Back-Up Generators (BUGs) - To Use or Not to Use

Presentation by University of California, Riverside

Place: **Hearing Room B, California Energy Commission**
Date: **October 6th 2004**
Time: **8:30 a.m. to 12:00 p.m.**

You are cordially invited to an informal presentation by researchers from the University of California, Riverside. The researchers will present a summary of the results of a recently concluded project funded by the CEC PIER Environmental Area concerning Back-Up Generators (BUGs). This project studied the impact of BUGs during the recent 2001 blackouts and the potential impacts of the future use of BUGs. The study produced the most comprehensive diesel emissions measurement analysis regarding BUGs made to date in the United States which has been provided to the US Environmental Protection Agency (EPA) for use in adopting new BUGs emission factors in their AP-42 emission factor manual.

A draft agenda is as follows:

8:30: *Introductions* -- Jim Lents, Director, CSSD /Marla Mueller, CIEE Research Coordinator
8:45: *Criteria of Emission from BUGs* -- Wayne Miller, Director, Vehicle Emissions, CE-CERT
9:15: *Use of BUGs during 2001 Outages* -- Nick Nikkila, NN Environmental Consulting
9:45: *BUGs and Interconnection Issues* -- Mike Wehrey, Consultant**,** Energy & Transportation Solutions
10:15: *Emissions Inventory Development* – Nicole Davis, Environmental Engineer
10:45: *Modeling Impacts of BUGs* – Gail Tonnesen, Manager, Emission Modeling, CE-CERT
11:15: *Comments and Questions* – All
12: 00pm: End

Presentation Abstracts

Criteria of Emission from BUGs – Wayne Miller

Emissions were measured from 15 diesel fueled back-up generators representing the most comprehensive tests of actual in-use generators made to date. These measurements were made following the EPA protocol and included particulate matter, nitrogen oxides, carbon monoxide, carbon dioxide, total hydrocarbons, and aldehydes. Data are presented on emissions at different levels of power generation and emission factors are calculated using the EPA protocol. A series of follow-on tests demonstrated reduced emissions with control technologies, including, fuel modification, addition of exhaust after treatment and combinations of fuel and after treatment. These data has been provided to the US EPA

for their use in establishing new AP-42 emission factors for use in developing emission inventories and analyzing the impacts of the use of diesel fueled generators for electricity production.

Use of BUGs during 2001 outages - Nick Nikkila

The responses of businesses to the 2001 power curtailments were studied. Businesses were contacted in different parts of California that endured power curtailments to determine how they handled the loss of electrical power. These studies indicate that businesses, including those with back-up generators, used the generators less than anticipated. This data provides the basis for more accurate projections of the air quality impacts potentially associated with power curtailments.

BUGs and Interconnection Issues - Mike Wehrey

The utilities require that the BUG(s) be operated in isolation from the grid for safety and power quality reasons – that is, a facility cannot receive part of its electricity from the grid and part from an on-site BUG simultaneously unless the areas of the facility served are isolated from each other or unless the facility has substantial power conditioning equipment. Regulations and codes dictate the conditions under which the BUGs can currently be installed and operated. If a BUG were to be operated as an energy source supplementing the utility system, feeding the owner's facilities and equipment and/or utility customers in the neighborhood via the utility grid, a BUG operator would have to make upgrades to the system, conform to government requirements and numerous applicable national standards, and reach an agreement with the local utility. This report identifies the technical and practical issues of BUG dispatch in California. It is applicable not only to backup generators themselves, but to other forms of distributed generation, which gradually are becoming part of California's energy mix.

Emissions Inventory Development – Nicole Davis

The EPA AP-42 Compilation of Emission Factors from diesel generators were compared with the emissions tested in the CEC study. Emission factors as a function of size and engine load were developed from the new test data and used for the emissions estimates for the air quality modeling.

Modeling Impacts of BUGs - Gail Tonnesen

The ultimate health impacts associated with the use of back-up generators derive from how those emissions disperse through the atmosphere and the public exposure to higher concentrations of pollutants. This study uses the latest modeling approaches overlaid with population densities and the improved emissions estimates to assess the potential public health impacts associated with the use of diesel fueled engines for electricity production and other uses of such engines.