UNIVERSITY OF WYOMING
Energy Science Graduate Stipends and Fellowships
NOVEMBER 1, 2012

2011 Session Laws, Chapter 88, Section 346(d)(ii)(D)

To the Joint Appropriations Committee, Joint Minerals, Business and Economic Development Committee and Governor Mead

During its 2011 session, the legislature appropriated $6,247,930 in Abandoned Mine Lands funds to UW's Office of Academic Affairs for energy science graduate stipends and fellowships. The funds are to be expended over multiple years with no more than $1 million expended per year.

For FY 2013, approximately $821,000 in funding was allocated for graduate stipends to support 30 graduate students. Of the 30 students receiving support, 13 are in their second year of the program while 17 students started a new graduate program at UW in August. The program is designed to support students over a two-year period.

The legislation also stipulated that, through Grade Point Averages and Graduate Record Examine (GRE) scores, "only highly qualified candidates are to be awarded energy science graduate stipends or fellowship opportunities." UW addressed this provision by examining the GRE scores for the students under consideration. The GRE scores of the fellowship recipients were *extremely high* with an average score of 318, representing students in the top 17th percentile of scores across the nation. The talent level attracted through this program is truly remarkable.

The energy science GA stipends permit UW to pursue important energy research for the state while raising the stature of graduate education by recruiting outstanding graduate students. Like those provided last year, the new awards for FY2013 support fundamental research in a wide array of energy topics important to Wyoming. Examples include unconventional (shale) natural gas, enhanced oil recovery, CO_2 sequestration, coal bed methane, wind turbine reliability, and solar energy. Studies aimed at improving oil and gas field air quality and treating water produced by hydraulic fracturing were also supported.

Table 1 provides a summary of the departments receiving FY13 energy GA awards along with a brief description of the projects. Table 2 lists the ongoing FY12 awards.

Table 1. Energy GA Awards made in AY 2012-13.

College / Department	Topic
Ag & Natural Resources	
Molecular Biology, PhD	Production of hydrocarbon fuels using photosynthetic microorganisms.
Arts & Sciences	
Chemistry, PhD	A study of nitrogen heterocycles as they relate to nitrogen oxides (NOx), a compound contributing to air pollution and detrimental effects in refining of hydrocarbons.
Chemistry, PhD	Basic energy research involving nanoscale separation columns.
Geology and Geophysics, MS	A study of the mineralogy and the processes that contribute to the formation of roll-front uranium deposits in WY Intermountain basins.
Geology and Geophysics, MS	Characterizing the sedimentologic and stratigraphic properties of active unconventional hydrocarbon wells in the Frontier and Niobrara Formations of the SW Powder River Basin.
Geology and Geophysics, MS	Unconventional (shale) gas reservoirs require fracture to permit gas flow. The research will employ geochemical experiments and computer simulations to determine fundamental shale-water interactions to evaluate whether CO_2 can augment or replace water in shale gas development.
Geology & Geophysics, MS	Engineered solar microbial fuel cell systems--an avenue to solar energy storage.
Geology & Geophysics, PhD	A geochemical lab study of the reactivity of important reservoir minerals with water-saturated CO_2 and related water-mineral reactions
Business	
Economics and Finance, PhD	Energy economics.
Engineering & Applied Science	
Atmospheric Sciences, MS	A study of the chemistry and source of volatile organic compounds (VOC's) emitted during oil and gas extraction. VOC's contribute to elevated ozone levels in the atmosphere.
Chemical and Petroleum Engr, MS	Development of sulfur resistant composite membranes for hydrogen purification.
Chemical and Petroleum Engr, MS	Synthesis and characterization of bimetallic catalysts to produce liquid fuels (alkalines) from lactose.
Chemical & Petroleum Engr, PhD	Synthesis and characterization of bimetallic catalysts to produce liquid fuels (alkanes) from pyrolysis products of biomass.
Civil and Architectural Engr, PhD	Commercialization of biomass enhanced coal bed natural gas process - a patent-pending technology developed at UW.
Mechanical Engr, MS	Conversion of beetle killed biomass and solar energy to Diesel grade biofuels investigated experimentally.
Mechanical Engr, MS	Developing modeling tools to predict fatigue life of composite wind turbine blades. Wind turbine reliability is one of the great challenges facing the wind energy industry.
Mechanical Engineering, MS	Synthesis and characterization of smart membrane materials for use in treating produced waters hydraulic fracturing.

Table 2. Energy GA awards made in AY2011-12. Students are provided funding for two years. The student in the highlighted project dropped out of the program.

Ag & Natural Resources	
Ag & Applied Economics, **MS**	Economic efficiency of conservation easements purchased to mitigate adverse effects to mule deer populations
Ag & Applied Economics, **MS**	Tradable permits to resolve conflicts over coalbed natural gas produced water at the agriculture-energy interface
Plant Sci., Agronomy & Restoration Ecology, **MS**	Impacts and management of noxious and invasive weeds associated with ground disturbance
Renewable Res, Soil Sci, **MS**	Transport of CBM produced water in the Powder River Basin
Arts & Sciences	
Chemistry, **PhD**	Efficient storage of energy using thermodynamic cycling of high surface area materials
Chemistry, **PhD**	Enhanced solar cell efficiency using quantum dots as strong sensitizers
Geology & Geophysics, **PhD**	Analysis of carbon sequestration in brine reservoirs
Geology & Geophysics, **MS**	Reducing carbon emissions from coal combustion
Mathematics, **PhD**	Analysis of fission processes for nuclear fuel reactors
Statistics, **PhD**	Capture/storage of carbon dioxide into deep saline aquifers
Business	
Economics & Finance, **PhD**	Market structures for non-renewable energy resources
Engineering & Applied Science	
Chemical & Pet Engr, **PhD**	Recoveries of residual oil--simulating sequential water flooding events
Chemical & Pet Engr, **PhD**, Petr Engr	Hydrocarbon recovery and CO2 storage
Mechanical Engr, **PhD**	Wind plant development: siting of individual turbines in wind farms