

Hawaii Transportation Energy Analysis: Vehicle Efficiency Options

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- Non-profit research Institute
- Air Pollution and Climate Impacts
- Focus on regulatory policies and fiscal incentives
- Activity across modes including aviation and marine
- Global outreach, with special focus on largest markets

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HCEI 2011 roadmap established an aggressive goal

Goal: Reduce the use of petroleum in ground transportation by 70% or ~ 385 MGY by 2030

Strategy with 2010 baseline	2015 target	2020 target	2030 target
Reduce vehicle miles traveled (VMT)	2% VMT reduction	4% VMT reduction	8% VMT reduction
Incorporate renewable fuels into transportation sector	E10 and biodiesel consumption at 2010 level (~45 million gallons)		150 million gallons
Improve standard vehicle efficiency of fleet	25 mpg cars 18 mpg LT	30 mpg cars 22 mpg LT	35 mpg cars 28 mpg LT
Accelerate the deployment of electric vehicles (EVs) and related infrastructure	4K EV sales (10K on road)	10K EV sales (40K on road)	30K EV sales

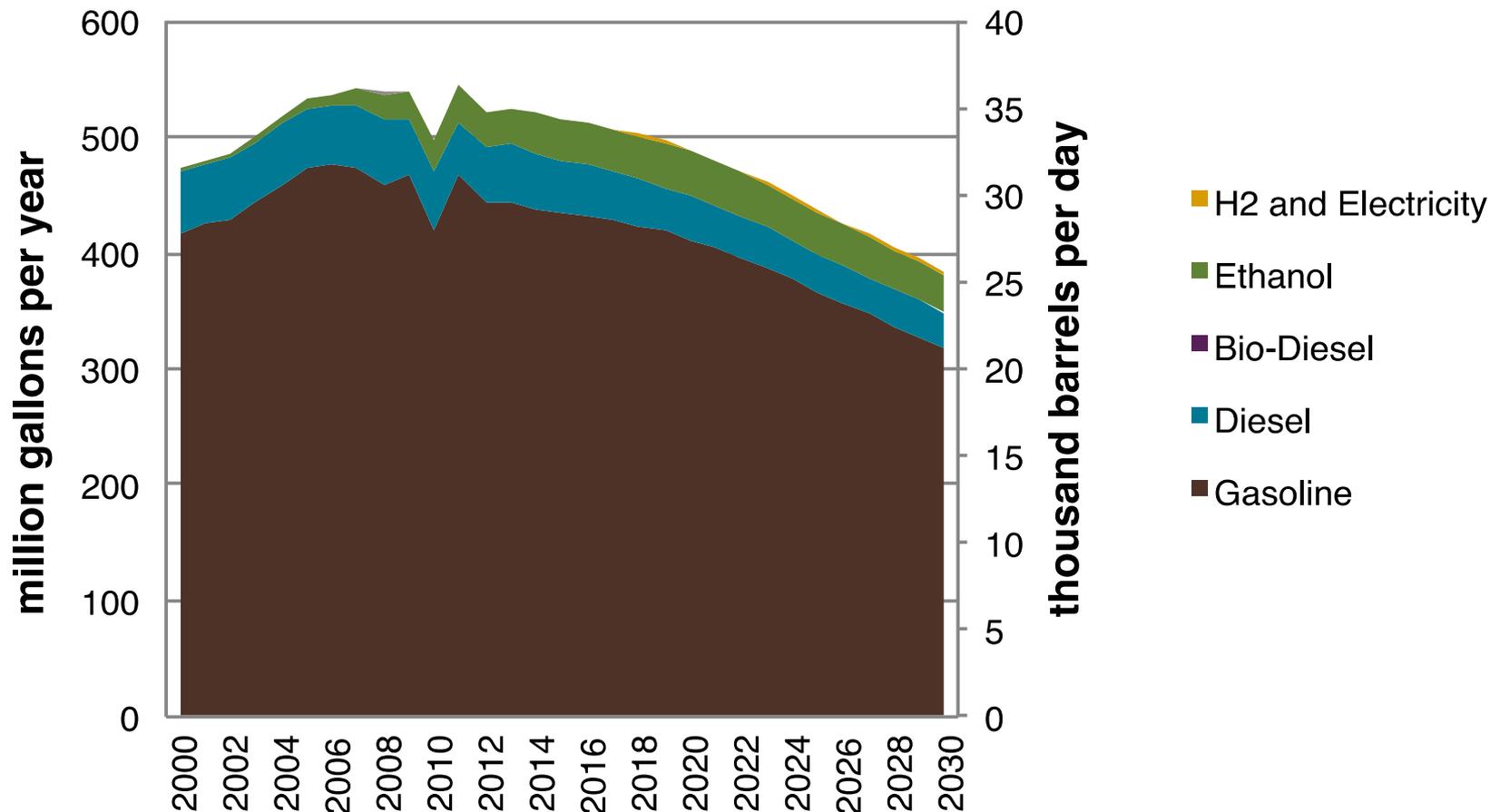
Comparing 2015/2020 goals with 2013 status

Strategy with 2010 baseline	2015 target	2020 target	2013/2014 Actual
Reduce vehicle miles traveled (VMT)	2% VMT reduction	4% VMT reduction	19% increase in VMT
Incorporate renewable fuels into transportation sector	E10 and biodiesel consumption at 2010 level (~45 gallon)		52 million gallons
Improve standard vehicle efficiency of fleet	25 mpg cars 18 mpg LT	30 mpg cars 22 mpg LT	25 mpg for cars & LT combined
Accelerate the deployment of electric vehicles (EVs) and related infrastructure	4K EV sales (10K on road)	10K EV sales (40K on road)	1K EV sales (~3K on road)

On-road fuel use of 525 MGY in 2013 as compared with 496 MGY in 2010; a 6% increase.

Hawaii on-road transportation energy demand projection based on current trends

On-road energy use by fuel type



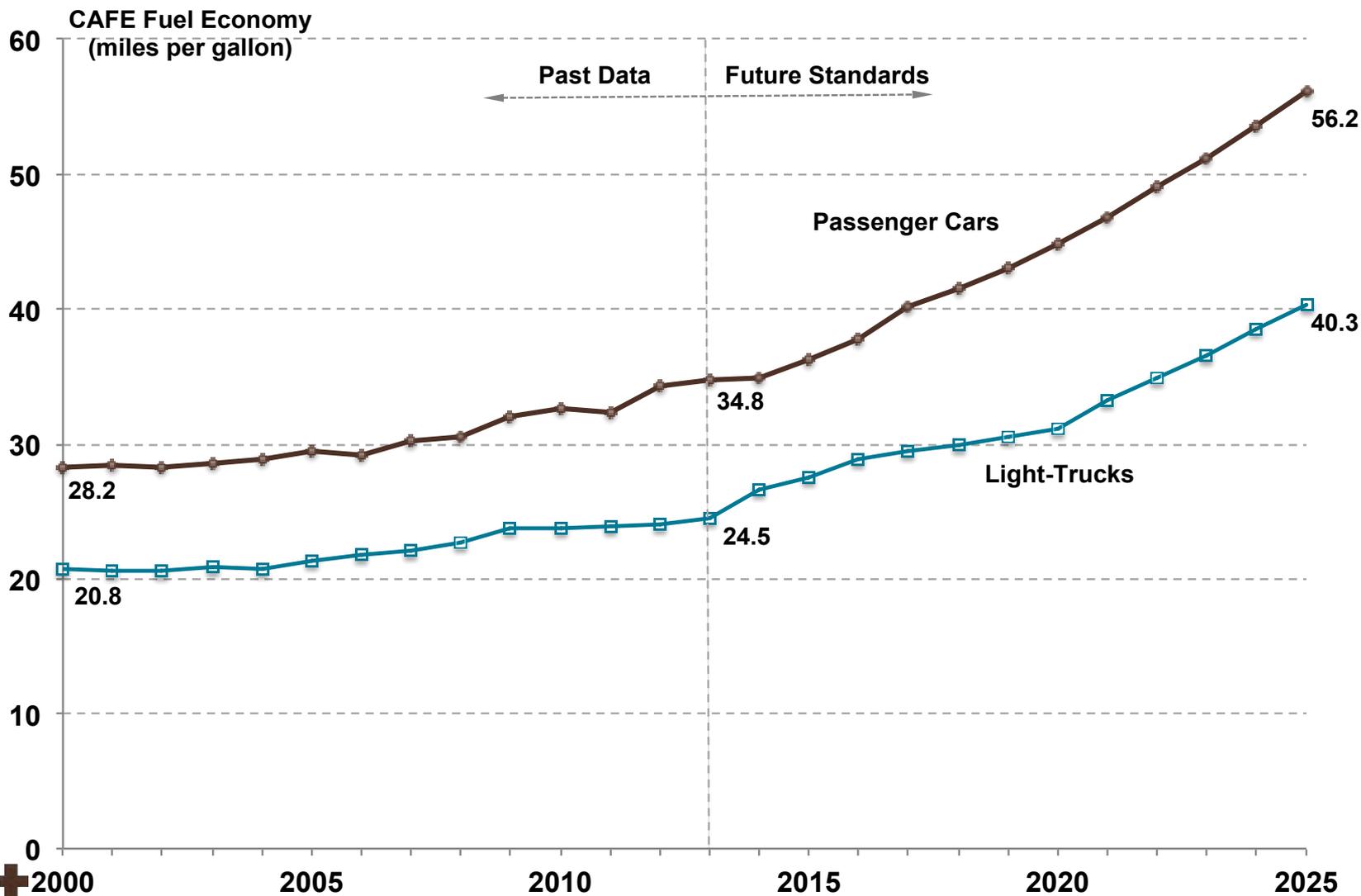
Core strategies under consideration for transportation energy roadmap

- Light as well as heavy duty vehicle efficiency improvements
- Transition to electric drive vehicles (EVs and FCVs)
- Alternative fuels including biofuels and natural gas
- Vehicle demand management/ promotion of transit, and non-motorized transport
- Improving aviation efficiency
- Improving marine efficiency

Vehicle Fuel Efficiency Improvement Tactics under consideration (not in any particular order)

- 1. Vehicle Fuel Economy Standards**
2. Feebates for vehicle fuel efficiency
3. Procure EVs and more efficient vehicles for public fleets
4. Green Freight activities
5. More efficient replacement tires
6. Vehicle retirement incentives for low-income groups
7. High efficiency taxis
8. High efficiency rental cars

US New Light-Duty Vehicle Fuel Economy: 2000-2025



NRC estimates of future fuel consumption reduction potential from light-duty vehicles

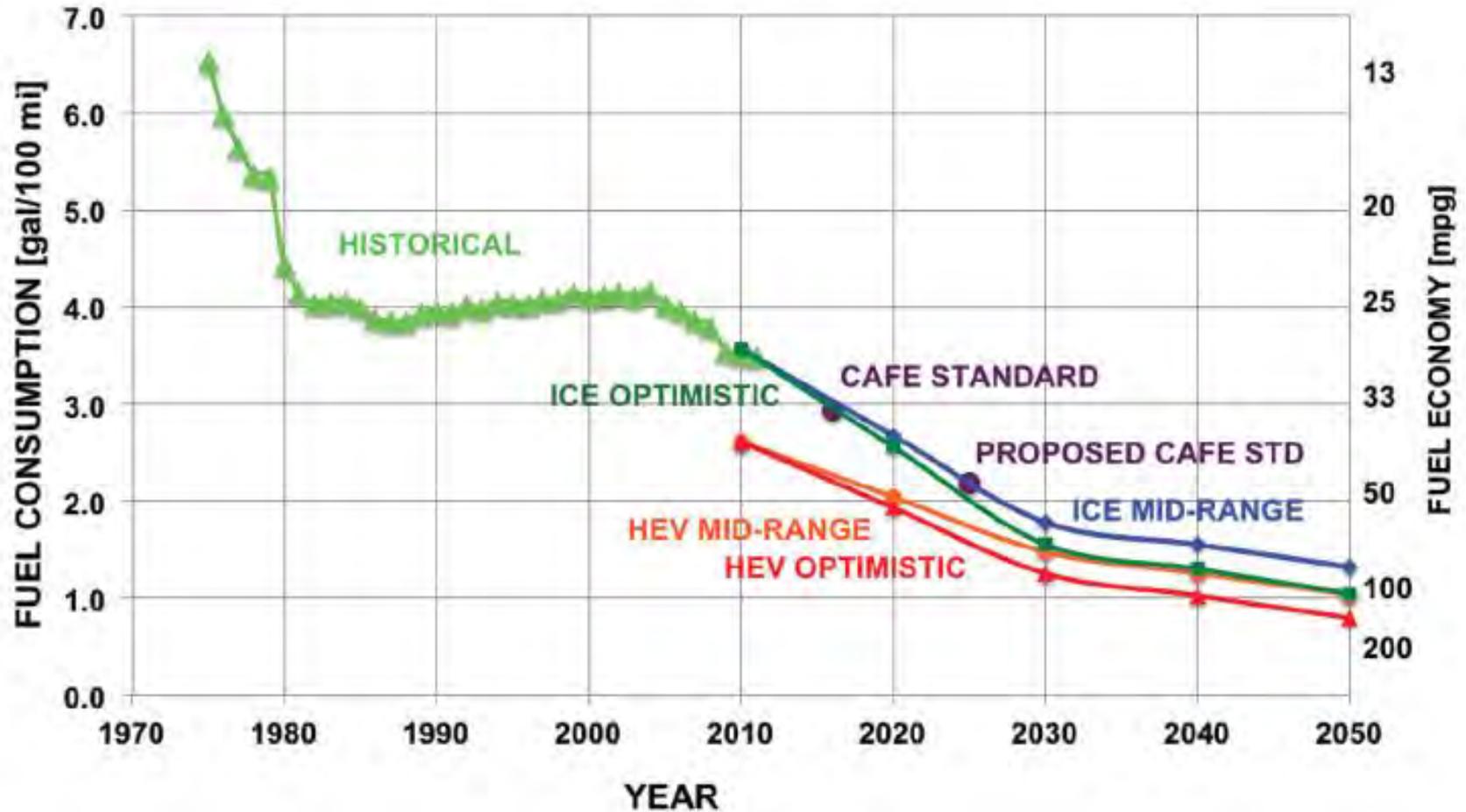
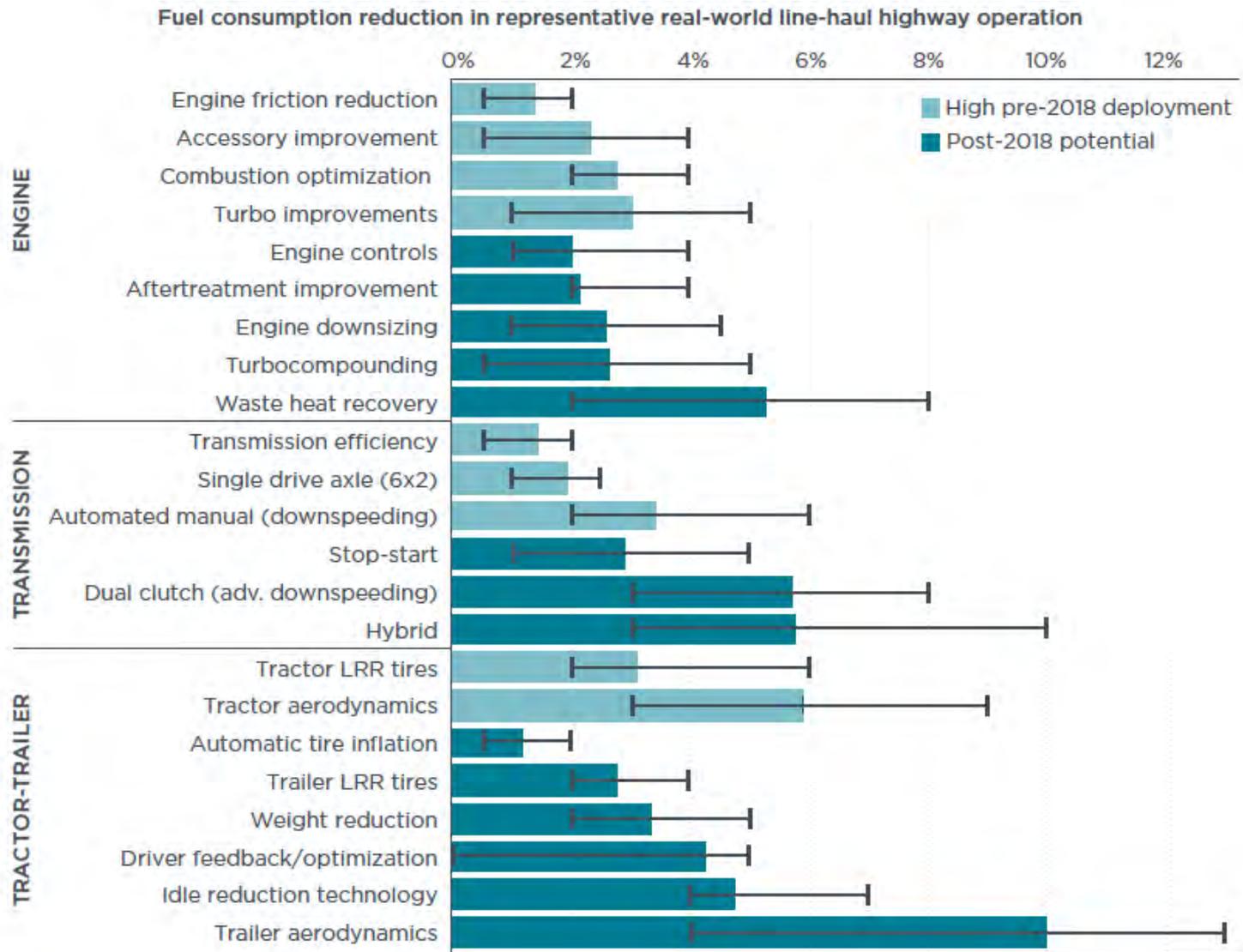


Figure 2-1 Historical and Projected Light-duty Vehicle Fuel Economy

Note: All data is new fleet only using unadjusted test values, no in-use fuel consumption.

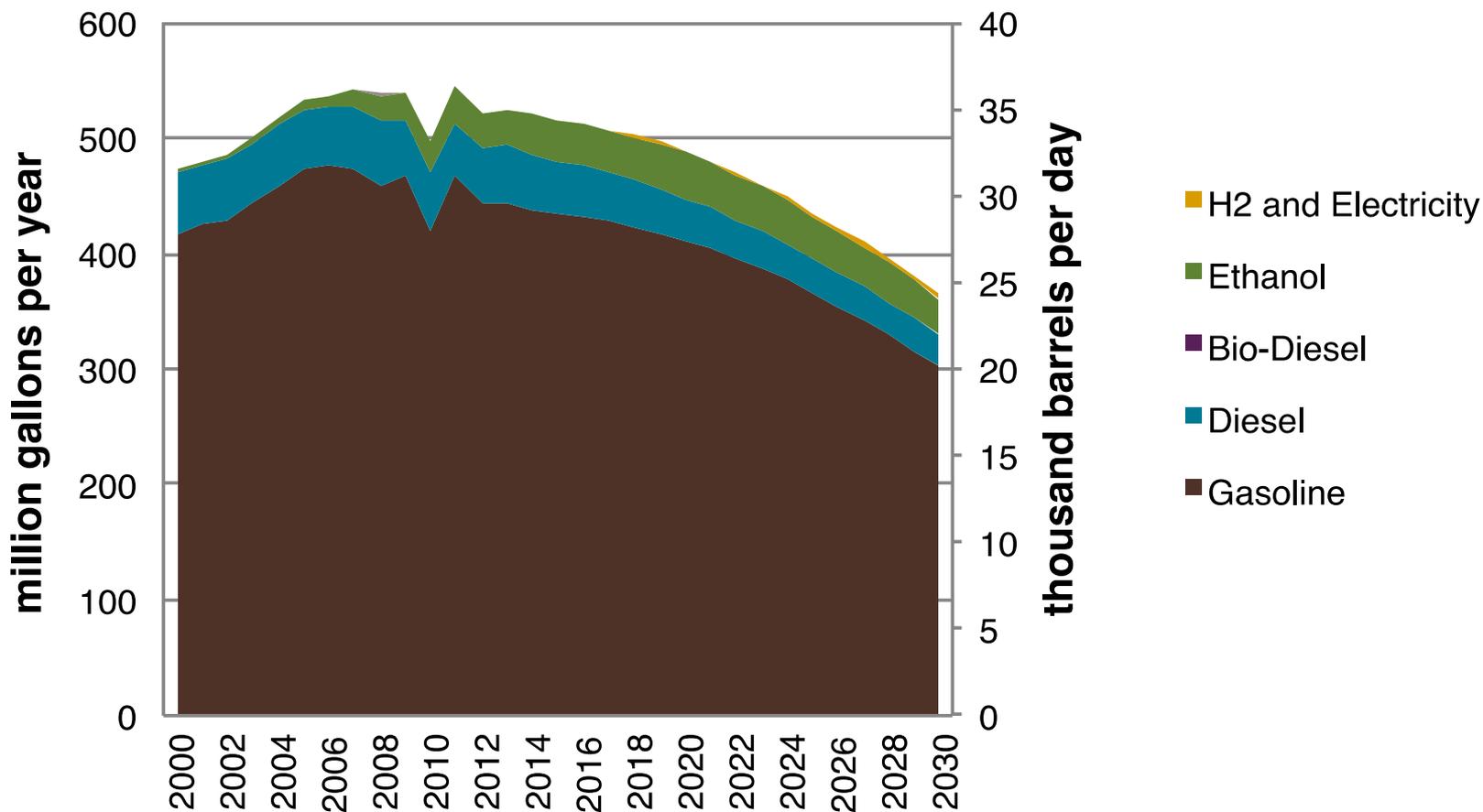
FTP values, projections assume light duty fleet is 38% light duty trucks

Timing of Tractor-Trailer Efficiency Technologies



Hawaii on-road transportation energy demand projection based on continuation of CAFE standards and electric drive adoption

On-road energy use by fuel type



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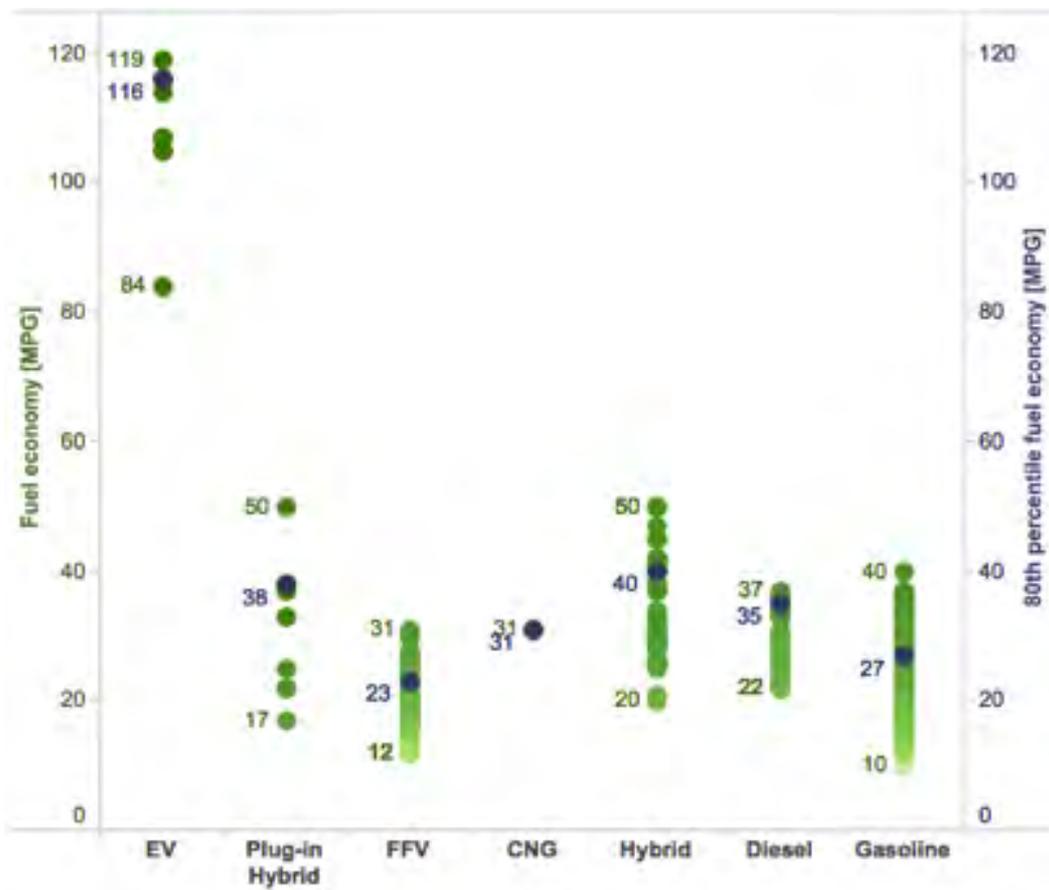
Implementation of fees for low efficiency/high GHG emission vehicles along with rebates for high efficiency/low GHG emission vehicles

- Feebate rate of \$20 per gCO₂/mi (equivalent to \$1765 per gal/100mi) would be similar to the implied rate of US Gas Guzzler Tax
- New vehicle fuel consumption reduction of 5-7%, and an additional 1-2% reduction in longer term*
 - Benefits scale with feebate rate
 - Hawaii-only feebate program could have smaller benefit
- Pivot point (no fee or rebate point) could be adjusted every three to five years to provide continued incentive and keep program revenue neutral

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Revise statewide vehicle procurement guidelines to ensure vehicle choices are efficient*



Adjust the hierarchy of fuel/technology options within procurement process to:

- (i) Allow purchase of more efficient hybrids over flex-fuel/CNG
- (ii) Allow purchase of more efficient gasoline/diesel option over hybrid
- (iii) Redefine fuel economy leaders as 90th percentile

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4. **Green Freight activities -- Smartway**
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SmartWay is a Public-private partnership with freight sector

- Market based, voluntary and no cost
- Industry standard carbon accounting system
 - Standardized tools and metrics for collecting & reporting data
 - Developed with extensive stakeholder input and peer reviewed

Goal: Move more ton-miles of freight with less emissions, and less energy

How: Accelerate adoption of advanced technologies and operational practices in the freight supply chain

Measured by:

- Gallons of fuel, barrels of oil, and \$ saved
- CO₂, NOx and PM emissions reduced

To date only five truck carriers in Hawaii have joined the SmartWay partnership*

- Tactic: Promote green freight activities jointly with EPA
- Target carriers to join SmartWay and install fuel-saving technologies
 - Focus on low rolling resistance tires, auxiliary power units, and improved aerodynamic technologies
- Encourage SmartWay certified carriers as preferred carriers for State and County operations
 - Encourage local businesses and shippers to use certified carriers
- Promotes skilled jobs locally for installation of SmartWay certified technology

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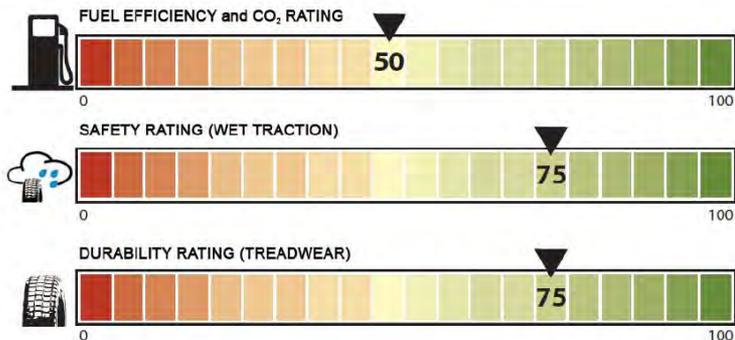
More efficient replacement tires can improve fuel efficiency of existing stock by 1-2%

GOVERNMENT TIRE RATINGS

ACME TIRE COMPANY

WILEY RR-S

SIZE: P225/60R16



Ratings range from 0 to 100 with 100 being the best, where the tire is properly inflated.
Source: National Highway Traffic Safety Administration (NHTSA)
For more information visit www.nhtsa.gov

NHTSA's proposed tire rating scheme, 2009

- Support NHTSA's adoption of tire efficiency labeling and minimum rolling resistance requirements
 - Possible state-level incentive program to demonstrate the feasibility, and benefits of low rolling resistance tires
- In order to ensure proper tire inflation:
 - Require state automotive service centers to check for tire underinflation
 - Require gas stations to provide free air to customers

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Offer financial incentives to allow low-income households to retire/replace old vehicles

- Texas and California fund accelerated vehicle retirement programs for low-income

- Texas funds program through \$2-6 fee on OBD/IM program
- California funds program through \$1 vehicle registration surcharge

- Additional air quality benefits and positive environmental justice

Income Eligibility	Replacement Options				
	8 year old or newer	May be also Eligible Low-Carbon Transportation (CVRP) type incentives			Alternative Transportation Mobility Options
		35+ MPG	Plug-In Hybrid ³	Zero-Emission Vehicle	
Low Income <225% Federal Poverty Level	\$4,000	\$4,500	\$4,500	\$4,500	\$4,500 Face Value
Moderate Income <300% Federal Poverty Level	Not Available	\$3,500	\$3,500	\$3,500	\$3,500 Face Value
Above Moderate Income <400% Federal Poverty Level	Not Available	Not Available	\$2,500	\$2,500	\$2,500 Face Value

California proposed modification of EFMP, 2014

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~2000 taxis in Hawaii, driven more than average compared with passenger cars

- Opportunity to reduce fuel consumption of taxis
 - Hawaii 2013 SR 144 supported the idea of promoting high efficiency vehicles including hybrids at HNL
 - TheCAB has a fleet of ~900 vehicles
- Fiscal incentives may be needed to encourage conversion to hybrids
 - Preferential treatment at airports and similar incentives may be helpful
- ~\$4 million investment may result in fuel savings worth ~ \$16 million with a fully implemented program

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~10,000 rental cars in Hawaii*

- Rental cars tend to be newer than average, but tend to get driven more than average as well
- More efficient rental cars may reduce fuel costs for tourists
 - Rental car companies own/lease the vehicles, but consumers pay for fuel
- Fiscal incentives similar to high efficiency taxis may be needed, but little is known about afterlife of rental cars in Hawaii once they leave the rental fleet

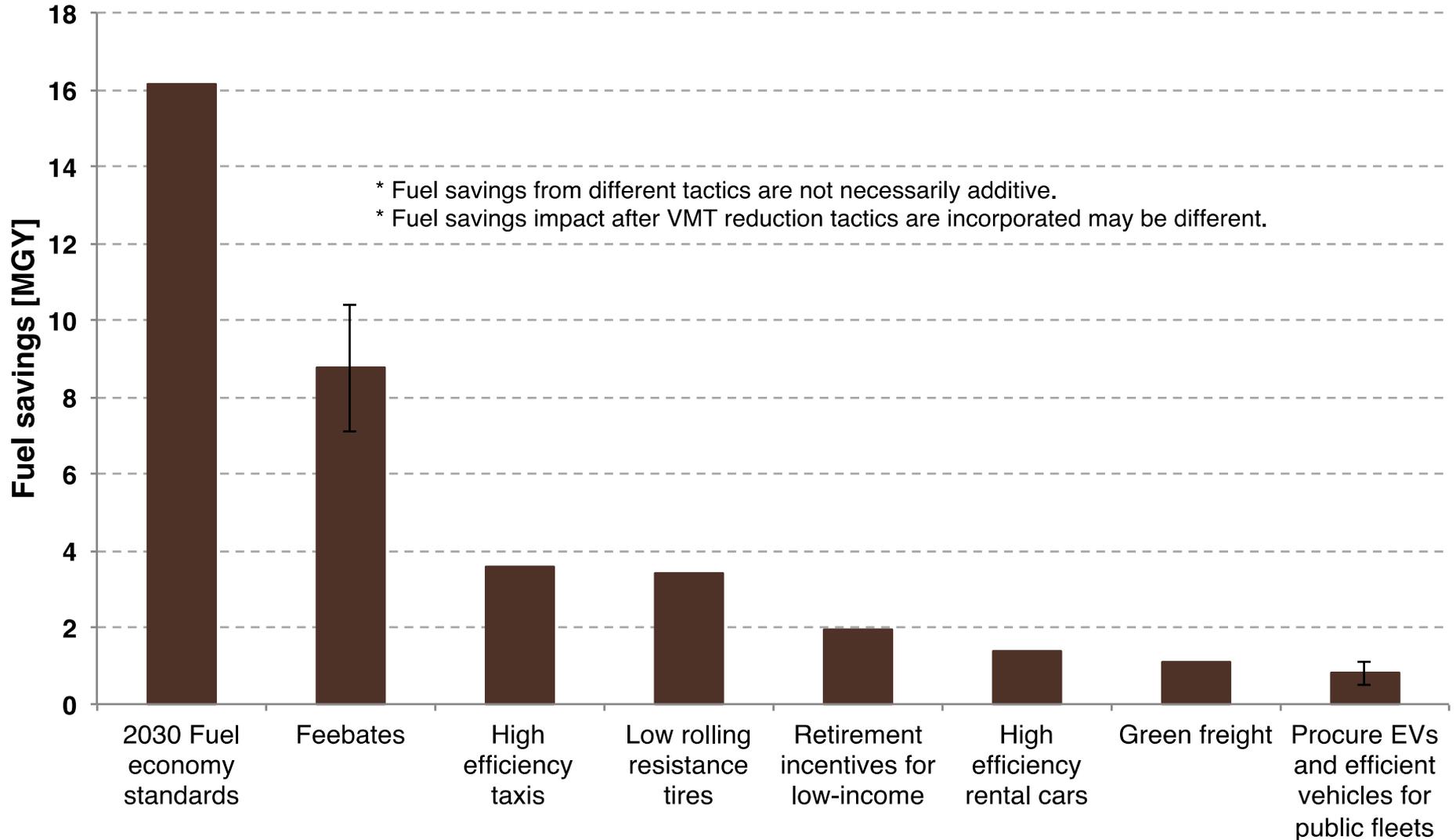
Qualitative Assessment of Vehicle Efficiency

Alternatives

#	Tactics	Major criteria			Co-benefits			Likelihood of implementation
		Petroleum reduction potential	Cost effectiveness	Capital/operating costs	Local jobs	Social acceptability	Lifecycle emissions	
VE-1	Vehicle fuel economy standards	High	High	Medium		High	High	Medium
VE-2	Feebates for vehicle fuel efficiency	High	High	Low		Low	High	Low
VE-3	EVs and efficient vehicles for public fleets	Low	Medium	Medium		Medium	Medium	Medium
VE-4	Green freight	Low	High	Low	Medium	High	Low	Medium
VE-5	Replacement tires	Medium	Medium	Medium		Medium	Medium	Low
VE-6	Low income vehicle retirement incentives	Medium	Low	Low		Medium	Low	Medium
VE-7	High efficiency taxis	Medium	Medium	Low		Medium	Medium	Medium
VE-8	Rental car efficiency program	Low	Medium	Medium		Low	Medium	Low

Legend	Low	Medium	High	N/A
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2030 Fuel Savings from Vehicle Efficiency Tactics



Additional complementary actions

- Better enforcement of vehicle idling restrictions
- Encourage use of fuel economy labels for used car sales:

[http://www.fueleconomy.gov/feg/UsedCarLabel.js](http://www.fueleconomy.gov/feg/UsedCarLabel.jsp)

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- Countries like New Zealand require display of fuel economy label at the time of used vehicle sale

Timeline for transportation energy analysis

- Stakeholder workshop: November 2014:
http://energy.hawaii.gov/wp-content/uploads/2011/09/TransWorkshop_Summary.pdf
 - Continued stakeholder engagement
 - Workshop on Electric drive vehicles: January 13-14, 2014
Register at: <http://energy.hawaii.gov/electric-drive-stakeholder-workshop>
 - Web-meetings on aviation and marine tactics: early February 2015
 - Qualitative and quantitative evaluation of tactics (January/February 2015)
 - Assess complementarity with existing Hawaii policies/plans and budgets (February/March 2015)
 - Seek broad agreement on plan and implementation steps (April/May 2015)
 - Final report (June 2015)
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- Late 2015: Actual work begins on implementing an integrated transportation energy strategy with shared roles and responsibilities

For more information...

- Hawaii State Energy Office Facebook page:
<https://www.facebook.com/HawaiiStateEnergyOffice>
- Hawaii Clean Energy Initiative Website:
<http://www.hawaiicleanenergyinitiative.org/>
- Two question HCEI survey: <http://tinyurl.com/HCEI-trans>
- ICCT website: <http://www.theicct.org/>
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