Smart Driving Pilots

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Metropolitan Transportation Commission

- Created by the California Legislature in 1970
- Jurisdiction includes all 9 Bay Area counties
- Governed by 21-member board of primarily local elected officials
- Responsibilities include:
  - Planning
  - Funding
  - Coordination
  - Operations
  - Advocacy
Bay Area Transportation Basics

- More than 4.6 million cars
- Some 28 transit agencies with 4,500 buses, railcars, and ferries
- 20,000 miles of local streets and roads
- 1,420 miles of highway
- 340 miles of carpool lanes
- Eight toll bridges
- 7th most congested region in U.S.
California Climate Change Legislation

- **Assembly Bill 32: Global Warming Solutions Act**
  - Sets the state GHG emissions limit in 2020 at 1990 levels and points the way towards 80% reduction by 2050

- **Senate Bill 375: Sustainable Communities Strategy**
  - Requires the integration of land use and transportation planning in a Sustainable Communities Strategy (SCS) to reduce emissions from light duty vehicles

Per Capita Light Duty Vehicle Emission Reduction Targets
Regional Transportation Plan/ Sustainable Community Strategy

- Road map that guides region’s transportation development over 25-year period
- Updated every four years
- Projects must be consistent with RTP to receive federal, state or regional funding
- SB 375 requires the integration of land use and transportation planning in a Sustainable Communities Strategy
- Plan Bay Area’s GHG emission reduction targets:
  - ~9% reduction expected from land use
  - ~6% reduction expected from elements of Climate Initiatives Program
Climate Initiatives Program Overview

- Transportation 2035: first RTP to outline GHG emission reduction strategies to comply with state laws, adopted in 2009

- $80 million program adopted in December 2009

- Program developed by Commission members, representatives from Bay Area transportation agencies, advocates and staff

- Program makes short-term investments that reduce transportation-related emissions and vehicle miles traveled

- Program focuses on evaluation to inform the next Regional Transportation Plan/Sustainable Communities Strategy
Climate Initiatives Program: Cycle 1

MTC Climate Initiatives Program ($80M)

**Initiatives**
- Innovative Grants ($33M)
- Safe Routes to School ($15M)
- Youth Education ($3M)
- Public Outreach ($7M)

**Projects**
- Funded grant projects (i.e. Bike Share project, EV Charging Stations, Dynamic Car Sharing, etc.)
- Funded infrastructure projects
- TBD projects
- Programs focused on inciting measurable behavior change (e.g. outreach campaigns or pilot programs)

**Tactics**
Methods for increasing audience participation in projects (e.g. tools and outreach)
Identify Targeted GHG-reducing Transportation Behavior(s)

- In late 2010/early 2011, MTC conducted primary and secondary research to identify target behaviors:
  - Random Telephone Survey
  - Extensive Literature Review
  - Online Listening

- Identification of Target Behavior(s) based on:
  - Likelihood of Adoption
  - Scalability
  - GHG Impact
Market Research Findings

• All behavior changes are not equal
  – SMART driving actions are viewed as comparatively easy actions to take
  – Trip reduction/trip modification actions are mixed – trip linking and reducing a trip are viewed as easy, other strategies like telecommuting and flex-schedules were difficult.
  – Mode or vehicle shift are perceived as the most difficult actions to take, with walking being a possible exception. Since emission reduction impact of EVs is so great, scored higher.

• Themes & motivators
  – Altruistic factors were the most compelling – keep Bay Area beautiful for future generations, improving air quality, protect public health
  – Self-interested factors included better for their health, reduce energy use, save time & save money
Smart Driving Pilots

• Pilot initially included testing of two devices:

1) In-vehicle devices using display real-time miles per gallon (MPG) efficiency.

2) Tire pressure caps to encourage timely inflation, improving MPG and driver safety.

• Began pilot in mid-2012 with pre-test of devices

• Found that two of the three devices were unacceptable

• Settled on testing of Ecometer (in-vehicle device) and smart driving education

• Will install OBD Key to capture MPG
OBDKey Overview

- Designed to allow owners to monitor vehicle performance and diagnose problems
- Bluetooth interface
- Custom programmed for MTC’s pilot:
  - Record average fuel use and mileage every 20 cold starts
  - Record % of miles over high speed (set at 65 mph)
  - Record % of miles with high throttle angle (set at 30%)
  - Record average speed
  - Record number of trips
OBDKey Overview, cont.

- **Challenges**
  - Does not work with:
    - Vehicles that do not have OBD (before 1996)
    - Vehicles that do not have a mass air flow sensor (some earlier Hondas)
  - OBD port access needed for Smog Check
  - No internal clock – cannot determine non-use times, just when engine is running.
  - Earlier vehicles shut off OBD port when key was turned off erasing data not stored
  - OBDKey had limited storage capability
### Live Data - Reading from ECU

<table>
<thead>
<tr>
<th>Reading</th>
<th>Status</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>Ready</td>
<td>14.0 volts</td>
</tr>
<tr>
<td>Logging Supported</td>
<td>Ready</td>
<td>Reading data...</td>
</tr>
<tr>
<td>Vehicle speed</td>
<td>Ready</td>
<td>0 kmh / 0.000 mph</td>
</tr>
<tr>
<td>Engine Coolant Temperature at start</td>
<td>Ready</td>
<td>22 Deg C / 71.600 Deg F</td>
</tr>
<tr>
<td>Total Distance</td>
<td>Ready</td>
<td>0.000 KM / 0.000 miles</td>
</tr>
<tr>
<td>Mass Air Flow</td>
<td>Ready</td>
<td>3.85 grammes per second</td>
</tr>
<tr>
<td>Fuel Used This Trip</td>
<td>Ready</td>
<td>0.037 gallons</td>
</tr>
<tr>
<td>Average Speed This Trip</td>
<td>Ready</td>
<td>Not recorded</td>
</tr>
<tr>
<td>Throttle Position</td>
<td>Ready</td>
<td>3 % of wide open</td>
</tr>
<tr>
<td>Over Speed Distance This Trip</td>
<td>Ready</td>
<td>0.000 KM / 0.000 miles.</td>
</tr>
<tr>
<td>Over Throttle Distance This Trip</td>
<td>Ready</td>
<td>0.000 KM / 0.000 miles.</td>
</tr>
<tr>
<td>Total Logging Time</td>
<td>Ready</td>
<td>336 secs</td>
</tr>
<tr>
<td>Cold start trip distance(s)</td>
<td>Ready</td>
<td>0.000 KM / 0.000 miles.</td>
</tr>
</tbody>
</table>

### Settings

<table>
<thead>
<tr>
<th>Reading</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current # Log Records</td>
<td>13</td>
</tr>
<tr>
<td>Current # Trips</td>
<td>59</td>
</tr>
<tr>
<td>Over TPS Distance Total</td>
<td>16319m / 10.142 miles</td>
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<td>Over Speed Distance Total</td>
<td>256000m / 159.110 miles</td>
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<td>Distance Total</td>
<td>534266m / 332.049 miles</td>
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<td>Fuel Total</td>
<td>10.460 gallons</td>
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<td>Average Moving Speed</td>
<td>73.295kmh / 45.553 mph</td>
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<tr>
<td>Total recording time</td>
<td>26480 secs</td>
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<tr>
<td>Trip distance(s) since cold start</td>
<td>0m / 0.000 miles.</td>
</tr>
<tr>
<td>Clear All Log and Archive Data</td>
<td>Delete all records</td>
</tr>
</tbody>
</table>

**Air Fuel Ratio = 14.1 : 1**
**Fuel Density = 2828 grammes per gallon**
Ecometer

- Connects to OBD port, mounts on dash
- Digital readout of instantaneous fuel economy
- Colored slider band – turns yellow and red with low mpg
Smart Driving Pilots

- Began Pilot in late 2012 by recruiting participants on 511.org website
- Offered $50 gift card as incentive
- After screening for vehicle type, had over 30 interested participants
- Began installing OBD Key devices in early 2013
- Eight participants had Ecometer’s installed, eight did not
- Started pilot activities/communication with first cohort with 16 participants in summer 2013
Smart Driving Pilots

- All 16 participants received biweekly “lessons” on smart driving and invitation to join a closed Facebook page
  1. Lesson 1: Smart Driving Overview
  2. Lesson 2: Driving Smoothly
  3. Lesson 3: Driving Defensively
  4. Lesson 4: Vehicle Maintenance
  5. Lesson 5: Vehicle Weight & Aero-dynamics
  6. Lesson 6: Trip Planning
Participant Schedule

Cohort 1
- Recruitment and installation of OBDKey
- Pull baseline MPG and install Ecometer
- Smart Driving lessons
- Device removal and data collection

Cohort 2
- Recruitment and installation of OBDKey
- Pull baseline MPG and install Ecometer
- Smart Driving lessons
- Device removal and data collection
Early Lessons Learned

- **Eager Participants**: Easy to recruit and resilient (didn’t mind delay in start).

- **Collecting actual data with OBD Key is challenging**: It’s difficult to schedule appointments, requires disassembly of dash and many older vehicles aren’t compatible.

- **Facebook participation minimal**

- **Baseline fuel economy shows little weekly variation**: Most vehicles are within 10% of their EPA-rated fuel.

- **Most find Ecometer useful and functional.**
Next Steps

• Complete second cohort over the next few weeks
• Will evaluate results December 2013 & January 2014
• Will tweak second wave based on results of first cohort
• Hope to have a smart driving campaign summer 2014 using in-vehicle devices and education
THANK YOU!

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