Compendium of Renewable/Sustainable/Clean Energy Education Degree Programs and Research Facilities in the Lower 48

BS Degree Programs

Oregon Institute of Technology: Renewable Energy Engineering

The degree program is geared toward readying students for occupations in: "energy efficiency and "green" buildings, solar thermal systems, photovoltaics, hydropower, wave and tidal energy, biomass and biofuels resources, wind energy, energy storage, geothermal systems, and alternative transportation systems."

ASU: School of Sustainability

The Bachelor of Science (BS) program introduces students to the concept of sustainability in the context of real-world problems, exploring the interaction of environmental, economic, and social systems. Priority placed on gaining a deep understanding of the concepts and methods of environmental economics, ecology, environmental biology, hydrology, environmental chemistry, engineering, earth-systems management, and other disciplines relevant to the sustainable use of environmental resources. Students can pursue the following tracks within the BS in Sustainability:

Sustainable Energy, Materials, and Technology
The Economics of Sustainability
Ecosystems Sustainability

Appalachian State University: Sustainable Technology

The program requires 28 semester hours in introductory technology and environmental design courses, 12-14 hours of interdisciplinary coursework, 27 hours in technical specialization (i.e., wind, hydropower, photovoltaic systems, solar thermal energy, building science, biofuels, etc.) and a capstone course or internship.

The Energy Institute at the University of Michigan

In addition to the MS in Energy Engineering, UM offers degree programs in: Electrical and Computer Engineering – Power and Energy. The School for Environment and Sustainability (SEAS) offers dual degrees in Engineering, Business, Urban and Regional Planning, and Law. The school also offers a Minor degree with a focus on Energy.

Northeastern University's College of Engineering: Energy Systems

In keeping with Northeastern's co-op model where "curriculum is firmly rooted in energy technology and includes exposure to the interface with business and financial decision processes. Students are exposed to business educators and practicing professionals."

SUNY Canton:
Renewable and Alternative Energy Systems

Stated goals for graduates of the program are: Ability to formulate solutions to the needs of the public for alternative and renewable sources of energy. Emerge as effective project planners and managers of alternative and renewable energy projects. Prepared to respond to the dynamic needs of the alternative energy market. Are able to communicate in an organized manner through technical reports in written, oral, and other formats appropriate to alternative and renewable energy issues. Develop skills to function in and lead a team-based effort.

Syracuse University:
Energy and Its Impacts BS

The Integrated Learning Major on Energy and its Impacts gives students the interdisciplinary background required to understand the origin of our current problems and the ability to seek solutions to them. Students from a broad range of primary majors (in the Natural Sciences, Social Sciences, Engineering, or Management) will come together to confront some of the most important challenges that confront the world. A team-based capstone project will enhance interdisciplinary learning while building problem-solving skills.

MS/PhD Degree Programs

Oregon Institution of Technology

The Master of Science in Renewable Energy Engineering (MSREE) program is offered at Oregon Tech's Portland-Metro Campus (in Wilsonville). The MSREE program has been structured to accommodate both full-time students and working professionals. The MSREE program is designed to prepare graduates to be energy engineering professionals who have advanced knowledge and skills that enable them to assume a broad range of technical leadership roles in nascent and established industries, government entities and NGOs.

Washington State University:
Electrical Power Systems Engineering

The Electrical Power Engineering PSM provides core technical education in power systems analysis, transmission and distribution systems and power system economics and electricity markets. Core technical work can be supplemented with elective courses in areas ranging from power electronics to power system protection to smart grid communication.

University of Colorado:
Master of the Environment

The Masters of the Environment (MENV) is a 17-month, cohort-based, on-campus professional degree program designed for new and early career professionals. The program focuses on applications and problem-solving and has four parts: (1) the core curriculum, (2) a choice of topical specializations that are supported by (3) electives, and (4) a Capstone Project.

The University of Michigan:
The Energy Institute

The Master of Energy Systems Engineering (ESE) program is a 30-credit graduate degree designed for students who are motivated to take on the challenges facing society in the areas of sustainable energy generation, storage, and conversion. In this program, you will learn about alternative and conventional energy technologies, the societal and environmental impact of technology developments, and the economic benefits of those developments. The curriculum takes a holistic approach and exposes you to courses from across disciplines, including engineering, natural and social sciences, public policy, environmental science, and business.

University of Illinois:
MS in Engineering with Concentration in Energy Systems

The M.Eng. in Energy Systems degree requires students to complete 32 credit hours of graduate coursework, consisting of courses in the areas listed below. The program structure is designed to provide students a solid foundation in fundamentals of one or more energy-related technical areas as well as broader exposure to the related economic, social, or political context in which energy systems operate.

University of Massachusetts, Lowell

The Energy Engineering Program at the University of Massachusetts Lowell is, along with the Nuclear Engineering Program, one of two ways to earn a graduate degree in Energy Engineering. The program offers both Master's and Doctoral degrees, as well as a Graduate Certificate, in Energy Engineering.

Columbia University:
Earth and Environmental Engineering /
Sustainable Energy

This concentration is aimed at engineers with a minimum background of a BS degree in an engineering discipline. The objective is to gain a better understanding of present day energy infrastructures, their strength and weaknesses and to scope out future technology developments for a world with seemingly insatiable demand for energy. The master degree aims at preparing a new generation of engineering professionals who will be involved with the rebuilding of a world energy infrastructure that today is stretched nearly beyond the limits of its capacity.

BS/MS/PhD Degrees with Specialty Focus

University of Hawaii, Manoa
School of Ocean and Earth Science and Technology (SOEST):

GeoSciences

The MGeo is for individuals, including working professionals, who have completed a bachelor's degree in the natural sciences, math, or engineering. The MGeo is intended to prepare students to pursue a career in a variety of fields such as geological, geotechnical, and environmental consulting, hydrology, natural hazard mitigation, climate change adaption, natural resource exploration, renewable energy development, and more.

Ocean Resources and Engineering

The engineering systems needed to develop the ocean's energy, mineral, and living resources, the potential use of the ocean for waste disposal, and the environmental and economic aspects of such activities.

Texas Tech University:
National Wind Institute

Wind Energy is the premiere multidisciplinary program developing transformational experts who apply knowledge, skills, and conviction to lead in the advancement of sustainable renewable power solutions with positive regional, national, and global impact.

Wind Science & Engineering Doctoral Program
Bachelor of Science in Wind Energy
Wind Energy Graduate Certificate Program

Cornell University:
Earth Energy Systems – Geothermal PhD

The Earth Energy Systems graduate educational program brings together students seeking degrees in engineering and in geosciences in a unique program designed to provide both communities with skills, knowledge, and a common language to address our energy challenges.

Stanford University:
MS/PhD Geothermal

The program undertakes studies in a number of significant areas, including well test analysis of fractured and multiphase reservoirs, design and interpretation of tracer tests in fractured reservoirs, adsorption in vapor-dominated reservoirs, experimental measurements of fluid flow parameters, and optimization of production and reinjection strategies.

University of Maine :
The Forest Operations, Bioproducts, and Bioenergy Program

This BS program has been designed to address a major challenge to the industry: the efficient and environmentally acceptable growth, management, extraction and transportation of timber for the manufacture of forest products. The interdisciplinary program combines coursework, fieldwork and faculty expertise in forest ecology, forest management and wood science, with an emphasis in business administration. Training in a forest setting begins the first semester.

University of California at Berkeley:
Energy Institute at Haas

A broad ranging energy curriculum is based out of the and includes a variety of MBA programs. The stated goal of the Institute is "to bridge the gap between the frontiers of economic and scientific energy research
and the marketplace.

Penn State University:
MS Professional Studies Renewable Energy and Sustainability Systems

Corporations, government entities, and organizations in the growing fields of renewable energy, energy trading, and systems management will need professionals with a balanced perspective of technical understanding and the advanced project management skills that this Master of Professional Studies in Renewable Energy and Sustainability Systems (MPS-RESS) with an option in Sustainability Management and Policy (SMP). Learn to analyze market and nonmarket strategies, communicate effectively about facility energy policy development, and use systems thinking approaches to unify project development tactics.

Microgrid Program Exec MBA from US Green Building Council

This is a 6-week, comprehensive, data-driven course on microgrid project development for professionals developed by RenewableEnergyWorld.com, Dr. Mahesh Bhave, and HeatSpring. Students will learn to evaluate project economics of microgrid projects in a variety of markets using case studies, financial models, and templates. The student capstone project is a microgrid investment proposal, including pro forma financials.

Graduate Certificates

University of Massachusetts Amherst:
Wind Energy Center- Wind Power Engineering

The Graduate Certificate/Concentration in Wind Power Engineering offers graduate students the opportunity to have their work and interest in wind energy formally acknowledged as an important part of their graduate training, providing certification of relevant knowledge for those seeking academic positions and careers in industry. The program of study is designed to meet the needs of students who are interested in either pursuing further academic studies in wind power or joining the burgeoning wind power industry. This Certificate/Concentration program responds to these professional currents, providing a clear but flexible curriculum for graduate students interested in wind energy, and preparing them with in depth skills and knowledge of all aspects of wind energy.

University of Hawaii, Manoa:
The Renewable Energy and Island Sustainability

A graduate certificate program that provides students with an opportunity to get both breadth and depth in energy and sustainability curriculum. Students will take classes in different colleges to get a broad perspective on energy sustainability. In addition to taking courses and attending a REIS seminar class, students will conduct a capstone project to obtain greater depth in an energy research area.

UC San Diego Extension:
Power Systems Engineering - Microgrids

This certificate program teaches the building blocks of the power system, its control and management. Designed for those with minimal experience with electric power, participants will be able to speak the language and perform substantial tasks within the electric grid and power system network including microgrids. Any engineering degree, preferably BSEE, is required for entrance.

Stanford:
Energy Innovation and Emerging Technologies Professional Program

Online Professional Certificate for working professionals. Eight Courses for completion include:
Solar Cells / Past, Present and Future of Fossil Fuels /
Smart Grid: Sensing, Data Analytics and Control / Energy Storage
Nuclear Energy - Why, How and Prospects
Planning for a Sustainable Future with Wind, Water and the Sun
Economics of Competing Energy Technologies
Behaviorally Informed Design on Energy Conservation

UC Boulder
Renewable and Sustainable Energy Institute (RASEI) Certificate

Energy science and technology. How traditional and renewable energy systems work, how energy technologies function, energy conversion processes, and the status and potential of renewable technologies.

Energy policy. How stakeholders interact to accomplish policy decisions, the impacts and potential of policies to promote renewable energy, and congressional and governmental process.

Energy industry. Finance, project development, economic analysis, and other components of building a viable business around renewable energy.

Bioenergy and Sustainable Technology Graduate Certificate – South Dakota State U/Kansas State U/Oklahoma State U/U of Arkansas

The certificate may be suitable for individuals who are place-bound in the target industries and need additional knowledge in their disciplines while requiring distance education options. With a rising interest in green chemistry and sustainability, and escalating crude oil prices, bio refinery industry now actively recruits individuals with specific training in bioprocessing and bio based materials. SDSU's Bioenergy and Sustainable Technology Graduate Certificate program is designed to serve the needs of these emerging industries and provide post-baccalaureate educational opportunities for industry practitioners who do not require a full graduate degree program. Students develop an interdisciplinary background and can tailor the program of study to specific interests.

Labs and Centers of Excellence

Hawaii Natural Energy Institute (HNEI University of Hawai'i at Manoa (UHM)

Conducts research of state and national importance to develop, test and evaluate novel renewable energy technologies. The Institute leverages its in-house work with public-private partnerships to demonstrate real-world operations and enable integration of emerging technologies into the energy mix. HNEI was established in statute in 2007 to address critical State energy needs. Our research focuses on sustainable energy production (wave, wind, PV), energy efficiency in transportation (Hybrid, PHEV and EV), large-scale energy management (smart grid, complex system optimization), design morphology, energy policy, new technology adaptation and education.

OSU Center for High Performance Power Engineering

CHPPE is a multi-million dollar world-class power electronics laboratory, located at the Ohio State University, specifically designed to exploit the high temperature, high frequency operation and efficiency advantages of silicon carbide (SiC)-based power electronics. It was established through a $3 M Ohio Third Frontier grant to be the host for a new generation of technologies in power electronics and systems.

*UC San Diego Sustainable Power and Energy Center

Theoretical, computational, and experimental approaches to study, improve, invent, characterize and troubleshoot materials, devices, and systems for energy storage. The mission is to *collaborate* and test our devices on UC San Diego's sought-after microgrid. Cost and performance bottlenecks with a focus on materials science and nano and atomic-scale engineering research. The team includes nanoengineers, materials scientists, chemists and micro-grid experts. Leaders in electrical, structural and chemical engineering as well as the economics of renewable energy. Professors, students and research scientists. Partnerships with companies large and small, U.S. national labs and other universities.

UC San Diego Center for Energy Research

An internationally recognized center of excellence built by fostering interdisciplinary research, developing visibility for UCSD as a leading institution in energy studies, and creating educational programs in energy technologies. The Center welcomes participation as a student, researcher, outreach partner, or in other capacities.

University of Pennsylvania: "PENNERGY"

The Penn center for energy innovation or "Pennergy" is the University's newest research center. Pennergy seeks to harness the collaborative efforts of energy researchers across campus to create innovative technologies and materials aimed at meeting the worlds growing energy demand and achieving environmental and economic sustainability. Pennergy brings together world-class researchers to solve scientific and technological problems enabling the efficient use of current energy sources, the practical use of more sustainable energy, and the facile conversion of energy to different forms.

University of Maryland Energy Research Center

The University of Maryland Energy research center is a multidisciplinary university initiative dedicated to advancing the frontiers of energy science and technology, with a focus on energy storage, efficiency, and clean energy generation. The Center researchers and educators integrate and share their knowledge through energy research, educational, and outreach activities that impact researchers, students, and our community. Research areas include:
Electrochemical Energy / Micro Power Systems /Energy Efficiency / Smart Grid / Power Electronics / Renewable Energy / Nuclear Energy / Chemical Energy Conversion / Carbon Capture & Sequestration / Climate Change & Environment/ Energy Policy / Economics / Energy R&D Policy / Energy Security / Renewable Energy & EE Policy / Education / Agency and Organizational Partnerships / Clean Energy Student Opportunities / Sustainability Workshop

SMU Geothermal Laboratory

The SMU Geothermal Lab is an active research facility, with a variety of ongoing geothermal resource projects. Faculty, staff, and students strive to broaden the understanding and use of geothermal energy, from the simplest form - geothermal heat pumps for buildings, to the large-scale deployment of geothermal power plants providing energy for our cities. Research also explores opportunities to integrate renewable geothermal projects in an oil & gas setting.

BA DEGREES

Western Washington U - Energy Policy Management

The goal of the BA in Energy Policy and Management is to give students knowledge and analytic skills in the policy and management aspects of today's diverse energy business, along with broad exposure to the science, environmental, business and policy aspects of the energy system that drive the formation and analysis of energy-related policies.

ASU – Sustainability BA

Understand the concepts and methods of environmental economics, sociology, anthropology, environmental politics, ethics, design, and human geography relevant to the sustainability of environmental resources and social institutions. Apply these concepts and methods to developing sustainable institutions for water, land, air, and urban management at the local to global level. Evaluate the sustainability of environmental institutions, legal frameworks, property rights, and culture.

Syracuse University – Energy and Its Impacts

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Minor/Undergraduate Certificate

M.I.T. - Minor in Energy Studies

A focus on practical applications. MIT: Designed by MITEI, the minor is an undergraduate course of study that encourages students from any department within MIT to expand their knowledge of energy issues across a range of fields, from science and engineering to policy to the humanities.

Duke University – Renewable Energy

Five unique courses and one capstone design course must be completed to earn the Minor in Energy Engineering. The requirements for the minor are below; you can also read course descriptions for the new ENRGYEGR courses and check out our anticipated teaching schedule. Click here for a detailed check list to help you keep track of your progress in the program.

University of Michigan – Energy Science and Policy Minor

Energy underlies all of our modern technological, social, political, economic, and ecological systems. The minor is designed to provide the information and analytic skills necessary to understanding the sustainable production and consumption of energy across a variety of disciplinary perspectives.

Iowa University – Wind Energy Certificate

Undergraduate work for the certificate focuses on energy, environment, and information science and includes core courses and electives. Mechanical engineering students may use the certificate as a tailored engineering focus area by adding an approved math/science elective.

Duke - Pratt School of Engineering: Certificate in Energy and the Environment

This certificate program provides Duke undergraduates with an understanding of the breadth of issues that confront our society in its need for clean, affordable and reliable energy. The goal of the Certificate is to develop innovative thinkers and leaders who understand the energy system as a whole and the important interconnections among policy, markets, technology and the environment. An expertise in energy will expand career options in the private, non-profit, government and academic sectors.

Innovative Partnerships

Brown University

Brown participates in an Exchange Scholar Program that enables advanced graduate students to study for one or two semesters in the graduate school of participating institutions. Energy relevant as it encourages/enables scholars to gain credit at outside institutions in specialty fields.

UC Solar

The University of California Advanced Solar Technologies Institute (UC Solar) is a multi-campus research institute made up of faculty from the University of California's Merced, Berkeley, Santa Barbara, Davis, San Diego, Riverside, Santa Cruz, Irvine and Los Angeles campuses and the Lawrence Berkeley National Laboratory (LBNL). UC Solar was established by a grant from the University of California Office of Research and officially launched in 2010. Headquartered at UC Merced, UC Solar creates technologies that make solar energy systems more efficient, more affordable, and the best choice for the people of California and the world. In addition, UC solar educates and develops tomorrow's solar energy leaders and entrepreneurs.

Interactive Distance Education Alliance (IDEA)

An online partnership between South Dakota State U/Kansas State U/Oklahoma State U/U of Arkansas. The Great Plains Interactive Distance Education Alliance (Great Plains IDEA) is a consortium of reputable universities who offer online, flexible, affordable programs for a virtual community of individuals from diverse backgrounds.