



# Hawaii Refinery Task Force Meeting #3

## Interim Report on Refinery Closure

November 12, 2013

## Outline of Presentation

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- 1. Sources of Information**
- 2. Transition Operation and Hawaii Independent Energy Startup**
- 3. Challenges Facing the Refineries**
- 4. Options to Promote Hawaii Energy Security**
- 5. Summary Findings**
- 6. Next Steps to Prepare Final Report**

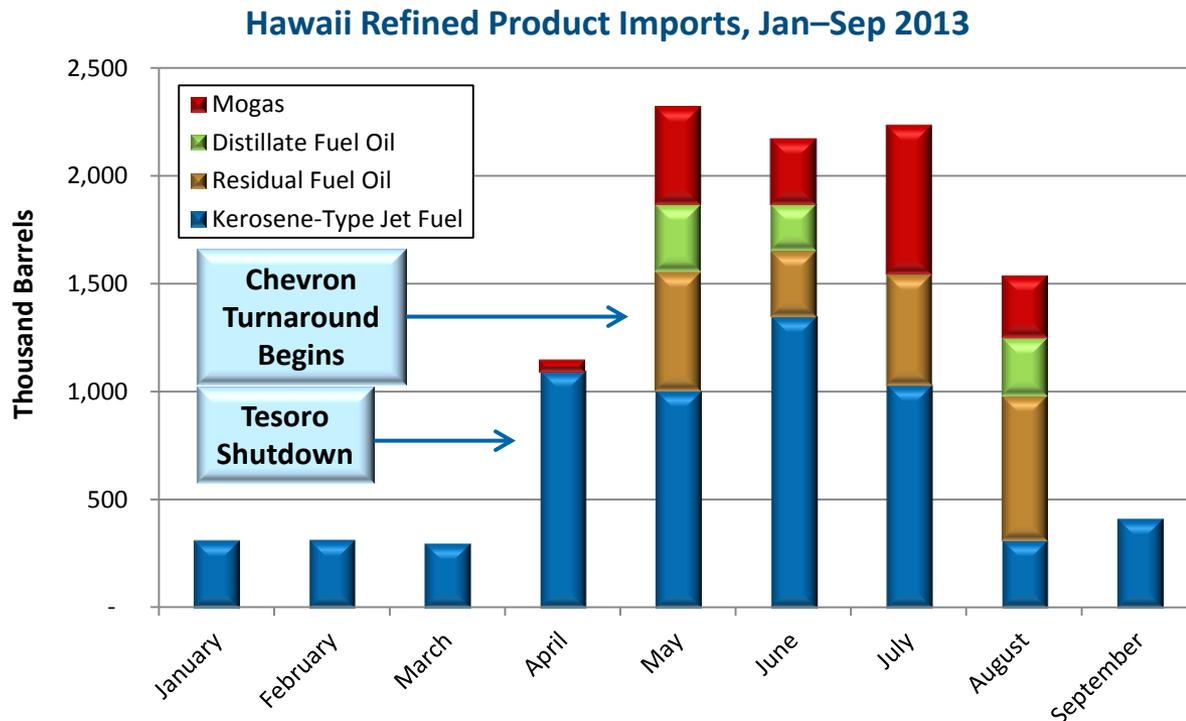
## Sources of Information for Phase 2 Report

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- Task Force and other stakeholder input
- EIA-923 data on utility power generation fuels and costs
- Import data from the Federal Government and ICF's subcontractor, Poten & Partners
- Consumption data from the Federal Government and Hawaii Records
- Poten & Partners freight analysis
- Pricing data from Bloomberg and gasbuddy.com
- EIIRP data on inventory, imports/exports, production
- Hawaiian Electricity Companies 2013 Integrated Resource Planning Report
- Hawaii Renewable Portfolio Standard Status Reports
- Hawaii Public Utilities Commission Document Management System (DMS)
- Hawaii State Energy Office Renewable Energy Projects Directory

# Transition Operation and HIE Startup (1 of 2)

- During transition period, Hawaii dealt with outages by refiners importing more product. Transition went well and no major problems occurred.
- During this period, crude imports declined and product imports increased.

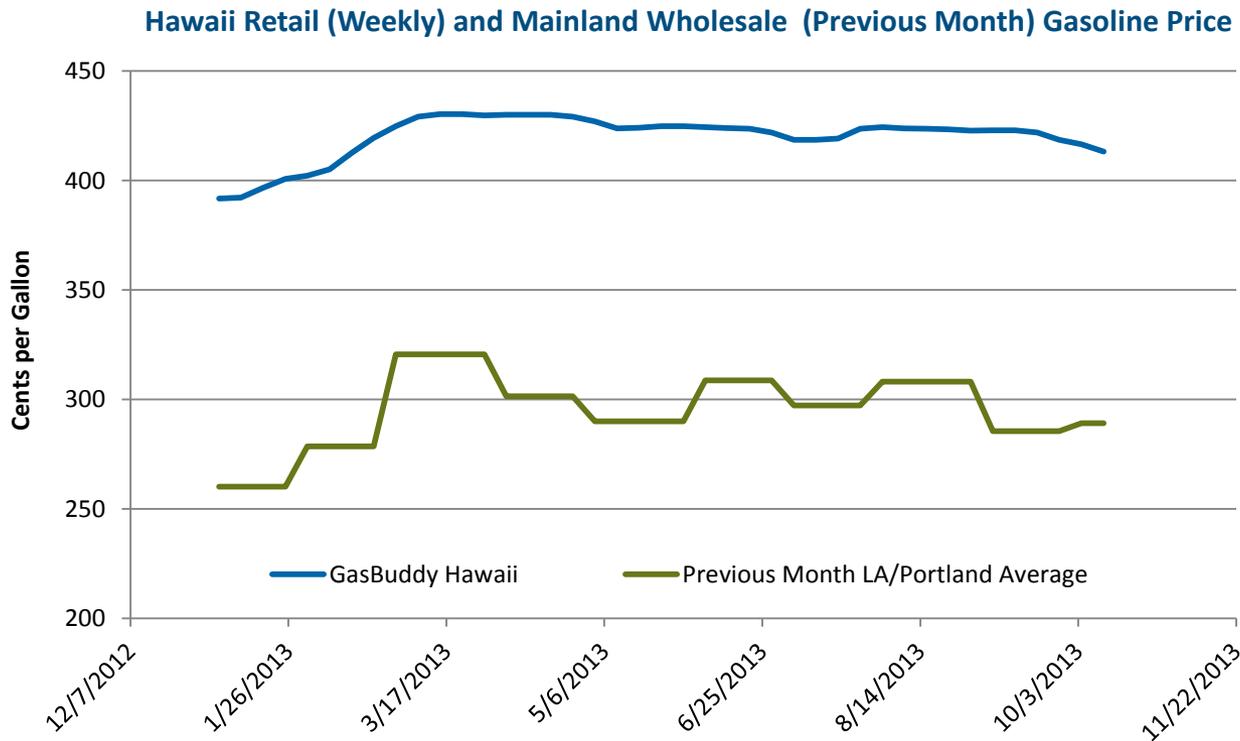


Sources: EIA Form-814 (Jan-July).  
Poten & Partners (Aug-Sep).

- Refinery restarted on September 25<sup>th</sup>; now working on contractual revisions.

# Transition Operation and HIE Startup (2 of 2)

- Use of refinery SPM and storage worked well; Barge Harbor OK; Sound planning; Some issues with propane supply and jet scheduling in Honolulu
- No evidence of price anomalies
- Limited time period may not be indicative of long term issues which may arise



Sources: GasBuddy Honolulu, HI Regular Gasoline pricing; Bloomberg Los Angeles (LA) 85.5 octane CARBOB Prompt Gasoline pricing (ticker symbol: MOGLCB85 Index); Bloomberg Portland Sub-octane Gasoline Pricing (ticker symbol: MOGHS87P Index).

# Challenges Facing Refineries: Overview

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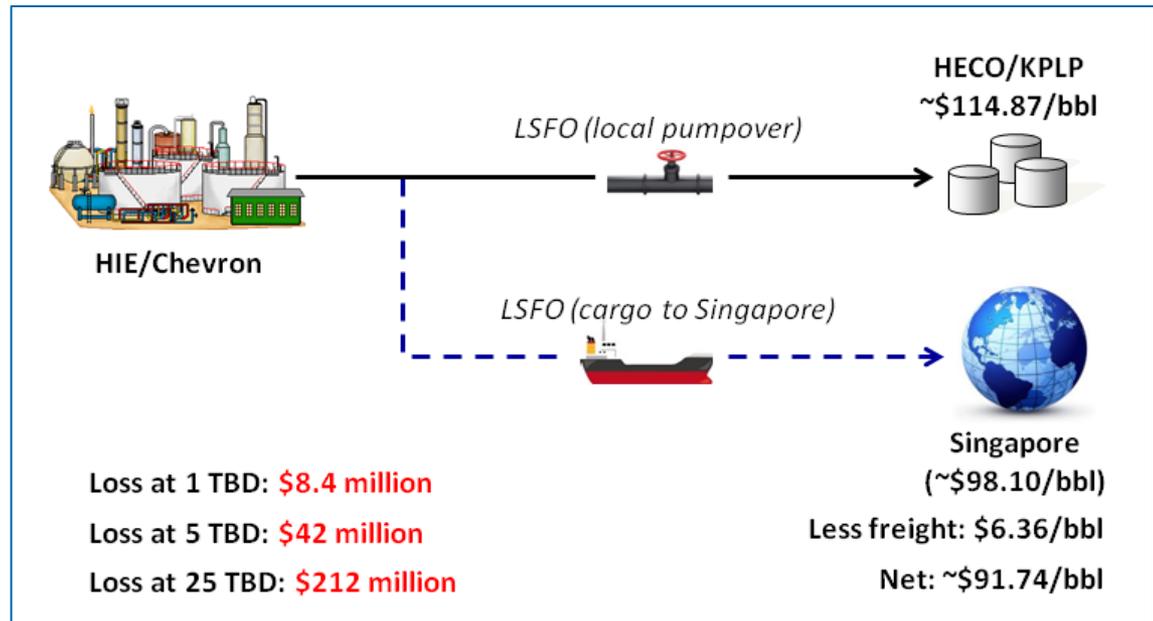
- **Regulatory requirements will likely reduce refinery profit margins substantially; leading to the likely closure of one or both refineries by 2020.**
  
- **The main challenges facing refineries that we examined are:**
  - **Federal and State Regulatory Requirements**
    - Federal Mercury and Air Toxics Standard (MATS)
    - Federal EPA Tier 3 Gasoline Standard
    - State GHG Reduction Initiatives
  - **Reductions in demand for fossil fuels, resulting from:**
    - HCEI initiatives related to power generation
    - Transportation Sector: CAFE standards; EV penetration; biofuels
    - Development of LNG

# Challenges: Mercury and Air Toxics Standard (MATS)

- MATS could require shift from LSFO to diesel by 2016/2017
- Refiners will need to procure the diesel fuel and ship to Hawaii
- Will likely require refiners to export LSFO into markets such as Singapore, resulting in substantial margin loss.

## Net Effects:

- ~ 25k b/d of LSFO to Singapore
- Purchase 27-28 TBD LSD
- Net Losses to Refiners: \$212M
- Net Cost to Consumers: \$160M



# Challenges: Tier 3 Standard & GHG Reduction Initiative

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## ■ Federal Tier 3 Gasoline Standard

- **HIE** may have minimal cost to meet the Tier 3 regulation, due to the significant removal of sulfur from refinery streams via hydroprocessing.
- **Chevron** may have more difficulty meeting the requirement, due to use of fluid catalytic cracking (FCC) process. Mitigation could be costly.

## ■ State GHG Reduction Initiative

- **Reduced Target:** DOH lowered GHG emissions reduction requirement from 25% to 16% by 2020 (from 2010 baseline)
- **Impacts:** Will need to reduce refinery throughputs by ~ 25% to lower the combustion heat needed to distill and refine fossil fuels.
  - Lower throughput reduces income and profits
  - Actions taken from 1990 to 2010 to improve efficiency and reduce emissions not recognized

## Challenges: Reduced Demand

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- **Power Sector:** The combination of energy efficiency, distributed generation, and a pipeline of likely utility-scale renewable projects will reduce demand for fossil fuels in power gen by ~14,900 b/d by 2020 (44% of 2012 consumption).
  - The proposed Hawaii Bioenergy and Aina Koa Pono projects are estimated to contribute an additional reduction of 2,200 b/d in the power sector by 2020.
- **Transportation Sector:** CAFE standards, increased EV penetration, and Hawaii biomass initiatives will have far smaller impact on transportation fuels. By 2020, demand will be reduced by 3,600 b/d (~4% of consumption).
- **LNG Impacts:** We estimate that LNG will have minimal impacts by 2015, with about 300 b/d of reductions by 2020.
- **Financial Impacts:** For every 1,000 b/d reduction in demand for LSFO, refinery annual profit levels will be reduced by roughly \$8.4 million based on 2010-2012 market prices.
  - Reductions in gasoline, diesel and naphtha demand may require similar order of magnitude losses, or reductions in crude processing.

# Options to Promote Hawaii Energy Security: Overview

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## ■ Objectives of Analysis:

- Evaluate options to assure supply
- Estimate potential to reduce FF demand by 2020, where possible
  - Base case is 2012 petroleum supply and consumption

## ■ The Main Options Assessed during Phase 2 were:

- Develop fuel importing infrastructure plan that accommodates for the potential shutdown of refineries
- Explore strategies to mitigate impacts of specific regulatory issues
  - Tier 3, MATS, GHG
- Reduce fossil fuel demand in power sector via HCEI activities
- Reduce fossil fuel demand in transportation sector (CAFE, EV, biofuels)
- Explore potential for LNG to displace a portion of refinery supply

# Develop Robust Petroleum Import Infrastructure

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- **Need:** Hawaii will remain heavily dependent on petroleum fuels for transportation through 2020, so accessibility to and improvements in the infrastructure for petroleum imports is critical to sustain supply.
- **Critical Infrastructure:** The infrastructure within and around the two refineries —storage tanks, offshore Single Point Moorings (SPMs), pipelines, etc.— must continue to be accessible to petroleum industry stakeholders to efficiently import and distribute products.
- **Planning:** Future planning for the Barge Harbor expansion, HECO supply, Hawaii Gas supply, etc. must include assessments of the impacts of refinery closures.
- **Actions:**
  - Evaluate HECO’s \$30 million pipeline project to receive fuel from the Barge Harbor and other such projects to expand fuel distribution flexibility.
  - Incorporate refinery closure scenarios in Barge Harbor studies
  - Resolve issues related to Hawaii gasoline specifications and jet fuel access to Pier 51.

# Mitigate Impacts of Specific Regulatory Issues

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## ■ **Federal Tier 3 Gasoline Standard:**

- Refiners must address with EPA; limited options

## ■ **State GHG Reduction Initiative:**

- Reduction to 16% helpful, but still creates challenges for refiners
- Refiners may consider working with the utilities to pool their reductions
- Or opt to pay the proposed fine of 12 cents per ton CO<sub>2</sub>e (~\$130,000)

## ■ **EPA Mercury and Air Toxics Standard (MATS):**

- HECO, with the assistance of DBEDT, has petitioned EPA to modify its ruling for non-continental boilers, but the outcome of this process is uncertain.
- Other alternatives must be pursued, including:
  - Import LSD and exporting some LSFO, while blending a combined product
  - Install particulate matter scrubbers on the boilers with the most significant problems
  - Consider biomass blending, if product is available in the required timeframe and quantity

# Reduce Fossil Fuel Demand in Power Sector via HCEI

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- **Energy Efficiency (EE):** The State is on target to meet its EE goals.
  - Between 2009-2012, EE initiatives have reduced energy demand by ~ 800 GWh.
  - It is anticipated that the State will achieve an additional reduction of 575 GWh by 2015, and a further 975 GWh by 2020, bringing total energy savings to 2,350 GWh.
- **Distributed Generation (DG):** Expanding very rapidly (esp. rooftop solar).
  - For this study, we adopted conservative estimates that show DG reaching around 245,000 MWh/year by 2015 and 619,000 MWh/year by 2020.
- **Utility-Scale Renewable Energy (RE) Generation:** ICF consulted with SEO and other stakeholders to estimate the amount of new renewable generation projects that are realistically likely to come online by 2020.
  - Did not include 3 of the 4 RFP projects, or Lanai Wind, as they are still uncertain.
  - By 2015, 15 new projects are likely to come online, totaling 404,811 MWh/year.
  - By 2020, another 5 projects are likely, providing an additional 701,819 MWh/year of renewable power generation.

# Impact of HCEI Initiatives on Power Sector

- **Impact in MWH/year:** The impacts of HCEI initiatives on the power sector are:

| Source                    | Added 2013-2015<br>(MWh/year) | Added 2013-2020<br>(MWh/year) |
|---------------------------|-------------------------------|-------------------------------|
| Energy Efficiency Savings | 575,000                       | 1,550,000                     |
| Distributed Generation    | 244,948                       | 618,598                       |
| Utility-Scale Renewables  | 404,811                       | 1,106,631                     |
| <b>Total</b>              | <b>1,224,760</b>              | <b>3,275,229</b>              |

- **Impact on Fossil Fuel Demand:** These developments are estimated to displace:
  - 5,600 b/d of petroleum product consumption by 2015
  - 14,900 b/d of petroleum product consumption by 2020
- **Additional Impacts:** Hawaii Bioenergy and Aina Koa Pono biomass projects will displace an additional 2,200 b/d prior to 2020 (plus produce 800 b/d bio-jet)
- **Total Impact about 17,100 b/d** (over 50% of 2012 fossil fuel usage in power gen)

# Reduce Fossil Fuel Demand in Transportation Sector

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- **Corporate Average Fuel Economy (CAFE) Standards:** Will reduce demand by 2,100 b/d of gasoline, assuming normal Hawaii fleet turnover and VMT held constant.
- **Electric Vehicle Penetration:**
  - Based on HECO's IRP forecast, it is anticipated that plug-in electric vehicles in the State will grow from less than 1,000 in 2012 to over 22,000 by 2020.
  - This will result in an estimated decrease in fossil fuel demand of 289 b/d by 2020.
- **Biodiesel:**
  - An initiative to require up to 5% biodiesel use in all diesel transportation fuels by 2020 (including the military) could reduce fossil fuel demand by about 293 b/d.
  - Initiatives to include modest levels of biodiesel in the 130 mgy marine diesel market (even at 2% levels) could provide an additional reduction of 170 b/d.
- **Biomass:** Creative biomass projects that develop both alternative transportation fuels and clean fuels for power generation should be supported (e.g. Hawaii BioEnergy, Aina Koa Pono)
  - Could leverage refinery capability and help to sustain refinery operation
  - Should be jointly pursued by entities such as GIFTAC and the refiners, with State oversight.

# Explore LNG as a Substitute for Liquid Fossil Fuels

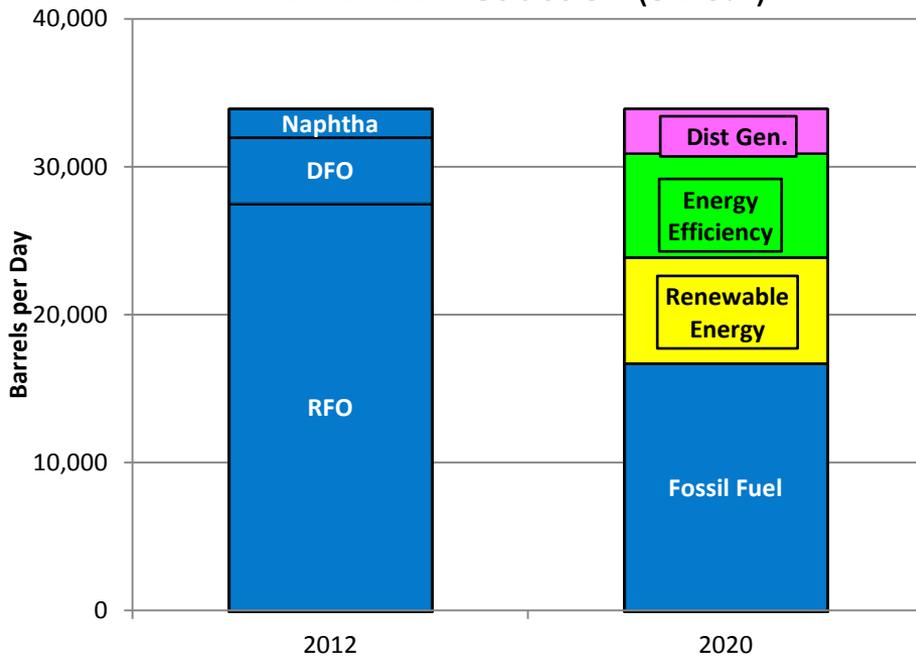
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- **LNG is a key focus of both HECO and Hawaii Gas**
  - Because it provides important alternatives for both of them
  - Hawaii Gas is looking to develop capacity to bring LNG in ISO containers to Hawaii to displace naphtha and potentially grow their business; assume 300 b/d by 2020
- **LNG has potential to displace some portion of LSFO used for power gen; but needs to be closely integrated with renewable development**
  - LNG can be one of several key enabling technologies for increasing penetration of renewables, by fueling modern CCGT generating units to provide swing capacity.
  - It is critical to assess balance of renewable penetration, LNG, and other technologies (e.g. storage, demand response) to ensure stability of future inter-island grid.
  - This transition must be carefully managed going forward; full analysis of the transition is outside scope of this report.
  - Clearly, as LNG infrastructure is developed and fossil fuel boilers retired, refinery LSFO will not be required.

# Total Impact of Options to Reduce Reliance on Fossil Fuels

- Combination HCEI initiatives, LNG imports, and developments in the transportation sector could reduce fossil fuel dependence in Hawaii by 20.7 TBD by 2020.

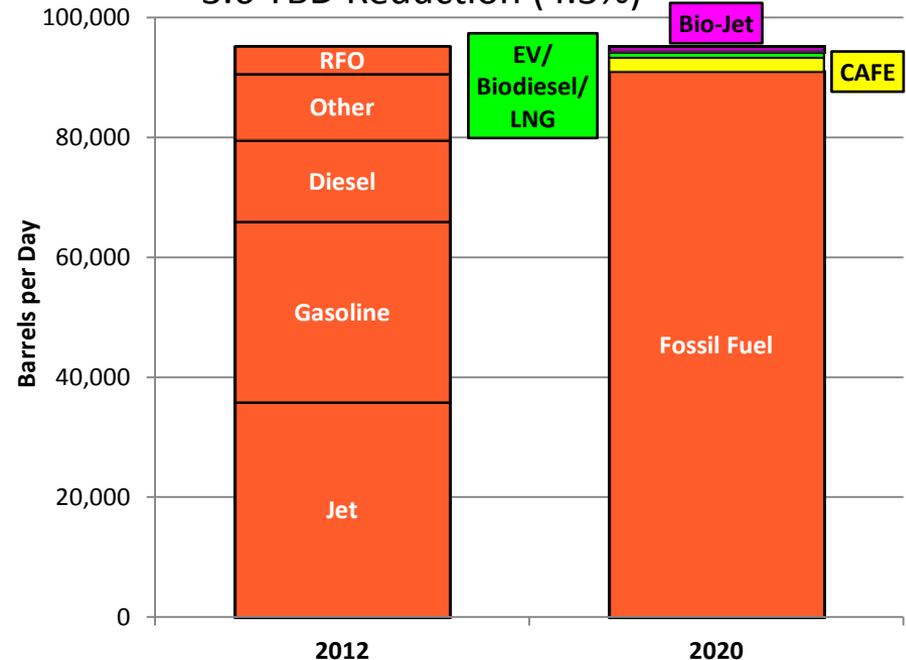
**Power Generation**  
17.1 TBD Reduction (51.0%)



Renewable Energy: 7.2 TBD\*  
Energy Efficiency: 7.0 TBD  
Distributed Generation: 3.0 TBD

\* Note: The 24 million gallon per year (mgy) Aina Koa Pono renewable diesel plant reduces DFO consumption, and 10 mgy of the Hawaii Bioenergy plant reduces RFO consumption based on the agreement with HECO. These are reflected in "Renewable Energy" portion of the bar chart above.

**Transportation & Other**  
3.6 TBD Reduction (4.3%)



CAFE: 2.1 TBD  
EV/Biodiesel/LNG: 0.7 TBD  
Bio-Jet: 0.8 TBD\*\*

\*\*Note: 12 mgy of renewable jet fuel from the Hawaii Bioenergy plant is included in the "Bio-Jet" portion of the chart above.

## Summary Findings

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- **One or both refineries are likely to close.**
- **Critical assets must be operational during transition, and key infrastructure projects and policy issues implemented (HECO pipeline, Pier 51, gasoline specifications).**
- **Resolve key regulatory issues to address the near term impacts on refineries:**
  - MATS options and GHG relief may be within State control to mitigate.
  - Blending options and/or particulate scrubbers
  - Explore potential for tracking of emissions reductions and pooling of reductions
- **HCEI Initiatives could cut fossil fuel use for power gen by 50% by 2020.**
- **Map out transition to new fuels ecosystem; grid reliability and integration issues are complex and more critical if HCEI initiatives are realized by 2020 .**

## Next Steps to Prepare Final Report

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- **Incorporate feedback from the Task Force, DBEDT, and other stakeholders.**
- **Continue to monitor operations with HIE refinery operating.**
- **Update data and assumptions used throughout the analysis.**
- **Investigate adequacy of energy assurance plans from both refiners.**
- **Develop actionable strategies to address critical infrastructure, near term impacts, and new fuels ecosystem alternatives.**
- **Final Report due to Governor by around May 1.**



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