

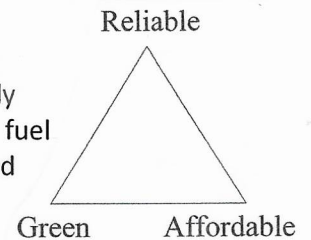
What Have We Learned About 100% Renewable in Seven Years?

A Briefing Paper of The Practical Policy Institute of Hawaii

Climate change is real. We need to do everything practical to address it. With a new governor and new legislators, the time is right to consider the lessons learned since the State's 2015 "100% renewable energy by 2045" goal and law. Here are eight lessons learned:

1. 100% renewable energy is a trade-off conundrum between green and affordable.

Picture an energy generation pyramid, with the tip labeled "reliable," the lower right corner "affordable," and lower left "green." As the analysts at S & P Global perceptively stated: "it appears that the choice is any two." Going clockwise from the top, the fossil fuel side has been both reliable and relatively affordable. But not green. The base, solar and wind, can be relatively affordable, but in order to be made reliable will be extremely costly. There are three reliable and green alternatives, but all are troublesome.



Power intensive production of hydrogen by electrolysis will be prohibitively expensive for Oahu. Biofuel and biomass depend on "net zero" rationalization that CO2 absorption during feedstock growth will offset CO2 released when the fuel is burned--controversial reasoning at best and not consistent with current PUC policy. While reliability is essential, green energy and affordable energy are conflicting priorities.

2. 100% renewable is an Oahu problem. Oahu has 1,700 people per square mile vs. 50 on the Big Island, 132 on Kauai, and 212 on Maui. The neighbor islands have abundant land where residents will rarely see wind and solar projects; not so for Oahu. Oahu has a huge demand for energy, with commercial and industrial usage exceeding 70% of electricity demand—think of powering all of Waikiki, downtown, State government offices, and the major military bases. Thus Oahu has by far the greatest conflict between green energy and competing priorities for residential development, sustainable agriculture, and the visual environment.

3. Utility scale wind farms on Oahu are all but dead. Windmills are problematic due to the visual blight, health concerns, and strong pushback from rural communities. Senator Gil Riviere summarized it best, "we must stop forcing massive wind turbines on small disadvantaged communities."

4. Rooftop solar won't get us anywhere near 100% renewable. At 37% rooftop penetration, we lead the nation—great! But customer-sited solar amounts to less than 14% of electricity generation. Even if rooftop solar were to almost double, which is doubtful, reaching 25% of total generation is highly unlikely. With less than 10% coming from H-Power and wind combined, a staggering 65% will have to come from some other source to achieve 100% renewable. While it appears that utility-scale solar farms are the most likely renewable source, is this practical?

5. Utility solar farms plus utility battery farms are cost prohibitive. The battery farm under construction at Kapolei is essentially a new middleman in electricity delivery—without adding a single kilowatt of actual power generation. HECO has estimated that \$500 million will be paid by ratepayers to the project's developer over the next 20 years. And the Kapolei project will hold less than 3% of a day's demand. Will it take more than 20 of these farms and more than \$10 billion to assure reliable electricity

for just two overcast days? Are we willing to forego the reliability reserve we currently enjoy in the form of fuel storage? The implicit lesson learned is that HECO will have to have a thermal source of power to make solar generation reliable.

6. Utility solar farms would gobble significant acreage. In previous Institute articles in the Star-Advertiser, we highlighted our calculation that at least 20,000 acres for utility solar farms would be required to achieve anywhere near 100% renewable generation. As a point of reference, the total area in crops on Oahu is about 22,400 acres, based on a 2015 Department of Agriculture study. Is paving over huge chunks of Oahu land with millions of solar panels really the future we want?

7. The coming electric vehicle transformation will be challenging. We will have to deal with implications from the pending transition to EVs. When complete, the majority of EV charging will not come from the car owner's home rooftop. The best study that we have seen estimates a 49% increase in "installed" electricity generation capacity to handle the transition to EVs. The implication for Oahu, with about 800,000 cars, is staggering.

8. The cost of electricity has exacerbated the financial struggles of Hawaii's families. The cost of living has increased significantly over the last seven years. The recent coal plant shutdown due to a State law just made matters worse. The situation has been further exacerbated by the cruelest of all impositions, inflation. And AUW's ALICE report highlighted the struggle faced by so many of our families trying to make ends meet. Should we continue with energy policies that add to our number one problem?

In consideration of the lessons learned over the last seven years, we continue to ask whether "100% renewable energy by 2045" is practical.