BACKGROUND AND REQUEST

WRIGHT STATE UNIVERSITY/UNIVERSITY OF DAYTON
Master of Science in Engineering in Renewable and Clean Energy

EXECUTIVE SUMMARY/RECOMMENDATION

This program clearly meets Regents' standards for graduate degree programs. The Regents' Advisory Committee on Graduate Study voted unanimous approval for the new program. RACGS members asked that Wright State University and the University of Dayton work cooperatively to ensure that procedures are in place to accommodate student needs occasioned by cross registration for courses across institutions, and both universities readily agreed to do so in order to move forward with this innovative program.

Request: Wright State University and the University of Dayton request new degree authority for a Master of Science in Engineering in Renewable and Clean Energy. The degree name will be Master of Science at the University of Dayton and Master of Science in Engineering at Wright State University. The Air Force Institute of Technology (AFIT) and Central State University will serve as collaborating partners, but neither AFIT nor Central State University is seeking separate new degree authority. Wright State University, the University of Dayton and the AFIT have been long-time partners in the Dayton Area Graduate Studies Institute (DAGSI). Accordingly, these new degree programs will follow all DAGSI policies and procedures in terms of course and other resource sharing.

Program Purpose/Mission: The Master of Science (in Engineering) in Renewable and Clean Energy will provide our state and country a supply of future engineers and researchers in the critical field of energy. Our country, and the world, is facing a shortage of liquid petroleum based fuels and the potential for shortages in natural gas within the next 20-30 years. While there are significant amounts of coal available in this country, there are environmental issues related to burning coal that will restrict its use. What is needed is alternative means for producing the energy required to keep our industry strong and to maintain a high standard of living. An economical alternative to the traditional fossil fuels, that we are so dependent upon, must be developed in the near future. Hopefully, such an alternative energy source will also be renewable and clean. To make this development happen, a large work force of engineers and scientists is required. WSU, UD and AFIT want to be at the forefront of supplying this critically needed educated work force in the area of renewable and clean energy. The goal of the programs being proposed is to satisfy a part of this need. These are the first programs of their kind in the State of Ohio.

The renewable energy field can be a significant employer in the state of Ohio. Many of these jobs will require advanced skills and education; thus, highlighting the need for a Master's degree in Renewable and Clean Energy.

A unique aspect of the program will be the opportunity for graduate students in these programs to work in internships with renewable energy company partners in Ohio. DAGSI fellowships can be allocated to provide incentives for Ohio industries to hire students in this program.

Enrollments: It is estimated that enrollment for the program will reach 20 students per year at WSU, and 20 students per year at UD. Enrollment in classes will be higher owing to students from other disciplines attending the energy program classes. In the past, large numbers of Mechanical, Aerospace, and Nuclear Engineering students have taken these courses, and it is expected that this will continue to be the case in the future. It is anticipated that students from other disciplines will enroll in this program. This is no different than students who have a Bachelor's degree in one discipline and then switch to Mechanical Engineering for their Master's degree. It is believed that these background courses will be manageable for most scientific disciplines with some connection to the study of energy. WSU, UD and AFIT are all committed to enrolling students from underrepresented groups in this master's program. In an effort to enroll underrepresented minority students, collaboration with Central State University has been formed. This collaboration involves having two Central State faculty teach courses at Wright State University in the Renewable and Clean Energy program, recruitment of Central State's students into this program, and potential research collaborations. Central State University is Ohio's only historically black public institution of higher education. It is located within 25 miles of Wright State University and the University of Dayton, which eliminates the distance barrier to collaboration.

Curriculum: The new degree programs, one at WSU and one at UD, both in Renewable and Clean Energy, will require a minimum of 45 quarter credits at WSU and 30 semester credits at UD. The programs will offer both thesis and non-thesis tracks, as do most engineering master's degree programs at the two institutions. WSU allows 12 quarter credit hours for thesis to count toward the degree and UD allows 6 semester hours. The non-thesis options will require the students to take an equivalent number of advanced graduate course credits, including a project oriented course to replace the thesis credits. The proposed curriculum will feature required courses and electives. The required portion of the curriculum includes two core fundamental courses in Advanced Thermodynamics and Energy Materials and three courses in renewable energy systems and clean energy. These latter three courses will be selected from among four categories; namely Renewable Energy, Clean Energy Systems, Energy Efficiency, and Large Scale Energy Systems. Two to three electives beyond the strictly energy focused courses will be permitted. Finally, students will be required to take one graduate level mathematics course at WSU, UD or AFIT and complete a thesis or take additional courses for a non-thesis option in order to satisfy the requisite credit hours of the respective universities.

Faculty, Facilities and Resources: The Department of Mechanical and Materials Engineering at Wright State University has 18 full time faculty members and has access to a large number of qualified adjunct instructors. All 18 of these faculty members have Ph.D. degrees and are experienced in instructing and mentoring master's level students. No new faculty are required to run the Renewable and Clean Energy Program as proposed, but the intent is to increase the number of faculty involved in the program, especially in the area of electrical engineering. For this academic year, the department specifically hired two faculty members with expertise in advanced energy systems. Next year, the department plans to hire an additional faculty member who has a specialization in renewable or clean energy. The class and laboratory facilities in the Department of Mechanical and Materials Engineering at Wright State University, and within the College of Engineering and Computer Science, are modern and well-equipped and will provide excellent support for a new master's degree program in renewable and clean energy. The laboratory space for graduate student research is adequate to begin the program, and it is anticipated that additional laboratory space for graduate student research will be made available as research grant money increases.

At the University of Dayton, faculty from Mechanical Engineering, and later Electrical Engineering will be associated with this degree program. No new faculty members are required to support the proposed Renewable and Clean Energy program: however, there is an ongoing search to add another faculty to support this program. The class and laboratory facilities in the Department of Mechanical and Aerospace Engineering at the University of Dayton are more than sufficient to support the new master's degree program in Renewable and Clean Energy. The Department of Engineering Physics at the AFIT has 20 faculty members. All 20 of these faculty members have earned Ph.D. degrees. Since AFIT does not offer undergraduate programs, the entire instructional effort is directed at graduate students. No new faculty members are required to support the AFIT involvement in the proposed Renewable and Clean Energy program. The class and laboratory facilities in the Department of Engineering Physics at the AFIT are sufficient to support the new master's degree program in Renewable and Clean Energy.

Evidence of Need: There are a number of factors that dictate a need for these master's degree programs. The primary motivator is society's need for stable, clean and economical energy sources. The recent increase in the price of oil indicates the need for other energy supplies. As of the end of 2004, the United States was only able to produce about 35% of its oil needs. It is reasonable to project that this difference between supply and demand will worsen in the future if something is not done to mitigate our dependence on oil. One way to reduce this country's dependence on fossil fuels is to develop alternative energy sources. Two key elements to developing economical energy alternatives are to educate people in this area and to increase the amount of research done in this area. The program being proposed addresses both of these issues.

A second need for a Master's program in Renewable and Clean Energy is the interest in this area by the State of Ohio. Ohio, through its Third Frontier Project and the University Clean Energy Alliance of Ohio, wants to encourage research in advanced energy systems. This proposed program aims to supply educated people to the State of Ohio in the field of renewable and clean energies and to perform research in this area.

A third need for a program such as this is the number of companies that are developing in the renewable and clean energy field. Ohio companies such as First Solar, UltraCell, GrafTech International, HydroGen Corporation, Pemery Corporation, Rolls-Royce Fuel Cell Systems Inc., EDCD Ovonics, and NexTech Materials are taking root among others. These companies are and will require an educated workforce. In addition, on the energy efficiency side of the equation, there is a dearth of capable engineers who are able to help Ohio reduce energy use in our residences, buildings, and industries. This program is designed to fill these needs.

End of Comment Period: November 24, 2008
No Comments Received, Recommend Approval

Approved	
Eric D. Fingerhut, Chancellor	11/24/08 Date