Telematics for fleets with electric vehicles

ROI that makes you smile™
Getting a Positive ROI on Green Fleet Initiatives

Turning off the light

Installing LED bulbs

Behavior management

Technology switching

If you were an energy conservation manager and your metric of success was energy savings, which strategy would you allocate your budget towards?
From a vehicle GHG reduction potential perspective...

<table>
<thead>
<tr>
<th>Smoother Acceleration and Braking</th>
<th>Reduction of Idling</th>
<th>Using Electric Vehicles instead of Petroleum Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 % to 8 %</td>
<td>12 % to 34 %</td>
<td>60 % to 99 %</td>
</tr>
</tbody>
</table>
Most telematics systems will help …

- Track vehicle location in real-time
- Notify you if there is an issue with the vehicle
- Track idling and driving behavior
- Schedule preventative maintenance
- Prevent fuel theft
- Prevent vehicle theft
- Track hours of service
- Improve productivity through enhanced dispatch
Technology differentiation is to help fleets:

1. **INCREASE EV ADOPTION**
   - General telematics with EV suitability modelling software

2. **MAXIMIZE EV ROI**
   - EV monitoring with utilization goals & EV smart charging technology
ICE Vehicles: Utilization as Average Daily Distance

Average distance for ICE fleet vehicles: 40 miles/day (~63 km / day)

% of vehicles travelling < 40 miles per day: 56%

Sample size = 3,686

Telematics for fleets with electric vehicles
Average distance for BEV fleet vehicles:

22 miles/day
(~36 km / day)

% of vehicles with < 40 miles per day:
70%

Sample size = 3,488
The Fleet Electric Vehicle Pool

Why is it risky to put your EVs in the pool?
FleetCarma Modelling Video Demonstration

Electric Vehicle Modelling and Simulation

Logged Vehicle
2010 Ford Fusion
2.5 L

Logged Vehicle Speed (mph)

Logged Gasoline Use

Trip Metrics
Distance: 18.01 miles
Fuel Economy: 30.37 MPG

Simulated Electric Vehicles

2014 Nissan Leaf

Vehicle Speed (mph)

Simulated Gasoline Use (gal)

2014 Toyota Plug-in Prius

No Gasoline
All Electric Vehicle

Battery State of Charge (%)

2014 Ford Fusion Energi

Telematics for fleets with electric vehicles
FleetCarma Modelling Video Demonstration

Electric Vehicle Modelling and Simulation

Logged Vehicle
2010 Ford Fusion
2.5 L

Logged Vehicle Speed (mph)

Logged Gasoline Use
Total Gasoline Use: 0.59 gal

Trip Metrics
Distance: 18.01 miles
Fuel Economy: 30.37 MPG

Simulated Electric Vehicles

Vehicle Speed (mph)

Simulated Gasoline Use (gal)

Battery State of Charge (%)
Final State of Charge: 24.8%
Power Used: 5.56 kWh

2014 Nissan Leaf
No Gasoline
All Electric Vehicle

2014 Toyota Plug-in Prius
Total Gasoline Use: 0.26 gal
Final State of Charge: 27.0%
Power Used: 0.91 kWh

2014 Ford Fusion Energi
Total Gasoline Use: 0.30 gal
Final State of Charge: 18.8%
Power Used: 2.12 kWh

Telematics for fleets with electric vehicles
Benchmark this duty cycle

Data logger

Fleet:
Vehicle: 2010 Ford Fusion
Unit Id: 1442

Log Dates: March 25 - April 10 2013
Logtime: 16 Days, 0 Hours
Operation Hours: 27.5 (1.7 h/operating days)
Time Idling: 318.8 min (19.3%)
Total Distance: 632 mi
Travelled: 632 mi
Longest Single Day: 194 mi

Consumption: 21 MPG
1,572 Wh/mi
Carbon Emissions: 1.20 lb/mi

Daily Utilization

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Telematics for fleets with electric vehicles

Monitoring ICE vehicles to plan for EV adoption

### FleetCarma Device

![FleetCarma Device Image]

#### Baseline vehicle

- **2010 Ford Fusion**
  - Range Capable: Yes
  - Charge Capable: No
  - Energy: 21 MPGeq
  - Emissions: 1.20 lb/mi
  - Annual Cost: $9,341
  - FleetCarma Score: 65

#### Simulated results of plug-in vehicles

- **2012 Toyota Prius-Plugin**
  - Range Capable: Yes
  - Charge Capable: Yes
  - Energy: 70%
  - Emissions: 71%
  - Annual Cost: $6,886
  - FleetCarma Score: 65

- **2012 Chevrolet Volt**
  - Range Capable: Yes
  - Charge Capable: Yes
  - Energy: 73%
  - Emissions: 76%
  - Annual Cost: $6,943
  - FleetCarma Score: 66

- **2012 Nissan Leaf**
  - Range Capable: Yes
  - Charge Capable: Yes
  - Energy: 85%
  - Emissions: 89%
  - Annual Cost: $5,736
  - FleetCarma Score: 61

- **2013 Ford Focus EV**
  - Range Capable: No
  - Charge Capable: Yes
  - Energy: 88%
  - Emissions: 92%
  - Annual Cost: $6,477
  - FleetCarma Score: 56
Sample fleet assessment results

Total Cost of Ownership Current Vehicles vs. Electric Vehicle

- Electric vehicle had lower total cost of ownership 11 times out of 25 duty cycles examined
- Current Vehicle
- Simulated Electric Vehicle

Financial Savings: 16% ↓ $233,559
Fuel Reductions: 64% ↓ 45,282 gallons
GHG Emissions Reductions: 67% ↓ 524 tons CO₂

Duty cycles suitable for EV: 44%
Avg. savings/vehicle changed: $21,232 ($252/month)

Telematics for fleets with electric vehicles
> 40 Electric Vehicle Models Supported in Firmware

- Altec JEMS HD trucks
- BMW i3
- Cadillac ELR
- Chevrolet Volt
- Chevrolet Spark EV
- Citroen C-Zero
- Coda Sedan
- EVI F550 PHEV
- Fiat 500e
- Ford Transit Connect EV
- Ford Focus EV
- Ford CMAX Energi
- Ford Fusion Energi
- Honda Fit EV
- Honda Accord PHEV
- Kia Soul EV
- Mitsubishi i-MiEV
- Mitsubishi Outlander PHEV
- Modec Delivery Van
- Navistar eStar
- Nissan LEAF
- Nissan eNV200
- Opel Ampera
- Peugeot iOn
- Phoenix e-shuttle bus
- Porsche Panamera e-Hybrid
- Renault Fluence
- Renault Kangoo
- Renault Twizy
- Renault ZOE
- Smart fortwo electric drive
- Smith Newton
- Tesla Model S
- Transpower e-trucks and buses
- Toyota Prius Plug-in
- Toyota RAV4 EV
- Via Motors EREV truck
- Via Motors EREV van
- Volvo V60 PHEV

... and more being added frequently
# Ford Focus EV – Vehicle Dashboard

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured Odometer</td>
<td>36,778 mi</td>
</tr>
<tr>
<td>Distance Logged</td>
<td>3,103 mi</td>
</tr>
<tr>
<td>Idle Fraction</td>
<td>20 Percent</td>
</tr>
<tr>
<td>Total CO2 Emissions</td>
<td>0 lb/mi</td>
</tr>
<tr>
<td>Electricity Consumption</td>
<td>145 Wh/mi</td>
</tr>
<tr>
<td>Driver Score</td>
<td>80 Rating (out of 100)</td>
</tr>
<tr>
<td>Battery Health</td>
<td>100 Percent</td>
</tr>
<tr>
<td>Electricity Consumed</td>
<td>725 kWh</td>
</tr>
<tr>
<td>Charger Loss</td>
<td>71 kWh</td>
</tr>
<tr>
<td>Total Charging</td>
<td>815 kWh</td>
</tr>
<tr>
<td>Average Starting SOC</td>
<td>59 Percent</td>
</tr>
<tr>
<td>Average Ending SOC</td>
<td>38 Percent</td>
</tr>
</tbody>
</table>

42312
2012 Ford Focus EV
F5332C

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Charging Histogram Dashboard

Charging by Time of Day

- Charging Energy Consumed in Target Time Period
- Charging Energy Consumed Outside Target Time Period

Telematics for fleets with electric vehicles
Daily Utilization of Trips and Charge Events

Electric driving = 16%

Before plug-in compliance policy and management

Electric driving = 73%

After plug-in compliance policy and management

Telematics for fleets with electric vehicles
Customers that use FleetCarma to monitor their PHEVs are able to see a return on investment in a number of ways including ensuring that vehicles are being plugged-in and maximizing the electric vehicle miles travelled as a proportion of total miles.

Prior to Plug-in Compliance Policy

- Energy Cost: $8.30 per 100 miles
- Payback Period: 4.1 years
- Electric fraction: 16%

After Plug-in Compliance Policy

- Energy Cost: $4.20 per 100 miles
- Payback Period: 2.6 years
- Electric fraction: 73%
- Energy Savings: $60.66 / month
Smart Charging Web Portal

Telematics for fleets with electric vehicles
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