Date of Report: July 1, 1997
LCMR Final Work Program Abstract

I. Project Title and Project Number: **Sustainable Development of Wind Energy on Family Farms** 0-21

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A. Legal Citation: ML95, Chp.220, Sec.19, Subd. 11(b).
Total biennial LCMR appropriation: $200,000
Balance: $0

Appropriation Language: This appropriation was from the oil overcharge money to the commissioner of administration for an agreement with the sustainable resources center to provide technical assistance and technology transfer for the development of wind energy harvesting.

Project Purpose:
Wind energy is developing rapidly in Minnesota, right now. It's being developed in wind plants which are large arrays of utility-scale turbines. This project introduces rural landowners to a parallel mode of development, such has been done in Europe. There, the typical wind project is a single or small cluster of 2-5 turbines, owned by local investors or cooperatives. This project introduces a decentralized approach to wind development to rural Minnesotans, and provides them basic tools to make a determination about developing their own wind rights in the windy portions of southern and western Minnesota.

Objectives:
This project had 3 main objectives. The first objective was to develop a curriculum to cover issues which family farmers identified as barriers to participating in wind energy development. The topics included: understanding the opportunity, economics of wind energy, wind measurement and siting, interconnection to utilities, buying and financing a wind turbine, options for ownership. The second objective was to train people who in their professional settings could share this wind energy information with their communities. The third objective was to pilot this material in actual training situations around the state.

Overall Project Results:
The curriculum was developed, peer reviewed and printed in its first draft form. The materials include a main text, a learning guide for teachers, and a software program. The materials were presented for the first time at this projects' train-the-trainer event called Windustry. By most accounts the materials were well received by the over 4 dozen attendees. The 31 participants were actively engaged in discussion, learning exercises and lecture presentations lead by 17 national and local wind energy experts over the course of three days. The experts and the attendees are the core of the wind energy network that SRC will continue to broaden in the next biennium to promote the sustainable development of wind energy in rural Minnesota. The materials have been used in a variety of manners since their initial release.

Project results use and dissemination:
When this project was planned two years ago, we felt formal types of education were the primary objective. The weather patterns this spring forced us to revise our methods for piloting this material in actual use. Our experience found that informal education along with formal classes is often more effective. Especially with time being so limited this spring for outreach to farmers and farmer educators . Some examples of informal outlets include: meetings for specific segments of the materials, presenting wind information at local town council meetings, having open discussions at a local coffee shop, organizing one hour meetings and one day regional meetings, creating a Windustry newsletter, or developing a regional training network for rural communities.

Conclusion:
SRC has found that this type of access to wind energy educational material and access to technical expertise in a non-marketing forum just did not exist prior to this project. As Minnesota gets set to be one of the most active areas in the country for wind energy development over the next few years, an educational effort like this is vital for this new clean energy industry to become a sustainable part of our economy.

Date of Report: July 1, 1997 (rev. of 1/15/97)

LCMR Final Work Program Update Report

Project Title and Project Number: **Sustainable Development of Wind Energy on Family Farms** 0-21

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A. Legal Citation: ML95, Chp.220, Sec.19, Subd. 11(b).
Total biennial LCMR appropriation: $200,000
Balance: $0

Appropriation Language: This appropriation is from the oil overcharge money to the commissioner of administration for an agreement with the sustainable resources center to provide technical assistance and technology transfer for the development of wind energy harvesting.

B. Status of Match Requirement: N/A

II. Project Summary:

The development and delivery of a curriculum of customer-oriented learning materials will be developed using a variety of media (print, video, slide & overhead, audio). It will cover issues which family farmers have identified as barriers to harvesting the wind: e.g., understanding the opportunity, economics of wind energy, wind measurement and siting, interconnection to utilities, standardized purchase-of-power contracts, buying and financing a wind turbine, leasing land to wind developers, formation and governance of cooperative corporations.

Background

Wind energy is developing rapidly in Minnesota right now. Minnesota's first wind energy development consisting of 76 wind turbines, with 100 foot diameters of their spinning blades has been completed in Lake Benton Minnesota in 1994.[1] Northern States Power is mandated to purchase 425 megawatts (MW) of power from wind energy by 2002, and 825 MW if the Public Utilities Commission determines that it is NSP's least-cost option for new electricity. Most wind industry experts fully expect the wind to be the lowest cost choice for electricity within the decade, especially if the environmental benefits are quantified as required by Minnesota State law. The current round of bidding for the next NSP wind project is expected to cost about 4¢ per kilowatt hour, less than half the price of the 1600 MW of wind energy developed in California's mountain passes in the 1980's.

[1] The project is a 25 megawatt development using turbines that have a capacity of about a third of a megawatt each. It was developed by Kennetech U.S. Windpower through a competitive procurement process by NSP. The cost of the power is estimated to be slightly below 5¢ per kilowatt hour.

Within this context, Minnesotans are beginning to ask how they can participate in developing Minnesota's wind resources. A collaborative effort of three organizations[2] called the Sustainable Energy for Economic Development (SEED) project is currently working with Southwest Minnesota farmers on how they can improve the benefits to their local communities as the wind energy industry develops. The Northwest Area Foundation is funding two small projects in this area, one to create a basic written guidance to people who own windy land, a short written piece just to identify the issues, and to answer basic questions. In addition, a survey of rural people is being conducted to assess the level of interest currently and the perception of what barriers exist to rural Minnesotans becoming equity partners in smaller, decentralized wind energy projects.

In its 1992 Energy Policy Act, the Federal government offered an incentive for wind energy development — a ten year credit of 1.5¢ per kilowatt hour for every project contracted for installation by July 1, 1999. This means that for every 100MW of wind energy developed after that tax credit expires, $50 million of benefits available from the Federal government to local economic development will have be lost.

Wind energy development: two models

The wind energy currently planned for Minnesota is expected to be developed on windfarms, isolated concentrations of wind turbines in arrays of 200 or more, financed and owned by developers who are not local. This project will introduce rural landowners to a parallel mode of development, such has been done in Europe. There, the typical wind project is a small cluster of 2-5 turbines, owned by local investors or cooperatives.

Purpose

This project will introduce this decentralized approach to wind development to rural Minnesotans, and provide them basic tools to make a determination about developing their own wind rights in the windy portions of southern and western Minnesota. The final output will be a comprehensive course which has been pilot taught 6-10 times and which can be continued to be offered after the expiration of the LCMR grant cycle. Many Minnesotans are already discussing the potential for local people to be equity partners in smaller, decentralized wind energy projects, yet do not know whether it is feasible or practical to do so. This curriculum fills that information gap.

The scale of the wind projects contemplated by this training and technology transfer project is small —projects of one to several windmills, using wind turbines potentially as large as 300-500 kilowatt (kW) state-of-the-art machines or as small as the existing 35-40 kW machines around rural Minnesota today. Along with economic benefits to local communities, there are some technical and environmental advantages to developing distributed systems of wind energy in parallel to the large-scale windfarms currently planned.

Methodology

This project will involve an advisory committee of wind energy professionals who will assist SRC. We will assemble current information and develop of a comprehensive course that will enable participants to learn what it takes to evaluate their wind resource and harvest the wind. Learning materials will be developed using a variety of media, including workbook, video,

[2] Minnesotans for An Energy-Efficient Economy, the Minnesota Project and Clean Water Fund began the SEED project in Fall of 1994 and it extends through Fall of 1996.

slides and transparencies. A trainer's manual will be developed to assist the course trainer, as will materials for the course participant to retain.

The project will assure that a base corps of trainers go through an intensive workshop to learn how to teach this course. These trainers will then have the opportunity to team-teach the course in pilot sessions in at least three rural Minnesota locations. The participants in the pilot sessions will be this project's target audience. The primary target is owners of windy land in rural Minnesota, and secondary audiences are described below in the final section of this summary.

Project Outcomes

1) Participants will gain an understanding of wind energy, the opportunity, and the economics. Participants will learn what factors go into wind speed assessment and turbine siting, and will examine Minnesota wind patterns. They will learn about the latest wind turbine technology and what is involved with turbine maintenance. Participants will consider how to finance a wind turbine and the various options for ownership. Also, participants will look at wind energy issues from the utilities perspective, how to connect to the grid and consider factors of selling power to the utilities. They will be able to describe different possible ownership arrangements and the ways to assure they can utilize the federal tax credit for wind. Topics will include partnerships with wind manufacturers or developers, formation and governance of cooperative corporations, and other options.

One train-the-trainer course will be held in a rural location with participants from different areas of state (SW, SE & NW) to build an infrastructure of knowledgeable educators who can disseminate the information broadly.

3) An established knowledge base will extend beyond the program life. Information will be available at many existing rural outlets for agricultural and economic development information and learning, so that the sustained orderly development of farmer-owned wind energy will be maintained.

4) Farmers will gain a powerful tool for low-risk diversified agricultural income, resulting in the saving of many family farms.

5) Pollution prevention is a core outcome. It varies depending on the mix of electricity generation technologies of the utility that buys the power. For example, 825 megawatt of wind added to NSP's mix prevents emissions of 8250 tons of sulfur dioxide, 9,900 tons of nitrous oxides and nearly 3 million tons of carbon dioxide per year, about 8% of system total for all three pollutants.

Vision.

As this project unfolds, we will be seeking ways to continue to promote this coursework, and continue to develop the curriculum and the knowledge base and keep it vital after the expiration of the LCMR funding. To continue to offer the course locally, the trainers and course developers will have to identify future markets for the course, through existing rural networks of information. Other audiences for this course beyond the family farmer will be identified. For instance, this course might be offered to rural town leaders and policy-makers, board members of municipal and cooperative utilities, and also bankers or other financiers of wind projects. Another future venue for this course may be to offer it as a night course at the Minnesota

Technical College at Jackson which currently offers a full Associates degree program in Wind Energy Technology, training students to become professional energy technicians. Future development of the course could include broadcast of a condensed version, or the development of a CD ROM version, including up-to-date wind maps, capital costs and turbine design.

III. Six Month Work Program Update Summary:
uly 1, 1997

here were a few areas that we had to revised our goals in order to pay attention to what our main constituents for this information were telling us.

SRC went through a learning process in terms of how much technical support and assistance is needed in respect to having new community educators use and teach the wind energy materials developed by this project. For most educators in the rural communities, the topic of wind energy is so new and our materials are so new they don't have a level of mastery yet. In our initial planning stages we had set very high expectations that they could just turn around after the 3-day train-the-trainer session and be an expert holding classes in their own communities. This was not the case. As stated in previous updates, the participants of the Windustry workshop were very much interested and eager to learn about wind energy. However, we learned that it takes a full time effort to get our new wind educators up to a level of comfort and confidence for sharing the information formally through class offerings, info meetings or full day workshops.

With this additional effort to do the pilots trainings and for our outreach in rural communities we had to delay the revising and re-printing of the curriculum's main text. With only one staff person, it was not possible to simultaneously work on the pilot trainings and republish the aterials. Since we have funding for the next biennium we will update and republish the main ext in September of 1997.

We also recognize that there is a very narrow window of opportunity to hold springtime classes in ag based communities - right after the snow melt but before the farmers can get back in their fields. Mother nature has to be somewhat predictable so we can properly schedule the classes. In this the year of the "500 yr. flood", Mother Nature was not predicatable. We were forced to cancel some of our classes and re-schedule to a time not well suited for our target audience.

When this project was planned two years ago, we felt formal types of education were the primary objective. The weather patterns this spring forced us to revise our piloting this material, and our experience found that informal education along with formal classes is often more effective. Especially with time being so limited this spring to reach out to farmer and farmer educators . Some examples of informal outlets include: presenting wind information at local town council meetings, having open discussions at a local coffee shop, organizing one hour meetings and one day regional meetings, creating a Windustry newsletter, or developing a regional training network for rural communities. Some of the informal meetings we organized or participated in included: the Environmental Education Conference in Duluth, and a Sustatainable Communities meeting in Lanesboro. Also, one of the Windustry participants, ho works for a municipal utility, successfully presented a wind energy proposal to his city council based on the information learned at this workshop. Moorhead Public Service began a wind assessment program in May of this year.

January 15, 1997
SRC made substantial progress on this project during the past six months. Two major products were delivered; the pilot draft of the curriculum, *Harvest the Wind* was published; and the train-the-trainer workshop was held. We have received high praise for both the workshop and the course materials.

The curriculum, *Harvest the Wind*, is an extensive document composed primarily of material created for this project as well as documents previously published. The curriculum content has been well researched and peer reviewed by the members of the project advisory panel. The advisory panel is to be credited with many long telephone conference calls where the major points as well as nuances of the curriculum were hashed out. The workbook itself is ten chapters long and covers topics which include: wind assessment, wind economics, energy production, utility markets - past, present and future; siting for wind, wind technology and case studies of people in midwest who have already gotten involved with wind energy. A learning guide is included in the materials as an outline for trainers to present the materials. There is also a lending library of slides, and a spreadsheet for economic evaluation of various scenarios.

The train-the-trainer event was planned, organized, and held on January 7-10, 1997 in Alexandria, Minnesota. The event was sandwiched in between a couple blizzards but that didn't put a damper on anyone's interest or intensity for this workshop. The event was called *Windustry Minnesota* . It had been broadly marketed across the state, with emphasis on reaching educators in areas of strong wind resources. The event was designed to bring together educators from the MN Extension Service, the Farmers Union, college and university farm management programs, and interested rural community adult educators, for three days of expert instruction about wind energy for electricity generation. At the workshop, we had an extensive roster of wind energy experts to both present the course material and to play the role of coach. The coaches were the lead person for facilitating small group learning exercises over the course of the three day training event.

The workshop training was quite well attended in spite of the extreme weather conditions. We had a broad and diverse group of attendees from several areas of the state. In addition to the farm management educators in attendance as mentioned above, we had biology and environmental educators from universities and colleges, representatives from rural development agencies, the Upper and Lower Sioux communities, and White Earth Land Recovery Project. Also, we had an unexpected but welcome small interest group of utility representatives from municipal utilities as well as a municipal power agency.

Our activities for the next few months will be to market and pilot this work further, support its use by workshop attendees, obtain as much feedback and plow revisions of the materials back into a final first draft.

IV. Statement of Objectives:

A. Develop the curriculum. The first objective of the project will be to produce the curriculum. It will involve a combination of planning, research, writing, physical design and development of the curriculum materials, and duplication of the materials.

B. Train the trainers. This objective will be to hold classroom training sessions for the trainers, to prepare them to present the materials.

C. Work with individuals to provide the training. Pilot courses will be offered to move the ideas and the curriculum materials into the community. The outcome of this phase will be the delivered curriculum and a network of citizens and investors who have the necessary information to make wind development decisions. The course will be designed and produced in sufficient quantities to enable it to be offered after the LCMR funding expires.

Timeline for Completion of Objectives:

	7/95	1/96	6/96	1/97	6/97
Objective A. Technical Program Development	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx				
Objective B. Establish Systems for Technology Transfer			xxxxxxxxxxxxx		
Objective C. Pilot Training and Program Delivery				xxxxxxxxxxxx	

V. Objectives/Outcome:

A. Title of Objective/Outcome: Technical Program Development

A.1. Activity: Survey existing literature and knowledge.

A.1.a. Context within the project: This research gathering is the starting point. This project will use existing books and papers and expert opinion as the building blocks from which to develop the curriculum. The United States Department of Energy's new wind energy information center and the National Renewable Energy Lab will be key sources.

A.1.b. Methods: Conduct a literature search to gather all current and relevant published materials. Interview sufficient experts and stakeholders in the wind energy industry to gain a broad knowledge of their views of the needed components in the curriculum.

A.1.c. Materials: A tape recorder and several audio cassette tapes for telephone interviews will be purchased. This equipment will be used in all phases of the curriculum development. It must be available to record interviews at the convenience of industry experts. At the completion of the project the tape recorder will be used for other public interest projects related to SRC's mission in community environmental issues, in addition to continued promotion of renewable energy development in Minnesota.

A.1.d. Budget: $5000

Total Biennial LCMR Budget: $5,000

LCMR Balance: $0

MATCH: N/A

MATCH BALANCE: N/A

A.1.e. Timeline:

7/95	1/96	6/96	1/97	6/97

PRODUCT #1: xxxx

annotated bibliography of current literature on wind energy.

PRODUCT #2: xxxx

Product 2 - Audio tapes of expert interviews with summary documentation.

A.1.f. Workprogram Update:

January 1, 1996: This objective is complete. After our research of wind topics and literature was underway, it was discovered that the National Renewable Energy Lab (NREL) in Golden, Colorado had published an extensive bibliography in May 1995. The work that went into this very recent document was more extensive and inclusive than the work we could produce within the scope of this project - so rather than duplicate this effort we took advantage of it. Sustainable Resources Center has used the NREL bibliography as the basis for our research and we have amended it with local publications and smaller pieces that weren't included.

Another discovery was that there are several more times the volumes of current wind information than we could ever hope to gather with the limited resources of this project. The NREL bibliography has been our starting point in the selection of publications that are relevant to the work at each phase and obtain them on loan or purchase if neccessary.

The telephone interviews with industry experts is an activity that will continue through all phases of this project. The tape recordings do not exist for many of the interviews especially in the first few months. There was a good deal of trouble getting a telephone tape recorder to work properly with SRC's office telephone system. Where there is no tape recording for the telephone interview, notes have been recorded manually in journals.

A.2. Activity: Develop a detailed topic outline.

A.2.a. Context within the project: To assure the outcome of the project will produce the desired results, a thorough outline will need to be developed.

A.2.b. Methods: Using information gathered in the previous activity, the outline will essentially be the design of the course. A matrix of topics will be created. It will include methods to convey information, whether by text, graphic, photographic, video etc.

A.2.c. Materials: An Apple Macintosh computer and software will be purchased ı this activity of the project for the estimated cost of $4000. The computer will be used ɔontinuously for the development phase of the project which lasts one year. Currently on site at SRC there is no computer available for the time basis that is required or with the available storage a project of this size requires. It will be used in the next two objectives of the project as well for activities which include training record keeping, mailing lists, feedback evaluation, and to produce course marketing materials. The software required includes a page layout program, presentation design, and graphics. At the completion of this project the computer and software will be used through its useful life to continue SRC's work in distributed wind energy as well as other SRC projects for the promotion of renewable energy development in Minnesota. Or if this type of work is discontinued at SRC, a commitment to pay back to the Fund an amount equal to either the cash value received or a residual value approved by the director of the LCMR if it is not sold.

A.2.d. Budget: $4,500
Total Biennial LCMR Budget: $4,500
LCMR Balance: $0
MATCH: N/A
MATCH BALANCE: N/A

A.2.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
RODUCT #1:	xxxx				

The first draft of course outline and topics matrix.

A.2.f. Workprogram Update:

January 1, 1996:

The first detailed draft of the topics outline for the course was created. We have a preliminary matrix of topics as well. We fully expect to make several revisions to this work. It was done with the orientation to be as inclusive as possible with the wind information, graphics and audio and visual aids. Then as we test the outline with our focus groups and industry experts and as we get further along in the project the most critical topics will be identified.

A Macintosh computer was purchased as described in the method section above. The amount spent on hardware and the basic software was $3,510.00. We haven't selected or purchased the desktop publishing or graphics software, yet. SRC may supplement the software purchase as necessary. We have been getting the computer set up and installed with the applications we know we'll use at this point - word processing, database for wind energy contacts, and communications. Our internet email address for this project is srclisad@mtn.org.

A.3. Activity: Test the outline.

A.3.a. Context within the project: To assure that the curriculum developed is what the intended audience needs to know the topic outline will be tested.

A.3.b. Methods: Using contacts and networks established by SRC and other groups doing work on wind energy in rural Minnesota a focus group of approximately 6-12 participants will be assembled in three areas of rural Minnesota.

A.3.c. Materials: Phone calls and meeting costs

A.3.d. Budget: $1,500

Total Biennial LCMR Budget: $1,500

LCMR Balance: $0

MATCH: N/A

MATCH BALANCE: N/A

A.3.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxx			

Comments of a focus group on the course contents, and revised outline.

A.3.f. Workprogram Update:

January 1, 1996:

We are close to completion on this objective. This feedback gathered in these discussion groups is being looked at as an integral part of developing this course. Rather than one focus group for the whole state we are conducting one focus group in three different parts of Minnesota. The scope of this objective was expanded to get more direct comments and feedback from rural Minnesotans in three parts of the state. There were two focus groups simultaneously held in Pipestone with farmers and rural landowners from all over Southwestern Minnesota. Next was a group in St. Charles for the Southeastern portion of the state. Our third area for a focus group is in Detroit Lakes for the Northwestern farmers and landowners on January 6, 1996. It was not possible to get all the focus groups scheduled between the harvest season and the holiday season. But many of the participants in the focus groups have volunteered to continue to provide feedback to the project as we go through the development phases. Building the foundation for networking and getting valuable feedback from the population for which the project is targeted is going well.

One big lesson we learned is that the scheduling of this project has to be ever mindful of the farming seasons. This factor did not enter our thinking with as much emphasis as it deserved when the workplan and timeline were originally outlined. It is expected that there will be other changes to our original timelines due to the farming seasons as we move through the various phases of this project.

July 1, 1996:

This objective has been completed. All three of the scheduled focus groups were held as scheduled in different parts of the state. Excellent feedback was provided by participants. Because most of the participants had great interest in the further development of the course materials, the focus groups will be reconvened periodically to assist with the further assessment of the curriculum. The input from farmers and rural landowners is a vital aspect in the objectives and the design of this project.

A.4. Activity: Detailed outline reviewed by experts.

A.4.a. Context within the project: To assure the accuracy of, and the validity of the current industry information as reflected in this outline a panel advisory committee will be put together.

A.4.b. Methods: The role of the expert panel will be to stay involved with the technical issues that are the biggest barriers to installing wind on family farms. Some of the project advisors will also serve on the expert team to train the trainers. This advisory committee will meet several times over the period of time which the project is being developed and implemented. The panel members ~~will~~ may include wind energy experts, a power company representative specializing in wind, an educator, an attorney with knowledge in regulatory and independent power issues, someone with knowledge of wind farming in Europe. Out of town advisors will participate by conference call.

A.4.c. Materials: Meeting materials.

A.4.d. Budget: $1000

Total Biennial LCMR Budget: $1,000

LCMR Balance: $0

MATCH: N/A

MATCH BALANCE: N/A

A.4.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1	xxxx				
Convene a group of experts to be advisory committee.					
PRODUCT #2:		xx			
Written comments on outline from experts on advisory committee.					

A.4.f. Workprogram Update:

January 1, 1996:

The timeline for this objective has been pushed to the beginning of February due to the delay in completing the focus groups on the course outline with farmers and rural landowners.(See previous objective.) Most of the panel members have been recruited. They include representatives local to rural windy areas to help to determine the course content during its development, and placement of the course in rural community venues in a way that it can be kept alive after this funding cycle. Also, the advisory panel includes several wind energy professionals who will provide technical expertise and assistance in developing the tools for the curriculum over the course of the project. As of today the panel includes: Michael Tennis, Union of Concerned Scientists; Susan Hock, Wind Program Director, National Renewable Energy Lab; Randy Swisher, Director, American Wind Energy Association; Paul Gipe, wind consultant; Rory Artig, MN Dept. of Public Service; John Dunlop, wind consultant; Nancy Lange, Izaak Walton League of America; Skip Delong, Jackson MN Technical College, windsmith instructor, Randy Jorgensen, Southwest Regional Development Commission; Pauline Nichol, MN Extention Service, Southwest Area.

The first meeting of the advisory panel is scheduled for mid January. It will be convened by telephone conference call. The course outline will be distributed for discussion and comments. We expect to have all written comments from the advisory panel by the beginning of February.

July 1, 1996:
This objective was completed. The project advisory panel was expanded to include: Al Brudelie, Farm Management, Southwest Technical College, Glenn Cannon, Waverly Light and Power, Don Bain, wind consultant, Linda Schutz with the Minnesota Municipal Utilities Association and Audrey Zibelman, Northern States Power. The three utility perspectives represented on our advisory panel are important because that is the market for which the energy generated is targeted. along with more professional farmer educators. The course outline was reviewed, reorganized and revised by our advisory panel.

A.5. Activity: Writing the first draft of the section on general wind information; understanding the opportunity; economics of wind energy.

A.5.a. Context within the project: This activity and the next several activities will have to do with writing the first draft of the course curriculum which is the central aspect of this project. Each activity deals with the topics and issues as we see them now before any formal research has been conducted. As this project progresses, topics may be changed, added or deleted according to what is indicated by analyzing and evaluating our research and expert opinion.

A.5.b. Methods: Read, compile, edit and write the course information on general wind energy and distributed generation in particular, what is currently happening and what the potential is. Avoid duplication by gaining permission to use existing educational resources, especially slides, of groups such as the American Wind Energy Association (AWEA) and the Union of Concerned Scientists (UCS). Describe the situation in Europe with cooperative and small investor ownership of dispersed wind generators as a model for Minnesota farmers. Compile a detailed explanation of how wind measurements are performed for the purposes of resource assessment. Compile a detailed explanation of the economics of wind energy generation and the economics particular to dispersed generation. Present information on Federal and State law governing selling independent renewable electricity to the utilities. Show advantages of utilizing federal production tax credits by having systems on line by 1999.

A.5.c. Materials: Telephone, tape recorder, existing literature base (see A1)
A.5.d. Budget: $21,000
Total Biennial LCMR Budget: $21,000
LCMR Balance: $0
MATCH: N/A
MATCH BALANCE: N/A

A.5.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxxxxx			
First draft of the section on general wind information.					
PRODUCT #2:		xxxxxxx			
First draft of the section on economics of wind energy.					
PRODUCT #3:		xxxxxxx			
First draft of the section on understanding the opportunity.					

A.5.f. Workprogram Update:

January 1, 1996:

It was predicted that no matter what issues are identified in the focus groups and by the advisory panel, the above name sections would be included in any kind of a curriculum on wind energy. So the first drafts of the three sections named above were created. These are first drafts and will reviewed for revisions and additions. Also the three sections as they stand now may change significantly depending on what the feedback comments indicate.

July 1, 1996:

This objective is complete. The sections were reviewed by the project advisory panel and discussed in detail. There were several suggestions for revisions and additions. Many of the revisions had to do with the phrasing of a statement but several of the comments were substantial conceptual revisions that required more elaborate discussion. This was the first time the advisory panel was asked for their contribution. The advisory panel method of validating the curriculum materials seems to be working out. The revisions have been prioritized, validated and incorporated as appropriate.

A.6. Activity: Writing the first draft of the section on the wind turbine technology; and on wind turbine maintenance.

A.6.a. Context within the project: This activity deals with writing the first draft of the course curriculum which is the central aspect of this project. Each activity deals with the topics and issues as we see them now before any formal research has been conducted. As this project progresses the section topics may be changed, added or deleted according to what is indicated by analyzing and evaluating our research and expert opinion.

A.6.b. Methods: Compile the general principles of wind turbine technology and wind turbine maintenance by referencing existing documentation and interviewing key industry experts as recommended by the American Wind Energy Association. Portions of this work will be contracted to engineering experts in the field.

A.6.c. Materials: Manufacturers product literature, technical information, material under development for use at Minnesota's new training center for wind energy field workers.

A.6.d. Budget: $9000

Total Biennial LCMR Budget: $9,000

LCMR Balance: $0

MATCH: N/A

MATCH BALANCE: N/A

A.6.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxxx			

The first draft of the section on the wind turbine technology.

PRODUCT #2:		xxxxx			

The first draft of the section on the wind turbine maintenance.

A.6.f. Workprogram Update:

July 1, 1996:

This objective is complete. These sections were drafted, distributed and reviewed by the project advisory panel. There were detailed discussions as to what the objectives of these two

sections should be. Several conceptual ideas were introduced and the advisory panel discussed various approaches for the format of all course sections to follow.

We have essentially designed a curriculum with three levels of detail for all topic sections. The first level is the lesson plan for the educator to present the topics and discuss the topics in the lecture hall. The middle level is more detailed explanation of the concepts and skills for the course section. This level is written expressly for this curriculum. The third level is to use published materials which already exist to provide the educator with easy access to more in-depth information on all topics covered by the course.

A.7. Activity: Writing the first draft of the section on the financing of a wind turbine; options for joint ownership e.g. corporation, cooperative, partnerships.

A.7.a. Context within the project: This activity will have to do with writing the first draft of the course curriculum which is the central aspect of this project. Each activity deals with the topics and issues as we see them now before any formal research has been conducted. As this project progresses the section topics may be changed, added or deleted according to what is indicated by analyzing and evaluating our research and expert opinion.

A.7.b. Methods: Research and interviews with rural lenders, existing cooperatives, agricultural leaders and other industry representatives to assure this course has enough sound information on options to finance an investment into electricity generation with wind, and the various options for ownership. The advisory committee will meet on these issues.

A.7.c. Materials:
A.7.d. Budget: $4,500
Total Biennial LCMR Budget: $4,500
LCMR Balance: $0
MATCH: N/A
MATCH BALANCE: N/A

A.7.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxxxxxxxxxxxxxxxxx			
The first draft of the section on the financing of a wind turbine					
PRODUCT #2:			xxxxxxxxxxxxxxxxxxx		
The first draft of the section on options for ownership of wind turbines.					

A.7.f. Workprogram Update:
July 1, 1996:
These sections are currently being researched. The timeline has changed to coincide with a similar piece of research work here in Minnesota which is being privately funded. Sustainable Resources is working as a part of the technical advisory panel for this additional project. The findings of this additional work will be used as appropriate within the context of this curriculum project. Because this is one of the central pieces of this curriculum for an ever emerging new industry for the state and the country, we have decided that any work we could do would have greater value with the additional findings to use as building blocks. This will not impact the project's final delivery dates. The timeline for drafting this section has changed to the end of September 1996.

January 1, 1997
The drafts for these sections were completed and peer reviewed. The extra time to draft these sections of emerging data on these topics was useful. It is expected that as this project proceeds more data will emerge and be integrated into these sections.

A.8. Activity: Writing the first draft of the section on wind speed assessment, turbine siting and the characterization of Minnesota Wind Regimes.

A.8.a. Context within the project: This activity will have to do with writing the first draft of the course curriculum which is the central aspect of this project. Each activity deals with the topics and issues as we see them now before any formal research has been conducted. As this project progresses the section topics may be changed, added or deleted according to what is indicated by analyzing and evaluating our research and expert opinion.

A.8.b. Methods: Information will be gathered from wind experts pertaining to research and measurement of wind in various regions in Minnesota. The starting point will be MN DPS 1994 wind speed maps and the maps of the Union of Concerned Scientists published report Powering the Midwest . More extensive and recent data needs to be gathered and analyzed for small scale projects.

A.8.c. Materials: Maps, technical literature and product literature on anemometers and options for assessing wind energy potential, existing siting resource materials.

A.8.d. Budget: $6,000
Total Biennial LCMR Budget: $6,000
LCMR Balance: $0
MATCH: N/A
MATCH BALANCE: N/A

A.8.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxxxxxxxxxxxxxxxxxx			

The first draft of the section on the characterization of Minnesota wind regimes.

PRODUCT #2: xxxxxxxxxxxxxxxxxxxx
First draft of the section on economics of wind siting.

PRODUCT #3 xxxxxxxxxxxxxxxxxxxx
First draft of the section on wind measurement

PRODUCT #4: xxxxxxxxxxxxxxxxxxxx
A compilation of existing mapping work describing Minnesota wind regimes, with improved means for interpretation by the layman.

A.8.f. Workprogram Update:
July 1, 1996:
As with Activity 7 here again, there is still more information emerging on the topics in this section. Our research is continuing and the drafting of these sections will be delayed about one month however this will not impact the project's final delivery dates. The completion date for this section is now revised to be the end of August 1996.
January 1, 1997
The drafts of these sections were completed and peer reviewed. This section may have extensive changes between this pilot and the final first printing in June 1997. There is work

currently being done to verify and analyze new and additional data that will change the current wind map of Minnesota. We will include this information as soon as it becomes available by the Department of Public Service.

A.9. Activity: Writing the first draft of the section on wind energy issues from the utility perspective; connecting to the utility grid; selling power to utilities.

A.9.a. Context within the project: This activity will have to do with writing the first draft of the course curriculum which is the central aspect of this project. Each activity deals with the topics and issues as we see them now before any formal research has been conducted. As this project progresses the section topics may be changed, added or deleted according to what is indicated by analyzing and evaluating our research and expert opinion.

A.9.b. Methods: Research and interviews with utility representatives and utility experts will be conducted to get current information on utility issues with distributed electricity generation, purchasing power from wind turbine owners, regulatory issues such as PURPA, Minnesota's requirements for bidding over 12 MW, and pricing. This section will also address the technical aspects of utility interconnection. The advisory committee will discuss the best methods and the level of detail appropriate to presenting these issues to a lay audience. Also, will have issues to research and discuss with an attorney with knowledge in regulatory and independent power issues. Some experts will be consulted as volunteers, and some will be contracted for higher levels of service.

A.9.c. Materials: Resources such as model purchase of power contracts, standard pricing, retail rate purchase agreements for small power producers, etc.

A.9.d. Budget: $18,000
Total Biennial LCMR Budget: $18,000
LCMR Balance: $0
MATCH: N/A
MATCH BALANCE: N/A

A.9.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxxxxxxxxxxxxxxxxxxx			

The first draft of the section on wind energy issues from utility side of generation

PRODUCT #2: xxxxxxxxxxxxxxxxxxxxx
Product 2 - The first draft of the section on connecting to the utility grid

PRODUCT #3: xxxxxxxxxxxxxxxxxxxxx
The first draft of the section on selling power to utilities.

A.9.f. Workprogram Update:

July 1, 1996:
The project has made good connections with utility representatives from three different types of utilities in Minnesota - investor owned, municipal and cooperative. The research on the utility perspective and related issues is continuing and should proceed as expected.

January 1, 1997
The drafts of the sections above were completed and peer reviewed. We are satisfied with the content and expect only minor changes in the final printing.

A.10. Activity: Prepare graphics for all sections of course.

A.10.a. Context within the project: Graphics assist in presenting the information in a manner that is easily read and understood which is the main goal of this curriculum.

A.10.b. Methods: Several graphics will be incorporated for appropriate topics in each section. The various types of graphics include tables, charts, graphs, illustrations and photos. Many materials can be produced in-house with graphics presentation software on the Macintosh; some materials will be contracted out for professional production.

A.10.c. Materials: Film, slides, transparencies and graphic design tools.

A.10.d. Budget: $14,000

Total Biennial LCMR Budget: $14,000

LCMR Balance: $0

MATCH: N/A

MATCH BALANCE: N/A

A.10.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxxxxxxxxxxxxxxxxxxxx			

Several types of professionally produced graphics for all sections of the course.

A.10.f. Workprogram Update:

July 1, 1996:

This material is being gathered as we proceed with the drafting of each section. Our approach is to evaluate what graphics and images currently exist for each section. Then obtain permission to use the selected graphics or create our own where appropriate. This includes slides, charts, tables, photographs, line drawings and small video segments.

January 1, 1997

These activities were completed. Along with charts and tables included in the content, the visuals for the curriculum include slide presentations, video segments, and masters for overhead transparencies. All of the visuals will be used for the pilot presentation of the curriculum.

A.11. Activity: Validate and verify course content.

A.11.a. Context within the project: It is critical that the contents of this curriculum be up-to-date, accurate, clear and understandable to a lay audience.

A.11.b. Methods: Members of the advisory committee will review this course for validation and verification purposes. Lay persons will be enlisted to review the course materials for ease of understanding, accessibility and user-friendliness.

A.11.c. Materials: Mailing, telephone and meeting costs.

A.11.d. Budget: $4,000

Total Biennial LCMR Budget: $4,000

LCMR Balance: $0

MATCH: N/A

MATCH BALANCE: N/A

A.11.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxxxxxxxxxxxxxxxxxxxxxxxxxxx			

Written review comments from advisory members.
PRODUCT #2: xxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Written, or documented oral input from lay reviewers.
PRODUCT #3: xxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Comments incorporated into the context of the course.

A.11.f. Workprogram Update:

July 1, 1996:

For product one we are gathering comments and validating the information as we review each section of the curriculum. Our procedure is to copy and distribute each section to our advisory panel as it is created. Then after a review period all comments are submitted organized and discussed by those participating on the sub-committee for that section. This activity is proceeding as expected. Then in October there will be another review process of the entire work all at once. Because of the timing and scheduling of the training sessions we have added an additional review process after the Train-the Trainers conference in January 1997. The timeline above includes the change.

For product two we periodically conduct reviews of specific sections with lay reviewers. Our lay reviewers come from two different groups - our focus group and the work group with some of the farmer educators.

January 1, 1997

The described review activities were completed for all sections of the course. The review meetings with the advisory panel members went well. Each section of the curriculum was reviewed by several different individuals and their comments incorporated into the draft of the curriculum. There will be additional review opportunities of the course content after the train-the-trainer's workshop held in Alexadria, Jan. 7-10.

A.12. Activity: Develop a unified thematic design for all marketing and course materials, and publish the course.

A.12.a. Context within the project: This project activity is about designing learning materials that will be of most benefit to the course participant. The materials must not only be easily read and understood but also visually inviting so that they are shared and re-read and used for reference. The goal of this activity is to give life to this knowledge base so that its value extends far beyond the individuals who attend the pilot courses. Quality of all materials will be uniformly high, and visually very appealing.

A.12.b. Methods: Through contracting with a design professional, this curriculum will be packaged as a recognizably uniform work. The design overlay will be incorporated into any media used.

A.12.c. Materials:

A.12.d. Budget: $22,500

Total Biennial LCMR Budget: $22,015

LCMR Balance: $0

MATCH: N/A

MATCH BALANCE: N/A

A.12.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:			xxxxxxxxxxxxxxxxxx		

Course material design and layout.

PRODUCT #2: xxxxxx
The final draft of the course produced and duplicated.

A.12.f. Workprogram Update:

uly 1, 1996:

ıe objectives for the design and layout of all the learning materials for this project have been established and prioritized. We are nearing the completion of conducting a search for layout and design professionals that meet our criteria. We expect this activity to proceed as scheduled.

January 1, 1997

This objective has been completed. The final draft of the curriculum was printed in late December in preparation for the conference to be held in early January. SRC contracted with a curriculum design professional to design an appropriate format for the information presented and with a professional graphic designer to develop all of the curriculum materials. The end result is a high quality, easy to read, course materials that will be useful in the field.

B. Title of Objective/Outcome: Establish systems for technology transfer.

B.1. Activity: Select and Recruit Consultants to be super trainers.

B.1.a. Context within the project: Training the trainers goes to the heart of the project's usefulness. Developing a community of Minnesota-based trainers who can offer the course in the future extends the knowledge base into the future. To train these citizens, we expect to be able to attract national talent and expertise, and have some duplication between these trainers of trainers (heretofore called super-trainers) and project advisors. A team might include Paul Gipe, Randy Swisher, Carl Weinberg, Mick Sagrillo, Jan Hamrin. They would bring the following mix of skills: U.S. foremost wind expert; executive of AWEA, the industry association; former utility strategic planner, consultant and current AWEA chair; a used wind turbine equipment expert; a regulatory expert. Additionally, an expert in education or training techniques would be very helpful, both on the advisory committee (see above A3, product 1) and as a super-trainer.

B.1.b. Methods: The key to selection of the super-trainers is to cover the expertise needed and to get exciting and lively people who will make the long workshop enjoyable. Some of these super-trainers will be fulfilling their own goals and workplans with this work, and would only need to be paid travel reimbursements. Others may be brought in through a contract. We have begun discussions with AWEA about the amount of support that the industry can provide, since they will be major beneficiaries.

B1.c. Materials: N/A
B.1.d. Budget: $23,000
Total Biennial LCMR Budget: $23,000
LCMR Balance: $0
MATCH: N/A
MATCH BALANCE: N/A

B.1.e. Timeline:

7/95	1/96	6/96	1/97	6/97

RODUCT #1: xxxxxxxxxxxxxx
Assembled list of ideal trainers of the trainers (i.e., super-trainers), and back-ups.

PRODUCT #2: xxxxxx
Negotiations with proposed super-trainers, documented.

PRODUCT #3 xxxxxxxx
ntracts or agreements executed.

B.1.f. Workprogram Update:

July 1, 1996:

Currently, this project has assembled a group of national talent and expertise, in wind development and rural economic development to act on it's advisory panel. From early in this project it has seemed appropriate that as this group of national and local talent help to create and review the curriculum materials, they are also in very good positions to present the topics respective to their expertise. So the super-trainers as referred in the activity description above are, in many instances, from our advisory panel. Several are consultants who are known for their public speaking skills on wind and energy related issues.

As the timeline indicates we will be contracting the specific super-trainers for specific presentations over the next couple months.

January 1, 1997

These activities were completed and executed in a timely fashion. SRC contracted with eight national and local experts to be the super trainers for the wind energy course. The super-trainers include: Don Bain, Oregon Dept. of Energy/Wind consultant; Skip Delong, Southwest Technical College,Jackson; John Dunlop, American Wind Energy Association; Paul Gipe, Author/International Wind Consultant; Michael Noble, Minnesotans for an Energy-Efficient Economy; Brian Parsons, National Renewable Energy Labs; Michael Tennis, Union of Concerned Scientists and Tom Wind, Professional Electrical Engineer.

B.2. Activity: Meetings of the team of super-trainers.

B.2.a. Context within the project: Getting the super-trainers prepared to run the workshop, teach the curriculum and add broad depth of experience for the trainers to draw on is critical to program success.

B.2.b. Methods: Telephone conference calls will be extensively used to get the super-trainers together on the division of labor, the how the curriculum materials should be enhanced by the experts at the trainers workshop. Budget is for three lengthy meetings by conference call.

B.2.c. Materials: Complete draft of curriculum materials will be available.
B.2.d. Budget: $1000
Total Biennial LCMR Budget: $1,000
LCMR Balance: $0 $
MATCH: N/A
MATCH BALANCE: N/A

B.2.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:			xxx		
Super-trainers meeting #1.(July)					

PRODUCT #2: xxx
Super-trainers meeting #2. (September)

PRODUCT #3: xxx
Super-trainers meeting #3. (December)

B.2.f. Workprogram Update:
July 1, 1996:
Since the super-trainers are also advisory panel members the training issues and the train-the-trainers workshop have been discussed as an agenda item at the regular advisory panel meetings. There will be some more specific meetings for the sub-committee to actually plan the format of the workshop. This sub-committee will probably meet more often than outlined above. The first meeting is scheduled for July as the timeline indicates.
January 15, 1997
These activities were completed on a different schedule. We held one telephone conference call meeting in September, one in October and two in December. Then on Jan. 6, we had one more meeting with all the super-trainers in person in Minneapolis. This last meeting was very productive in serving as a final orientation meeting. We disscussed the super-trainer role for the three day workshop, presented the small group activities they would be facilitating and answered any remaining questions on the proceedings.

B.3. Activity: Determine the content of the workshop for trainers, location of workshop and select appropriate trainers.

B.3.a. Context within the project: To maximize the impact of the course long after the project ends, trainers will need to be selected who have the willingness and the ability to continue to offer the course in local communities. There is no ideal trainer, and no one person will be the sole trainer for a single course. We envision the course offered by a team of two, who interact, assist and relieve each other, and keep the course moving along as a high energy, high quality learning experience. Two trainers who have agreed to serve as a core are John Dunlop and Dan Juhl, Minnesota's foremost wind experts.

B.3.b. Methods: While super-trainers are working on their materials for the trainers workshop, intensive work will be done locally to strategically select a pool of trainers for the program. SRC will speak with trade allies, organizational sponsors, local educators, local utilities to identify candidates. A fair application and screening process will be used to select trainers, with every attempt to be inclusive and diverse while maintaining a high caliber group. Number will depend on projected market demand for the course, to be developed during the market research component, but it is hoped that it will be not less than 16-20 people who will be qualified to offer the course in tandem. Training will be offered to them free of charge in exchange for a commitment to be paid if used as a trainer at future pilot phase offerings. Note: not all trainers will necessarily be utilized to do training for pilot courses described below in Objective C.

B.3.c. Materials: Resource and background materials, curriculum materials.
B.3.d. Budget: $ 4,500
Total Biennial LCMR Budget: $4,500
LCMR Balance: $0
MATCH: N/A

MATCH BALANCE: N/A

B.3.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
ODUCT #1:				xxx	

ontent of workshop delivered by super-trainers to trainers.

PRODUCT #2:			xxxxxxxxx		

Train the Trainer Workshop organization and setup: dates, location, meals, lodging.

B.3.f. Workprogram Update:

July 1, 1996:

We are ahead of schedule on product 2 here. The date for the Train-the-Trainer workshop has been set based on the feedback from the groups of farmer educators that we have involved in this project. The date is set for January 7-10 1997, at the Arrowwood conference center in Alexandria, Minnesota. SRC has negotiated a very reasonable rate for meeting rooms, lodging and meals.

January 15, 1997

The train-the-trainers conference was held as scheduled in early January. Conference participation was at our expected levels and we have ensured that the most likely candidates for future training events were in attendance at the conference. Our expectation is that the conference will be a very successful kick-off to our training phase of this project. We have established relationships with the MN Extension both in rural communities around the state and on the St. Paul campus. Also, we are working with the MN Farmers Union, the state technical college system of farm management programs and with a few regional development agencies. The super-trainers' work on the drafting of e course itself made them very familiar with the content, so they were for the most part very mfortable with the topics they presented.

B.4. Activity: Conduct train the trainers workshop.

B.4.a. Context within the project: This three-day event will immerse the trainers in the curriculum. Hopefully we have a diverse cross-section of Minnesota professionals, educators, public interest groups, community leaders and other citizens who wish to teach the course, or who wish to become local experts in this subject matter. To hold costs down, a location such as Wilder Forest would be sought. Also, trainers would be reimbursed travel expenses, but not wages or consulting fees to attend. Perhaps, it will be best to use a Friday afternoon through Sunday morning format so people who have unrelated primary job duties can attend.

B.4.b. Methods: By constructing a fun, action-packed session with the super trainers and those getting ready to train, we expect to broadly expand the capability to get this information out to citizens. The heart of the work will be actually taking the course (of course), but there will be additional material on learning styles and teaching tactics.

B.4.c. Materials: The curriculum in final published form, other supplementary publications or materials as agreed to by the super-trainers.

B.4.d. Budget: $9,500

Total Biennial LCMR Budget: $10,800

LCMR Balance: ($1300)

MATCH: N/A

MATCH BALANCE: N/A

B.4.e. Timeline:

7/95	1/96	6/96	1/97	6/97
			xxx	

PRODUCT #1
Completed workshop training the trainers.

B.4.f. Workprogram Update:
anuary 15, 1997
his acivity was completed on schedule and with evidence of great success. The three day train-the-trainer workshop was held in Alexandria at the Arrowwood resort. The event was well attended and extremely well received by the participants.

In spite of blizzard conditions in the Alexandria area just before the workshop and several days of digging out the roads, and just all around poor conditions due to weather, the SRC wind energy workshop had 31 participants and 15 speakers. There were approximately 10 cancellations due to poor driving conditions - several of these from the southwestern part of the state where the blizzard conditions were the most life-threatening.

We had a broad and diverse group of attendees which included: MN Extension Service educators from communities along the western third of the state and from the St. Paul campus, farm management educators from the technical college system, university and college professors, Native American community members which are currently involved in wind assessment activities, representatives from several municipal utilities and a regional power agency as well as other interested individuals from around the midwest region.

Perhaps because it was so much work to get to this workshop, it is fair to say, that overall, the ople that made it there were intensely interested in the topics and issues being presented. he participants were genuinely engaged and asking thoughtful questions throughout most of the workshop, so rather than cut some topics we ran some sessions a bit longer than scheduled.

While the overall the response from attendees of the workshop was unquestionably favorable, there are aspects of the curriculum and the training sessions that didn't work as well as others. We received several constructive comments on the format and experience of the small groups. (This activity didn't provide the overall assimilation experience we had hoped for partly due to the weather, since some of the participants in each small group opted to leave early to avoid another blizzard that was heading toward Alexandria.) Also, there is so much information that some participants expressed concern about attempting to teach all this material in their own professional settings until after they have more time with it. We will work to address these concerns within this new network of wind energy ambassadors over the next few months.

This opportunity to learn about dispersed wind energy development as it emerges in Minnesota was certainly welcome and valued by those who attended this workshop. The following are some of the written comments on the workshop evaluations: "If all workshops could be this informative and intense, I would quit my job and only attend workshops." "The facilities and atmosphere were ideal nd the curriculum excellent." "The speakers were the most knowledgeable in the industry and a wide ariety as well." "Experiences far exceeded expectations, it was great." "You put together a wonderful program filled with excellent speakers." "I was totally impressed with your meeting." "Excellent job overall. Congratulations!"

C. Title of Objective/Outcome: Pilot Training and Program Delivery

C.1. Activity: Determine co-sponsorship, venues and dates for training.

C.1.a. Context within the project: Co-sponsorship, host sites and dates for training should be planned carefully and sufficiently in advance to give the curriculum program high credibility, accessibility, and convenience for the schedules of the target audience. At a minimum, it is planned that there will be a minimum of two high visibility co-sponsors for each training and one training site in each of the following regions: northwest, west central, southwest, and south central Minnesota.

C.1.b. Methods: Co-sponsorship will be determined by meetings with organizations with strong track records in providing reliable educational information to rural communities on economic and diversification issues, such as the University of Minnesota, technical colleges, nature centers and rural organizations. Host sites will be selected to maximize the quality of the learning environment, minimize the cost and provide accessibility to landowners in the western and southern third of the state. Special consideration will be given to venues that are willing to provide in-kind contributions such as registration, public information and marketing support. Dates and times for training will be selected after consultation with rural people about the work cycles of their seasons and weeks.

C.1.c. Materials: Phones, postage, promotional materials, on-site visits.

C.1.d. Budget: $7,000

Total Biennial LCMR Budget: $5,700

LCMR Balance: $1,300

MATCH: N/A

MATCH BALANCE: N/A

C.1.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:			xxxxxxxxxxxx		

A list of potential co-sponsors and venues for training, with contact names, phone numbers and faxes.

PRODUCT #2: xxxxxxxxx

A course summary and promotional piece to attract interest of local cosponsors and host sites.

PRODUCT #3: xxxxxxxxxxxxxxxxxx

A record of contacts, visits, correspondence with potential co-sponsors and host sites.

PRODUCT #4: xxx

A draft final roster of co-sponsors and host sites.

C.1.f. Workprogram Update:

January 15, 1997

This activity continues; we have been to gathering data for product #1, the potential sponsors and venues. We are in the process of firming up the planned meeting/class offerings. Product #2: The marketing materials used to market the train-the-trainer event were designed with the ease of adapting them for the local trainings. This should work out nicely.

July 1, 1997

This was an ongoing activity for the last 8 - 9 months with most concentration in the last 6 months. Establishing relationships with people who want to bring the curriculum to their communities. Setting up meetings and classes in various venues and preparing the marketing material.

C.2. Activity: Development of marketing plan.

C.2.a. Context within the project: For the project to be successful, a large number of potential customers will need to learn about this training, and will have to have a few exposures to the program concept to decide to participate.

C.2.b. Methods: A marketing plan will developed with the advice of experts who reach these target markets with products and especially educational information. The media value of the innovative concept and the public interest credentials of the Sustainable Resources Center will be used for maximizing free exposure, through newspaper coverage, public service announcements, call-in radio interviews. A high quality brochure will be produced with all program host sites and dates not later than four months before the first course. A distribution plan for printed materials will be included, and the value of targeted direct mail marketing will be evaluated as part of the marketing plan.

C.2.c. Materials: Printed materials, some color duplication for media kits.

C.2.d. Budget: $20,000

Total Biennial LCMR Budget: $20,000

LCMR Balance: $0

MATCH: N/A

MATCH BALANCE: N/A

C.2.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:		xxxxxxx			

Selection of marketing advisor for project, preferably a volunteer, perhaps someone from an agricultural company..

PRODUCT #2: xxxxxxxxx

A marketing plan for the course, including pricing analysis, media plan, brochure distribution plan, and analysis of targeted direct mail.

PRODUCT #3: xxxxxxxxxxxx

Assemble media packet and news release for course with copy emphasizing innovation and rural development, maps of windy areas of MN, and photographs.

PRODUCT #4: xxxxxxxxxx

Draft of marketing brochure copy to deliver to graphic designer.

PRODUCT #5: xxxx

Final printed brochures.

PRODUCT #6: xxxx

Summary of media exposure and distribution of marketing piece.

C.2.f. Workprogram Update:

January 15, 1997

This activity continues; it has been designed to be more suitable for the pace at which the new trainers are comfortable. Because the participants of the train-the-trainer event have feel they have so much to present and they are new to training this material, it is generally felt that smaller groups of people with focused interest would be more preferable than a larger audience with less immediate goals. So we have scaled this marketing plan back. A preliminary marketing plan has been developed for use after the train the trainer conference has been completed.

July 1, 1997

Our marketing was performed primarily with traditional methods such as fllyers and mailings. We did not go for broad appeal in this round because of the trainers comfort level. As their familiarity and confidence grows we will do more intensive marketing.

C.3. Activity: Presenting the pilot courses.

C.3.a. Context within the project: This is the culmination of the LCMR portion of the project - actual delivery of the course to the target audience. The course will be designed and sufficient copies of course materials will be produced so that the course can continue to be offered after the end of the project. The pilot will be offered in no fewer than three, but preferably four locations. Exact number of repeat offerings per location is undetermined, but possibly 2 per site. Total pilot courses offered under this grant will be 6-10.

C.3.b. Methods: Trained trainers, guest speakers, course materials including slides, instructor's manual, student materials as described under objectives 1 and 2.

C.3.c. Materials: In addition to the prepared materials, there needs to be reliable high quality audio-visual equipment that is easily transportable between training locations. Cost estimate is $1500. At the completion of the project the audio-visual equipment will be used for other public interest projects related to SRC's mission in community environmental issues, in addition to continued promotion of renewable energy development in Minnesota.

C.3.d. Budget: $24,000
Total Biennial LCMR Budget: $24,000
LCMR Balance: $0
MATCH: N/A
MATCH BALANCE: N/A

C.3.e. Timeline:

	7/95	1/96	6/96	1/97	6/97
PRODUCT #1:				xxxxxxxx	
Final schedule, planned logistics, including registration, refreshments, audio visual equipment.					
PRODUCT #2:				xxxxx	
An evaluation tool for completion by the participants.					
PRODUCT #3 :					xxxxxxx
Delivery of programs.					
PRODUCT #4 :					xxx
Evaluation results of course participants.					

C.1.f. Workprogram Update:

January 15, 1997.

This activity continues. SRC staff has completed the evaluation tool for participants and instructors, and we are focusing our efforts on implementing the course after firming the co-sponsors and venues.

July 1, 1997

The results of this activity had to be revised. There were priorities with the weather conditions 's winter and spring that limited accessibility to rural meetings and classes. It was clear that .ve did not have the time to do all of the 6 to 10 formal class offerings as originally planned. It was clearly out of the question to try to hold trainings in the North Western part of the state while they were having first the blizzards and then the floods. The trainers we trained in this part of the state would have welcomed the opportunity to team teach this material had the weather not been so overwhelming.

In Southwestern Minnesota we also had a canceled and rescheduled class due to the flood conditions. We were able to squeeze in a condensed version (2 days rather than 3) right before the farmers had to get back out for spring planting. This class which concentrated on wind energy economics was successful. It was presented by SRC and a engineer consultant. Then subsequent information meetings were held with the same farmer participants as follow up. These meetings went well and it is considered an on-going project to support this groups' efforts to explore having equity in a turbine project on their own property.

When this project was planned two years ago, we felt formal types of education were the primary objective. The weather patterns this spring forced us to revise our methods for results, and our experience found that informal education along with formal classes is often more effective. Especially with time being so limited this spring to reach out to farmer and farmer 'ucators . Some examples of informal outlets include: presenting wind information at local .own council meetings, having open discussions at a local coffee shop, organizing one hour meetings and one day regional meetings, creating a Windustry newsletter, or developing a regional training network for rural communities. Some of the informal meetings we organized or participated in included: the Environmental Education Conference in Duluth, and a Sustatainable Communities meeting in Lanesboro. Also, one of the Windustry participants, who works for a municipal utility, successfully presented a wind energy proposal to his city council based on the information learned at this workshop. Moorhead Public Service began a wind assessment program in May of this year.

VI. Evaluation:

The potential impacts of this project are a flourish of independently-sited wind turbines across the Red River Valley, the Buffalo Ridge, the Lake Agassiz area, windy locales near Crookston, Worthington, Morris, Marshall and Albert Lea and as far east as Rochester. In Minnesota there is a special opportunity due to the mandate for NSP to build or purchase 425 megawatts of electricity from the wind ,and double that if wind turns out to be the least cost option, including the costs to the environment. Wind industry experts are certain that wind will meet that challenge. This is equivalent to 2000 to 5000 turbines, depending on the size, and there is no necessary reason why it should all be developed in vast windfarms owned by California or uropean investors. This course can be a catalyst, but the full evaluation of its impact will be at least five years from now. By the year 2000, when the federal tax credits are due to expire, it will be a suitable time to evaluate the macro-level impact of this course.

On a micro-level, the best tool is to ask the attendees in writing for their candid assessments of the instructors, the learning materials and the overall utility of the course.

. Context:
This work is ground-breaking in that it focuses exclusively on dispersed generation —the vision that windmills can produce non-polluting energy and be economically spread across the rural landscape and owned by local investors/farmers and entrepreneurs. The knowledge base on wind energy technology has moved very rapidly over ten years, and even more rapidly over the past five as the price of wind electricity has plummeted.

This work is parallel to an on-going public education and organizing effort to inform rural people about wind energy through a two-year project, the Sustainable Energy And Economic Development project (SEED), which is a collaborative project of three Minnesota organizations. Ms. Daniels, the key staff person coordinating this project is affiliated with this effort.

VIII. Budget context:
Our organization serves a leadership role in Minnesotans for An Energy-Efficient Economy, who is the primary organization for the SEED project. The SEED project total budget is currently $280,000 for two years, and other grants are imminent. SRC is also cooperating with the Izaak Walton League who is developing a quick resource guide to owners of windy land which is expected to be available for print by January 1 1995. It is being done on a special $20,000 discretionary grant from the Northwest Area Foundation.

. Dissemination:
See above objectives B and C.

X. Time:
This project will stay within the two year funding period.

XI. Cooperation:
N/A

XII. Reporting Requirements:
Semi-annual six-month workprogram update reports will be submitted not later than January 1, 1996, July 1, 1996, January 1, 1997 and a final six month workprogram update and final report December 31, 1997.

XII. Required Attachments:
Attached is biological sketch the primary staff person of the project and two possible trainers who may also serve as advisors.