

# Supporting Hawaii's Clean Energy Transformation

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### **World Bank Training Visit**

May 24, 2016



HAWAII STATE  
Energy Office

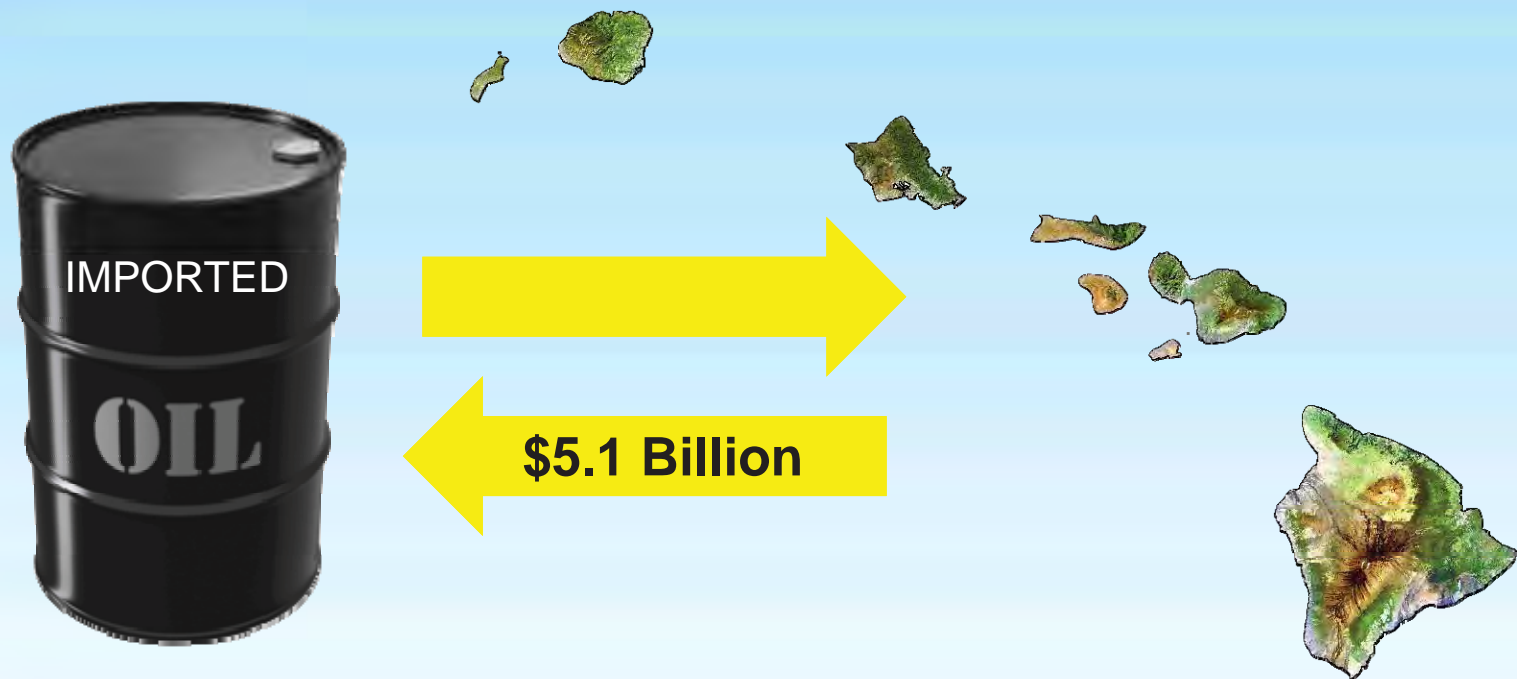
# Overview

- Hawaii's historic over-reliance on imported fossil fuels has stimulated a broad-based push for energy transformation.
- DBEDT and HSEO have a statutory role in developing energy policy and building a new clean energy economic sector.
- Energy transformation is embodied by policies and stakeholder alliance known as the Hawaii Clean Energy Initiative.
- HSEO is working with stakeholders to ensure smart planning achieves greatest value at lowest cost to utility ratepayers.
- Five Energy Policy Directives provide guidance and clarity for actions necessary to fulfill Hawaii's energy transformation.



# Breaking Our Addiction to Oil

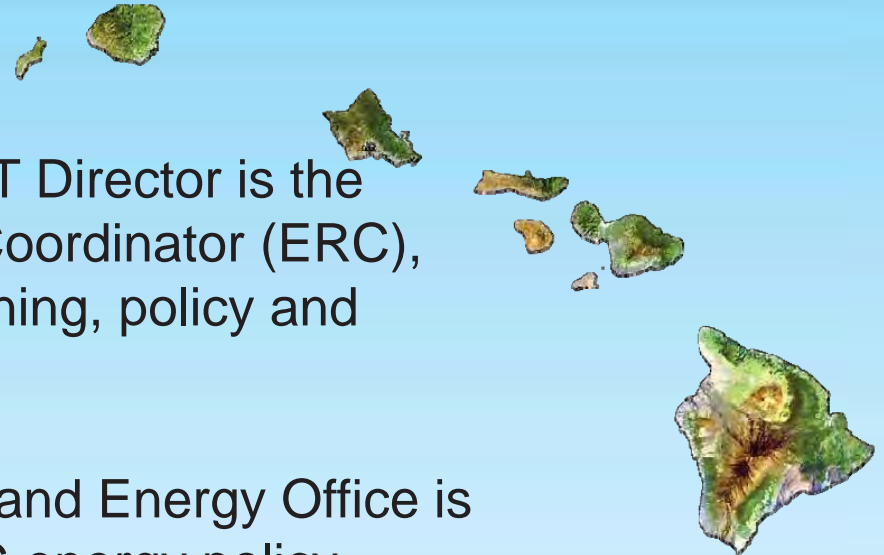
- Most oil dependent state in the U.S. – imported 93% of our energy in 2014
- Pays the highest electricity rates in the U.S.



# HSEO is Driving Clean Energy

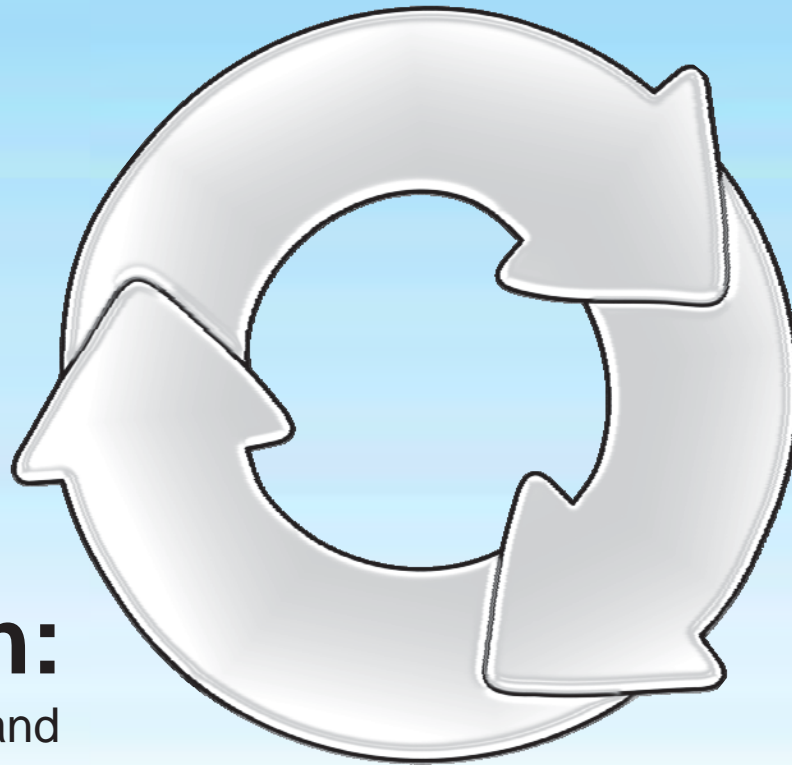
The Energy Resources Coordinator sets Hawaii's energy policy

- Under HRS 196, the DBEDT Director is the state's Energy Resources Coordinator (ERC), responsible for energy planning, policy and programs.
- State Energy Administrator and Energy Office is delegated with fulfilling ERC energy policy directives.
- In 2011, the ERC repositioned clean energy as economic driver – departing from original principal focus on environmental and energy security.



# Strategies & Tactics

**Focus:** On high-impact clean energy solutions that maximize economic development, especially in the innovation sector



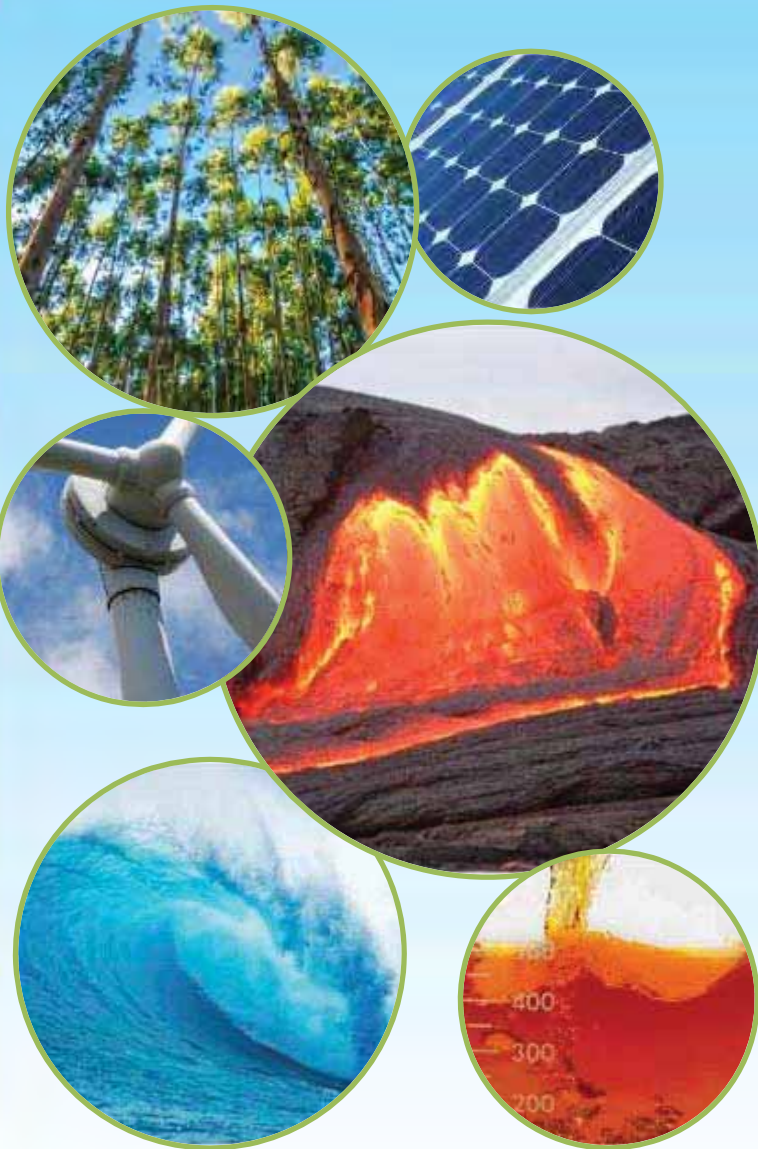
**Reach:**  
Objectives and maintain strong communication and outreach to key stakeholders

**Leverage:**  
Resources through federal, county and private sector partnerships using HCEI as a key driver





# Guiding Policy Directives



- Diversifying our energy portfolio.
- Connecting the islands through integrated, modernized grids.
- Balancing technical, economic, environmental and cultural considerations.
- Leveraging our position as a test bed to launch an energy innovation cluster.
- Creating an efficient marketplace that benefits producers & consumers.



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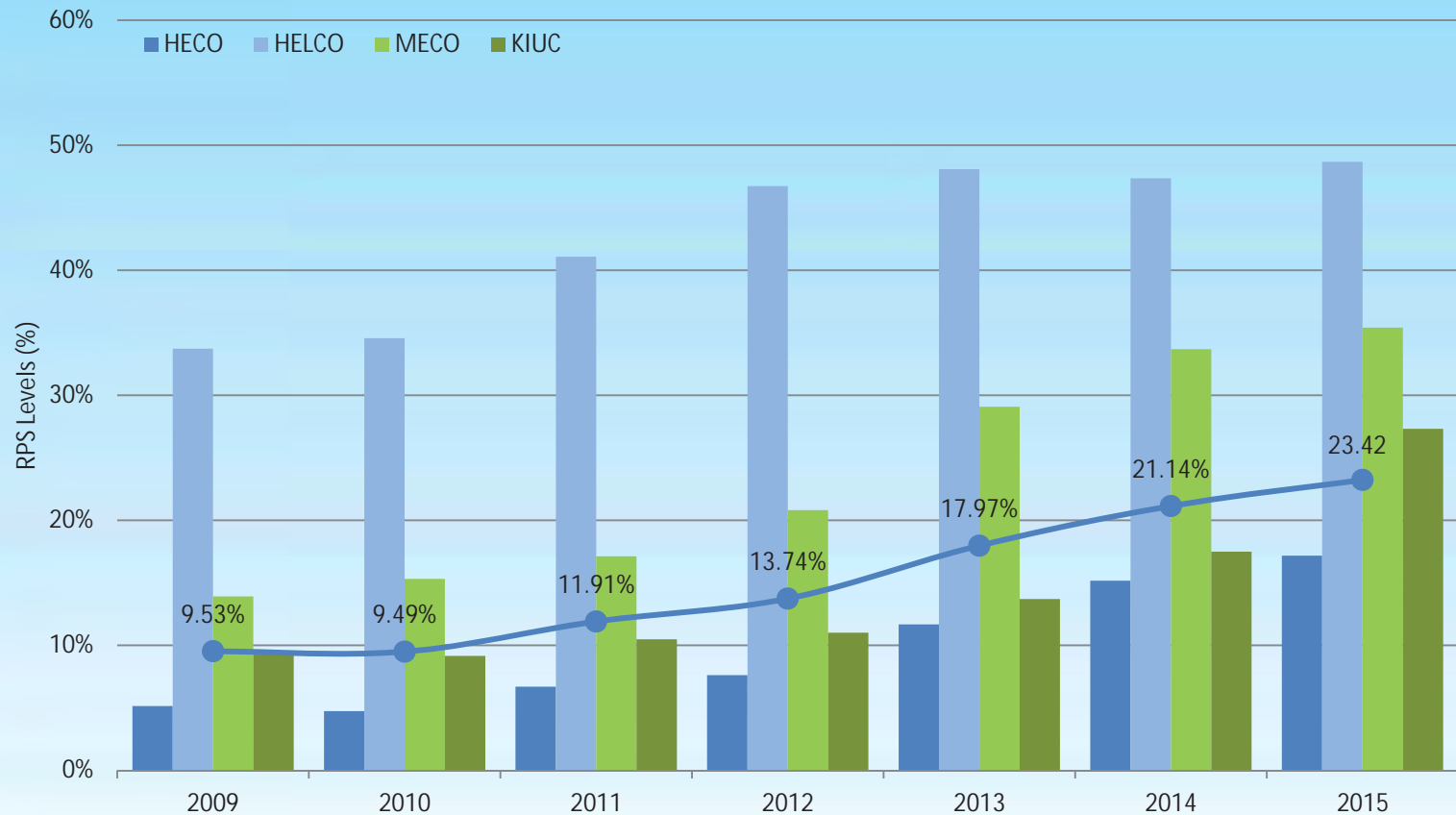
# Hawaii Clean Energy Initiative (HCEI)

- 100% Renewable (electricity sector) by 2045
- Reduce 4,300 Gwh by 2030 - EEPS
- New Energy in Transportation Road Map



# RPS: Ahead of Interim Target

Hawaii Renewable Portfolio Standard (RPS) Levels 2009-2015

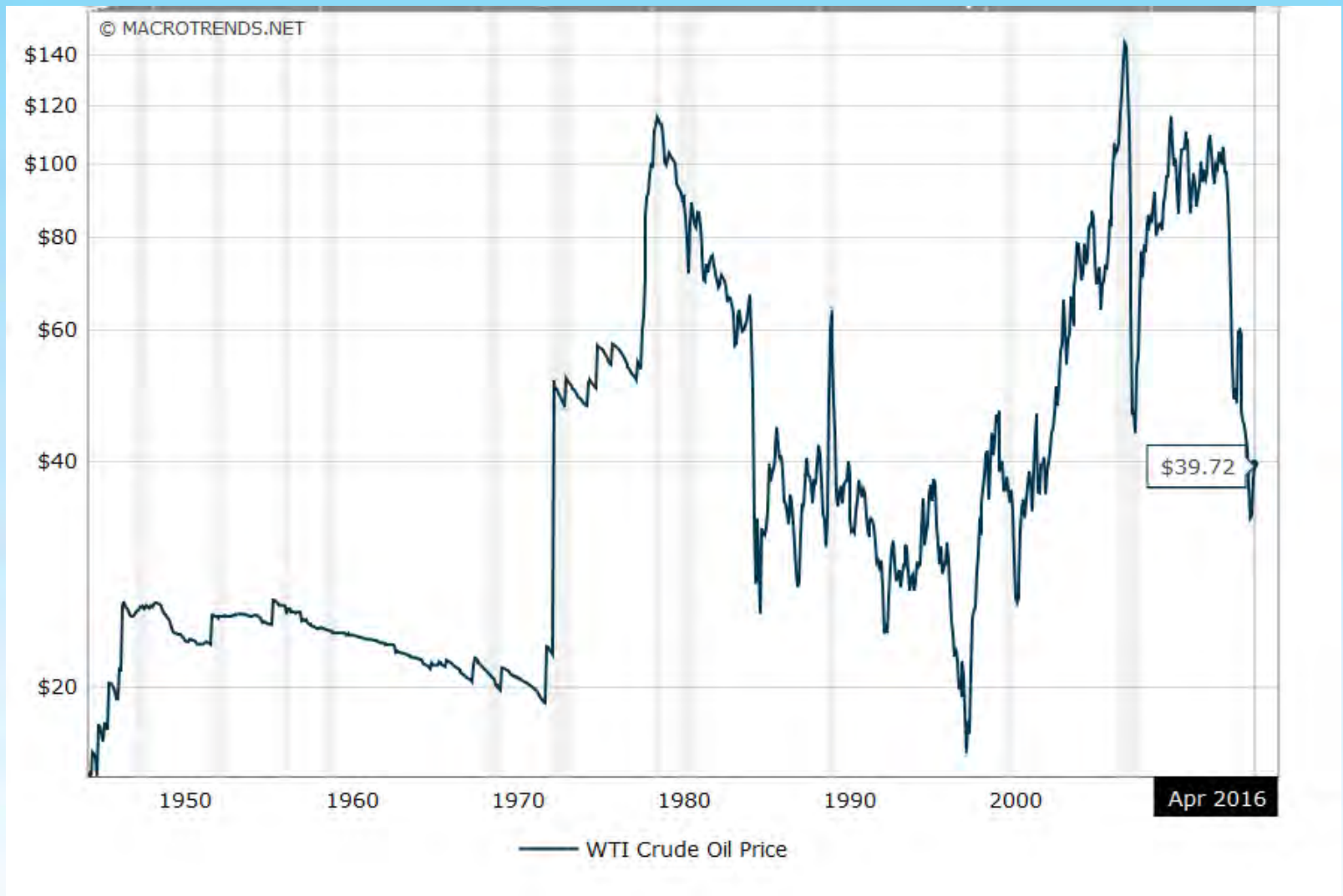


Source: *Renewable Portfolio Standards Status Reports, 2009-2015* (Hawaii Public Utilities Commission).





# Crude Oil Volatility



# Holistic Approach to Planning

## Comprehensive Energy Eco-System Roadmap:

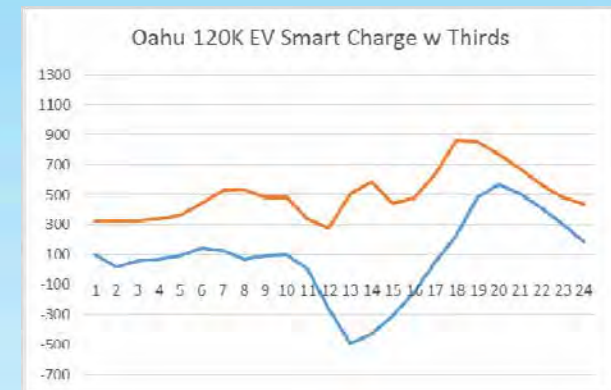
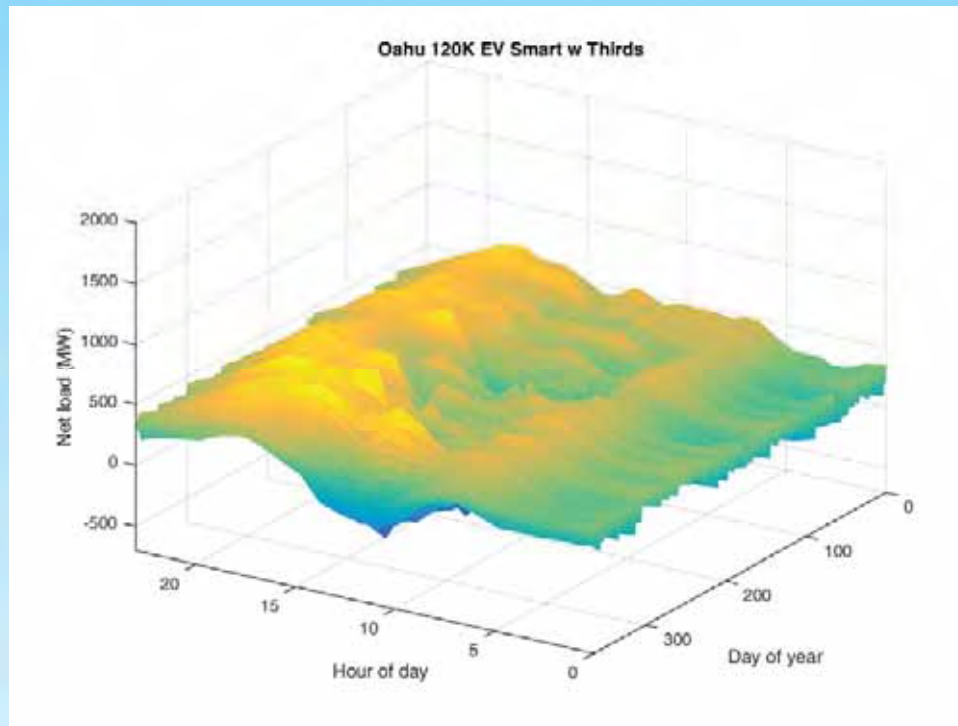
*Our goal is to put the whole energy eco-system into perspective*

- In order to prioritize high impact, cost effective activities to achieve energy independence, ESP assesses and reports the impact of existing and potential energy policies and projects on Hawaii's energy eco-system.
- We then look to enable high value activities through demonstrations and programs, legislation and regulatory proceedings.



# Energy Transfer Between Sectors

## Electric and Ground Transportation



	Peak Load (MW)	System Storage Requirements	
Base Case	~1,200	~500 MW (min. load)	~0 MWh
70% RPS	~900	~ -550 MW	~ +1,500 MWh
70% w/ Evening Charge	~+15%	~+12%	~+14%
70% w/ Smart Charge	~0%	~ -12%	~ -20%

RPS Modeled with 1/3 wind, 1/3 solar and 1/3 baseload renewables (e.g. biomass, geothermal, OTEC)  
Assumes 120k EVs on Oahu (roughly 15% of passenger vehicles)



# HSEO Collaborating with UH on Visualization Platform



- Visualization is key to understanding complex energy systems
- CyberCANOE provides for visual analysis of large amounts of data
- Innovative approach will help with utility planning optimization



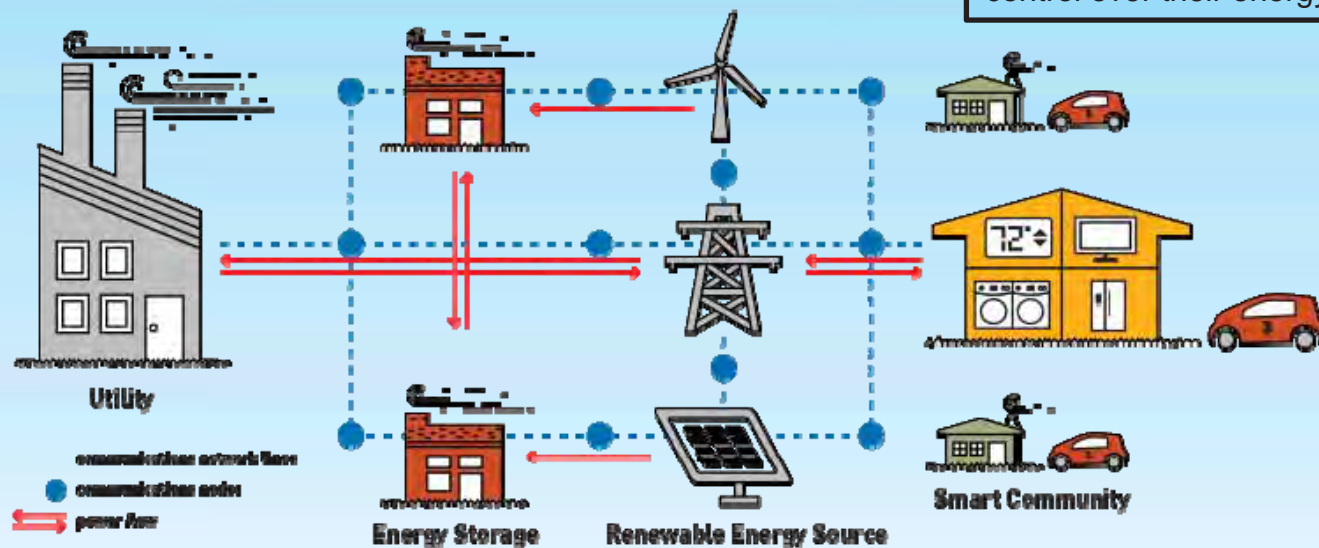
# Modernizing The Grid

## Instantaneous Response and Integration:

The electric grid joins the digital age with fast, reliable and secure communications.

## Customer Engagement:

An integrated grid with smart meters gives customers better control over their energy use.



## More Renewable Capacity:

Better optimization will renewable resources allow Hawaii's to be utilized to their fullest extent.



# Performance Contracting

Energy Services Coalition Ranking						
State	Population	Performance Contracting	Dollars per Capita	Job Years Created	Source Energy Saved	Tons Carbon Avoided
1. Hawaii	1,360,301	\$435,512,722.22	\$320.16	4,374	3,613,884	62,076
2. Kentucky	4,339,367	\$750,000,000.00	\$172.84	8,152	6,223,500	106,901
3. Delaware	897,934	\$138,707,463.00	\$154.47	1,508	1,150,994	19,771
4. Ohio	11,536,504	\$1,252,683,627.00	\$108.58	13,616	10,394,769	178,551
5. Kansas	2,853,118	\$278,951,861.00	\$97.77	3,032	2,314,742	39,760

- EPC projects pay for themselves through energy savings
- For more than 20 years HSEO has led the state's EPC efforts
- HSEO offers technical advice and other assistance





# Growing a Clean Energy Innovation Sector

Hawaii – Clean Energy Test Bed for the Asia-Pacific Region



Edisun



Geli



stem

AMBRI



terviva



AMBER\_KINETICS



kWh analytics



oreeco



Ballast energy

PYRO-E



# Mahalo

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