



Hawaii Energy

Your Conservation and Efficiency Program



WATER SYSTEMS: EFFICIENCY FROM SOCKET TO FAUCET



Chanda Durnford
Energy Efficiency Advisor

3rd Annual Joint Government Water Conference

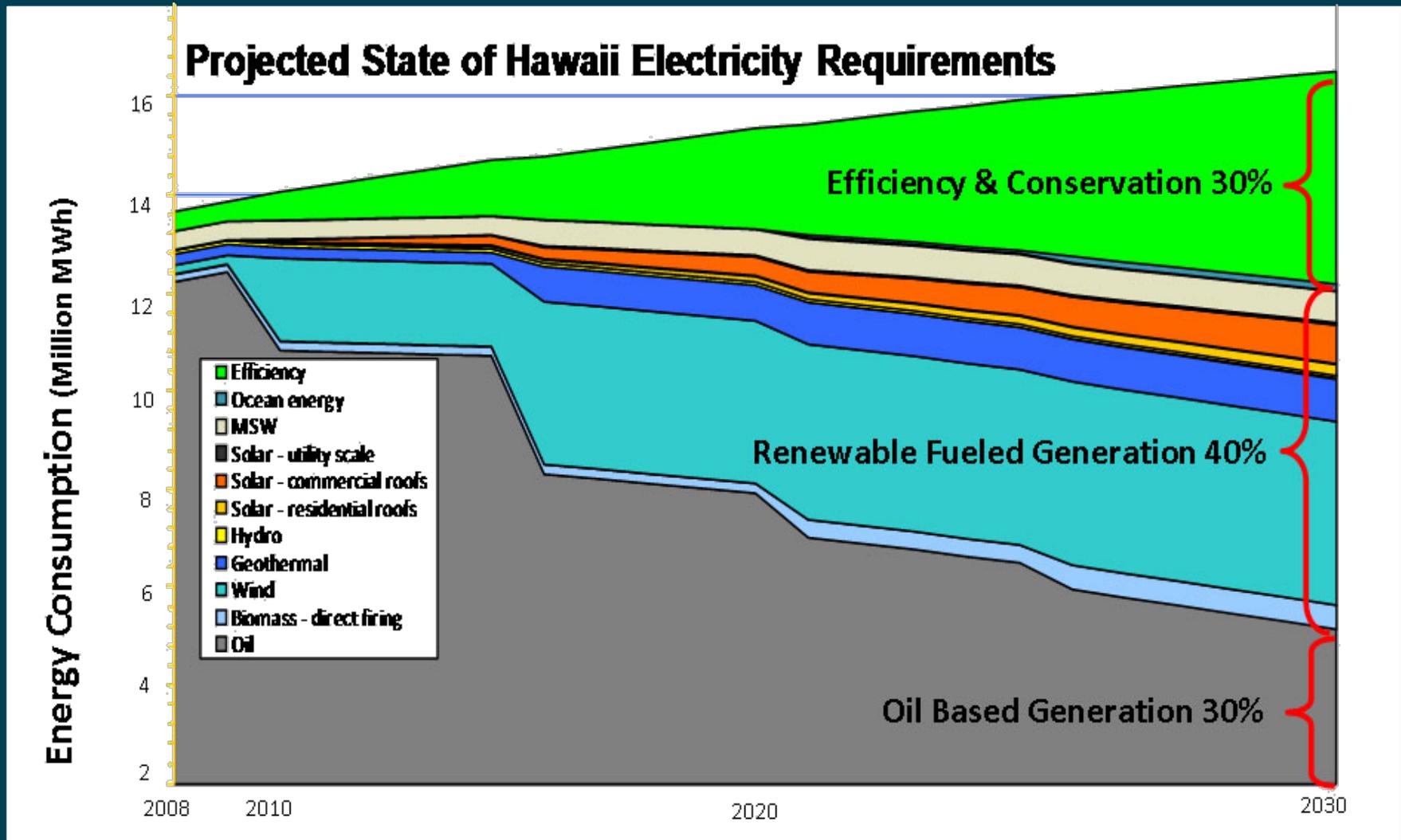
HAWAII CLEAN ENERGY INITIATIVE

The State of Hawaii and the Department of Energy signed a historic memorandum agreeing to:



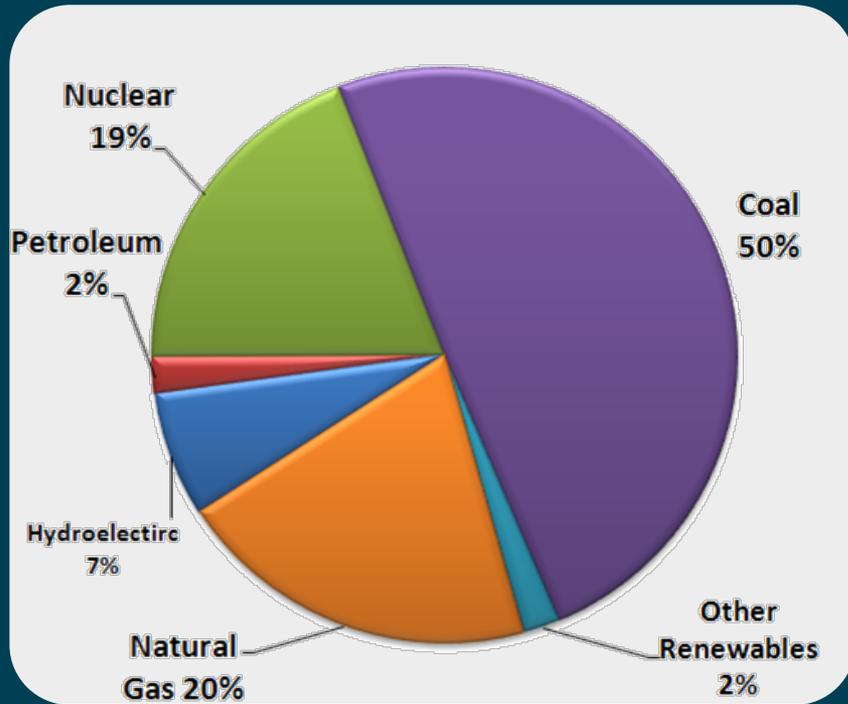
- Meet 70% of Hawaii's energy demand through conservation and clean-energy sources by 2030
- Make Hawai'i a national leader in smart energy use
- Create new jobs and a new, energy-based economy in Hawai'i

THE COMPONENTS

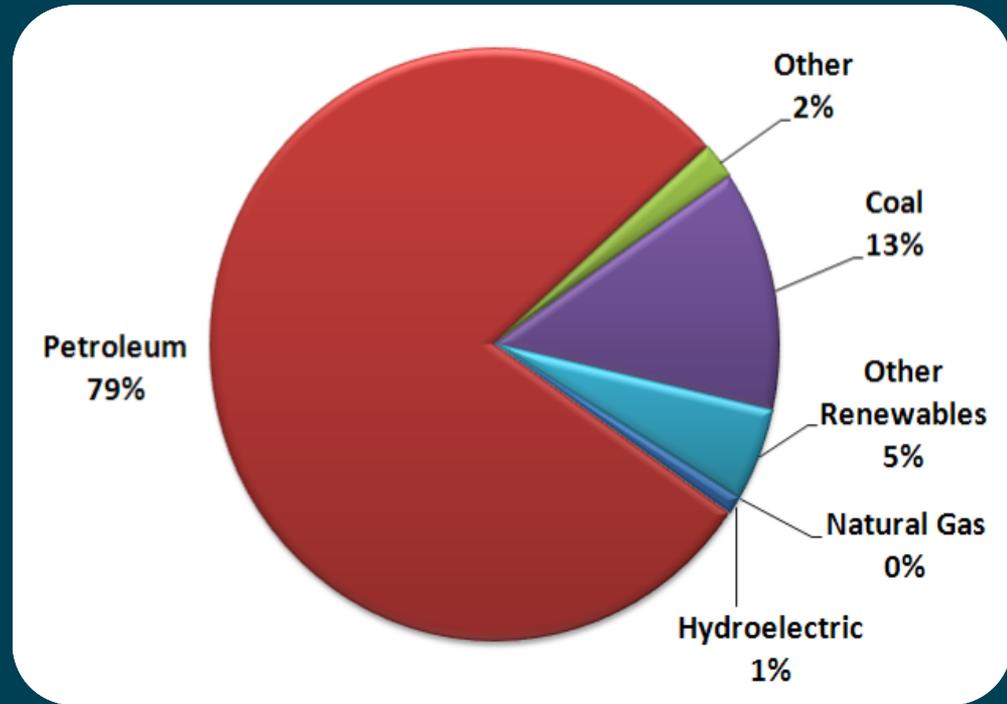


HAWAII'S DEPENDENCY

U.S. Electricity Generation



Hawaii Electricity Generation



W&WW SAVINGS POTENTIAL

		Annual Cost	Energy (kWh/Year)	Demand (kW)
Water & Wastewater Sites	\$	95,331,264	290,256,437	56,422
HECO 2012			9,206,000,000	1,535,200
% of HECO			3.2%	3.7%
Potential Reductions				
	10% \$	9,533,126	29,025,644	5,642
	20% \$	19,066,253	58,051,287	11,284
Simple Payback Est.			15	
Low Capital Cost Est.	\$	142,996,896		
High Capital Cost Est.	\$	285,993,792		

EFFICIENCY FROM SOCKET TO FAUCET

- **Manage Resources and Production**
- **Optimize Distribution and Storage**
- **Consumer Awareness and Behavior**
- **Find and Fix leaks**
- **Use Efficient Fixtures**
- **Minimize Landscaping Use**
- **Monitor Cooling Towers**
- **Optimize Collection**
- **Manage Processing and Reuse**
- **Start over**



W&WW PILOT PROGRAM DEVELOPMENT

- **PUC: Review Opportunities for W / WW Sites**
- **Gain Market Knowledge and Understand Challenges**
- **Site Inspections, Interviews, Review Prior Studies**
- **Opportunities**
 - **Education, Tools and Methods**
 - **Design Standards and Simulations**
 - **Maximization of Current Capital Improvements**

FREE EQUIPMENT PROVIDED

- Recipients: HBWS, HRWA, and RCAC
 - Fluke 1735 power meters
 - Multimeters with pressure module
 - Ultrasonic flowmeter
 - HOBO remote data logger



PUMP ENERGY INEFFICIENCIES

- Original Design Load vs. Existing Conditions
- Motors
- Gearsets
- Pumps
- Volume Control Method
- Wear / Site Conditions



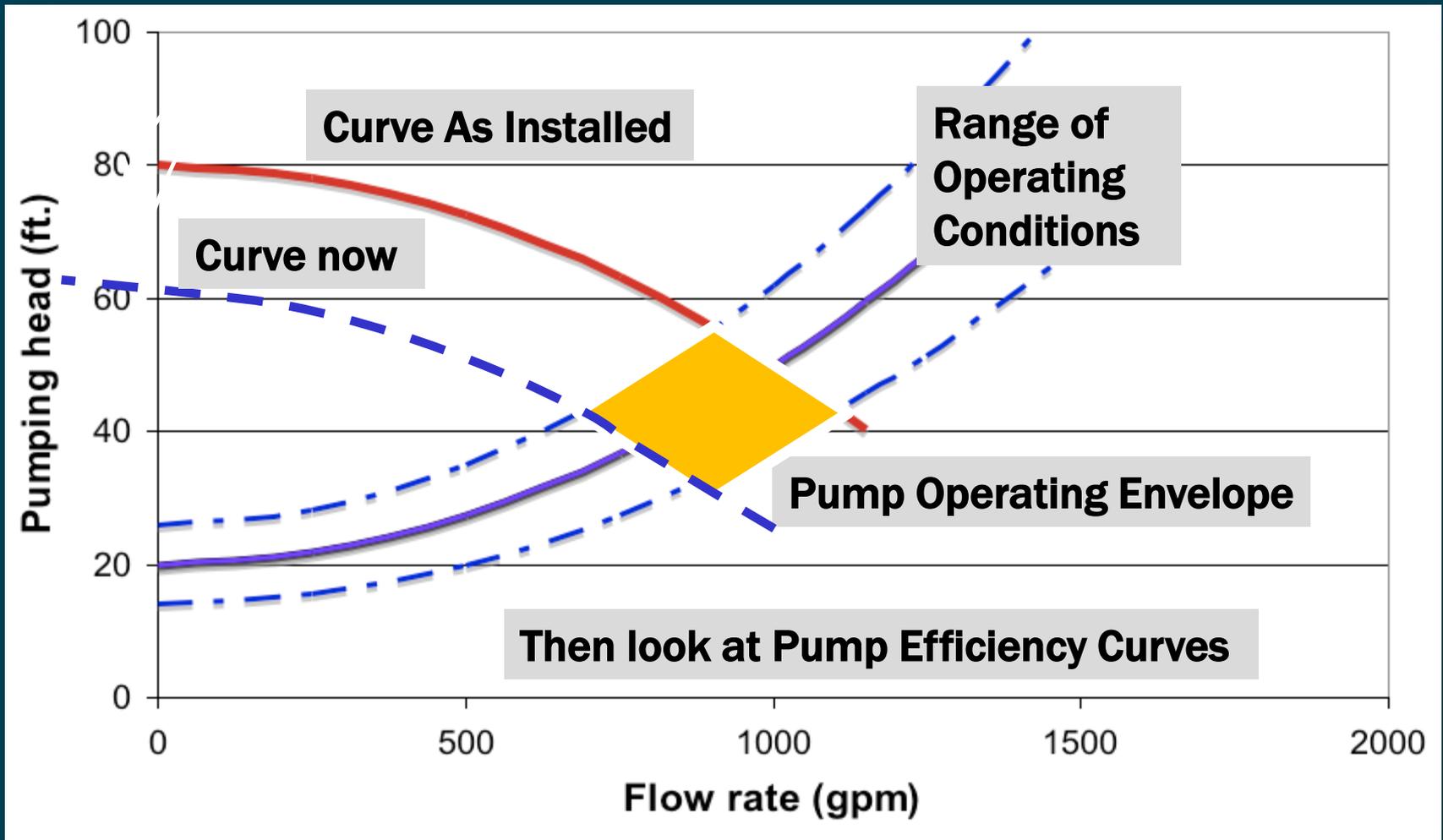
WHY ROB A BANK?

That's where the money is!

	Efficiency Range	Low	Average	High
Motor	85-95	.85	.9	.95
Drive	20-98	.20	.6	.98
Pump	30-85	.30	.6	.85
System Efficiency		.05	.32	.80

System Efficiency

WHERE DOES THE PUMP LIVE NOW?



GROUPS WE SUPPORT

- **Hawaiian Beaches Water Company (Big Island)**
- **Hawaii Water Service Company (Big Island)**
- **Hana Water Company (Maui)**
- **Aqua Engineers**
- **Veolia Water (Oahu)**
- **Rural Community Assistance Corporation**
- **Hawaii Rural Water Association**
- **County of Maui DWS**
- **County of Hawaii DWS**
- **Honolulu BWS**
- **And more...**

PROJECT A: PRIVATE WW FACILITY

- Existing: large pumps with VFDs
- Pumps grossly oversized, not running efficiently
- “Right-sized” 2 of 3 pumps and upgraded VFDs
- **Estimated savings = 170,000 kWh (1st year)**
- Incentive amount = ~\$23,000 (20% of total project cost)

PROJECT B: MUNICIPAL WATER COMPANY

- Has a known problem of water leaks
- Has a proven leak detection program, but needs to replace failed loggers
- Project has stalled from lack of funding
- Hawaii Energy provided \$135,000 for purchase of new loggers (about 200 loggers)
- **Estimated savings = 500-600 kWh/year per logger (total over 100,000 kwh, 1st year)**
- **FIRST LEAK DETECTED and Fixed!**



PROJECT C: COUNTY WASTEWATER FACILITY

- UV upgrade project – 2015/2016
- Single channel test (6 channels total)
- \$5 million project cost
- Old: 2.8 kW per lamp, 338 lamps per channel
- New: 1.0 kW per lamp, 220 lamps per channel
- **Estimated savings = 7.6 million kWh per year!**
- Committed incentive = \$2.3 million
- Plans for expansion to additional channels

HAWAII BENCHMARKING

Table 2 presents the average energy use rates for the various classes of drinking water utilities in Wisconsin⁴⁵. It should be noted that one-fourth of Wisconsin's drinking water utilities use less than 1.0 kWh per 1000 gallons.

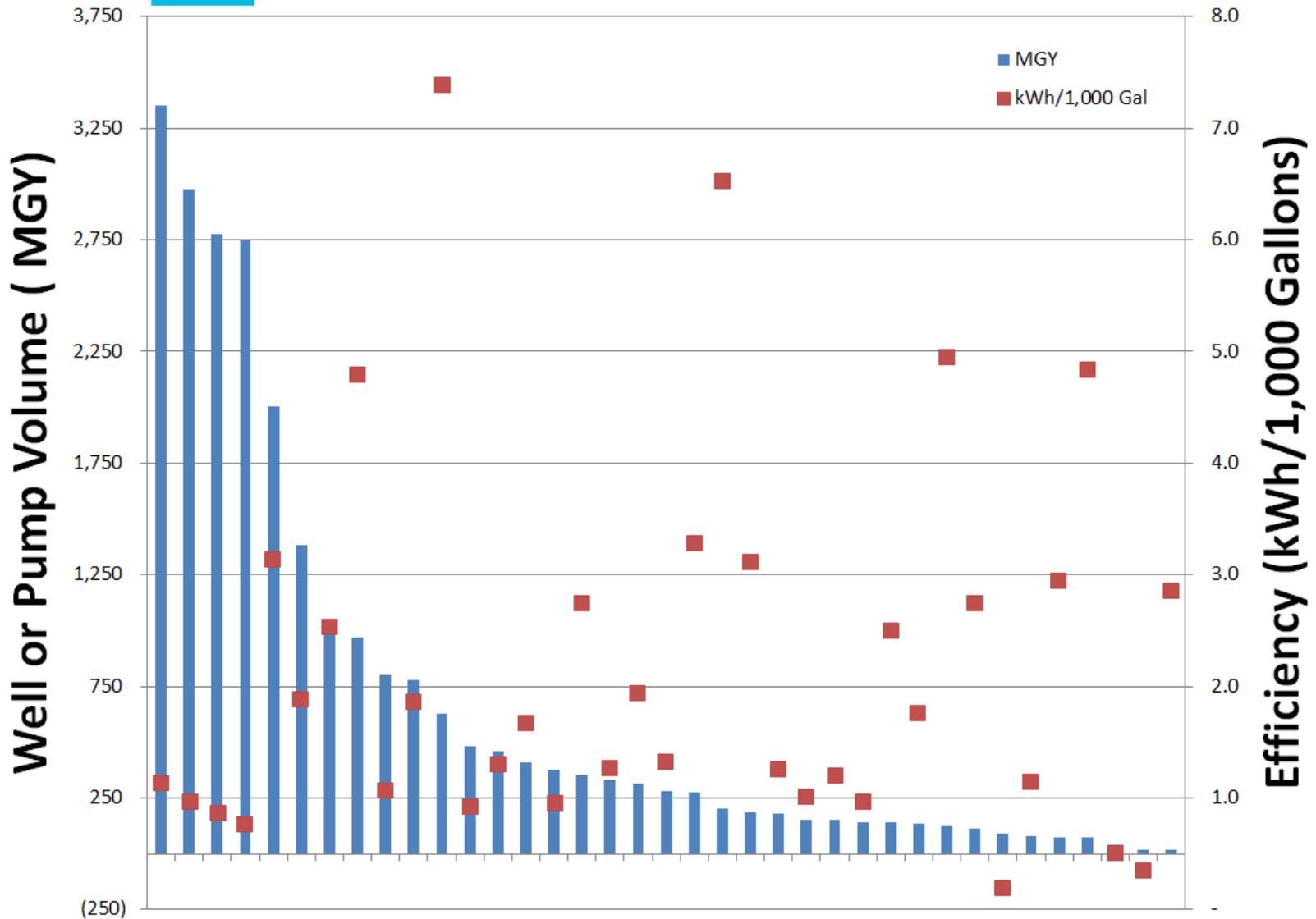
Table 2
Energy Use Rates at Drinking Water Utilities

Type	kWh/1000 gallons
Class AB (>4000 customers)	1.51
Class C (1000-4000 customers)	1.85
Class D (<1000 customers)	1.89
Surface water source (US)	1.4
Groundwater source (US)	1.8

Note: The energy rates for the three classes of utility include distribution losses and delivery to customers. The average water loss for the state is 11% of the water produced.



2015 Water Pumping Volume vs. Efficiency Benchmarking



IDENTIFICATION OF OPPORTUNITIES

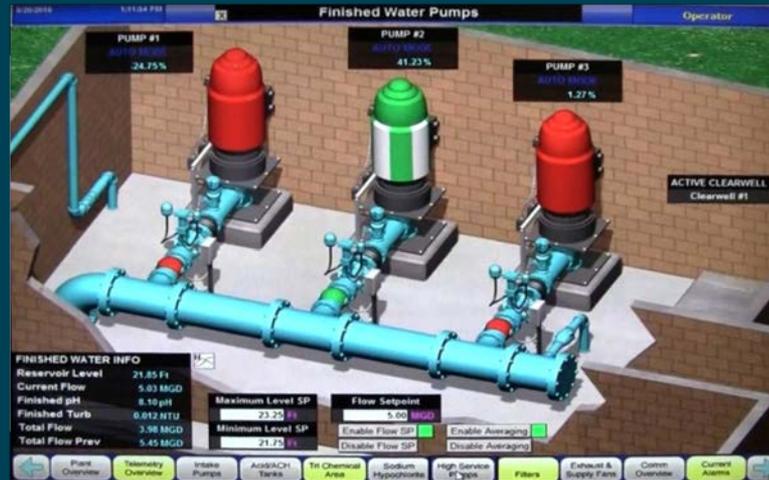
- **Analyze System Information**
- **Develop energy cost per thousand gallons for each source**
- **Analyze utilization of storage – is it operated efficiently**
- **How much power is consumed during peak and non-peak time periods?**
- **Can non-peak operations be increased to save power?**

IDENTIFICATION OF OPPORTUNITIES

- **Can pressure in the system be decreased yet meet all demand requirements?**
- **Can elevations in storage vessels be modified?**
- **Any potential to reduce amount of pumping or re-pumping?**
- **Are all motors energy efficient?**
- **Are the combinations of pumps, drives and motors the most efficient?**

CUSTOMIZED INCENTIVES

Measure of Life	Average Energy Reduction Incentive	Evening Peak Demand Incentive 5 to 9 p.m.	Day Peak Demand Incentive (HVAC Only) 12 to 2 p.m.
≤ 5 years	\$0.11/kWh	\$125/kW	\$100/kW
> 5 years	\$0.22/kWh	\$125/kW	\$100/kW



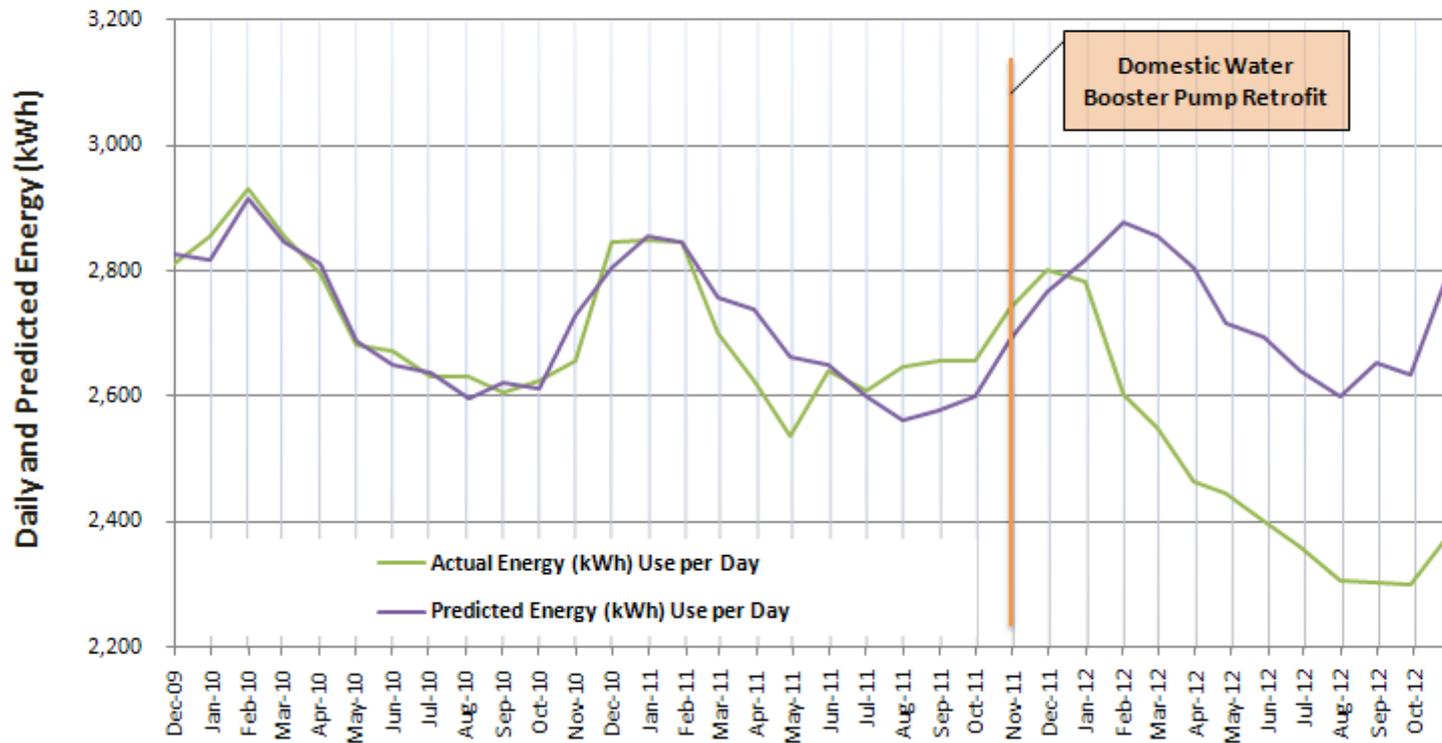
US EPA through the New England Water Treatment Technology Assistance Center at the University of New Hampshire.

PROJECT RESULT REVIEWS



Hawaii Energy

Weatherized - Baseline Energy Forecast vs. Actual Usage



CONTACT INFORMATION

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Mahalo

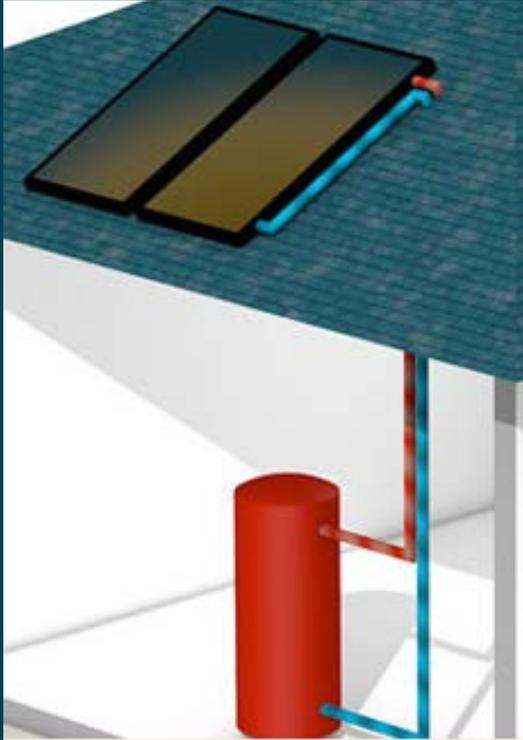
Oahu 1-808-537-5577

Neighbor Island 1-877-999-7242



EXTRA SLIDES:

SOLAR WATER HEATING



- **\$750 Contractor Incentive or**
- **\$750 Interest Buy-Down**
- **100 point inspection**
- **90% water heating cost reduction - about \$10-\$15 per person**
- **35% Hawaii State Renewable Energy Tax Credit**
- **30% Federal Tax Credit**
- **Opportunities for Water Conservation actions**



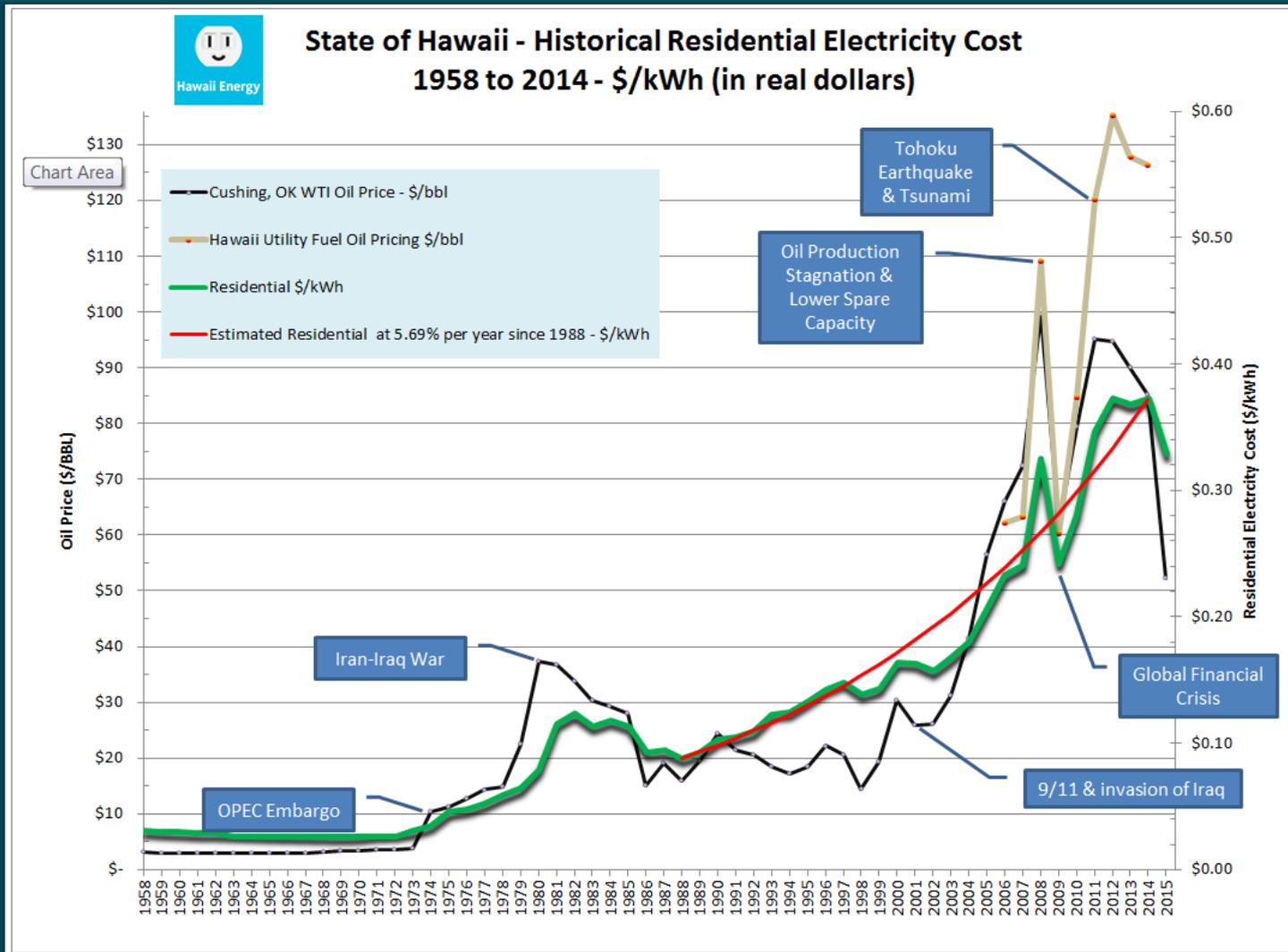
LIGHTING INCENTIVES



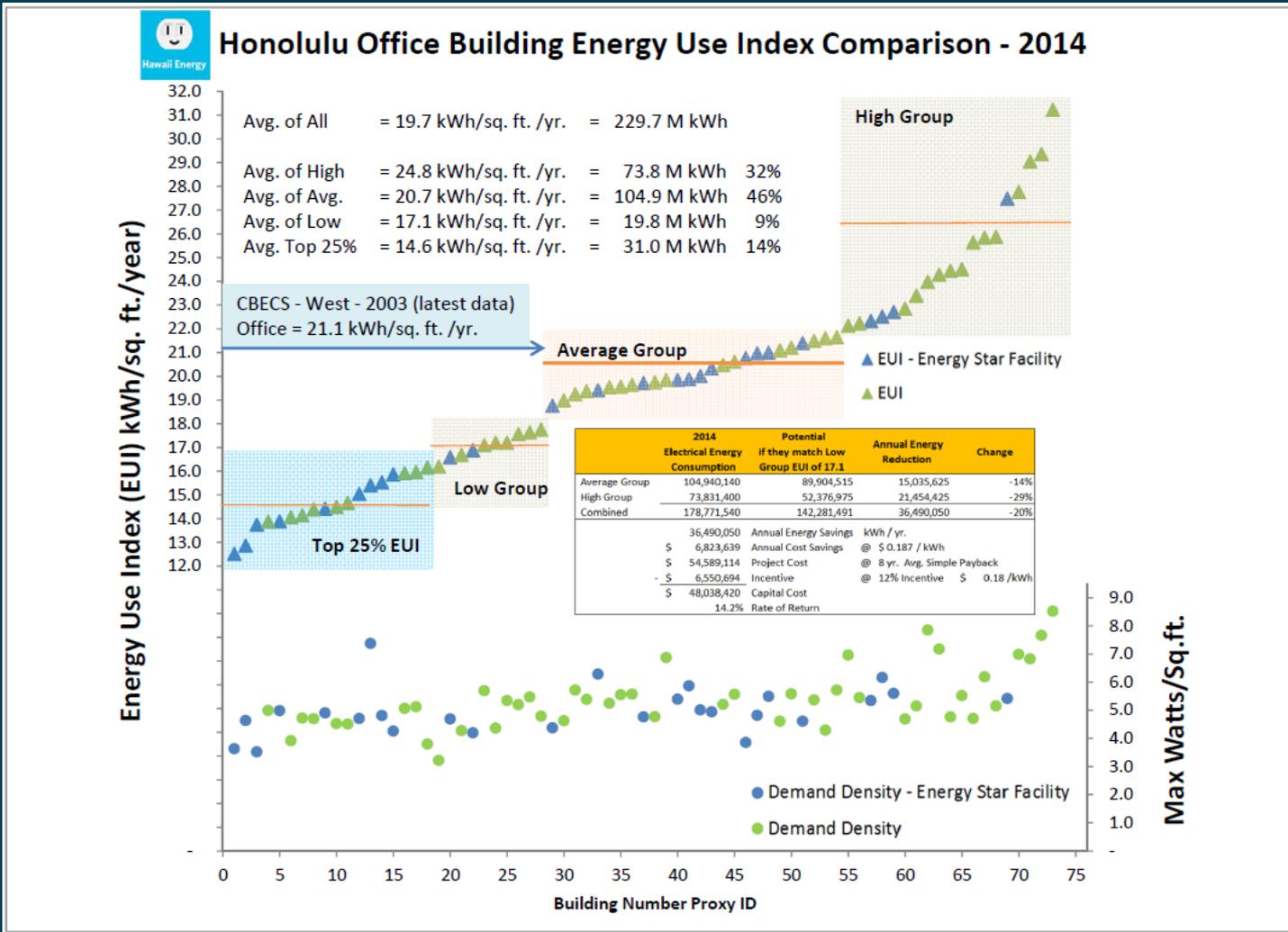
- **Incandescent Lamps**
 - Ceramic Metal Halide
 - CFL
 - LED
- **Four Foot Lamps**
 - Low Wattage T8s – (25/28 W)
 - High Efficiency Ballasts
 - Delamping
- **Controls**
 - Occupancy Sensor
 - Time Clock / EMCS
 - Bi-Level / Re-circuiting



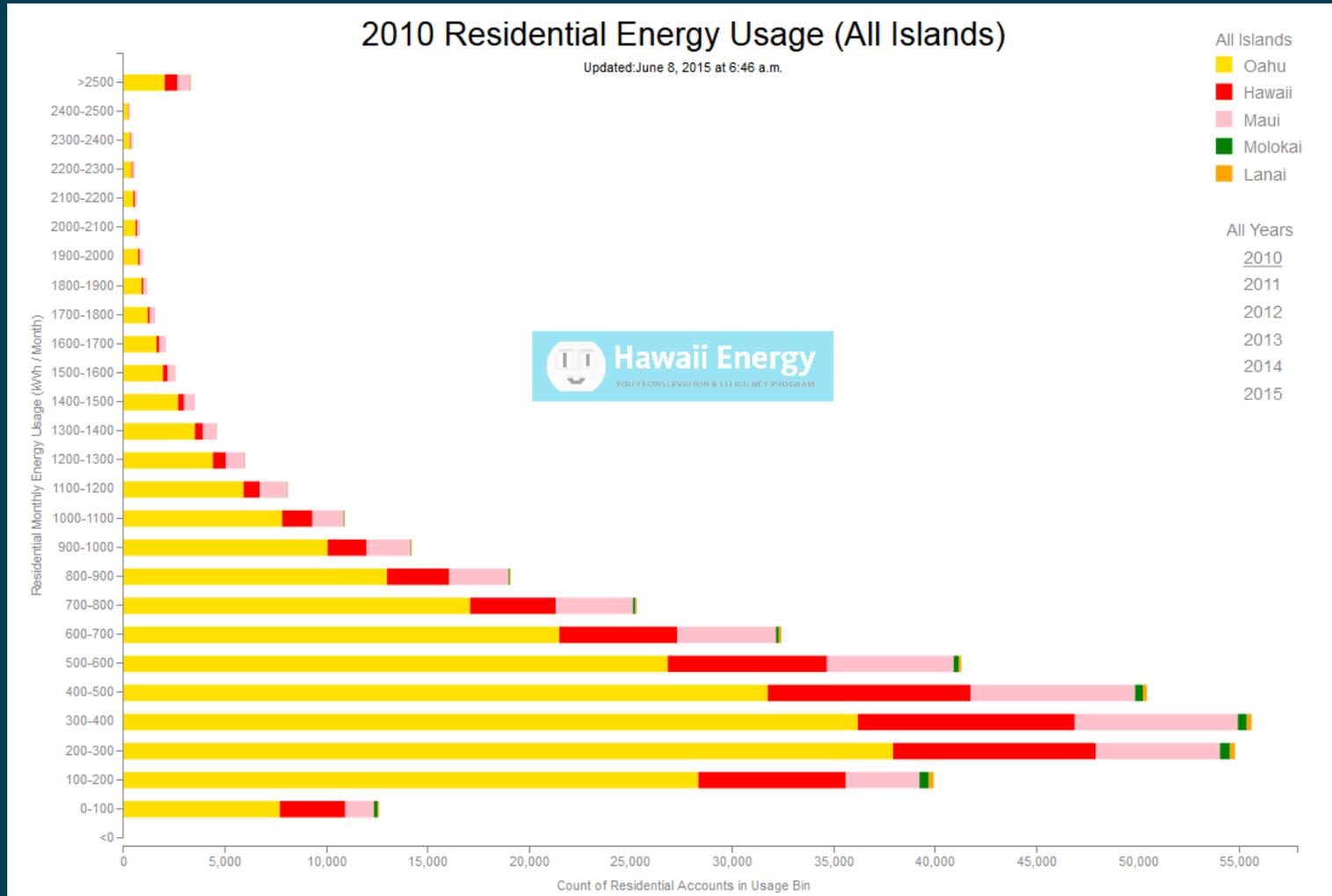
BUSINESS RISK TO BE MANAGED



COMMERCIAL OFFICE BENCHMARKS



RESIDENTIAL MARKET IDENTIFICATION



CHANGE IN USAGE OVER TIME

2015 Residential Energy Usage (All Islands)

Updated: June 8, 2015 at 6:46 a.m.

