HELCO PUC hearing in Kailua-Kona, HI, 30 Oct. 2012

Requests for (1) AKP's biofuel subsidy of 1/6 ¢/kWh and (2) a 4.2% rate hike.
New, individual PV+battery, life-cycle 20 ¢/kWh approach for our Big Island energy future.

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The AKP biofuel subsidy (PUC Docket 2012-0185) is equivalent to ~1 $/gallon or $16M(million)/year; the 4.2% rate hike (PUC Docket 2012-0099) is equivalent to adding $19.8M to HELCO's annual revenue of $471M and $18M profit. I am a permanent resident of Kailua-Kona, and oppose both requests for the following reasons:

1. Neither request reduces our already high electricity rates of 0.42 $/kWh on the near term

2. The merits of either cannot be evaluated based of the provided financial data, comparative benchmarks or alternative options.Items 7 & 8, below, may be better options.

3. Biomass could be pelletized in-situ in the field and combusted in HELCO's steam boilers, with much less truck traffic through our neighborhood roads, less conversion energy waste and leading to a rate below **10 ¢/kWh**, if the steam-to-electricity efficiency is at least 10%, including reasonable steam boiler adaptation costs.

4. However, it is the cost and energy losses of biomass conversion to fuel in the AKP plant and subsequent conversion to electricity, which would **add another ~40 ¢/kWh**, including HELCO's share of CAPEX, OPEX, transmission, and distribution

5. My preference for the use of bio-fuels is for transportation rather than for generation of electricity. It's good to remember that today's $4.50/gallon at the pump is the energy equiv. of only 14 ¢/kWh, but 46.7 ¢/kWh after conversion to & transmission of electricity. In other words, charging an EV with 40 to 50 ¢/kWh would be like paying now over 13 $/gallon.

6. In benchmarking installed cost of generators on a $/watt basis, to produce renewable energy: HELCO, AKP and PUC know from the FIT rates (i.e. fair compensation), that these range from **13.8 or 18.9 ¢/kWh** for Tier-2 wind or PV IPPs over 20 kW. However, looking at AKPs biofuel plant's total levelized life-cycle cost over 20 years I get **3.94 $/gallon** or, after converting it to electricity: **48.3 ¢/kWh,** as detailed below:

¢/kWh = (CAPEX + OPEX + Land Lease + Taxes + Profit + HELCO-share) ** / Biofuel energy x generator efficiency

= 100,000,000 ¢/M$ (750+470+156+154+100+370)M$ / 3.4 BkWh = 48.3 ¢/kWh

Federal & State tax credits may lower the CAPEX by ~50%, leading to **44.6 ¢/kWh**

** CAPEX of $350 M, including interest (incl.HELCO's share of $250 M) =	750 M$
OPEX at 5% of CAPEX/year (incl.HELCO's share of $120M)=120+350*0.05*20 =	470 M$
Land lease of 13,000 acres at 600 $/year/acre = 13,000*600*20 =	156 M$
Taxes at 12% of fuel (4 $/gal) and electricity sales = 0.12*16 Mgal*4*20 =	154 M$
Profit of less than 10% =	100 M$
Total =	1630 M$

Generator efficiency (incl. transmission & distribution losses) = 30 %

Biofuel energy = 16E6*20*120,000 Btu/gal*1054 J/Btu / 3.6E6 kWh/J*0.30 = 3.4 Billion kWh

7. My team would like to propose **a better approach to our Big Island energy future**. Rather than using the 16 Mgallons/year of fuel for electricity, use it for transportation fuel and simultaneously find investors to finance $1448 M in roof PV + battery systems. This would buy 1293 M$/(6000W PV***10 $/W)** = 21,557 such systems. The costs would cover

CAPEX including interest = 21,557 homes * 6000W PV***10 $/W** =	1293 M$
OPEX, mostly the Minimum Monthly Charge (MMC) = 20*12*21,557*30 =	155 M$
Land lease of 13,000 acres at 600 $/year/acre =	0 M$
Taxes at 12% of fuel (4 $/gal) and electricity sales =	0 M$
Total =	1448 M$

This would lead to a household levelized, life-cycle $/kWh rate of

¢/kWh = 100,000,000*1448 / (6kW*0.16*21557hms*8760h/y*30y) = 26.6 ¢/kWh

Federal & State tax credits may lower the CAPEX by ~50%, leading to **14.7 ¢/kWh**

This rate is 3x lower than the one via the AKP-HELCO approach. What is the catch? The needed up-front investment for PV is higher than with the biofuel-to-electricity approach. Any ideas? Financing at 4%/y.interest for 10y may add $602M to CAPEX and 5.6¢ to the 14.7 rate. A PV system w/battery back-up may look as illustrated in Fig.1, at right.

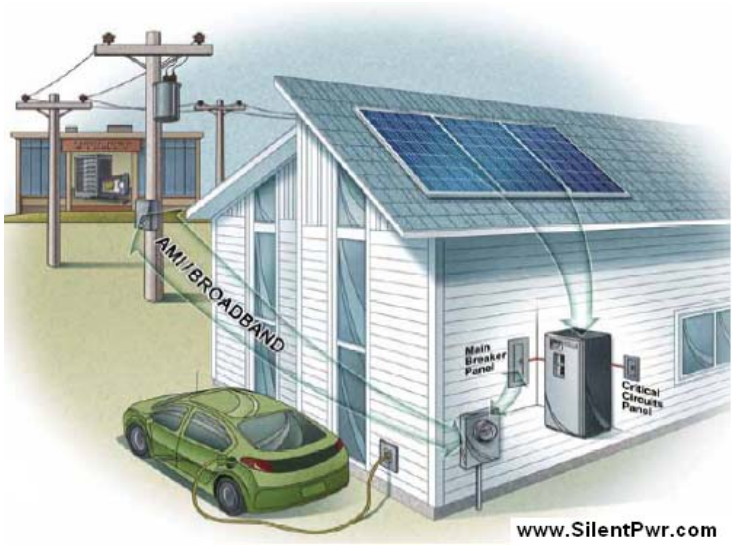

Figure 1. Home with grid-connected PV+battery system

8. There are more good news:
   (A) The battery liminates the feared peak power demand on the grid
   (B) We can continue to enjoy HELCO's services (at equal profit and dividend dollars) for NEM or FIT contracts for secondary back-up (i.e. "**battery "trickle charging"** rather than using a small 0.1 $/W on-site generator), transmission, distribution and metering (also of geo, wind and hydro) by continuing to pay the 2012 MMC of $20/month. The average PV oversize output of 30% is entrusted to HELCO
   (C) The PV+battery systems are tailored to each home but oversized to overcome lower PV output during cloudy days w/o overloading the grid's back-up function. On average, only 70% of the PV energy is consumed locally (460 kWh/mo). I expect that some homes only need a 2-kW PV + battery system, like mine; others may need a 10-kW system.
   (D) HELCO's smart meters can keep track of the excess energy provided to the grid by each PV household, so that reimbursement or preferential pricing at PHEV, EV or FCV charging stations can be done fairly
   (C) Eliminate oil imports corresponding to these 21,557 homes
   (D) All of the above, incl. the 15-20 ¢/kWh rates hold true, if we were to grow this approach to cover all present 73,000 homes as well as all commercial and industrial rate payers
   (E) The average excess PV energy from all present rate payers plus existing wind, hydro and geo energy would be enough to power all 200,000 BI vehicles if all were to convert to EV and FCV, despite assuming an overall conservative 3 miles/kWh
9. Maybe when the time comes, HELCO might re-invent itself as a transmission & distribution company, but continuing the coordination of the IPPs?

Thank you for listening to our concerns and suggestions.