VERMONT NRCS CONSERVATION INNOVATION GRANT
Quarterly Progress Report

Grantee Entity Name: Meach Cove Real Estate Trust	
Project Title: Fuel from the Field to the Flue: Grass pellet heating equipment combustion optimization project.	
Agreement Number: 69-1644-11-08	
Project Director: Christopher W. Davis	
Contact Information	Phone Number: (802) 985-9218 E-Mail: cdavis@meachcovefarms.org
Three Month Period Covered by Report: April 1, 2015 – June 30, 2015	
Project End Date: 9/20/2015	

A. Project Status

1. *Summary of progress, including the results to date and a comparison of actual accomplishments with proposed goals (milestones) for the period and, where project output can be quantified, a computation of the costs per unit of output.*

   During this period the Project Director continued to run various grass species and wood/grass blended pellets through the **Evoworld** 350C (Evo) biomass boiler and record the emission data.

   During this reporting period Adam Dantzscher worked with the BHS "slugger" densification machine to work out the feedstock and moisture balances needed to make "pucks" that are best suited to the **Evoworld** boiler large diameter material handling augers. To date he has successfully manufactured approximately 1,200 pounds of pucks of a density and hardness that seem well suited to the operation in the **Evoworld** boiler. Adam has received a delivery of *Miscanthus* and in the coming weeks he will try to make some *Miscanthus* "pucks".

   The test result data obtained with the Wohler emission analyzer for each test run has been entered into an Excel spreadsheet designed to represent the data in a clear and easy to read format that is similar to the data reports created for the **BERC** "*Technical Assessment of Grass Pellets as Boiler Fuel in Vermont*" released in January, 2011.

   The Project Director met on May 5 at the site with Amy Overstreet, USDA Public Affairs Officer, to review the details of the project for possible use in USDA publications. We are also working on possible dates to host an open house in late August or September.

2. *Current problems or unusual developments or delays.*

   As stated in the previous quarterly report, some of the grass species form a molten ash that becomes a hard crust layer in the boiler following cooling after the burn cycle in the boiler has been completed. The Project Director continues to work with the engineer at TBW to

come up with options for dealing with this rigid ash byproduct so that the **Evoworld** biomass boiler can operate for continuous cycles when fueled with the various species of grass.

The Project Director continues to spend time learning how to operate the boiler efficiently on wood pellets and he is using this knowledge to make changes to the boiler fuel and air mixtures to optimize the combustion performance of the various grass pellet samples that will be tested as part of this project. The Project Director intends to provide the **Evoworld** company with notes and text that they may consider adding to their operator's manual for this boiler.

3. *Reasons why goals and objectives were not met, if appropriate.*
   The goals for this project are being met.

4. *Additional pertinent information including, where appropriate, analysis and explanation of cost overruns or high unit cost.*

   The project is being completed within the budget submitted.

5. *Any funded or unfunded time extensions.*

   The project time extension was granted until September 20, 2015.

6. *Any changes to the project's original objectives, methods, or timeline with a summary of the justification for the changes.*

   As more time is spent working to improve the settings to optimize grass fuel combustion it may be possible to have the **Evoworld** boiler operate as it is designed without modifying the boiler. Based on the test burns conducted as of this date there may be a need to modify the ash cleaning feature for the ventilated portion of the grate to facilitate better cleaning when some species of grass pellets are burned.

7. *Lessons learned that inform future project activities or broader efforts in the project's topic area.*

   After only a few weeks of running test burns with the various species of grass pellets it is clear that this model **Evoworld** biomass boiler can handle the combustion of the species of grass tested to date without special modifications of the boiler as it was fabricated. Over time the efficiency and emission profile of the various grasses is expected to improve as the Project Director becomes more familiar with the capabilities of the **Evoworld** biomass boiler and the impact of the various settings. Running more tests will produce more emission data for analysis. Using the expanding database the Project Director and his collaborators should be able to make fact-based statements regarding the viability and costs of burning the grass species that Meach Cove and UVM Extension have demonstrated can be grown successfully in Vermont.

8. *Work to be performed during the next three month period.*

    - Continue to test grass species and record the data in the spreadsheets.
    - Work with Adam Dantzscher to produce quantities of "pucks" of several grass species to test in the **Evoworld** biomass boiler.
    - Hold one or more open houses and demonstrations of the project.
    - Work out the modifications to the **Evoworld** boiler software and operation set up to allow continuous heating cycles burning the various grass species.
    - Post the preliminary data and other related information on the Meach Cove website.

B. Project Results

1. *Any preliminary results that can be used by NRCS for practice standard revisions, new practice standard adoption, policy changes, program revisions and training opportunities.*

    It is possible that the data produced by this project will have a positive impact on several agricultural practices and standards in Vermont.

    A preliminary list includes:

    - Providing demonstrated proof that there is a viable and economical boiler under 500,000 BTU/hour capacity produced in the U.S. with UL and ASME certifications that can burn several different biomass fuels.
    - Providing emission data for a variety of grass fuels which should aid in the decision on which species of grass others might consider as a fuel.
    - Providing costs to accompany any recommendations for which grass and which size of pellet or puck another operator might consider selecting to use as a fuel.
    - Providing a resource list of people or companies that could assist another operator who is considering combustion testing of other forms of biomass or biomass blends, or someone who is considering purchasing and operating an **Evoworld** biomass boiler with grass fuel.

2. *Products, software tools and/or technologies currently ready for adoption and/or transfer.*

    The data and information collected and disseminated as a result of this work will allow **Evoworld** wood chip boilers, that are manufactured in capacity sizes ranging from 25 KW

to 500 KW, will represent viable choices for any business owner or farmer who wishes to install one and burn grass pellets or pucks.

The cost comparisons for the production, processing and manufacture of either pellets or pucks from the species of grass tested as part of this project will help potential adopters of this process to decide how best to proceed for their application and budget.

3. *Potentially promising products, software tools and/or technologies not yet ready for adoption and/or transfer, and a description of what is needed to reach that maturity.*

   Continuing to work on densification and combustion testing of additional grass species or blends of biomass in the pellet and puck forms should lead to more cost effective and trouble free fuels for use by business, farm and small industrial consumers.

4. *Identification of any new data or research needs to inform broader efforts in the project's topic area.*

   The Project Director will cite any sources of new data or research in the final report that is filed and post links to that information on the Meach Cove Farms website, www.meachcovefarms.org/biomass.html.

5. *Project activities that have been featured on recipient or partner websites and success stories that could be amplified by NRCS.*

   The **Vermont Sustainable Jobs Fund** website for energy projects at www.vsjf.org

   The **University of Vermont Agricultural Extension Service** website at http://pss.uvm.edu/vtcrops/?Page=energycrops.html

C. EQIP Requirements

Provide the following in accordance with the Environmental Quality Incentives Program (EQIP) and CIG grant agreement provisions:

1. *A listing of EQIP-eligible producers involved in the project, identified by name and address;*

   The primary EQUIP-eligible producer for the project is:

   Meach Cove Real Estate Trust
   P.O. Box 309
   Shelburne, VT 04582

2. *The dollar amount of any direct or indirect payment made to each individual producer or entity for any structural, vegetative, or management practices. Both biannual and cumulative payment amounts must be submitted.*

   There are no ($00.00) direct or indirect payments for structural, vegetative or management practices under this project.

3. *A self-certification statement indicating that each individual or entity receiving a direct or indirect payment for any structural, vegetative, or management practice through this grant is in compliance with the adjusted gross income (AGI) and highly-erodible lands and wetlands conservation (HEL/WC) compliance provisions of the Farm Bill.*

   The Project Director, Christopher W. Davis, certifies that there will not be any direct or indirect payments made to an individual or entity for any structural, vegetative or management practices through this grant. The AIG and HEL/WC provisions do not apply to this project.

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