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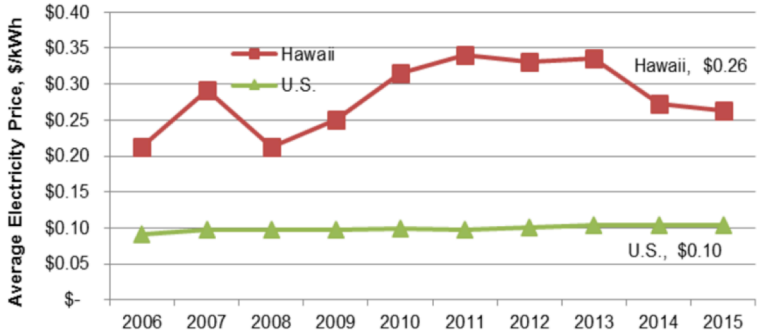
August 2016

Hawaii's Grand Experiment

By almost any criteria the Hawaiian Islands should be well positioned to implement an extensive and cost-effective effort to generate electric power through the use of renewable energy. Electricity rates are high (Figure 1) and power generation still relies heavily on petroleum (Figure 2).

Given Hawaii's extensive endowment of alternative energy resources (solar, wind, geothermal, among others), the electric power companies should be in a good position to make use of alternative fuels.[1] A combination of Hawaii's abundant endowment of renewable fuels and the existing high cost structure for power generation should make an aggressive transition to renewable energy sources cost effective. In fact, Hawaii is the first state to set a goal of producing 100% of its electricity from renewable energy sources and already has about 25 percent of generated electricity from renewable energy through expansive feed- in-tariff and net metering programs. The state plans to reach a 100 percent renewable power generation goal by 2045.

Figure 1
Electricity Prices Hawaii and Mainland USA



Source: State of Hawaii Energy Office (May 2016)

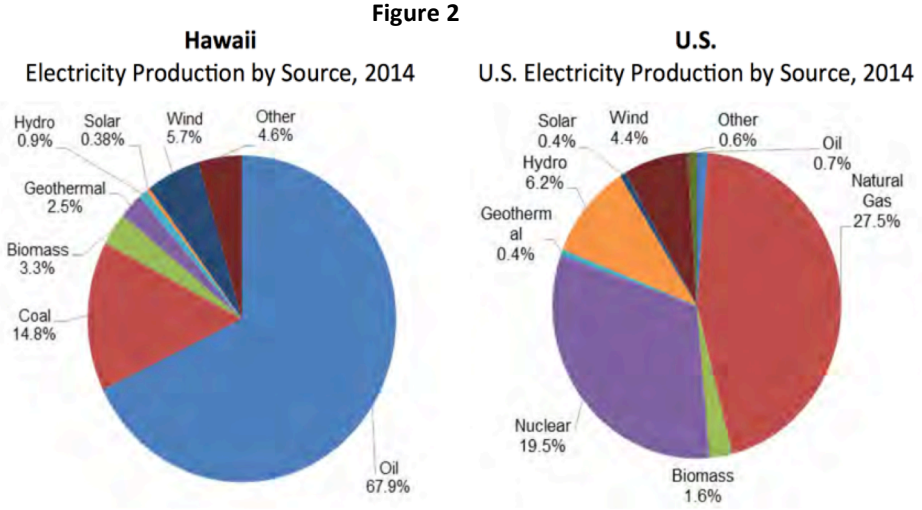
A central question is whether an aggressive program to transform electric

[1] The two primary utilities that service the power needs of the state are Hawaiian Electric Industries Inc. (HEI) and the Kauai Island Utility Cooperative (KIUC) on Kauai. Hawaiian Electric Industries is the largest supplier of electricity in the state of Hawaii, supplying power to 95% of Hawaii's population through the following electric utilities: Hawaiian Electric Company, Inc. (Oahu), Hawaii Electric Light Company, Inc. (Hawaii) and Maui Electric Company, Limited (Maui).

generation will also yield substantial savings for electricity costs for the residents in Hawaii. Renewable fuels are inexhaustible, but are they also inexpensive? Of course, the answer to this question depends upon the cost of alternatives.

Changing the energy inputs from petroleum and coal, or any pay as you go fuel, seems logical when the alternative is seemingly free sunlight, wind and waves. However, free electricity comes at a cost. Energy conversion either takes time or is expensive. Plants can be used to make biofuels by converting sunlight to energy over time.

Figure 2



Source: State of Hawaii Energy Office (May 2016)

Solar collectors and wind generators convert sunlight and wind immediately, but at a price.

Since all electric power is not the same, it is important to calculate the capital costs needed to stabilize the grid to accept and distribute power from renewable sources. The old adage "time is money" has important implications for Hawaii's effort to move to a renewable power platform as well. Upgrading the grid and installing existing technology now is more expensive than performing the upgrade over time, and capitalizing on technology under development for advanced renewable platforms and support systems.

There are of course some knotty problems in any assessment of future power generation. Among the more important is the price of traditional fuels, especially fuel oil and LNG and how these alternatives compare to the capital and maintenance expense for a reliable 100% renewable energy grid.

For policy makers in Hawaii, the answers to these questions are essential. Movement of the state economy to fully renewable fuels is a laudable goal and demonstrates a shared concern to reduce greenhouse gas (GHG) emissions. However, it is also a fact of life that Hawaii's carbon emissions will not have any measurable effect on global climate. In contrast, as a collection of island communities, the state is in many ways both uniquely and

disproportionately vulnerable to the consequences of climate change, especially seal level rise, beach erosion, more frequent storms and droughts.[2] Managing these climate change risks is critical for the future of Hawaii given its heavy dependence on income from tourism. If the 100% renewable goal becomes too costly, we will also have to decide if those resources should instead be allocated to addressing some of the direct consequences of climate change and whether the benefits exceed the costs.

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Jeff Kissel is an EPRINC Distinguished Fellow and former CEO of Hawaii Gas. He has led a wide range of organizations and has considerable hands on experience in the utility, petroleum, engineering and construction industries, including renewable energy and environmental mediation. If you have comments or questions on this research project please contact Jeff directly at jeffreykissel@gmail.com.

[2] Private communication from Dominic Pugliaresi, a senior and double major (economics and Chinese) at UH Manoa. He pointed out to me that at the margin (for the State of Hawaii) the return for funding adaption programs is likely always greater than mitigation efforts. Hawaii's carbon emissions abatement programs are potentially expensive, but the contributions are so small that the reduction in climate change cannot be measured.