Overview

- Transportation Fuel Demand Projections
- Alternative Fuels
- Alternative Fueled Vehicles
- Incentives
Gasoline Demand per Year
Alternative Fuels

- Alcohol Fuels
  - Ethanol
  - Methanol
- Biodiesel
- Electricity
- Hydrogen
- LPG
- Natural Gas (CNG, LNG)
- Others under development (P-series, diesohol)
Most Significant Alternative Fuels for Hawaii

✓ Alcohol Fuels
  ■ Ethanol  *Blending to begin in 2006; flex-fuel vehicles in use*
  ■ Methanol

✓ Biodiesel

✓ Hydrogen / Fuel Cell / Electricity  *Potentially significant; under development*

✓ LPG  *30 years of local use but facing challenges*

Natural Gas (CNG, LNG)  *If LNG available, this could change*

Others under development (P-series, diesohol)
Most Significant

Alternative Fuels for Hawaii

- Ethanol
- LPG (Propane)
- Biodiesel
- Hydrogen / Fuel Cell / Electricity
Fuel Ethanol

- Ethanol is also known as ethyl alcohol. It’s the alcohol in beer, wine, rum, vodka, etc.

- Ethanol was used to fuel some of the first automobiles.
Fuel Ethanol

On the Mainland, independent gasoline stations were generally first to offer E10 (formerly known as gasohol).

- 1970s-1980s: Used as a **gasoline extender**
- 1980s: An **octane booster** (raises octane 2-3 points)
- 1990s: Used as an **oxygenate** for clean air (Adds oxygen & reduces emissions of carbon monoxide)
Projected US Ethanol Demand

BN GLN = billion gallons
Fuel Ethanol

- Today, ethanol-blended gasoline is available in most states.
- All of Minnesota's gasoline contains ethanol
  - Minneapolis/Saint Paul, 1995
  - Statewide, 1997
- California, New York, and Connecticut switched completely at the end of 2003 and are now using ethanol rather than MTBE.
States With 10 or More Years of Fuel Ethanol Use

Number of years ethanol tax incentives shown in EIA data since 1980

Hawaii Gasoline to Contain 10% Ethanol

Beginning in April of 2006, at least 85 out of every 100 gallons of gasoline sold in the State for use in motor vehicles shall contain 10% ethanol by volume.  

* If all gasoline blended with ethanol

**ETHANOL DEMAND**

**GASOLINE DEMAND**

HRS §486J(10), HAR 15-35
Ethanol-based Alternative Fuel: E85

- Gasoline with ethanol is still gasoline. It's not an alternative fuel.
- An increasing number of new vehicles can use E85 (15% gasoline, 85% ethanol), which is an alternative fuel.
E85 Flexibly-Fueled Vehicles
## Onroad Alternative Fuel and Hybrid Vehicles in the U.S., 2003

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Light Duty Total</th>
<th>Medium Duty Total</th>
<th>Heavy Duty Total</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed Natural Gas (CNG)</td>
<td>2,229</td>
<td>2,705</td>
<td>1,188</td>
<td>6,122</td>
</tr>
<tr>
<td>Electric (EVC)</td>
<td>12,382</td>
<td>12</td>
<td>1</td>
<td>12,395</td>
</tr>
<tr>
<td>Ethanol, 85 Percent (E85)</td>
<td>859,261</td>
<td>0</td>
<td>0</td>
<td>859,261</td>
</tr>
<tr>
<td>Gasoline/Diesel-Electric Hybrid</td>
<td>50,357</td>
<td>0</td>
<td>175</td>
<td>50,532</td>
</tr>
<tr>
<td>Hydrogen (HYD)</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Liquefied Natural Gas (LNG)</td>
<td>20</td>
<td>0</td>
<td>91</td>
<td>111</td>
</tr>
<tr>
<td>Liquefied Petroleum Gas (LPG)</td>
<td>180</td>
<td>1,650</td>
<td>281</td>
<td>2,111</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>924,435</strong></td>
<td><strong>4,367</strong></td>
<td><strong>1,736</strong></td>
<td><strong>930,538</strong></td>
</tr>
</tbody>
</table>
State, Federal, and Fuel Provider Fleets are Required to Purchase AFVs

Energy Policy Act of 1992 (EPACT) alternative fueled vehicle (AFV) purchase requirements

<table>
<thead>
<tr>
<th>Model Year</th>
<th>Federal Fleets</th>
<th>State Fleets</th>
<th>Fuel Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>25%</td>
<td>10%</td>
<td>50%</td>
</tr>
<tr>
<td>1998</td>
<td>33%</td>
<td>15%</td>
<td>70%</td>
</tr>
<tr>
<td>1999</td>
<td>50%</td>
<td>25%</td>
<td>90%</td>
</tr>
<tr>
<td>2000</td>
<td>75%</td>
<td>50%</td>
<td>90%</td>
</tr>
<tr>
<td>2001+</td>
<td>75%</td>
<td>75%</td>
<td>90%</td>
</tr>
</tbody>
</table>
Propane (LPG)
Biodiesel

- Produced locally (Maui & Oahu) from used cooking oil
- Can also be produced from oilseed crops
- For use in diesel engines
Hydrogen / Fuel Cell / Electricity

Internal Combustion Engine Vehicles

- Fuels:
  - Alcohol Fuels (SI/CI)
  - Biodiesel (CI)
  - Diesel (CI)
  - Gasoline (SI)
  - Hydrogen (SI/CI)
  - Natural Gas (SI/CI)
  - Propane (SI)
  - SI = Spark Ignition Required
  - CI = Compression Ignition Required

  In engine, fuel burned in cylinders either compression-ignited (diesel engine) or spark-ignited (gasoline-type engine)

Fuel into fuel tank
Fuel through fuel line to engine
Engine drives wheels

Electric Vehicles

- Fuels:
  - Electricity

  Electricity into batteries
  Batteries store electricity
  Electricity drives motor
  Motor spins wheels

Fuel Cell Vehicles

- Fuels:
  - Alcohol Fuels
  - Gasoline
  - Hydrogen
  - Natural Gas
  - Other fuels ("energy carriers") are under development

Fuel into fuel tank
Fuel cell produces electricity
Batteries store electricity
Electricity drives motor
Motor spins wheels
Incentives

- Federal ethanol credit: 51¢ per gallon
- Federal biodiesel credit: $.50 or $1.00 per gallon
- Federal small ethanol producer credit: 10¢/gallon
- Federal Commodity Credit Corp: credits for new production of ethanol and biodiesel (amounts vary; approx. $100 million nationwide)
- State credit for ethanol facility: up to $4.5 million
- State highway taxes reduced for alt. fuels
- E10 exempt from 4% state excise tax until 12/31/06
- Electric vehicles with special license plates are allowed free parking at meters; HOV access
- Counties provide highway tax reductions or exemptions for alternative fuels
## Sum of State & County Highway Taxes (cents per gallon)

<table>
<thead>
<tr>
<th></th>
<th>Gasoline</th>
<th>Ethanol</th>
<th>LPG</th>
<th>Biodiesel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>City &amp; County of Honolulu</strong></td>
<td>32.5</td>
<td>4.8</td>
<td>10.6</td>
<td>12.3</td>
</tr>
<tr>
<td><strong>County of Maui</strong></td>
<td>34.0</td>
<td>6.2</td>
<td>9.5</td>
<td>4.0</td>
</tr>
<tr>
<td><strong>County of Hawaii</strong></td>
<td>24.8</td>
<td>3.7</td>
<td>8.1</td>
<td>6.2</td>
</tr>
<tr>
<td><strong>County of Kauai</strong></td>
<td>29.0</td>
<td>4.3</td>
<td>9.5</td>
<td>4.0</td>
</tr>
</tbody>
</table>
Summary

- Transportation Fuel Demand is Projected to Increase
- Alternative Fuels and Vehicles are Available
  - Ethanol
  - LPG
  - Biodiesel
  - Hydrogen / Fuel Cell / Electricity
- Incentives are Available
Thank You!