Hawaii Solar Update

US EPA Innovative Energy Management Workshop: Maui I

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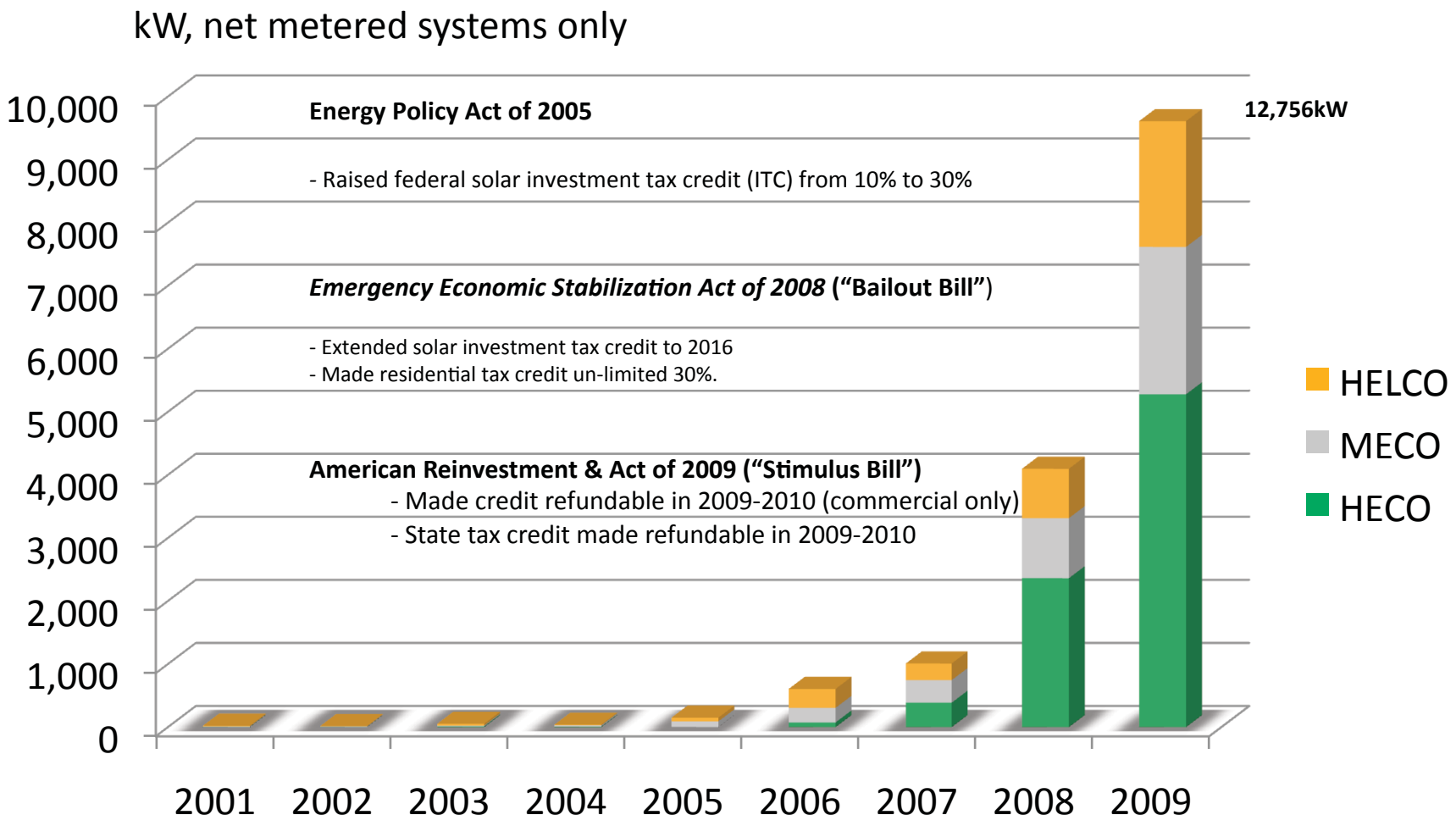
Hawaii Solar Energy Association
Serving Hawaii Since 1977

Section 1

5 kW system offsets over ½ of the power at Kihei Lutheran Church, 2008.

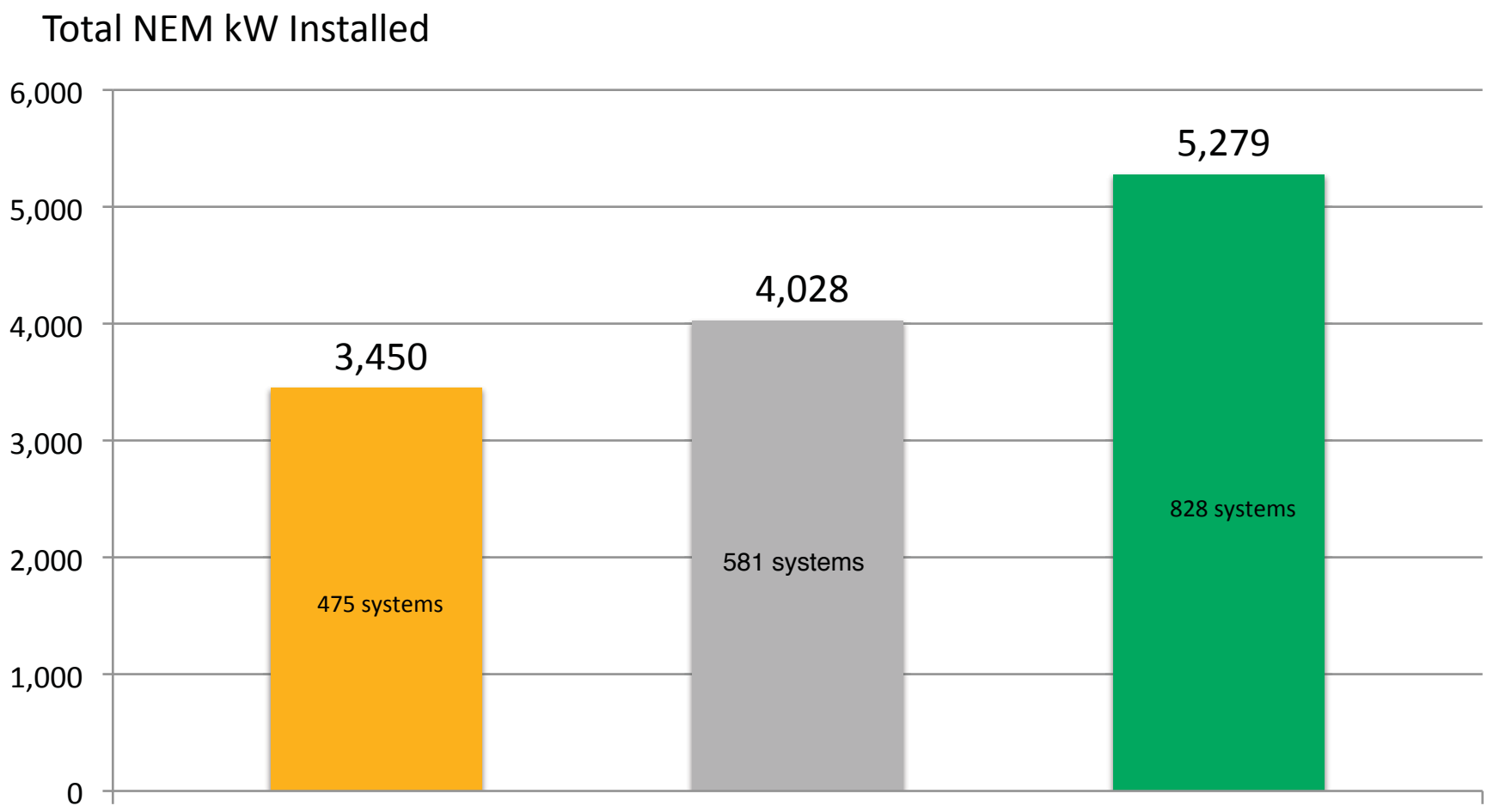
SOLAR MARKET OVERVIEW

PV Growing Despite the Downturn I



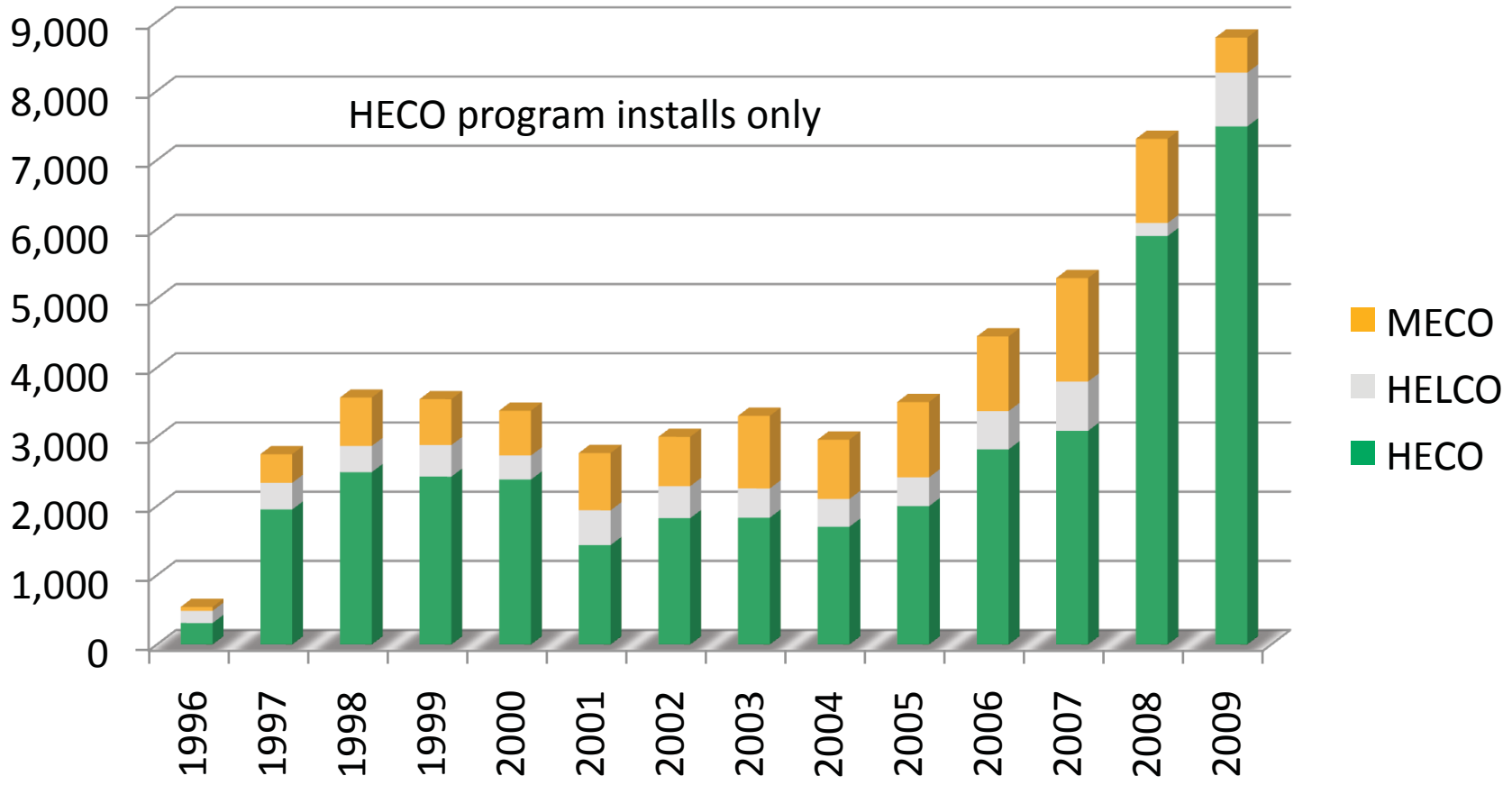
Source: HECO Companies Net Energy Metering Annual Status Report 2009. I

NEM by Utility



Source: HECO Companies' Annual NEM Activity Report, 2009.

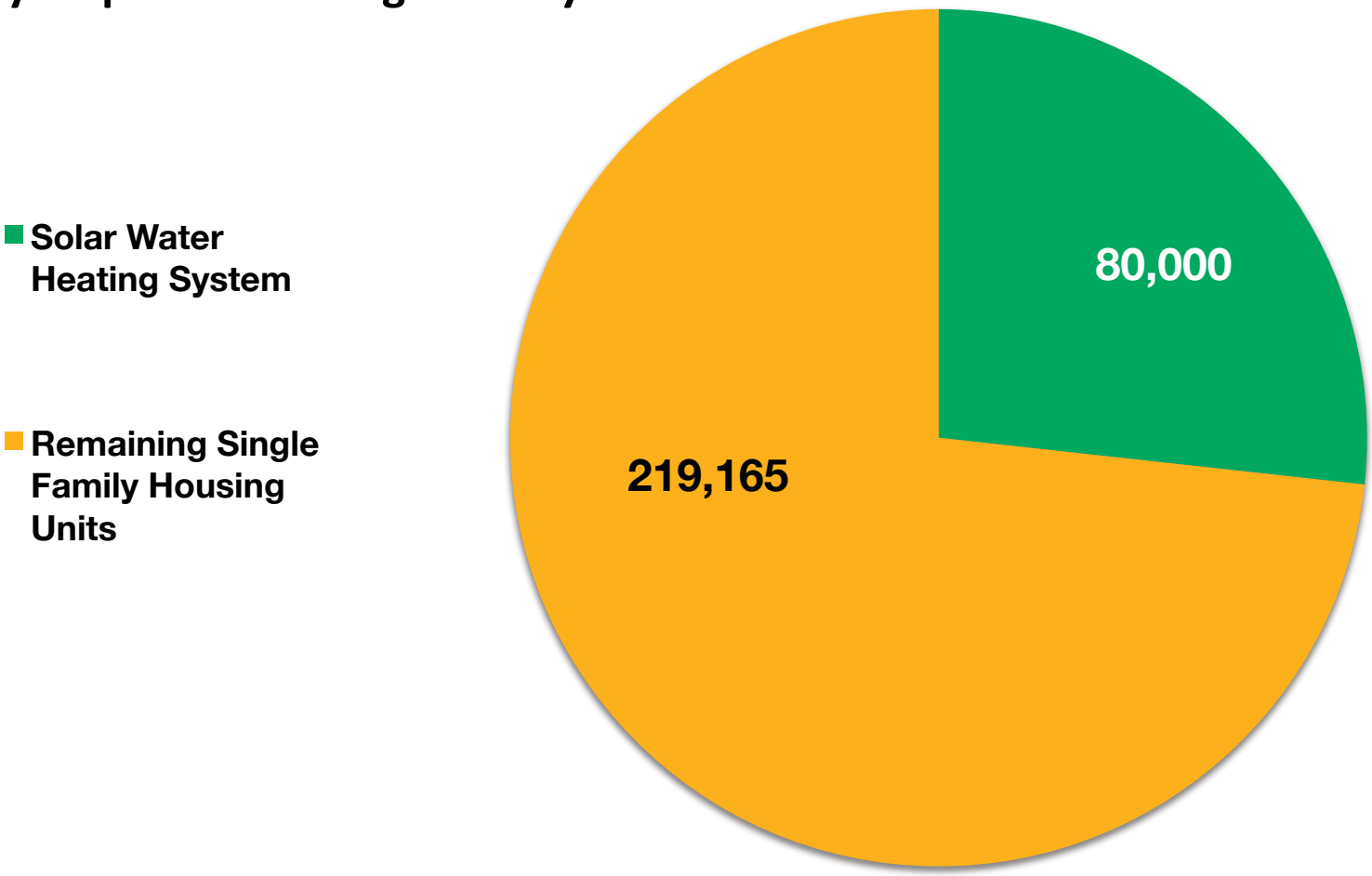
Solar Hot Water Installs up 196% from 2004-2009



Source: Honeywell Utility Solutions.

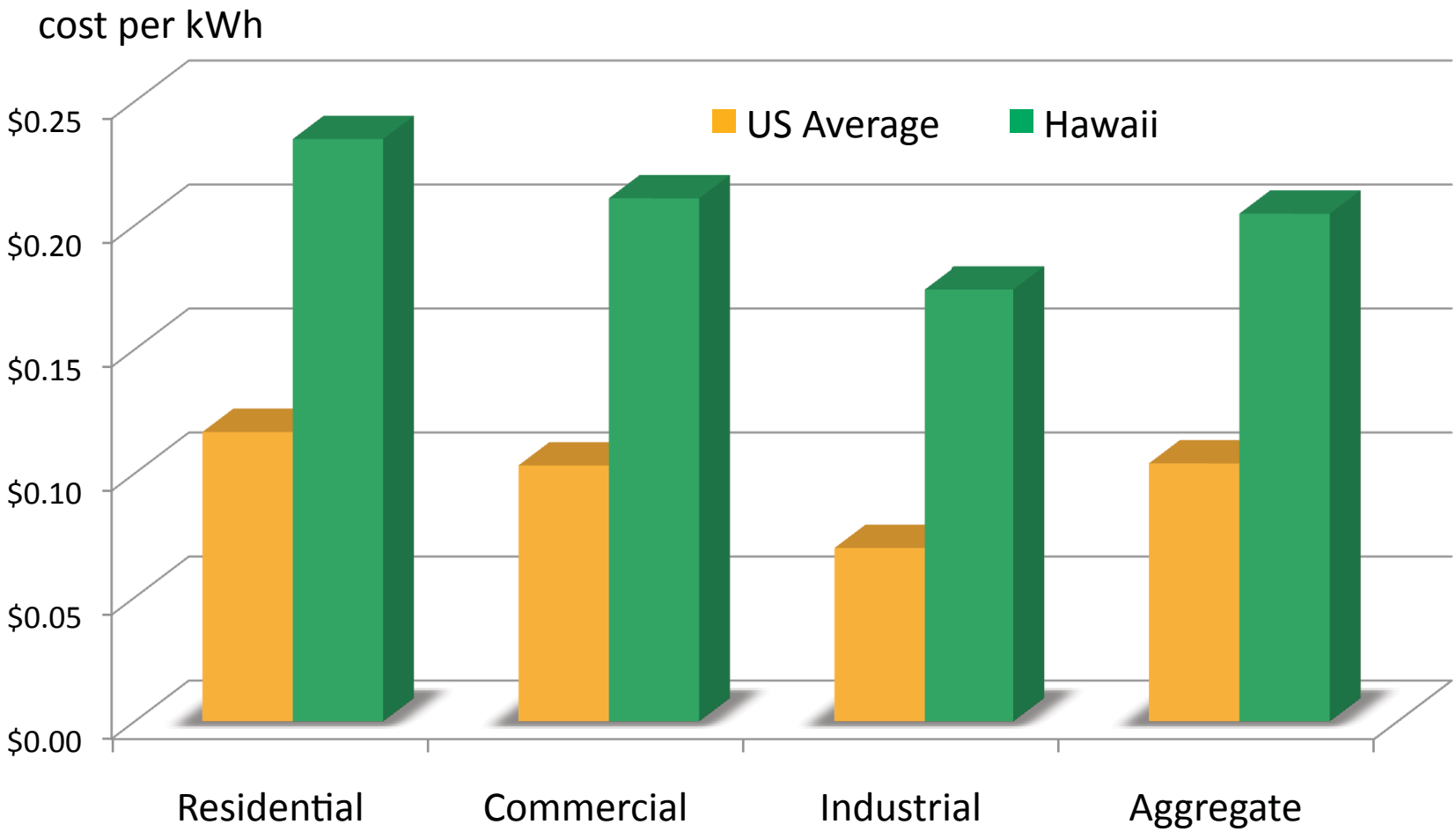
Solar Hot Water Penetration

Roughly 25 percent of single family homes



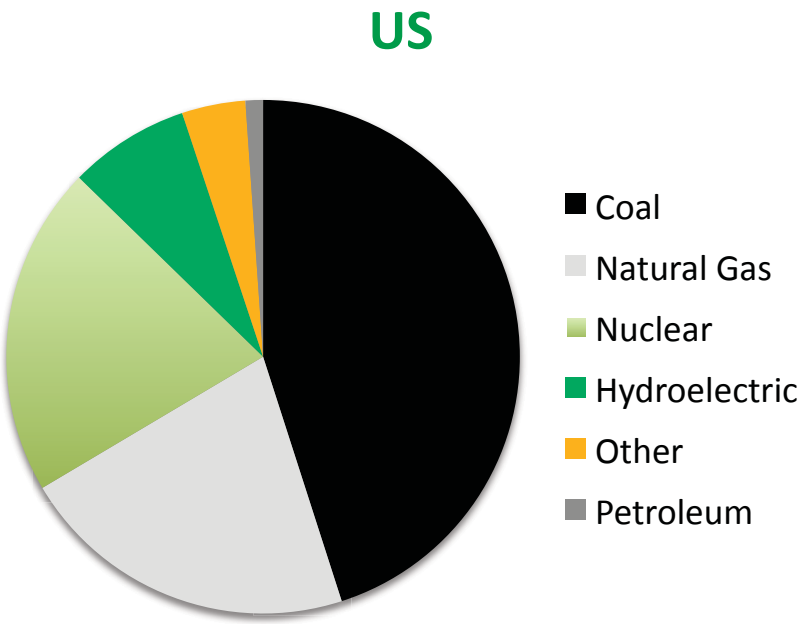
Note: Total is based on number of combined single-family attached and detached homes.
Source: US Census , American Community Survey, three year estimates for 2007; HECO Companies press release, June 4th, 2009.

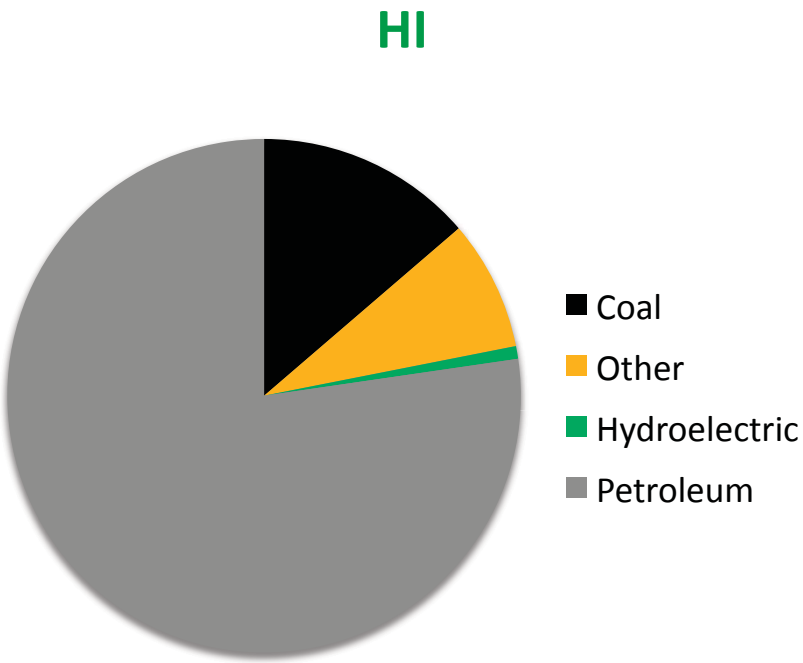
Grid Power is Expensive in Hawaii



Source: USDOE Energy Information Administration, Average Retail Price to End User, December 2009 release (data for Sept 2009).

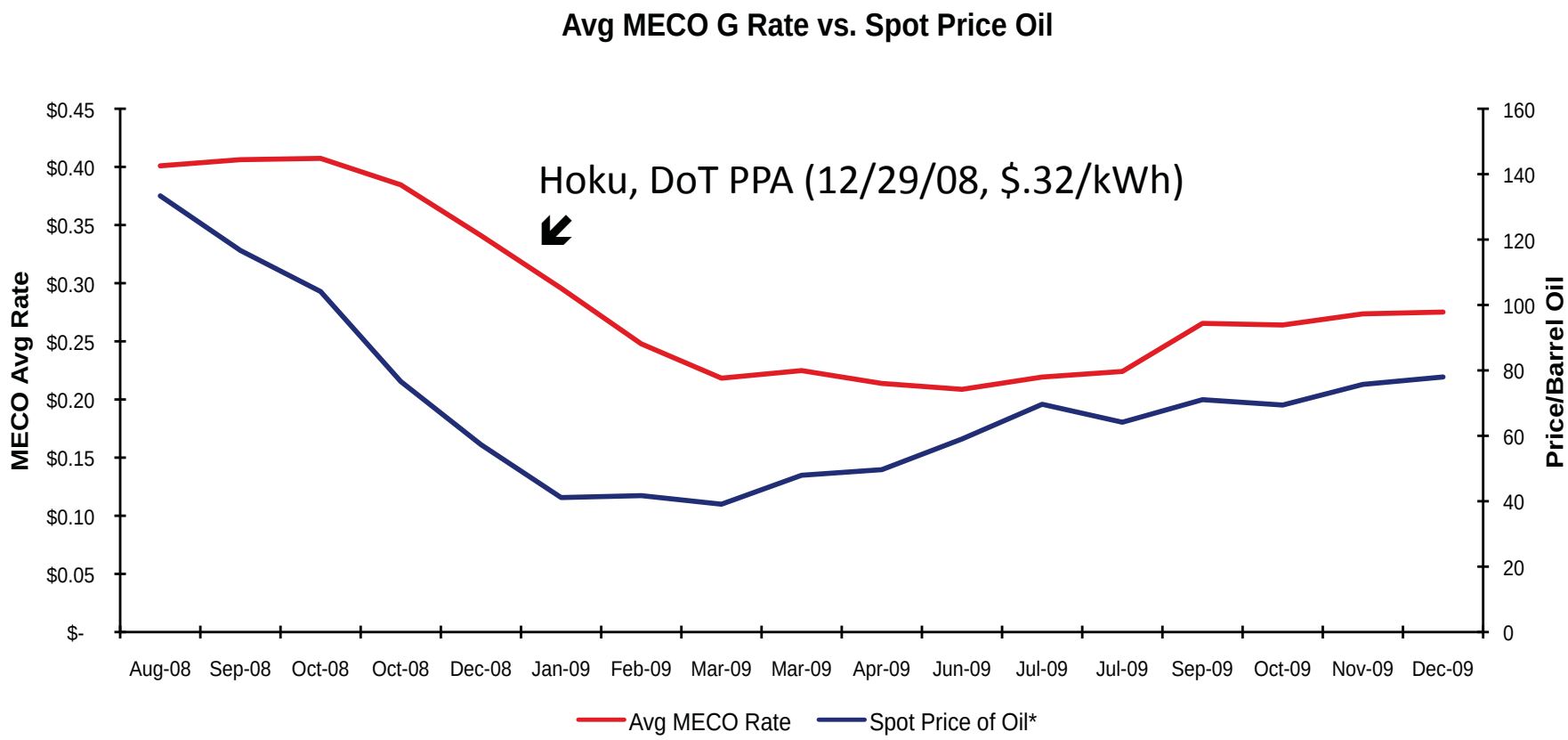
Energy Supply Vulnerability Cannot be Overstated





Source: USDOE Energy Information Administration, Electric Power Industry Generation by Primary Source (as of 2007).

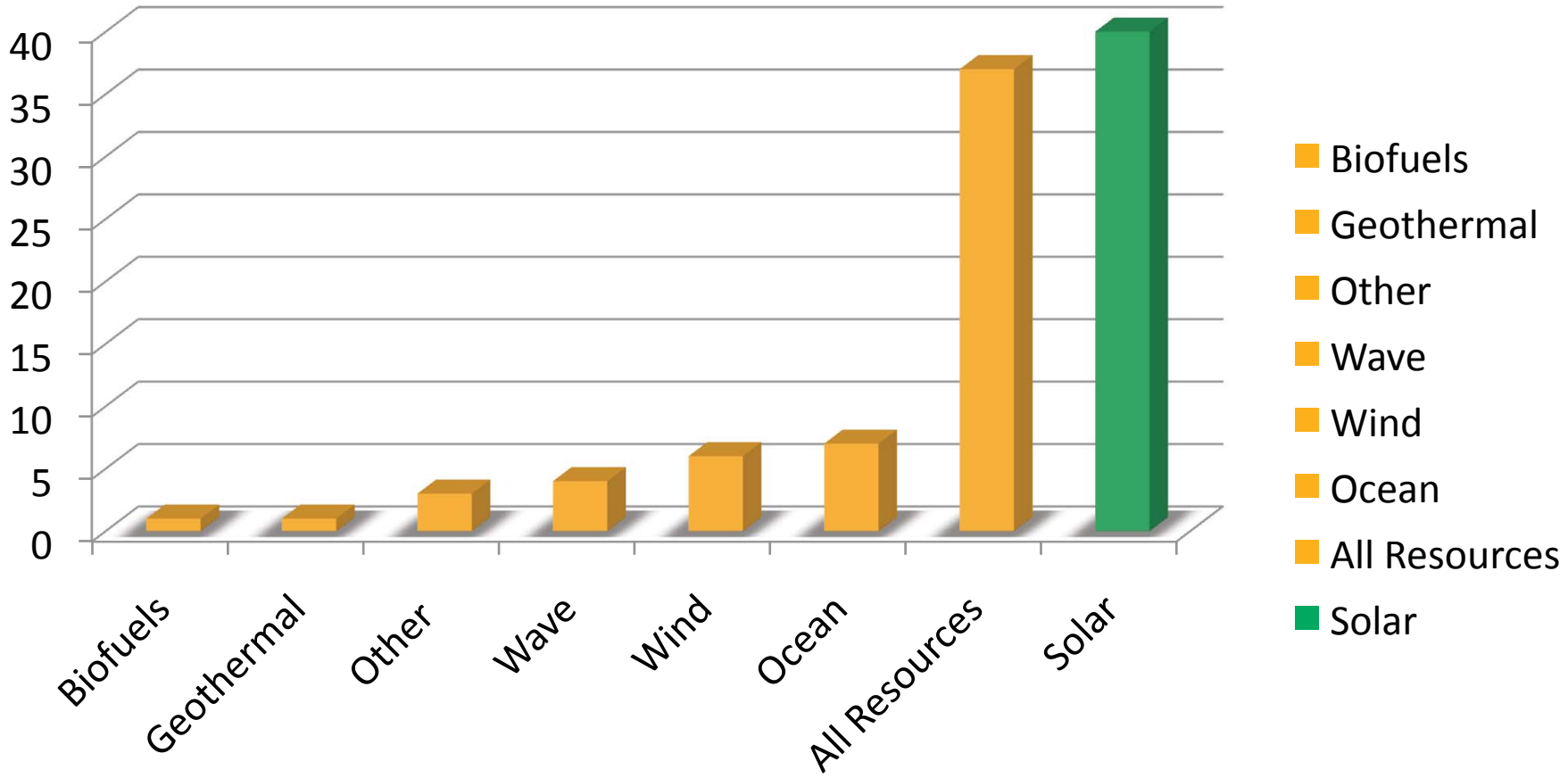
Rollercoaster Rates and Relationship to Oil



Source: Customer MECO bill, G-rate service, EIA: Cushing, OK spot prices oil

Hawai‘i Residents Prefer Solar

Which Source of Clean Energy Is Best for Hawai‘i?



Source: Blue Planet Foundation Survey of Hawai‘i residents, N=403, Nov-Dec 2008.

Section 2

Hawaiian God Maui Captures the Sun a top Haleakala.

NEM/GRID-INTERCONNECTED/FIT POWER PURCHASE (PPA)

© Distributed Energy Partners, LLC 2009

Regulatory Policy: NEM, Interconnection, and FIT

NEM

- 'Store' electrons in the grid for later use
- Accounting based on kWh credits, not dollars
- Applies only to systems < 100 kW (in rough terms $3,000/mo. power bill on Oahu)
- Capped at 1% (HECO) or 4% (MECO & HELCO) of peak demand
- Only credited up to annual kWh used

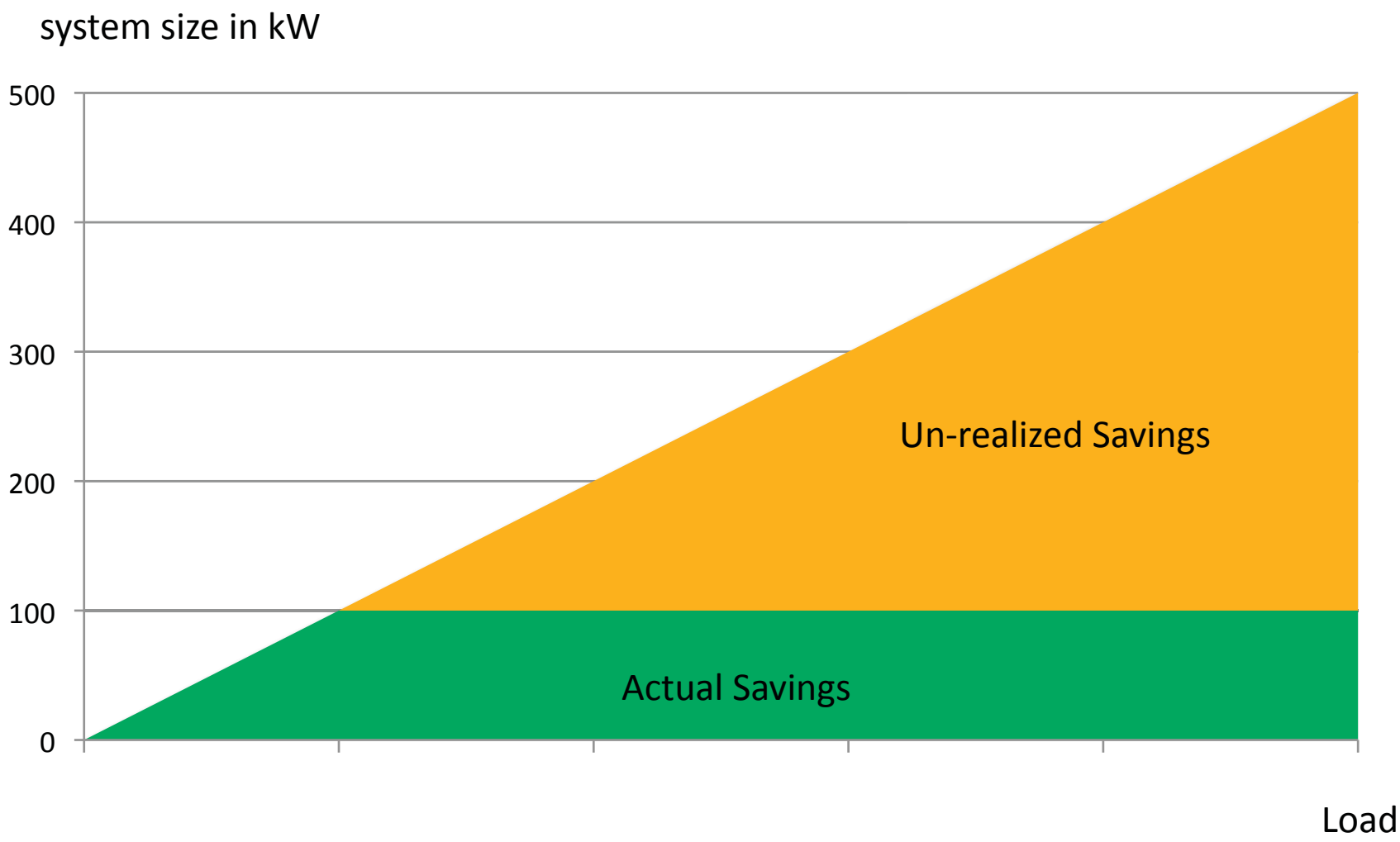
Interconnected

- All power produced by the system must be used on site as available.
- Systems can be up to one megawatt.

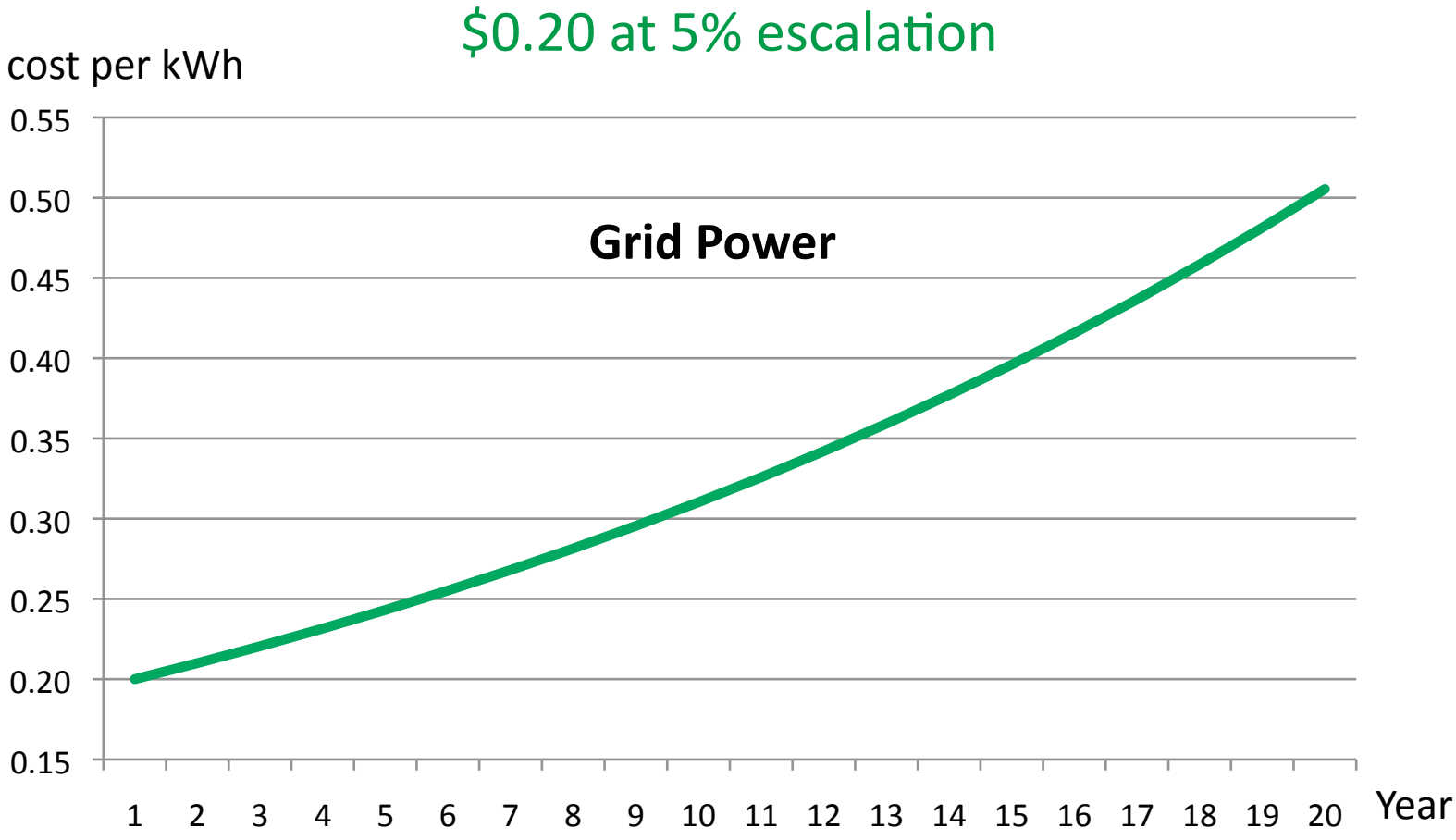
FIT

- Higher system size caps than NEM
- Accounting in dollars not kWh
- Applies to systems up to 5 MW
- Capped at 5% of peak demand (HECO: 60 MW, MECO/HELCO: 10 MW)
- Not linked to load at site

Net Metering 100 kW limit: Unrealized Savings



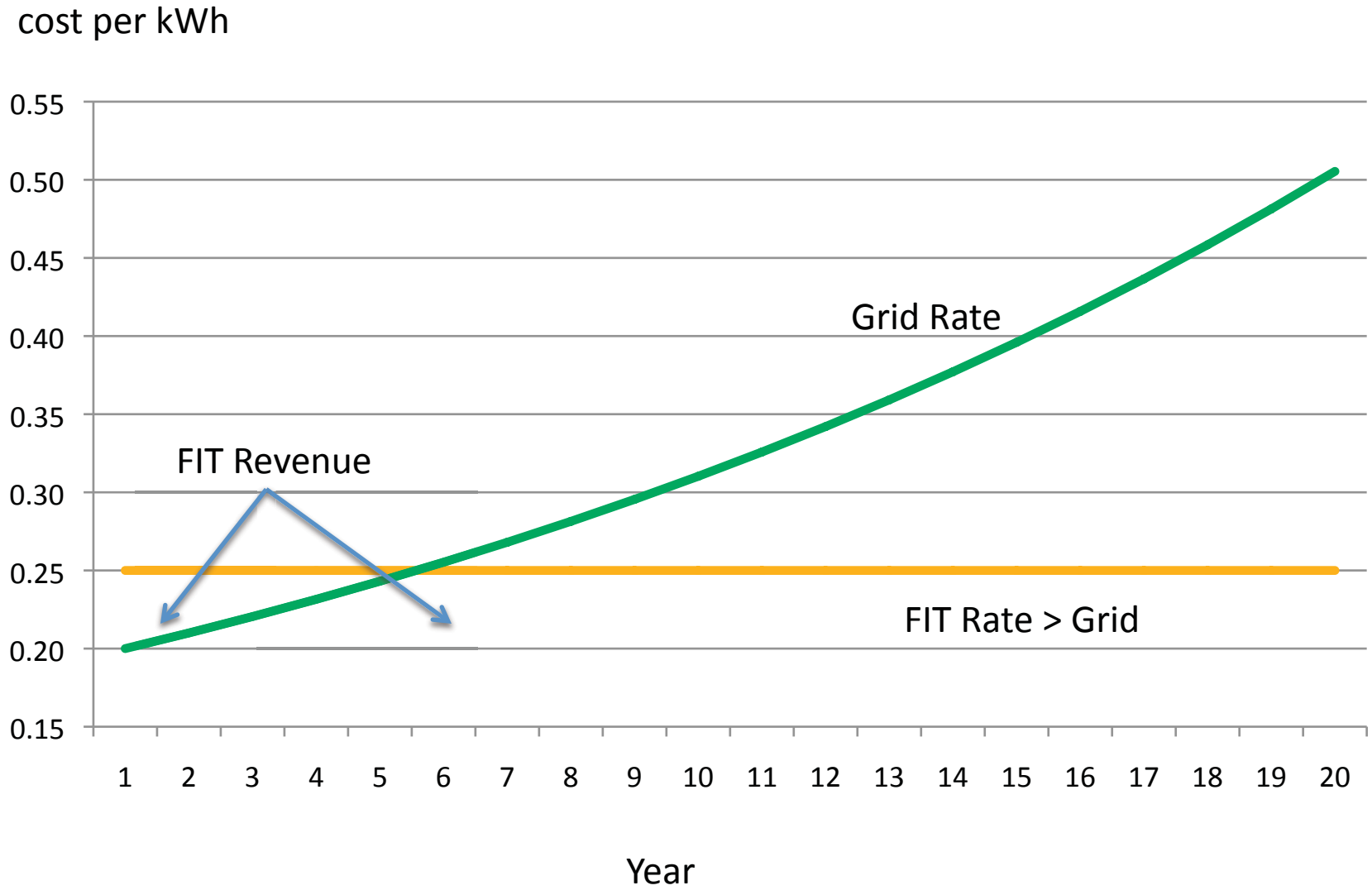
Hypothetical Grid Power Trajectory



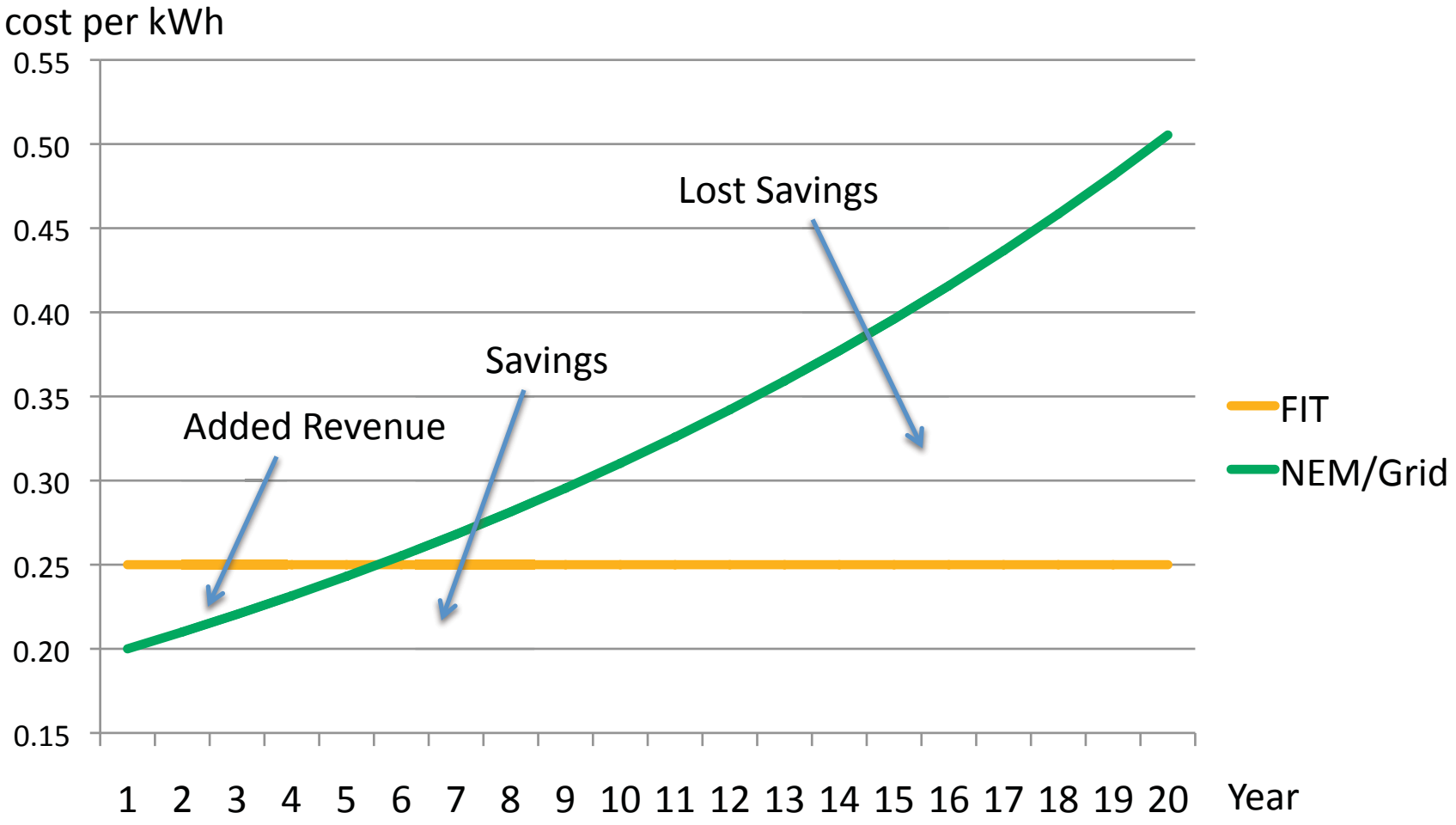
DBEDT Databook, 2007
According to the Hawai'i Department of Economic, Business, Development and Tourism (DBEDT), residential electricity rates in the State of Hawai'I have increased, on average, by 4.5% per year since 1960, 5% per year since 1990, and 5.6% per year since 2000.
Rates in Hawai'i also fluctuate radically based on unstable oil costs.

FIT at $0.25 per kWh

Grid at $0.20 at 5% escalation



Above $ Grid FIT vs. NEM for Customer-Generator with Load



Summary

- NEM/Interconnection & FIT serve different needs in the market

  - NEM/interconnection is for management of operating costs
  - FIT involves getting into the energy business
  - Risks and rewards are different

- Currently customers needing more than 100 kW can must either:

  - install 100 kW systems
  - size system above 100 kW but never export power
  - negotiate with utility for purchase of excess power

- Rules make it difficult to offset larger loads with PV
  (however water pumping is ideal for interconnection)

The Solar Power Purchase Agreement (PPA)

A Solar Power Purchase Agreement (PPA) is a financing structure where a 3rd party investor owns and operates a solar-electric/PV system and sells the electricity the system produces to the 'off-take' or 'site-host' at a pre-determined rate for a pre-determined length of time.

Following the contract term, the site-host has the option to purchase the system from the investor at fair market value, renew the agreement, or have the system removed.

The structure is particularly advantageous for government entities and non-profit organizations who cannot take advantage of Federal and/or State tax incentives for renewable energy projects.

Typical structures include either a fixed rate over the course of the agreement, or an initial discount to utility power rates (10%-20%), with an annual escalator (3%-5%). Agreement durations are not shorter than 6 years (required for investors to keep tax incentives), and typically between 15-20 years.

622kW Sewage Commission
Oroville Region, CA 2003

1.1 MW system Valley Center Water District
Valley Center California, 2008

107 kW Waste Water reclamation Facility,
Makena, 2009

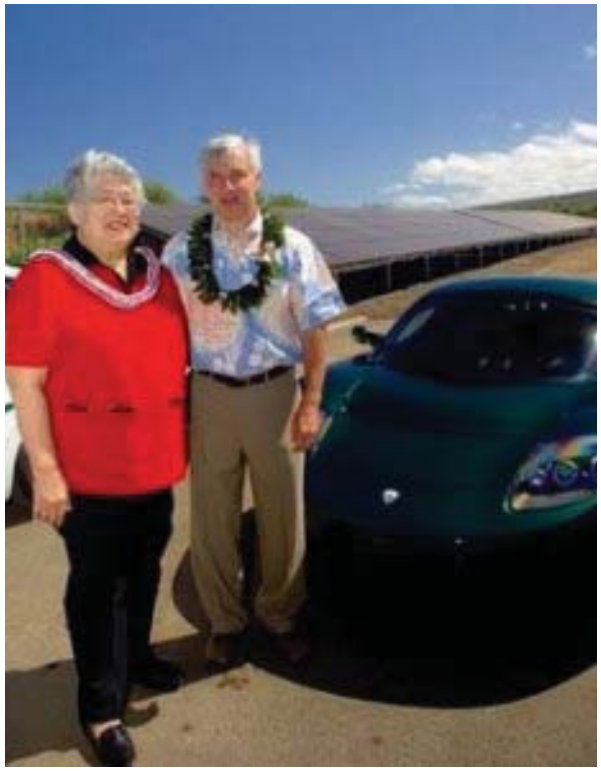
Section 4

WHY SOLAR IS RIGHT FOR WATER PUMPING

FINANCIAL SAVINGS

Why Solar is right for water pumping

•It often allows pumping to happen when solar resource is available and utilities experience high demand.
•PPA companies like to finance Municipal Utility projects.
•The large continuous daytime loads allow larger systems to be interconnected.
•There is usually available space for large ground mount arrays. Approx 430kW per acre.



107kW Makena Waste Water reclamation Facility, 2009
Capacity 750,000 gallons per day
204 kW expansion Planned
Net zero energy goal

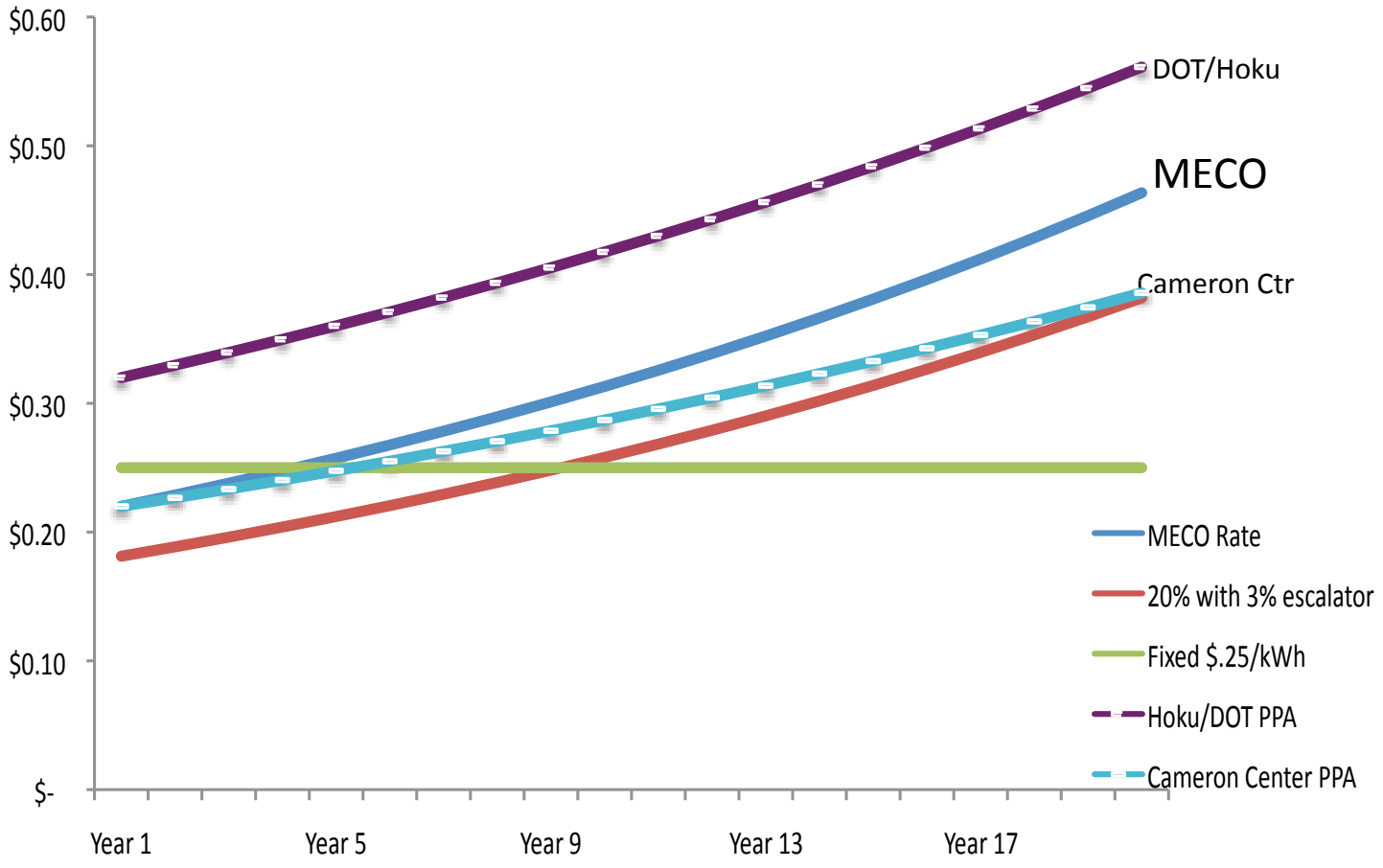
•The full 204 kW photovoltaic system will generate 300,000 kWH.

•save 175 barrels of oil per year.

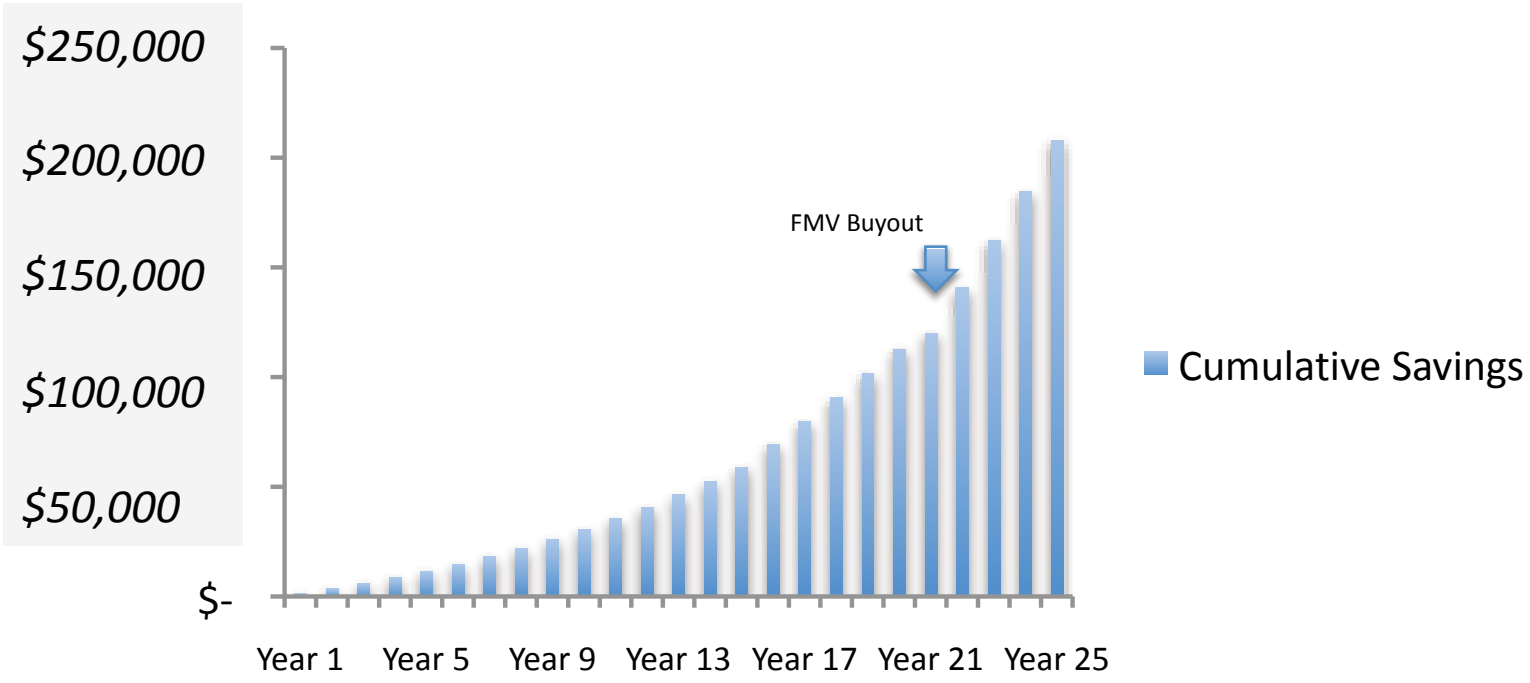
•offset 4,800 tons of carbon dioxide over 25 years.

•Equivalent to eliminating 300 cars from Maui's roadways.

PPA Savings Comparisons



250 kW Example



Maui Economic development Board (MEDB), 2008

Section 3

INTERCONNECTION

Rule 14H

Additional technical study may be needed based on:

1. Complexity of the portion of the grid system is being interconnected to
2. Connection to a network system
3. Plan to export power
4. Feeder penetration > 10%
5. Starting voltage drop
6. Generating facility capacity
7. Short circuit contribution ratio >5%
8. Type of interface transformer

Source: Rule 14, Appendix III, Sheet 34D-8 and 34D-9.

Challenges of Interconnection Study

- Cost to developer of existing studies has been $30,000-$100,000
- Time frame >6 months (typically shifts placed-in-service tax year)
- Outcome can be purchase of equipment to interconnect the system

Latest Grid Access Challenges

- Addition of grid-wide DG penetration cap, almost certainly below current 14H level of 10%
- Introduction of new circuit level DG cap at 33% of minimum load
- Attempt to abolish third-party financed PPAs
- Requirement for SCADA down to 500 kW (from 1 MW)
- Possible requirement for SCADA down to residential level

➔➔➔ New PUC Docket on DG

Future Issues/Trends

- MECO energy costs continue to rise due to:
  - MECO proposed 9.7% rate increase.
  - oil price trends.
  - cost recovery on infrastructure for HCEI and smart grid.
  - carbon pricing schemes.

- End of federal grant option in 2010?

- End bonus depreciation 2010?

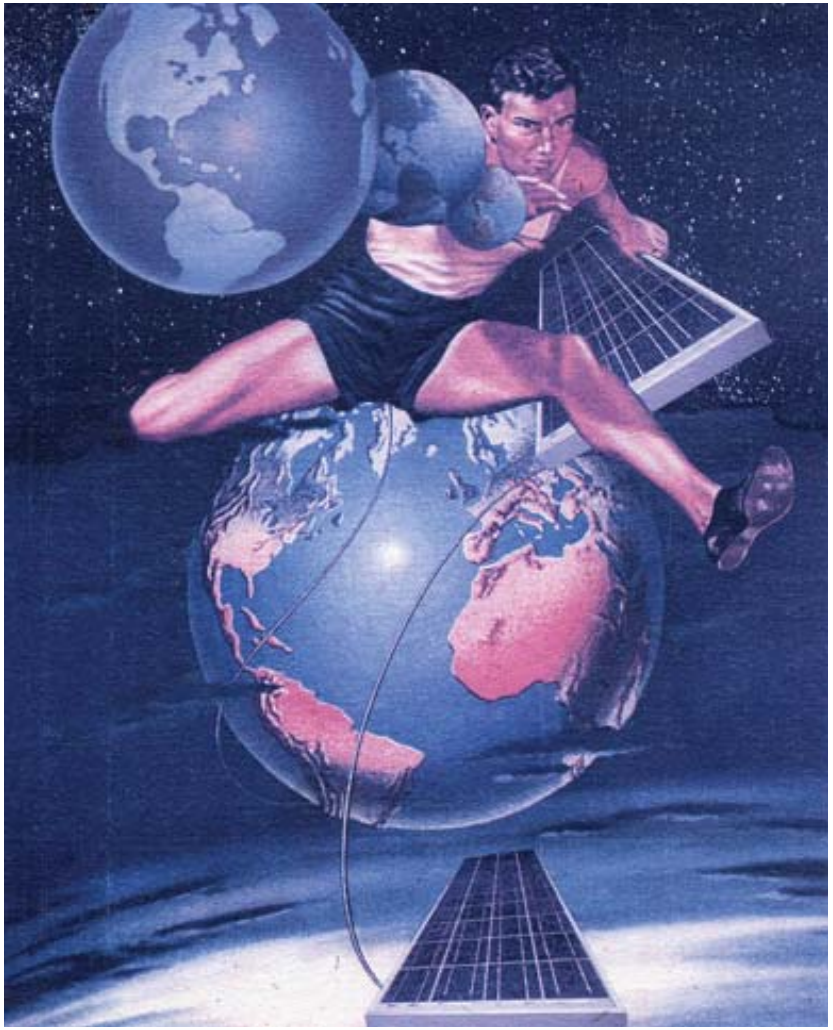
- Module pricing?

- Continued grid access?

You Have two Choices:

Do Nothing
Keep paying more and contributing to the problems of the world.

Go Solar
Save money and help save the planet.



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