[This letter was submitted by ACEEE on 1 May 2003. For further information or an online link to the letter, please visit: http://www.aceee.org/chp/policy.htm]

May 1, 2003

John Barnes, P.E.
NYSDEC
Division of Air Resources
625 Broadway
Albany, NY 12233-3251

Dear Mr. Barnes:

The undersigned organizations, including the American Council for an Energy-Efficient Economy, Capstone Turbine Corporation, Coast Intelligen Inc., Hess Microgen, Invensys, RealEnergy, and TurboSteam Corporation encourage the adoption of clean and efficient distributed generation technologies. We offer a unique perspective that blends engineering, business, and environmental expertise. We hold the position that clean and efficient distributed generation (DG) can be beneficial to both the electricity customer and electricity supplier, while reducing overall air emissions.

The efforts made by the New York State Department of Environmental Conservation (NYSDEC) to improve the air quality in the state of New York are admirable. We especially commend the NYSDEC's choice to publish the new rules on an output-basis. Output-based standards are important in encouraging adoption of clean and efficient distributed generation technologies. We look forward to working with the NYSDEC to take leadership in this area. However, we feel that certain modifications to the proposed emissions standards as written are needed to improve the air quality in the state and increase the market opportunities for clean and efficient distributed generation. There are three issues that need additional consideration for the development of this standard:

1. Emission limits
2. CHP provisions
3. Diesel-fired units

The issues laid forth in the following paragraphs should not be considered only as individual suggestions, but as a whole.

Emission Limits
The rule, as currently drafted allows natural gas units to emit no more than 4.4 lb/MWh of NO_x for natural gas engines and oil-fired turbines. Likewise, a limit of 2.2 lb/MWh NO_x for gas turbines and 1.3 lb/MWh NO_x for microturbines was suggested. The NYSDEC has established these limits to encourage the use and installation distributed generation technologies other than

diesel-fired engines. We believe that these standards are overly lax and would allow the installation of DG units that are not environmentally optimal for their application.

We propose that the NYSDEC consider using state-of-the-art peaking units as the comparison technology for distributed generation systems. Peak shaving is the one of the current major applications of distributed generation technologies, and should be the basis for comparison rather than emergency diesel generators or base-load state-of-the-art combined-cycle gas turbine systems. Some on-site peaking generators run their units periodically during periods of high electric system demand to reduce their peak costs, avoid reliability and power quality problems, and to generate peak electricity for sale back to the grid. In attainment areas, the operation of load shaving units can help improve the overall reliability of the grid during peak times. Advanced simple cycle gas turbines can achieve NO_x emission rates of below 0.5 lb/MWh, and are considered the most advanced technology for electricity peak shaving. Even lower rates can be achieved if these units are continuously operated in combined heat and power mode. Conversely, uncontrolled emergency backup diesel generators can emit more than 20 lb/MWh of $NO_{x,}$ while selective catalytic reduction (SCR) controlled diesel units can achieve under 5 lb/MWh of NO_x We believe that a fair emissions limit for DG technologies should lie somewhere between these two extremes. The rule should encourage the adoption of DG technologies that while not necessarily at the forefront of technology are at least above average.

Based on research by our colleagues at Energy and Environmental Analysis Inc., we suggest the following emissions limits for new non-diesel fired generators:

Technology	NO_x Emissions Limit (lb/MWh)	CO Emissions Limit (lb/MWh)
Non-Diesel DG	2.2	5.0

Existing generators should be required to meet this standard by 2008.

CHP Systems

In addition to setting DG emissions limits we encourage the NYSDEC to support the adoption of CHP provisions in the rule. In many industrial and commercial applications process heat is just as valuable as useable electricity. There have been many debates over the value of recovered heat in a CHP system. While it may be difficult to imagine process steam or heated water output as being of the same value as electricity, one must consider how process heat is obtained in a separate heat and power arrangement. In typical industrial settings, boilers fueled by natural gas, fuel oil, or coal are required to provide steam and hot water needs. The combustion of a fuel to produce this heat has its own set of thermal losses and emissions. These losses are in addition to the losses and emissions inherent to grid-supplied electricity that must be purchased from the local utility. The value of heat must be considered in comparison to how it is obtained in a standard situation. While many regulators and energy experts consider CHP to be primarily an electricity-generating technology, it is important to understand that industrial and commercial operators frequently think of CHP as a heat-generating technology with the added benefit of on-site power production. Therefore, while thermal energy may be considered to be lower quality (based on its difficulty in being converted to other forms of energy) than electricity, it is nonetheless highly valued in both industrial and commercial settings.

We recommend calculating a CHP unit's compliance with electric emissions rates by subtracting the emissions that would have occurred at a stand-alone boiler. We also recommend that at least 20% of a system's output should be thermal and at least 20% electrical to ensure that they are proper CHP units (except in the case of systems that include technologies which generate electricity or mechanical power using back-pressure steam turbines in place of existing pressure-reducing valves or which make use of waste heat from industrial processes). This methodology was used in the Regulatory Assistance Project's model regulations for the output of specified air emissions from smaller-scale electric generation resources. We offer the following methodology as an example for calculating the emissions rates of a CHP system:

> When calculating compliance of an individual CHP unit with electric output-based emissions standards, the emissions from the unit should be discounted by the avoided emissions that a conventional system would have otherwise emitted had it provided the same thermal output. For example, a 35 megawatt electric (MW_e) CHP system with a power-to-heat ratio of 0.7 produces 50 megawatt thermal (MW_t). For this system, we assume that the CHP unit displaces an industrial, commercial, or residential boiler with an efficiency of 80%. Using this assumption and a sample emissions standard for boilers, we assume that the displaced boiler would emit 0.050 lbs NO_x/MMBtu on an input basis, equivalent to 0.21325 lbs NO_x/MWh_t on an output basis. Based on a power-to-heat ratio of 0.7, the emission credit on an electric basis would be 0.3046 lbs NO_x/MWh_e. In other words, a CHP unit could emit 2.5 lbs NO_x/MWh_e and comply with with a 2.2 lbs/MWh emissions rate (since 2.5 lbs NO_x/MWh_e - 0.3046 lbs/MWh_e = 2.1954 lbs/MWh_e). An example of this calculation is attached.

While we recommend the calculation of CHP electric emissions rates based on the value of displaced boiler emissions, we recognize that there may be certain situations for which technologies are eligible for electric offset credits. Any device that generates electric power by recovering the energy from a pressure drop in any gas unless the device also includes a condenser, or any devise that recovers energy from waste heat to generate electricity may be eligible for this type of credit.

Diesel-Fired Units and Emergency Backup

Under 6 NYCRR Part 201 Subpart 3, emergency generators operating fewer than 500 hours per year are exempt from permitting. Centrally dispatched generators operating fewer than 200 hours per year are likewise exempt. Most industrial facilities, as well as many commercial and institutional buildings rely on backup generators to maintain their operations during grid power outages. The least expensive option, and consequently most common, for supplying backup power is the uncontrolled diesel engine. This type of engine emits more than 10 times more NO_x per MWh of power output than a natural gas engine. WE believe that the NYSDEC should discourage the use of diesel generators other than true emergency applications. We feel that what is needed is more stringent regulation of emergency generation, and more favorable on-site generation permitting, which could encourage many users with high reliability requirements to choose this more efficient and environmentally friendly option.

We are not implying that emergency backup generators are used primarily for peak shaving purposes, but we are concerned that the term “emergency backup” may be taken liberally. For many industries, an emergency situation may arise even with small electricity interruptions or voltage quality fluctuations. 6 NYCRR Part 201 Subpart 3 does not quantify what exactly constitutes an “emergency.” For industries that have high power quality and reliability requirements, an “emergency” may occur several times a day, frequently during periods of peak demand, if they must operate their backup generators to maintain their operations. NYSDEC should consider more a restrictive definition of “emergency,” and consider further restricting the hours of operation, especially in non-emergency situations such as reliability operation.

We also recognize that there are significant portions of New York State with limited natural gas availability. These areas are typically rural and sparsely populated, but are home to agricultural, institutional, and industrial facilities. Many of these facilities may have little choice but to employ DG technologies fired on liquid fuel such as diesel, propane, or gasoline. We are concerned that this rule may have the perverse effect of discouraging clean distributed generation in favor of less costly and more polluting diesel generation. If current emergency generation regulations continue, new capacity that is installed for “emergency” purposes can experience “mission creep” to begin address load management which will compromise local air quality and provide no efficiency benefits. We feel that what is needed is more stringent regulation of diesel emergency generation, and more favorable on-site generation permitting for clean technologies, which could encourage many users with high reliability requirements to choose this more efficient and environmentally friendly option. We propose that the proposed DG rule be modified to tighten the regulations on non-emergency diesel generators. Permitted diesel generators should be required to operate on transportation-grade diesel fuel and employ tailpipe emissions controls. We recommend the following emissions limits for new diesel facilities that are located in attainment areas for NO_x and other pollutants:

Technology	NO_x Emissions Limit (lb/MWh)	CO Emissions Limit (lb/MWh)
Diesel-fired DG	5.5	6.2

In non-attainment areas, diesel generators should not be permitted for peaking and base-load operation unless the systems can achieve emissions levels that are equal to or better than the levels proposed for non-diesel generators.

As a final comment, we wish to point out that one of the advantages of output-based standards is that they allow one to craft emissions regulations on a technology-neutral basis. While the initial proposed standards by NYSDEC are to be commended for their conversion to an output basis, one must also recognize that by remaining technology-specific, the standards have the potential to encourage unintended behavior and sub-optimal technology selection for specific applications. We thus encourage the NYSDEC to consider developing a more universal standard that applies to all DG technologies as to provide fair incentives to the cleanest and most efficient systems. We also encourage NYSDEC to consider adopting a DG and CHP certification program that is similar in structure to that adopted in California. A process such as this allows for streamlined permitting of highly clean and efficient systems.

We hope that these comments will help the NYSDEC develop an improved standard permitting process for on-site generators while improving the overall air quality in New York. We look forward to working with the NYSDEC in the future.

Sincerely,

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Sample CHP Calculation

fictional CHP unit emission rate$_{electric}$	= 2.5 lbs NO_x/MWh_e
sample boiler emission rate$_{boiler}$ standard	= 0.050 lbs NO_x/MMBtu (input basis)
fictional unit power-to-heat ratio	= 0.7

convert emission rate$_{boiler}$ from an input basis to an output basis:
assume: boiler efficiency (heat out/heat content of fuel in) = 80%

emission rate$_{boiler}$ (output basis) = emission rate$_{boiler}$ (input basis)/boiler efficiency
= 0.050 lbs NO_x/MMBtu / 0.8
= 0.0625 lbs NO_x/MMBtu

convert emission rate$_{boiler}$ units from lbs/MMBtu to lbs/MWh_e:
emission rate$_{boiler}$ = 0.0625 lbs NO_x/MMBtu * 3.412 MMBtu/MWh_t
= 0.21325 lbs NO_x/MWh_t

convert emission rate$_{boiler}$ from lbs NO_x/MWh_t to lbs NO_x/MWh_e:
where: emission rate$_{boiler}$ = emission rate$_{boiler}$ (thermal basis) / 0.7
(based on power to heat ratio)
emission rate$_{boiler}$ = 0.21325 lbs NO_x/MWh_t / 0.7
emission rate$_{boiler}$ = 0.3046 lbs NO_x/MWh_e

calculate adjusted emission rate based on displaced boiler emissions:
adjusted emission rate = emission rate$_{electric}$ + emission rate$_{boiler}$
adjusted emission rate = 2.5 lbs NO_x/MWh_e - 0.3046 lbs NO_x/MWh_e
= 2.1954 lbs NO_x/MWh_e