

F. Ensuring Sustainable Energy Resources

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Background

Introduction

Energy is generally divided into renewable and non-renewable resources. Renewables include solar, wind, hydropower, biomass, biogas, etc. whereas non-renewables include fuels such as petroleum and coal. Non-renewables are, strictly speaking, not sustainable. Sustainability for Hawai'i's energy economy will require a reduction in energy consumption and a shift to renewable resources. With its strong sun, steady tradewinds, mild climate and year-round growing season, and the highest electric rates in the country, Hawai'i would seem ideally suited for such a transition.

Hawai'i's energy situation

In ancient times, Hawaiians relied on biomass, which is sustainable so long as harvesting does not exceed the rate of regrowth. In the nineteenth century, 'Iolani Palace had electricity from a small hydropower plant (even before anyplace in the U.S. did), also a renewable resource. Shortly thereafter, gas lamps were installed for street lighting. By 1960, about 82% of Hawai'i's energy was from petroleum, about 17% was from biomass (mostly sugar cane residue), and the remainder (less than 1%) from hydropower. By 2000, biomass declined to only 2.2% due mainly to the demise of the sugar industry. Renewable resources were diversified with the addition of geothermal (0.8%), solar hot water (1.1%), wind (0.1%), and municipal solid waste (1.6%), but these were far outweighed by growth in fossil fuel consumption, with petroleum now providing 89.2% and coal 4.8% of Hawai'i's energy. In other words, Hawai'i is 94% dependent on non-renewable energy resources. Of Hawai'i's petroleum consumption, 31.5% is used to generate electricity; 35.7% is for air transportation, 19% for ground transportation, 7.1% for marine transportation. 6.3% is used in commercial/industrial applications and direct residential use accounts for 0.3%. Of the coal, all is used for electricity.

Hawai'i's energy policy

Hawai'i, like several other states, has had an energy policy that calls for reducing dependence on imported fossil fuels and increasing energy efficiency and the use of renewable energy. Hawai'i Revised Statutes §226-18 states the following objectives for Hawai'i's energy facilities:

1. Dependable, efficient, and economical energy systems capable of supporting the needs of the people
2. Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased
3. Greater energy security in the face of threats to Hawai'i's energy supplies
4. Reduction, avoidance, or sequestration of greenhouse gas emissions

§226-18 goes on to say that to achieve these objectives, it is state policy to:

1. Support research and development and promote the use of renewable energy resources
2. Ensure that the combination of energy supplies and energy-saving systems is sufficient to support demand
3. Base decisions on least-cost supply-side and demand-side options where least-cost is determined by a comprehensive, quantitative and qualitative accounting of long-term, direct and indirect economic, environmental, social, cultural, and public health costs and benefits
4. Promote all cost-effective conservation of power and fuel supplies
5. Ensure to the extent that new supply-side resources are needed, they utilize the least-cost energy supply option and maximize efficient technologies
6. Support research, development, and demonstration of demand-side management
7. Promote alternate fuels and energy efficiency in transportation
8. Support actions that reduce, avoid, or sequester greenhouse gases.

In the early 1990s, Hawai‘i developed an integrated energy plan with leadership from the Department of Business, Economic Development and Tourism (DBEDT). This was followed by the initiation of an Integrated Resource Planning (IRP) process under the auspices of the Public Utilities Commission. The IRP system was intended to incorporate the full range of energy alternatives into electric utility regulation, including demand side management and the use and pricing of renewable energy. This did result in a significant demand-side management program for both residential and commercial electric customers. It is not certain, however, that the broad definition of “least-cost” under #3 above has been applied to new generating facilities.

Issues

Looking forward, Hawai‘i will need to develop its long-term strategy within the context of national and global energy, environmental, and regulatory trends. These trends include the following: (1) rapid advances in energy technology; (2) new policy and regulatory approaches that may make renewable energy more cost competitive; (3) changing patterns of global fossil fuel supplies and costs; and (4) national and international requirements to curb greenhouse gas emissions. This strategy must lead to energy policies that are technically, economically, and politically feasible.

Given that the government does not actually own any energy facilities, its options for direct action are rather limited. It can, for instance, implement energy conservation programs in government buildings, acquire alternative fueled vehicles for the state fleet, etc. Legislation has also been proposed that would allow the government to sell bonds to directly invest in renewable energy production.

Most policy options for all the “promoting” and “supporting” mentioned above fall into two basic categories: incentives and mandates. Incentives include items such as direct funding (e.g. for ocean thermal research); tax credits (e.g. for solar water heaters); fee exemptions (e.g. for alternate fueled vehicles). Mandates include strategies such as instructions to the Public Utilities Commission; building codes for energy conservation; and requirements placed on electric utilities such as renewable portfolio standards and net metering.

Some of the main obstacles that need to be considered are: (a) technical problems (for instance, improving the “firmness” of intermittent sources like wind); (b) economic problems (chiefly the high cost of renewables compared to oil and coal); and (c) opposition from those on whom mandates would be imposed.

Our new governor has raised hopes by stating a goal of 20% renewable energy by the year 2020. However, the governor’s legislative package includes only a 4-year extension of the renewable energy tax credit. The House and Senate, on the other hand, have proposed a large number of additional measures. These include: funding for alternative energy systems on Kaho‘olawe and hydrogen research; tax incentives for clean fuel vehicles, fuel efficient vehicles, biodiesel fuel, and geothermal-to-hydrogen systems; requiring biodiesel in government vehicles; bonds for energy efficiency and renewables in state facilities; increased net metering; and a statewide energy audit.