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ENERGY ENGINEERING EDUCATION

FOR THE CENTER FOR COAL TECHNOLOGY RESEARCH MEETING

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Background

- Energy is one of the national high priority issues.
- Coal is an important natural resource of Indiana.
- Proper use of the coal technology has significant impact on our state's economy and environment.
- The nature of the technology is multidisciplinary.
- Research and workforce development require well-trained people.

Integration

Workforce

Education

Coal Industry

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Education is needed

- "Energy Economy" is predicted to be dominant in next few decades.
- Significant federal funding has been and will be devoted to energy research and technology development.
- Commercialization is the goal, meaning the energy sector will grow.
- The needs of engineers with training in energy engineering will be in demand.

IUPUI

- Establishment of Richard G. Lugar Center of Renewable Energy (LCRE) in 2007
- Research focuses on energy storage, fuel cell and battery technologies, power system grid control, clean coal technology, etc.
- Development of faculty expertise in the fields

Therefore, we have the foundation to develop energy degree programs and training programs.

Accomplishments

- Secured more than $9M research funding from government agencies
- Participated in the Indiana Advanced Electric Vehicle Training and Education Consortium headed by PUWL for course developments
- Established a new Energy Engineering BS degree program
- Organized workshops, seminars, etc. on energy related issues for state wide audiences

Uniqueness

- Our BS program in energy engineering is research-based. The curriculum covers broad topics.
- IUPUI has the research infrastructure (LCRE). It creates the depth and provides frontier knowledge to students.
- Science and engineering programs offer fundamental courses required for energy engineering.
- Specialty courses in energy engineering will be offered.
- The curriculum will provide a bridge for students to energy related graduate programs.
- There are many energy related companies in Indiana, which provide internship and co-op opportunities as well as guidance to the new degree program.

Education

- BS degree in Energy Engineering (4 years)
- Combined BS degree in Energy Engineering and Mechanical Engineering
- Internship opportunities with energy related companies, such as Earth Solar, AlgaeWheel, Xylanco, Horizon Wind Energy, I-Power Energy Systems, Tawas, Rolls-Royce, Cummins, IPL, Midwest ISO, and Delphi
- Certificate programs (to be developed)
- Graduate programs (to be developed)
- Training programs tailored for specific needs, including clean coal technology

Energy Engineering BS Curriculum

Science and Math courses	30 cr.
Engineering Fundamentals (ME and ECE)	44 cr.
Energy Engineering courses	28 cr.
Technical Electives	6 cr.
General Education	21 cr.
Total	129 cr.

Specialized courses

- Renewable Energy Systems and Design
- Electric Power Networks and Interfaces
- Clean Power Generation
- Thermal and Hydro Generation
- Wind and solar Generation
- Hybrid & Electric Transportation
- Energy Storage Devices and Systems
- Fuel Cell & Battery Engineering
- Nuclear Power Systems
- Electric Power Systems
- Power Electronics
- Industrial Energy Systems Design
- Power System
- HEV Modeling and Simulation

Call for involvement

- We encourage industry to be involved in our programs
  - Advisory board
  - Students
  - Curriculum development
  - Internship or co-op
  - Assessing the programs

Mutual benefit to both IUPUI and Indiana companies

- Make companies more competitive
- Attract energy companies to Indiana
- Promote collaborative research
- Strengthen the education program