LEADING BY EXAMPLE: BIOHEAT FUEL OIL IN STATE FACILITIES

June 2007

Executive Order 484, issued by Governor Deval Patrick on April 18, 2007, calls on state agencies to demonstrate leadership in the use of cleaner forms of energy and in using energy more efficiently. Among the specific provisions of the Order is a requirement that, where available, state agencies switch their #2 heating oil boilers and equipment to a minimum three percent bioheat fuel (a blend of pure biodiesel and conventional heating oil) beginning in the 2007-2008 heating season, and increase the blend to ten percent bioheat fuel by 2012. In anticipation of this requirement, the Executive Office for Administration and Finance (A&F) directed the Executive Office of Energy and Environmental Affairs (EOEEA, formerly the Executive Office of Environmental Affairs) in August 2006 to conduct a pilot program under which state facilities would test the use of bioheat fuel during the 2006-2007 heating season.

What is bioheat fuel?

Bioheat fuel is the name given to any blend of conventional, petroleum-based home heating oil and pure biodiesel, an alternative fuel produced through the chemical transformation of vegetable oils and animal fats. As with transportation biofuels, which are blends of biodiesel and conventional petroleum-based diesel fuels, bioheat fuel blends are identified by their volume relative to the conventional fuel. Thus, B100 is the term used for pure biodiesel, while B3 bioheat fuel describes a blend of 3 percent biodiesel and 97 percent conventional heating oil.

What are the advantages of using bioheat fuel?

The biodiesel component of bioheat fuel is a renewable, and potentially domestically-produced fuel that can contribute to greater energy independence and provide new, potentially valuable outlets for the nation's agricultural products. Compared to conventional heating oils, bioheat fuel is also cleaner burning. Laboratory studies and field trials conducted over the past decade have documented reduced particulate, sulfur oxide, and nitrogen oxide emissions, in bioheat blends, which also result in lower smoke and odor production. Over the lifecycle of the bioheat fuel there are also significant carbon dioxide reductions relative to petroleum-based diesel.

Does bioheat fuel cause problems in heating equipment?

Biodiesel does act as a cleaning agent in the fuel tank and can dissolve or loosen accumulated sediments, which might then become deposited in components such as filters, strainers, and nozzles. However, field tests demonstrate that blends up to B20 have the potential to result in fewer incidences of clogging once the accumulated deposits have been removed. According to the National Biodiesel Board, all known tanks and systems, including gaskets, seals, hoses, and O-rings, are compatible with (i.e.,

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will not be adversely affected by) bioheat fuel blends up to B20. The pilot projects at state facilities found no evidence of any potential concerns such as clogging of burner components or compatibility with storage tanks and other parts of a heating system.

Doesn't bioheat fuel turn into a gel at low temperatures?

Cold weather conditions can affect the performance of bioheat fuel, though not to a significant degree at or below a B20 blend. For bioheat fuel blends of less than B20, the same, standard precautions associated with storage and use of conventional heating oil in cold weather apply.

Who participated in the pilot program?

Four state entities volunteered to participate in the pilot program: the Bay State Correctional Center, Salem State College, Taunton State Hospital, and the University of Massachusetts, Amherst. UMass provided individual boilers at five different locations on the Amherst campus as well as three boilers at the Cold Spring Orchard in Belchertown.

> *The transition to biofuel was seamless. [It's] a real win-win, for both the life of the boiler, and for the environment.*
>
> *— Director of Engineering & Facilities Management, Taunton State Hospital*

Was the pilot program successful?

The pilot program was very successful in that none of the four sites reported any problems attributable to the use of bioheat fuel, while several experienced an improvement in boiler performance. In fact, boiler operators did not notice any significant difference between bioheat fuel and conventional fuel oil, nor did they experience any problems with components such as hoses, gaskets, or filters. Staff engaged in end-of-year boiler cleaning activities reported that their equipment appeared to be cleaner than it had been at the end of previous heating seasons. One site reported that bioheat fuel use resulted in less boiler exhaust odor.

Did the pilot program reveal any particular challenges to the use of bioheat fuel?

The pilot program did reveal that the only significant obstacle to widespread use of bioheat fuel may be ensuring the availability of supply on a regular or as-needed delivery schedule. However, the pilot program occurred at a time when the market for bioheat fuel is still relatively small and relatively immature. The Commonwealth of Massachusetts is working to establish one or more bioheat fuel contracts like those that currently exist to provide public agencies with biodiesel for transportation purposes, a step which should help to ensure the future reliability and quality of bioheat fuel distribution.

> *The fact that the fuel was a non-issue is in itself worth noting.*
>
> — Farm Superintendent, Cold Spring Orchard, University of Massachusetts

Where I can get more information?

For more information about the bioheat fuel pilot program, please contact Ian Finlayson at the Executive Office of Energy and Environmental Affairs (ian.finlayson@state.ma.us). A good source of general information about bioheat fuel, including links to other online resources, is the National Biodiesel Board (http://www.biodiesel.org/).