

Renewable Energy/Sustainability Careers (from Vault):

The energy sector produces, converts and distributes fuels for heat, light and propulsion. Oil, natural gas and coal are burned to make heat and electricity. Wind, flowing water and sunlight are converted into electricity. Oil is refined to propel cars, planes and industrial machines. And to achieve these things, the companies who are producing, transporting, converting and distributing these energy sources are supported by a variety of service firms, investors, equipment providers, and government regulators.

There is a great divide in the energy sector between the oil and gas "side" and the electricity "side," each of which accounts for about half of the business jobs across the sector. "Oil and gas" refers to the exploration for, and extraction and processing of oil and natural gas. In contrast, the electric power business revolves around converting fuel to electricity in power plants and distributing that electricity to consumers. The economics of the two fields, and the regulations that govern them, are quite distinct. Generally, people make their energy careers in one camp or the other, without too much crossover. Natural gas is one arena that bridges the oil and gas versus electricity divide -- it is extracted from the earth together with oil, and is also a primary fuel for generating electricity.

When people refer to the "energy sector," they can actually mean: electric power, oil and gas, or both together. We're taking a broad view of the industry, covering upstream (exploration), midstream (refining) and downstream (distribution and sales) oil and gas activities, electric power generation and transmission, equipment manufacturing, regulatory oversight and lending to, investing in and advising companies involved in the sector.

Just how big is the industry that comprises all those diverse activities? Companies in the energy sector take in nearly \$1 trillion in revenue annually, out of the \$17 trillion earned by all U.S. businesses. Energy-related businesses employ about 2.5 million people, or 2 percent of the U.S. workforce -- far more than banking, high tech or telecommunications. Energy companies as a whole employ a high percentage of production workers (the people who drive local utility repair trucks, laborers on oil rigs and gas station attendants), compared to other industries; of the 2.5 million energy jobs in the U.S., about 90 percent of them are blue-collar jobs or technical positions. The subject of this book is the one-quarter-million energy-related business jobs out there: the business analysts, finance associates, marketing managers, economic modelers and operations consultants, to name a few roles.

Energy sector positions capture about 2 percent of new MBA graduates, an amount roughly proportional to the industry's size. In contrast, the investment banking and investment management sectors together capture 40 percent of graduates, and consulting absorbs another 20 percent. Even the significantly smaller high tech industry takes on three times the number of new MBAs as does the energy sector. What this means for you as a job seeker is that the energy sector is not as dominated by people with graduate business degrees as some other popular arenas. There is plenty of opportunity for smart, well-trained college graduates to rise through the ranks without necessarily going back to school.

Major energy sector employers

Let's take a look at the characteristics of each of the major energy sector employer types:

Oil companies

Oil companies engage in exploration and production of oil ("upstream" activities), oil transportation and refining ("midstream"), and petroleum product wholesale and retail distribution ("downstream"). The largest companies, known as the "majors," are vertically integrated, with business operations along the entire spectrum from exploration to gas stations. Smaller oil companies, known as "independents," are often exclusively involved in exploration and production. Upstream is considered the glamorous place to be, where all the big decisions are made. Upstream jobs also involve heavy international work, with many employees sent off to new postings around the world every three years or so. We should also note that E&P businesses are fairly similar in nature among oil companies and companies mining other natural resources like uranium or coal -- moving among these types of firms during a career can be a logical path.

The majors are known for excellent rotational training programs, and a fair number of people take advantage of those programs and then jump over to independents for good salaries. Oil companies pay well in general, but jobs are not necessarily as stable as one might think. When oil prices drop, company operating profits are dramatically impacted, and

layoffs are fairly common. American oil jobs are overwhelmingly concentrated in Houston. International hot spots include London, Calgary and the Middle East.

Some oil companies focus exclusively on midstream and downstream activities. They operate refineries to distill crude oil into its many commercially useful petroleum derivatives, like gasoline, jet fuel, solvents and asphalt. Refineries are, in theory, built to last 40 years, but some have been around for as long as 80 years. That means that new refineries are rarely built, and the refinery business is mostly about managing the razor-thin margins between purchased crude oil inputs and revenue from refined product outputs.

Oil services companies

Oil services companies provide a very wide range of outsourced operational support to oil companies, such as owning and renting out oil rigs, conducting seismic testing and transporting equipment. The fortunes of these companies follow the price of oil: when oil is expensive, oil companies drill a lot and make a lot of money, so business volume and revenue increase for their oil services contractors. Working for an oil services company probably means working in Texas or internationally, and can feel very much like working for an oil company, given the similarity in issues and activities.

Pipeline operators

Pipeline operators own and manage tens of thousands of miles of petroleum products and natural gas pipelines. Many of them also operate oil intake terminals, engage in commodities trading and energy marketing, and own natural gas storage facilities or petroleum refineries as well. Unlike the major oil companies, pipeline operation companies are not household names !! nonetheless, the largest ones take in several billion in annual revenue, comparable to the scale of a medium-sized oil company.

Utilities

Utilities are, by definition, located all over the country ... everyone has to get their electricity and gas from somewhere, of course. However, as a result of massive consolidation among utility holding companies, the corporate offices for your local utility may not necessarily be that local. There are presently about 50 investor-owned utilities in the country, but industry insiders predict that in a few years mergers may leave us with as few as 10. The "graying" of the utility industry is a well-documented trend; 60 percent of current utility employees are expected to retire by 2015 -- meaning there's lots of opportunity today for young job seekers.

"Utility" is actually a loose term that we use to succinctly refer to gas utilities and all types of power generation companies: investor-owned utilities, government-owned utilities, municipal power companies, rural electric co-ops and independent power producers (IPPs) or non-utility generators (NUGs). Utilities differ greatly in terms of their lines of business: some have sold off most of their generation assets and are primarily distribution companies with power lines as their primary assets. Others may own large amounts of regulated power plants, and may also own non-utility generators or individual independent power plants. As the electricity market fell apart starting in 2001, most IPPs sold off their assets piecemeal to large utility holding companies or financial institutions.

Transmission grid operators

Transmission grid operators, known as independent system operators (ISO) or regional transmission operators (RTO), provide a power generation dispatch function to a regional electricity market. They don't own the transmission lines, but coordinate how much power is generated when and where, such that supply and demand are equal at every moment. This is an extremely complex process, and necessitates the analytical skills of electrical engineers and other generally quantitative and analytical operations staff.

Equipment manufacturers

Equipment manufacturers make turbines, boilers, compressors, pollution control devices, well drilling and pipeline construction equipment, software control systems, pumps and industrial batteries. Many of them also provide engineering services and construction/installation of their equipment. The major gas turbine manufacturers, for example, also offer engineering, procurement and construction of entire power plants. Oil-related equipment makers

are often characterized as "oil services" firms. The equipment manufacturers in the energy industry are not particularly concentrated in one geographic area, though of course many of the oil business-oriented ones have major offices in Texas.

Nonprofit groups

Nonprofit groups are tax-exempt corporations (pursuant to IRS code 501(c)3) engaged in issue advocacy or public interest research. Advocacy groups may focus on developing grassroots support for public policy changes, publicizing public interest issues or problems through direct actions, or working to influence politicians to enact or change legislation. Most of the energy-related advocacy groups focus on environmental topics, though some also cover corporate financial responsibility and investor protection issues. Think tanks are public policy research institutes, staffed mainly by PhDs who generate research and opinion papers to inform the public, policy-makers and media on current issues. Interestingly, the think tank is primarily a U.S. phenomenon, although the concept is slowly catching on in other countries. Some think tanks are independent and nonpartisan, whereas some take on an explicit advocacy role. Nonprofits are funded by individual donations and grants from foundations, and accordingly a substantial portion of their staffs are dedicated to fundraising. Most energy nonprofits are based in Washington, D.C., where they have access to the federal political process, but many of them have small regional offices or grassroots workers spread out across the country.

Government agencies

Government agencies at the federal and state levels regulate the energy markets and define public energy and environmental policy. Federal agencies are mostly located in Washington, D.C., and each state has staff in the state capital. Jobs can include policy analysis, research project management or management of subcontractors. The energy agencies tend to hire people with environmental or engineering backgrounds, and are lately following a policy of hiring people with general business and management education and experience.

Energy services firms

Energy services firms help companies (in any sector) reduce their energy costs. Working for an energy services firm is similar in many respects to consulting -- except that you go much further down the path of implementation. Typically, an energy services firm first conducts an energy audit to understand where a company spends money on energy: electricity, heat and industrial processes. Then, the firm actually implements energy-saving measures "inside the fence" of the client company. This can involve investments and activities such as putting lightbulbs on motion sensors, upgrading the HVAC (heating, ventilation, air conditioning) system, negotiating better rates with the utility suppliers, or developing a cogeneration power plant adjacent to the factory. Often, the energy services firm receives payment for these services in the form of a share in the net energy cost savings to the client. These firms are located across the country, with a few of the largest clustered in Boston.

Resources specific to Renewable Energy :

BOSTON UNIVERSITY ENERGY CLUB (<http://buenergy.com>)

The BU Energy Club is a respected graduate institution with the mission to “facilitate fact-based analysis and discussion between the educational and professional communities advancing our understanding of energy and its efficient use in our society”.

Formed from an alliance between the School of Management, College of Engineering and the Center for Energy and Environmental Studies in the College of Arts and Sciences we are creating working relationships between groups of students, renowned faculty, and industry leaders, to deliver solutions that both benefit the university and serve the wider Boston community.

Our large and varied membership gives us the ability to stimulate focused discussion on the role of energy in areas as diverse as technology, public policy, education, economics and conservation. This has led to the creation of credit courses and directed studies within the three schools that enhance our understanding and build practical experiences helping people and organizations to make our environment more sustainable.

Finally, using this expanded skill set, we want to complete the cycle – turning these good ideas into great businesses, sensible policies, and implemented technologies. All of these will improve our environment and act as a stimulus to future generations of students to continue to help Boston University lead in the burgeoning energy sector.

New England Renewable Energy Companies :

Massachusetts is home to one of the largest renewable energy clusters in the country. Below is a list of regional companies in the energy industry, many of which may be hiring at any given time.

A123systems	Cambridge
Acumentrics, Inc.	Westwood
AES-Advanced Energy Systems	New York, NY
Alternative Energy Store, The	Hudson
AMERESCO	Framingham
Amperion	Chelmsford
Aspen Products Group	Marlborough
Aspen Technology, Inc.	Cambridge
Axsess Group	Northborough
Beacon Power Corporation	Wilmington
BSC Group	Boston
Cambridge Energy Research Associates	Cambridge
CellTech Power	Westborough
Coler & Colantonio, Inc.	Norwell
Conservation Services Group	Westborough
Crystal Systems	Salem
Energy Insights, IDC	Framingham
Energy New England	Foxboro
Energy Security and Analysis	Wakefield
Energy Services Group	Pembroke
EnerNOC	Boston
ENSR International	Westford
Epsilon Associates	Maynard
ERG	Lexington
ESS Group	Wellesley

Evergreen Solar	Marlborough
GreenFuel Technologies Corporation	Cambridge
ISO-NE	Holyoke
KEMA	Burlington
Konarka	Lowell
Lodestar	Peabody
NORESCO	Boston
NSTAR	Westwood
Northern Power	Waitsfield, VT
Nuvera Fuel Cells	Cambridge
Saint-Gobain	Northboro
Select Energy Services, Inc	Natick
Steven Winter Associates	Norwalk, CT
World Energy Exchange	Worcester

Jobs/Internships Websites :

- CommonGood Careers, www.cgcareers.org (occasional postings by environmental organizations)
- Eco Employ, www.ecoemploy.com
- Energy Central Jobs.com, www.energycentraljobs.com
- Environmental Career Opportunities, www.Ecojobs.com
- Environmental League of Massachusetts, www.environmentalleague.org/jobs/jobs.html
- Green Biz, www.greenbiz.com/jobs
- Green Dream Jobs, www.sustainablebusiness.com/jobs
- Green Energy Jobs, www.greenenergyjobs.com (mostly international jobs- great career information)
- Grist, www.jobs.grist.org
- Hydrogen & Fuel Cell Jobs.org, www.hydrogenandfuelcelljobs.com
- Idealist, www.idealists.org (a nonprofit job and organization listing, including environmental organizations)
- Just Means, www.justmeans.com
- Monster.com, www.monster.com (To maximize your search results, plug-in the keywords most relevant to your employment interests, such as: renewable energy, photovoltaic(s), or fuel cell(s).)
- MonsterTRAK, www.monstertrak.monster.com/greencareers/
- Net Impact, www.netimpact.org
- Nonprofit Jobs Cooperative, www.newenglandjobs.org
- Renewable Energy Access.com, www.renewableenergyaccess.com (formerly solaraccess.com)
- The Environmental Career Center, www.environmentalcareer.com
- Treehugger, www.jobs.treehugger.com

General Associations/Information (local, national and international)

- ANPED, the Northern Alliance for Sustainability, www.anped.org
- Ashoka, www.ashoka.org (for social entrepreneurs, including those with environmental interests)
- Association for the Advancement of Sustainability in Higher Education, www.aashe.org
- Association of Environmental Professionals, www.califaep.org
- Bioneers, www.bioneers.org
- Boston University-Greening the Campus, www.bu.edu/green
- Campus Consortium for Environmental Excellence, www.c2e2.org
- Center for International Environmental Law (CIEL), www.ciel.org
- Earth Portal, www.earthportal.org
- Fostering Sustainable Behavior, www.cbsm.com

- Green Decade Cambridge, www.greencambridge.org
- Green Decade Coalition, Newton, www.greendecade.org
- ICLEI, Local Governments for Sustainability, www.iclei.org
- Institute for Transportation & Development Policy, www.itdp.org
- International Business Leaders Forum, www.iblf.org
- International Institute for Environment and Development, www.iied.org
- International Institute for Sustainable Development, www.iosd.org
- Net Impact, www.netimpact.org (for the Campus Greening Initiative, click on Programs & Benefits)
- New Urbanism, www.newurbanism.org
- Prometheus Institute for Sustainable Development, www.prometheus.org
- Real Climate, www.realclimate.org
- Second Nature, www.secondnature.org
- Sustainable Business Network of Greater Boston, www.rbaboston.org
- Sustainable Endowments Institute, www.endowmentinstitute.org
- SustainLane Government, www.sustainlane.us
- The Orion Society, www.oriononline.org (also includes job postings)
- The Skoll Foundation, www.skollfoundation.org (for social entrepreneurs, including the environmentally-focused)
- Union of Concerned Scientists, www.ucsusa.org (based in Cambridge)

Energy

- Alliance to Save Energy, www.ase.org
- American Wind Energy Association, www.awea.org
- American Council for an Energy-Efficient Economy, www.aceee.org
- Consortium for Energy Efficiency, www.cee1.org
- Energy Future Coalition, www.energyfuturecoalition.org
- Energy Star, www.energystar.gov
- Massachusetts Technology Collaborative, www.masstech.org/renewableenergy/necn.html
- Northeast Sustainable Energy Association, www.nesea.org
- Post Carbon Institute, www.postcarbon.org
- Renewable Energy Access, www.renewableenergyaccess.com
- U.S. Dept. of Energy: Energy Efficiency and Renewable Energy, www.eere.energy.gov

Green Building (includes organizations based in the Boston area)

- Architecture 2030, www.architecture2030.org
- BuildingGreen, www.buildinggreen.com
- eco-structure, www.eco-structure.com/index.cfm
- Green Building Resources, www.taunton.com/finehomebuilding/how-to/articles/green-building-resources.aspx
- Green Homes Northeast, www.ghne.org
- Green Roundtable, www.greenroundtable.org
- Igreenbuild, www.igreenbuild.com
- Jonathan Rose Companies LLC, www.rosecompanies.com
- Oikos Green Building Source, www.oikos.com
- Rate It Green, www.rateitgreen.com
- Sasaki green, www.sasakigreen.com
- Sustainable Architecture, Building and Culture, www.sustainableabc.com
- U.S. Green Building Council, www.usgbc.org
- William McDonough + Partners, www.mcdonoughpartners.com

Individual Organizations/Companies

Boston area

- Abt Associates, www.abtassociates.com
- Blue Wave Strategies, bluewavestrategies.com
- Ethical Investment Research Services (EIRIS), www.eiris.org

- GreatPoint Energy, www.greatpointenergy.com
- GreenFuel Technologies Corporation, www.greenfuelonline.com
- New Ecology, www.newecology.org
- Recycline, www.recycline.com
- Save that Stuff, www.savethatstuff.com
- Second Wind, Inc., www.secondwind.com
- Synapse Energy Economics Inc., www.synapse-energy.com
- Urban Ecology Institute, www.urbaneco.org
- Vanasse Hangen Brustlin Inc., www.vhb.com (additional offices throughout the country)
- Zapotec Energy, Inc., www.zapotecenergy.com

National/Other

- Bioengineering Group, www.bioengineering.com
- Biomimicry Institute, www.biomimicryinstitute.org
- Foundation for Sustainable Development, www.fsdinternational.org
- groSolar, www.groSolar.com
- MBDC, www.mbdc.com
- Patagonia, www.patagonia.com
- Sustainable Business Practices, www.sustainablebizness.com
- Sustainable Hosting, www.sustainablehosting.com
- Sustainable Industries, www.sustainableindustries.com
- SustainLane, www.sustainlane.com
- Whole Foods Market, www.wholefoodsmarket.com

Educational opportunities

- Arizona State University Certificate in Sustainable Technology & Management, www.cstm.asu.edu
- Bainbridge Graduate Institute, www.bgiedu.org
- Boston Architectural College Certificate in Sustainable Design, www.the-bac.edu/x350.xml
- Marlboro College's MBA in Managing for Sustainability, www.gradcenter.marlboro.edu/academics/MBA.html
- New College MBA, www.newcollege.edu/mba