



MOBILE-ECO²

Cost Savings with Real Vehicle Data

Bill McFarland
Dir. Sales Engineering



Agenda

MOBILE-ECO² Savings in ECOlogy & ECONomy

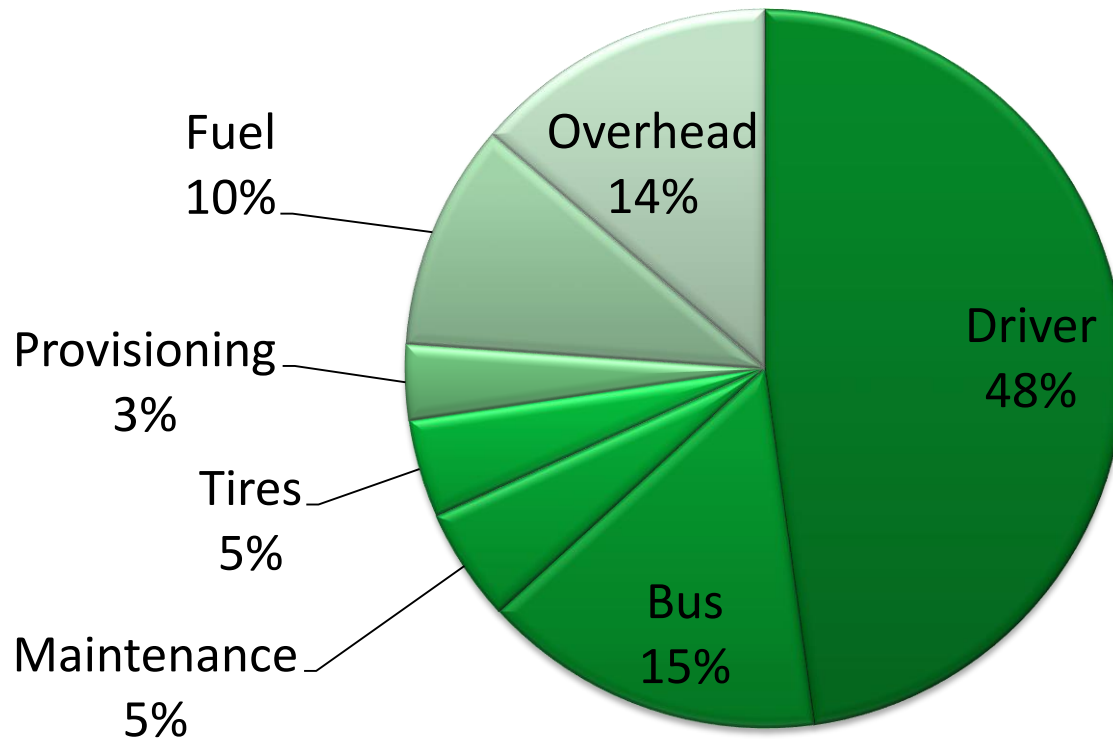
- **Cost Savings with real vehicle data**
- **Operational cost breakdown**
- **Vehicle health & driver behavior solution**
- **Reports and Dashboards**

Real Vehicle Data

- Today's vehicles are equipped with numerous interconnected electronic control units
 - To function more efficiently and exchange data with each other
 - To obtain diagnostic data on abnormalities or malfunctions which can be stored for future maintenance activities
- Collected data gives access to:
 - Vehicle status
 - Vehicle performance
- The high level objective is to exploit this vehicle data incorporating it into business processes to realize cost savings

Operating Costs Breakdown

Costs per Vehicle Mile



Challenges

- The challenges are:
 - Gathering data across non-homogenous fleets
 - Bringing it into a usable format
 - Converting the data into actionable information
 - Realizing trends and developments
 - Providing data to the point of action
- Automated process benefits
 - Overcomes the challenges
 - Provides information at the right time
 - Puts actionable information into the right hands

MOBILE-ECO²

■ Vehicle Health

- Real in-vehicle data recorded and formatted for optimization of onboard and offboard business processes
- Onboard and off board components and device monitoring
- Data sources
 - Full J1939
 - Engine
 - Transmission
 - Brakes
 - Tire Pressure Sensors
 - Gateway J1939 or serial for digital/ analog Inputs
 - 3D accelerometer



MOBILE-ECO²

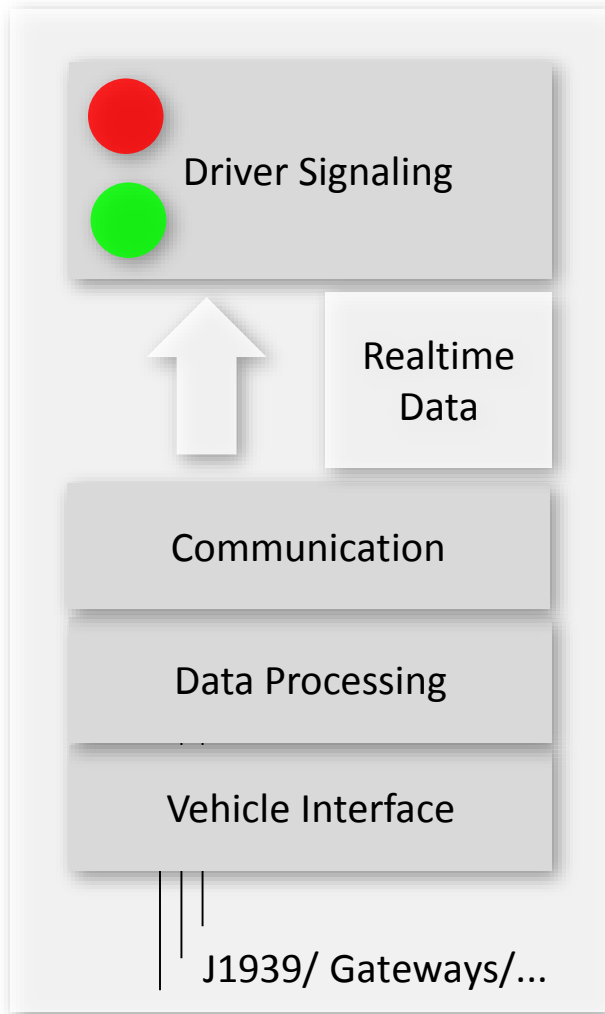
Driver Behavior

- Computes costs per driver
- Makes drivers aware of the impact of their driving behavior on the public transportation company
- Provides 5 status indicators:
 - Excessive revving of the engine
 - Excessive idling
 - Harsh Acceleration/Braking
 - Abrupt lane changing or turning
 - Speeding alert

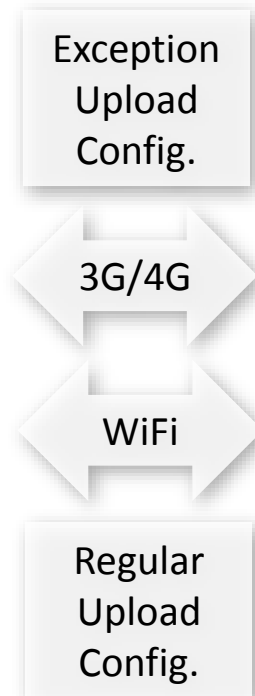
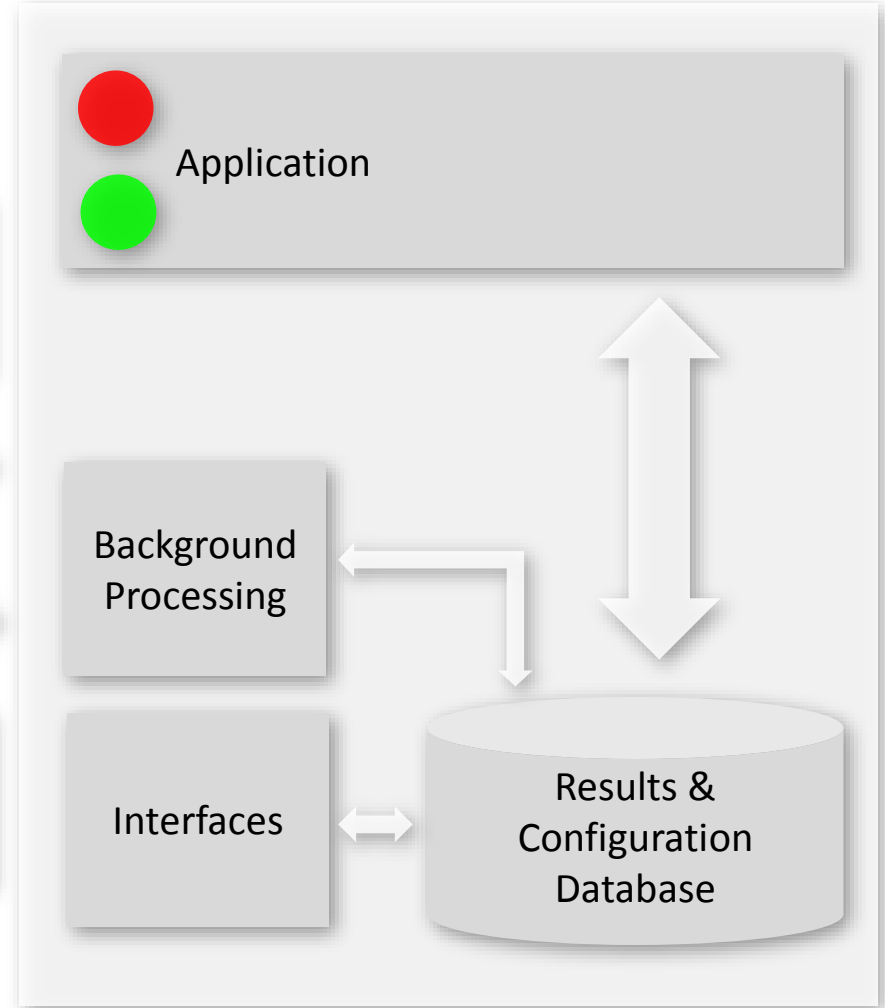


MOBILE-ECO² - Architecture

In-Vehicle System



Central System



MOBILE-ECO² – Application Structure

Maintenance

- Objective: Display current health status of vehicles
- View of
 - Vehicles
 - Failures and Warnings
- Actions:
 - List vehicles with failures
 - Act on critical vehicle alarms
 - Trigger maintenance activities (planning, work order, spare parts, ...)

MOBILE-ECO² – Application Structure

Performance & Reliability

- Objective: Investigate performance and reliability characteristics of vehicles and components
- Views of (dashboards)
 - Vehicles, vehicle types, components and component types



MOBILE-ECO² – Application Structure

Driver Behavior

- Objective: Analyze driving behavior with a focus on fuel consumption and customer comfort
- View: Drivers and their statistical behavior over time in relation to context (vehicle type, route, time of day, weather...)
- Live Look-in of telemetry & behavior
- Actions:
 - Train drivers to improve their behavior
 - Feedback loop to monitor improvements

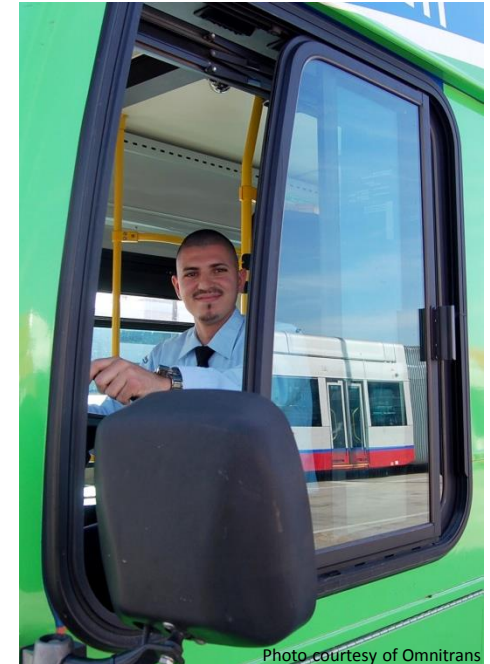


Photo courtesy of Omnitrans



MOBILE-ECO² – Application Structure

Asset Management

- Objective: Maintain a record over the complete lifecycle of a vehicle
- View of:
 - Vehicles with setup information
 - Changes, events, maintenance activities, ...
- Actions:
 - Provide information about a vehicle's history
 - Use information for legal/ warranty purposes
 - Provide information for MAP-21

MAP-21

MOBILE-ECO² - Stand-alone option



The iMobil

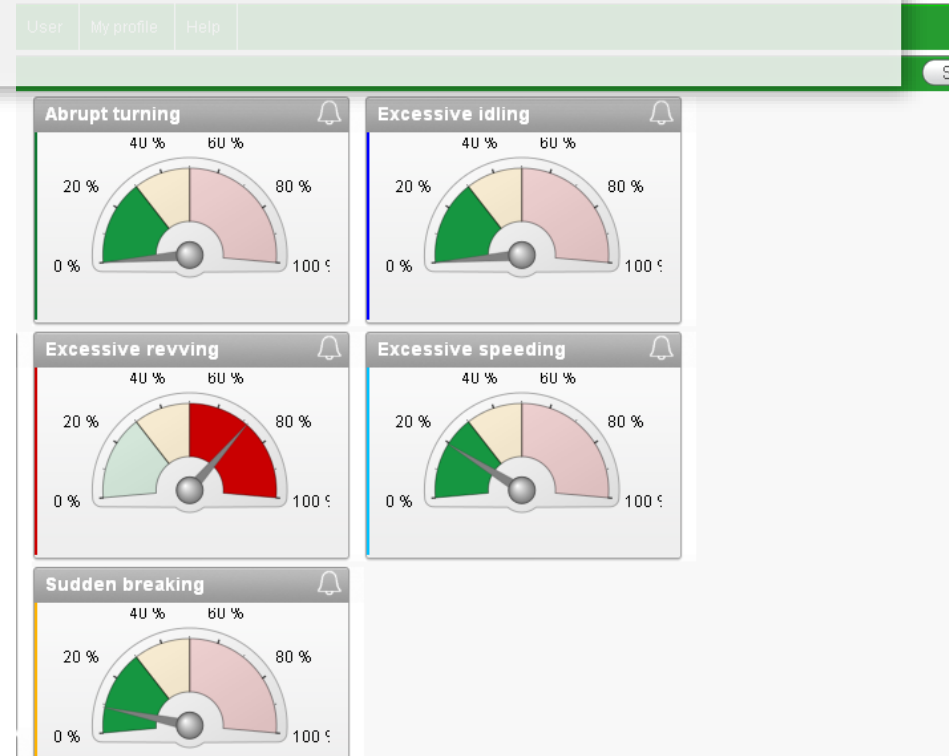
- Onboard computer
for independent
operation

- CAN for connecting to the vehicle J1939 CAN bus system
- CAN for connecting to the RTI
- Serial for connecting to the Bus Fare Equipment System
- Ethernet, USB, serial for maintenance, updates, troubleshooting, etc.

Reports

Presentation Tools

- Mainstream database formats -- Oracle and MS SQL
- Graphical Dashboards for KPIs
- Map based presentations of Maintenance and Driver issues
 - Higher levels for availability
 - Lower levels for specialists
 - Stored details minimizes physical trips to vehicles



Vehicle Control Board		Vehicle Trends			Vehicle Event History			init ECO2		
Vehicle ID	Time Stamp	Stop Engine	Check Engine	Stop System (Transmission)	Check System (Transmission)	Engine Temp	Oil Pressure	Coolant Level	Transmission Temp	Fan Fault Light (EMP)
V25138900	07/22/2014 18:02					198	38	84%	225	
V25138901	07/22/2014 18:04				⚠	200	35	80%	260	
V25138902	07/22/2014 18:01			⚠		202	34	82%	230	
V25138903	07/22/2014 18:09		⚠			195	36	85%	215	
V25138904	07/22/2014 18:04					196	39	97%	212	
V25138905	07/22/2014 18:11					197	36	93%	208	
V25138906	07/22/2014 18:12					203	32	89%	219	
V25138907	07/22/2014 18:18		⚠			210	37	86%	225	

Current Vehicle Status Details

Component	Manufacturer	Code	Top	Description	Time Stamp
Engine	Cummins CM123	157	Engine Injector Metering Rail 1 Pressure	Voltage above normal or shorted to high source	07/22/2014 18:02
Transmission	Allison X128	130	Transmission Temp Exceeded Custom Threshold		07/22/2014 18:04

Reports

Operational Reports

Home | Operation Day | Standard Reports | My profile | Help

Mileage Report

Vehicle

Vehicle : B9TL 161671

No.	Operation Day	Hour	Distance
1	12-JUN-14	00:00	12720
2	12-JUN-14	01:00	18196
3	12-JUN-14	02:00	9172
4	12-JUN-14	03:00	17228
5	12-JUN-14	04:00	12240
6	12-JUN-14	05:00	16904
7	12-JUN-14	06:00	17868
8	12-JUN-14	07:00	9660
9	12-JUN-14	08:00	17224
10	12-JUN-14	09:00	8376
			139588

Vehicle : WEB62808323125355

No.	Operation Day	Hour	Distance
11	12-JUN-14	00:00	13890
12	12-JUN-14	01:00	10265
13	12-JUN-14	02:00	15470

Date period

*From: 12-Jun-14
 *Until: 12-Jun-14

Fuel Report

Vehicle

Vehicle : B9TL 161671

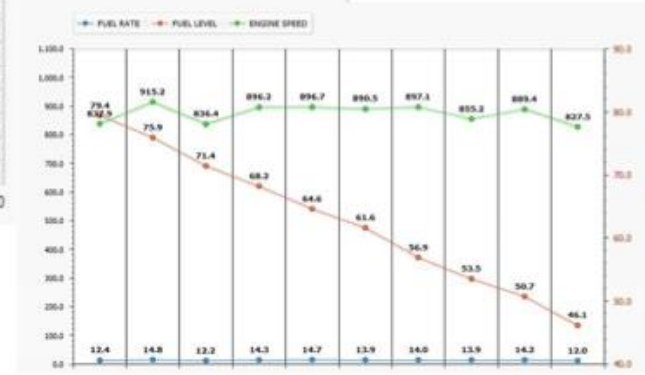
No.	Operation Day	Hour	Fuel Rate	Fuel Level	Engine Speed
1	12-JUN-14	00:00	12.44	79.4	836
2	12-JUN-14	01:00	14.77	75.9	915
3	12-JUN-14	02:00	12.18	71.4	836
4	12-JUN-14	03:00	14.28	68.2	896
5	12-JUN-14	04:00	14.67	64.6	897
6	12-JUN-14	05:00	13.93	61.6	890
7	12-JUN-14	06:00	14	56.9	897
8	12-JUN-14	07:00	13.87	53.5	855
9	12-JUN-14	08:00	14.2	50.7	889
10	12-JUN-14	09:00	11.99	46.1	827

1 - 10

Date period

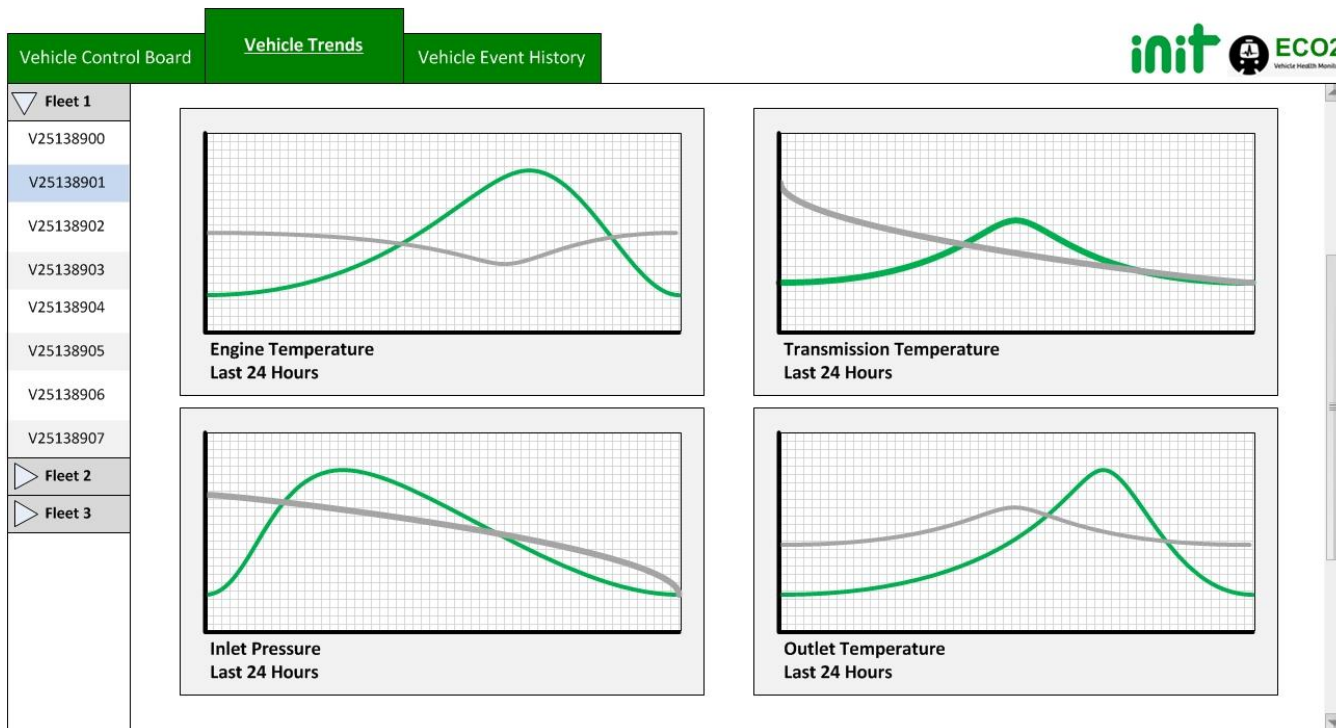
*From: 12-Jun-14
 *Until: 12-Jun-14

Vehicle
 B9TL 161671



Reports

Trend Reports



Reports

Event Reports

The screenshot displays a software interface for vehicle event reporting. It features two map views and a control panel on the right.

Top Map: Titled "Map: 12-JUN-14 Vehicle 71878101000". It shows a wide area of a city with a route highlighted in red and blue. The interface includes a navigation bar with "Zoom to Point", "Reset Zoom", and "Close" buttons, and a menu with "Home", "Operation Day", "Standard Reports", "My profile", and "Help".

Bottom Map: Titled "Map: 12-JUN-14 Vehicle 71878100989". It provides a zoomed-in view of a specific route. Three event callouts are visible:

- 00:05:01 - Excessive Revving (Excessive Revving)
- 05:08:11 - Excessive Speeding (Excessive Speeding)
- 02:02:01 - Sudden Braking (Sudden Braking)

Right Panel: Contains a "Time Filter" section with a range from 00:00 to 36:00. Below it is a "Filter" section with the following options:

- Route
- Driver Events
- Abrupt Turning
- Excessive Idling
- Excessive Revving
- Excessive Speeding
- Sudden Braking
- Others
- Cyclic event
- Trip start
- Trip

Reports

Driver Behavior Reports

Home Operation Day Standard Reports My profile Help

Operation days > Driver Behaviour

Vehicles 12-JUN-14

Go Reports 3 Events Actions

1 - 125 of 125

Opd Date : 12-JUN-14, Class : Excessive Revving

No.	Veh Name	Type	Act Time	Odometer	Veh Speed	Gps Longitude	Gps Latitude
1	B9TL 161671		00:05:01	44578804	5.329	103.852332	1.36030
2	B9TL 161671		05:38:41	44656888	11.121	103.891451	1.34361
3	B9TL 161671		05:38:41	44656888	11.274	103.891428	1.34371
4	B9TL 161671		05:38:42	44656888	11.121	103.891451	1.34361
5	B9TL 161671		06:41:22	44675564	6.171	103.87819	1.36932

Opd Date : 12-JUN-14, Class : Excessive Speeding

No.	Veh Name	Type	Act Time	Odometer	Veh Speed	Gps Longitude	Gps Latitude
6	B9TL 161671		00:18:10	44581540	15.579	103.868161	1.37191
7	B9TL 161671		00:18:15	44581540	16.459	103.86907	1.37181
8	B9TL 161671		00:18:16	44581540	16.459	103.86907	1.37181
9	B9TL 161671		01:45:33	44602956	15.766	103.892378	1.35611
10	B9TL 161671		01:45:35	44602956	16.772	103.892517	1.35741
11	B9TL 161671		01:45:36	44602956	16.772	103.892517	1.35741
12	B9TL 161671		01:45:39	44602956	16.736	103.892681	1.35791
13	B9TL 161671		01:45:41	44602956	16.75	103.892756	1.35821
14	B9TL 161671		01:45:42	44602956	16.74	103.892793	1.35841
15	B9TL 161671		01:45:42	44602956	16.75	103.892756	1.35821
16	B9TL 161671		01:45:42	44602956	16.75	103.892756	1.35821

Date period

*From: 12-Jun-14

*Until: 12-Jun-14

< >

Legend

Dashboard 12-JUN-14

Total

FLOP driver

TOP driver

Abrupt turning

Excessive speeding

Excessive idling

Sudden breaking

History

Date period

*From: 12-Jun-14

*Until: 12-Jun-14

<< >>

Settings

*Period: Day

*History: 5

Visibility/Weighting factor





















































Reports

Driver Economic Report

- Demonstrates areas of success or improvements
- Provides clear KPI's
- Grades across several performance categories
- Allows for driver incentive / improvement

Safe & Economical Driving Report

Fleet average	Savings achieved	Savings opportunity	YTD Savings achieved	YTD Savings opportunity
	2,85	5,87	31,45	70,12

	Total	Brake	Overrun	Engine	Over speed	
Fleet average						
Jenkins						 91-100
Davis						 81-90
Harris						 71-80
Smith						 61-70
Taylor						 51-60
Jones						 41-50
Henderson						 <40
Jarad						

An aerial photograph of a city, likely New York City, showing a dense urban landscape with various buildings and streets. Overlaid on the image are several glowing green lines that represent energy or data flow, originating from the bottom left and spreading across the city. The text is centered over the image.

Thank you
for your attention

Bill McFarland
wmcfarland@initusa.com
www.initusa.com