

## **Regulation No. 1144: Control of *Stationary Generator* Emissions**

### **1.0 General.**

**1.1 Purpose.** The purpose of this regulation is to ensure that emissions of nitrogen oxides (NO<sub>x</sub>), nonmethane hydrocarbons (NMHC), particulate matter (PM), sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), and carbon dioxide (CO<sub>2</sub>) from *stationary generators* in the State of Delaware do not adversely impact public health, safety, and welfare.

### **1.2 Applicability.**

**1.2.1** This regulation applies to *new* and *existing*, *emergency* and *distributed*, *stationary generators*, except for:

**1.2.1.1** a *generator* covered by a permit which imposes a NO<sub>x</sub> emission limitation established to meet Best Available Control Technology (BACT) or Lowest Achievable Emission Rate (LAER);

**1.2.1.2** an *emergency generator* located on a residential property where no commercial or industrial activity is carried on, and operated solely to provide *emergency* electric power only to the domestic residence and structures on that property housing no more than three (3) families; or

**1.2.1.3** a *generator* which is mobile.

**1.2.2** The requirements of this regulation are in addition to all other applicable State and Federal requirements.

### **1.3 Initial Notification.**

**1.3.1** The *owner* of a *stationary generator* shall submit to the *Department* the following information:

**1.3.1.1** the *generator owner's* name and telephone number;

**1.3.1.2** the physical address where the *generator* is installed, or will be installed;

**1.3.1.3** a description of the *generator* including the make, model number, and serial number;

**1.3.1.4** the year of manufacture for the *generator*;

**1.3.1.5** the *standby power rating* or the *prime power rating* for the *generator*, or both power ratings if both are known;

**1.3.2** The owner of a *stationary generator* shall submit to the *Department* a letter stating whether the *generator* is to be classified as an *emergency generator* or a *distributed generator*.

#### **1.4 Dates.**

**1.4.1** The *owner* of a *new stationary generator* shall submit the information required in Section 1.3 and comply with the requirements of this regulation by the date of installation.

**1.4.2** The *owner* of an *existing stationary generator* shall submit the information required in Section 1.3 no later than [insert date 3 months after the effective date].

**1.4.2.1** If the *generator* is to be classified as an *emergency generator*, the *owner* shall comply with the requirements of this regulation by [insert date 3 months after the effective date].

**1.4.2.2** If the *generator* is to be classified as a *distributed generator*, and is subject to 3.2.1.1, the *owner* shall comply with the requirements of this regulation by [insert date 12 months after the effective date].

**1.4.2.3** If the *generator* is to be classified as a *distributed generator*, and is subject to 3.2.1.2, the *owner* shall comply with the requirements of this regulation by [insert date 3 months after the effective date].

**1.4.3** If a *generator* is to be reclassified from an *emergency generator* to a *distributed generator*, or vice versa, the *owner* of a *stationary generator* shall submit to the *Department* a letter stating whether the *generator* is to be reclassified as an *emergency generator* or a *distributed generator*, and the *owner* shall comply with the requirements of this regulation before this reclassification.

**2.0 Definitions.** The following words and terms, when used in this regulation, shall have the following meanings:

“*Biodiesel*” means a domestic, renewable fuel for diesel engines derived from natural oils like soybean oil, and which meets the specifications of ASTM D 6751-03a, “Standard Specification for *Biodiesel* Fuel (B100) Blend Stock for Distillate Fuels,” ASTM International, hereby incorporated by reference.

“*Biodiesel Blend*” means a blend of *biodiesel* and *diesel fuel*, designated BXX, where XX represents the volume percentage of *biodiesel* fuel in the blend. Pure *biodiesel* is designated as B100.

“*Combined heat and power*” and “*CHP*” means a *generator* that sequentially produces both electric power and thermal energy from a single source, where the thermal energy is wholly or partly used for either industrial processes or other heating or cooling purposes.

“*Combustion turbine*” means an internal combustion engine in which expanding gases from the combustion chamber drive the blades of a turbine to generate mechanical energy in the form of a rotating shaft.

“*Commercial poultry producing premises*” means any location in the State of Delaware where live, commercial poultry (i.e., poultry wholly owned by a corporate enterprise that controls the entire growing cycle of the birds, from the breeder flock to the processing plant) is kept.

“*Department*” means Department of Natural Resources and Environmental Control as defined in Title 29, Delaware Code, Chapter 80, as amended.

“*Design system efficiency*” means for *CHP*, the sum of the full load design thermal output and electric output divided by the heat input.

“*Diesel fuel*” means any fuel sold in any state or Territory of the United States and suitable for use in diesel motor vehicles, diesel motor vehicle engines, or diesel nonroad engines, and which is commonly or commercially known or sold as *diesel fuel*.

“*Digester gas*” means gas generated by the anaerobic digestion of organic wastes such as livestock manure or food processing waste.

“*Distributed generator*” means a *stationary generator* that may be used during an *emergency*, during *testing*, and for *maintenance* purposes, as well as for any other purpose at times other than during an emergency.

“*Emergency*” means:

- a. an electric power outage due to: a failure of the electrical grid; on-site disaster; local equipment failure; or public service emergencies such as flood, fire, natural disaster, or severe weather conditions (*e.g.*, hurricane, tornado, blizzard, etc.); or
- b. when there is a deviation of voltage or frequency from the electrical provider to the premises of three percent (3%) or greater above, or five percent (5%) or greater below, standard voltage or frequency.

“*Emergency generator*” means a *stationary generator* used only during an *emergency*, during *testing*, and for *maintenance* purposes. An *emergency generator* may not be operated in conjunction with a voluntary demand-reduction program or any other interruptible power supply arrangement with a utility, other market participant, or system operator (e.g., Conectiv, Delaware Electric Cooperative, PJM, etc.).

“*Existing*” means a *generator* which is not *new*. An *existing generator* shall not be considered *new* if it is relocated and reinstalled on the same property, nor if it is reclassified from an *emergency generator* to a *distributed generator* or vice versa.

“*Gaseous fuel*” means a fuel which is neither solid nor liquid, and includes but is not limited to natural gas, propane, *landfill gas*, *waste gas*, and anaerobic *digester gas*.

“*Generator*” means an internal combustion engine, except for a combustion turbine, and associated equipment that converts primary fuel (including fossil fuels and renewable fuels) into electricity, or electricity and thermal energy. The use of the term “*generator*” in this regulation shall refer to any and all generators subject to the requirements of this regulation unless it is otherwise specified the type of generator being referred to.

“*Landfill gas*” means gas generated by the decomposition of organic waste deposited in a landfill (including municipal solid waste landfills) or derived from the evolution of organic compounds in the waste.

“*Maintenance*” means the recurrent, periodic, or scheduled work necessary to repair, prevent damage, or sustain *existing* components of a *generator* or any ancillary equipment associated with its use.

“*Mobile*” means a *generator* powered by an internal combustion engine that is self-propelled or serves a dual purpose by both propelling itself and performing another function (such as converting primary fuel into electricity, or electricity and thermal energy); is intended to be propelled while performing its function; or that, by itself or in or on a piece of equipment, is portable or transportable, meaning designed to be and capable of being carried or moved from one location to another (i.e., a *generator* which is not *stationary*).

“*New*” means a *generator* which is installed or *repowered* on or after [insert effective date].

“*Owner*” means the *owner* of, or person responsible for, a *generator*.

“*Power to heat ratio*” means for a *CHP* unit, the design electrical output divided by the design recovered thermal output in consistent units.

“*Prime power rating*” means the maximum amount of power generation a *generator* is capable of supplying during continuous duty, as specified by the manufacturer.

“*Repower*” means the replacement of the internal combustion engine of a *generator* with another internal combustion engine.

“*Standby power rating*” means the amount of power generation a *generator* is capable of supplying during a power outage for the duration of the interruption, as specified by the manufacturer.

“*Stationary*” means a *generator* powered by an internal combustion engine which is not propelled or intended to be propelled while performing its function, that is used either in a fixed application, or in a portable (or transportable) application in which the engine will stay at a single location on a property (which includes the land, the buildings, and all improvements thereon) for more than 12 consecutive months (*i.e.*, a *generator* which is not *mobile*). Any *generator* which is moved from one location to another in a deliberate attempt to circumvent the residence time requirement of 12 consecutive months shall be deemed *stationary*.

“*Supplier*” means a person or firm that manufactures, assembles, or otherwise supplies *generators*.

“*Testing*” means determining the capability of a *generator* to meet the specified requirements of this regulation or determining if the *generator* and any ancillary equipment associated with its use are functioning correctly.

“*US EPA*” means the United States Environmental Protection Agency.

“*Waste gas*” means manufacturing or mining byproduct gases that are not used and are otherwise flared or incinerated. A manufacturing or mining byproduct is a material that is not one of the primary products of a particular manufacturing or mining operation, is a secondary and incidental product of the particular operation, and would not be solely and separately manufactured or mined by the particular manufacturing or mining operation. The term does not include an intermediate manufacturing or mining product which results from one of the steps in a manufacturing or mining process and is typically processed through the next step of the process within a short time.

**3.0 Emissions.** A *generator* shall not exceed the following standards (in pounds per megawatt-hour (lbs/MWh) of electricity output) under full load design conditions or at the load conditions specified by the applicable *testing* methods.

**3.1** *Emergency generator.*

**3.1.1** *Existing emergency generator.* The *owner* or operator of an *existing emergency generator* shall operate the *generator* in conformance with the *generator* manufacturer’s instructions, such as following *maintenance* and operating requirements to help minimize emissions.

**3.1.2** *New emergency generator.* A new emergency generator shall meet the applicable emissions standards set by the US EPA for non-road engines (40 CFR 89, 90, 91, 92, 94, 1039, or 1048 July 1, 2004 Edition).

**3.2** *Distributed generator.* The following standards do not apply to *distributed generators* while operating to provide *emergency* electric power during an *emergency*.

**3.2.1** *Existing distributed generator.*

**3.2.1.1** Except as provided for in Section 3.2.1.2 of this regulation, an *existing distributed generator* shall meet the following emission standards:

<b>Pollutant</b>	<b>Emission Standard In lbs/MWh</b>
Nitrogen Oxides	4.0
Nonmethane Hydrocarbons	1.9
Particulate Matter (liquid-fueled reciprocating engines only)	0.7
Carbon Monoxide	10.0
Carbon Dioxide	1,900

**3.2.1.2** As an alternative to the *owner* of an *existing distributed generator* installed on *commercial poultry producing premises*, to generate electricity to those premises, the *generator* shall be exempt from the emission standards of 3.2.1.1 if one of the following requirements are met:

**3.2.1.2.1** the *owner* of such a *generator* is participating or is signed up to participate in a *Department* approved, emission control strategy cost-share program for *generators* offered by either the Kent Conservation District or the Sussex Conservation District; or

**3.2.1.2.2** the *generator* is *gaseous fueled*.

**3.2.2** *New distributed generator.*

**3.2.2.1** Except as provided for in Section 3.2.2.2 of this regulation, a *new distributed generator* shall meet the following emission standards:

Pollutant	Emission Standards in lbs/MWh		
	Installed On or After [Effective Date]	Installed On or After January 1, 2008	Installed On or After January 1, 2012
Nitrogen Oxides	2.2	1.0	0.6
Nonmethane Hydrocarbons	0.5	0.5	0.3
Particulate Matter (liquid-fueled reciprocating engines only)	0.7	0.7	0.07
Carbon Monoxide	10.0	10.0	2.0
Carbon Dioxide	1,900	1,900	1,650

**3.2.2.2** A new distributed generator that uses waste, landfill, or digester gases containing less than 1.5 grains hydrogen sulfide per 100 dry standard cubic feet or 30 grains total sulfur compounds per 100 dry standard cubic feet, as fuel, shall be exempt from the emission standards of 3.2.2.1 and shall meet the following emission standards:

Pollutant	Emission Standards in lbs/MWh
	Installed on or After [Effective Date]
Nitrogen Oxides	2.2
Nonmethane Hydrocarbons	0.7
Carbon Monoxide	10.0
Carbon Dioxide	1,900

**3.3** By [insert date 4 years after the effective date] the Department shall complete a review of the state of, and expected changes in, technology and emissions rates; as well as a review of generators operating within the State of Delaware, and their emissions. This review shall be used by the Department in considering whether these standards in Sections 3.1 or 3.2 should be amended, or new standards adopted, to ensure the continued improvement of the ambient air quality of the State of Delaware. Any amendment to these standards shall be in accordance with the requirements of 7 Del. Code, Chapter 60 and 29 Del. Code, Chapter 101.

#### 4.0 Operating Requirements

- 4.1** An emergency generator may operate for an unlimited amount of hours during an emergency.
- 4.2** An emergency generator may operate for an unlimited amount of hours during testing or for maintenance purposes, pursuant to the definition of an emergency generator, except as restricted by Section 4.4.

- 4.3 A *distributed generator* may operate at any time, except as restricted by Section 4.4.
- 4.4 No *emergency* or *distributed generator* shall be used during *testing* or for *maintenance* purposes before 5 p.m. on a day which has been declared by the *Department* as an “Ozone Action Day,” an “Ozone Advisory Day,” or an air quality alert day.
- 4.5 Despite Section 4.4, an *emergency generator* may be tested on any day that such *testing* is required to meet National Fire Protection Association (NFPA) or Joint Commission on Accreditation of Healthcare Organizations (JCAHO) standards.

## 5.0 Fuel Requirements.

- 5.1 *Diesel fuel* or a *biodiesel blend*, combusted in a *generator*, shall have a sulfur content equal to or less than 0.05% by weight.
- 5.2 **Gaseous Fuels.** *Gaseous fuels* combusted in a *generator* shall contain no more than ten grains total sulfur per 100 dry standard cubic feet, except for *waste, landfill, or digester gases* which shall contain less than 1.5 grains hydrogen sulfide per 100 dry standard cubic feet or 30 grains total sulfur compounds per 100 dry standard cubic feet.

## 6.0 Record Keeping and Reporting.

- 6.1 **Record-Keeping Requirements.** On the property where the *generator* is installed, or at such other place that the *Department* approves in writing, the *owner* of a *generator* shall maintain the following records:
  - 6.1.1 An *owner* shall monitor the monthly and yearly amounts of fuel, or fuels, consumed by their *generators*. Yearly fuel consumption shall be calculated and recorded by the *owner* each calendar month by recording (for each fuel) the current calendar month’s fuel consumption and adding it to those of the previous eleven consecutive months.
  - 6.1.2 A non-resettable hour metering device shall be used by an *owner* to continuously monitor the monthly and yearly operating hours for each of their *generators*. Yearly operating hours shall be calculated and recorded by the *owner* each calendar month by recording the current calendar month’s operating hours and adding them to those of the previous eleven consecutive months.
  - 6.1.3 Monthly and yearly operating hours for an *emergency generator*. Yearly operating hours during which *testing* or *maintenance* occurred shall be calculated and recorded by the *owner* each calendar month by recording the current calendar month’s *testing* or *maintenance* hours and adding

them to those of the previous eleven consecutive months. A brief description of each *testing* or *maintenance* performed shall also be recorded.

**6.1.4** Except as provided for in 6.1.5, for each shipment of liquid fuel (other than liquefied petroleum gas), received for use in a *generator*, a shipping receipt and certification shall be obtained from the fuel distributor which identifies:

**6.1.4.1** the type of fuel delivered; and

**6.1.4.2** the percentage of sulfur in the fuel (by weight dry basis), and the method used to determine the sulfur content.

**6.1.5** As an alternative to 6.1.4, the *owner* may have the fuel in the *generator's* fuel tank certified by a third party laboratory, after each shipment of liquid fuel, and before subsequent operation of the *generator*. This certification shall identify:

**6.1.5.1** the type of fuel delivered; and

**6.1.5.2** the percentage of sulfur in the fuel (by weight dry basis), and the method used to determine the sulfur content.

**6.2 Availability of Records.** The *owner* shall maintain each record required by Section 6.1 for a minimum of five years after the date the record is made. The *owner* may retain hard copies (*e.g.*, paper) or electronic copies (*e.g.*, compact discs, computer disks, magnetic tape, etc.) of the records. An *owner* shall promptly provide the original or a copy of a record or records to the *Department* upon request.

## **7.0 Emissions Certification, Compliance, and Enforcement.**

**7.1 Emissions Certification of New Distributed Generators by a Supplier.** A *supplier* may seek to certify that its *generators*, which are meant to be installed as *new distributed generators*, meet the provisions of this regulation.

**7.1.1 Certification Process.** Emissions of nitrogen oxides, nonmethane hydrocarbons, particulate matter, carbon monoxide, and carbon dioxide from the *generator* shall be certified in pounds of emissions per megawatt hour (lb/MWh) at International Organization for Standardization (ISO) conditions or at the load conditions specified by the applicable *testing* methods in Section 7.5.1. If the design of a certified *generator* is modified, the *generator* will need to be re-certified. Certification means that a *generator* meets the required emissions standards of this regulation and can be installed, as supplied, for use as a *distributed generator*. With

respect to nitrogen oxides, nonmethane hydrocarbons, carbon monoxide, and carbon dioxide, test results from EPA Reference Methods, California Air Resources Board methods, or equivalent *testing* may be used to verify this certification. When *testing* the output of particulate matter from liquid-fuel reciprocating engines, ISO Method 8178 shall be used. Test results shall be provided upon request to the *Department*. A statement attesting to certification shall be displayed on the nameplate of the unit or on a label attached to the unit with the following text:

This *generator* has met the standards defined by the State of Delaware's Regulation No. 1144 and is certified as meeting applicable emission levels when it is maintained and operated in accordance with the *supplier's* instructions.

- 7.1.2 Responsibility of Supplier.** Certification will apply to a specific make and model of *generator*. For a make and model of a *generator* to be certified, the *supplier* shall certify that the *generator* is capable of meeting the requirements of this regulation for the lesser of 3,000 hours of operation or five years.
- 7.2 Emissions Certification of New Emergency Generators by a Supplier.** An engine that has been certified to meet the currently applicable *US EPA* non-road emissions standards shall be deemed to be certified for use in *new emergency generators*.
- 7.3 Emissions Verification by an Owner.** An *owner* shall verify that a *generator* complies with the emission requirements of Section 3.0 by submitting the following data to the *Department* for review:
- 7.3.1** the type, or a description, of any emission control equipment used; and
- 7.3.2** emissions test data for the *generator* (such as a manufacturer's technical data sheet), any supporting documentation for any emission control equipment used, any supporting calculations, any quality control or assurance information, and any other information needed to demonstrate compliance with the requirements.
- 7.4 Reverification.** To ensure continuing compliance with the emissions limitations, the *owner* or operator shall verify a *distributed generator's* compliance with the emission standards every five years. This verification may be accomplished by following a *maintenance* schedule that the manufacturer certifies will ensure continued compliance with the required standards, by third party *testing* of the *distributed generator* using appropriate test methods to demonstrate that the *distributed generator* still meets the required emission standards, or by some other means as proven to the *Department*.

## 7.5 *Testing.*

**7.5.1 Emissions.** Compliance with this regulation shall be demonstrated through *testing* using the applicable EPA Reference Methods, California Air Resources Board methods, or equivalent test methods approved by the *Department* if:

**7.5.1.1** a *supplier* is seeking to certify that one of its *generators* meets the provisions of this regulation, pursuant to Section 7.1;

**7.5.1.2** an *owner* owns a *generator* that is not certified or verified under the terms of Section 3.1.2, Section 7.1, Section 7.2, or Section 7.3; or

**7.5.1.3** an *owner* of a *generator* is seeking to reverify the *generator* via third party *testing* pursuant to Section 7.4.

**7.5.2 Sulfur Content.** Sulfur limits pursuant to Section 5.1 shall be determined using the applicable sampling and *testing* methodologies set forth in 40 CFR 80.580 (July 1, 2004).

**7.6 Duty to Comply.** An *owner* shall comply with the requirements of this regulation. Neither certification nor compliance with this regulation relieves *owners* from compliance with any other applicable state and federal regulations or permitting requirements.

**7.7 Enforceability.** This regulation is enforceable by the *Department* as provided by law.

## 8.0 **Credit for Concurrent Emissions Reductions.**

**8.1 Flared Fuels.** If a *generator* uses fuel that would otherwise be flared (*i.e.*, not used for generation or other energy related purpose), the emissions that were or would have been produced through the flaring can be deducted from the actual emissions of the *generator*, for the purposes of calculating compliance with the requirements of this regulation. If the actual emissions from flaring can be documented, they may be used as the basis for calculating the credit, subject to the approval of the *Department*. If the actual emissions from flaring cannot be documented, then the following default values shall be used:

<b>Emissions</b>	<b>Waste, Landfill, Digester Gases</b>
Nitrogen Oxides	0.1 lbs/MMBtu
Particulate Matter	N/A
Carbon Monoxide	0.7 lb/MMBtu
Carbon Dioxide	117 lb/MMBtu

## 8.2 Combined Heat and Power.

**8.2.1** *CHP* installations shall meet the following requirements to be eligible for emissions credits related to thermal output:

**8.2.1.1** At least 20% of the fuel's total recovered energy shall be thermal and at least 13% shall be electric. This corresponds to an allowed power-to-heat ratio range of between 4.0 and 0.15.

**8.2.1.2** The *design system efficiency* shall be at least 55%.

**8.2.2** A *CHP* system that meets the requirements of 8.2.1 may receive a compliance credit against its actual emissions based on the emissions that would have been created by a conventional separate system used to generate the same thermal output. The credit shall be subtracted from the actual *generator* emissions for purposes of calculating compliance with the limits in Sections 3.1 or 3.2. The credit will be calculated according to the following assumptions and procedures:

**8.2.2.1** The emission rates for *CHP* facilities that replace *existing* thermal systems (*e.g.*, boiler) for which historic emission rates can be documented shall be the historic emission rates in lbs/MMBtu, but not more than the emission rates for *new* facilities that displace a thermal system, which are:

Emissions	Maximum Rate
Nitrogen Oxides	0.2 lbs/MMBtu
Particulate Matter	N/A
Carbon Monoxide	0.08 lbs/MMBtu
Carbon Dioxide	117 lbs/MMBtu

**8.2.2.2** The emissions rate of the thermal system in lbs/MMBtu will be converted to an output-based rate by dividing by the thermal system efficiency. For *new* systems the efficiency of the avoided thermal system will be assumed to be 80% for boilers or the design efficiency of other process heat systems. If the design efficiency of the other process heat system cannot be documented, an efficiency of 80% will be assumed. For retrofit systems, the historic efficiency of the displaced thermal system can be used if that efficiency can be documented and if the displaced thermal system is either enforceably shut down and replaced by the *CHP* system, or if its operation is measurably and enforceably reduced by the operation of the *CHP* system.

**8.2.2.3** The emissions per MMBtu of thermal energy output will be converted to emissions per MWh of thermal energy by multiplying by 3.413 MMBtu/MWh<sub>thermal</sub>.

**8.2.2.4** The emissions credits in lbs/MWh<sub>thermal</sub>, as calculated in 8.2.2.3, will be converted to emissions in lbs/MWh<sub>emissions</sub> by dividing by the *CHP* system power-to-heat ratio.

**8.2.2.5** The credit, as calculated in 8.2.2.4, will be subtracted from the actual emission rate of the *CHP* unit to produce the emission rate used for compliance purposes.

**8.2.2.6** The mathematical calculations set out in subsections 8.2.2.1 through 8.2.2.4 above are expressed in the following formula:

$$\text{Credit lbs/MWh}_{\text{emissions}} = [(\text{boiler limit lbs/MMBtu})/(\text{boiler efficiency})] * [3.413/(\text{power to heat ratio})]$$

**8.3 Non-Emitting Resources.** When electricity generation that does not produce any of the emissions regulated herein is installed and operated simultaneously at the facility where the *generator* is installed and operated, then the electricity savings supplied by the non-emitting electricity source shall be added to the electricity supplied by the *generator* for the purposes of calculating compliance with the requirements of this regulation, subject to the approval of the *Department* and in accordance with the following formula for determining such savings:

$$\text{Rate}_{\text{EF}} = (\text{Rate}_{\text{A}}) * [(\text{Size}_{\text{A}})/(\text{Size}_{\text{A}} + \text{Size}_{\text{NER}})]$$

$\text{Rate}_{\text{EF}}$  = effective emission rate of *generator*, accounting for non-emitting resource(s) (lb/MWh)

$\text{Rate}_{\text{A}}$  = actual emission rate of *generator* alone (lb/MWh)

$\text{Size}_{\text{A}}$  = actual *prime power rating* of *generator* (MW)

$\text{Size}_{\text{NER}}$  = total generating capacity of non-emitting resource(s) (MW)