Sustainable Transportation
Designing for the Dynamics

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A Mix of Old and New!
Engines, Fuels, Feedstocks

- Engines and Power Trains
  - Internal Combustion/Explosion Engines
  - Direct Energy Conversion–Batteries and Fuel Cells
  - Degrees of “Hybridization”

- Future Fuels and Feedstocks
  » Animal, Plant or Mineral?
    - Fossil (Gasoline, Diesel, CNG, Propane)
    - Bio & Waste (Biodiesel, Ethanol, Food, etc.)
    - Common Carriers (Electricity, Hydrogen, Methanol, etc.)

“Our Hero

“It would be nice to get the sign right”
Prof. Greg McRae, MIT Chemical Engineering

Remember: Energy Diversity and Energy Efficiency Rarely Work in Parallel

Hybrids, Diesels, etc.

- Where do the “efficiency savings” really come from?

Source: www.fueleconomy.gov
Newer & Better Hybrids

• What’s New?
(http://www.fueleconomy.gov/feg/hybrid_news.shtml)

<table>
<thead>
<tr>
<th>Model</th>
<th>Year</th>
<th>City (mpg)</th>
<th>Highway (mpg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ford Escape</td>
<td>2003</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>Toyota Prius</td>
<td>2003</td>
<td>52</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>60</td>
<td>51</td>
</tr>
<tr>
<td>Honda Insight</td>
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<tr>
<td>Hybrid Civic</td>
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<tr>
<td>BMW H2 Conv.</td>
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<tr>
<td>ex-GM EV1</td>
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<td>ex-Ford Think</td>
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<tr>
<td>DaimlerChrysler GEM</td>
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</tbody>
</table>

Source: www.fueleconomy.gov

Advertising Alternative Vehicles

• What is it about the Wind?

- Honda Insight
- Hybrid Civic
- BMW H2 Conv.
- ex-GM EV1
- ex-Ford Think
- DaimlerChrysler GEM
Newton Rules!!!

- **Transportation is Different!**
  - Energy = Work
  - Work = Force x a Distance
  - Force = Mass x Acceleration

- **Can’t Get Around It**
  - Mass = Vehicle Size/Weight
  - Distance = Trip Length(s)
  - Acceleration = Driving Style, Congestion

Vehicle efficiency is just part of the story.

Magical Mobility Equation...

- **Which Is the Most Important?**
- **Can Any Be Ignored?**
The Demand for Transport

The Three “Ats”

- At Home
- At Work
- At Play

The Most Environmentally Responsible?

Having Fun Working at Home!

Olmstead Creates!!!

- Land Use is Crucial !!!
  - Mixed Use
  - Foot & Bikeways
  - Conservation & Recreation
  - Transportation Carrots & Sticks

- Ignore Them to Everyone’s Detriment
  - Finding the Vision(s)
  - Devoting the Resources to Implement Them
**Getting from A to B...**

- **Get You Out of Your Cars and On To**
  - Public Transportation
  - Sidewalks and Bike Paths
  - Around the Neighborhood

- **“Design” Challenges**
  - Providing ‘Easier’ Alternatives
    - What are “plug & play” solutions to sustainable mobility?
    - Respecting people’s hectic lifestyles
    - Acknowledging that this already an expensive place to live
  - Building upon Boston/New England’s reputation as a compact, livable city/region

- **Couch Potato/Mouse Potato/Traffic Spud**

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**Sustainable “Mobility”**

- **People and Packages**
  - How far and how fast?
  - Mobility for all!

- **Vehicles and Transportation Networks**
  - How heavy and how far? (Trucks, Trains & Planes)
  - Traffic bad enough for you?

- **Future Fuels and Feedstocks**
  - Volume, variability and conversion losses

- **Stay tuned...**
  - *AltWheels* Alternative Transportation Festival
    - Sept. 28-29, 2007 [www.altwheels.org](http://www.altwheels.org)
• Thanks for Listening...
• Thanks for Your Questions...

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Sept. 28-29, 2007
Boston City Hall Plaza