

** TX CONFIRMATION REPORT **

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minnesota power / 30 west superior street / duluth, minnesota 55802 / telephone 218-722-2641

March 21, 1997

Mr. John Velin, Director
Legislative Commission on Minnesota Resources
100 Constitution Avenue
Room 65 - State Office Building
St. Paul, Minnesota 55155

Dear John:

On behalf of Minnesota Power and Schott Power Systems, I am writing to notify you that we are withdrawing the project, Inter-city Electric Vehicle Transportation Demonstration, from further consideration for funding from the LCMR.

This is being done with great regret, as this project presented an exciting opportunity to bring electric vehicle technology to Minnesota. It also had potential to promote charging technologies being manufactured in this state. Unfortunately, however, the electric vehicle technology, which was needed to make the demonstration a reality, has not evolved to the point we had expected it to, in the time frame originally anticipated. There are still problems with limited range and cold weather operation capabilities. In our evaluation of vehicles that are now available, we have not been successful in finding an electric vehicle that would fill our needs for a demonstration in this region.

I would like to thank you, the members of your staff, and the LCMR for your support and patience, in trying to bring this project together. Despite the outcome, I hope our efforts have been beneficial in increasing the level of awareness of this technology.

It is inevitable that electric vehicle technology will eventually see widespread use in this country. When the technical challenges have been met, it is possible we may see renewed interest in pursuing a demonstration of this type in Minnesota.

Sincerely yours,

David A. Johnson
Account Engineer,
Industrial and Commercial Marketing

ALWAYS AT YOUR SERVICE

Date of Report: May 15, 1996

LCMR Work Program 1995

I. Project Title and Project Number: Inter-city Electric Vehicle Transportation Demonstration

Program Manager: David A. Johnson
Affiliation: Minnesota Power
Mail Address: 30 W. Superior St., Duluth, MN 55802
Phone: (218) 720-2673
Fax: (218) 720-2795

A. Legal Citation: ML 95, Chp. 220, Sec. 14, Subd. 11.(a).
Total biennial LCMR appropriation: \$150,000
Balance: \$150,000

Appropriation Language: This appropriation is from the oil overcharge money to the commissioner of administration for an agreement with Minnesota Power and Light Company to develop and evaluate an electric vehicle infrastructure with charging stations for use between Duluth and St. Paul, including installation of a charging station at the state of Minnesota central motor pool location. This appropriation must be matched by at least \$30,000 of nonstate money.

B. Status of Match Requirement:
Match Required: \$30,000
Amount Committed to Date: \$30,000
Match Spent to Date: \$ 1,100

II. Project Summary: This will be the first public demonstration of its kind, in the nation, to show the feasibility of using electric vehicles for long-distance commuting. The project involves the development of three electric vehicle charging stations, which will facilitate the use of electric vehicles for transportation in and between Duluth and the Twin Cities. Charging stations will be located at a mid-point, such as Hinckley, and at the endpoints. The Twin Cities charging station will be located at the state of Minnesota central motor pool location. A long-term demonstration will be conducted to demonstrate the feasibility and practicality of using electric vehicles for transportation in Minnesota. Educational demonstrations will be held at the charging sites to demonstrate to the public the use of fast-charging systems with electric vehicles. Results of the demonstration will be used in educating the public on the technology and the environmental benefits associated with this mode of alternative transportation.

Other factors contributing to the significance of this project are that this will be the first demonstration of this type to be done in a northern climate, and the demonstration will utilize Minnesota based electric vehicle fast-charging technology. Solar photovoltaics will also be incorporated as a component in the charging system, allowing an evaluation of this renewable technology for use in electric vehicle charging systems.

III. Six Month Work Program Update Summary:

May 15, 1996

Due to inadequate electric vehicle range, and other delays in technology development during 1996, it has become necessary to revise the scope of this project. The project will be divided into two consecutive phases. During 1996, two local electric vehicle demonstrations will be started. One vehicle will be based in St. Paul at the state motor pool location and the other will be located in Duluth. Both vehicles will utilize inductive coupled charging equipment. A long-term demonstration will begin to demonstrate the use of the vehicles and charging equipment. Building on this, in the second phase of the program, a third electric vehicle will be added to the fleet. This vehicle will be used for transportation between Duluth and St. Paul. A fast-charging station will be added at Hinckley and at one or both of the end points. A long-term demonstration of this system will also be conducted. A one-year time extension is being requested to complete both phases of this project. Additional funding has been committed from other sources to help fund the expanded scope of the project.

IV. Statement of Objectives

A. Local Electric Vehicle Demonstrations - During 1996, two local electric vehicle demonstrations will be started. One vehicle will be based in St. Paul at the state motor pool location and the other will be located in Duluth. Both will utilize inductive coupled charging equipment.

B. Inter-City Electric Vehicle Demonstration - This objective will involve the construction of charging stations at three locations; Duluth, a Twin Cities location, and Hinckley. The stations will utilize the inductive coupled, fast charging equipment. This system will permit inter-city use of electric vehicle between Duluth and St. Paul.

C. Documentation, and Presentation - A one-year demonstration of each electric vehicle system will be conducted. The electric vehicles will be used for regular trips in and around Duluth and the Twin Cities by state Government, Minnesota Power, and Schott Power employees. Reporting systems will be established to monitor vehicle performance and charging station operation. Results of this demonstration will be documented and presented to various groups in both public and private sectors.

Timeline for Completion of Objectives:

	7/96	1/97	6/97	1/98	7/98	1/99
A. Local Electric Vehicle Demonstrations	XXXXXXXXXXXXXXXXXXXXXXXXXXXX					
B. Inter-City Electric Vehicle Demonstration			XXXXXXXXXXXXXXXXXXXX			
C. Documentation, and Presentation				XXXXXXXXXXXXXXXXXXXX		

V. Objectives/Outcome:

A. Local Electric Vehicle Demonstrations

A.1 Activity: Charger Purchase and Installation

A.1.a. Context Within the project: This activity will provide the necessary charging equipment to facilitate the use of electric vehicles for the local use in and around Duluth and St. Paul. The St. Paul charger will be located at the Travel Management Division service facility. The Duluth location will be a Minnesota Power facility.

A.1.b. Methods: The chargers used in the demonstration will be inductive coupled 6 KW chargers as manufactured by Hughes Power Control Systems. Following quotation, a purchase order will be issued for the chargers.

A.1.c. Material: Two 6 KW stationary chargers and two 1.2 portable chargers will be purchased for use in a one-year demonstration. At the end of the demonstration, the chargers will remain at the sites indefinitely, under State ownership, for continued use by the State, Minnesota Power, Schott Power, and other parties using electric vehicles. Agreements will be made prior at that time regarding responsibility of the involved parties for maintenance, monitoring, energy supply etc.

A.1.d Budget

Total Biennial LCMR Budget: \$18,000

LCMR Balance: \$18,000

Match: \$0

Match Balance: \$0

A.1.e. Timeline:

	6/96	8/96
1. Purchase Order	X	
2. Delivery of Chargers		X

A.1.f. Workprogram Update: Quotes have been requested and received.

A.2. Activity: Electric Vehicle Procurement

A.2.a. Context Within the project: This activity will involve the evaluation of existing commercially available electric vehicles and purchase of two vehicles for the local demonstration projects.

A.2.b. Methods: Selection of the vehicles will be based primarily on range, charging capabilities, and thermal management capabilities. Following receipt of bids from manufacturers, a purchase order will be issued.

A.2.c. Material: Two electric vehicles will be purchased. The St. Paul vehicle will be based at the Travel Management Division service facility. The second vehicle will be located at a Minnesota Power facility in Duluth. The vehicles will be maintained in State ownership during and following the demonstration period.

A.2.d Budget

Total Biennial LCMR Budget: \$86,000

LCMR Balance: \$86,000

Match: \$0

Match Balance: \$0

A.2.e. Timeline:

	5/96	6/96	9/96
1. Evaluation	X		
2. Purchase		X	
3. Receive Vehicles			X

A.2.f. Workprogram Update:

A.3 Activity: Long-term Evaluation

A.3.a. Context Within the project: A one-year demonstration of the electric vehicles and charging systems will be conducted.

A.3.b Methods: The electric vehicles will be used for regular trips in and around Duluth and the Twin Cities by state government employees, Minnesota Power, and Schott Power System employees. A reporting system will be established to monitor vehicle performance and charging station operation. A system will also be established to coordinated the use of the vehicle.

A.3.c. Material: Repair and replacement parts. No major material purchases during this activity.

A.3.d Budget

Total Biennial LCMR Budget: \$0

LCMR Balance: \$0

Match: \$3,000

Match Balance: \$3,000

A.3.e. Timeline:

	6/96	1/97	6/97	1/98	6/98	1/99
1. Long-term Evaluation					X	
2. Demonstrations					X	

A.3.f. Workprogram Update: Negotiations are currently going on with the vehicle manufacturers.

B. Inter-City Electric Vehicle Demonstration

B.1 Activity: Development of EV Infrastructure

B.1.a. Context Within the project: This activity will provide all necessary charging equipment to facilitate the use of electric vehicles for the inter-city transportation demonstration. This activity will include the following tasks;

- Charging Equipment Selection and Purchase
- Charger Site Selction
- Charging Station Design and Construction
- Photovoltaic System Selection and Installation

The use of solar photovoltaics will be demonstrated at one of the charging stations or on the electric vehicle as a means of augmenting the use of fossil-fuel based electricity. The selected photovoltaic system will be used for decorative lighting at one of the charging sites. An evaluation will be done during the demonstration to determine the viability of solar photovoltaics in supplementing electric vehicle charging systems.

B.1.b. Methods: The charger(s) used in this phase of the demonstration will be inductive coupled fast and standard charging type (25KW to 50 KW) as manufactured by Hughes Power Control Systems. Charging station mechanical and electrical design for the preselected sites will be done by Minnesota Power. Local contractors will be utilized in the construction of the stations, installation of the chargers, and electrical hookup.

B.1.c. Material: One or more additional charging systems will be purchased. With current funding, it is planned that one charger (located at Hinckley) will be a 25 or 50 KW fast charger.. If funding permits, the Duluth charger will be upgraded to a 25 or 50 KW fast charging system at this time. Other materials purchased will include materials necessary for station construction, including electrical, mechanical and other finishing materials. One photovoltaic lighting system will also be purchased for the Hinckley station. The size will be determined during the design phase. At the end of the demonstration, the chargers will remain at the sites indefinitely, under State ownership, for continued use by the State, Minnesota Power, Schott Power, and other parties using electric vehicles. Agreements will be made prior at that time regarding responsibility of the involved parties for maintenance, monitoring, energy supply etc.

B.1.d Budget

Total Biennial LCMR Budget: \$46,000

LCMR Balance: \$46,000

Match: \$19,000

Match Balance: \$18,000

B.1.e. Timeline:

	1/96	6/96	1/97	6/97	1/98
1. Purchase Order				X	
2. Delivery of Chargers				X	

B.1.f. Workprogram Update:

B.2 Activity: Electric Vehicle Procurement

B.2.a. Context Within the project: This activity will involve the evaluation of existing commercially available electric vehicles and purchase of one vehicle for the inter-city demonstration project.

B.2.b. Methods: Selection of the vehicle will be based primarily on range, charging capabilities, and thermal management capabilities. Following receipt of bids from manufacturers, a purchase order will be issued.

B.2.c. Material: One electric vehicle will be purchased. The vehicle will be maintained in State ownership during and following the demonstration period.

B.2.d Budget**Total Biennial LCMR Budget: \$0****LCMR Balance: \$0****Match: \$0****Match Balance: \$0****B.2.e. Timeline:**

	6/96	1/97	7/97	1/98
1. Evaluation			X	
2. Purchase			X	
3. Receive Vehicle				X

B.2.f. Workprogram Update:**B.3 Activity: Long-term Evaluation**

B.3.a. Context Within the project: A one-year demonstration of the inter-city electric vehicle transportation system will be conducted.

B.3.b Methods: The electric vehicle will be used for regular trips between Duluth and the Twin Cities by state government employees, Minnesota Power, and Schott Power System employees. A reporting system will be established to monitor vehicle performance and charging station operation. A system will also be established to coordinated the use of the vehicle.

B.3.c. Material: Repair and replacement parts. No major material purchases during this activity.

C.1.d Budget**Total Biennial LCMR Budget: \$0****LCMR Balance: \$0****Match: \$5,500****Match Balance: \$5,500****B3.e. Timeline:**

	6/96	1/97	6/97	1/98	6/98
1. Long- Term Evaluation					X
2. Demonstrations					x

B.3.f. Workprogram Update:**C. Documentation and Presentation****C.1 Activity: Results Documentation and Presentation**

C.1.a. Context Within the project: Results documentation and Final Report.

C.1.b. Methods: During and following the demonstration, results will be compiled. A final report, summarizing the results of the demonstration, will be prepared for use by the LCMR and other interested parties,. The final report will also include results of the photovoltaic portion of the demonstration.

C.1.c. Material: No major material purchases during this activity.

C.1.d Budget**Total Biennial LCMR Budget: \$0****LCMR Balance: \$0****Match: \$****Match Balance: \$****C.2.e. Timeline:**

	1/97	6/97	1/98	6/98	1/99
1. Results Documentation					X

C.1.f. Workprogram Update:

C.2 Activity: Educational Activities

C.2.a Context Within the Project: This activity will be used to help promote public awareness of the technology.

C.2.b. Methods: On-site public demonstrations will be held to show the use of the fast-charging systems. At the conclusion of the demonstration period, educational programs will be developed for presentation to schools and other groups to promote increased awareness in the technology and related environmental issues.

C.2.c. Material: No major material purchases during this activity.

C.2.d Budget
Total Biennial LCMR Budget: \$0
LCMR Balance: \$0
Match: \$2,500
Match Balance: \$2,500

C.2.e. Timeline:

1/97 6/97 1/98 6/98 1/99

1. Educational Program Development

C.2.f. Workprogram Update:

VI. Evaluation: Results of this demonstration will be used to prove the feasibility of using electric vehicles for long-distance inter-city commuting in Minnesota. It will help to prove the feasibility of using electric vehicles in harsh winter climates. This project will demonstrate that recharging electric vehicles will be as convenient and safe as refueling gas powered vehicles. It will also heighten public awareness of both electric vehicles and the environmental implications that they have for reduction of non-point source emissions. The potential impact of this project will be continued growth in the use of electric vehicles in the state of Minnesota and the related infrastructure, stimulating economic growth.

VII. Context Within field: This pilot project will demonstrate the practicality and convenience of applying new electric vehicle technologies allowing them to be used in long-distance commuting. Recent demonstrations have shown electric vehicles to be effective for commuting within metro areas. This project will also add to the existing knowledge base by linking metro areas with an electric vehicle system and providing operational information related to the performance of electric vehicles in northern climates. It will also provide opportunities to educate the public about solar photovoltaics, electric vehicles, and reducing non-point source pollution. Proving the feasibility of electric vehicles for long-distance commuting will stimulate the use of electric vehicles, thereby reducing non-point source pollution in Minnesota. Information gained from this study will also be used by state fleet operators in complying with the 1992 Energy Policy Act and other possible future mandates, which require the purchases of alternative fuel vehicles.

VIII. Budget Context: Minnesota Power has been active in electric vehicle research for the past several years, with a primary interest in the potential environmental benefits that come from the use of electric vehicles. In 1991, Minnesota Power became involved in a two-year demonstration of the electric G-Van. Since that time, Minnesota Power has spent considerable additional time and funds in demonstration and education activities related to electric vehicles and electric transportation in general. During the 95-97 biennium, Minnesota Power and Schott Power Systems will be contributing an additional \$30,000 in in-kind labor to this project. Commitment has also been received from the State of Minnesota Travel Management Division to participate in the purchase of up to three vehicles for this project by providing funds equal to their cost, for comparably sized gasoline powered vehicles.

IX. Dissemination: Results of this demonstration will be documented and presented to various groups in both public and private sectors. The information gained will be valuable to Minnesota utilities, state and local government agencies, and other fleet users, for planning and implementation of electric vehicles, in the coming years. Educational programs will be developed for presentation to schools and other groups to promote increased awareness in the technology and related environmental issues. A separate evaluation of solar photovoltaics will also be done to determine its viability in the region.

X. Time: The formal electric vehicle demonstration will be concluded in July of 1997. However, it is anticipated that delivery of the educational materials will continue for one to two additional years and that the charging systems and vehicle will be used indefinitely for continued transportation between Duluth and the Twin Cities. It is hoped, with the success of this project, other vehicles will be purchased and individuals will

be using the system for both business and personal use. It is also possible that other destinations will be added in the future to expand the potential for this alternative form of clean air transportation in Minnesota.

XI. Cooperation: Schott Power Systems is the primary cooperator in this demonstration project. Schott Power is a recognized leader in the manufacture of power electronics used in electric vehicle charging systems. They have been closely involved with the Hughes Power Control Systems Division of General Motors in developing and supplying power electronics that are used with the GM Impact electric vehicle. Through Minnesota Powers' affiliation with the Electric Power Research Institute, Edison Electric Institute, and other electric utilities, extensive experience will be brought to the project, insuring successful results. The Electric Power Research Institute will be involved in the cold weather and vehicle battery testing in the project. The project team will also actively seek participation by vendors, other research organizations, and government agencies.

XII. Reporting Requirements: Semiannual six-month work program update reports will be submitted no later than January 1, 1996, July 1, 1996, January 1, 1997, and a final six-month work program update and final report by September 20, 1998.