("OAC") Chapter 3745-14. The NOx SIP Call required 22 states and the District of Columbia to reduce emissions of NOx, an ozone precursor, to reduce the out-of-state contribution to ground level ozone pollution in the eastern United States. Ohio's rules established the NOx Budget Trading Program in Ohio to reduce NOx emissions from electrical generating utilities and large industrial boilers.

The NOx Budget Trading Program requires substantial reductions of NOx emissions for regulated units during the compliance period, May through September (also referred to as the ozone season). In its NOx SIP Call, U.S. EPA set a cap on the total NOx emissions from regulated units in Ohio during the compliance. The cap is Ohio's NOx Budget for regulated units and represents a 60% to 85% reduction of NOx emissions from these units compared to their historical emission rates. Beginning in 2004, and for each following year, regulated units receive an allocation of NOx allowances from Ohio's NOx Budget. Each NOx allowance represents one ton of NOx emissions. At the end of each control period, NOx allowances available to each regulated unit must equal or exceed the tons of NOx emissions from the unit during the control period. How this is done is left up to the unit's owner. The owner can install NOx control equipment, reduce hours of operation, or purchase NOx allowances on the open market.

As an incentive to further reduce NOx emissions in Ohio, the rules also set aside NOx allowances for energy efficiency/renewable energy ("EE/RE") projects and innovative technology ("IT") projects.

An EE/RE project is defined in the rules as:

"any project that, during the control period, reduces end-use demand for electricity, including demand-side management practices, or displaces electrical energy utilization through the use of wind power, solar power, biomass or landfill methane generation."

An IT project is defined in the rules as:

"any project utilizing technology that has not been adequately demonstrated in practice, but that would have a substantial likelihood of reducing NOx emissions compared to current practices. An innovative technology project could include technology to decrease electrical energy or fuel use either in stationary or mobile sources."

The EE/RE and IT set-asides each contains 454 NOx allowances.

Ohio EPA's goal in using the EE/RE and IT set-asides is to produce greater NOx reductions than would be achieved by merely setting limits on regulated sources. A more energy efficient process results in not only less NOx emissions but also cost savings. Cost savings is the catalyst that will keep successful energy efficient processes operating long after the set-asides cease. By providing an increased financial incentive for successful projects, the

set-asides can abate some of the financial resources and long term market development problems associated with new technology.

The EE/RE and IT set-asides are not meant to be the major financial driving force for any project. As of March 23, 2005, NOx allowances for the years 2006-2007 were being traded between \$2,950 and \$3,550 per NOx allowance. Although the value of one allowance may be relatively small, even one allowance awarded for five years to a project could be in excess of \$15,000. Of course, the actual value of one NOx allowance depends on its market price at the time it is sold.

The Ohio EPA Division of Air Pollution Control will work closely with the Ohio Department of Development's Office of Energy Efficiency ("OEE") and the Ohio EPA Office of Compliance Assistance and Pollution Prevention ("OCAPP") to evaluate project eligibility and verify energy reductions achieved by approved EE/RE and IT projects.

PROJECT ELIGIBILITY

EE/RE Projects

Projects eligible to receive NOx allowances from the EE/RE set-side are those reducing the generation of NOx emissions either through reduction of electricity consumed (i.e., demand-side reductions) or the displacement of fossil fuel generated electricity using renewable energy sources.

An EE/RE project must meet the following minimum requirements to be eligible:

- reduce/displace electricity load from electric utilities in Ohio;
- not be required by Ohio or Federal government regulations or permits;
- be in operation in the year for which it applies for allowances;
- reduce or displace energy during the compliance period;
- be measured and verified in accordance with approved methods;
- represent or be aggregated into not less than one ton of NOx allowances.

Projects using demand side reductions are eligible because reduced electricity consumption corresponds to less fuel burned and fewer NOx emissions. Renewable energy projects such as wind power, solar power, biomass or landfill methane generation displace or replace traditional fossil-fueled electrical generation with non-emitting generation or low NOx emitting electrical generation.

The following describes several types of projects that could be eligible for NOx allowances from the EE/RE set-aside:

- End-use energy efficiency projects, including demand-side management programs. Demand-side management programs can include energy efficiency projects such as lighting retrofits using more efficient lights or building retrofit projects that decrease energy needed for heating and cooling. Installation of energy efficient equipment or changing processes in a way that increases energy efficiency and reduces fuel usage are two examples.

- Renewable energy projects that displace electricity produced by a utility for the power grid. Projects in this category could involve energy resources that cannot be depleted (e.g. wind and solar power) and that do not emit NOx during their operation.
- Renewable energy projects generating electricity through the capture of methane gas from landfills, water treatment plants, sewage treatment plants, or anaerobic digestion systems operating on animal or plant wastes.
- Highly efficient electricity generation for the predominant use of a single end user, such as combined cycle, combined heat and power and micro turbine systems.

Table 1: List of End-use Energy Efficiency Technologies Potentially Eligible for Set-Aside Allowances¹

<p>LIGHTING TECHNOLOGIES T-5 or T-8 lamps: fluorescent lamps with electronic or high-efficiency magnetic ballasts. Occupancy Controls: occupancy sensors installed where existing controls do not exist. Daylight Dimming Controls: control system to adjust lighting level where existing controls do not exist. Incandescent to Hardwired CFL: permanently attached compact fluorescent fixtures to replace standard incandescent lamps. High Pressure Sodium or Metal Halide: High pressure sodium or metal halide fixtures to replace mercury vapor lamps. LED Exit Signs: replace incandescent signs. LED Traffic Signals: replace with light emitting diode traffic lights and pedestrian signals</p> <p>ENERGY EFFICIENT LABELED PRODUCTS Energy Star: labeled office equipment, consumer products, building systems, lighting, HVAC equipment, motors, pumps, roof products, transformers, agricultural fans, insulation and windows.</p>	<p>MOTORS/OTHER MEASURES Increased Motor Efficiency: Variable Speed Drives: VSD motor control to replace single speed motor control. Economizer: System must use outside air to reduce cooling or heating loads and operate automatically. EMS System: Energy Management System controlling HVAC or lighting loads. Heat Pump Water Heaters: Commercial or domestic, replace existing heating system. Cooling: technologies reducing summer peak demand. Unitary A/C Unit Replacement: Factory made direct expansion space cooling system with self contained or matched split evaporator coils. Chiller Replacement: New chiller and condenser resizing, chilled water loop pump and condenser motor controls. Solar Water Heaters: Replacement of traditional hot water heaters. Green/Eco or High Emissivity Roof Designs: Replace traditional roof with alternative roofing materials and design to reduce heating/cooling costs.</p>
<p><u>Some Technologies Not Eligible Under the Program</u> Actions with a measurable life span of less than 3 years. Measures that do not meet federal and state minimum energy efficiency standards. Load shifting technologies. Fuel switching projects. Maintenance of existing equipment.</p>	

¹ Creating an Energy Efficiency and Renewable Energy Set-aside in the NOx Budget Trading Program: Designing the Administrative and Quantitative Elements, EPA-430-K-00-004, April 2000.

The following examples, provided by U.S. EPA ², illustrate projects that would be eligible to receive NOx allowances from the EE/RE set-aside.

OFFICE LIGHTING RETROFIT

A financial institution with locations throughout the state implemented lighting retrofits at a total of 2.5 million square feet of retail branches, administrative office buildings, and data centers. They replaced 4500 176-wattage lighting fixtures with energy efficient lighting that uses only 70 watts to deliver the same light output. In addition, they installed several thousand energy efficient T8s and electronic ballasts. To maximize these savings, they also installed lighting occupancy sensors that are programmed to power down during non-use periods. In total, they saved 2.8 million kWh per compliance period. Using the equations in this guidance document, the project sponsor could request 2 NOx allowances based on the energy savings involved with this project.

COMMERCIAL BUILDING ENVELOPE RETROFIT

A retailer completes a variety of energy efficient retrofits at a number of different store locations. It installs lighting upgrades at 170 stores, including installation of compact fluorescent lighting. In addition, it undertakes full building envelope upgrades at 40 stores, such as energy management systems, energy efficient HVAC and windows, and LED exit signs. It downsizes its cooling systems from the original (and oversized) systems by installing smaller pumps and installing low-e glass windows to cut down on the heating and cooling load. In total, the retailer saves 4 million kWh per compliance period. Using the equations in this guidance document, the project sponsor could request 3 NOx allowances based on the energy savings involved with this project.

NEW RESIDENTIAL CONSTRUCTION

A developer of energy-efficient homes constructs several subdivisions of homes. The homes, all of which have the same basic floor plan, meet the national model energy code for insulation and equipment. For 80% of the homes, the developer upgrades the windows, seals and insulates the ducts, seals the homes against infiltration of outside air, improves the water heater efficiency, and installs programmable thermostats. The result is approximately 30% savings from those of a typical house meeting the model energy code. For the remaining 20% of homes constructed, in addition to the upgrades already mentioned, the developer decides to strive for an even higher level of efficiency. In these homes, the developer installs a high-efficiency gas furnace and water heater, energy efficient lighting (T8s, compact fluorescent lights, photocell/motion detectors on outside lighting) and energy efficient appliances (including Energy Star refrigerators, horizontal-axis washers, and smart-logic dishwashers). The developer builds 4500 homes, and saves 1.4 million kWh of energy per summer ozone season relative to standard efficiency. The developer, as project sponsor, could be awarded 1 NOx allowance based on the energy savings involved.

INDUSTRIAL PLANT RETROFIT

An industrial plant, which employs 400 people, manufactures \$18 million worth of linear position and pressure transducers each year. Electricity powers the majority of the process-related equipment, air conditioning, and lighting. Natural gas is used for space heating and hot water, about 10% of total energy use. The plant owner implements energy efficiency retrofits that include replacing five chillers with a single unit sized to match the system load, replacing lamps and ballasts, installing reflectors in fluorescent fixtures, reducing the lighting operating hours for unoccupied areas. In addition, the company used a time clock controller to reduce the operating hours of hot water circulation pumps, insulating hot water lines, replacing 14 motors with high-efficiency replacements, and repairing leaks in the compressed air line. In total, the plant saves approximately 2.4 million kWh per year. The project sponsor could request 2 NOx allowances based on the energy savings from this project.

2 Creating an Energy Efficiency and Renewable Energy Set-aside in the NOx Budget Trading Program: Designing the Administrative and Quantitative Elements, Volume 2, U.S. EPA, EPA-430-K-00-004, April 2000, pages 12 and 13.

Other examples include:

WIND TURBINES

A wind development company installs a small wind farm in Ohio. Each of ten turbines generates 3,500 MWh of electricity during the compliance period. Based on 0.0015 lbs of NOx per kWh, the project displaced fossil fuel electricity production that would have produced 26.25 tons of NOx. The project sponsor could receive 26 NOx allowances from the EE/RE set-aside.

LANDFILL METHANE

A landfill captures methane produced inside the landfill and uses it to fuel two internal combustion engines each powering an 800 kilowatt generator. The engines operate continuously during the compliance period, producing 5,875,200 kilowatt hours of electricity for distribution to the power grid. The project sponsor could request 4 NOx allowances based upon the energy produced by this project.

COMBINED HEAT & POWER SYSTEM

A 60% efficient CHP system is installed with a heat input of 100 mmBtu/hr and NOx emissions of 0.1 lb/mmBtu. The system generates 4.4 megawatts of electricity and 45 mmBtu/hr of steam. During the compliance period, it operates at full capacity for 1000 hours. The project sponsor could request 3 NOx allowances based upon the fossil fuel energy production displaced.

IT Projects

The following are some examples of projects that may be eligible for NOx allowances from the IT set-aside:

- Using fuel cells to replace energy in the home, business or industrial setting to offset electrical energy usage or other NOx producing power sources.
- Using fuel additives for mobile sources (e.g., automobiles, trucks, buses or off-road vehicles that reduce the NOx emissions from these vehicles.
- Using innovative NOx emission control technologies on fossil fuel-fired boilers or turbines producing power for industrial processes or electricity production.

In order to be eligible for allowances, the IT project should:

- reduce NOx emissions from sources in Ohio;
- not be required by Ohio or Federal regulations or permits;
- be in operation in the year for which allowances are reserved;
- reduce NOx emissions during the compliance period;
- be measured and verified in accordance with appropriate methods;
- represent, or be aggregated into, not less than one ton of NOx allowance.

PROJECT SPONSORS

Potentially eligible EE/RE project sponsors could be any individual or organization that uses electricity and can initiate, finance, or carry out projects that reduce or displace electricity generation. Potentially eligible IT project sponsors could be any individual or organization that operates a process emitting NOx and can initiate, finance, or carry out projects that

reduce that NOx emission. EE/RE project sponsors could be end users, aggregators, vendors and might involve:

- commercial and industrial businesses;
- energy service companies;
- home builders;
- home owners associations;
- universities;
- federal, state, and local government agencies;
- utilities;
- faith-based groups;
- environmental groups;
- manufacturers and other industrial energy users; and
- manufacturers leasing or selling high energy efficiency equipment.

IT project sponsors could include the EE/RE project sponsors indicated above as well as electricity producers.

Many projects involve small retrofits or measures producing small energy reductions. Ohio EPA encourages the aggregation of projects that may be too small by themselves to generate the one ton minimum reduction needed to obtain a NOx allowance. For aggregated projects, Ohio EPA assumes the project sponsor has the legal right to the NOx allowances that would be awarded for a successful project. In the case where several participants are collaborating on one project, the project sponsor will have to designate one NOx authorized account representative for the project. Projects with more than one project sponsor will not be approved.

Ohio EPA will not act as a mediator in situations where more than one project sponsor requests NOx allowances for the same project. If a NOx authorized account representative is not in place at the time allowances are to be awarded, those allowances will be forfeited.

APPLICATION PROCESS

Applicants must submit the EE/RE or IT project application by November 15 of the year prior to the year for which allowances can be reserved. Projects are eligible for allowances from the set-asides for a maximum of five years. However, the project sponsor must apply for the allowances each year. Because of the nature of the allocation process, described below, it is possible that a project producing the same NOx reductions each year could receive a different number of NOx allowances in each of those years.

The EE/RE or IT application requires a basic description of the project, how the energy savings will be obtained, a projection of the expected energy savings, and how the energy savings will be measured and verified (“M&V Plan”). Appendix A should be used to submit an application for either the EE/RE or the IT set-aside. Appropriate information and documentation should be included in the application.

Upon receipt of the project application, Ohio EPA and OEE will review the application. The review will focus on the project description, the estimated energy savings or NOx emissions

reductions, the proposed measurement and verification methodology and the projected verification documentation. If needed, Ohio EPA may request more information from the project sponsor. Insufficient project information may result in the proposed project being denied.

Ohio EPA will use a two-step application process.

STEP 1

The project sponsor submits the application for the proposed project. The application will be reviewed to determine the following:

- is the project eligible for NOx allowance awards from the set-asides;
- are proposed energy reductions or NOx emissions reductions reasonably expected if the project is implemented;
- will the proposed M&V Plan adequately verify energy usage or NOx emission reductions.

Ohio EPA will notify project sponsors of approved or denied applications by March 1 of each year. NOx allowances from the appropriate set-aside will be reserved for approved projects.

Project sponsors implement the proposed project.

STEP 2

After the compliance period for which the project is proposed is completed the following occurs:

- the project sponsor submits a project verification report;
- Ohio EPA and OEE evaluate the project verification report to determine the validity of the results;
- Ohio EPA issues the appropriate NOx allowances for the successfully verified project.

ALLOCATION DETERMINATION

The number of NOx allowances available for a EE/RE project depends on how much energy the project saves or displaces, and, for an IT project, the NOx emissions reduction achieved.

Two pieces of information are necessary to calculate the amount of NOx associated with a certain amount of electricity or other energy saved or displaced. First, the amount of electricity or other energy saved or generation displaced by the EE/RE project during the

control period must be quantified. Second, a NOx emissions factor, which is the rate at which NOx is emitted for the type of fuel used to generate the electricity saved or displaced, must be determined.

Only the NOx reductions and electricity savings or displacements that occur during the compliance period are relevant for determining NOx allowances for EE/RE or IT projects. U.S. EPA recommends using a standard NOx emission rate of 0.0015 lbs/kWh. This is based on a typical average system heat rate of 10,000 Btu/kWh and the NOx emissions limit of 0.15 lbs/mmBtu that was used in U.S. EPA's NOx SIP Call. Ohio EPA will use this rate for all projects.

This section includes different equations for various types of projects envisioned for EE/RE set-asides. The equations will be used to convert energy savings, or generation in the case of renewable energy, from the EE/RE project into NOx allowances.

A key piece of information supplied in the project application is the estimated electricity or other energy saved or displaced by the project. The number of NOx allowances reserved for a project and potentially awarded to the project sponsor, depends on this information. The project sponsor should provide detailed information about the estimated energy savings. Use the following formulas to determine the amount of NOx allowances for the different types of projects which are eligible for NOx allowances from the set-asides.

- End-use energy efficiency projects, including demand-side management programs that claim allowances based upon reductions in the consumption of electricity, receive allowances based upon the number of kilowatt hours of electricity saved during a compliance period according to the following formula:

$$\text{Allowances} = (\text{kWh}_s \times 0.0015) / 2000$$

Where:

kWh_s = the number of kilowatt hours of electricity saved during a compliance period by the project.

0.0015 = the default emission rate in pounds of NOx per kilowatt hour

2000 = the conversion factor converting pounds into tons

If the project is a new project (not a retrofit or upgrade), energy savings should be calculated by comparing the energy efficiency of comparable current industry-standard equipment to the equipment used in the project.

- End-use energy efficiency projects, including demand-side management programs that claim allowances based upon reductions in the consumption of energy other than electricity will be awarded allowances according to the following formula:

$$\text{Allowances} = [(E_{t_1}/P_{t_1}) - (E_{t_2}/P_{t_2})] \times P_{t_2} \times N_{Pt_2} \times (N_{Pt_1}/N_{Pt_2}) / 2000$$

Where:

Allowances = the number of allowances awarded to a project sponsor.

Et_1 = energy consumed per control period prior to project implementation.

Pt_1 = units of product produced per control period prior to project implementation.

Et_2 = energy consumed in the most recent control period.

Pt_2 = units of product produced in the most recent control period.

NPt_1 = NOx produced during the consumption of energy, measured in pounds per million Btu prior to project implementation.

NPt_2 = NOx produced during the consumption of energy, measured in pounds per million Btu in the most recent control period.

2000 = the conversion factor converting pounds into tons.

If the project is a new project (not a retrofit or upgrade), Et_1 should be calculated using the energy rates of comparable current industry-standard equipment.

- The following formula should be used to determine NOx allowances for combined heat and power (CHP) systems that are not NOx budget units as defined in OAC rule 3745-14-01(B)(2)(eee). Allowances are determined by comparing the emissions from a conventional system, which consists of a coal fired power plant and an industrial boiler, to the actual emissions from a CHP system. The conventional system is assumed to have standard NOx emission rates of 0.15 lbs/mmBtu for electric generation and 0.17lbs/mmBtu for the boiler. Also, the electric generation efficiency is assumed to be 34% and the boiler efficiency is assumed to be 80%.

$$NOx_{\text{conventional}} = (((0.15 \times 3,412) \times (\text{kWG}/0.34)) + (0.17 \times ((\text{Heat}_{\text{Out}})/0.8)))/1,000,000$$

$$NOx_{\text{CHP}} = (\text{Btu}_{\text{In}}/1,000,000) \times NOx_{\text{Rate}}$$

$$\text{Allow} = (NOx_{\text{conventional}} - NOx_{\text{CHP}})/2000$$

Where:

Allow = the number of allowances awarded to a project sponsor.

kWG = the number of net kilowatt hours of electricity generated during a control period by the project.

Heat_{Out} = the number of Btus of heat or steam effectively used for space, water, or industrial process heat during a control period by the project.

Btu_{In} = the number of Btus of fuel used to produce electricity, heat, or steam during a control period by the project

NO_{xRate} = NO_x emitted in normal system operation by the project (in lbs NO_x/mmBtu).

3,412 = the conversion factor for changing Btu into kWh.

- Renewable energy projects producing zero-emissions, including wind and solar power, and renewable energy projects generating electricity through the capture of methane gas from landfills, water treatment plants, or sewage treatment plants receive allowances based upon the number of kilowatt hours of electricity each project generates during an control period according to the following formula:

$$\text{Allowances} = (\text{kWG} \times 0.0015) / 2000$$

Where:

kWG = the number of kilowatt hours of electricity generated during an control period by the project.

0.0015 = the default emission rate in pounds of NO_x per kilowatt hour

2000 = the conversion factor converting pounds into tons.

Ohio EPA will calculate the number of NO_x allowances requested for each approved project based on the energy savings or NO_x emissions reduced by the project. By March 1 of each year, Ohio EPA will determine the total number of NO_x allowances to be reserved for approved projects. If the total number of NO_x allowances requested for approved projects is less than or equal to the number of NO_x allowances in the designated set-aside, the number of allowances requested will be reserved for each approved project. If more NO_x allowances are requested than exist in the set-aside, allowances will be reserved on a pro-rated basis based on the number of allowances available. Approved projects requesting only one NO_x allowance will not be pro-rated.

After Ohio EPA has received and reviewed a project application, one of the following will occur:

- the application will be approved and Ohio EPA will reserve the number of NO_x allowances requested by the project sponsor;
- the application will be approved with modifications and Ohio EPA will reserve the number of NO_x allowances appropriate to the modification;
- the application will be denied and returned to the project sponsor with the reasons for denying the request.

Reserved NO_x allowances will be deposited into the sponsor's account after the following occur:

- the project has been implemented during a control period;
- the sponsor has submitted verification that the projected electrical usage reduction

or NOx emissions reductions were achieved; and

- the project results have been verified by Ohio EPA and OEE.

GENERAL ACCOUNTS

In Ohio's NOx Budget Trading Program, NOx allowances are held in accounts belonging to the owners of the NOx allowances. These accounts are set up and managed by U.S. EPA and are similar to bank accounts. NOx allowances can be deposited to them or transferred from them.

In order for Ohio EPA to allocate NOx allowances to a project sponsor, a General Account needs to be established with U.S. EPA. An Account Certificate of Representation must be submitted to U.S. EPA along with the application for the General Account. The Account Certificate of Representation establishes a NOx authorized account representative ("NOx AAR") for the General Account. An alternate NOx AAR may also be designated. The U.S. EPA forms required to set up a General Account and specify a NOxAAR can be found at www.epa.gov/airmarkets/forms/#nbp.

Ohio EPA and U.S. EPA will only communicate with the NOx AAR or alternate NOx AAR concerning NOx allowances in the General Account. Only the NOx AAR or alternate NOx AAR can submit a request to U.S. EPA to transfer NOx allowances from the General Account.

The Account Certificate of Representation and the request to establish a General Account should be sent to U.S. EPA after the EE/RE or IT project application has been approved and before the end of the first compliance period in which the project is to be implemented.

PROJECT VERIFICATION REPORT

To claim reserved NOx allowances for approved projects successfully implemented, the project sponsor must submit a project verification report to Ohio EPA. The project verification report must use the procedures specified in the approved project proposal to verify the actual energy efficiency or NOx emissions reductions obtained by implementing the project. The project verification report should also include an official request to Ohio EPA by the NOx AAR to transfer the appropriate NOx allowances to the General Account established for the project sponsor. The project verification report must be signed by the NOx AAR or the alternate NOx AAR and contain the following statement:

"I am authorized to make this submission on behalf of the owners of the NOx budget General Account for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and

information, including the possibility of fine or imprisonment.”

The project verification report will be evaluated to assess the success of the approved project and determine the number of NOx allowances to be awarded for the project. NOx allowances will be awarded on the basis of actual NOx emissions reduction achieved, except that no awards of NOx allowances will be made in excess of the amount reserved for the project. Based on the evaluation of the project verification report, Ohio EPA will request that U.S. EPA transfer NOx allowances to the appropriate General Account. The appropriate NOx AAR will receive a copy of this request. The actual populating of the NOx allowances into General Accounts is done by U.S. EPA. The status of all NOx accounts are available for inspection on-line at www.epa.gov/airmarkets/tracking/index.html#queries.

IMPORTANT DEADLINES

- November 15 – deadline for submitting a project application for an initial EE/RE or IT project, or annual re-application for previously approved projects for the following year’s compliance period. Allocations can be requested for approved projects for a maximum of five control periods.
- March 1 - Ohio EPA will notify project applicants of projects approved and NOx allowances reserved for approved projects commencing on May 1 of that year.
- May 1 to September 30 - compliance period; all energy efficiency increases, renewable energy production or NOx emissions reductions must be made during this period to be eligible to receive NOx allowances from the set-asides.
- October 31 - deadline to submit Project Verification Report for reductions made during the previous compliance period.
- February 15 - NOx allowances for verified projects will be awarded.

MEASUREMENT AND VERIFICATION

In order to document energy savings or NOx emissions reductions and receive NOx allowances, project sponsors must use established measurement and verification procedures. The U.S. Department of Energy, U.S. EPA and others have developed measurement and verification guidance procedures. Some of these are listed in the “Contact and Resource Information” section of this document.

The measurement and verification required will depend on the type of project proposed. Considerations such as the type of project, the complexity of the project and the variability of the energy savings will help determine the appropriate measurement and verification option.

As an example, some of the items that are required by the U.S. Department of Energy in a measurement and verification plan for federal energy projects include the following³:

Project Measurement and Verification Plan Content Components

Category	Content Components
Project description	Project goals and objectives
	Site characteristics
	Descriptions that include how savings will be achieved
Project savings	Estimated savings by energy conservation measure
Scheduling	Equipment installations
Reporting	Raw data format
	Compiled data format
	Reporting interval
Measurement and verification approach	Accuracy requirements
Measure-Specific Measurement and Verification Plan Components	
Category	Content Components
Analysis method	Data requirements
	Stipulated values supporting data
	Savings calculation equations
	Regression and Computer simulation models
Metering and monitoring	Metering protocols
	Calibration protocols
	Metering points
	Sampling
	Metering duration and interval
Baseline determination	Performance factors
	Operating factors
	Existing service quality
	Minimum performance standards
Savings adjustments	Party responsible for changes

3 U.S. Department of Energy's M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2, pages 42 and 43.

The following list comes from the International Performance Measurement and Verification Protocol also developed by the Department of Energy⁴:

- A description of the energy conservation measure and its intended result.
- Identification of the boundaries of the savings determination. The boundaries may be as narrow as the flow of energy through a pipe or wire, or as broad as the total energy use of one or many buildings. The nature of any energy affects beyond the boundaries should be described and their possible impacts estimated.
- Documentation of the facility's base-year conditions and resultant base-year energy data. In performance contracts, base-year energy use and base-year conditions may be defined by either the owner or the ESCO, providing the other party is given adequate opportunity to verify it. A preliminary energy audit used for establishing the objectives of a savings program or terms of an energy performance contract is typically not adequate for planning measurement and verification activities. Usually a more comprehensive audit is required to gather the base-year information relevant to measurement and verification:
 - T Energy consumption and demand profiles.
 - T Occupancy type, density and periods.
 - T Space conditions or plant throughput for each operating period and season. (For example in a building this would include light level and color, space temperature, humidity and ventilation. An assessment of thermal comfort and/or indoor air quality (IAQ) may also prove useful in cases where the new system does not perform as well as the old inefficient system).
 - T Equipment inventory: nameplate data, location, condition. Photographs or videotapes are effective ways to record equipment condition.
 - T Equipment operating practices (schedules and setpoint, actual temperatures/pressures).
 - T Significant equipment problems or outages.

4 U.S. Department of Energy, International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy Savings, Volume 1, October 2000, p. 31.

CONTACT

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RESOURCE INFORMATION

U.S. EPA Clean Air Markets Division
<http://www.epa.gov/airmarkets/>

International Performance Measurement and Verification Protocol,
U.S. Department of Energy's M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2.

Chapter 35 of "U.S. Department of Energy's M&V Guidelines: Measurement and Verification for Federal Energy Projects," Version 2.2. <http://ateam.lbl.gov/mv/>

National Renewable Energy Laboratory
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
www.nrel.gov

Lawrence Berkeley National Laboratory
Measurement and Verification Documents
<http://ateam.lbl.gov/mv/>

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
www.ashrae.org

International Performance Measurement and Verification Protocol, Inc.
www.ipmvp.org

U.S. Department of Energy
Energy Efficiency and Renewable Energy
www.eere.energy.gov

ENERGY STAR, a program operated jointly by U.S. EPA and U.S. DOE
www.energystar.gov

University of Toledo Energy Efficiency and Pollution Prevention Tools
<http://p2tools.utoledo.edu>

University of Dayton Industrial Assessment Center
www.engr.udayton.edu/faculty/jkissock/http/IAC/default.htm

Minimizing Energy Consumption, Recommendation by the Whole Building Design Guide Sustainable Committee, National Association of Building Sciences
<http://www.wbdg.org/design/index.php?cn=3.8.2&cx=0>

**Appendix A
Application for NOx allowances**

**Energy Efficiency/Renewable Energy (EE/RE) Projects
Innovative Technology (IT) Projects**

Project Type: 9 EE/RE 9 IT 9 Undetermined		9 Initial Application		9 Re-application	
Project Sponsor Name:					
Address:					
City:		State:		ZIP code:	
Contact Person:					
Telephone:			FAX :		
E-mail:					
Project Description					
Project Start Date:			Compliance period for which allowances requested:		
Project Location:					
Address:					
City:		State:		ZIP code:	
Project Contact Person: (if different from Sponsor)					
Telephone:			FAX:		
E-mail:					
Project Participants (if aggregated)					

APPLICATION STATUS (to be completed by Ohio EPA)					
Date Application Received:			Reviewed By:		
Date Accepted:			Date Denied:		
Date Project Sponsor Notified:			Reason Denied:		
Allowances Reserved :					
PROJECT VERIFICATION					
Date Verification Received:			Audit Conducted		9 Yes 9 No
			Date Conducted:		
Performance Verified:			Allowances Awarded:		
Performance Not verified:			Date Sponsor and U.S. EPA notified :		