Internship with the National Renewable Energy Laboratory

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For Dr. Roger Pielke
Environmental Studies

Introduction

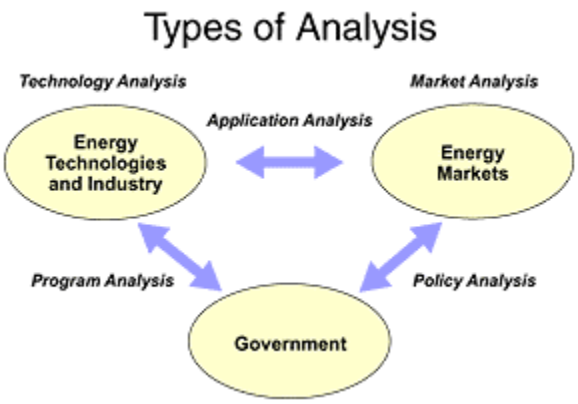
During the summer of 2002, I applied for and accepted a grant from the Edna Bailey Sussman Fund to work with Senior Energy Analyst Lori Bird, at the Department of Energy's National Renewable Energy Laboratory in Golden, Colorado. In this report I will assess the effectiveness of NREL's Energy Analysis Office with respect to its own goals and mission statement. This report also details my experience as an environmental policy student in a professional setting and makes recommendations for other students interested in interning with NREL.

The National Renewable Energy Laboratory

The National Renewable Energy Laboratory (NREL) is one of ten national laboratories under the Department of Energy (DOE). NREL is the only lab focused specifically on renewable energy. NREL's overall mission is to develop renewable energy and energy efficiency technologies and practices, advance related science and engineering and transfer knowledge and innovations to address the nation's energy and environmental goals.

NREL is divided into groups that work either on renewable energy, energy efficiency, new technologies (e.g., new solar cell materials, latest wind turbines, and fuel cell experimentation), or communications. I interned for the Energy Analysis Office—one of NREL's renewable energy groups. The analyses conducted or facilitated by the Energy Analysis Office concentrate on the interactions between government, markets, and

technology, with regard to renewable or "green" energy and energy technologies.[1] the applications, implications, and benefits of new energy technologies and their affect on markets, industry, and society.



The specific mission of the Energy Analysis Office (EAO) at NREL is *to increase the understanding of the current and future characteristics, roles, and interactions of government, markets, and technology and to use that understanding to inform technology, program, policy, and market decisions as energy efficient and renewable energy technologies advance from concept to commercial application.*

Evaluation

My overall evaluation of the EAO mission is that they are successful in increasing understanding and informing decisions about renewable energy. However, each goal should be evaluated individually.

The goal to increase understanding of current and future characteristics of government, markets, and technology seems vague and a bit unrealistic for a national laboratory that

[1] For the purposes of this paper, "green" power and "renewable" power both refer to energy from the following five resources: solar, wind, small-scale hydropower, biomass, and geothermal.

focuses on energy unless their goal applies strictly to NREL staff.[2] Increasing understanding about the future is difficult, like any projection, in part because we are limited by contemporary knowledge of an issue. The EAO is very useful in increasing understanding of *current* issues to the interested public. The EAO most likely seeks to increase understanding of *government* by explaining which regulatory policies might be implemented in the near future (e.g., renewable portfolio standards or the Federal Energy Regulatory Commission's current attempt to standardize market rules). The EAO publishes white papers and updates their informative web site called the "Green Power Network"[3] about federal and state regulatory policy. Increasing awareness about current and future *markets* refers to NREL's papers and web site information about today's renewable power options offered in states with both regulated markets where consumers purchase electricity from one utility, and restructured electricity markets in which consumers can choose their electricity provider. The EAO updates market data weekly on their web site. As stated above, they do well at making information on current markets available. Some papers produced by the EAO discuss future electricity market issues such as *Customer Aggregation: An Opportunity for Green Power?*

I believe their research on potential market or government/regulatory solutions and opportunities is very useful to the public as well as to decision makers. These papers do not make predictions but provide possible options to consider when creating policy or procurement procedures (for regulators, utilities or other power providers). In addition to

[2] If this were the case (which is doubtful), I would appraise the result as successful. My supposition is that the goal is to increase understanding by the interested public – the public that use their web site and read NREL publications.
[3] http://www.eere.energy.gov/greenpower/home.shtml

current energy market statues, the web site lists planned energy projects by state. This serves as part of the "understanding current *technology*." Future technology could be explored by EAO (e.g., fuel cell research). However, I have not seen evidence of increasing understanding of future technology directly from the EAO. The other groups at NREL tend to focus much more on developing new technology and making the public aware of it.

The second part of EAO's mission is to inform decisions with regard to: technology, program, policy and markets. EAO informs the interested public about current *technology* by asking research questions such as "How is performance of technologies affected by changes in design attributes (e.g., material inputs)?" However, during my summer at NREL, I did not see reports or web information that predicted future technologies, other than projections on the prices of technologies.

EAO does inform decisions on *programs* by asking important research questions such as "What are the cumulative energy savings contributed by the nation's energy efficiency programs?" EAO also provides information for decision makers and the public about *policy* and *markets* by studying costs and benefits of various renewable power sources or results from renewable policy regulations (e.g., the Production Tax Credit or state systems benefits charge). I have spoken with directors of energy policy groups and with energy consultants who use NREL's EAO papers and web information on a regular basis.[4]

[4] Dr. Jan Hamrin, Executive Director of the Center for Resource Solutions; Adam Capage, Platts Energy Consulting.

Perhaps the EAO group plans to report on future technologies soon. If not, the future technologies category could be removed from their mission statement and left up to other groups at NREL who do a very comprehensive job making new technology information available to the public and to decision makers in the energy field.[5]

Description of work

Senior Energy Analyst Lori Bird performs green power market analysis, examines trends in residential and commercial procurement of renewable power in all states and ensures that information is made available on the Internet through NREL's Green Power Network. She also authors white papers and NREL publications such as *Utility Green Pricing Programs: What Defines Success?;* and *Green Power Marketing in the United States: A Status Report.* During the summer of 2002, I worked with Lori on three projects. The first was to update price and product information on green power programs in all states. Secondly, we determined standards that apply to biomass energy in different regions of the country. Neither of the first two projects I worked on were part of my original scope of work, which was (project number three) to help Lori on a paper regarding renewable energy's price stability when compared with natural gas.

Information gathering was the main part of my work for NREL. I was to gather data on various power programs throughout the United States and provide Lori Bird with my results. This entailed speaking with state regulatory agencies (e.g., public utilities

[5] Among other ways of communicating, NREL has a communications group, technology writers and hosts monthly meetings for the non-profit citizen group: Colorado Renewable Energy Society.

commissions), utilities and other power providers, green power marketers (e.g. Green Mountain Energy) and consumer watchdog organizations (e.g., Alliance to Save Energy); as well as much Internet research and some library work. I assisted Lori in updating current information for the Green Power Network and in adding new data about nascent programs (e.g., a new renewable portfolio standard or new solar electricity option for utility customers).

My research included utility programs that offer renewable power options, and on power providers in states where electricity has been restructured (deregulated). It is usually the case in deregulated regions that utilities who used to be the only power provider still have the majority of electric customers even though new companies offer competition, and the utilities may now offer green power options. I assisted Lori in determining which renewable energy electricity programs (offering tradable renewable energy credits, solar, wind power, low impact hydropower, biomass, or geothermal power) are most successful around the country and why.[6]

We catalogued nearly every renewable energy program offered to residential, commercial and industrial users in the country to better identify which programs are working well and which are not. The success of the program is based on the number of customers (a percentage of the potential customers) and the installed capacity of the renewable energy resource (e.g., number of kilowatts of solar). We included information about marketing strategies and incentives (e.g., bill inserts or slogans such as 'switch to green power and receive twenty free fluorescent light bulbs'). Information gathered about what influences

[6] Please see Appendix A for one example of data we compiled for tradable renewable credits.

people to switch to a renewable energy source is presented in aggregate form at green power conferences for utilities and other power providers. That way, marketers will know what has been successful, and what to use in the future, but no secrets will be given away.

Project evaluation

I was surprised to find how difficult it is to receive what would seem like simple information about energy offerings in each state. Information about customer numbers is proprietary (especially commercial and industrial customers) so cannot always be released; and most utility telephone operators are not well informed about renewable energy choices or policies. The solution to the problem of proprietary information was to use aggregate data from power providers so as not to single out particular customers or companies. When power providers understood that their exact customer numbers would not be released, they were more willing to give us information.

In addition to the Green Power Network data collection, I also helped Lori on her fuel pricing stability paper. Though the price of some energy sources fluctuates quite dramatically at times, renewable energy price fluctuation is low. Fuel price volatility has become an increasing concern, especially after the huge price fluctuations of natural gas in 2000 and 2001. The paper was to discuss examples in which green power purchasers received price stability benefits in both regulated and competitive markets. This project was halted during the early summer due to lack of funding.

Tools of the Environmental Studies Program were not employed specifically for this summer project though I did enhance my research skills and learn about policy writing in a non-campus environment. I was able to do this internship with Lori because I had known her through previous work. My recommendation to students starting an internship is to have a project that can be completed in one summer (even if it is a small part of a much larger project) so that both the intern and mentor have a sense of accomplishment. In addition, it is advisable to establish a clear idea about what the policy employer/ mentor expects in the beginning. I recommend working at NREL if a student is interested in energy policy or technology—especially to students who have not worked for a government agency before.

Relevant web sites

NREL
http://www.nrel.gov
The Green Power Network
http://www.eren.doe.gov/greenpower/home.shtml
U.S. Green Pricing Programs and Activities
http://www.eren.doe.gov/greenpower/pricing.shtml
U.S. Green Power Marketing Programs and Activities
http://www.eren.doe.gov/greenpower/marketing.shtml
Credit trading
http://www.eren.doe.gov/greenpower/certificates.shtml
NREL's Energy Analysis Office mission statement
http://www.nrel.gov/analysis/energy_analysis.html#mission

Appendix A – Tradable renewable energy credits offered by state

Appendix B – Example of the Green Power Network