COMMONWEALTH OF MASSACHUSETTS
Office of Consumer Affairs & Business Regulation
DIVISION OF ENERGY RESOURCES

RENEWABLE ENERGY PORTFOLIO STANDARD

ADVISORY RULING
FOR
ALLSTON BRIGHTON COMMUNITY DEVELOPMENT CORPORATION'S PROPOSED BIODIESEL COMBINED HEAT AND POWER PROJECT

May 11, 2004

1. Advisory Ruling Request by the Allston Brighton Community Development Corporation

Allston Brighton Community Development Corporation (ABCDC) has requested that the Massachusetts Division of Energy Resources (DOER or the Division) provide an Advisory Ruling with regard to the qualification for the Massachusetts Renewable Energy Portfolio Standard (RPS) of a proposed new Biodiesel Combined Heat and Power (CHP) Project.[1] This document is DOER's response to ABCDC request.

The RPS regulations, at 225 CMR 14.06(5),[2] provide an opportunity for a generation unit owner or developer "to request an advisory ruling from the Division to determine whether a Generation Unit would qualify as a New Renewable Generation Unit" and be granted a Statement of Qualification (SQ) by DOER.[3]

2. Description of ABCDC's Biodiesel CHP Project

ABCDC proposes to install and operate a combined heat and power system for a sixteen-unit building at its Brian J. Honan Apartments, a low-income housing development at Everett and Hano Streets in the Allston neighborhood of Boston. The Generation Unit is a 40 kW internal combustion, diesel engine fueled with 100% (neat) biodiesel. As currently planned, the recovered waste heat would provide thermal energy to the hydronic space heating and domestic hot water systems of the building, acting as the lead boiler in a multiple boiler system throughout the year, thereby reducing the annual demand for natural gas, and providing electricity from a renewable source. The load on the engine would follow the thermal demand, running in a 15-30 kW range. To prevent waxing due to low temperatures, the 100% biodiesel fuel would be stored in a heated space.[4]

This Advisory Ruling will address the proposed project's fuel, technology, and air emissions.

[1] The ABCDC request was provided in the form of a letter to Messrs. Breger and Bernstein at DOER, dated September 30, 2003, modified by information in a March 17, 2004 e-mail message to Mr. Bernstein, as well as by several later email messages from the project engineer. The letter will be referenced hereafter as the 9/30/03 letter. The project is being undertaken with financial assistance from the Massachusetts Technology Collaborative.

[2] Hereafter, all references to the RPS regulations will be to sections of 225 CMR 14.00.

[3] More information about Advisory Rulings for MA RPS is at http://www.state.ma.us/doer/rps/advisory.htm.

[4] 9/30/03 letter and 3/17/04 e-mail. Note that the earlier communication described the use of a 29 kW micro-turbine.

3. Qualification of the Fuel as an Eligible Biomass Fuel

ABCDC states in its 9/30/03 letter that the project would use 100% biodiesel, i.e., neat biodiesel. Because neat biodiesel is included in the RPS definition of "Eligible Biomass Fuel" at Section 14.02, the proposed fuel for this project meets the regulatory qualification.[5]

4. Discussion of the Project's Biomass Technology

The RPS regulations provide, at Section 14.05(1)(a)6, that the qualification of biomass generation units is limited to "low emission, advanced biomass power conversion technologies using an Eligible Biomass Fuel." These criteria are designed to insure that the RPS provides incentives for older, dirtier technologies to be replaced by cleaner and more efficient technologies. DOER also believes that biomass technologies should improve over time, both pursuant to the incentives created by the RPS and, more broadly, continued technological progress in the electricity generation sector.

DOER does not normally regard an internal combustion engine (ICE), in and of itself, to qualify as "advanced" technology. However, in the case of this small and otherwise innovative demonstration project, DOER is likely to deem the biodiesel-fueled ICE as "advanced" for the following reasons:

- DOER regards as advanced technology the process for converting soybeans or other feedstocks (other oilseeds, used cooking oil, animal fat, etc.) to biodiesel that meets the strict standards of the American Society for the Testing and Materials (ASTM).[6] Producing biodiesel is the equivalent of converting other forms of low energy density biomass (woody debris, energy crops, human and animal wastes, etc.) to such high-density biofuels as bio-oil and anaerobic digester gas. Only in the case of biomass gasification must the conversion of feedstock to fuel normally be carried out in the same set of interconnected equipment as the conversion of fuel to electrical energy, while the other processes can and often are done at separate locations altogether and then transported to a Generation Unit. However, whether at the same or a different facility, DOER deems as advanced technologies all of these processes for converting low-density biomass to high-density, cleaner burning biofuels.[7]
- The project represents innovative applications for the use of biodiesel, experience with which should help to advance the technology for biodiesel applications:
  - There has been very little use of biodiesel in small, stationary ICEs.[8] For that reason, engine manufacturers are unwilling to provide warranties to ABCDC. Although the need to adjust or modify the equipment is unlikely, ABCDC is setting aside funds to cover the risk of such contingencies.
  - The use of biodiesel for combined heat and power (CHP) apparently is a new application, as well, although ICEs themselves are in common use for CHP.

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[5] If this project eventually is granted an SQ, and ABCDC subsequently were to decide to use biodiesel blended with petroleum diesel, then the SQ would be invalidated unless ABCDC were to apply for and receive a revised SQ under a "Co-Firing with Ineligible Fuels Waiver," as provided at Section 14.05(3).

[6] Go to http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/REDLINE_PAGES/D6751.htm?L+mystore+vywn9287 to see ASTM's permanent specification for biodiesel, D6751-02.

[7] DOER made a similar argument as part of its Advisory Ruling for Renewable Oil International LLC's proposed BioOil project, accessible via http://www.mass.gov/doer/rps/advisory.htm.

[8] DOER has located a 2001 pilot project at the University of California, Riverside that fueled three very large, two megawatt ICEs (totaling 6 MW) with neat biodiesel for backup power, which is an entirely different equipment scale and application. See http://www.biodiesel.org/markets/ele/default.asp.

DOER believes that, in addition to the reasons given above, this very small-scale biomass project (40 kW CHP) could be a worthy demonstration project from which the bioenergy industry, DOER, and other RPS participants can learn useful lessons while having a minimal impact on the RPS market. However, as a demonstration project, DOER intends that it not necessarily set precedent for subsequent projects using biodiesel in small ICEs with or without CHP.

5. Discussion of the Project's Air Emissions

A generation unit using an eligible biomass fuel and advanced technology must meet the criterion of "low emissions" in order to be an eligible New Renewable Generation Unit for the RPS, pursuant to the regulations at 14.05(1)(a)6. This criterion does not set specific emission targets. In fact, the threshold for eligibility is expected to become more stringent as biomass energy conversion and emission control technologies improve. In addition, that threshold may differ among fuels, technologies, and project scale – as determined by the MA DEP. Under the RPS regulations at 14.05(1)(a)6.a, a generator must receive a Valid Air Permit from its appropriate state air quality regulatory agency to qualify as an eligible biomass generator. In addition, that same subsection provides that the project "must . . . demonstrate to the satisfaction of the Division that its emission rates are consistent with emission rates for comparable biomass units as prescribed by the Massachusetts Department of Environmental Protection."

However, unlike projects previously reviewed by DOER, the criteria of the RPS regulations at 14.05(1)(a)6.a do not apply to the ABCDC project because its 40 kW generating capacity is below the level at which current Massachusetts regulations require an air permit. Furthermore, 40 kW also would fall below the proposed 50 kW threshold for new, non-emergency, small engines in the proposed regulations (310 CMR 7.20) that the MA DEP recently released for public comment.[9] Therefore, this project would be subject to another subsection of the RPS regulations, namely 14.05(1)(a)6.c. The latter provides that the project "must . . . demonstrate to the satisfaction of the Division that its emission rates are consistent with emission rates for comparable biomass units in a manner described in the Guidelines."

DOER has concluded that the proposed ABCDC project is likely to be qualified as using "low emission" technology. The bases for this conclusion are the following:

- The emissions of most pollutants, although they will not be known until the engine is in operation and can be tested, are likely to be substantially lower than those of other small, stationary ICEs, which could be viewed as offsetting the likelihood of slightly higher NOx emissions. In addition, the project's emissions will be offset, in part, by the use of recovered waste heat to provide thermal energy to the hydronic space heating and domestic hot water systems of the building, thus avoiding some emissions from fossil fuel combustion.[10]
- This project presents an opportunity to learn what levels of both criteria pollutant emissions and of other air emissions result from the use of biodiesel in a small, stationary ICE.
- Although the RPS regulations, in the case of this project, call for emission rates to be consistent with those of "comparable *biomass* units" (italics added), there are, to the best of

[9] The proposed regulations may be viewed in the May section of this web page: http://www.mass.gov/dep/new.htm.

[10] On the other hand, DOER acknowledges that the MA DEP does not regard diesel-fired ICEs to be low emission sources. Moreover, although this project is not subject to the jurisdiction of the MA DEP's forthcoming draft rule for small engines and combustion turbines (310 CMR 7.20), the draft rule would require NOx emissions for new 50 kW engines that are as much as 90% lower than are typical of engines in use today, including those of the proposed ABCDC engine. Finally, the DEP regulations currently do not provide for consideration of emissions offsets due to the reduction in emissions elsewhere that are attributable to CHP.

DOER's current knowledge, *no such units*.[11] This one may be the first such unit and, if so, may provide a basis for future comparisons.

As with the advanced technology criterion, DOER regards this project as potentially serving a useful demonstration role regarding air emissions. Meanwhile, the impact on Boston area air quality will be minimal. DOER states again that, as a demonstration project, DOER intends that it not necessarily set precedent for subsequent projects using biodiesel in small ICEs with combined heat and power. Only after the performance and air emissions of this project are recorded and evaluated can DOER consider the eligibility of subsequent, comparable projects.

6. Summary of ABCDC Advisory Ruling

DOER has found the biodiesel combined heat and power project proposed by the Allston Brighton Community Development Corporation to fall within the eligibility criteria for biomass-fueled New Renewable Generation Units as provided in the RPS regulations at 14.05(1)(a)6. The following summarizes this finding. It also notes several issues and requirements for ABCDC to consider in its project planning, and which would guide DOER in reviewing its application for the generation unit to receive an RPS Statement of Qualification.

1. DOER finds that the proposed fuel – 100% (neat) biodiesel – qualifies as an Eligible Biomass Fuel. DOER expects to include in any Statement of Qualification a requirement that the use of neat biodiesel be documented at regular intervals. Any use of biodiesel blended with petroleum diesel would invalidate the unit's qualification unless approved by DOER in a Co-Firing with Ineligible Fuels Waiver.[12]
2. DOER finds that the project is likely to qualify as using advanced biomass power conversion technologies.
3. DOER finds that the project is likely to meet the low emission criteria of the RPS regulations. However, such qualification is contingent on receiving more detailed information in a Statement of Qualification Application (SQA), which would be evaluated by both DOER and the MA DEP. In reaching its final determination, DOER expects to consider the demonstration nature of the project and the opportunity to learn from it both how biodiesel operates in a small, stationary, internal combustion engine and what its air emission characteristics actually are. DOER expects to require a protocol of testing and reporting as part of any Statement of Qualification.
4. However, DOER regards this project as a demonstration project and intends that it not necessarily set precedent for subsequent projects using biodiesel in small ICEs, with or without combined heat and power, including their emissions profiles.
5. ABCDC should be cognizant of any current and new state and federal standards that potentially could be applicable to the project.
6. ABCDC should note that, while DOER may grant a Statement of Qualification for the project, it would always be contingent on ABCDC's obtaining any MA DEP permits that might be required (if any), and on its operating the plant in compliance both with MA DEP permits and regulations (if any) and with DOER's RPS regulations. ABCDC should note as well that, once DOER grants a Statement of Qualification, further advances in biomass power conversion technologies will have no effect on the plant's MA RPS qualification.

[11] See footnote 8, above, regarding a much larger ICE application.

[12] Such a waiver is provided in the regulations at 14.05(3).