

UH Hilo Facilities & Energy Up-date

The PV systems:

- 65 KW of PV at Main Campus - completed & in production.
- 88 KW of PV at NHERC also in operation (2 NHERC facilities are Net Zero facilities.)
- 502 KW of new PV on main campus - pending HELCO approval.
- Another 30 KW PV project is under construction contract.
- Projected UH Hilo PV production will be over 1,000,000 kwh/year/ or 8% of UH Hilo's total annual electricity usage.
- See attached UH Hilo projected PV savings.

The electric sub-meters:

- Over 85 web based utility sub-meters completed in 2013.
- The sub-meters will provide baseline data, information on how and when energy is consumed. So we can implement appropriate energy conservation measures and reduce total overall energy demand.
- They can also provide verifications of the reduction of energy consumption resulted by energy projects and/or change of behaviors.
- FY 14 Energy Report of kbtu per gsf of major buildings is posted in OFPC web site.
- Sub-meters on PV panels made it easier to account for energy savings.

Energy Performance Contract:

- The technical portion of the Energy Performance Contract RFP is completed.
- Financing of EPC is a challenge, the project has been put on hold.
- Hopefully the GEMS financing will be the answer to UH Hilo's EPC.
- UH Hilo needs to improve energy efficiencies with any funding available to us.

Energy Reinvestment Projects Account:

- Learned the reinvestment concept from the Hawaii Energy UC Energy Trip.
- With the support of VC Marcia Sakai, the account has been established to finance the needed improvements.
- **The UH Hilo Energy Reinvestment Projects account is intended for planning, design, construction and/or equipment of energy retrofit and/or energy production projects with a calculated payback period of less than 10 years.**
- Projected PV savings will be the major source of income of this account.
- Electric sub-meters can provide savings verification from PV systems.
- Detailed baseline study by EPC consultant identified many energy conservation opportunities.

- Without proceeding with the EPC, this Energy Reinvestment Projects Account provides the financing for needed improvements.
- See attached for details

Pilot Project - LED & Bi-Level LED Lighting:

- Learned the bi-level lighting concept during the Hawaii Energy UC Energy Trip.
- Converting stairway, corridors, exterior light fixtures that need to be on all night or 24/7 to bi-level LED will substantially reduce energy consumption.
- Bi-level LED light fixtures are added to on 2 on-going construction projects.
- Converting lighting in general to LED will save energy & operation costs.
- The County's blue light filtering requirements is a major challenge in converting exterior light fixtures to bi-level LED.

Added Scope to Standard A/E Contracts:

- Perform life cycle energy analysis and report findings to the University regarding impact on energy consumption for various building design schemes, proposed equipment options, etc. Coordinate with the University to achieve the best overall design solution.
- Incorporate into the design, renewable energy and/or energy conservation measures such as automated sensors and reporting systems for continuous commissioning, smart lab and new ideas to assist the University with achieving its climate neutrality goal. Total estimated construction budget allocation for renewable energy and/or energy conservation measures - beyond the normal practice, shall be approximately five percent (5%) of the proposed construction budget.
- Provide building commissioning services as part of the design contract. The commissioning process shall commence with the conceptual design review through building occupancy.
- Provide estimated facility utility usage based on the final design.

UH Hilo PV Systems

1/29/2015

8/27/2014

Projects - Completed and Under Construction	PV System (KW)	Status		
On Campus				
Renovation of Campus Center (Bldg 336)	11.6	Completed		
Renovation of Redwood City Phase II	10	Completed		
Renovation of Redwood City Phase V	20	Completed		
Science and Technology Building	23	Completed		
Total Connected	64.6		101,625.50 KWH/Yr	\$ 37,601.44
By Student Services Building Project see below for breakdown of locations	502.6	Pending interconnection agreement		
LLC 2B	30.2	To be constructed		
On Campus Total	597.4			
Off Campus				
NHERC - Connected	88	Completed	88,754.00 KWH/Yr	\$ 32,838.98
UH Hilo TOTAL PV SYSTEMS	685.4			
*Breakdown of locations of PV System by Student Services Building Project				
New Student Services Building	75			
Old Student Services Building	10.8			
New Mower Shed Building	8.8			
South Roof of Learning Resource Bldg (Library)	222			
Auditorium Building (Theater)	75			
West Roof of Learning Resources Bldg (Library)	111			
LLC 2B	30.2	To be constructed		
Not Connected/Completed	532.8		838,174.40 KWH/Yr	\$ 310,124.53
UH Hilo TOTAL PV SYSTEMS	685.4			
Per FY 2014 Sub-meter data	1573.15	KWH/KW/Yr		
Estimated KWH to be produced by PV	1,078,237.12	KWH/year	Estimated Total Savings	\$ 380,564.94
FY 14 UH Hilo Main & Off Campus total usage	13,411,169.00	KWH/year		
Percent by PV - after completion	8.04%			
Percent by PV - connected	1.79%			
Pending Inter-connection Agreement				
Under Construction Contract				

UH Hilo Energy Reinvestment Account:

During last July's Energy Trip to UC by Hawaii Energy, we have learned that Facilities Offices of UC campuses kept the energy savings on their energy conservation projects – to finance future energy conservation projects. At that time, we also learned from Samantha Ruis that UH is working on an Energy Reinvestment policy.

Students in UH Hilo Sustainability Committee and Aurora Winslade of Hawaii Energy are interested in the Green Revolving Funds. We found some info on the Green Revolving Funds. It requires \$1m to set up an account. Because the GRF partially relies on donations, the project cost/benefit analysis, approval & saving verification processes are quite involved. It would require a system wide efforts & not something our office could accomplish.

At the same time, UH Hilo has been benefiting energy savings from PV productions. There are incentives for us to start a simple reinvestment account. So, we can continue investing the savings to more energy conservation projects. I discussed this idea with VC Marcia Sakai. She is very supportive of this idea. So, the account was established. As PV systems are all on web-based sub-meters, we could calculate the savings & findings have been transferred into this account. Attached are: 2nd Quarter PV savings calculations.

We plan to start with small pilot projects with the Energy Reinvestment Projects account. In the Energy Trip, we also learned bi-level lighting retrofit projects in UH Campuses. Lights in parking areas, roadways, stairways, etc. are on all night or 24/7. However, most of the time those lights are not needed. The bi-level fixture will turn those lights to a lower level when there are no occupants. The motion sensors will turn those lights to full brightness. The energy savings could be as high as 70%.

Because of the County of Hawaii lighting regulations, UH Hilo has special challenges on exterior lights. We are working on bi-level LED fixtures with the County required filter. Until then, we will concentrate to interior applications.

UH Hilo Auxiliary Services has been interested in converting light fixtures into LED. LED fixtures will not only provide energy savings, the much longer bulb life also reduces the operation cost. Auxiliary Services & our offices are working on a couple of pilot projects. One project is to replace light fixtures in stairs to bi-level LED. The other one is to convert one classroom to LED fixtures. Light sensor data loggers will also be deployed to confirm the savings.

We believe the two pilot projects will be successful & plan to continue the LED conversion with the Energy Reinvestment Projects account. As the large PV panels are connected, we also plan to proceed with energy conservation measures identified in the EPC RFP.

FY 2015			July	August	September	October	November	December	January	February	March	April	May	June
1,147,	1A	PB11 PV System No. 1	606.60	654.20	627.00	549.50	479.60	487.40						
1,147,	1B	PB11 PV System No. 2	2,689.40	2,767.00	2,409.90	2,640.80	2,087.10	2,239.90						
1,151,	1D	325 Science & Tech - PV System	2,253.30	2,125.40	1,868.80	2,120.90	1,739.80	1,846.00						
1,153,	1A	336 Campus Center - PV1	339.40	326.00	280.40	301.90	233.40	240.20						
1,153,	1B	336 Campus Center - PV2	690.60	669.00	577.70	612.90	475.90	492.30						
1,153,	1C	336 Campus Center - PV3	708.50	685.00	578.60	574.00	427.50	418.80						
1,153,	1D	336 Campus Center - PV 4	693.10	672.00	567.40	593.60	455.60	458.00						
1,155	1A	Hawaiian Language PV System	9.80	9.00	9.20	9.00	9.00	8.80						
1,156	1A	New SSB PV	-	-	-									
PV Total			7,990.70	7,907.60	6,919.00	7,402.60	5,907.90	6,191.40						

UH Hilo PV Sub-meter

FY 2015 PV Savings		July	August	September	October	November	December	January	February	March	April	May	June	Total kwh	First Quarter Savings	Second Quarter Savings	Third Quarter Savings	Forth Quarter Savings	Year to date Savings
All PV in Main Campus		7,990.70	7,907.60	6,919.00	7,402.60	5,907.90	6,191.40							42,319.20					
Average \$/kwh		0.3701	0.3701	0.3701	0.3507	0.3507	0.3393												
Cost Savings		\$ 2,957.36	\$ 2,926.60	\$ 2,560.72	\$ 2,596.09	\$ 2,071.90	\$ 2,100.74								\$ 8,444.68	\$ 6,768.73			\$ 15,213.42
NHERC PV	Estimated	7396.17	7396.17	7396.17	7396.17	7396.17	7396.17							44,377.02					
Estimated \$/kwh		0.3976	0.3976	0.3976	0.3768	0.3768	0.3645												
Cost Savings		\$ 2,940.72	\$ 2,940.72	\$ 2,940.72	\$ 2,786.57	\$ 2,786.57	\$ 2,695.99								\$ 8,822.15	\$ 8,269.13			\$ 17,091.28
Total															\$ 17,266.83	\$ 15,037.86			\$ 32,304.70