# Transportation Energy Strategies - *Vehicle Efficiency*

Rebuild Hawaii

presented by

**Ken Kelly**
*National Renewable Energy Laboratory*

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# HCEI 70 % Clean Energy Goal

## *Energy Sectors and HCEI Roadmap*

| Electricity Sector | Efficiency Sector | Transportation Sector | Fuels Sector |
|---|---|---|---|
| *40% RPS by 2030* | *30% EEPS by 2030* | *Displace 70% Petroleum by 2030* | *Meet In-State Demand for Renewable Fuels* |
| **Strategies:**<br>•Align regulatory and policy framework with clean energy goals<br>•Increase process certainty in developing new RE<br>•Deploy RE and grid infrastructure<br>•Explore next gen technologies and new applications | **Strategies:**<br>•Align regulatory and policy framework<br>•Retrofit residential and commercial buildings<br>•Strengthen new constructions policies / building codes<br>•Identify non-building related energy efficiency measures | **Strategies:**<br>•Accelerate EV and H2 vehicle and infrastructure deployment<br>•Increase renewable fuel use in the transportation sector<br>•Improve vehicle fleet efficiency<br>•Reduce vehicle miles traveled | **Strategies:**<br>•Support development of local agricultural industry<br>•Invest in key infrastructure at scale<br>•Evaluate and develop renewable fuel processing infrastructure<br>•Match potential fuel supply with in-State demand |
| **Interim Targets …** | **Interim Targets …** | **Interim Targets …** | **Interim Targets …** |
| **Accomplishments…** | **Accomplishments …** | **Accomplishments …** | **Accomplishments …** |
| **Important Actions …** | **Important Actions …** | **Important Actions …** | **Important Actions …** |

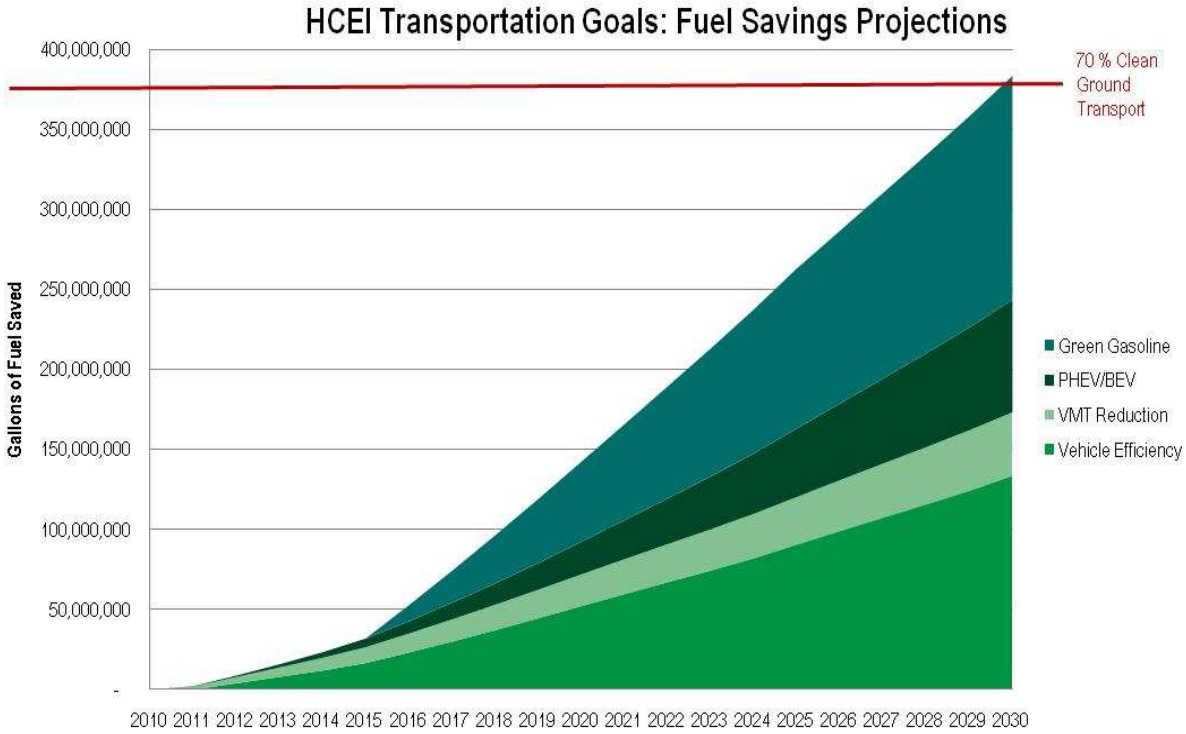
…

# HCEI Transportation Analysis Goals

Transportation energy analysis has focused on the development and definition of the HCEI Transportation Energy Roadmap

- Focus pathways and targets have been identified so that, when combined, the goal of 70% reduction is achieved

1. **Electric Vehicles: 20% (75 MGY)**
   - **PHEV , EV, Fuel Cell adoption**
2. **Vehicle Efficiency: 30% (120 MGY)**
   - **HEVs**
   - **Diesel substitution**
   - **Standard car and truck efficiency improvements**
3. **VMT Reduction: 10% (40 MGY)**
   - **Public transit**
   - **Telecommuting**
   - **Others**
4. **Renewable Fuels: 40% (150 MGY)**
   - **Drop-in replacement for gasoline and diesel**
   - **Hydrogen**



# Transportation Goals and Strategies

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

**Key Strategies**

- Improve the efficiency of the standard vehicle fleet
- Reduce the overall number of vehicle miles traveled
- Expand the use of renewable fuels for transportation
- Accelerate the deployment of electric vehicles and related infrastructure

***HCEI Transportation sector is directly aligned with Governor's New Day Energy Goal: "Reduce dependence on fossil fuel for transportation"***

***Also aligned with: Green Jobs, Renewable Technology Deployment***

# HCEI Transportation WG – Policy Analysis

| Strategy | Policy/Program |
|---|---|
| Improve standard vehicle efficiency of fleet | Establish programs encouraging large private fleets (e.g. rental, etc) to increase average fuel economy |
| | Set requirements for state fleet fuel economy increases |
| | HI specific energy labeling for new vehicle sales |
| Reduce VMT | Bicycle Infrastructure |
| | Bike Share |
| | Commute Trip Reduction Programs |
| | Ciclovia type program |
| | Complete Streets Policy Statement |
| Accelerate the deployment of EVs and related infrastructure | Establish a program encouraging adoption of EVs by large/rental fleets |
| | EV Ready Homes/Capacity for EVs |

# Vehicle/Fleet Efficiency
## target: offset 120 MGY by 2030

## Opportunity

- Efficient vehicle technologies are on the way due to increasing fuel efficiency standards at the national level (CAFÉ)
- New vehicles will save millions of gallons of petroleum per year
- Does not require infrastructure investment
- 50,000 purchase decisions made each year

## Challenges

-Full realization of this potential depends on changes in consumer behavior

- Vehicle turnover rates are slow
  - At 50,000/year, *vehicles purchased this year* will still be on the road in 2030

# CAFÉ Standards & Fleet Average Efficiency


*High mpg - coming soon to a showroom near you… !*

2010 Prius
50 mpg

Under Evaluation

100
90
80
70
60
50
40
30
20
10
0

1970 1980 1990 2000 2010 2020 2030

# Plug-In Hybrid-Electric Vehicle (PHEV)

Fuel Flexibility

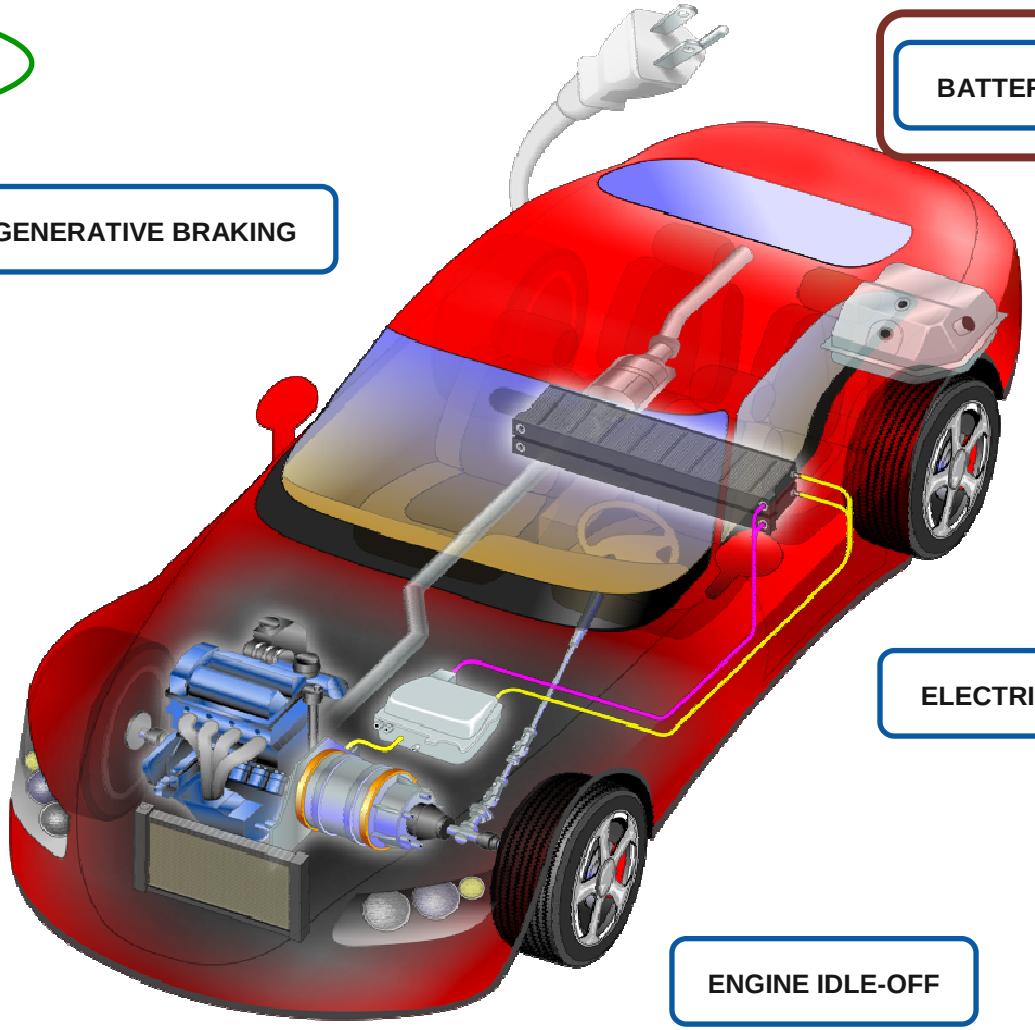
PETROLEUM

AND/OR

ELECTRICITY

REGENERATIVE BRAKING

BATTERY RECHARGE



ELECTRIC ACCESSORIES

ADVANCED ENGINE & CONTROLS

ENGINE IDLE-OFF

ENGINE DOWNSIZING

# Hawaii’s 100+ pmpg vehicles?

# Commercial Fleets

*Fuel efficiency = the bottom line*

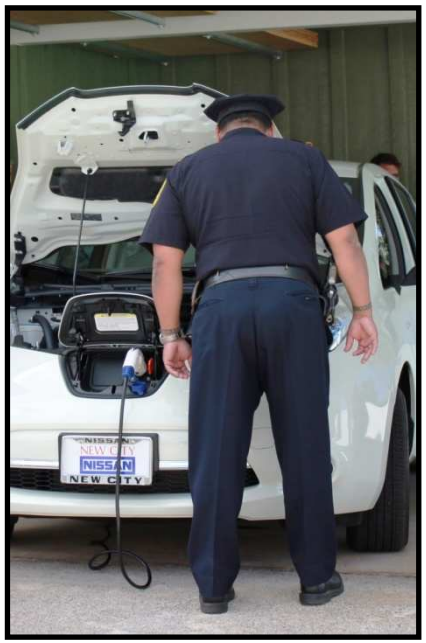


- ✓ 80 Hybrid electric buses
- ✓ Efficient bus routing
- ✓ EMP cooling system
- ✓ Electrification of ancillary loads
- ✓ Nitrogen tire inflation
- ✓ More frequent wheel alignments
- ✓ Maintenance schedule – air cleaners, engines
- ✓ Reduced garage idle-times
- ✓ Clean-diesel technologies
- ✓ Continue to monitor and adopt new technologies

# Electric Vehicles – target: offset 75 MGY by 2030

## Opportunities

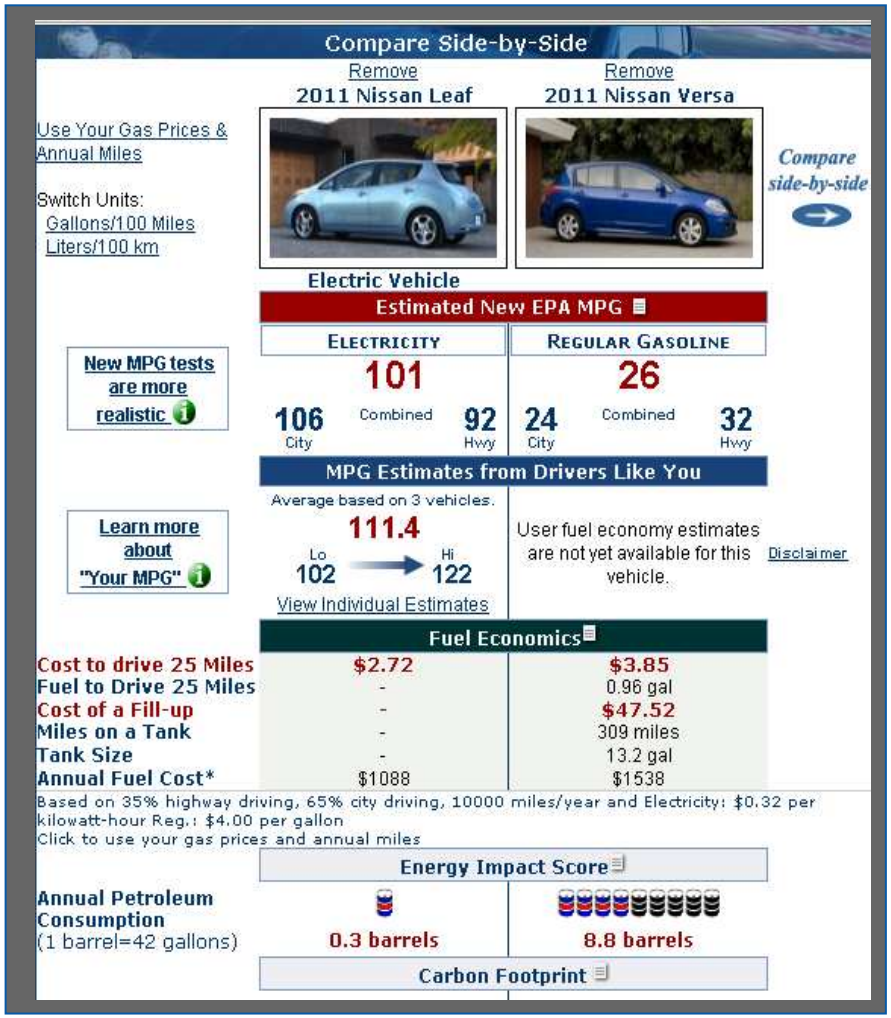
- Potential to become international showcase
- Climate
- Limited driving distances
- Abundance of renewables
- Favorable policies
- Synergies with tourism industry
- Connection to smart grid and high-penetration renewables




## Challenges

- Market penetration – cost and vehicle turnover rate
- Establishing EVSE – home and public charging
- Public education and outreach

# How much does it cost to drive an EV?




***source: www.fueleconomy.gov***

**Leaf example:**

34 kWh/100 mile

x $0.32 / kWh

**= 10.9 cents / mile**

**"Average Hawaii car:**

$4.00 / gal

÷ 20 miles / gal

**= 20 cents / mile**

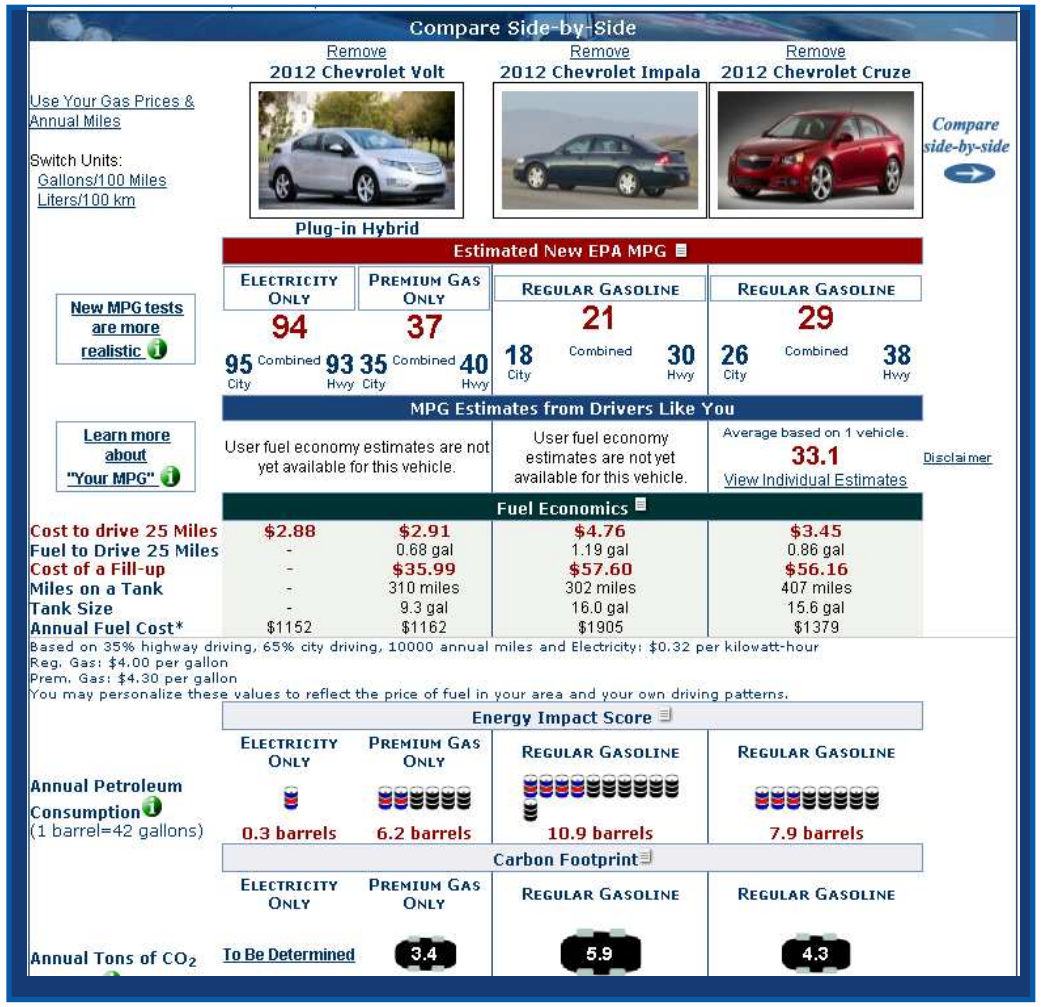
**Nissan Versa (gasoline):**

$4.00 / gal

÷ 26 miles / gal

**= 15.4 cents / mile**

# How much does it cost to drive an EV?



Compare Side-by-Side

| | Remove 2012 Chevrolet Volt | Remove 2012 Chevrolet Impala | Remove 2012 Chevrolet Cruze |
|---|---|---|---|
| | Plug-in Hybrid | | |
| **Estimated New EPA MPG** | | | |
| | Electricity Only | Premium Gas Only | Regular Gasoline | Regular Gasoline |
| | 94 | 37 | 21 | 29 |
| | 95 City / Combined / 93 Hwy | 35 City / Combined / 40 Hwy | 18 City / Combined / 30 Hwy | 26 City / Combined / 38 Hwy |
| **MPG Estimates from Drivers Like You** | | | | |
| | User fuel economy estimates are not yet available for this vehicle. | User fuel economy estimates are not yet available for this vehicle. | Average based on 1 vehicle. 33.1 View Individual Estimates | |
| **Fuel Economics** | | | | |
| Cost to drive 25 Miles | $2.88 | $2.91 | $4.76 | $3.45 |
| Fuel to Drive 25 Miles | - | 0.68 gal | 1.19 gal | 0.86 gal |
| Cost of a Fill-up | - | $35.99 | $57.60 | $56.16 |
| Miles on a Tank | - | 310 miles | 302 miles | 407 miles |
| Tank Size | - | 9.3 gal | 16.0 gal | 15.6 gal |
| Annual Fuel Cost* | $1152 | $1162 | $1905 | $1379 |
| **Energy Impact Score** | | | | |
| Annual Petroleum Consumption (1 barrel=42 gallons) | 0.3 barrels | 6.2 barrels | 10.9 barrels | 7.9 barrels |
| **Carbon Footprint** | | | | |
| Annual Tons of $CO_2$ | To Be Determined | 3.4 | 5.9 | 4.3 |

Based on 35% highway driving, 65% city driving, 10000 annual miles and Electricity: $0.32 per kilowatt-hour
Reg. Gas: $4.00 per gallon
Prem. Gas: $4.30 per gallon
You may personalize these values to reflect the price of fuel in your area and your own driving patterns.

***source: www.fueleconomy.gov***

**Volt example:**

36 kWh/100 mile
x $0.32 / kWh
**= 11.5 cents / mile**

**"Average" Hawaii car:**

$4.00 / gal
÷ 20 miles / gal
**= 20 cents / mile**

**Chevy Impala (gasoline):**

$4.00 / gal
÷ 27 miles / gal
**= 14.8 cents / mile**

# Vehicle Miles Traveled
## target: offset 40 MGY by 2030


## Opportunity

- Urban Planning
- Transit Oriented Development
- Transit Modernization
- Bikeways
- Fractional Ownership
- Telecommuting
- Alternative Work Schedules
- Interconnected multi-modal mobility


## Challenges

- Near term change, commitment and funding resources
- Long term infrastructure development
- Public education and outreach

# Mahalo nui loa!