DOE/CE/15460--T8

DOE/CE/15460--T8

DE93 002700

Mr. Glenn Ellis CE-12
Department of Energy
1000 Independence Avenue
Washington, D.C. 20585

October 30, 1992

Reference: Recommendation No. 460
D.O.E. Grant award #DE-FG01-90CE15460

Subject: Final Report "Portable High-Speed Biomass Processor for Chunkwood"

Dear Glen:

In August of 1991, I attended the "Commercialization Planning Workshop" conducted by Mohawk Research Corporation. One of the main points brought up during the session was the question "what is the market potential for your product?" I realized this question had to be answered before the commercialization of the machine was possible. It was suggested by Philip Hayes of the DOE that I contact Ray Watts, editor of "Inventor-Assistance Program News" for possible assistance in the Market Analysis of the Chunkwood machine. Ray suggested several sources for invention evaluation. I chose the University of Wisconsin Innovation Service Center and the Innovation Assessment Center at Washington State University. The Wisconsin Innovation Service returned my application because it was not within their scope for analysis, however, WSU accepted my application and returned a very complete market analysis of the proposed Chunkwood machine.

The evaluation was based on thirty-three criteria that were considered important in determining the commercial viability of the machine. It was suggested that my attention be directed to the major factors that received the lowest evaluation scores. These factors are listed below.

BUSINESS RISK FACTORS:

1. Investment Costs: Heavy
2. Payback period: Six to ten years
3. Profitability: Cover direct and indirect costs but might not meet capital costs.

DEMAND ANALYSIS FACTOR:

1. Potential Sales: Expected sales of this product might be small.
2. Trend of Demand: Demand expected to be constant to declining.

MARKET ACCEPTANCE FACTORS:

1. Promotion: The costs and effort required to promote the advantages, features, and benefit are likely to be high relative to expected sales.
2. Distribution: The cost and difficulty of establishing distribution channels are likely be moderate to high to expected sales.

Also included in the market analysis were comments made by one of the evaluators. A condensation of these comment are listed.

MASTER

da
DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

USE OF THE CHUNKWOOD MACHINE:

1. New forestry now views much of the slash as essential to maintaining soil fertility, especially the larger pieces.
2. The proposed machine is ill-suited for pre-commercial thinning. It is too large and cumbersome.

DEMAND ANALYSIS:

1. It appears that the success of the machine depends upon the market for chunkwood. Currently there is no market for chunkwood in the Inland Empire. A market for chunkwood would have to be developed before anyone would be interested in the Chunker.

COMPETITIVE FACTOR:

1. Current wood chip technologies are going to create the most competition. Conversely, if the inventor can convince the wood chip industry that chunkwood is better than current chips, then the machine may be a viable endeavor.

Many of the evaluation factors and comments are very negative. Many changes are taking place in logging and forest practices because of environmental concerns. My original prime use for the Chunkwood machine was to convert logging slash to baled or bagged chunkwood for use as boiler fuel. This may have been a valid assumption only a couple of years ago, but now it appears that new forestry practices prefer to leave the slash after logging to maintain soil fertility.

Per your suggestion, I contacted Craig Chase (Biomass Energy Systems & Energy Resources Management Consultant) of Bellevue, Washington for his comments and suggestions. He thought there might be a market for the machine if it were fitted with a shear/accumulator head for one step harvesting and in-the-field processor for right of way clearing, highway median and roadside clearing as well as residue recovery. The shear/accumulator head is out of the scope of this project, however there are several on the market that could be fitted to the Chunker. In addition to the shear/accumulator head, he suggested the machine should be downscaled and equipped with rubber tires instead of tracks as originally designed. I have done a complete redesign of the Chunker to lower costs and make it more compatible with the new intended use. Attached drawings show three CAD views of the redesigned new Chunker. Even with the redesign, Mr. Chase believed the market would be very limited.

Other comments by Mr. Chase were: Chunkwood certainly has a fuel potential, but he questioned the economic benefits of chunkwood vs. whole log recovery for pulp chips or particle board furnish. This pretty much agrees with the WSU analysis.

Per the suggestion of Mr. Chase I contacted Dr. Richard Folk, Department of Forestry, University of Idaho. His activities and comments are:

1. Dr. Folk recently performed a test using chunkwood on the University boiler. Six tons of chunkwood were used for the test with no major changes made to the handling and feed system. He said the University boiler system was typical, so other systems could probably handle chunkwood as boiler fuel. This is encouraging.

2. I asked Dr. Folk if there were any power plants using chunkwood on a regular basis for power generation? He said there were none he knew of. This is very discouraging since the concept for the development of the Chunker was based on the assumption there was a market for chunkwood. This pretty much confirms the WSU analysis saying that a market for chunkwood would have to be developed before anyone would be interested in the Chunker.

3. Wood chips, chunkwood or other grades of hog fuel are very low value products. Because of transportation costs and handling costs, it is not economically justifiable to do in-the-woods processing for wood energy fuels. This negates the use of the bagger/baler designed for use with the Chunkwood machine. Until the price of fossil fuels significantly increases, the last resort for energy would be in-the-woods chipping. This could be many years away.

I have also presented the Chunker/baler machine to Christopher W. Murdoch, Director, Office of Professional Development & Assistant Professor of Forest resources, University of Maine. He is investigating the Chunker and other forest harvesting machines which may have applications for the Biomass Industry. This report will not be complete until late November.

I have finished all the design tasks as outlined in the grant award. The multiple blade shearing system and the chunkwood baler were very challenging. I believe if there was a market for chunkwood, the redesigned Chunker would be a viable marketable product. It appears however that at best the market is very limited and would not justify an investment either by me or a possible licensee at this time. I do believe however, that eventually the costs for fossil fuels are going to raise to the point that chunkwood will be a profitable product. When this time arrives, we will have a good machine waiting in the wings to fill this future need.

I would like to thank you and the DOE for all your help and financial assistance for completion of this project. It was a pleasure working with you, other members of your department, and the other DOE sponsored programs. All the assistance was very helpful and ideas were developed through the development of the Chunker that can be used on other energy related machines.

Thanks again.

Sincerely,

Warren A. Aikins
3489 Indian Creek Drive
Longview, WA 98632
(206) 425-5470 (RES)
(503) 556-9136 (RHI)

DRAWING • 11006

Note: Grapple, Engine and Baler not shown

PORTABLE CHUNKWOOD MACHINE

DRAWING • 11006 (Side View)

DRAWING # 11006

Note: Grapple, Engine and Baler not shown

PORTABLE CHUNKWOOD MACHINE

DRAWING # 11006 (Front View)

Note: Grapple, Engine and Baler not shown

PORTABLE CHUNKWOOD MACHINE

DRAWING #11006 (Isometric View)

END

**DATE
FILMED**

12 / 30 / 92