

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Engineering
Engineering College Curriculum Committee
Vern Schaefer, Chair
vern@iastate.edu
294-9540

Date: January 20, 2012

To: Jan Thompson, Chair, Faculty Senate Curriculum Committee

From: Vern Schaefer, Chair, Engineering College Curriculum Committee



Subject: Proposed Energy Systems Minor

Last semester a proposal for an Energy Systems Minor was developed by a group in the College of Engineering, to be administered in the Mechanical Engineering Department. All the departments involved (shown in the attached proposal) have approved the minor and the Engineering College Curriculum Committee (ECCC) conducted a review of the proposed minor and it passed the ECCC unanimously. Subsequent to the ECCC approval, the recommendation was discussed at a College of Engineering faculty meeting on October 26, 2011 and submitted for electronic voting to the College of Engineering faculty. 169 faculty voted on the issue, with 146 (86.4%) voting yes, 12 (7.1%) voting no, and 11 (6.5%) abstaining or not voting. Thus, the ECCC and the College of Engineering faculty recommend approval of the Energy Systems Minor.

We now pass this onto the Faculty Senate Curriculum Committee for their action.

Please let me know if you have any questions or need additional information.

A Proposal to Develop a Minor in Energy Systems

1. Name of the proposed minor.

Minor in Energy Systems

2. Name of the department(s) involved.

This minor will have a home in Mechanical Engineering for administrative purposes but will be directed by a steering committee comprised of people with an interest in the minor.

3. Name of contact person(s).

- Ted Heindel, Mechanical Engineering, 294-7121, theindel@iastate.edu (Primary)
- Additional Steering Committee Members:
- Tom Brumm, Agricultural and Biosystems Engineering, 294-5145, tbrumm@iastate.edu
 - Vik Dalal, Electrical and Computer Engineering, 294-1077, vdalal@iastate.edu
 - Steve Martin, Material Science and Engineering, 294-0745, swmartin@iastate.edu
 - Ron Cox, CIRAS, 294-9592, rcox@iastate.edu

4. General description of the minor.

This minor is being developed with support from a grant through the Iowa Office of Energy Independence (OEI); a copy of this grant can be found in the appendix. Students with a minor in Energy Systems will complete 15 credits, 6 of which will come from two required 3-credit courses:

- **E E 351. Introduction to Energy Systems: An Engineering Perspective.** (Cross-listed with E St). (3-0) Cr. 3. Energy-scientific, engineering and economic foundations. Energy utilization-global and national. Sectoral analysis of energy consumption. Relationship of energy consumption and production to economic growth and environment. Technology for energy production. Economic evaluation of energy utilization and production. Scientific basis for global warming. Environmental impact of energy production and utilization. Renewable energy.
 - Note this course has recently gone through a revision, with support from the OEI grant, to upgrade the content to be more engineering centric.
- **Econ 380. Energy, Environmental and Resource Economics.** (Cross-listed with ENV S) (3-0) Cr. 3. F. Prereqs: Econ 101. Natural resource availability, use, conservation, and government policy, with emphasis on energy issues. Environmental quality and pollution control policies.
 - This course has recently gone through a name and description change subject to this minor being approved to more accurately reflect its focus on energy issues.

A memo summarizing this change from the Department of Economics Curriculum Committee Chair is attached in the appendix.

The remaining 9 credits will be selected by the students from a menu of courses (see Table A1 in the appendix). All of the courses listed in Table A1 are either currently offered or under modification/development in the College of Engineering. In order to be included on the approved course list, course content must be at least 50% energy related. Energy related means content significantly covers any of the following in an engineering context:

1. energy fundamentals, e.g., thermodynamics, heat transfer;
2. energy production, transmission, utilization, economics, or policy;
3. design of components or systems for energy production, transmission or utilization;
4. analysis of components or systems for energy production, transmission or utilization.

The final POS for each student in the minor will be approved by the minor steering committee or their designate to ensure uniform program oversight.

One advantage of a minor in Energy Systems at ISU is that, as shown in Table A1, there are currently many courses related to a variety of energy and energy system topics that are being taught by our faculty. As new courses are developed in energy systems, they can be added to this list after being approved by the minor's steering committee. The OEI grant has provided some resources to modify/develop new courses that will fit into areas we would like to strengthen and these courses are identified in Table A1.

5. Need for the proposed minor.

The College of Engineering strategic plan focuses on grand challenges and builds upon our core competencies, which include energy related areas and new curricula (<http://www.engineering.iastate.edu/strategic-plan/strategy/>). Iowa State University has embraced this concept, and elements of the grand challenges are integral in the University's 2010-2015 Strategic Plan (<http://www.provost.iastate.edu/sp/>). A common theme in the grand challenges and ISU's strategic plan is energy and how renewable and sustainable energy systems are critical for the future of our nation. In all cases, this proposed minor will help the University and College meets its strategic objectives. The proposed minor could also help strengthen the educational objectives of the recent NSF EPSCoR project (<http://www.news.iastate.edu/news/2011/sep/EPSCoR>).

To address the energy challenges of the future, we must educate students of today in the area of energy and energy systems. The State of Iowa has recognized this need and approached Iowa State with a request to develop educational content in energy and energy systems. As a result of this request, the leaders in this effort (Heindel, Brumm,

Cox) submitted a proposal to the Iowa Office of Energy Independence (OEI) which was subsequently funded. Part of this project is to develop a minor in energy systems to help educate Iowans and others in this vital area. Please see the appendix for a copy of the OEI contract.

6. Objectives of the proposed minor including the student learning outcomes and how the learning outcomes will be assessed.

Energy systems are pervasive in our society. The goal of the minor in energy systems is to provide our engineering students with focused educational opportunities in the broad area of energy systems. Students will first be given the opportunity to understand broad energy perspectives and the language of energy systems in the course EE 351 – Introduction to Energy Systems: An Engineering Perspective (3 credits). This course will be required of all students in the minor. It is already offered and has recently been retooled to address the specific needs of the minor.

A second required course Econ 380 – Energy, Environmental and Resource Economics (3 credits) will be required to provide students information related to energy policy, environmental impact, and economic considerations. This course is currently offered through the Department of Economics and has a prerequisite of Econ 101, a general education elective commonly taken by many engineering students. The content currently includes energy economics and policy. The Department of Economics has approved a name change to include the word “Energy” to better reflect the renewed emphasis on energy issues. Note that a course addressing issues related to energy economics and policy has been endorsed by any company with whom we discuss the proposed minor.

The remaining 9 credits in the minor will be selected from a list of approved engineering courses related to energy systems. Courses will be approved by the steering committee and meet the criteria outlined in Section 4. See the appendix for a list of currently approved courses.

Learning outcomes will be assessed in individual courses within the minor through course homework assignments, projects, and exams in the respective courses.

7. Relationship of the minor to other programs at Iowa State University.

There are many energy-related courses available at Iowa State University in each of the engineering departments. Currently, students can minor in Nuclear Engineering. The minor in Energy Systems will provide our students with a solid background in energy and then allow the students to take electives in various energy-related areas of their choosing. This will provide our students a solid foundation for the changing energy sector.

A minor in Wind Energy is also being proposed by another group. There were discussions for a semester (fall 2010) between the two faculty groups developing the respective minors about how they may work together. It was mutually agreed upon that it would best serve the students with only a minimal increase in resources to offer both an Energy Systems Minor and a Wind Energy Minor. The Energy Systems Minor is much broader in its coverage of energy systems, whereas the Wind Energy Minor is more focused in a particular area. There will inherently be some overlap of the courses contained within the minors, and both minors will benefit by this overlap. See the memo in the appendix outlining the mutual endorsement of both minors.

8. Relationship of the minor to the Department's/College's/University's strategic plans.

Every engineering discipline addresses energy in some fashion. For example, mechanical engineers have a core area in thermo-fluids where courses in thermodynamics, fluid mechanics, and heat transfer are required; electrical engineers address power transmission and distribution as well as electric motors and power systems; civil engineers develop structures for wind turbines and hydroelectric dams; chemical engineers develop alternative fuels and clean burning technologies; material engineers develop new materials for batteries and fuel cells; aerospace engineers develop wind turbines; industrial engineers address manufacturing efficiency and energy reduction; agricultural engineers develop biorenewable energy forms; the list is endless.

Energy is a core competency identified in the College's strategic plan. To enhance our energy competency, we must develop educational opportunities in energy systems. By developing new curricula in this area, we are also addressing a desire in the College's strategic plan.

Energy systems extend beyond engineering in that renewable and sustainable energy systems are a focus in the University's 2010-2015 strategic plan. As stated in this plan, "Iowa State will lead in developing more sustainable ways to produce and deliver ... energy..." Iowa State cannot lead in this area unless we provide our students with options to obtain an educational focus in energy systems.

Finally, a minor in Energy Systems addresses a need identified by the State of Iowa in which they would like Iowans to know more about energy. Iowa's land grant university – Iowa State University – is a perfect place for this program because it fits the mission of our land grant institution.

9. Comparison of the proposed minor with:

a. Standards, if any, established by accrediting associations;

To the authors' knowledge, there is no accrediting association for an energy systems course sequence or minor program.

b. Similar programs at other Universities.

Many universities have minors in various energy related areas. A few examples are provided in Table 1. The advantage of ISU's minor will be the breadth that it provides in terms of available courses and the flexibility it provides to students as well as faculty, who can continually add or delete content from it with the approval of the steering committee.

Table 1: Samples of energy related minors at other institutions.

Institution	Minor Name
Department of Energy and Mineral Engineering, Penn State University	Energy Engineering – B.S. degree as well as minor (http://www.eme.psu.edu/undergrad-minors-options/minor-energyeng.html)
Department of Energy, Environmental, and Chemical Engineering, Washington University in St. Louis	Energy Engineering Minor (http://eece.wustl.edu/undergraduateprograms/Pages/minor-in-env-eng-science.aspx)
College of Engineering, University of Notre Dame	Energy Engineering Minor (http://www.nd.edu/~engineer/academics/energy_minor.html)
Massachusetts institute of Technology	Minor in Energy Studies (http://web.mit.edu/mitei/education/minor.html)
Cornell University	Minor in Sustainable Energy Systems (http://www.engineering.cornell.edu/student-services/academic-advising/engineering-handbook/2010/minor-suses.cfm)
Department of Electrical, Computer, and Energy Engineering , University of Colorado – Boulder	Minor in Electrical Renewable Energy Systems (http://ecee.colorado.edu/academics/ugrad/minors/re_energy_minor.html)
Clarkson University	Minor in Sustainable Energy Systems Engineering (http://www.clarkson.edu/cses/ses-minor.html)
Department of Mechanical Engineering, Syracuse University	Minor in Energy Systems (http://coursecatalog.syr.edu/2010/schools/lcs/326_undergraduate_minors)

Many of the programs listed in Table 1 are housed in a single department with a limited number of courses that constitute the minor. Some of the minors are also very focused in building energy, electrical transmission and distribution, or other areas although the title includes the broad areas of “energy engineering” or “energy systems”.

A significant advantage of the Iowa State minor in Energy Systems is the options and breadth it can provide our students through the variety of courses we already offer in each department in the area of energy.

10. Program requirements, including:**a. Prerequisites for prospective students;**

Good standing within the College of Engineering.

b. Language requirements;

None.

c. Courses and seminars presently available for credit toward the program;

EE 351 – Introduction to Energy Systems: An Engineering Perspective will be required of all students and is currently offered. Econ 380 – Energy, Environmental and Resource Economics (proposed new title) will be required and is currently offered as Econ 380 –Environmental and Resource Economics. Table A1 provides a list of elective courses that are currently offered or currently under modification/development at ISU that would be applicable electives for this minor.

d. Proposed new courses or modifications of existing courses;

An RFP has been extended and proposals awarded to ISU engineering faculty for the development of additional course content that will be used in the minor. Resources were provided through the OEI grant. Note that there are currently sufficient courses available to satisfy the minor requirements, and the additional content is being developed only to enhance our offerings. New courses could also be added in the future.

e. Implications for related areas within the University.

There may be courses outside of engineering that address energy systems, including those in agronomy, design, geology, ethics, economics, policy, etc. (e.g., Arch 351 – Solar Home Design,). Adding these courses to the minor will be considered after the minor is established in the College of Engineering and the respective course is evaluated by the steering committee.

11. General description of the resources currently available and future resource needs, in terms of:**a. Faculty members;**

All the courses listed in Table A1 are currently offered by engineering faculty at ISU. Having their courses in the energy systems minor will advertise their offering to more engineering students so class size may increase. It is anticipated that some of the new faculty filling current open positions in the College will have expertise to develop a new course for this minor. This opportunity may be used as a recruiting tool.

c. Effects of the new courses on the work load of the present staff;

Class size may increase in existing courses. New courses will be developed and others will be retired due to the flexibility of the minor. This occurs naturally with all elective courses.

d. Research facilities;

No research facilities will be used for this minor degree.

e. Library facilities (journals, documents, etc.) in the proposed area;

No new library acquisitions, outside those typical in any given year, will be required for this minor.

f. Supplies, field work, student recruitment, etc.

If a course applicable to the minor has a laboratory component, additional laboratory space and/or supplies may be required. Acquisition of these resources will be the responsibility of the faculty and department delivering their desired content. Faculty may actually use the minor as leverage in proposals to acquire resources to develop educational materials.

A minor in Energy Systems can be used in recruiting materials and will enhance the stature of the College of Engineering.

12. Describe the needs for new resources and/or reallocated resources. Attach to the program proposal memos from the department chair(s), the college dean(s), and other appropriate persons, agreeing to the allocation of new resources and/or the reallocation of resources.

Appendix A contains a copy of the contract with Iowa Office of Energy Independence that describes our efforts in energy education development, including the development of a minor in Energy Systems. Part of the funds in this project have been used to develop new course content at the undergraduate level that will enhance current offerings in energy systems. Note that the proposal was approved with 50% cost-share and has the support of the College and University. In addition, the College of Engineering has committed \$120K of cash cost-share to the OEI grant. A portion of these funds have been used in the development of additional course content for the minor.

The OEI grant ends in March 2012. Additional resources are needed to provide staff support to manage the paperwork and inquiries about the minor. We anticipate this will require 35% of a P&S staff member. This staff member is already in place and their workload will shift to accommodate the minor. It is anticipated that additional students will apply to the College of Engineering because of the minor, which will bring additional tuition dollars to the college and departments. This will support the staff member assigned as the minor staff contact.

13. Attach to the program proposal, letters of support, recommendations, and statements when appropriate:

a. From programs at the other Regents universities;

Not applicable.

b. From programs and departments at ISU which are associated with the proposed program or have an interest in the proposed program.

- The minor proposal was sent on September 9, 2011 to each College of Engineering departmental curriculum committee for feedback and support. Each department subsequently approved the minor.
- The proposal was sent to the College of Engineering Curriculum Committee on October 1, 2011 and discussed at a College of Engineering Curriculum Committee meeting on October 7, 2011. The CECC unanimously approved the minor.
- All College of Engineering department chairs support this minor and their faculty who participate in it; a letter of endorsement is attached in the appendix.
- A letter of support is also attached from John Schroeter, Interim Chair of the Department of Economics.

14. If the new program is interdisciplinary, a governance document should be created and submitted to the Associate Provost for Academic Programs. Indicate here that it has been completed.

Not applicable.

15. Additional information.

The attached appendices include:

1. List of energy-related classes in the College of Engineering.
2. Memo from the Department of Economics regarding changes to Econ 380.
3. Letter of endorsement signed by John Schroeter, Interim Chair of the Department of Economics.
4. Table summarizing input from each College of Engineering Department.
5. Memo from College of Engineering Department Chairs supporting minor.
6. Joint memo from Energy Systems and Wind Energy minor groups.
7. Office of Energy Independence contract.

Appendix 1: Energy-related courses in the College of Engineering.Table A1: Current undergraduate energy-related courses at ISU. *Note cross-listed and co-listed courses are only listed once.*

Dept.	Cat. No.	Course Title
Aer E	381x*	Introduction to Wind Energy
Aer E	481x*	Advanced Wind Energy
AE	325	Biorenewable Systems
AE	363	Agri-Industrial Applications of Electric Power and Electronics
AE	413	Fluid Power Engineering
AE	423**	Energy and the Environment
AE	472/572	Design of Environmental Modification Systems for Animal Housing
BRT	501	Fundamentals of Biorenewable Resources
BRT	535	Thermochemical Processes of Biorenewables
BRT	545x	Production and Use of Biofuels
BRT	5XX**	Biorenewables Law and Policy
BSE	380	Principles of Biological Systems Engineering
BSE	415*	Biological Systems Engineering Design
BSE	480	Engineering Analysis of Biological Systems
CE	411/511	Bioprocessing and Bioproducts
CE	430/530**	Anaerobic Biotechnology in Waste-to-Energy
ChE	356	Transport Phenomena I
ChE	357	Transport Phenomena II
ChE	358	Separations
ChE	381	Chemical Engineering Thermodynamics
ChE	382	Chemical Reaction Engineering
ChE	415	Biochemical Engineering
ConE	352	Mechanical Systems in Buildings
ConE	353*	Electrical Systems in Buildings
ConE	454*	Building Energy Modeling
EE	303	Energy Systems and Power Electronics
EE	448*	Introduction to AC Circuits and Motors
EE	452	Electrical Machines and Power Electronic Drives
EE	455	Introduction to Energy Distribution Systems
EE	456	Power Systems Analysis I
EE	457	Power Systems Analysis II
EE	458	Economic Systems for Electrical Power Planning
EE	4XX**	Photovoltaic Energy Conversion
EE	459x/559x	Electromechanical Wind Energy Conversion and Grid Generation
EE	552x	Energy Systems Planning
EE	554	Power System Dynamics
EE	555	Advanced Energy Distribution Systems
EE	556	Power Electronic Systems
ENGR	340x	Introduction to Wind Energy: System Design and Delivery
IE	443x/543x	Wind Energy Manufacturing
ME	332	Engineering Thermodynamics II
ME	433	Alternative Energy Conversion
ME	436	Heat Transfer
ME	437x**	Introduction to Combustion Engineering
ME	441	Fundamentals of Heating, Ventilating, and Cooling
ME	442	Heating and Air Conditioning Design
ME	444	Elements and Performance of Power Plants
ME	446	Power Plant Design

ME	449	Internal Combustion Engine Design
ME	4XX/5XX**	Sustainable Engineering Design
ME/ECON	4XX/5XX**	Quantitative Energy Economics and Policy
ME	530	Advanced Thermodynamics
ME	536	Advanced Heat Transfer
ME	540	Solar Energy Systems
ME	542	Advanced Combustion
ME	545	Thermal System Design
MatE	311	Thermodynamics in Materials Science
MatE	463x**	Materials for Wind Energy
MatE	4XX**	Electrochemical Energy Storage Science
MSE	520	Thermodynamics and Kinetics of Multicomponent Materials
NucE	401	Nuclear Radiation Theory and Engineering
NucE	441x*	Probability Risk Assessment
NucE	461x	Radiation Detection, Measurement and Simulation

* Course has been modified/updated with support from the OEI grant.

** New course under development with support from the OEI grant.

Appendix 2: Memo from the Department of Economics regarding changes to Econ 380.

From: Lence, Sergio H [ECONA]
Sent: Friday, March 04, 2011 1:14 PM
To: vern@iastate.edu
Cc: Wallace, Robert S [EEOBS]
Subject: Energy minor

Dear Vern:

Attached is the proposed catalog change to Econ 380 that our department has approved to have it as a required course for the Energy minor. I submitted the request to Rob Wallace for approval at LASCC. Please note that we would like to change Econ 380 if the Energy minor is approved; otherwise, we would prefer to leave as it is. Given this, I think it might be best to note in the proposal for the minor that the minor involves changing Econ 380 as requested and run the proposal for the energy minor through the LASCC to get its endorsement. That way, we should be able to get around the catch 22 problem of the conditional change in Econ 380 (i.e., that the minor cannot be approved without changing 380, but we do not want to change 380 if the minor is not approved). Please let me know what you think. Thanks,

Sergio

Sergio H. Lence
Professor
Department of Economics
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Ames, IA 50011-1070
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(Attachment is on next page)

PROPOSED CHANGE TO THE 2012-13 CATALOG
RECOMMENDED BY THE DEPARTMENT OF ECONOMICS

Proposed change of title and description of Econ 380:

Econ 380. Energy. Environmental and Resource Economics. (Cross-listed with ENV S) (3-0) Cr. 3. F. Prereqs: 101. Natural resource availability, use, conservation, and government policy, with emphasis on including energy issues. Environmental quality and pollution control policies.

Background:

The College of Engineering is putting together a new minor in Energy Systems. There will be two required courses to this minor, one of which was to be a 300-level econ-type course. The College of Engineering approached Prof. Bushnell in the economics department about this. After Prof. Bushnell talked this over with the chair, and upon the chair checking with the current Econ 380 instructors and other faculty in the area, it was concluded that some minors changes to our current Econ 380 would create a suitable class. This opportunity suits the dept well because this course has had low enrollment and we were about to reduce its offering from twice a year to once a year.

Recommendation from Department of Economics:

Change as proposed if the Energy Systems minor is approved, do not change otherwise.

**Appendix 3: Letter of endorsement signed by John Schroeter, Interim Chair of the
Department of Economics.**

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Department of Economics
Heady Hall
Ames, Iowa 50011-1070
515 294-6741
FAX 515 294-0221

September 2, 2011

Ted Heindel
Professor and Interim Chair
Department of Mechanical Engineering
Iowa State University

Dear Ted:

On behalf of the Department of Economics, I am happy to offer our endorsement of your proposal for an undergraduate minor in Energy Systems. We agree that Iowa State University has an important role to play in preparing students to meet the energy challenges of the future, and we think that this new minor will make an important contribution to that effort. We see no conflict between your proposed minor and our department's current courses and programs.

As explained in your proposal, one of our courses, Econ 380, will be required in the minor. You suggested, and our department has approved (conditional upon approval of the minor itself), certain changes to the title and description of this course designed to better reflect its current focus on energy issues. We expect that the minor will generate greater demand for Econ 380, and that would be a welcome development from our perspective.

Regards,



John R. Schroeter
Professor and Interim Chair

c: Sergio Lence

Appendix 4: Input from each College of Engineering Department.





Dept.	Input Provided	Response	Status of Minor
ABE	None provided		Approved on 9/9
AerE	None provided		Approved on 9/22
CBE	Would like two or more of the electives chosen from courses that have a strong energy focus	Incorporated definition of an energy related course	Approved on 9/28 subject to acceptance of our changes.
CCEE	Requested criteria for inclusion of courses in elective list	Incorporated definition of an energy related course	Approved on 10/6
ECpE	None provided		Approved on 9/15
IMSE	Presented to faculty meeting on 9/29 – no suggestions at that time		Approved on 10/6
MSE	None provided		Approved on 9/21
ME	None provided		Approved on 9/29

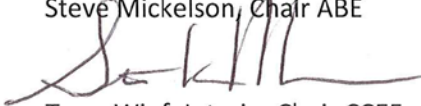
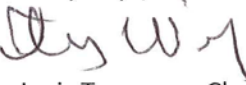


Appendix 5: Memo from College of Engineering Department Chairs supporting minor.

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Theodore (Ted) J. Heindel
Department of Mechanical Engineering
2025 Black Engineering Building
Ames, Iowa 50011-2161
Tel (515) 294-7121
Fax (515) 294-3261
theindel@iastate.edu
<http://www.me.iastate.edu/>

Interoffice Communication

DATE: September 7, 2011
TO: Vern Schaefer
College of Engineering Curriculum Committee
488 Town Engineering
FROM: Richard Wlezien, Chair AERE

Surya Mallapragada, Chair CBE

David Jiles, Chair ECpE

Richard LeSar, Chair MSE

SUBJECT: Support of an Energy Systems Minor

Steve Mickelson, Chair ABE

Terry Wipf, Interim Chair CCEE

Janis Terpenny, Chair IMSE

Ted Heindel, Interim Chair ME


Energy systems are pervasive in our society. The goal of an Energy Systems Minor is to provide our engineering students with focused educational opportunities in the broad area of energy systems. The minor will be housed in the Department of Mechanical Engineering, but energy-related courses from all engineering departments will be used as possible electives for the minor.

Students will first be given the opportunity to understand broad energy perspectives and the language of energy systems in the course EE 351 – Introduction to Energy Systems: An Engineering Perspective. This course will be required of all students in the minor. It is already offered and has recently been retooled to address the specific needs of the minor. A second required course Econ 380 – Energy, Environmental and Resource Economics will be required to provide students information related to energy policy, environmental impact, and economic considerations. The remaining 9 credits in the minor will be selected from a list of approved engineering courses related to energy systems. Courses will be approved by the steering committee.

Many of the elective courses are currently being offered in the college. Some new courses have also been developed through a grant from the Iowa Office of Economic Development. The chairs of the respective College of Engineering departments support the development of an Energy Systems Minor and the utilization of our classes as possible minor electives. We support and endorse our faculty to be involved in this minor through the courses they teach that support the minor electives.

Appendix 6: Joint memo from Energy Systems and Wind Energy minor groups.**IOWA STATE UNIVERSITY**
OF SCIENCE AND TECHNOLOGY**Interoffice Communication**

DATE: October 10, 2011

TO: Interested Curriculum Committees

FROM: Ted Heindel, primary contact for the Energy Systems Minor
Frank Peters, primary contact for the Wind Energy Minor

SUBJECT: Need for minors in Energy Systems *and* Wind Energy



The purpose of this memo is to describe the motivation and need for developing minors in both Energy Systems and Wind Energy, and to specifically address the “Relationship of the Minor to other programs at Iowa State University” question in the minor approval form.

A minor in Energy Systems was initiated from a grant from the Iowa Office of Energy Independence in August 2010. A minor in Wind Energy has been under development for two years and recent proposal activity provided the critical mass for full development. The groups developing these minors met several times in Fall 2010 and came to the mutual conclusion that there is a need for both minors, and each group fully supports and endorses the other. While there is some commonality, the minors have different goals.

The advantages of having different minors is that they

- (i) will be individually identified on a student’s transcript,
- (ii) provide increased visibility of the programs internally and externally to ISU
- (iii) can be leveraged in proposal activity (e.g., ISU’s recent NSF IGERT and REU in wind energy), and
- (iv) both fill a desire from students and industry for focused content in the respective areas.

With nearly 6000 engineering undergraduate students, there are plenty of students to take advantage of either minor. In addition, the Wind Energy Minor was specifically developed to be open to students from other colleges, in particular the Meteorology program.



OFFICE OF ENERGY INDEPENDENCE

Chester J. Culver, Governor
Patty Judge, Lt. Governor
Roya Stanley, Director

108409/10-1971
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Tp

August 9, 2010

Tammy Polaski, Associate Director
Office of Sponsored Programs Administration
Iowa State University
1138 Pearson Hall
Ames, IA 50011-2207

RE: Project Title: Enhancing Energy Education in Iowa
SEP Contract # 10-ED02

Dear Ms. Polaski:

Enclosed please find a fully executed original State Energy Program Contract between Iowa State University and Iowa Office of Energy Independence. This contract has been signed by our office and a second copy has been retained for our files.

Should you have any questions, please feel free to contact me at 515-725-0746.

Sincerely,

Jordan Vaughan
Program Manager

Enclosure

Wallace Building
502 E. 9th St
Des Moines, IA 50319
P/515.725.0431
www.energy.iowa.gov

STATE ENERGY PROGRAM GRANT SUB-RECIPIENT CONTRACT

This State Energy Program Grant Sub-recipient Contract is between the Office of Energy Independence (OEI), an agency of the State of Iowa created by Iowa Code chapter 469, and the Sub-recipient (SR) identified in the attached Term Sheet. The parties agree as follows.

1. Purpose.

1.1 OEI has received a State Energy Program (SEP) grant from the United States Department of Energy, Award No. DE-EE000162, to fund energy efficiency and renewable energy improvements for public sector, private sector, and non-profit facilities.

1.2 The parties are entering into this contract for SR to receive funds under the SEP program.

2. Incorporation of documents.

2.1 **Incorporation.** This contract incorporates the following documents:

.A Funding Opportunity Announcement, State Energy Program Formula Grants, American Recovery and Reinvestment Act, Funding Opportunity Number DE-FOA-0000052, dated April 24, 2009;

.B OEI's grant application; and

.C Assistance Agreement for Award No. DE-EE000162 between the United States Department of Energy and OEI, including any amendments to that agreement during the term of this contract.

2.2 **Resolution of inconsistencies or conflicts.** If there is a conflict between this contract and federal law, the parties agree that federal law will govern.

3. Scope of services.

SR will perform the services identified in Exhibit A, Description of Project and Award Budget.

4. Compensation.



4.1 Reimbursement of allowable costs. OEI will reimburse SR for the allowable costs that SR incurs in performing the work under this contract in the amount and in manner described in Exhibit A, Description of Project and Award Budget.

4.2 No reimbursement of unallowable costs. OEI will not reimburse SR for any cost that is contrary to (1) this contract; (2) any restriction or limitation in the documents identified in paragraph 2.1; (3) 10 CFR Part 600; (4) the applicable cost principles found in OMB Circular A-21 Cost Principles for Educational Institutions, OMB Circular A-87 Cost Principles for State, Local, and Indian Tribal Governments, or OMB Circular A-122 Cost Principles for Non-Profit Organizations; or (5) any other applicable laws, rules, regulations, and policies.

4.3 Invoices and supporting documentation. All invoices and all required supporting documentation must comply with all applicable rules concerning payments of these claims.

4.4 Representations. By submitting an invoice, SR represents to OEI that all of the following are true:

.A the services identified in the invoice are within the scope of services described in paragraph 3, and

.B the costs are allowable, allocable, and reasonable in accordance with (1) this contract; (2) the documents identified in paragraph 2.1; (3) 10 CFR Part 600; (4) the applicable cost principles in OMB Circular A-21 Cost Principles for Educational Institutions, OMB Circular A-87 Cost Principles for State, Local, and Indian Tribal Governments, or OMB Circular A-122 Cost Principles for Non-Profit Organizations; and (5) any other applicable laws, rules, regulations, and policies.

4.5 Payment of invoices. OEI will review each invoice for compliance with this contract and applicable laws, rules, regulations, and policies. It will approve all or a portion of the amount sought in the invoice and will pay the approved amount within the time required by applicable law.

4.6 Withholding payments. Despite anything to the contrary in this contract, OEI may withhold paying all or a portion of the invoices if SR has failed to comply with this contract, including any problems identified during OEI's monitoring of SR's performance.

4.7 Recovery of reimbursed funds. If OEI or any federal agency concludes that SR has been reimbursed for any cost that is unallowable, unallocable, or unreasonable under this contract, SR will repay those funds within 30 days of receiving written notice from OEI. OEI may withhold any payment under this contract if SR fails to repay those funds by the deadline.

4.8 Payment is no waiver. By paying all or a portion of an invoice, OEI does not waive its ability to challenge any reimbursement for failing to comply with this contract at a later date.

5. American Recovery and Reinvestment Act requirements.

5.1 Acknowledgement of receiving Recovery Act funds: SR understands and agrees that the source of the payments under this contract, either in whole or in part, is the American Recovery and Reinvestment Act of 2009—Pub. L. 111-5—(Recovery Act). SR further understands and agrees that it will comply with the Recovery Act.

5.2 Recovery Act process is evolving. SR understands and agrees that the federal stimulus process is still evolving and that new requirements for Recovery Act compliance may still be forthcoming from the federal government and the State of Iowa. Accordingly, SR agrees that it and its subgrantees and subcontractors will comply with all Recovery Act requirements promulgated by the federal government or the State of Iowa, or both, during the contract.

5.3 Recovery Act funds are temporary. SR agrees that Recovery Act funds are temporary and that programs supported with Recovery Act funds, including this program, will not be continued with the State of Iowa financial appropriations when Recovery Act funds are expended.

5.4 Applicable Recovery Act definitions. Because this contract uses Recovery Act funds, the Recovery Act defines the following terms that are relevant to this contract:

.A A “prime recipient” is a non-federal entity that receives Recovery Act funds as federal awards in the form of grants, loans, or cooperative agreements directly from the federal government.

.B A “sub-recipient” is a non-federal entity that expends federal awards received from another entity to carry out a federal program but does not include an individual who is a beneficiary of such a program.

5.5 Prime recipient and sub-recipient. For purposes of this contract, OEI is the prime recipient and SR is a sub-recipient. Further, SR understands that it might have one or more sub-recipients when performing this contract.

5.6 Registration requirements. SR and its first-tier subgrantees and subcontractors must register and maintain their registration in the Central Contractor Registration at all times during which they have active federal awards funded with Recovery Act funds.

5.7 Enforceability. SR agrees that if it or one of its subcontractors or subgrantees fails to comply with all applicable federal or state requirements, or both, OEI may withhold or suspend, in whole or in part, any payments to SR under this contract, or recover misspent funds from SR. This provision is in addition to all other remedies available to OEI.

5.8 Recovery Act reporting requirements. Under Section 1512 of the Recovery Act, OEI, as the prime recipient, must submit a report to the federal government no later than 10 calendar days after the end of each calendar quarter ("Reporting Period"). This report must contain the information outlined below. Accordingly, SR agrees to provide the State of Iowa with the following information in a timely manner and in the format or form required by OEI:

- .A The total amount of Recovery Act funds received by SR during the Reporting Period;
- .B The amount of Recovery Act funds that were expended or obligated during the Reporting Period;
- .C A detailed list of all projects or activities for which Recovery Act funds were expended or obligated, including:
 - .1 the name of the project or activity;
 - .2 a description of the project or activity;
 - .3 an evaluation of the completion status of the project or activity; and
 - .4 an estimate of the number of jobs created and the number of jobs retained by the project or activity.
- .D For any subcontracts or sub-grants equal to or greater than \$25,000:
 - .1 The name of the entity receiving the sub-award;
 - .2 The amount of the sub-award;
 - .3 The transaction type;
 - .4 The North American Industry Classification System (NAICS) code or Catalog of Federal Domestic Assistance (CFDA) number;

- .5 Program sources;
- .6 An award title descriptive of the purpose of each funding action;
- .7 The location of the entity receiving the sub-award;
- .8 The primary location of the sub-award, including the city, state, Congressional District, and country;
- .9 A unique identifier of the entity receiving the sub-award and the parent entity of the Contractor/Grantee, should the entity be owned by another; and
- .10 The names and total compensation of the five most highly compensated officers of the company if it received: (1) 80% or more of its annual gross revenues in Federal award; and (2) \$25,000,000 or more in annual gross revenue from Federal awards.

.E For any subcontracts or sub-grants of less than \$25,000 or to individuals, the information required in subparagraph D may be reported in the aggregate and requires the certification of an authorized officer of the vendor or grantee that the information contained in the report is accurate.

.F Any other information requested by the State of the Iowa or required by state or federal law or regulation.

.G Standard data elements and federal instructions for use in complying with reporting requirements under Section 1512 of the Recovery Act were published in the Federal Register on April 1, 2009 (74 FR 14824), and once approved will be provided online at www.FederalReporting.gov.

5.9 Department of Energy's reporting requirements. In addition to any other reporting requirements, the Department of Energy's Federal Reporting Checklist—DOE F 4600.2—identifies the reporting requirements for this contract. SR agrees that it will comply with these reporting requirements. SR shall provide a copy of their federally negotiated indirect cost rate agreement with signed contract.

5.10 OMB guidance on reporting requirements.

.A OMB Memorandum M-09-21 dated June 22, 2009, outlines the standard data elements and federal implementation guidance for complying with the reporting requirements under section 1512 of the Recovery Act. SR agrees that it will comply with OMB Memorandum M-09-21 and timely provide the information required by that memorandum to OEI.

.B OMB Memorandum M-10-08 dated December 18, 2009, provides updated guidance on Data Quality, Non-Reporting Recipients, and Reporting

of Job Estimates. SR agrees that it will comply with OMB Memorandum M-10-08 when complying with its reporting obligations.

.C Further, SR agrees that it will comply with any other OMB memorandums or guidances concerning reporting under the Recovery Act.

5.11 SR's failure to comply with reporting requirements. SR's failure to comply with any of the Recovery Act reporting requirements—including, without limitation, paragraphs 5.8, 5.9, and 5.10—constitutes a material breach of this contract. In addition to any other remedy, if SR fails to comply with the reporting requirements, OEI may withhold further payments, suspend this contract, or terminate this contract.

5.12 Segregation of funds. SR can use Recovery Act funds to supplement, not supplant, other federal funding. SR agrees that it will segregate obligations and expenditures of Recovery Act funds from other funds. In addition, SR must not commingle Recovery Act funds with other funds or use Recovery Act funds for a purpose other than that of making payments for costs allowable under the Recovery Act.

5.13 Prohibition on use of Recovery Act funds. SR must not use any funds made available under this contract for any casino or other gambling establishment, aquarium, zoo, golf course, swimming pools, or similar projects. In addition, SR must not use Recovery Act funds (a) for construction, such as construction of mass transit systems and exclusive bus lanes, for the construction or repair of buildings and structures, (b) to purchase land, a building, or structure, or any interest therein, (c) to subsidize fares for public transportation, (d) to subsidize utility rate demonstrations or state tax credits for energy conservation or renewable energy measures, or (e) to conduct or purchase equipment to conduct research, development, or demonstration of energy efficiency or renewable techniques and technologies not commercially available.

5.14 Preservation of open competition.

.A Unless prohibited by state or local laws, SR must ensure that bid specifications, project agreements, or other controlling documents in construction contracts awarded under this contract, or under a subaward under this agreement, do not:

.1 require or prohibit bidders, offerors, contractors, or subcontractors to enter into or adhere to agreements with one or more labor organizations, on the same or related construction project or projects;
or

.2 otherwise discriminate against bidders, offerors, contractors, or subcontractors for becoming or refusing to become or remain signatories or otherwise adhere to agreements with one or more labor organizations, on the same or other related construction project or projects.

.B The term “construction contract” as used in this provision means any contract for the construction, rehabilitation, alteration, conversion, extension, or repair of buildings, highways, or other improvements to real property.

.C Nothing in this provision prohibits bidders, offerors, contractors, or subcontractors from voluntarily entering into an agreement with labor organizations.

5.15 **Buy American requirement.**

.A As required by Section 1605 of the Recovery Act, SR agrees that neither SR nor its subcontractors or sub-grantees will use Recovery Act funds for a project for the construction, alteration, maintenance, or repair of a public building or public work unless all of the iron, steel, manufactured goods used in the project are produced in the United States. SR understands this requirement may only be waived by the applicable federal agency if the requirement is determined to be (a) inconsistent with the public interest, (b) the relevant manufactured goods are not produced in the United States in sufficient and reasonably available quantities of and of a sufficient quality, or (c) inclusion of the relevant manufactured goods produced in the United States will increase the cost of the overall project by more than 25%, as set out in Section 1605 of the Recovery Act.

.B For additional information about waivers of the Recovery Act’s Buy American requirement, OEI directs SR’s attention the Department of Energy’s Guidance on the Buy American Provisions as Applied to Energy Efficiency and Renewable Energy Projects Funded by the American Recovery and Reinvestment Act of 2009 and Administered by the Office of Energy Efficiency and Renewable Energy dated December 17, 2009.

5.16 **Wage requirements.** As required by Section 1606 of the Recovery Act, SR agrees that all laborers and mechanics employed by contractors and subcontractors on the work funded under this contract will be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by

the United States Secretary of Labor under the Davis-Bacon Act, 40 U.S.C. § 3141 et sec.

5.17 Whistleblower protection. SR agrees that both it and its subcontractors and sub-grantees will comply with Section 1553 of the Recovery Act. SR and its subcontractors and sub-grantees must not discharge, demote, or otherwise discriminate against any employee who discloses, in the ordinary course of the employee's duties, information the employee reasonably believes is evidence of (1) gross mismanagement of the contract or grant relating to Recovery Act funds; (2) a gross waste of Recovery Act funds; (3) a substantial or specific damage to public health or safety related to the implementation or use of Recovery Act funds; (4) the abuse of authority related to implementation or use of Recovery Act funds; or (5) a violation of law, rule, or regulation related to an agency contract (including the competition for or negotiation of a contract) or grants awarded or issued relating to Recovery Act funds. Further, SR agrees that it and its subcontractors and subgrantees will post notice of the rights and remedies available under Section 1553 of the Recovery Act.

5.18 National Environmental Policy Act (NEPA) requirements.

.A SR cannot take any action using federal funds that would have an adverse affect on the environment or limit the choice of reasonable alternatives before the Department of Energy or OEI provides either a NEPA clearance or a final NEPA decision about the project. If SR proceeds with activities that are not authorized for federal funding of the Department of Energy Contracting Office before the final NEPA decision, SR risks not receiving federal funding and those costs may not be recognized as allowable cost. If the contract includes construction activities, SR must submit an environmental evaluation report or evaluation notification form regarding NEPA issues before the Department of Energy or OEI initiating the NEPA process.

.B SR agrees to manage waste generated through this project in accordance with all federal, state, and local regulatory requirements.

.C SR also agrees to submit to OEI a solid and hazardous waste management plan before project implementation. At a minimum, the waste management plan must include:

.1 type and estimated volume of waste that the project proponent anticipates will be generated; and

.2 the disposal path for each waste stream (e.g., landfill disposal, recycling, reuse).

5.19 National Historic Preservation Act. Before expending any Recovery Act funds to alter any structure or site that are listed or eligible for listing in the National Register of Historic Places, SR must first comply with Section 106 of the National Historic Preservation Act (NHPA), consistent with the Department of Energy's 2009 letter of delegation of authority about the NHPA.

5.20 False Claims Act. SR agrees that it will promptly refer to an appropriate Federal Inspector General any credible evidence that a principal, employee, agent, sub-grantee, subcontractor, or other person has committed a false claim under the False Claims Act or has committed a criminal or civil violation of laws pertaining to fraud, conflict of interest, bribery, gratuity, or similar misconduct involving those funds.

5.21 Non-discrimination. SR must comply with Title VII of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and other civil rights laws applicable to recipients of federal financial assistance.

5.22 Job posting requirements. Section 1512 of the Recovery Act requires the State of Iowa to report on the jobs created and retained as a result of the stimulus funds. SR is encouraged to post job opportunities created in connection with the projects funded in whole or in part with Recovery Act funds on the State of Iowa job opportunity website and the federal Recovery Act website, if required.

5.23 Inspection of records. SR agrees that it will permit the United States Comptroller General or its representative or the appropriate inspector general appointed under Section 3 or 8G of the Inspector General Act of 1978 or its representative (1) to examine any records that directly pertain to, and involve transactions relating to, this contract; and (2) to interview any officer or employee of SR or any of its subcontractors or sub-grantees regarding the projects funded with Recovery Act funds.

5.24 Lobbying restrictions. By accepting funds under this contract, SR agrees that none of the funds under this contract will be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. § 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

5.25 Suspension and debarment. SR agrees that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction nor from federal financial or non-financial assistance, nor are any of the participants involved in the execution of this contract suspended, debarred, or voluntarily excluded by any federal department or agency in accordance with Executive Order 12549 (Debarment and Suspension) and 44 CFR Part 17, or are on the disbarred vendors list at www.epls.gov. Further, SR will notify OEI by certified mail if SR or any of its agents become debarred, suspended, or voluntarily excluding during the term of this contract.

5.26 Flow-down requirements. SR must include the terms of this contract in any subaward or subcontract.

6. Monitoring activities.

6.1 OEI has the right to monitor SR's performance of this contract—including the performance of SR's subcontractors, subgrantees, or sub-recipients—to verify that SR is complying with this contract.

6.2 Monitoring activities include, but are not limited to:

- .A a 100% inspection;
- .B a random sampling;
- .C a periodic inspection;
- .D inspecting any document related to SR's performance of this contract;
- .E auditing or reviewing any documents related in any way to any payments under this contract;
- .F inspecting the work at any time;
- .G allowing its consultants, agents, or experts to examine or evaluate completed work, work in progress, payments, or any other matter related in any way to SR's performance of this contract;
- .H examining the books, ledgers, documents, papers, and records related in any way to this contract; and

.I attending any meetings where SR discusses matters related to the performance of this contract.

7. Termination.

7.1 Immediate termination by OEI. OEI may immediately terminate this contract when one or more of the following events occurs:

.A SR fails to comply with any provision of this contract that provides for immediate termination; or

.B OEI determines that SR made a statement, representation, warranty, or certification that is materially false, deceptive, incorrect; or incomplete.

7.2 Termination on notice by OEI. Following 30 days' written notice, OEI may terminate this contract in whole or in part for convenience without the payment of any penalty or incurring any further obligation to the non-terminating party. Following termination upon notice, OEI will pay SR, upon submission of invoices and proper proof of claim, for services provided under this contract up to and including the date of termination.

7.3 Termination for cause by OEI. OEI may declare SR to be in default of its obligations under this contract when any of the following events occurs:

.A SR fails to observe and perform any covenant, condition or obligation created by the contract;

.B SR fails to make substantial and timely progress toward performance of the contract;

.C SR's work product and services fail to conform with the requirements of this contract; or

.D SR's work product or services infringe on any patent, trademark, copyright, trade dress or any other intellectual property right.

7.4 Notice of default. If there is a default event that SR can cure, OEI must provide written notice to SR requesting that the breach or noncompliance be immediately remedied. If the breach or noncompliance continues 10 days beyond the date of the written notice, OEI may:

- .A immediately terminate the contract without additional written notice;
or
- .B enforce the terms and conditions of the contract and seek any legal or equitable remedies.

In either event, OEI may seek damages due to the breach or failure to comply with the terms of the contract.

7.5 Termination by OEI due to lack of funds or change in law. Despite anything in this contract to the contrary, and subject to the limitations, conditions, and procedures set forth below, OEI may terminate this contract without penalty by giving 60 days' written notice to SR if any of the following occurs:

- .A the legislature or governor fails to appropriate funds sufficient to allow OEI to operate as required and to fulfill its obligations under this contract;
- .B if funds are de-appropriated or not allocated;
- .C if the federal government reduces or eliminates the federal grant;
- .D if OEI's authorization to operate is withdrawn or there a material alteration in the programs administered by OEI;
- .E if OEI's duties are substantially modified.

7.6 SR's remedies if OEI terminates the contract due to lack of funds or change in law. If OEI terminates this contract due to lack of funds or change in law as provided above, SR's exclusive, sole, and complete remedy is the payment for services completed prior to and including the date of termination.

7.7 SR's duties on termination. When SR receives OEI's notice of termination for any reason allowed under this contract, SR must:

- .A cease all work under this contract except any work that OEI directs SR to perform;
- .B comply with OEI's instructions for the timely transfer of any active files and related work product; and

.C cooperate in good faith with OEI during the transition period between the notification of termination and the substitution of any replacement contractor.

7.8 This section is intentionally deleted.

8. Insurance. SR, as entity of the State of Iowa, self-insures any work funded in whole or in part under this contract.

9. Fiscal procedures.

9.1 SR's accounting system. SR represents that its accounting system is adequate to comply with this contract.

9.2 Audit exceptions. If an authorized federal or state audit takes exception to the services provided under this contract for which federal or state reimbursement has been paid, SR must refund the reimbursement if the audit exception is due to the SR's error. If the audit exception is due solely to the OEI's error, the OEI is responsible for the reimbursement. If the audit exception is a joint responsibility, the parties will work together to achieve an equitable resolution.

10. Compliance with laws.

10.1 In general. SR must comply with all applicable federal, state, and local laws, rules, ordinances, regulations, and orders when performing services under this contract. SR represents that it has complied with all federal, state, and local laws regarding any business permits and licenses that may be required to carry out the work to be performed under this contract.

10.2 Compliance with anti-discrimination laws.

.A SR must comply with all laws applicable to the prevention of discrimination in employment.

.B In addition, SR, as a sub-recipient of a federal grant, must comply with all laws prohibiting discrimination on the basis of race, color, national origin, age, religion, sex, or disability in the delivery of services or benefits.

10.3 SR agrees to comply with the organizational audit requirements of OMB Circular A-133, Audits of States, Local Governments, and Non-Profit Organizations.

11. **Certification.** By signing this contract, SR certifies that it will comply with all applicable federal and state laws including, without limitation, the Recovery Act. This certification is a material representation of act upon which OEI is relying when entering into this contract. A false certification constitutes a material breach of this contract.

12. **Contract administration.**

12.1 **Amendments.** No supplement, modification, or amendment of this contract will be binding unless it is in writing and signed by both parties.

12.2 **Third parties.** This contract has no third party beneficiaries; it benefits only OEI and SR.

12.3 **Assignment and delegation.** No party may assign, transfer, or convey in whole or in part this contract without the prior written consent of the other party. For purposes of this clause, a transfer of a controlling interest in SR constitutes an assignment.

12.4 **Choice of law and forum.** Iowa law governs this contract without regard to its choice-of-law provisions. Any litigation arising out of or related to this contract must be brought in Des Moines, Iowa, Polk County District Court.

12.5 **Representations.** Each party represents to the other that:

.A It has the right, power, and authority to enter into and perform its obligations under this contract.

.B It has taken all requisite action (corporate, statutory, or otherwise) to approve the execution, delivery, and performance of this contract.

.C This contract constitutes a legal, valid, and binding obligation on itself in accordance with its terms.

12.6 **Integration.** This contract constitutes the entire agreement between the parties and none of the parties are relying on any representations that may have been made that are not included in this contract.

12.7 **Not a joint venture.** Nothing in this contract creates the relationship of a partnership, joint venture, or other association of any kind, or agent and principal relationship between the parties. Each party is an independent contractor to the other contracting for services and acting toward the mutual benefits derived from

this contract. No party, unless otherwise specifically authorized in this contract, has the authority to enter into any contract or create any obligation or liability on behalf of, in the name of, or be binding on another party to this contract.

12.8 Obligations beyond the term of this contract. This contract will remain in full force and effect to the end of the specified term or until terminated or canceled under this contract. All obligations of the parties incurred or existing under this contract as of the expiration, termination, or cancellation will survive the termination or cancellation of this contract.

12.9 Supersedes former agreements. This contract supersedes all prior contracts between OEI and SR for the services provided under this contract.

12.10 Waiver. No waiver of any term of this contract constitutes a waiver of any other provision, whether similar or dissimilar. No waiver of any term constitutes a continuing waiver of that term. No waiver is binding unless it signed in writing by the waiving party.

12.11 Notices. Whenever this contract requires a party to send notice or other communication to the other party, the notice must be in writing and must be delivered personally or sent by certified or registered mail, or by overnight courier, postage prepaid, to the addresses identified in the Term Sheet. A notice is effective either (1) on the day of personal delivery, or (2) two days after the date of mailing, whichever is earlier.

12.12 Severability. If any term of this contract is for any reason invalid or unenforceable, the rest of the contract remains fully valid and enforceable.

12.13 Cumulative rights. The various rights, powers, options, elections, and remedies of any party in this contract are cumulative and not one of them is exclusive of the others or exclusive of any rights, remedies, or priorities allowed either party to pursue any other equitable or legal remedy to which either party may be entitled as long as any default remains unremedied, unsatisfied, or undischarged.

12.14 Time is of the essence. Time is of the essence with respect to the performance of the terms of this contract.

12.15 Successors in interest. This contract binds and inures to the benefit of all parties and their successors, assigns, and legal representatives.

12.16 Record retention and access. SR must maintain books, records, and documents that sufficiently and properly document and calculate all charges billed to OEI throughout the term of this contract for a period of at least 5 years following the date of final payment or completion of any required audit, whichever is later. SR must permit the Auditor of the State of Iowa or any authorized representative of the State of Iowa and where federal funds are involved, the Comptroller General of the United States or any other authorized representative of the United States government, to access and examine, audit, excerpt and transcribe any directly pertinent books, documents, papers, electronic or optically stored and created records or other records of SR relating to orders, invoices, or payments or any other documentation or materials pertaining to this contract. SR must not impose a charge for audit or examination of SR's books and records.

The parties are signing this contract on the date stated in the Term Sheet.

OFFICE OF ENERGY INDEPENDENCE

By: Roya Stanley
Roya Stanley, Director

SUBRECIPIENT NAME

By: Tammy Polaski
Tammy Polaski, Associate Director 8/2/2010



TERM SHEET

1. **Sub-recipient.** Iowa State University is the Sub-recipient (SR). SR is a state entity established by Iowa Code chapter 263.
2. **Date of signing contract.** The parties have signed this contract on August 4, 2010.
3. **Term.** The term of this contract is from July 16, 2010, through March 31, 2012, unless the contract is terminated in accordance with this contract.
4. **Notice addresses.** Whenever this contract requires a party to send notice or other communication to the other, the party must send that notice to following addresses:

If to OEI: Office of Energy Independence
 Attn: SEP Program Manager
 Wallace State Office Building, Third Floor
 Des Moines, Iowa 50319

If to SR: Office of Sponsored Programs Administration
 Attn: Tammy Polaski
 1138 Pearson Hall
 Ames Iowa 50011-2207

E-mail Address: tra@iastate.edu
Phone Number: (515) 294-0983

EXHIBIT A

***DESCRIPTION OF THE PROJECT AND AWARD BUDGET
TO STATE ENERGY GRANT SUB-RECIPIENT CONTRACT***

DESCRIPTION OF THE PROJECT AND AWARD BUDGET

1. General

Name of SR: Iowa State University
Address: Office of Sponsored Programs Administration
1138 Pearson Hall
Ames, IA 50011-2207
County: Story
Project Title: Enhancing Energy Education in Iowa
Contract # 10-ED02

2. Project Description/Scope of Work:

SR will develop sustainable educational programs in the area of energy and energy systems that cover four areas: A) K-12, B) undergraduate, C) graduate, and D) continuing education.

3. Award amount: \$500,000.00 Match Amount: \$500,000.00

Type Award: Grant

Project Start Date: July 16, 2010

Project Completion Date: March 31, 2012

4. Financial Procedures and payment schedule:

a. Payment and invoicing procedures: OEI will pay SR consistent with the payment schedule identified below and paragraph 4 of this contract. To be paid, SR must provide OEI with an invoice, a GAX form, and a progress report. Verification that the expenditure of matching funds is proceeding as planned must be included with the submittal.

b. Performance Measures, Acceptance Criteria, and Payment Schedule:

Task	Completion Date	Performance Measures	Acceptance Criteria
Measures in place to comply with contract requirements	07/01/2011	Document the SR has measures in place to comply with NEPA, NHPA, Davis-Bacon Act, Buy American Act, and has completed a waste management plan.	Waste management plan, NEPA, NHPA, Buy American, and Davis-Bacon requirements met.
A.1 Develop at least 10 energy-related activities and educational packets, modules	2 by December 31, 2010; 2 more by May, 31, 2011; 3 more by August 31, 2011; 3 more by December 31, 2011	10 modules created	Completed lesson plans approved by managing faculty member..Provide OEI with a copy.
A.2 Train 10 student groups to present modules, work on K-12 projects.	5 by May 31, 2011; 5 more by December 31, 2011	10 student groups successfully trained and presenting to schools.	Registration lists from training workshops, dates of outreach activities at schools and list of participating student groups.
A.3 Develop at least 10 curricular materials that can be used in K-12 outreach.	2 by December 31, 2010; 2 more by May, 31, 2011; 3 more by August 31, 2011; 3 more by December 31, 2011	10 curricular materials created.	Completed curricula plans approved by managing faculty member. Provide OEI with a copy.
A.4 Make available 10 energy-related demonstrations and educational materials for K-12 use.	2 by December 31, 2010; 2 more by May, 31, 2011; 3 more by August 31, 2011; 3 more by December 31, 2011	10 energy-related demonstrations and educational materials made available	List of available materials, dates and locations where materials are used. Provide OEI with copies of educational materials.
A.5 Develop and implement a four-week summer academy for middle school science teachers	December 31, 2011	10 middle school teachers enrolled in summer academy, summer 2011	Copies of "Certificates of Completion" to all participating middle school teachers.
B.1 Develop a minor in energy systems open to engineering and qualified non-engineering students	May 31, 2011	Minor proposal submitted for curriculum approval process. 20 students enrolled in the minor by Fall 2012 and grow to 50 students within 5 years.	Undergraduate minor approved by the ISU Faculty Senate.

B.2 Develop and deliver two new required courses for the minor	1 developed by December 31, 2010 and offered spring semester 2011; 1 more developed by May 31, 2011 and offered Fall 2011.	Course syllabi	Course approval by Faculty Senate; class roster. Provide copies of Syllabi to OEI.
B.3 Categorize current courses for minor	October 31, 2010	Categorized list of courses	Class schedule for proof of offering
B.4 Develop 5 new undergraduate courses in energy area	1 by December 31, 2010 and offered Spring 2011; 1 more by May 31, 2011 and offered Fall 2011; 3 more by August 31, 2011 and offered Spring 2012.	Course syllabi	Course approval by Faculty Senate; class roster. Provide copies of Syllabi to OEI.
C.1 Develop a Master's of Engineering coursework-only graduate degree	May 31, 2011	Degree proposal submitted for approval. 10 students enrolled by fall 2012; 20 or more new students each subsequent year.	Master's of Engineering approved by the Board of Regents
C.2 Develop 3 required classes for Master's degree	1 by December 31, 2010 and offered Spring 2011; 2 more by May 31, 2011 and offered Fall 2011.	Course syllabi	Course approval by College of Engineering Curriculum Committee; class roster. Provide copies of Syllabi to OEI.
C.3 Categorize current courses for Master's program	October 31, 2010	Categorized list of courses	Class schedule for proof of offering
C.4 Develop 5 new graduate courses in energy area	1 by December 31, 2010 and offered Spring 2011; 1 more by May 31, 2011 and offered Fall 2011; 3 more by August 31, 2011 and offered Spring 2012	Course syllabi	Course approval by College of Engineering Curriculum Committee; class roster. Provide copies of Syllabi to OEI.
C.5 Develop a graduate minor in energy systems	May 31, 2011	Minor proposal submitted for approval, 10 students enrolled in the minor by Fall 2012 and grow to 25 students within 5 years	Graduate minor approved by ISU Faculty Senate.
C.6 Develop certificate program in energy systems	May 31, 2011	Certificate proposal submitted for approval. 10 students	Certificate program approved by ISU Faculty Senate.

		enrolled by fall 2012; 20 or more new students each subsequent year.	
D.1 Develop a menu of current continuing education courses in the area of energy and energy systems	December 31, 2010	Course syllabi	Courses available online through Engineering Distance Education. Provide copy of courses to OEI.
D.2 Categorize current CEUs into career tracks	October 31, 2010	Categorized list of courses	Courses available online through Engineering Distance Education.
D.3 Develop 5 new CEUs in the area of energy systems	1 by December 31, 2010; 1 more by May 31, 2011; 3 more by August 31, 2011	Course syllabus	Courses available online through Engineering Distance Education. Provide copy of courses to OEI.
Final report	March 31, 2012	Final report completed	All documentation submitted to OEI. See section 5b below for final report requirements.

Payment schedule: Payment will be based on a cost reimbursement schedule with invoices provided on a quarterly basis within 30 days after the quarter end. The final payment invoice will be provided within 30 days after the project end date of March 31, 2012

5. Recovery Act compliance.

a. Compliance with Davis-Bacon.

- SR must sign a DOL Standard Form 1413, Statement of Acknowledgement signifying an understanding of Davis Bacon compliance requirements.
- The Davis-Bacon Act wage decision for the county or counties in which construction occurs will correspond to the effective date of this contract. OEI will provide the general decision number and wage decision to the SR. The wage decision that is in effect at the time of the effective date of this contract, will remain throughout the entire term of this contract. Current and archived wage decisions can be found at: <http://www.wdol.gov/dba.aspx#0>
- Each Friday of each week during construction, SR must submit a Weekly Certified Payroll on a Form WH347 to OEI at <https://www.iowagrants.gov/index.do>

- SR must retain the original, signed weekly form. The file must be available for review for a period of three years from project completion.

b. Compliance with Recovery Act reporting requirements.

- SR must provide monthly Recovery Act progress reports at <https://www.iowagrants.gov/index.do> no later than the 25th day of the month for each year of this contract. In addition to any other requirements, each progress report must include the following information for the preceding month:
 1. Cumulative number of individuals compensated for any amount of work during the time period;
 2. Updated project progress to include accomplishments or setbacks;
 3. Updated development timelines;
 4. Quantification of performance measures achieved.
- SR must provide quarterly Recovery Act progress reports at <https://www.iowagrants.gov/index.do> no later than December 26, March 25, June 25, and September 25 of each year of this contract. In addition to any other requirements, each progress report must include:
 1. Jobs created through both Recovery Act funds and non-federal funds;
 2. Cumulative number of individuals compensated for any amount of work during the time period;
 3. Updated project progress to include accomplishments or setbacks;
 4. Updated development timelines;
 5. Quantification of performance measures achieved;
 6. Invoices for reimbursements and a summary spreadsheet containing expenditure amounts, recipients of payments, and dates paid.
- SR must provide a final report to OEI upon completion of the project. SR must send the final report to <https://www.iowagrants.gov/index.do>. Among other things, the final report must include:
 1. A synopsis of the completed project;
 2. Job creation/retention statistics;
 3. Before/during/after photo documentation if pictorial history is relevant;
 4. Performance measures achieved;
 5. Quantification of energy saving and cost saving results to date;
 6. Quantification of energy saving and cost saving projections for the next three calendar years;
 7. Construction punchlist, commissioning reports, and other technical project evaluations resulting from project implementation;
 8. Financial information;
 9. Any other information requested by OEI.

- SR agrees to provide OEI with long term project implementation results as requested following the closure of the project account as necessary to document the ongoing benefits associated with the completion of this project.

c. Table summarizing reporting deadlines.

Report	Due no later than
Weekly Certified Payroll (Form WH347):	6:00 p.m. each Friday of each week during construction
Monthly Recovery Act and Progress Reports:	The 25 th day of every month of this contract
Quarterly Recovery Act, Progress, and Invoice Reports:	March 25, June 25, September 25, and December 26 of each year of this contract
Final Report:	30 days after project completion

d. OEI's receipt of reports is no waiver.

By receiving any report, OEI does not waive its ability to challenge any report for failing to comply with this contract at a later date, nor does OEI's receipt of a report waive any remedy it may have against SR for the report failing to comply with this contract.

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

August 2, 2010

Jordan Vaughan
Iowa Office of Energy Independence
Wallace State Office Building
502 East 9th Street
Des Moines, Iowa 50319

Office of Sponsored
Programs Administration
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-5225
FAX 515 294-8000
www.ospa.iastate.edu

RE: State Energy Program Grant Sub-Recipient Contract #10-ED02
Project Title: *Enhancing Energy Education in Iowa*
ISU PI: Theodore Heindel; ISU Proposal #108409 10-1971

Dear Mr. Vaughan:

Enclosed please find two (2) originals of the referenced document signed by Iowa State University. Please return a fully executed original of the document to my attention at the address below.

Also enclosed is a copy of Iowa State University's Federally Negotiated Indirect Cost Rate Agreement per the request in Article 5.9 of the agreement. This Indirect Cost Rate Agreement is effective through the entire period of performance of the above referenced project.

Thank you for your assistance in this matter.

Sincerely,



Tammy Polaski
Associate Director
Iowa State University
1138 Pearson Hall
Ames, IA 50011-2207
515-294-0983
tra@iastate.edu

cc: Theodore Heindel
Mary Bilstad
Ellen Reints