Renewable Energy Initiative (REI) Committee Report

Academic Year
2005-2006

Prepared by
Adam Lee Milt
October 26, 2006

This document has been prepared to assist in informing the student body and the administration of Appalachian State University about the proceedings of the REI Committee during the academic year from Fall of 2005 through the Second Summer Session of 2006. We are proud to be charged with responsibility of the implementation of renewable energy technology on behalf of our peers, the students of Appalachian State University. The following document is being provided to assure you that the decisions made on behalf of the Committee will be done in a thorough and legitimate manner. We are ready to fulfill the responsibilities that have been charged to us.

Included in this document is information regarding the proceedings of the REI, the selection process for newly added members, the students' involvement, the rules that govern the committee's decision making process, and developments of specific projects. A set of appendices have been attached to provide further documentation of specified events. You will find minutes from the Board of Governors, the Faculty Senate, the REI Committee and other correspondence pertinent to the operations and decisions of the Committee.

Thank you for taking the time to review our progress. Please let us know if there is any additional information that we can provide for you. We are excited to continue fulfilling our commitment to the student body through the implementation of renewable energy technologies on our campus. With your help, we are able to stand proud behind Appalachian State University as it transforms into a model campus for other schools in the UNC system, and beyond.

Committee Members for 2005-2006

Officers

Mike Dooraghi …….. Chair

Eric Mathis …… Vice-Chair

Alyssa Rudolph …….. Secretary

Brent Summerville ……. Treasurer

Lindsay Dula ……..…….. Grant Oversight

Parker Sloan ……... SGA Representative

Student Members

Mary Baker

Faculty Advisors

Patrick E. Beville……Appalachian State University Project Manager

Dr. Dennis Scanlin……..…….Appropriate Technology

Chuck Smith……..…….Sustainable Development, Chair

Jeff Tiller…….Building Science

Ben Winebarger……..…….. Physical Plant Maintenance Supervisor

Student Members Selected to Serve thru 2006 and 2007

Adam Lee Milt

Matthew Parks

Mission Statement

Reduce the environmental impact of Appalachian State University by replacing the university's existing sources of energy with cleaner forms of renewable energy technology on campus and serve as a resource for students and faculty by identifying and investing in the most appropriate renewable energy projects.

Meetings

September 1, 2005

October 6, 2005

November 10, 2005

December 13, 2005

January 19, 2006

February 16, 2006

March 23, 2006

April 27, 2006

History

Fall 2005

It was this fall that we realized there were some complications which hindered our ability to begin making purchases with REI funds. (Correspondence on this issue: Appendix A) We have been working diligently to resolve this issue but have made little progress. In the mean time, the Committee has continued working hard and has made some very important decisions:

1. We have allocated $7,000 to assist the students involved in the Biodiesel Processor Project. These funds will be used to supplement the grant that was received from the EPA to purchase parts and materials for the building and testing of the processor. (Discussion and voting on this issue: Appendix B)

2. Student Project Managers have been appointed for each of the six proposed projects we are researching. Each student will report to an appointed faculty advisor. Project Managers are responsible for providing the committee with detailed information regarding costs and specifications, an expenditure budget, and will be the spokesperson for the specified project. (Appointment of Faculty Advisors: Appendix C)

> Lindsay Dula: Biodiesel Processor Project, advised by Jeff Tiller
> Eric Mathis: Biodiesel Pilot Project, advised by Ben Winebarger
> Alyssa Rudolph: Solar Thermal Pool Heating, Advised by Patrick Beville
> Mary Baker: Raley Photovoltaic, advised by Chuck Smith
> Brent Summerville: Wind, advised by Dennis Scanlin
> Mike Dooraghi: Kiosk, advised by Jeff Tiller

3. The committee has allocated funding to purchase a 4,000 gallon fuel tank to be used for the Biodiesel Pilot Project. This project will enable an Appalcart bus, and two ASU vehicles, a truck and a tractor, to run on biodiesel for three months as a test for the fuel. Our intention is to receive a commitment that biodiesel will replace the diesel fuel currently used in ASU vehicles. Eric is working with Chris Turner and the Physical Plant to ensure the project's success. (Minutes reflecting the voting for this expenditure: Appendix C)

4. Miriam Makhyoun's SGA representation seat was filled by Parker Sloan, SGA Director of Sustainability, as decided by the SGA. In addition to holding a seat, Parker was elected in October to be media spokesperson for the committee.

It was decided during the November 17, 2005 REI meeting that monies cannot be authorized for a project without faculty or staff signature. (REI Committee minutes regarding signing off for monies with faculty advisor: Appendix C)

Spring 2006

Finally tangible strides have been made in spending procedures and project development, including:

1. The Guidelines and Procedures Document was adopted February 16, 2006. It contains information on Committee member selection and project funding.

2. The Project Funding Form was also adopted February 16, 2006 and will be used by REI Project managers to briefly describe the proposed project idea. The form will be signed by the Committee Chair. Then the Project Manager and Faculty/Staff Advisor will meet with Bob Feid to discuss the specifics of the project. After this meeting the form will be sent through Student Development to be approved.

3. Matt Parks and Adam Milt were added as members of the REI Committee on March 23, 2006 to serve throughout the 2006 – 2007 academic year.

4. A vote was held for officer positions for the 2006 – 2007 academic year. Results are:

Mary Baker……..Chair
Adam Milt……Vice-Chair
Alyssa Rudolf……..Treasurer
Eric Mathis……...Secretary
Matt Parks……Public Relations Officer
Lyndsay Dula……...Grants Officer

Project Overviews

Photovoltaic (PV) Array Project Summary

During the January 17, 2005 committee meeting it was decided that anyone would be able to submit project ideas in accordance with the REI Project Guidelines. It would be the committee's responsibility to review and approve possible projects that may be a candidate for further research. Input would be solicited via open forums, written submission forms, through the REI website, Appalnet, and the Appalachian. An open forum was scheduled for February 7, 2005 at 7:00pm. The deadline for submission of ideas was set for the end of March 2005. From there project ideas would be researched in terms of costs, payback, and feasibility. Our decisions for the project/s to be implemented were to be made in early April.

The committee met February 10, 2005 to discuss the ideas presented/discussed during the open forum. It was decided that the possibility of PV installations including a site at the Duck Pond would be researched, as well as a ground mounted grid tied PV array to be placed at a specified location on campus. It was also agreed upon that projects will have an accessible kiosk with information regarding system energy and system output. Patrick Beville confirmed that there will be no problem grid tying PV panels with New River Power and expressed concern for roof mounting panels as roof sites are not accessible to students. Dennis Scanlin did not want roof mounted panels to be eliminated from possible projects at that time. Alyssa Rudolph suggested possible combination systems with some panel roof mounted and some ground mounted, depending on site analysis.

Brent Summerville, Mike Dooraghi, and Alyssa Rudolph organized a site assessment project day through ASUSES, using solar assessment equipment donated for use from the Appropriate Technology department. Along with several student volunteers, (including Mary Baker) the group evaluated several sites on campus for the feasibility of locating a solar installation. Sites investigated included the southern roof of the new student recreation building under construction, an area next to the sidewalk in front of the Duck Pond, the landscaping bank in front of Raley Hall, the south-facing wall of the West Rankin Science Building, and open grassy areas in front of Walker Hall and on the Sanford Mall.

During the March 17, 2005 committee meeting, the group further discussed the possibility of a ground mounted grid tied PV array system to be installed at a specified location on campus. The committee agreed that the installation should occur somewhere on the main campus, in a high traffic area where it would be highly visible and accessible. The group discussed the possibility of the installation occurring on the top of the new Howard Street parking deck, but felt that since the project had not yet began its construction phase the idea would be better off saved for the next phase of project ideas. From the solar site assessment results, the committee decided that the landscaping between Raley Hall and a faculty parking area that faces out over Rivers St. would be the most suitable site for the PV array installation. Besides the excellent visibility of the

project within a high traffic area, there is also ample room for an on-site kiosk display of the monitored system energy output and savings. Because several of the first site assessment areas did not turn out to be feasible locations, committee members suggested alternative sites to be evaluated as well. The alternative site assessment suggestions included Varsity Gym, Broyhill Inn, and Chapell Wilson.

Before the April 14, 2005 meeting Brent Summerville, Mike Dooraghi, and Alyssa Rudolph organized another solar site assessment day for alternatives that had been suggested. The Varsity Gym proved to be an inadequate site, Broyhill Inn was a good site, and there were one or two good spots around Chapell Wilson, but not in an area large enough for an array. The committee discussed these results and felt that Broyhill should be ruled out because of its lack of visibility and overall university traffic. Also discussed was how the group should prioritize the projects for completion. The committee agreed to complete some final research before the final meeting of the semester in May so that a vote could be made before ending discussions until August.

May 2005, the committee agreed to first pursue the biodiesel project, secondly pursue the PV array project, thirdly the solar thermal project, etc... Meetings would be held over the summer to continue progress on the biodiesel project.

At the committee meeting on September 1, 2005 Patrick Beville said he would discuss any concerns regarding a PV system installation in front of Raley Hall with the Dean of the College of Business. Brent Summerville volunteered to contact Bob Zickafoos regarding electricity paybacks and utility savings for a grid tied PV system, as well as speak with New River to discuss the NC Green Power program. After a review discussion for the implementation of a PV system in front of Raley Hall, Lindsay Dula motioned that the committee pursue the grid tied array. Parker Sloan seconded the motion. Mike Dooraghi asked for further discussion. There was no further discussion. The motion passed unanimously. Patrick began to fill out the OC-25 for the PV system also including a Fat Spaniel data and information logger.

During the October 6, 2005 Patrick Beville announced that Dr. Clyde Robins had shown resistance to the aesthetics of the proposed PV system that REI would like to install on the bank in front of Raley Hall. He has asked that the committee provide a Photoshop representation of the system in place with landscaping to resolve the conflict of interest. Mary Baker and Alyssa Rudolph worked on this presentation. Patrick Beville also mentioned that Dr. Robins is excited about the possibility of a wind turbine on campus up behind the Broyhill Inn. This project will be considered if the opposition to the PV system is not resolved.

It was brought to the attention of the committee that each project should have a project manager. The role of the project manager is to act as spokesperson for the specified project, as well as run a subcommittee, if necessary, to fulfill any responsibilities that coincide with the given project. It was discussed that project managers (one student for each project) will be responsible for composing an expenditure sheet to be reviewed by the rest of the committee. To efficiently make use of time between committee meetings, it

was discussed that project managers would be able to O.K. small expenditures without bringing it before the committee at the formal monthly meeting. Mary Baker was voted to be the PV Array System project manager.

November 2005 meeting- Mary Baker presented a copy of the PV Array Photomontage of a Raley Hall installation that had been given to Dr. Robbins. Mary Baker and Brent Summerville had reviewed the findings of the Spring 2005 site assessments (ASUSES) and had gone out to reevaluate the Raley Site. Following the committee's and Dr. Robbin's suggestion they also assessed the backside of the AppalCart bus stop located near Raley Hall. After discussing the results, it was confirmed that the committee considered Raley Hall the best site for the project. Mary volunteered to document their findings to present to Dr. Robbins at a later date.

During the February 16, 2006 meeting it was restated that as previously discussed, Dr. Clyde Robbins of Design and Construction has shown some hesitation to the PV array to be placed in front of Raley Hall. He has suggested alternative locations to be looked at by the committee. We have chosen to postpone potential PV projects until more funding is available and additional sites can be analyzed.

September 2006, the PV array project is still temporarily postponed.

Duck Pond PV Kiosk Project Summary

During the January 17, 2005 committee meeting it was decided that anyone would be able to submit ideas in accordance with the REI Project Guidelines. It would be the committee's responsibility to review and approve possible projects that may be a candidate for further research. Input would be solicited via open forums, written submission forms, through the REI website, Appalnet and the Appalachian. An open forum was scheduled for February 7, 2005 at 7:00pm. The deadline for submission of ideas was set for the end of March 2005. From there project ideas would be researched in terms of costs, payback, and feasibility. Our decisions for the projects to be implemented were to be made in early April.

The committee met February 10, 2005 to discuss the ideas presented/discussed during the open forum. It was decided that the possibility of PV installations including a site at the Duck Pond would be researched, as well as a ground mounted grid tied PV array to be placed at a specified location on campus. It was also agreed upon that projects will have an accessible kiosk with information regarding system energy and system output. Patrick Beville confirmed that there will be no problem grid tying PV panels with New River Power and expressed concern for roof mounting panels as roof sites are not accessible to students. Dennis Scanlin did not want roof mounted panels to be eliminated from possible projects at that time. Alyssa Rudolph suggested possible combination systems with some panel roof mounted and some ground mounted, depending on site analysis.

During the September 1, 2005 meeting it was stated that the duck pond installation and kiosk is still a possible project for the committee. No further decisions were made at time in regards to the implementation of this idea.

October 6, 2005, it was brought to the attention of the committee that each project should have a project manager. The role of the project manager is to act as spokesperson for the specified project, as well as run a subcommittee, if necessary, to fulfill any responsibilities that coincide with the given project. It was discussed that project managers (one student for each project) will be responsible for composing an expenditure sheet to be reviewed by the rest of the committee. To efficiently make use of time between committee meetings, it was discussed that project managers would be able to O.K. small expenditures without bringing it before the committee at the formal monthly meeting. Mike Dooraghi was voted to be the Duck Pond PV Kiosk project manager.

During the December 2005 meeting we introduced the new members to the committee replacing our graduating members: Mike Dooraghi and Brent Summerville. The new members were Matt Parks and Adam Milt. It was agreed upon that Matt would take over as project manager for the Duck Pond PV Kiosk project upon Mike's departure.

February 16, 2006, we have chosen to postpone potential PV projects until more funding is available and additional sites can be analyzed.

Solar Thermal Project Overview

September 1, 2005, Alyssa gave a report on her findings for a proposed solar thermal pool heating system for the new sports complex. The analysis included energy savings, costs, and paybacks. She also spoke with the architect of the complex to determine that additional loads added to the roof would be within the means of the system. Based on the information provided to her, there should be no complications with the additional weight of the solar thermal panels. Hard copies of the report are on file for more details. Alyssa was selected by the committee to be the Solar Thermal Project Leader.

November 10, 2005, Patrick was successful at obtaining access to the roof above the new pool complex to determine the site's resources for solar thermal installation. He took pictures from five different points on the roof. The back half of the roof has been determined as a good site for the installation and Dr. Robins approved this possibility. Patrick discussed with Dr. Robins the layout of the pipes and all ideas were accepted.

December 18, 2005, Alyssa presented a proposal for the pool project and the committee approved hiring a designer and capped the project at $200,000

February, 16 2006, It was brought up for discussion that student fees pay for 60% of the Student Recreation Center and 100% of the Student Union. There has been interest expressed in a solar thermal system for the Student Union. We considered whether or not we should reduce the system size for the pool and expand the solar thermal to be included on the Student Union due to the amount of student funds going to the building. We

decided to proceed with the pool project as planned because of the fuel cost savings that would be utilized by the university. Solar thermal for the Student Union will be considered as a future project.

March 23, 2006, Because the cost of the pool project is under $300,000, we were not required to advertise for a designer. Instead we needed to inform potential designers that we were looking to complete the pool project and if they were interested they needed to submit an RFP to the committee for review. We set a deadline for RFP submittal to be on April 7, 2006 after which we would review the RFP's, conduct interviews if necessary, and hire the designer of choice. We would then begin the design process for the solar thermal system.

April 27, 2006, Information about the pool indicated that the pool might be able to heat itself with waste heat from the dehumidifiers. Alyssa agreed to look into this further.

A sub-committee of Alyssa, Mike, Mary, Adam, Matt, and Patrick interviewed Sundance Power Systems and Elm Engineering, Inc. and decided to choose Elm Engineering to do an assessment of the pool, Newland Residence Hall, and Plemmons Student Union.

August 31, 2006, After a presentation from Elm Engineering, the committee decided to go ahead with a full design for the Plemmons Student Union and cap the project at $100,000.

Wind Turbine Project Summary

September 1, 2005, Brent reported that there was a class 2/3 wind site in the vicinity of the Broyhill Inn. He researched several different wind turbines for cost comparisons.

October 6, 2005, Brent Summerville voted in as project manager.

November 10, 2005, Dennis Scanlin voted as faculty advisor.

August 31, 2006, The wind project was postponed until further funds become available for funding.

Biodiesel Pilot Project

September 1, 2005, The pilot project was designed as a trial period for the university to utilize biodiesel as an alternative fuel source. Vehicles in the motor pool and the Appalcart were targeted for the trial. At the end of the trial the hope was to have achieved a commitment from the parties involved to continue using the fuel, with the REI paying any differences in fuel costs. Research was conducted on tank size and availability, placement, and cost.

Brent Summerville motioned that we allocate $7,000, to fulfill the request of the biodiesel proposal, contingent upon: 1. an available site for the project, 2. permission

from the EPA that outside funds are allowed to be used in addition to the $10,000 grant, and 3. the group commits to a regular review process based upon the existing grant timeline. Eric Mathis was selected to be project manager for the project.

October 6, 2005, There was discussion over what size tank needed to be purchased for this project. Factors that weighed into that decision include:

1. A secondary use after the pilot project to be given to the biodiesel processor group (if a small tank is purchased),
2. The number and types of vehicles that would be involved in the trial and their usage per a given period of time,
3. How often the distributor would be able to refill the tank and those costs,
4. The tank will continue to be used for the same purpose after the trial has been successfully completed.

Eric would work with Ben to find numbers for the amount of fuel that would be used, the costs for adding a pump to the tank, find out specifics for the permits required to obtain a 2000 gallon tank, and a proposed location for that tank. This information would be made available to the committee so that the letter of understanding for the trial period could be drafted. The purchase of the tank would be made after the details of size and permits were discussed and the charge letter had been received.

The letter of understanding would include the following information:

1. The vehicles that would be run on biodiesel
2. The amount of time the trial period would run
3. Information about the fuel
4. Financial criteria for funding the purchase of the fuel
5. Guidelines for early termination of the project

November 10, 2005, Eric presented a power point with information regarding 3 possible tank sizes for the biodiesel project. See document attached for details. At this point in time, three vehicles were been chosen to participate in the three month long pilot project to run completely on biodiesel. There was discussion amongst committee members regarding whether or not we should use the biodiesel in older or newer vehicles for the pilot project with the following debate. Older vehicles are more likely to have preexisting problems that could easily be blamed on the use of biodiesel, but the use of the fuel would reassure those concerned that it is an appropriate substitute for diesel fuel in older vehicles. New vehicles may present a problem because while proving the fuel works in them, there still may be some hesitation in running the older vehicles. Jeff Tiller was concerned that if we used only new vehicles this hesitation is a likely problem.

Ben told the committee that there are no significantly older vehicles that could be tested. With that as a consideration, the decision to use the vehicles that have already been nominated stands. Eric would talk with Chris Turner to determine the age of the buses and get his commitment to use a new Apalcart bus for the trial. Ben brought up the

concern about diesel and biodiesel gelling in cool temperatures. If the biodiesel vehicles were treated in the same manner as the diesel and the additives were added to both, this would not be an issue. A 5,000 gal fuel tank existed at the motor pool. If we purchased a 4,000 gal tank to be used for the trial, once the trial is over we would have the fuel holding capacity necessary to maintain a 1,500 gal reserve when a new batch of fuel, 7,000 gal (state contract amount), is ordered and being delivered.

If we were to purchase a 2,000 gal above ground tank that included a sheltered area for pumping, we could incorporate PV panels into the roof. We would have a problem with the fuel delivery, though because the combination of the current 5,000 gal tank and new 2,000 gal would not allow for a reserve. Therefore additional costs would need to be addressed once ASU made the commitment to switch fuels.

If we rented a tank for the pilot period, as suggested by Jeff Ramsdell, we would avoid the current issue of purchasing a new tank. But when the project went through we would have spent unnecessary funds on rental fees for those three months because a new tank would still need to be purchased. In addition, a rental tank houses 500 gal and would need to be filled on a very regular basis. If the tank were to run dry, then the vehicles would have to fill up with diesel and the test results would be void.

Dr. Ramsdell introduced a piece of legislation to the committee concerning motor pool fleets under state ownership. The law stated that state agencies are to reduce the use of petroleum products by 20% by 2010 (see handout for complete information). A plan for this reduction needs to be proposed by January 1, 2006. Biodiesel would fit into the plan as an alternative fuel. At this point in time, Ben said that the motor pool did not own diesel vehicles. Eric will look into Appalcart to determine if it is a state entity to be included in the new law. Jeff Tiller would consult with the State Energy Office to inquire about partial funding for the tank. Eric motioned that we proceed with the purchase of the 4,000 gal tank. Brent motioned to amend the previous motion to include continued research for additional outside funding for this purchase.

Further discussion was conducted. Eric suggested that the REI Committee purchase the tank and the difference in fuel costs if the biodiesel rate is higher than that of diesel. Jeff Tiller said that because we are purchasing the tank, ASU should pay fuel costs no matter what the price of biodiesel. Mary told the committee that included in the price of the 4,000 gal tank was a free cleaning for our current 5,000 gal tank at the motor pool. This process is necessary to remove any contaminants or buildup currently in the tank before biodiesel could be put into it.

Brent brought up the alternative that biodiesel may make its way to the High Country through a local fuel dealer. The problem with this as a source for biodiesel for the school is that the fuel would not be under the state contract price. Eric said if we decided on the 4,000 gal tank it could be installed in December. Brent reminded us that if we made this purchase, there would be sufficient funds in the account to be able to hire a designer for the spring project. It was suggested by Ben and Mike that we should ask the motor pool to step up the reserve amount from 1,500 gal to 2,000 gal after the biodiesel switch to

make sure we will be able to get fuel delivered in a reasonable amount of time. Jeff Ramsdell said that obtaining the fuel would not be an issue.

The motion was restated as it stands: We proceed with the purchase of the 4,000 gal tank, while continuing to seek out additional funding, but accepting that such funds may not be available, in which case the Committee would make the entire purchase. ASU will pay costs equivalent to that of diesel with the REI paying the difference in costs for the extent of the trial period, after which ASU will pay the complete fuel costs. Jeff Tiller seconded the motion. The vote passed unanimously.

It was decided that Ben Winebarger would be Eric's faculty advisor for the Biodiesel Pilot Project. Eric would write the pilot project letter and send it to the REI committee for review.

December 13, 2005, The tank purchase was prepared and ready to be sent out for bids. It was revised to $37,000 to include a pump that was not previously accounted for. A letter of commitment was not necessary.

January 1, 2006, Ben Winebarger and Eric Mathis presented the update on the motor pool biodiesel project. The project is unable to move any further until the REI committee is able to obtain access to funds. Eric proposed that the signage for the project be done using campus resources. The committee decided to wait until funds are obtained and a complete proposal is made to decide how much of the fuel cost, if any, we would be willing to incur.

February 16, 2006, Eric worked with Chris Turner. It was decided that the Blue Route of the Appalcart would run on B20 for one month after which, contingent upon problems, the entire fleet will be switched to run on B20. Eric planned to meet with Bob Feid to finalize the Project Funding Form.

There was uncertainty with regards to the purchase of biodiesel fuel for the pilot project. Patrick planed to discuss this issue with Jane Helm and it would be determined whether or not REI purchases the fuel or just pays the difference between the cost of the biodiesel and straight diesel. Eric arranged for a sign to be printed through the ITC to be posted on the Appalcart bus for the pilot project. It was suggested that stickers be obtained for all the Appalcart buses after the fleet has switched.

March 23, 2006, A proposal document has been drawn up for the pilot project. This document will be reviewed and signed to initiate the beginning of the pilot project. The Blue Route of the Appalcart would run on B20 fuel for one month after which the motor pool would adopt B20 as fuel for the diesel vehicles and the Appalcart buses. Eric would look into the additives that may be necessary to add to the fuel and determine whether or not these additives would be supplied with the purchased fuel or would need to be added to the tank at the motor pool.

There was a need to increase the amount of funding allotted to the project due to the increased expense of purchasing the first 2,000 gallons of B20 fuel for the pilot. This purchase would need to be made using committee funds as a part of the agreement for the trial period. The increase would also allow for the cleaning of the current tank to remove any diesel residue that could cause complications in the future, and the costs associated with the design and printing of advertising for the Appalcart buses. The committee voted unanimously in favor of the pilot project budget be increased from $38,000 to $45,000.

Major Problems

This year was monumental for the REI in that the procedure for dispersing funds to projects was finally ironed out. This took a lot of work because Appalachian State University has never allocated such a large amount of money to a committee composed mostly of students. Now that this hurdle has been overcome, the REI has been actively pursuing the implementation of projects.

Another problem that the REI faces is deciding the proper way to go about many of the procedural activities inherent in any committee of students, such as replacing graduating members, adding new members, and publicizing activities. The REI established regulations for adding new members to the committee and established a Public Relations Officer position to the committee.

There has been significant resistance to projects like the PV and Biodiesel Pilot Project from several members of the administration. In the case of the PV Project the objections to its installation have been mostly aesthetic concerns. With the energy that has been devoted towards improving the grounds over that past ten to fifteen years, it is understandable that those responsible for the appearance of the grounds would be apprehensive about installing an uncommon technology. Mary Baker has been successful in showing that the visual impact of pole-mounted arrays can be minimal at the Raleigh installation site and the administration has been more supportive as of late.

Knowing that any new technology will be met with some opposition, the REI committee is happy to educate those who are opposed to installations of RET out of ignorance and also happy to be educated about what real considerations must be made when installing new technology on a state-funded university. This has been a relatively smooth process overall with the administration and the REI committee making strong compromises when the need has arisen.

Funding Allocations

Funds collected from 2005-06 school year	$126,393.45
Funds expected from 2006-2007 school year (will change)	$126,393.45
Funds expected from 2007-2008 school year (will change)	$126,393.45
Total	$379,180.35

Projects	Allocation	Expended	Remaining
Raley PV	$ 65,000.00	$ .00	$ 65,000.00
Biodiesel Solar Thermal	$ 7,000.00	$ 7,000.00	$ .00
Pool Solar Thermal	$180,000,00	$ 3398.71	$ 176,601.30
Broyhill Wind	$ 65,000.00	$ .00	$ 65,000.00
REI Kiosk	$ 6,500.00	$ .00	$ 6,500,00
Biodiesel Tank	$ 43,000.00	$ 162.50	$ 42,837.50
Miscellaneous			
Maintenance Reserve	$ 76,800.00	$ .00	$ N/A
Operational Expenses	N/A	$ 746.00	$ N/A
Total	$443,300.00	$11,307.21	$349,438.80

Remaining Unallocated and/or Unspent Funding	$ 29,741.55

Future Plans

This year had a lot of struggles and victories. Now that a procedure has been put in place for fund disbursement the REI is excited to tackle some large projects. Foremost in the minds of the REI is the need to implement a large renewable energy system that displays the best this technology has to offer. Solar thermal and biodiesel are at the top of this list and will probably require most of the funding that the REI has received to date.

The REI is also very interested in conducting more outreach to the student body to inform them of our progress, get feedback about our work, and to get interested students involved in projects. Ideas for outreach include tabling periodically, improving media coverage, presentations to the student body every semester, and presentations to the SGA every semester.

Grants could greatly improve the effectiveness of the REI. Because Appalachian State University has such a huge demand of energy, it is difficult to make a huge impact on these demands with the limited funding we receive. We will be interested in obtaining grants to expand the amount of projects we can fund.

The REI will come before the student body for a vote on whether or not to continue its funding. This could get complicated because there are a number of questions that arise, especially because the legislation that started the REI has the renewal set one full year before the funding actually ends. Our main goal will be to determine which approach will be best to continue the REI's work and pursue this approach.

Overall, the REI is most interested in working with the student body, faculty, and administration in a more synergistic way. There are still many opportunities at the university that the REI has not gained the capacity to take advantage of yet. We will be pursuing opportunities work together with other committees, clubs, and groups on projects.

The REI is particularly excited about and interested in working with the Provost's Task Force and its constituent sub-committees for the creation of an Appalachian State University research "Eco – Institute". This is largely a conceptual project now, but the REI feels that when it is time to construct the facility that will house the institute this committee will entertain the allocation of resources to outfit the building with renewable energy technology and equipment. This has the potential to be a very exciting project and

facility for Appalachian State University, especially so since there is opportunity here for REI's involvement.

Appendices

Appendix H

Communication between REI committee members during the fall 2005 about difficulties with gaining access to the student raised REI money

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Sept 6, 2005 [From Patrick Beville to REI Committee]

Bob Feid, Associate Vice Chancellor, met with me today. He needs the committee to provide him with a document showing authority given to this committee to decide how to spend state money.

The document would come from the Chancellor's office and would basically give us proper authority to spend lots of money for the school.

We also may need to document how the appointments to the committee were made. Perhaps SGA has this documented.

Sept 14, 2005 [From Patrick Beville to REI Committee]
REI:

I have asked Greg Lovins, Associate Vice Chancellor, to step in on his. He will meet with Ms. Jane Helm, Vice Chancellor Business Affairs, in the morning to verify the type of document needed. It will probably simply be a letter from the chancellor. He will follow up and procure whatever documentation is needed.

Patrick

Oct 12, 2005 [From Patrick Beville to REI Committee]
REI -

I have been researching the manner in which we are going to be able to spend money in the group. I have conferred with several different sources regarding the authorizations. As determined during the last meeting, students will be assigned as project managers and determine when monies can e spent. However, a faculty or staff member will be required to review and approve the recommendation. We are still determining where it will go from here.

Patrick A. Beville, P.E.

November 10, 2005 [Beville to REI Committee at November 11, 2005 meeting]
The REI Committee has run into complications in obtaining the authorization to make purchases. To assist in the process, Patrick has been told that the committee needs to provide a document that summarizes its activities up to this point in time. The summary is to include the following information:

1. How the original committee and its members were established
2. What individuals served on the original committee?
3. What individuals are serving on the current committee and what are the positions held by these members

4. How were the decisions made when committee members were assigned?
5. How are decisions made in the committee now, what is the voting process
6. What projects are being pursued, the project managers for each, and the faculty/staff advisors for those projects

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Appendix B

REI Committee Minutes: September 1, 2005-11-22

Allocating Biodiesel Processor Project Funds

REI Committee Minutes for September 1, 2005

Absent: Jeff Tiller, Ben Winebarger, Eric Mathis, Mary Baker

Guests: Jeff Ramsdell, Jeremy Ferrell, Paul Feather, Chris Jude

First Order of Business: The Committee has welcomed Parker Sloan as our newest member. Parker serves as the SGA Director of Sustainability.

Treasury Report: Our expenditures thus far: 54.76
Proposed Budget: 591.00
Remaining Balance: 536.24

The REI funds have begun to accumulate in our account as of this semester. Funds are estimated to be $64,000 per semester. Brent will be meeting with Bob Fied on 9/6/05 for a more accurate report.

Discussion of Projects:

Biodiesel Processor: The EPA has issued a $10,000 grant to the above mentioned guests to build a biodiesel processor. The grant will allow for the design and development of a sustainable processor that will incorporate the abilities of students from numerous disciples throughout the university. Biodiesel will then be made, part of which will be supplied for university use. The Grant committee has approached the REI Committee with a request for an additional grant to assist in funding the project. See hard copy of proposal for additional details regarding this request.

Biodiesel Pilot Project: The pilot project will be designed as a trial period for the university to utilize biodiesel as an alternative fuel source. Vehicles in the motor pool and the Appalcart will be targeted for the trial. We wish to provide a tank for the fuel and allow for a specified amount, to be decided upon, over a given amount of time. Upon the end of the trial we will hope to have achieved a commitment from the parties involved to continue using the fuel, with the REI paying any differences in fuel costs.

Research is being conducted on tank size and availability, placement, and cost.

A 2/3 quorum was established at this meeting. Upon having this quorum, Brent Summerville motioned that we allocate $7,000, to fulfill the request of the biodiesel

proposal, contingent upon an available site for the project, as well as regular review process based upon the existing grant timeline. Dennis Scanlin seconded the motion. Mike Dooraghi asked for further discussion. There was no further discussion. The motion passed unanimously.

PV Installation:

Patrick will discuss any concerns regarding a PV system installation in front of Raley Hall with the Dean of the College of Business.

Brent will contact Bob Zigafoose regarding electricity paybacks and utility savings for a grid tied PV system, as well as speak with New River to discuss the NC Green Power program .

After a review discussion for the implementation of a PV system in front of Raley Hall, Lindsay Dula motioned that the committee pursue the grid tied array. Parker Sloan seconded the motion. Mike Dooraghi asked for further discussion. There was no further discussion. The motion passed unanimously.

Patrick will begin to fill out the OC-25 for the PV system also to include a fat squirrel data and information logger.

Solar Thermal:

Alyssa gave a report on her findings for a proposed solar thermal pool heating system for the new sports complex. The analysis included energy savings, costs, and paybacks. She also spoke with the architect of the complex to determine that additional loads added to the roof would be within the means of the system. Based on the information provided to her, there should be no complications with the additional weight of the solar thermal panels. Hard copies of the report are on file for more details.

Patrick will look into the possibility of one or more REI committee members to access the roof of the pool for a more in depth solar site analysis.

Wind:

Brent reported that there was a class 2 wind site in the vicinity of the Broyhill Inn. He researched several different machines for cost comparisons. See hard copies of this report for more information.

Kiosk:

The duck pond kiosk is still a possible project for the committee. No further decisions were made at time in regards to the implementation of this idea.

There was no further discussion. Mike adjourned the meeting.

Appendix C

REI Committee Minutes: November 17, 2005

REI Committee minutes regarding signing off for monies with faculty advisor and appointment of Faculty Advisors

REI Committee Minutes for November 10, 2005

Present: Brent Summerville, Patrick Beville, Mary Baker, Alyssa Rudolph, Parker Sloan, Ben Winebarger, Mike Dooraghi, Lindsay Dula, Eric Mathis, Jeff Tiller

Guest: Jeff Ramsdell

Absent: Dennis Scanlin, Chuck Smith

Access to REI Money:

The REI Committee has run into complications in obtaining the authorization to make purchases. To assist in the process, Patrick has been told that the committee needs to provide a document that summarizes its activities up to this point in time. The summary is to include the following information:

1. How the original committee and its members were established
2. What individuals served on the original committee
3. What individuals are serving on the current committee and what are the positions held by these members
4. How were the decisions made when committee members were assigned
5. How are decisions made in the committee now, what is the voting process
6. What projects are being pursued, the project managers for each, and the faculty/staff advisors for those projects

The responsibilities for completing this report have been broken up between the committee members in the following way:

Alyssa will provide a summary of information about the processes of the committee from the official establishment of the group, December 2004.

Mike will do precommittee research through previous Faculty Senate, Staff Council, and SGA minutes. Mike will also obtain from Ernie Hodgson any information he may have in regards to the initial processes of the legislation.

Mary is working to contact Miriam Makhyoun and Nick Albu to obtain information from them.

Parker will contact Judd Watkins and Chris Pereira, current SGA leaders.

Brent will provide information about how the student portion of the committee was selected.

We will meet Thursday November 17, 2005 at 7:30 to finish the compilation of the document.

Tresaury Report:
Our current budget stands at $65,077.61. No purchases have been made from our account.

Biodiesel Pilot Project:
Eric presented a power point with information regarding 3 possible tank sizes for the biodiesel project. See document attached for details.

At this point in time, three vehicles have been chosen to participate in the three month long pilot project to run completely on biodiesel. A total fuel usage of 2000 gal (*please check that number, I am not sure I have it right) has been projected for each month of the project.

There was discussion amongst committee members regarding whether or not we should use the biodiesel in older or newer vehicles for the pilot project with the following debate. Older vehicles are more likely to have preexisting problems that could easily be blamed on the use of biodiesel, but the use of the fuel would reassure those concerned that it is an appropriate substitute for diesel fuel in older vehicles.

New vehicles may present a problem because while proving the fuel works in them, there still may be some hesitation in running the older vehicles. Jeff Tiller was concerned that if we used only new vehicles this hesitation is a likely problem.

Ben told the committee that there are no significantly older vehicles that could be tested. With that as a consideration, the decision to use the vehicles that have already been nominated stands.

Eric will talk with Chris Turner to determine which bus will be used for the trial.

Ben brought up the concern about diesel and biodiesel gelling in cool temperatures. If the biodiesel vehicles are treated in the same manner as the diesel and the additives are added to both, this will not be an issue.

Tank Discussion:
We currently have a 5,000 gal fuel tank at the motor pool. If we purchase a 4,000 gal tank to be used for the trial, once the trial is over we will have the fuel holding capacity necessary to maintain a 1,500 gal reserve when a new batch of fuel, 7,000 gal (state contract amount), is ordered and being delivered.

If we were to purchase a 2,000 gal above ground tank that included a sheltered area for pumping, we could incorporate PV panels into the roof. We would have a problem with the fuel delivery, though because the combination of the current 5,000 gal tank and new 2,000 gal would not allow for a reserve. Therefore additional costs would need to be addressed once ASU made the commitment to switch fuels.

If we rented a tank for the pilot period, as suggested by Jeff Ramsdell, we would avoid the current issue of purchasing a new tank. But when the project goes through we would have spent unnecessary funds on rental fees for those three months because a new tank would still need to be purchased. In addition, a rental tank houses 500 gal and would need to be filled on a very regular basis. If the tank were to run dry, then the vehicles would have to fill up with diesel and the test results would be void.

Dr. Ramsdell introduced a piece of legislation to the committee concerning motor pool fleets under state ownership. The law states that state agencies are to reduce the use of petroleum products by 20% by 2010 (see handout for complete information). A plan for this reduction needs to be proposed by January 1, 2006. Biodiesel would fit into the plan as an alternative fuel.

At this point in time, Ben said that the motor pool does not own diesel vehicles. Eric will look into Appalcart to determine if it is a state entity to be included in the new law.

Jeff Tiller will consult with the State Energy Office to inquire about partial funding for the tank.

Eric motions that we proceed with the purchase of the 4,000 gal tank.
Brent motioned to amend the previous motion to include continued research for additional outside funding for this purchase.

Further discussion was conducted. Eric suggested that the REI Committee purchase the tank and the difference in fuel costs if the biodiesel rate is higher than that of diesel.

Jeff Tiller said that because we are purchasing the tank, ASU should pay fuel costs no matter what the price of biodiesel.

Brent brought up the alternative that biodiesel may make its way to the High Country through a local fuel dealer. The problem with this as a source for biodiesel for the school is that the fuel would not be under the state contract price.

Eric said if we decided on the 4,000 gal tank it could be installed in December.

Brent reminded us that if we made this purchase, there would be sufficient funds in the account to be able to hire a designer for the spring project.

It was suggested by Ben and Mike that we should ask the motor pool to step up the reserve amount from 1,500 gal to 2,000 gal after the biodiesel switch to make sure we

will be able to get fuel delivered in a reasonable amount of time. Jeff Ramsdell said that obtaining the fuel would not be an issue.

The motion was restated as it stands: We proceed with the purchase of the 4,000 gal tank, while continuing to seek out additional funding, but accepting that such funds may not be available, in which case the Committee would make the entire purchase. ASU will pay costs equivalent to that of diesel with the REI paying the difference in costs for the extent of the trial period, after which ASU will pay the complete fuel costs.

Jeff Tiller seconded the motion. The vote passed unanimously.

It was decided that Ben Winebarger will be Eric's faculty advisor for the Biodiesel Pilot Project.

Eric will write the pilot project letter and send it to the REI committee for review.

Biodiesel Processor Project:
Lindsay reported that the progress for the processor is right on schedule. The group was concerned about when they would be able to utilize the funds granted to them from the REI committee. They have made purchases that include some items listed on the proposal list submitted to the REI. There was a concern about whether they would get reimbursed for these items. It was decided that the group would be reimbursed if they could provide invoices for the specified items once REI funds were available to be distributed.

Jeff Tiller was assigned to be Lindsay's faculty advisor for the Biodiesel Processor Project.

Lindsay also presented the Committee with a possible grant opportunity. This grant would provide matching funds to purchase biodiesel (see handout for full grant information). She will contact the contract officer to get more details for what the grant will cover before we decide to pursue the application process. The grant proposal is due on Dec. 1, 2005.

Solar Thermal Pool Assessment:
Patrick was successful at obtaining access to the roof above the new pool complex to determine the site's resources for solar thermal installation. He took pictures from 5 different points on the roof. The back half of the roof has been determined as a good site for the installation and Dr. Robins approves this possibility. Patrick discussed with Dr. Robins the layout of the pipes and all ideas were accepted.

Mike, Brent, and Alyssa will review the pictures.
Alyssa will continue to research estimates to be presented at the next meeting.

REI Display Board and handout:
Mike will be working on designing a display board for the REI committee that can be taken to events.

Raley PV:
There is continued opposition to the Raley PV system. Mary successfully completed the photoshop representation which was received by Dr. Robins. We will continue to pursue PV by looking for alternative sites on campus. Dr. Robins has stated that the site behind the Appalcart stop would be acceptable for the installation. We will do a second site assessment at this area to determine its potential.

Faculty Advisors:
REI monies cannot be authorized without faculty or staff signature. Each student Project Manager will work closely with an appointed faculty advisor. Any request to make purchases will go through the committee faculty/staff for approval. The following faculty advisor appointments have been made:

Ben Winebarger will advise Eric Mathis on the Biodiesel Pilot Project.
Jeff Tiller will advise Lindsay Dula on the Biodiesel Processor Project.
Patrick Beville will advise Alyssa for the Solar Thermal Pool Project.
Dennis Scanlin will advise Brent on the Wind Project.
Chuck Smith will advise Mary on the PV Project.
Jeff Tiller will advise Mike on the Kiosk Project.

Other Business:
Patrick discussed with Jeff Tiller the possibility of compensation for the students because of the large amount of work we are doing. Patrick suggested the possibility of earning credits towards graduation. Jeff said that could be done through a special topics course in the Tech Building. Though this would not be possible for some students who have a rigid program of study, there are some that will be able to take advantage of the opportunity.

Media coverage:
Parker will submit an article to the Appalachian giving them an update on the progress of the Committee as it currently stands.

The next meeting has been tentatively scheduled for Tuesday December 13. This date will be confirmed in the near future.

There was no further discussion. Mike adjourned the meeting.