University of Notre Dame
Strategic Academic Planning Committee
September 2009

PROPOSAL COVER SHEET

Proposal Type: Full Grant __X__ Seed Grant _____

Proposal Title: Sustainable Energy Initiative

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A. Abstract

Providing readily-available, inexpensive, and non-polluting energy is arguably humankind's greatest challenge for the 21st Century. As the late Nobel Laureate Richard Smalley argued so eloquently, "Which of humanity's top challenges (clean water, adequate food, a clean environment, poverty, terrorism and war, disease, adequate education, etc.) could not be solved if clean, inexpensive energy were available to all?" The Sustainable Energy Initiative (SEI) is designed to tackle these pressing challenges by revolutionizing energy-related research and education on campus. The SEI will establish Notre Dame as a preeminent leader in three strategic areas: (i) the development of safer nuclear energy – focus on *actinide materials stabilization*, (ii) the design of cleaner fossil fuel processes – focus on materials for *gas separations*, and (iii) the creation of transformative solar energy technologies – focus on materials for conversion of *solar to chemical energy*. These focus topics have been selected to build upon significant existing strengths on campus, to encourage broad participation, and to provide a balanced research portfolio in each of the sectors likely to be required to achieve practical solutions for energy sustainability, *i.e.* nuclear, fossil and renewables.

A multifaceted approach will be taken to achieve our goals in expanding international recognition in energy-related research and to provide an unsurpassed education to undergraduate and graduate students at Notre Dame. First, the current Notre Dame Energy Center (NDEC) will be completely integrated into the SEI. In turn, the SEI will be the primary energy-related research, education and outreach organization at Notre Dame. The university-wide SEI will build upon NDEC successes, but will accelerate and radically expand the energy-related research activities on campus.

Next, a tightly controlled incentive-based funding mechanism, primarily utilizing post-doctoral researchers and graduate students, will be created to quickly and efficiently form a large number of multiple cross-disciplinary and inter-college research teams (~20-30 projects to be funded annually). This will bring together existing, but presently disparate, researchers on campus to form coherent and problem-focused efforts in energy sustainability.

This research will be enabled through the creation of five new facilities on campus, a materials synthesis and characterization facility, laboratories for safer nuclear and cleaner fossil, a solar testing laboratory, and an integrated materials simulation facility. The opening of Stinson-Remick is timely as this new building will house most of the facilities, and will create capacity for other facilities in Nieuwland Science Hall and Fitzpatrick/Cushing Hall. Each facility will be managed by a research assistant professor, who will collaborate with faculty on research projects and grant writing. The research, education and outreach mission of the SEI will be assisted by formation of a strong administrative structure.

Finally, an integral part of the SEI will be the hiring of faculty in specific energy-related research areas. A significant synergy with this proposal is the commitment from the colleges of engineering (CoE) and science (CoS) for six new teaching and research (T&R) faculty hires in energy-related research, with the potential for others at the endowed chair level. This tremendous commitment from the colleges illustrates the strategic importance of sustainable energy in fulfilling the research and education mission of Notre Dame. Overall, the SEI will optimize the ongoing success of energy research on campus, elevating it to new levels of national and international visibility.