Grand Challenge Initiative Proposal

Energy Transition and Economic Diversification

College of Engineering & Department of Physics
Francois Jacobs, Ph.D.
Renxiang Lu, Ph.D.
Yuri Dahnovsky, Ph.D.
Haibo Zhai, Ph.D.

College of Education
William Cain, Ph.D.

College of Business
Alexandre Skiba,

Written Proposal = 2 Pages
Written Proposal + Images + Budget Narrative = 4 Pages
Proposal PI – Francois Jacobs @ fjacobs@uwyo.edu
The Challenge: Wyoming’s economy has long depended upon revenue generated from the extraction of minerals and natural resources. A rapidly evolving energy landscape brings the urgent challenge of diversifying the State’s economy and transitioning its energy portfolio. In order to help the energy sector thrive through advanced technologies while enhancing and growing other areas of the State’s economy, through consistent, though diversified, revenue streams for the people of Wyoming. Recognizing that our markets and global economies are transitioning toward renewable energy sources and that major oil and coal companies are accelerating spending on low decarbonized fossil fuel energy resources, the State needs to develop and enhance the skills of its current workers, so that transitioning into a different technology will assist these workers in staying employed. Wyoming’s unique blend of people and place provides exceptional opportunities to help define and contribute to this changing energy landscape. The diagram below demonstrates the need for a workforce transition from declining energy sectors to future energy sectors pertinent to the Wyoming landscape.

The University of Wyoming’s Role in the Solution: As the State’s flagship and land-grant institution, UW is positioned to contribute to Wyoming’s economic diversification and enhance its energy industries. It is poised to serve as a central leader to work with stakeholders to help the energy industry in our economy. UW’s relatively small size means we know one another and, through interdisciplinary work, possess a model to address complex challenges facing the State. As a comprehensive university, UW boasts broad expertise to address energy and economic challenges, as well as providing outstanding expertise in environmental and energy economics, cutting edge research in energy within engineering, geology, and the School of Energy Resources, as well as related expertise and notable opportunities in the departments of economics, physics,
education, data science, community development, and more. The diagram below demonstrates the interdisciplinary integration of academic units at UW in support of a viable energy transition in Wyoming.

**Relevance to Wyoming:** A long-standing concern has been the out-migration of UW graduates. Even when they wish to stay in Wyoming, finding rewarding employment is a struggle. Addressing the challenge of economic diversification, particularly in light of emerging trends in energy, has the potential to deliver clear benefits. Individuals from across the State would benefit from focused educational opportunities that yield employable skills relevant to the “new” economy. Attacking this challenge is also likely to shed light on necessary adjustments to incentive structures within the State – structures that balance revenue, regulation, and investment. The diagram below demonstrates the potential of UW’s education opportunity leverage across the state at the listed community college locations.

**Correspondence to Presidential Priorities:** UW can capitalize on its position as the flagship and land-grant institution by using its entrepreneurial and interdisciplinary strengths to build a strategic “all university” approach in collaboration with community colleges, high schools, and stakeholder communities to build economic opportunities for Wyoming citizens. UW has already invested in existing interdisciplinary strengths in a variety of technical fields and continues to support interdisciplinary centers, institutes, and programs that address Wyoming-specific problems of space and time (e.g., migration pathways and energy corridors). Wyoming’s dispersed population creates challenges but also drives novel ideas for new economic opportunities (e.g., blockchain). Online technologies, adopted widely since COVID-19, provide resources and expertise that has expanded access to educational opportunities across the State. Recognizing the uniqueness
of Wyoming’s communities and sense of place also provides opportunities to address diversity and inclusiveness by engaging with working Wyomingites and creating economic opportunity for the population as a whole. We envision collaboration across UW’s departments of Engineering, Physics, Business, and Education to ensure the education of a qualified energy sector workforce, through the development and instruction of macro and micro curricula at the University, Community Colleges across the state, and industry sector localities.

**State and National Research Funding:** The attached budget outline of $20,000 will allow energy researchers in the College of Engineering and Physics Department in tandem with the School of Education and Business to develop an expanded State and National funding proposal in support of Wyoming’s rapidly evolving energy landscape, with specific reference to the following state and national funding agencies: *National Science Foundation (NSF)*, *Department of Labor (DOL)*, *Department of Education (DoED)*, *Department of Energy (DOE)*, and *Wyoming Department of Workforce Services (DWS)*. The expanded proposal will secure funding at the State and National levels to address energy sector workforce challenges across Wyoming. The diagram below lists five identified funding agencies at the state and national level with support in renewable energy, labor and workforce training, education, and carbon capture funding, which is unique to the proposal focus.

**Proposal Framework & Budget Narrative:** The proposal framework below consists of the following two phases.

**Phase I (step 1 & 2):** Consists of Grand Challenge Initiative funding ($20,000) to support the planning and development of an interdisciplinary grant proposal at the state and national level. The funding will be distributed across the interdisciplinary units (Engineering, Physics, Education, and Business) in relation to their respective contribution in time and resources commitment during the development of the proposal. Grand Challenge funding will support a total of two graduate and one post doc student during the spring and summer of 2021. Subsequent funding might support proposal-related travel across Wyoming.
Phase II (step 3, 4 & 5): Step 3 will consist of state and national funding in the development of a Renewable Energy Training Center and related curricula across interdisciplinary academic units at UW. Step 4 will utilize state and national funding in the deployment of renewable workforce training initiatives across the state. These training initiatives will be offered at macro (degree bound) or micro (certificate bound) levels. Renewable workforce training will also be offered to educators (UW education students and schoolteachers) through continuous education credits and certificates as a way to introduce energy education across classroom platforms in Wyoming. Step 4 will provide renewable workforce training at community colleges in Wyoming. Step 5 will measure the research initiatives to ensure a sustainable energy portfolio across Wyoming.

Budget Narrative ($20,000 total)

- Graduate Student Funding (2 students) ($2,500)
- Post-doc Researcher Funding (1 Student) ($2,400)
- Faculty Initiative Funding (ENG, PHY, BUS & Education) ($5,000)
- Others (Energy Sector Meetings & Proposed Travel) ($10,000)
Energy Transition and Economic Diversification Proposal

January 15, 2021

Grand Challenge Initiative
Energy Transition and Economic Diversification Proposal

Declining Energy Sectors

Emerging Energy Sectors

Workforce Transition

Oil & Gas
Mining

Solar
Wind
CCS (Carbon Capture Storage)

Grand Challenge Initiative
Energy Transition and Economic Diversification Proposal

Legend:
- Delivery of information
- University of Wyoming
- Community college

Grand Challenge Initiative
Grand Challenge Initiative

Energy Transition and Economic Diversification Proposal

- Wyoming Department of Workforce Services (DWS)
  Workforce Training Funding
- National Science Foundation (NSF) (CBET)
  Renewable Energy Funding
- Department of Labor (DOL)
  Labor Transition Funding
- Department of Education (DoED)
  Education Initiative Funding
- Department of Energy (DOE) (NETL)
  Carbon Capture Funding

Potential Funding Sources
Energy Transition and Economic Diversification Proposal

Phase I
Grand Challenge Initiative

Step 1
Proposal Planning

Step 2
Interdisciplinary Grant Development (State & National)

Step 3
Development of Renewable Energy Education

Step 4
Deploy Workforce Training Across the State (Macro or Micro Level)

Phase II
State and National Funding Initiative & Implementation

Step 5
Sustainable Energy Portfolio

Grand Challenge Initiative
Energy Transition and Economic Diversification Proposal

Budget Narrative ($20,000 total)

- Graduate Student Funding (2 students) - 13% ($2,600)
- Post-doc Researcher Funding (1 Student) - 12% ($2,400)
- Faculty Initiative Funding (ENG, PHY, BUS & Education) - 25% ($5,000)
- Others (Energy Sector Meetings & Proposed Travel) - 50% ($10,000)

Grand Challenge Initiative
Energy Transition and Economic Diversification Proposal

Grand Challenge Initiative
Energy Transition and Economic Diversification Proposal

Thank you!

Questions?
For more information, feel free to contact me (Francois) fjacobs@uwyo.edu

Grand Challenge Initiative