Institutional and non-technical barriers to adoption of renewable energy: Lessons learned from the Minnesota Agri-Power Project

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Introduction

The purpose of this report is to examine the non-technical and institutional challenges faced by an agriculturally-based advanced conversion technology research and development venture. Evaluation of lessons learned from nearly 6 years of experience with the Minnesota Agri-Power (MAP) Project will serve to illustrate the major barriers. These lessons include those related to feedstock supply and related agreements, conversion technology development, and a group of non-technical and institutional barriers related to contracts, business structure, regulatory procedures, and environmental regulations. This report is intended to provide guidance to public and private officials who are preparing to invest time and money in the renewable energy market.

To the best of the authors' knowledge, there are few other papers written that are publicly available describing the development of renewable energy projects in general and provide details about an actual project as a model. In this way, we attempt to outline a general roadmap of procedures applicable to a broad group of renewable energy projects.

The paper is organized as follows. First, we describe biomass feedstock supply requirements, and market development implications with application to alfalfa. Alfalfa was proposed to be separated into two components. Stem material would be have been used for combustion to produce a low BTU gas for electric power generation. Leaf material would have been used as a higher value protein for livestock and other animal feed. Second, we describe five specific challenges facing the high-technology conversion systems development. Specifically, an integrated gasification combined cycle conversion system was proposed. Third, we describe in general terms with specific implication to the MAP project, the role of the National Environmental Policy Act (NEPA) in the renewable energy marketplace. Last, we explain other non-technical and institutional barriers specifically with respect to the MAP Project.

In the discussion section that follows, we summarize lessons learned from the MAP Project. These are 1) necessity of developing a marketing plan and study of existing and non-existing markets for agriculturally-based products, 2) necessity of a proven and guaranteed readiness of processes to gasify alfalfa pellets, 3) need for developing suitability criteria for feedstock for electric conversion, 4) need for explaining feedstock testing results from a pilot plant and ultimate implications for transferring these data to an operating power plant, 5) understanding specific technical barriers related to feedstock conversion through gasification, 6) necessity of implementing four specific steps toward NEPA compliance in renewable energy projects, 7) taking a creative approach to a) investment and financing arrangements, b) guarantee customer commitment, c) clearly enumerate risks of technology development in a business framework, and 8) re-tooling federal renewable energy program design and administration.

The failure to meet these points, to various degrees, contributed to the eventual withdrawal of a major corporate partner, elimination of DOE funding, and cessation of the Biomass Power for Rural Development project that was the MAP Project