

Eceee Summer Study 2013

Electric vehicles: Improving consumer information to encourage adoption

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The Low Carbon Vehicle Partnership

Information | Influence | Network

- Develops initiatives
- Policy advice to Government
- A forum for stakeholders
- Opportunities for UK business
- Contribution to meeting climate targets

c200 member orgs



Accelerating the Shift to Low Carbon Vehicles and Fuels

Overview

Why aren't consumers buying electric vehicles?

From general principles to one element of a solution...

□ Background

- EVs and consumers: main barriers to uptake (synthesis)
- Potential solutions

□ Review of the UK Fuel Economy label

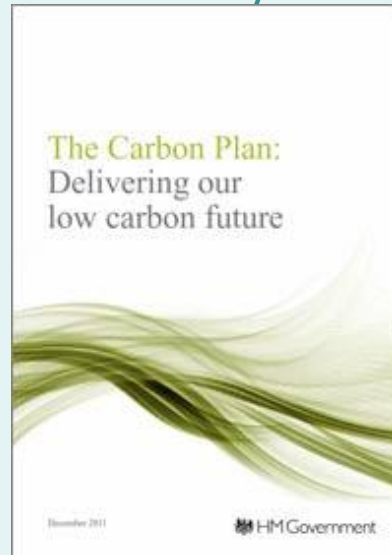
□ Labelling EVs (BEVs, PHEVs)

□ Labelling - study conclusions and recommendations



Background: UK Context

- ❑ UK Climate Change Act (2008) – legally binding CO₂ reduction targets
- ❑ 80% cut in CO₂ emissions in 2050 vs 1990
- ❑ Road transport electrification key element in UK Govt Carbon Plans



“...the emergence of ultra-low emission vehicles (ULEVs) and hybrid and electric cars will be crucial in preparing for progress in the 2020s” (Carbon Plan - DECC 2011)

Despite doubts about EV's emissions benefits, policy makers in UK (and all over the World) are backing them

- ❑ Life-cycle analyses of EVs emissions show modest – or no - benefits based on current power generation mix (NTNU 2012; Ricardo 2011; Hawkins et al 2012)
 - Fuel use phase benefits offset by emissions embedded in vehicle and battery production
 - 10-24% lower global warming potential than conventional (ICE) vehicles at current generation mix

- ❑ But policy-makers and manufacturers worldwide are 'hanging their hats' on vehicle electrification; assumption of power grid decarbonisation and scale efficiencies

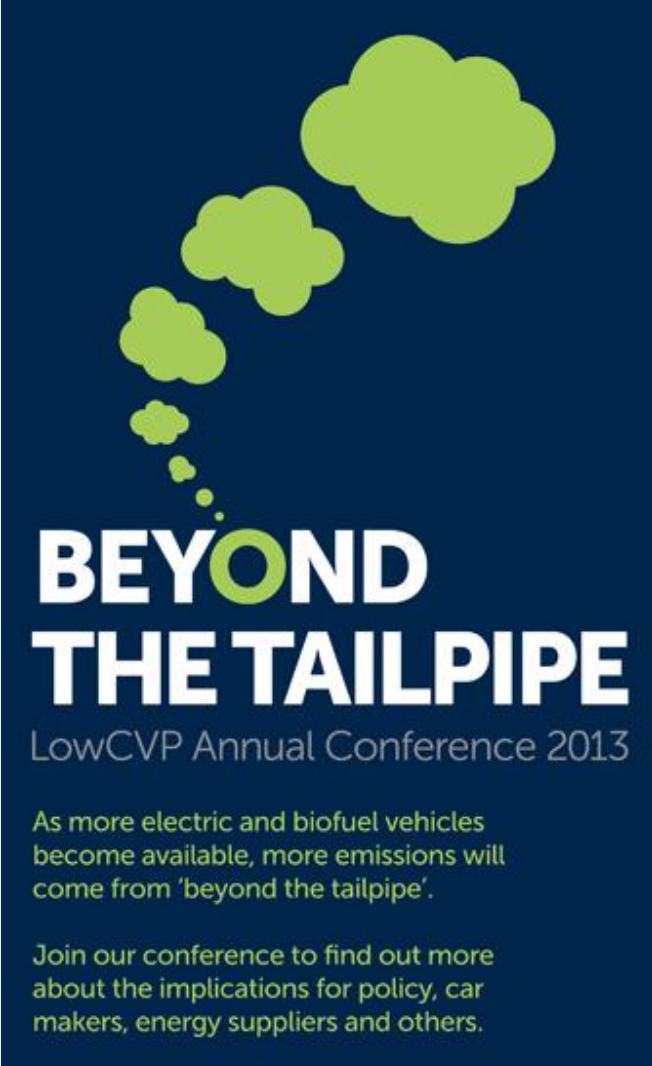
By the way...

Road transport electrification and rising biofuels use (+ hydrogen?) means we need to change where and how emissions are measured...

➤ Profound implications for policymakers, motor co's, fuel suppliers and others.

LowCVP Conference, July 11, London:

www.lowcvp.org.uk for more details



**BEYOND
THE TAILPIPE**

LowCVP Annual Conference 2013

As more electric and biofuel vehicles become available, more emissions will come from 'beyond the tailpipe'.

Join our conference to find out more about the implications for policy, car makers, energy suppliers and others.

Main barriers to consumer uptake of EVs

- High purchase price
- 'Range anxiety'
- Recharge time
- Limited model range
- Unfamiliar technology and pace of technology change
- Maintenance/battery replacement costs uncertainty
- Safety concerns

Nissan Leaf - £24k

Renault Zoe - £14k

Mitsubishi iMiEV- £24k

Vauxhall Ampera (hybrid) – £30k

NB All prices after £5k UK Government subsidy

But...consumers not driven by purely 'rational' factors – importance of 'individual values' (eg style; values; alignment with self-image)

Breaking down the barriers – how?

❑ High purchase price

- Purchase subsidies + tax benefits -> economies of scale production
- Total ownership cost benefits (consumer education)

❑ ‘Range Anxiety’

- Infrastructure subsidies -> kick-start private provision
- Comprehensive and up-to-date information (use latest info tech)
- Consumer education; trial and familiarity

❑ Recharge time

- Fast-charge facilities on main routes (c30 mins)
- Consumer education; trial and familiarity

❑ Technology issues; maintenance costs; safety

- Consumer education; trial and familiarity

Consumer Information & Education

- ❑ Variety of communicators: government; motor and fuel companies; dealers; media & others – need for consistency:

Nissan advertisement (about Leaf): “Over 300mpg-equivalent”
NextGreenCar (media website), Leaf listing: “169mpg-equivalent”

- In UK, OLEV (Office for Low Emission Vehicles) working to promote consistency in messaging
- LowCVP support via eg ‘Green Claims Guide in Marketing’

❑ Product labelling

- EU Labelling Directive, 1999 required standardised, comparable data to be displayed on vehicles for sale from 2001
- Colour-coded fuel economy label; introduction facilitated by LowCVP in UK in 2005

UK Fuel Economy Label review

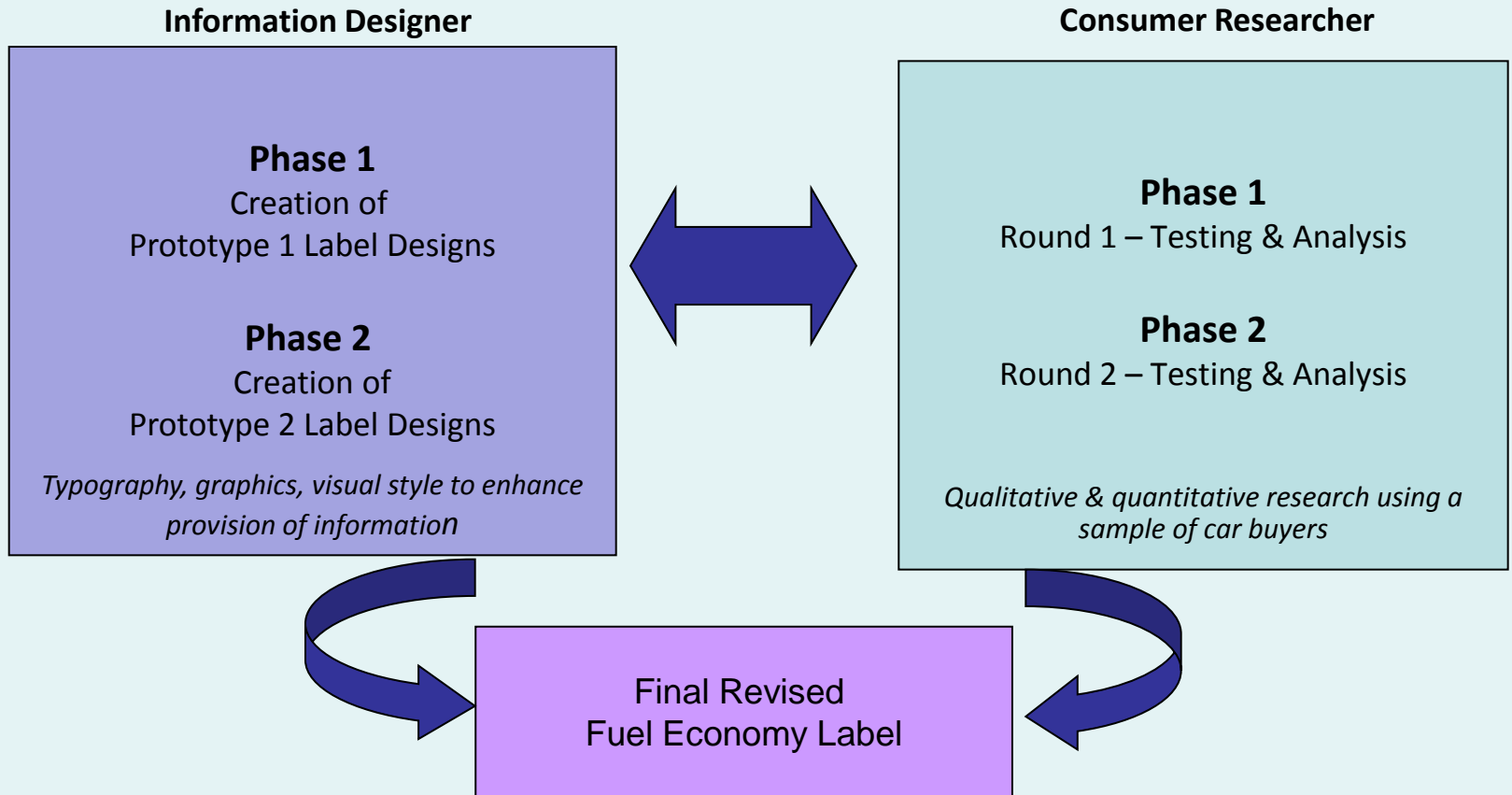
LowCVP Aims:

- ✓ To improve the presentation of financial information to demonstrate benefits of choosing low CO₂ vehicle
- ✓ To test consumer reactions to mpg vs CO₂ figures on label
- ✓ How to improve provision of comparative information
- ✓ How to incorporate new information technology
- ✓ How to specifically accommodate new vehicle types including electric and plug-in hybrid vehicles

Method: 6 x focus groups (n=10) and 1 quantitative (n= 1005) web-based study

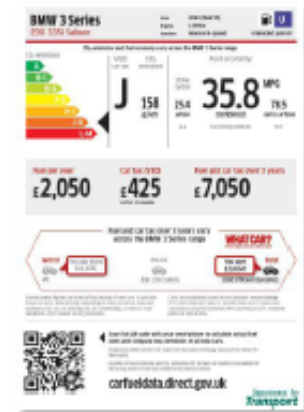
Target audience: Recent new or used car buyers (99% petrol or diesel)

Design & Testing process



Design and testing be an iterative process between information designer and consumer researcher

Round 1 Prototype Fuel Economy Label Designs



Current label
x 1

'Traditional'
x 2
'You lose'
'You pay'

'Slider'
x 3
Per mth slider
Per mth rank
Per mile

'Dashboard'
x 2
Petrol
EV

'Buyers Guide'
x 3
Petrol 1 year
Petrol 3 year
EV

Current Fuel Economy Label - feedback

FOCUS GROUPS – MPG & CO2 INFO

Title at odds with prominence of CO2 information

Fuel Economy		VED band and CO ₂
CO ₂ emission figure (g/km)		
<=100	A	
101-110	B	
111-120	C	
121-130	D	
131-140	E	E 137 g/km
141-150	F	
151-160	G	
161-170	H	
171-180	I	
181-200	J	
201-225	K	
226-255	L	
256+	M	
Make/Model:	Ford Focus	Engine Capacity (cc): 1753 cc
Fuel Type:	Diesel	Transmission: Manual
Fuel Consumption:		
Drive cycle	Litres/100km	Mpg
Urban	6.7	42.2
Extra-urban	4.3	65.7
Combined	5.2	54.3

Little demand for metric data

Demand for MPG to be more prominent

Very strong visual element – liked by almost all

Weakest part of this design element

Traditional Label Design – Loss Aversion

BMW 3 SERIES
E90 335i Saloon

Year 2010 (March)
Engine 1399cc
Gearbox Manual 6-speed
Unleaded petrol

CO₂ emissions and fuel economy vary across the BMW 3 Series range, with best referring to most efficient

CO₂ emissions: A (best), B-C, D-E, F-G, H-I, J-K, L-M

VED car tax: **J**

CO₂: 158 g/km

FUEL ECONOMY (MPG):
drive cycles: 35.8
urban: 25.4
combined: 35.8
extra urban: 78.5
5.0 litres/100km

CAR TAX (VED): **£425**
in the first year, thereafter £235

FUEL COST PER YEAR: **£2,050**

Fuel economy figures are from official testing of new cars. In practice these can vary when driving depending on how you drive, load and maintain your car, use heating and air conditioning, as well as road conditions. VED is based on CO₂ emissions.

Costs are estimated based on the standard annual mileage of 12,000 miles per year and calculated using the combined MPG and the price of unleaded petrol at 100 p/gallon.

You lose £1,365
per year compared to the most efficient BMW 3 Series

SCAN THIS QR code with your smartphone to calculate actual fuel costs and compare CO₂ emissions of new cars.
0800 815 015 freephone number for your questions to Energy Saving Trust (0800 815 015).
A guide to fuel economy and CO₂ emissions for all new car models is available for free at any point of sale and online at: CARFUELDATA.DIRECT.GOV.UK
Department for Transport

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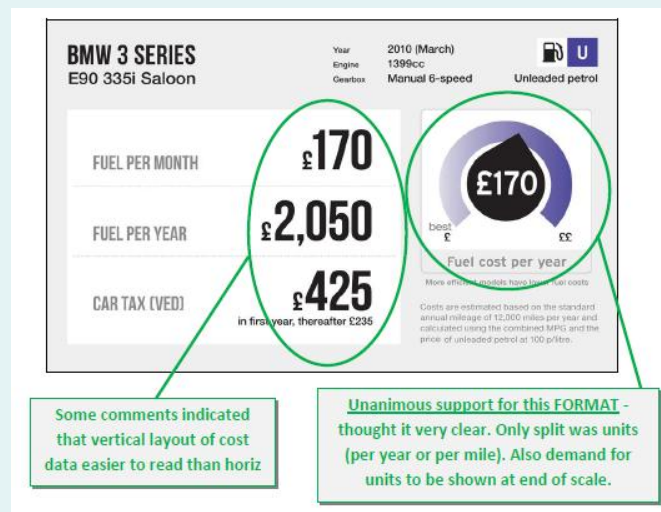
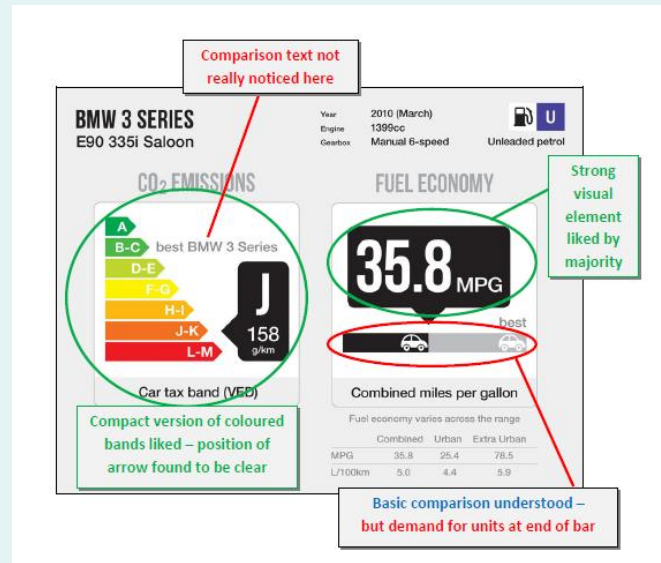
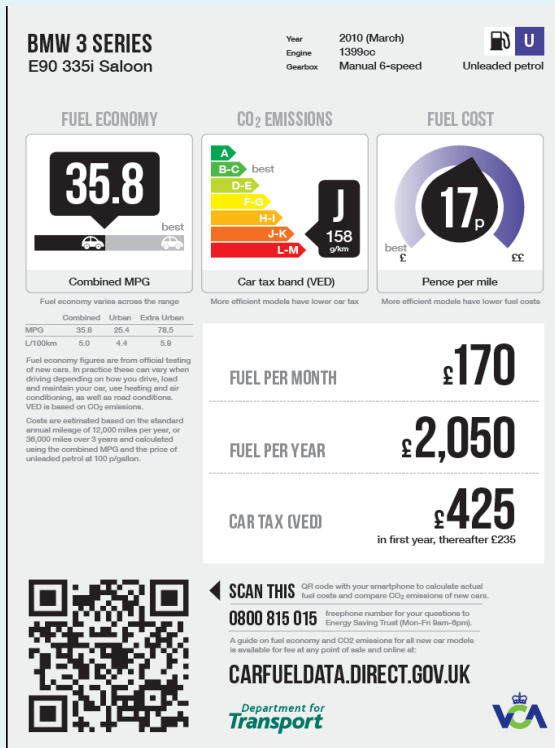
Very strong negative EMOTIONAL response to message – many explained mismatch between the negative message conveyed and what is usually viewed as an enjoyable experience (buying a car)

CAR TAX AND FUEL COST

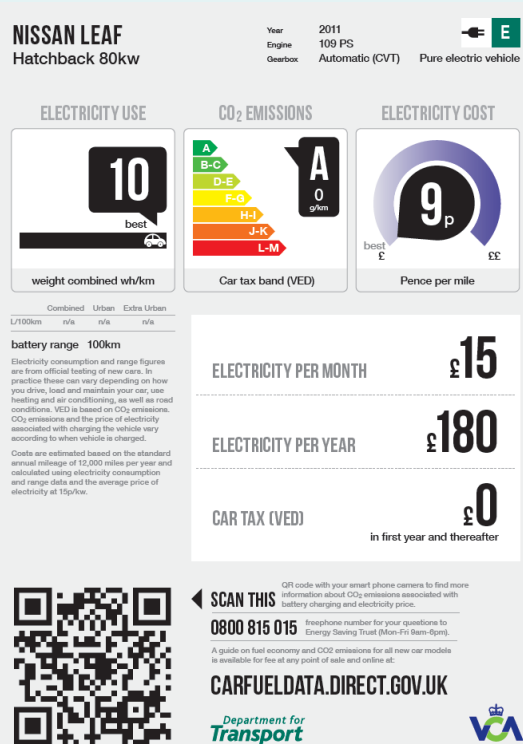
You pay £1,365

more per year compared to the most efficient BMW 3 Series

'Dashboard' Label Design



'Dashboard' Label Design – Electric Vehicle



Majority confused about what 'Wh' means – more clearer about 'km' but most would prefer units in miles. Alternative to show MPG equivalent welcomed.

Majority found this format clear (although many also commented that power-station emissions not zero).

Groups that preferred p/mile comparison liked this for EVs as it enabled direct comparison with conventional vehicles. However, some commented that fuel costs only part of the cost comparison citing capital costs, depreciation etc.

Although most would expect labels for conventional and electric cars to look similar, most wanted additional information about EVs as knowledge base was low. Info mentioned included driving range, and recharge time.

QR – Quick Response - Code

Unanimous support for this QR Code reader tools – whether knew about technology or not. Of the two types of tools tested, vast majority prefer the CALCULATE tool rather than the ‘flat’ information glossary.

QR CODE READER TOOLS



Scan this QR code with your smartphone to calculate actual fuel costs for this model.

Freephone 0800 815 015 for help from the team at Energy Saving Trust (Mon-Fri 9am-6pm).

A guide on fuel economy and CO₂ emissions for all new car models is available for free at any point of sale and online at the address below.

carfueldata.direct.gov.uk

Fuel cost calculator

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In discussing QR Code vs phone vs website access for more information, many thought all three methods should be available so user can choose.

Tested QR code using iPod Touches as smart phones and creation of a mock up tool on a URL

Fuel calculator tool linked to QR Code

VW Polo **Best in model range**

VW Polo 1.2 TDI 75PS BlueMotion
Supermini, Manual 5-speed, 1199cc (1.2 litre), Diesel



**For this model...
Select your driving information using the following menus**

Your MPG

Your driving style

Your fuel price

Your annual mileage

Calculate your fuel cost now >

VW Polo **Best in model range**

VW Polo 1.2 TDI 75PS BlueMotion
Supermini, Manual 5-speed, 1199cc (1.2 litre), Diesel



83.1 mpg Miles per gallon (combined)
Metric: 3.4 litre/100km

89 g/km CO2 Emissions
Vehicle tail pipe emissions only

A £0 Car tax - Standard rate 2011/12
12-month rate for cars reg since 01/03/01*

A £0 Car tax - First year rate 2011/12
12-month rate for cars reg since 01/03/01*

7.7 p/mile Fuel cost per mile
Pence per mile

V Euro Emissions Standard
CO: 0.023 PM: 0.000
HC+NOx: 0.163

£0 /day London Congestion Charge
100% Greener Vehicle Discount

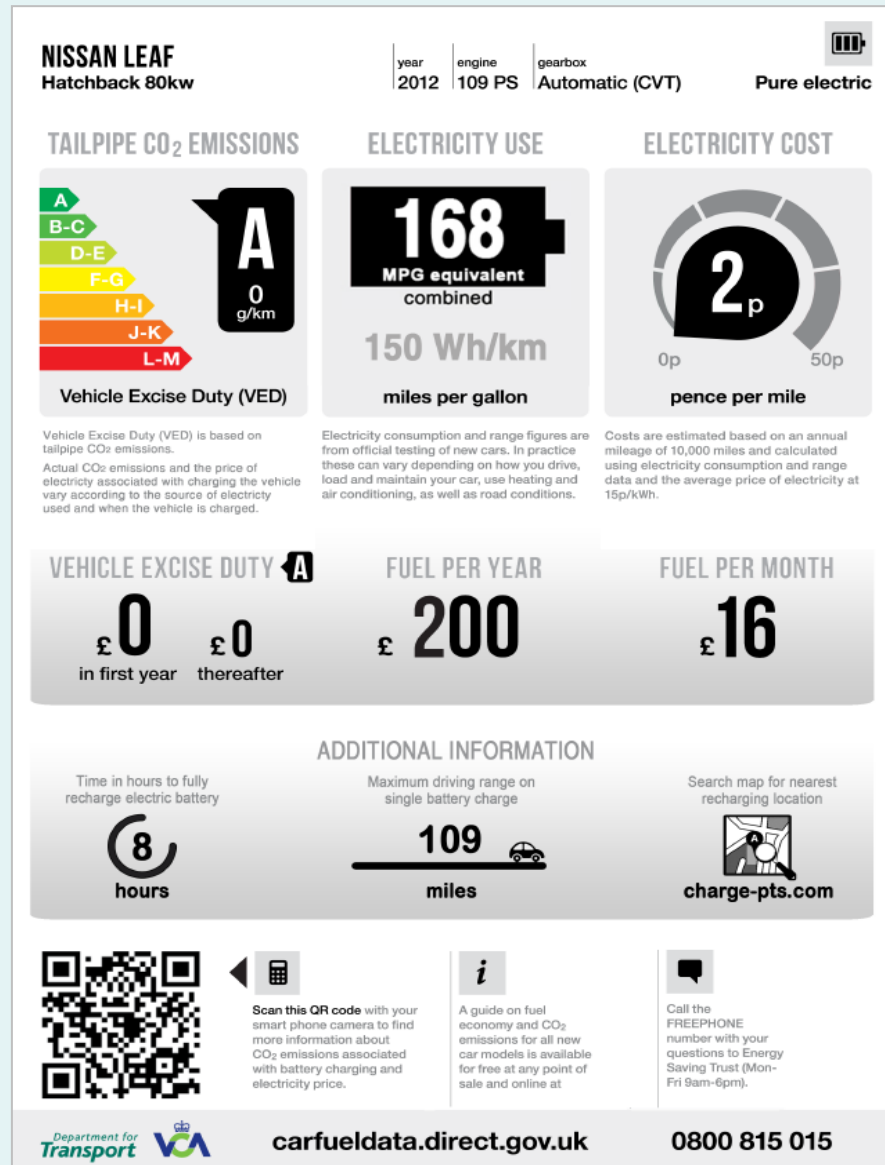
Compare with best in model range >

VW Polo **Best in model range**

Top Polo models		MPG (Comb)	CO2 (g/km)
List shows greenest in this model range			
	Polo 1.2 TDI 75PS BlueMotion Manual 5-speed / <small>APPROVED 2010</small>	83.1	89
	Polo 1.2 TDI 75PS BlueMotion Manual 5-speed /	80.7	91
	Polo 1.4 TDI 80PS without A/C +DPF Manual 5-speed /	74.3	99
	Polo 1.4 TDI 80 PS BLUEMOTION +DPF 3/5dr Manual 5-speed /	74.3	99
	Polo 1.4 TDI 80PS without A/C +DPF 3/5dr [from Nov Manual 5-speed /	74.3	99
	Polo 1.4 TDI 80PS without A/C +DPF Manual 5-speed /	74.3	99
	Polo 1.4 TDI 80ps BLUEMOTION 1 +DPF 3/5dr Manual 5-speed /	74.3	99
	Polo 1.4 TDI 80ps BLUEMOTION 2 +DPF 3/5dr Manual 5-speed /	74.3	99
	Polo 1.4 TDI 80ps BlueMotion 1 +DPF Manual 5-speed /	74.3	99
	Polo 1.4 TDI 80ps BlueMotion 2 +DPF Manual 5-speed /	74.3	99

↓ Show more vehicles in this range ↓

Fuel Economy Label – Electric Vehicle

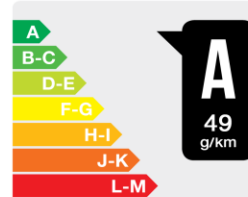


Fuel Economy label – Plug-in hybrid vehicle

TOYOTA PRIUS
1.8 VVT-i T4 5dr

year 2009 engine 1798cc gearbox Automatic (E-CVT) **Plug-in hybrid**

TAILPIPE CO₂ EMISSIONS

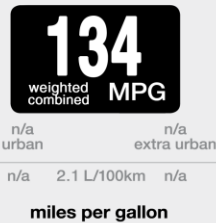


Vehicle Excise Duty (VED)

CO ₂ g/km	Weighted combined	Battery state of charge max	min
49	49	0	92

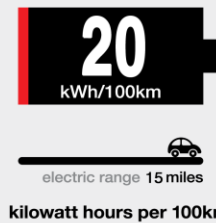
VED is based on CO₂ emissions. CO₂ emissions and the price of electricity associated with charging the vehicle vary according to when vehicle is charged.

FUEL CONSUMPTION



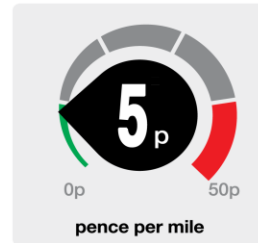
'Weighted' is a representative mixture of running a plug-in hybrid/range-extended electric vehicle over the combined drive cycle (urban and extra urban) partly on battery and partly using the combustion engine.

ELECTRICITY USE



Fuel consumption, electricity consumption and range figures are from official testing of new cars. In practice these can vary depending on how you drive, load and maintain your car, use heating and air conditioning, as well as road conditions.

FUEL & ELECTRICITY COST



FUEL PER MONTH £ **70**

FUEL PER YEAR £ **840**

VEHICLE EXCISE DUTY £ **0**
in first year and thereafter

Costs are estimated based on an annual mileage of 10,000 miles and calculated using fuel and electricity consumption, range data and the average price of unleaded petrol at 140p/litre and electricity at 15p/kWh.



To calculate actual electricity & fuel costs and compare all new cars

SCAN QR CODE or visit

CARFUELDATA.DIRECT.GOV.UK



Call the Energy Saving Trust team with your questions

0800 815 015 FREEPHONE Mon-Sat 9am-6pm



Department for
Transport

Results Summary

1. Dashboard most popular label (existing & traditional labels least)
2. MPG leading metric – but some distrust about validity
3. CO2 viewed primarily in terms of cost – tax not emissions
4. Demand for comparison – dial works better than ‘slider’ format
5. Per month and per mile costs useful – in addition to per year
6. Model ranking and ‘lose’ framing elicit strong emotional response
7. Positive response to Car Buyer label – clear comparisons
8. Independent branding adds authority to label – e.g. WhatCar?
9. QR Code tools very popular – CALC tool most useful
10. EV labels: Little understanding of Wh/km, demand for additional info

Questions/Comments/Feedback?

The Low Carbon Vehicle Partnership

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www.lowcvp.org.uk

