

**Title: Secure 20 ¢/kWh for 30 years for all, via roof PV with on-site battery backup (PVBB)**

**To:** HELCO and PUC and to hawaii.puc@hawaii.gov

**From:** Ulrich Bonne, representing myself (Chemical Physicist, retired, Kailua-Kona, Hawaii)  
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**Comments to HELCO regarding draft 2013 IRP[1]:**

I believe that we can all agree on the following goals:

- Secure reliable, affordable and uninterruptible electricity for homes, businesses and transportation
- Secure 30-year leveled electricity rates at less than half of today's rates;
- Eliminate the need for electricity generation via combustion of imported oil or LNG or bio-fuel, and their associated remediation costs due to air pollution, health impairments, global warming and ocean acidification and
- Eliminate the need for more central geothermal, wind farms, PV farms and inter-island cables

Some of the above are reflected in the draft 2013 IRP report you and your Advisors put together, but **none of your four slides show how to "Lower Customer Bills" commit to one or more numeric low-cost electricity goals or milestones, especially as you complete each of the listed actions.** Without such data I find the IRP unacceptable, as it surely would flunk in any business school test.

An acceptable plan, in my view, would not only list the uncertainty factors, but also quantify the corresponding consequences in terms of estimated achievable electricity rates or range thereof. It would compare HELCO's present & planned performance with published benchmarks, e.g. NREL.[3] HELCO's "start-up business" into distributed solar PVBB should be subsidized as others are, so that PVBBs can be a key, profitable part of HELCO's portfolio rather than just a "grid destabilizing" one.

**Questions to HELCO:**

1. What is preventing you from offering to rent roof-space on any willing home or business, to finance, install and maintain solar PVs (preferably **with on-site storage**), so that you can offer electricity rates below 20 ¢/kWh to the landlords, use surplus low-cost electricity to reduce the rate to all ratepayers, and make a profit to boot -- as you did (w/ partners) at the W.Hawaii Civic Center?
2. Not having seen any electricity price milestones or benchmarks (i.e. ¢/kWh, as a measure of utility performance) in your draft 5-year 2013 IRP draft report -- maybe you proposed such milestones to the PUC, but which then were omitted in your published IRP? Given the uncertainties of geothermal, bio-fuels and interisland cable, why not expand into predictable & distributed solar, as suggested before[2], without giving up on your diverse portfolio of wind, hydro and geothermal?
3. If all your wind and geothermal PPAs were renegotiated to eliminate both oil-based tariffs AND curtailments, by how many \$/kWh would that reduce your present rates?
4. Being aware of the trend to renewable distributed PV generation by utilities, by how much would residential \$/kWh rates decrease if you were to install on-grid PVBBs on all ~73,000 households?

[1] Draft Action Plans Integrated Resource Planning (IRP) 2013, Hawaiian Electric Companies (Hawaiian Electric, Maui Electric, Hawaii Electric Light Company), IRP Advisory Group Meeting #10 May 30, 2013, **Hawaii Electric Light Company Draft Action Plan**, [www.IRPIE.com](http://www.IRPIE.com), <https://docs.google.com/file/d/0BxvCvKr8bi94SHo4dFg3UXRzT1k/edit>

[2] U. Bonne, "Request HELCO study a plan for support of **many small, individual PV + battery back-up systems**," Public's inputs to HELCO's 2013 IRP (PUC Docket 2012-0036), 5 Dec. 2012, [http://dms.puc.hawaii.gov/dms/OpenDocServlet?RT=&document\\_id=91+3+ICM4+LSDB15+PC\\_DocketReport59+26+A1001001A12L06B20857F2108318+A12L06B20857F210831+14+1960](http://dms.puc.hawaii.gov/dms/OpenDocServlet?RT=&document_id=91+3+ICM4+LSDB15+PC_DocketReport59+26+A1001001A12L06B20857F2108318+A12L06B20857F210831+14+1960)

[3] NREL, "2012 Utility Green Power Leaders in terms of top MWh sales in 2012," 5 June 2013, <http://www.nrel.gov/news/press/2013/2211.html>

**Hawaii County scenario changes for retail electricity rates between 2013 and 2020** – In view of this year's approach to the IRP based on comparing different scenarios, I thought it might help me understand the complexity of the challenges HELCO is facing to accommodate all their customers' (rates below 20 c/kWh) and stockholders' (profits) wants and expectations. Then it occurred to me that we all, including PUC, legislators and HELCO may find it of interest to ponder and consider such an energy generation and c/kWh costing scenarios, comparing one we have today with one we might enjoy by **(1) Renegotiating all PPAs to eliminate their oil-price dependence in exchange for zero curtailment, (2) Reduce use of most oil-fired generators except for the diesel-peaking units, (3) Invest in roof PVs and PVBBs for the equivalent of just 50% of the county's 73,000 homes, and (4) Add just a nominal amount of to total wind, hydro and geothermal (PGV).** As shown comparing Tables 1 and 2 below, the possible 2020 (IRP goal??) scenario would or could result in ~20 c/kWh for all of HELCO's customers, beyond homes!! **If we incorporated such a scenario into the new IRP plan, Table 2 could be updated periodically, and measure progress towards goals.**

Table 1. Contribution of HELCO generators to retail ¢/kWh rate in							2013
Generation Sources	A Instld.Cap. MW	B Average Utilization %	C MW	D %	E Rate ¢/kWh	F Wt.Rate ¢/kWh	
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1 Residual Fuel Oil	150	39	58	45.37	50.0	22.68	
2 Diesel	60	20	12	9.39	59.0	5.54	
3 Wind (oil displ. contracts)	20	10	2	1.56	50.0	0.78	
4 Wind (incl. curtailments)	10	50	5	3.91	11.0	0.43	
5 Hydro (oil displ. contracts)	10	80	8	6.26	50.0	3.13	
6 Hydro (incl. curtailments)	10	90	9	7.04	11.0	0.77	
7 Geothermal (oil displ. contr.)	30	87	26	20.34	50.0	10.17	
8 Geothermal (incl. curtailm.)	8	94	7.5	5.87	11.0	0.65	
9 PV (oil displ. contracts)	1	17	0.17	0.13	50.0	0.07	
10 PV (incl. curtailments)	1	17	0.17	0.13	11.0	0.01	
<b>Totals</b>	300	503	127.8	100.00		44.23	
<b>Averages</b>		GWh/y=	1120	42.6		44.23	
UlrichBonne@msn.com, 13 Jun '13, GeTL-13-PVBBs							
A = <b>Input:</b> Installed capacity in MW		Oil price		100 \$/barrel in 2013			
B = Average utilization of these generators, in %. B = 100*E/A							
C = <b>Input:</b> Average Utilization in MW							
D = Average contributions to kWh sales in %. D = 100*C/Sum(C1 to C10)							
E = Effective retail rate of active generators, including T&D, taxes, CapEx & OpEx costs							
F = Weighted rate contribution to average rate in kWh. F = D*E/100							
Underlined numbers are estimated inputs							
Table 2. Contribution of HELCO generators to retail \$/kWh rate in							2020
Generation Sources	A Instld.Cap. MW	B Average Utilization %	C MW	D %	E Rate \$/kWh	F Wt.Rate \$/kWh	G Invest. M\$
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1 Residual Fuel Oil	10	50	5	4.12	76.5	3.15	1
2 Diesel	60	20	12	9.88	89.2	8.81	0
3 Wind (oil displ. contracts)	0	0	0	0.00	76.5	0.00	0
4 Wind (w/o curtailments)	40	50	20	16.46	10.0	1.65	0
5 Hydro (oil displ. contracts)	0	0	0	0.00	76.5	0.00	0
6 Hydro (w/o curtailments)	25	92	23	18.93	11.0	2.08	0
7 Geothermal (oil displ. contr.)	0	0	0	0.00	76.5	0.00	0
8 Geothermal (w/o curtailm.)	40	90	36	29.63	11.0	3.26	0
9 PV (oil displ. contracts)	0	0	0	0.00	76.5	0.00	0
10 PV & PVBB (w/o curtailmt.)**	150	17	25.5	20.99	10.0	2.10	600
<b>Totals</b>	325	319	121.5	100.00		21.04	601
<b>Annual Averages</b>				37.4		21.04	85.9
Oil price 140.71 \$/barrel in 2020							
** Roof PVs for half of Hawaii County homes, averaging 490 kWh/month							
On cloudy days, PV output may drop to 12.3 MW, but #1 & 2 gens. may fill that gap							
G = Possible HELCO investment for distributed PVBBs for only half of home loads							