Task 3.14- Demonstration of Technologies for Remote Power Generation in Alaska

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TABLE OF CONTENTS

INTRODUCTION	1
OBJECTIVES	1
ACCOMPLISHMENTS	1
FUTURE ACTIVITIES	2

TASK 3.14- DEMONSTRATION OF TECHNOLOGIES FOR REMOTE POWER GENERATION IN ALASKA

INTRODUCTION

In over 165 villages in Alaska, the use of local fossil fuel supplies or renewable energy resources could greatly reduce the cost of electricity and space heating. Currently, the diesel generators are the most commonly used electrical generating systems; however, the high fuel costs result in extremely high electrical power costs relative to the lower 48 states. The reduction of fuel costs associated with the use of indigenous, locally available fuels running modular, high-efficiency power-generating systems would be extremely beneficial.

OBJECTIVES

The overall goal of this project is a site-specific demonstration of a small, environmentally acceptable electric generating system fueled on indigenous fuels and waste materials to serve the microgrid or stand-alone power distribution systems typical of remote, isolated Alaska Native communities.

The objective of the project is to develop a commercialization plan that includes an analysis of the quantity, quality, and cost of the available fuels; a mapping of the electricity and district heating needs of a selected community, including electrical distribution layout and interconnecting steam piping; a step-by-step review of the environmental regulations and permit applications that need to be met; and a preliminary design and budget for the demonstration of a 0.5- to 6-MWe power system to be completed by the Energy & Environmental Research Center (EERC) in a manner that provides technical and regulatory readiness to proceed with implementation of the demonstration.

The scope of work is divided into two phases. The first phase will involve a workshop to provide input for the final definition of the technology to be demonstrated and the selection of a study site, followed by process design verification studies as needed (e. g., combustion tests on candidate fuels). The second phase of the work will develop the preliminary engineering design and provide the engineering, economic, and regulatory information necessary to proceed with the full demonstration. Parallel work will be conducted as needed to support the demonstration of other power technologies for additional remote sites.

ACCOMPLISHMENTS

The role of the EERC in this project is to manage the activities related to meeting the goals of this project. The EERC has been working with the other partners in this effort, the U.S. Department of Energy (DOE) Morgantown Energy Technology Center (METC), Doyon Ltd., McGrath Power and Light (MP&L), MTNT Limited, the University of Alaska-Fairbanks, the Mineral Industry Research Lab, and the state of Alaska Department of Community and Regional Affairs. Other subcontractors in this effort include J. S. Strandberg Consulting Engineers, Parsons

Power Group, and **Donlee** Technologies. This group is currently involved in the final feasibility of demonstrating a fluid-bed combustor to supply electricity and district heat to the community of McGrath.

Through a joint effort of the partners, a draft position paper was recently completed, with the goal of 1) defining where the feasibility study is today, 2) identifying the opportunity represented by the proposed demonstration, 3) identifying the outstanding issues that need to be addressed, and 4) providing clear guidelines to move the project forward. In general, the result of this effort was to determine that the direction of the project from this point is to proceed to final feasibility determination. The final feasibility determination will be made by **ML&P**, the Alaskan Division of Energy, and DOE as represented by the EERC. This effort is ongoing. The full text of the report will be made available after it is finalized by all of the project participants.

The EERC is continuing to investigate alternative technologies and/or configurations to those currently being considered for the McGrath demonstration. The objective of this effort is to identify other options that could result in lower-cost electricity. Configurations being considered are targeting towards improved efficiency, lower capital costs, and/or the use of lower-cost fuels. These alternative systems/configurations, once conceived, will need additional engineering to more closely estimate system costs and reliability.

Through a subcontract with Energy Resources International, Inc. (**ERI**), an assessment of the market for similar systems in other parts of the world was completed. The report, entitled “Global Market Assessment of Coal Bed Methane, **Fluidized-Bed** Combustion, and Coal-Fired Diesel Technologies in Remote Applications,” has been received by the EERC and is currently being reviewed. Upon final review, it will be issued as a topical report.

FUTURE ACTIVITIES

- Complete an agency review draft of the design and feasibility study, and review this draft study with all partners at a meeting in McGrath.
- Complete the final written report of the design and feasibility study, and disseminate the report to all interested parties.
- Deliver one or more presentations on the results of the design and feasibility study to interested audiences, and begin to seek construction funding if the project is feasible or make recommendations for future actions if the project is not feasible.