Hybrid Truck Fieldtest

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Introduction

1. DAF in HCV

2. Hybrid customer fieldtest
   - Locations
   - Vehicles
   - Results

3. Conclusions

DAF in HCV

- Vehicle test procedure development & validation

- Safety guidelines (design, use, maintenance, recycling)
  - Overview of existing safety norms and guidelines
  - Identification of gaps in current norms
  - Norms currently in development
  - Report is publicly available

- Hybrid customer fieldtest demonstration

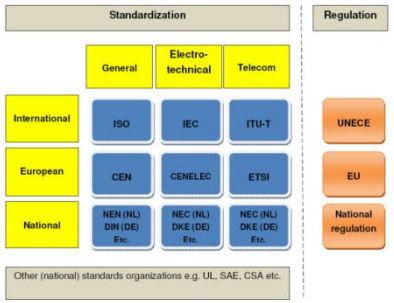
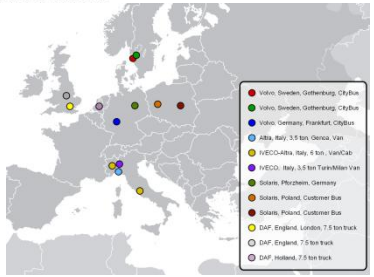
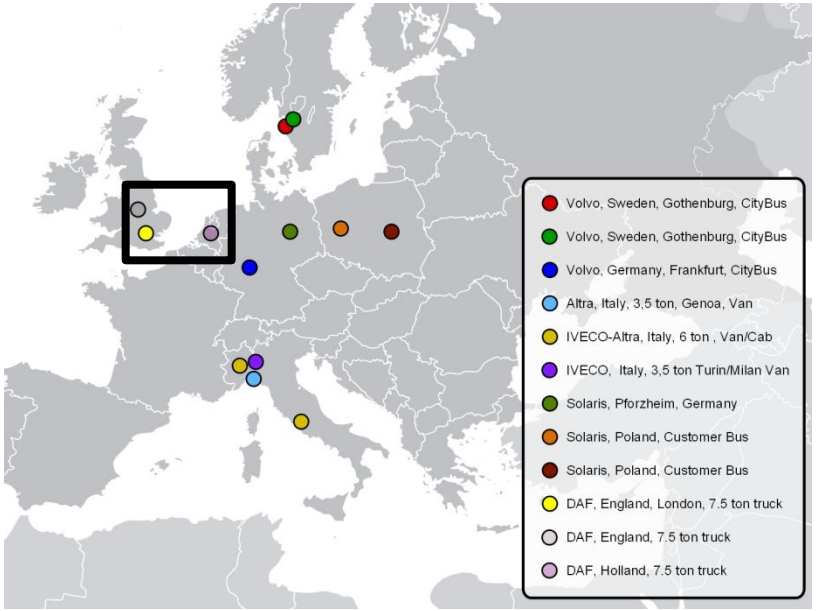


Figure 1: Standardization



Fieldtest validation & demonstration of hybrids

- Field tests locations
  - London
  - Hull
  - Eindhoven
- Highly varying usage patterns



Fieldtest validation & demonstration of hybrids

- Approach
  - ~3000km
  - ~4 weeks
  - 6 vehicles
  - 3 Hybrid trucks (euro5)
  - 3 Reference trucks (euro5)

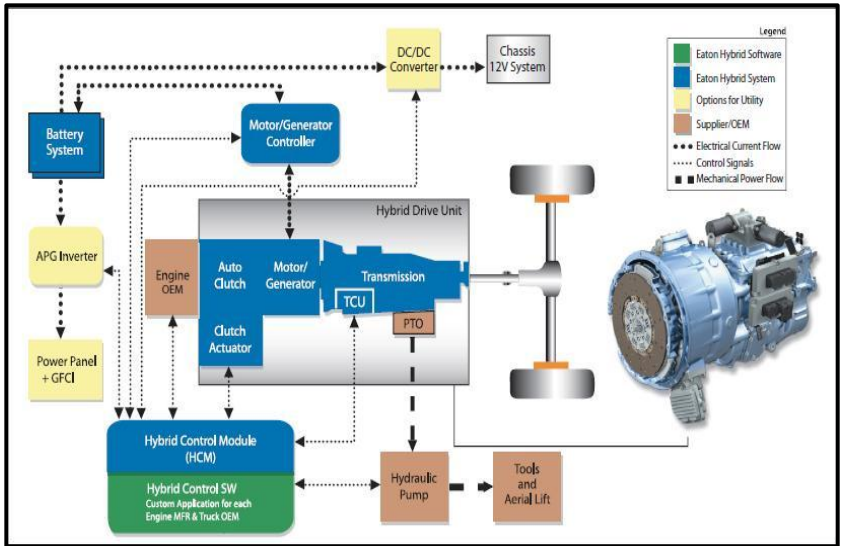
Reference (euro5)

Hybrid (euro5)

Powertrain specifications

		
Engine type	FR118 (4 cyl, 4.5 litres)	FR118 (4 cyl, 4.5 litres)
Engine power	118 kW (1900 rpm)	118 kW (1900 rpm)
Engine torque	600 Nm (1200-1800 rpm)	600 Nm (1200-1800 rpm)
Gearbox	5s42	Hybrid
Number of gears	5	6
Differential ratio	3.73	3.73
Tyres	225/75 R17.5	225/75 R17.5

Hybrid specifications

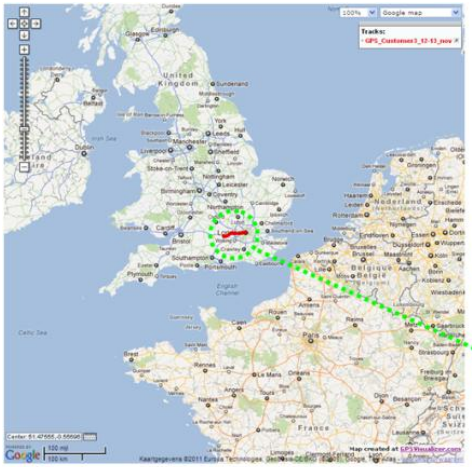


Emotor type	Permanent Magnet
Emotor power	44kW peak, 26kW nominal
Emotor torque	420Nm peak, 250Nm nominal
Battery type	Lithium Ion
Battery size	1.9kWh
Battery cooling	Air cooled
Total weight	300kg
Auxiliaries	24V DC/DC-converter
E-range	~2km

Field test location 1: London (UK)

Statistics

	Reference		Hybrid
Distance [km]	3500		3250
Fuel consumption [l.100km^{-1}]	16.1	**-7.5%**	14.9
Average velocity [kmh^{-1}]	47.8		46.1
Start-stops [#]	-		2445 (Short: 1886) (Long: 559)
Start-stops [#.100km^{-1}]	-		75 (Short: 58) (Long: 17)

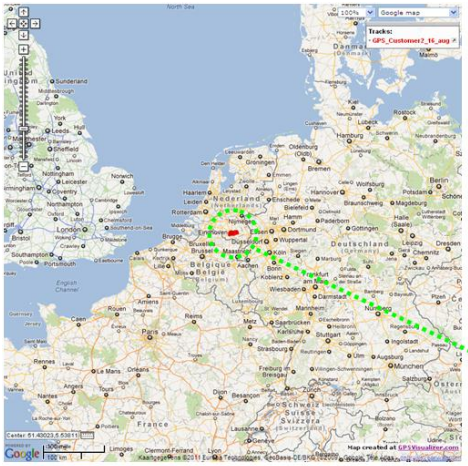


Example route

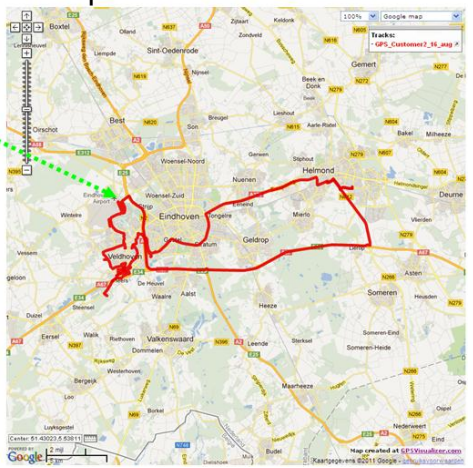
Field test location 2: Eindhoven (NL)

Statistics

	Reference		Hybrid
Distance [km]	3000		2500
Fuel consumption [l.100km^{-1}]	17.2	**-13.4%**	14.9
Average velocity [kmh^{-1}]	33.2		32.1
Start-stops [#]	-		2007 (Short: 1576) (Long: 431)
Start-stops [#.100km^{-1}]	-		80 (Short: 63) (Long: 17)



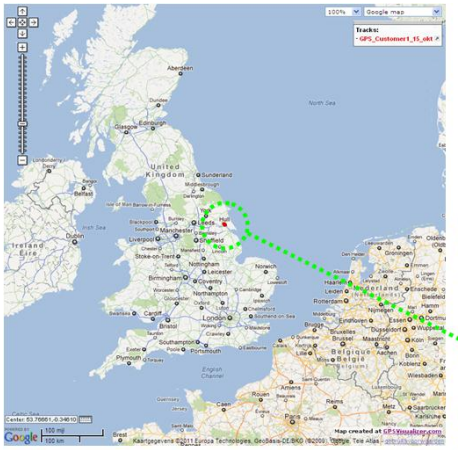
Example route



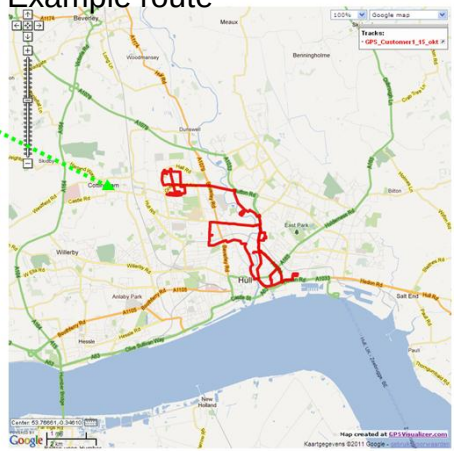
Field test location 3: Hull (UK)

Statistics

	Reference		Hybrid
Distance [km]	1500		1400
Fuel consumption [l.100km^{-1}]	21.8	**-21.1%**	17.2
Average velocity [kmh^{-1}]	19.3		20.9
Start-stops [#]	-		1812 (Short: 1495) (Long: 317)
Start-stops [#.100km^{-1}]	-		129 (Short: 107) (Long: 22)



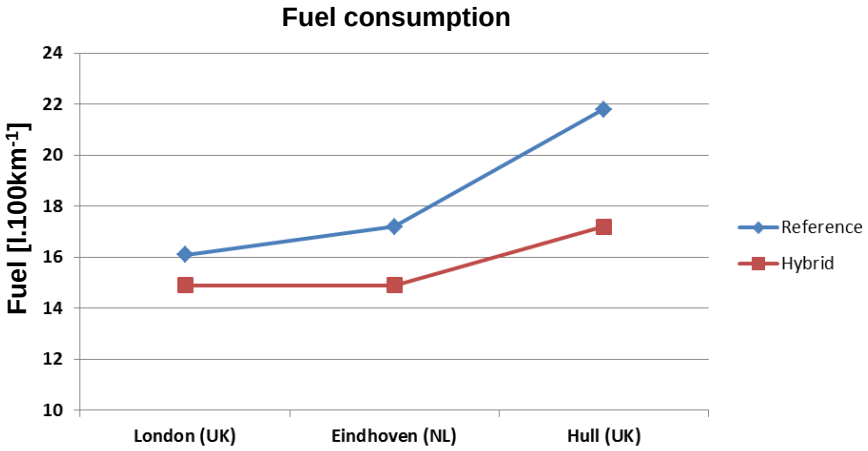
Example route

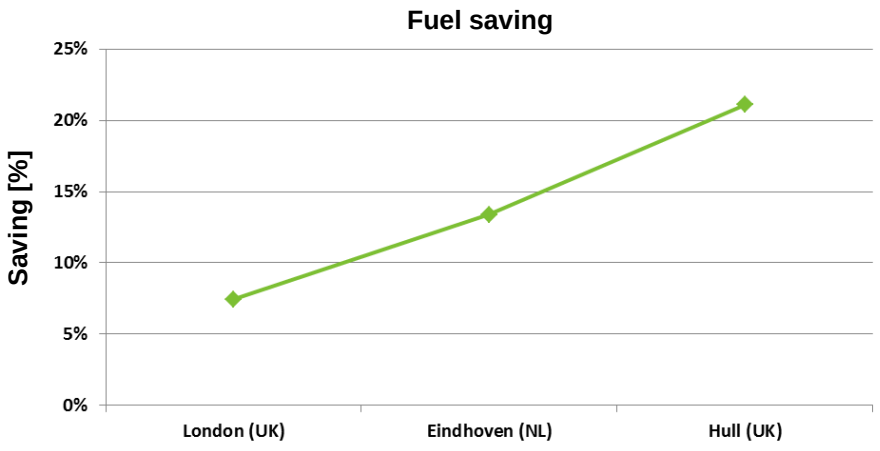


Field test results overview (1)

Observations/conclusions:

- Large spread in absolute fuel consumption of both reference and hybrid trucks.
- However, spread of absolute fuel consumption of hybrid trucks is significantly smaller (-50%).
- Therefore also large spread in relative fuel consumption of trucks.

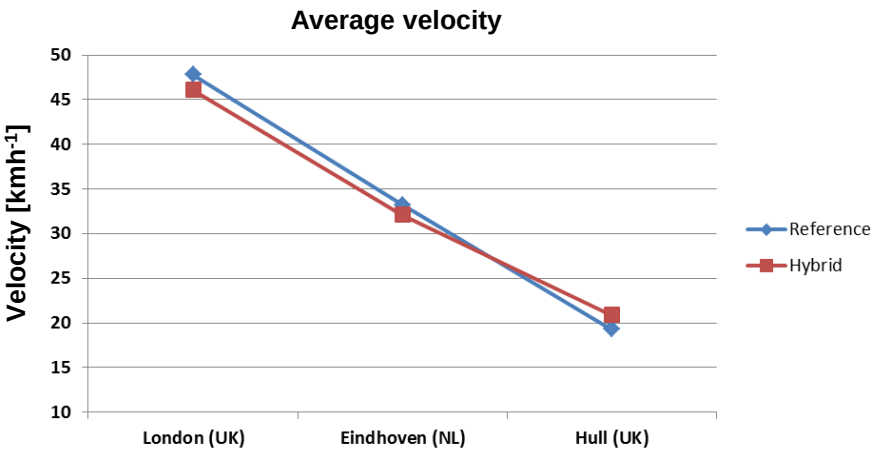


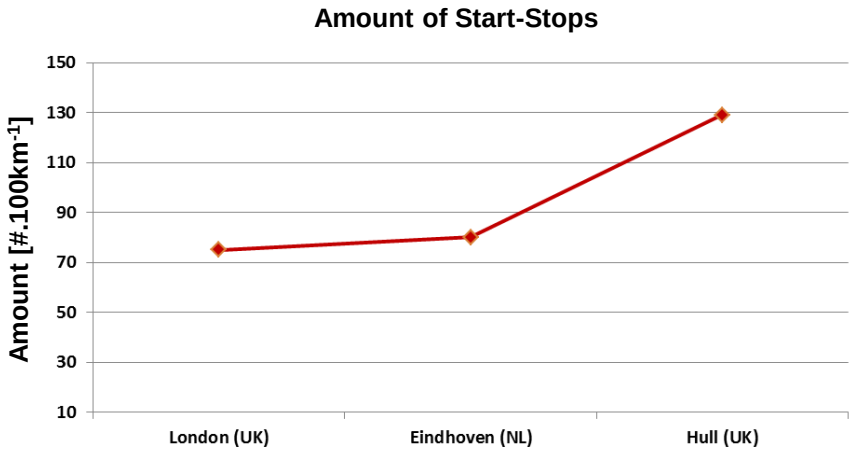


Field test results overview (2)

Observations/conclusions:

- Large spread in usage pattern for this class/type of trucks.
- Average velocity of reference trucks is not significantly different compared to hybrid trucks.
- No strong relation between average velocity and number of stops.

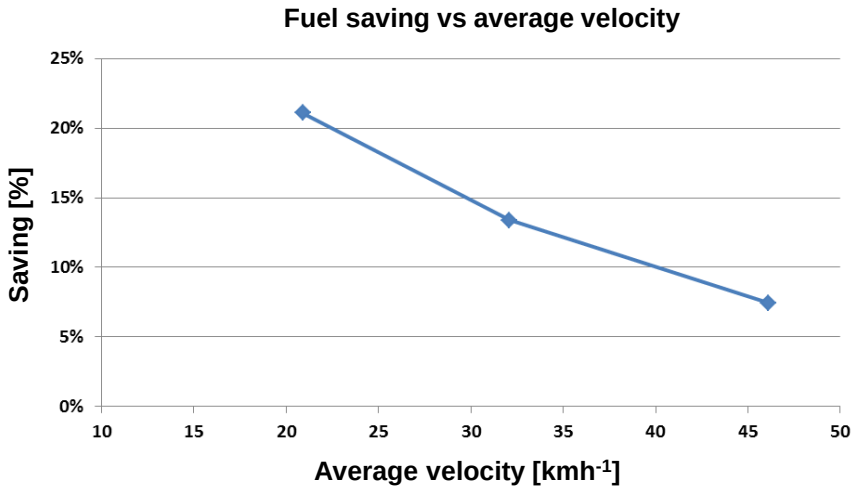


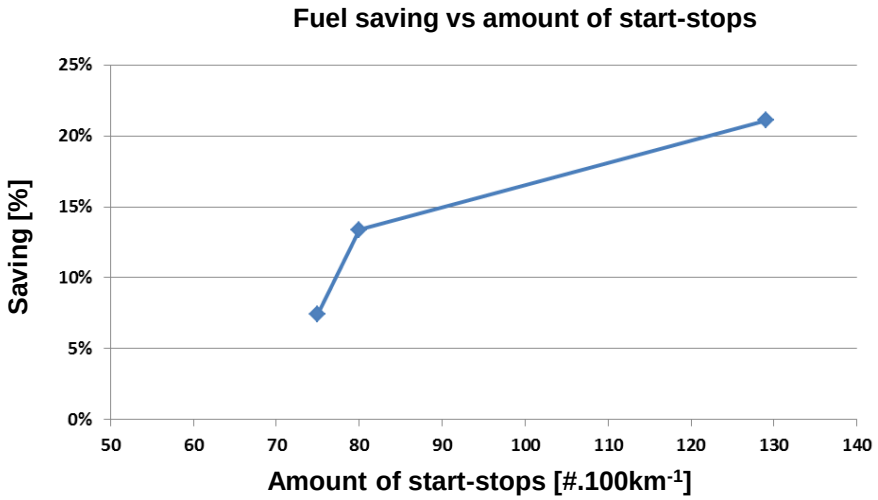


Field test results overview (3)

Observations/conclusions:

- A strong relation between average velocity and fuel saving is assumed.
- This suggest that most of the fuel saving comes from regenerative coasting/braking due to the dynamics of the drive cycle.
- No strong relation between the amount of Start-Stops and fuel saving is assumed. Savings by eliminating idle time of the combustion engine does not significantly contribute to the total fuel saving.





Conclusions

- Annual fuel cost saving

Parameter	Value
Annual mileage [km]	30.000 – 50.000
Fuel consumption [l.100km^{-1}]	16 - 22
Fuel saving [%]	7.5 – 21.1
Business fuel price NL [euro]	1.10 – 1.30
Annual cost saving [euro]	**750 - 1750**

- Cost saving on hybrid components is crucial for the future success for this kind of technology both for the business-case of the operator as well as for the business-case of the OEM.
- A cost saving of 40% for the main hybrid components has been part of the HCV-project.
- Furthermore increasing hybrid component volume by improving synergy is very important.

Questions

Questions?