

# Permitting DG Technologies and Air Quality

## A CHP Air Permitting Case Study

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*Special Joint Seminar*  
*Building, Electrical, Plumbing/Gas and Fire Prevention*  
*Inspectors*  
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# Project Overview

- Developer – Trigen-Boston Energy
- Site – NECCO, Revere, MA
- Size – 6 MW
- Status – Permitted/Under Construction
- Startup – Q1 2003
- NECCO – New England Confectionary Co. moving two candy manufacturing facilities in Cambridge to one site in Revere
- No. 6 Oil and Gas Boilers provide process steam
- Electricity from utility

# Project Description

- Trigen develop, install, own, operate and maintain two 3 MW gas fired engines, two heat recovery steam/hot water generators, air pollution control equipment, two small boilers (25.1 MMBTU/hr gas, 90 days 0.05% S oil).
- Overall annual efficiency of 68% compared to 33% for conventional generation
- Trigen providing steam, electricity, refrigeration, chilled water, FDA-quality potable hot water.

# Photos – Under Construction



# Air Permitting Process

- Trigen applied for Non-Major Comprehensive Air Plan Approval from MA DEP in February, 2002
- Pre-Application Meeting Nov, 2001
- MA Best Available Control Technology
- Air Quality Dispersion Modeling
- Noise Analysis

# BACT Analysis - Engines

- Sulfur Dioxide (SO<sub>2</sub>): Natural Gas – 0.0023 lb/MMBTU
- Nitrogen Oxides (NO<sub>x</sub>): SCR – 0.2 g/bhp-h, 0.063 lb/MMBTU (represents 87% removal)
- Carbon Monoxide (CO): Oxidation Catalyst – 0.3 g/bhp-h
- Volatile Organic Compounds (VOC): Oxidation Catalyst – 0.2 g/bhp-h
- Particulate Matter (PM): Proposed 0.1 g/bhp-h, permitted at 0.05 g/bhp-h
- Ammonia Slip: 2 ppmdv @ 15% O<sub>2</sub> (Urea reducing agent)

# Comparison to Model Regulation

- Regulatory Assistance Project – Draft Model Regulations for Air Emissions from Smaller Scale Electric Generation Resources – 10/31/2002
- Output based – different NO<sub>x</sub> for ozone attainment and non-attainment
- Three phases proposed (2004, 2008, 2012) – Non-attainment (MA) – NO<sub>x</sub>: 0.6/0.3/0.15 lb/MWh
- Trigen-NECCO – 0.063 lb/MMBTU = 0.6 lb/MWh – meets proposed Phase I
- To meet later phases, need significantly higher removal efficiency or lower engine emissions – Phase III a “stretch” goal for IC engines
- Proposed CO limits: 10/2/1 lb/MWh – later phases indicate CO oxidation catalyst – Trigen at <0.1 lb/MMBTU (~1 lb/MWh)

# Boilers – Emission Limits

- MA Environmental Results Program (ERP)
- 310 CMR 7.26(30) - <40 MMBTU/hr
- No BACT required – agree to meet specified limits for gas and oil
- NO<sub>x</sub>: 0.035 lb/MMBTU (gas); 0.15 lb/MMBTU (oil)
- PM: 0.01/0.02 lb/MMBTU (gas/oil)
- CO: 0.08 lb/MMBTU (gas/oil)
- VOC: 0.03 lb/MMBTU (gas/oil)
- SO<sub>2</sub>: 0.05% sulfur in oil/pipeline gas



# Facility wide Potential Emission Limit

- For two engines and two boilers
- NOx: 26.8 tpy (non-major, <50 tpy)
- CO: 41.57 tpy (<100 tpy)
- VOC: 22.58 tpy (<50 tpy)
- PM: 6.5 tpy
- SO2: 2.4 tpy
- NH3: <1 tpy
- Total HAPs: 6.5 tpy (<25 tpy)

# Engines – Air Modeling

- Screening Modeling (SCREEN 3)
- Simultaneous Engines, two boilers (oil – worst case)
- Engine stacks 1.27 x building ht.
- Total project impact plus background < NAAQS

# Permit Conditions

- Emission Limits as indicated in BACT (g/BHp-h, lb/hr, and tpy)
- Engine compliance testing for NO<sub>x</sub>, CO, VOC and ammonia at start-up and each three years thereafter
- Parametric Monitoring System (PEMs) for NO<sub>x</sub>, CO and VOC – specify parameters during initial compliance test

# Noise

- MADEP regulates noise by nuisance regulation and policy 90-001
- Limits increase in  $L_{90}$  ambient (1 hr) to 10 dBA
- Existing ambient survey (five locations)
- Lowest existing ambient: 40-43 dBA
- Nearest property line (only ~100 ft away)
- Noise modeling demonstrates 10 dBA increase at property line, 6 dBA at closest residence (1 dBA at most residences)

# Conclusions

- Air Permit received April, 2002, five weeks after submittal
- Importance of Pre-application meeting – frequent interaction with DEP in review and permit writing stage
- Win/Win/Win project for NECCO/Trigen/Environment
- Reduced emissions for steam production/possible displacement from existing power plants

# Questions/Contact

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