Car buyer research – improving the presentation of vehicle performance, environmental and running cost information during the car buying process.

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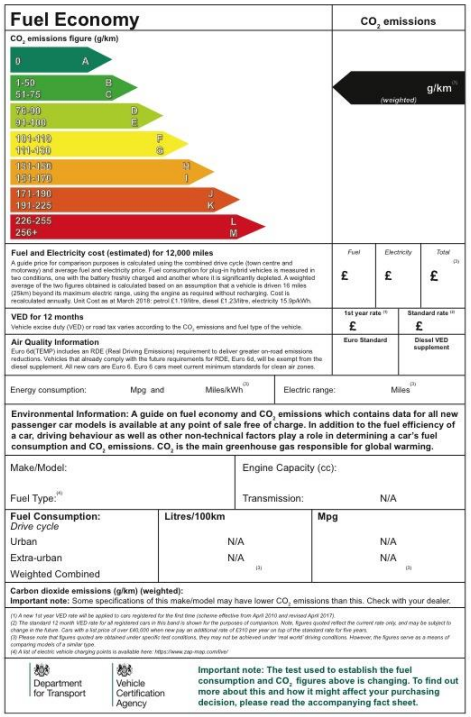
Introduction

LowCVP has undertaken a consumer research study to inform improving the presentation of fuel economy, electric range, CO_2 emissions and running cost information during the car buying process.

The overarching aim of the research is to raise awareness, and stimulate, the purchase of low and ultra low emission cars during the car purchase journey.

The outcomes of our research will inform:

- Creation of refreshed car fuel economy labels for BEV/PHEV/HFC and ICE powertrains as part of the transition to World Harmonised Light Duty Test Procedure.
- Make recommendations for improving consumer information at the Point of Sale.
- Outline best practice guidelines for presenting car buying information covering environmental, cost, technical and operational specifications for different powertrains.



Fuel Economy | **CO_2 emissions**

CO_2 emissions figure (g/km)

0 A

1-50 B
51-75 C

76-90 D
91-100 E

101-110 F
111-120 G

121-130 H
131-150 I

151-190 J
191-225 K

226-255 L
256+ M

g/km (weighted)

Fuel and Electricity cost (estimated) for 12,000 miles

A guide price for comparison purposes is calculated using the combined drive cycle (town centre and motorway) and average fuel and electricity price. Fuel consumption for plug-in hybrid vehicles is measured in two conditions, one with the battery freshly charged and another where it is significantly depleted. A weighted average of the two figures obtained is calculated based on an assumption that a vehicle is driven 15 miles (25km) beyond its maximum electric range, using the engine as required without recharging. Cost is recalculated annually. Unit Cost as at March 2018: petrol £1.19/litre, diesel £1.23/litre, electricity 15.9p/kWh.

Fuel	Electricity	Total
£	£	£

VED for 12 months

Vehicle excise duty (VED) or road tax varies according to the CO_2 emissions and fuel type of the vehicle.

1st year rate	Standard rate
£	£

Air Quality Information

Euro 6d(TEMP) includes an RDE (Real Driving Emissions) requirement to deliver greater on-road emissions reductions. Vehicles that already comply with the future requirements for RDE, Euro 6d, will be exempt from the diesel supplement. All new cars are Euro 6. Euro 6 cars meet current minimum standards for clean air zones.

Euro Standard	Diesel VED supplement

Energy consumption: Mpg and Miles/kWh | Electric range: Miles

Environmental Information: A guide on fuel economy and CO_2 emissions which contains data for all new passenger car models is available at any point of sale free of charge. In addition to the fuel efficiency of a car, driving behaviour as well as other non-technical factors play a role in determining a car's fuel consumption and CO_2 emissions. CO_2 is the main greenhouse gas responsible for global warming.

Make/Model: | Engine Capacity (cc):

Fuel Type: | Transmission: N/A

Fuel Consumption: Drive cycle	Litres/100km	Mpg
Urban	N/A	N/A
Extra-urban	N/A	N/A
Weighted Combined		

Carbon dioxide emissions (g/km) (weighted):
Important note: Some specifications of this make/model may have lower CO_2 emissions than this. Check with your dealer.

Department for Transport | Vehicle Certification Agency

Important note: The test used to establish the fuel consumption and CO_2 figures above is changing. To find out more about this and how it might affect your purchasing decision, please read the accompanying fact sheet.

Consumer Research Study

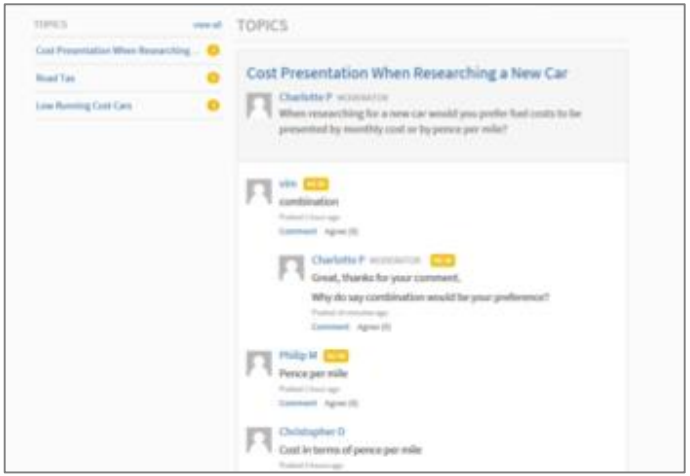
Study Objectives

- To identify where consumers find information related to MPG/CO2, purchasing decision influencers, how cars are compared, factors influencing purchase decisions, key information for electric cars, understanding of different journey profiles.
- To determine understanding of consumer friendly, alternative terminology for WLTP phases
- To identify the most effective way to present running cost information – fuel and tax
- To identify what additional information could be presented to influence purchase behaviour towards the most efficient cars for a customers journey needs.

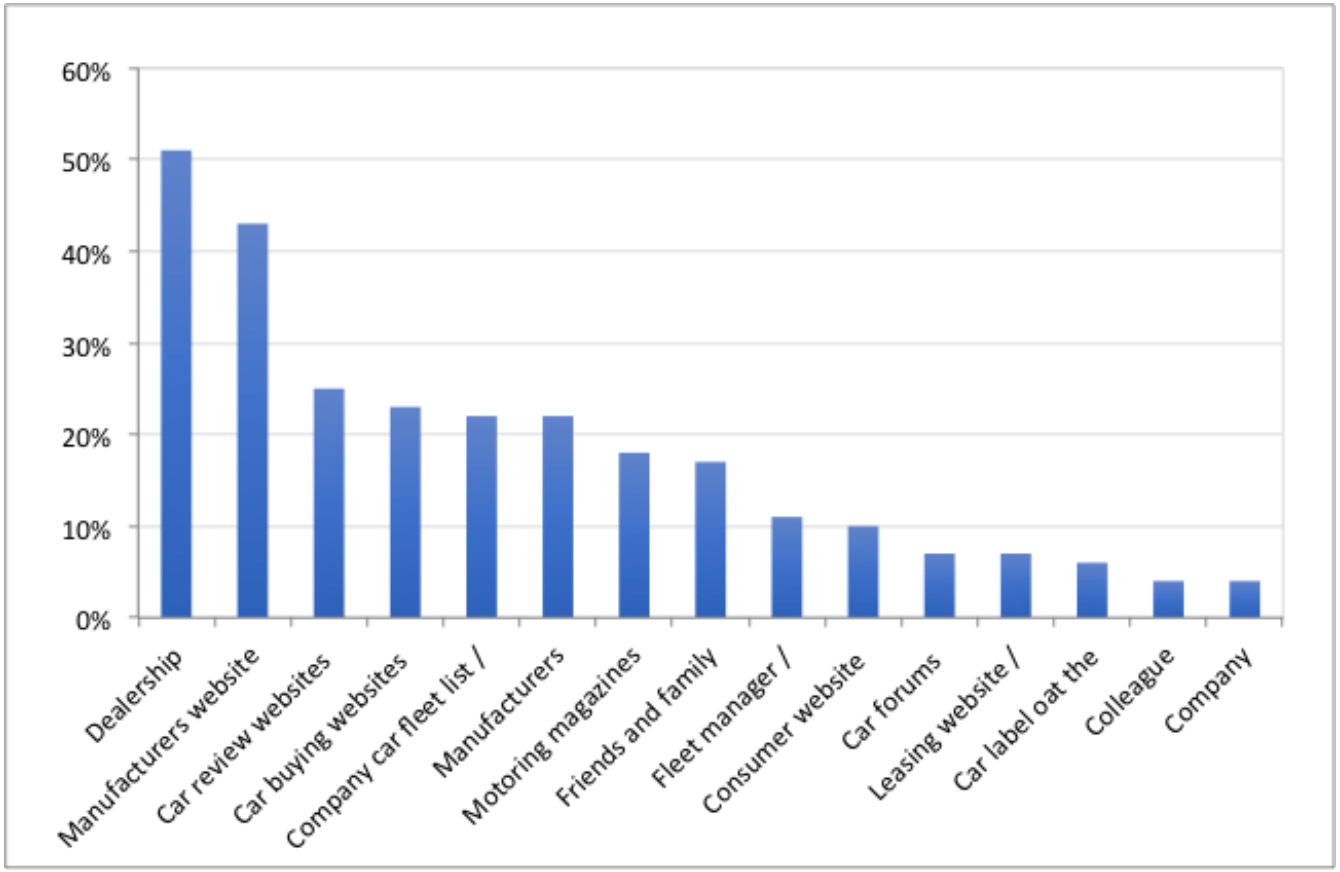
Methodology

On-line survey
- 3500 respondents (95% private, 5% company)
- 92% diesel/petrol/hybrid, 8% BEV/PHEV drivers

Focus group
- Respondents from across the UK, trailing on-line chat room
- Created four topic areas, 12 people in each

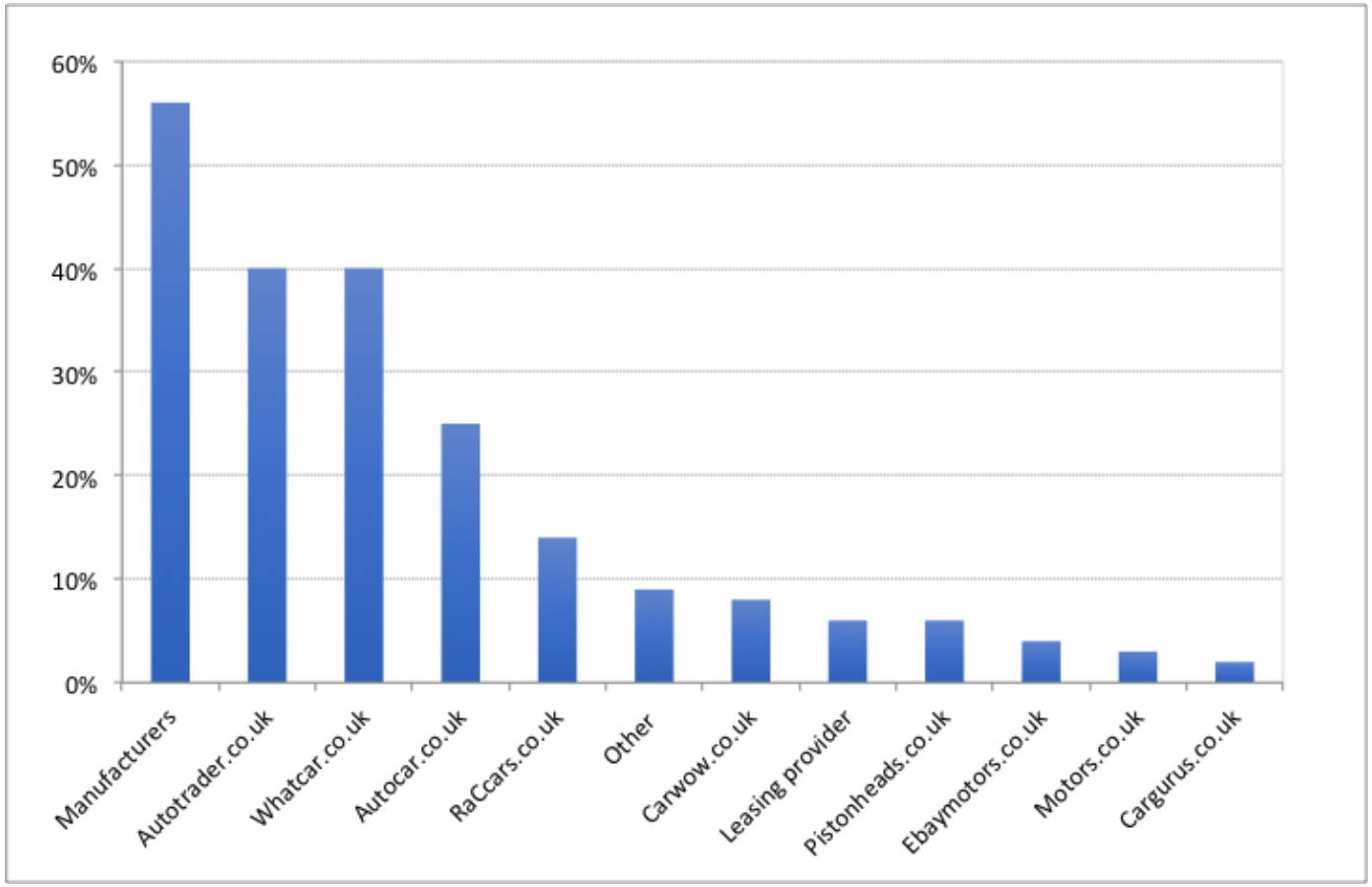


Survey Results - Where did you look for information when deciding on your current car?



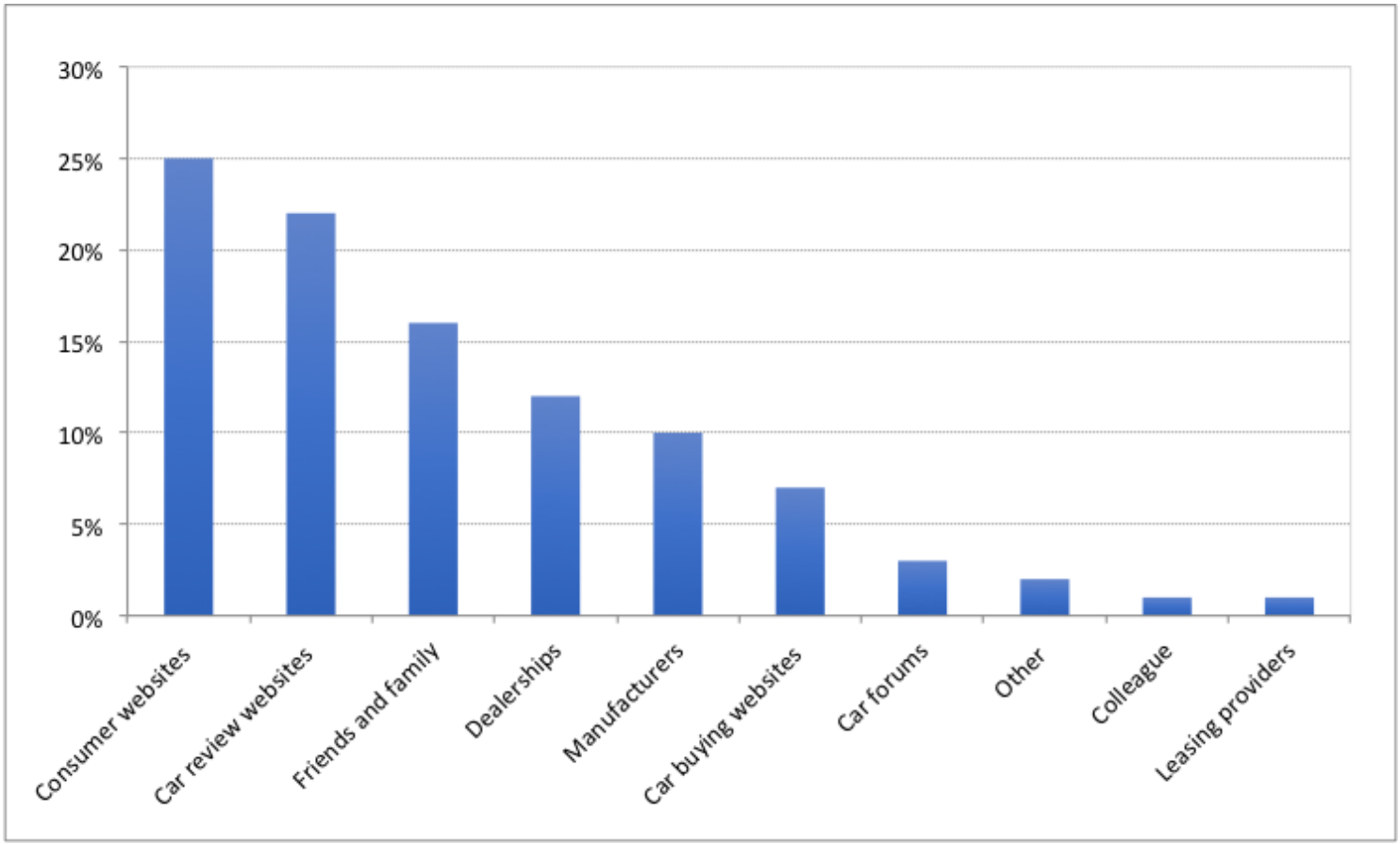
71% respondents source information related to BEV/PHEV operation from the OEM websites, followed by dealers, car review website and others include Facebook forums, You Tube.

When looking for a new car, which websites would you consider the most influential whilst vehicle shopping?



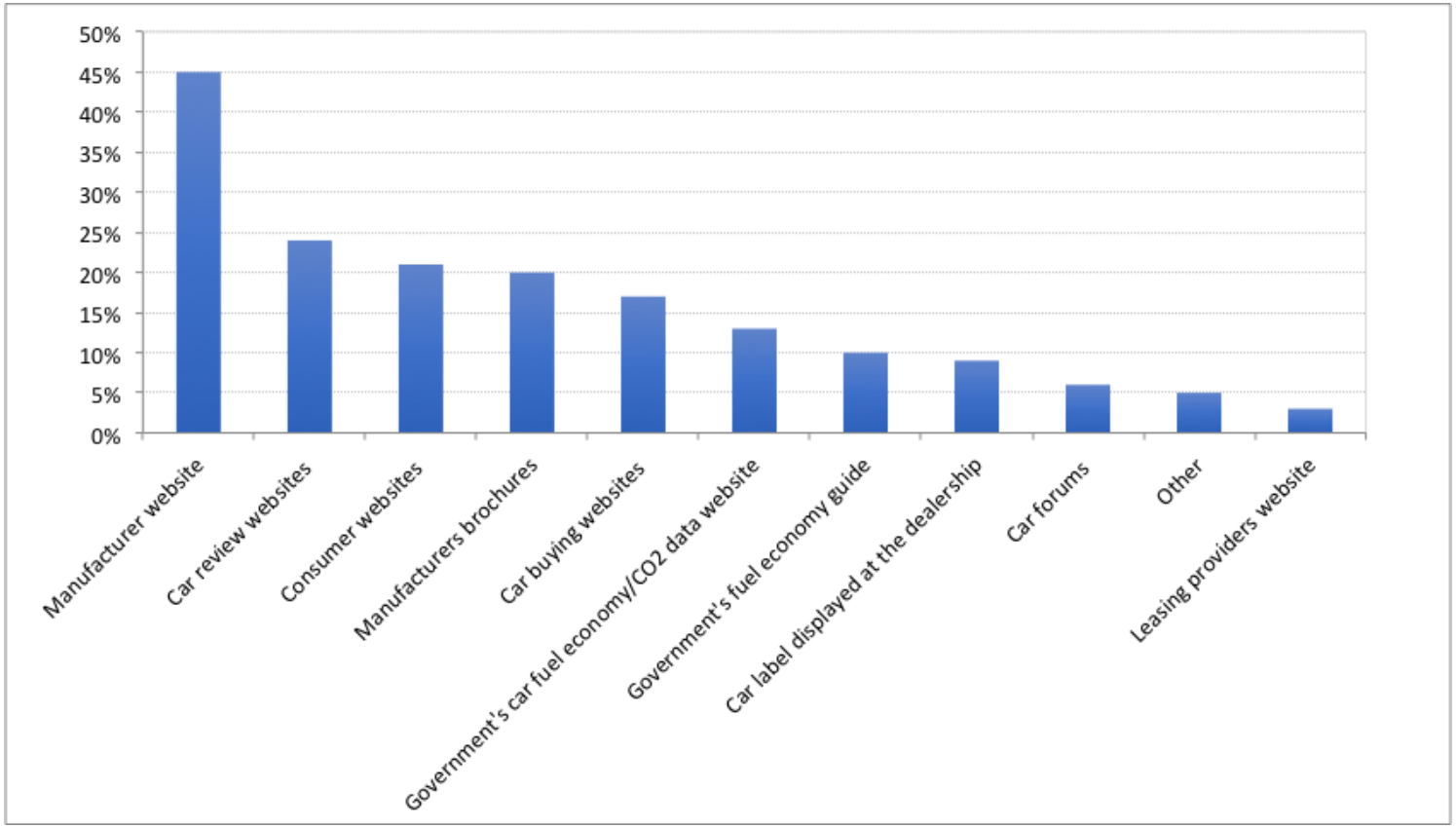
Other popular website identified: Auto Express, Honest John, You Tube, Which

Whose recommendation is most influential whilst looking for a new car?



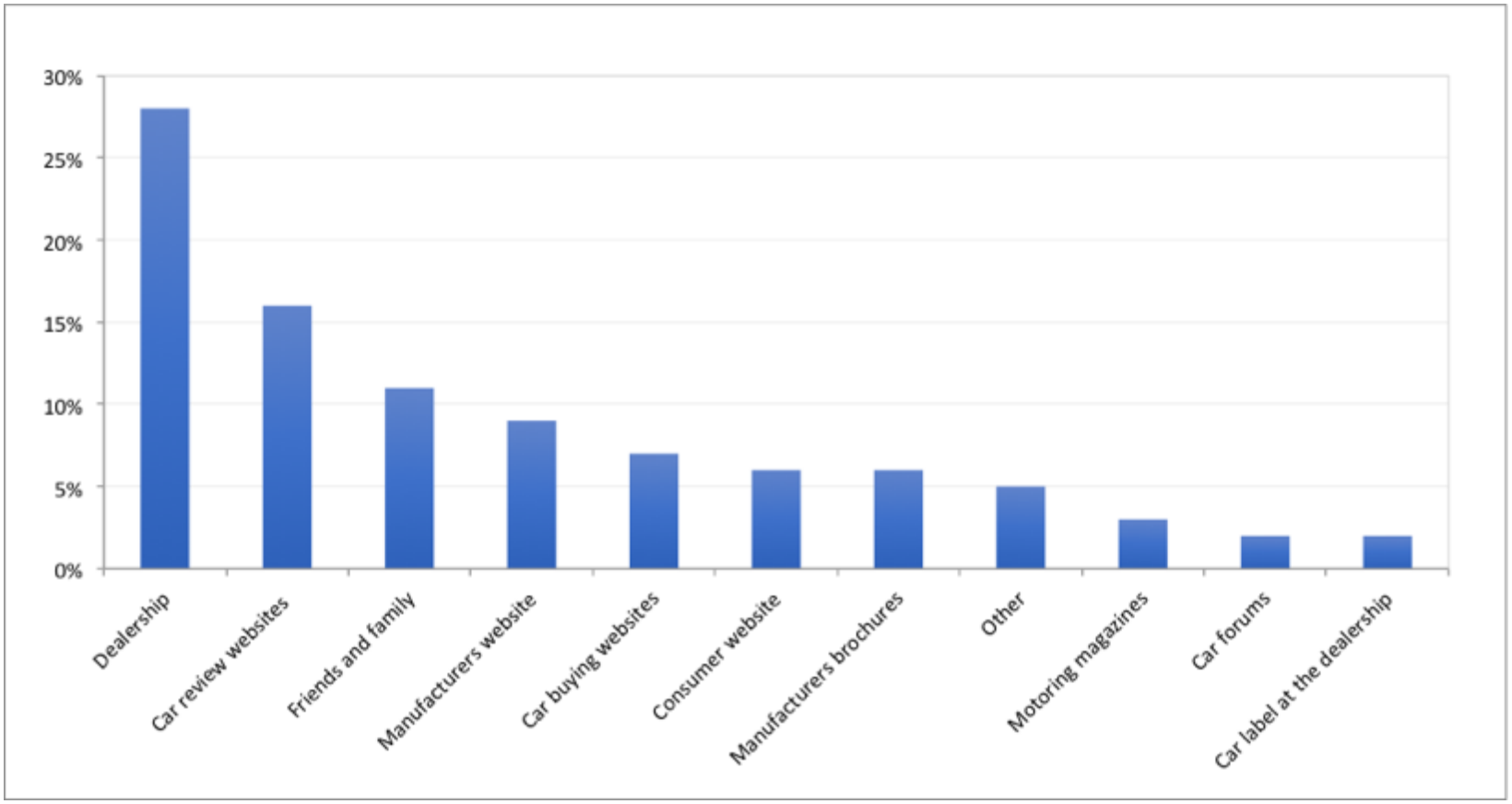
Fleet consultants & leasing providers are the most influential source for company car drivers

Which of these information sources did you use when researching the fuel consumption of your new car?



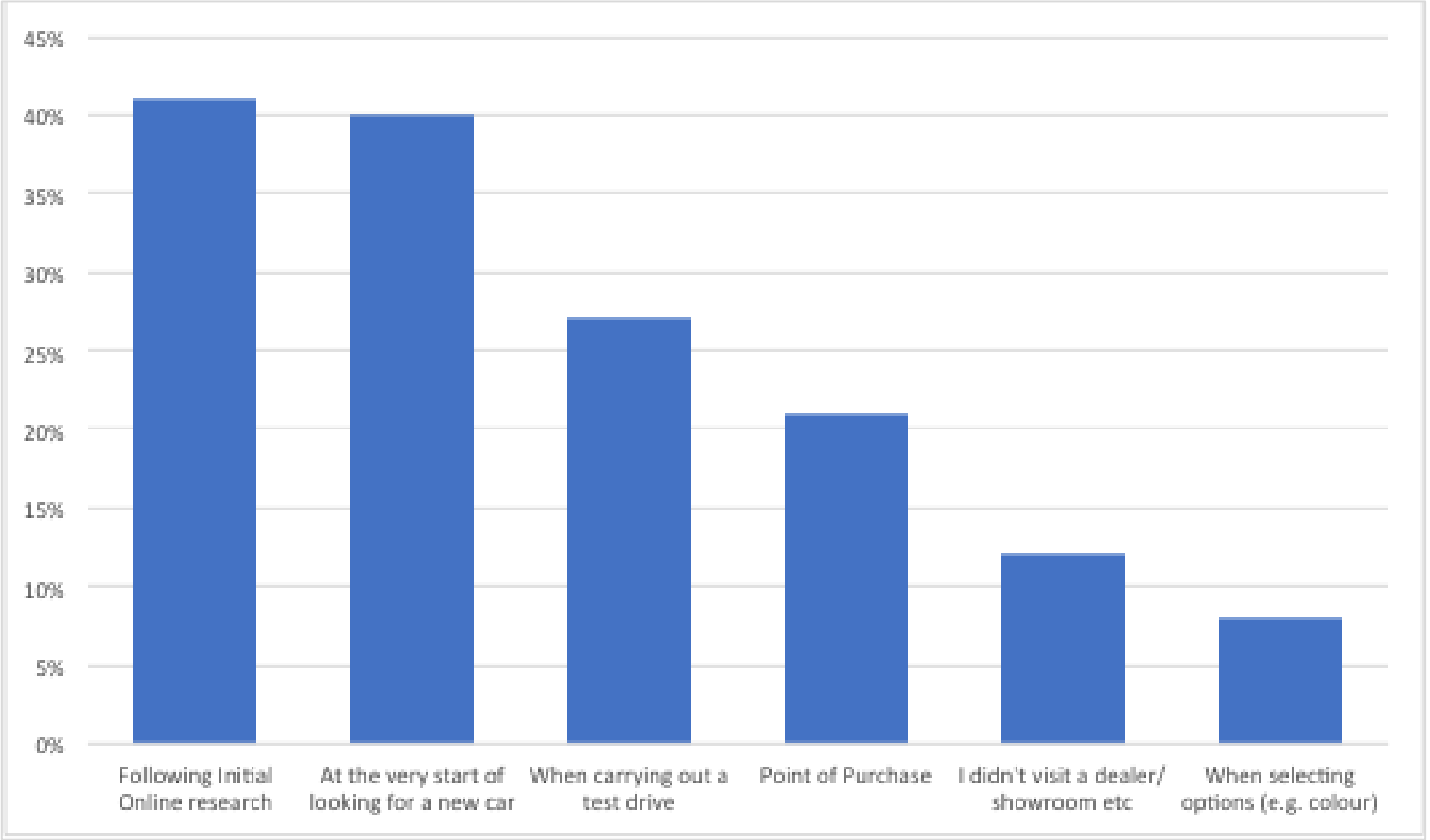
Company car drivers showed a higher preference for the Government's CO2/fuel economy website and OEM brochures

What source of info most influenced your final decision to purchase your vehicle?



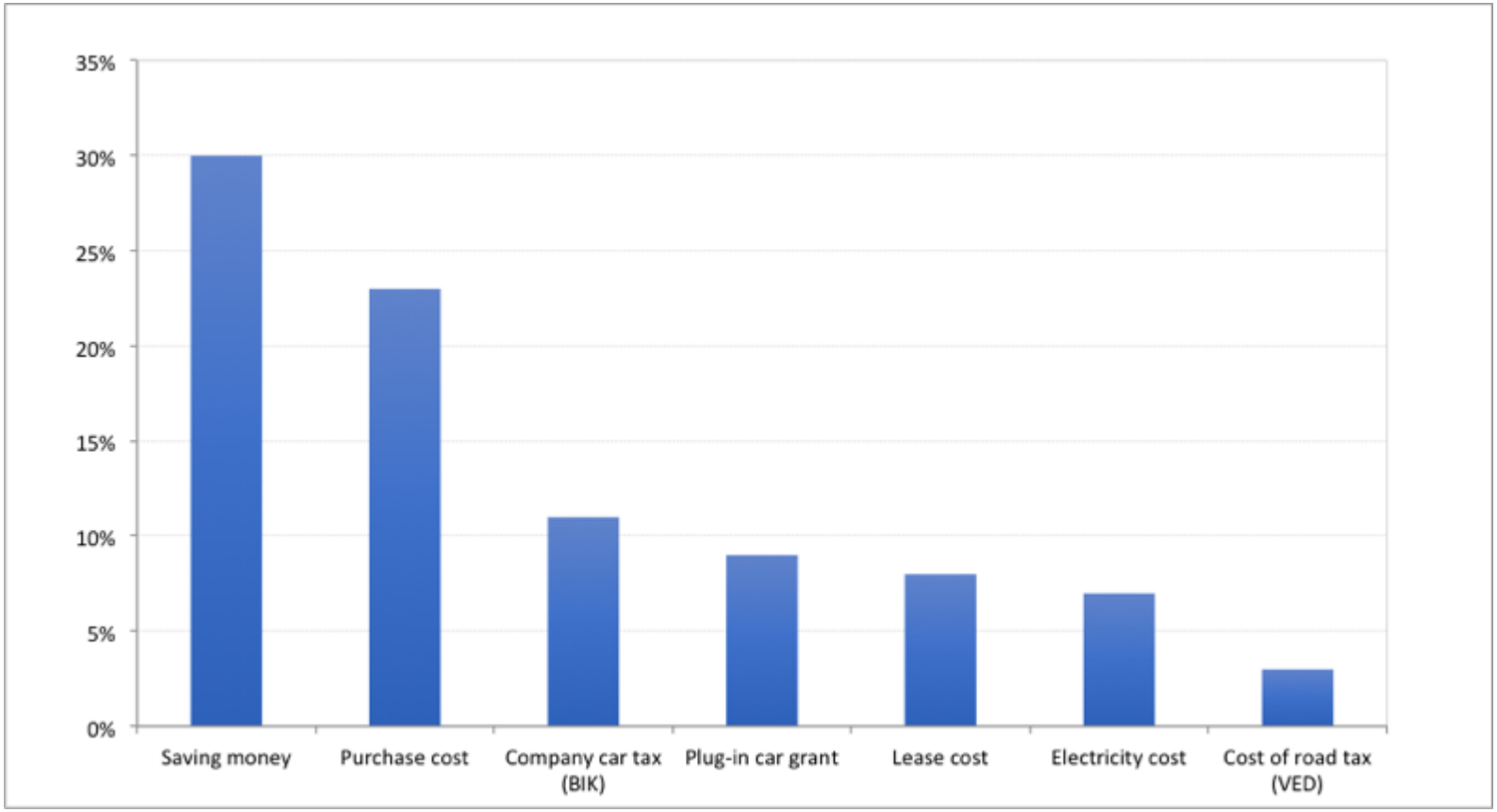
In the case of company car driver the dealership & the company car fleet list were most influential sources. Car fuel economy label has limited influence on consumers the final decision.

At what point did you (if ever) visit the dealer, car showroom or car supermarket when acquiring your car?



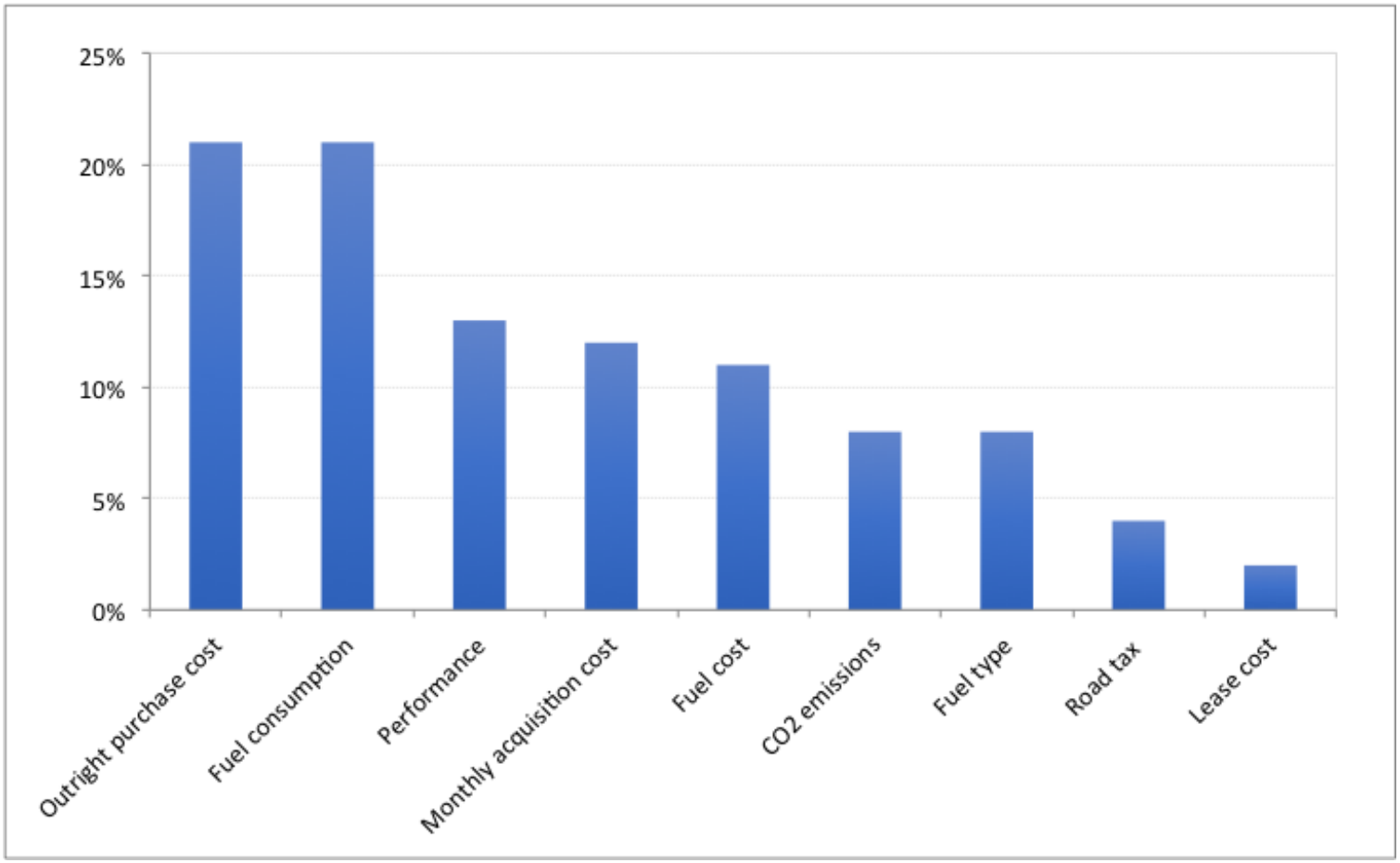
The dealership continues to have an important role to play in the car buying journey, more so for private buyers.

What cost information most influenced your purchase decision for an electric car?



For company cars BIK and lease cost are the most important cost factors

What is most the important information for comparing cars?



Company cars preferences different - BIK, monthly acquisition cost, MPG and CO2 emissions

What factors do you feel were important when purchasing your new car?

Private Car Buyers – ranked in order of importance

	Diesel/petrol/hybrid
1	**Reliability**
2	**Safety**
3	**Purchase cost**
4	**Monthly acquisition cost**
5	**Comfort**
6	**Total cost of ownership**
7	**Performance**
8	Fuel cost
9	Fuel consumption
10	Size
11	Road tax
12	Fuel type
13	Lease cost
14	Insurance
15	Style
16	Appearance
17	Your type of journey
18	Air pollution
19	CO2 emissions
20	Brand
21	Status

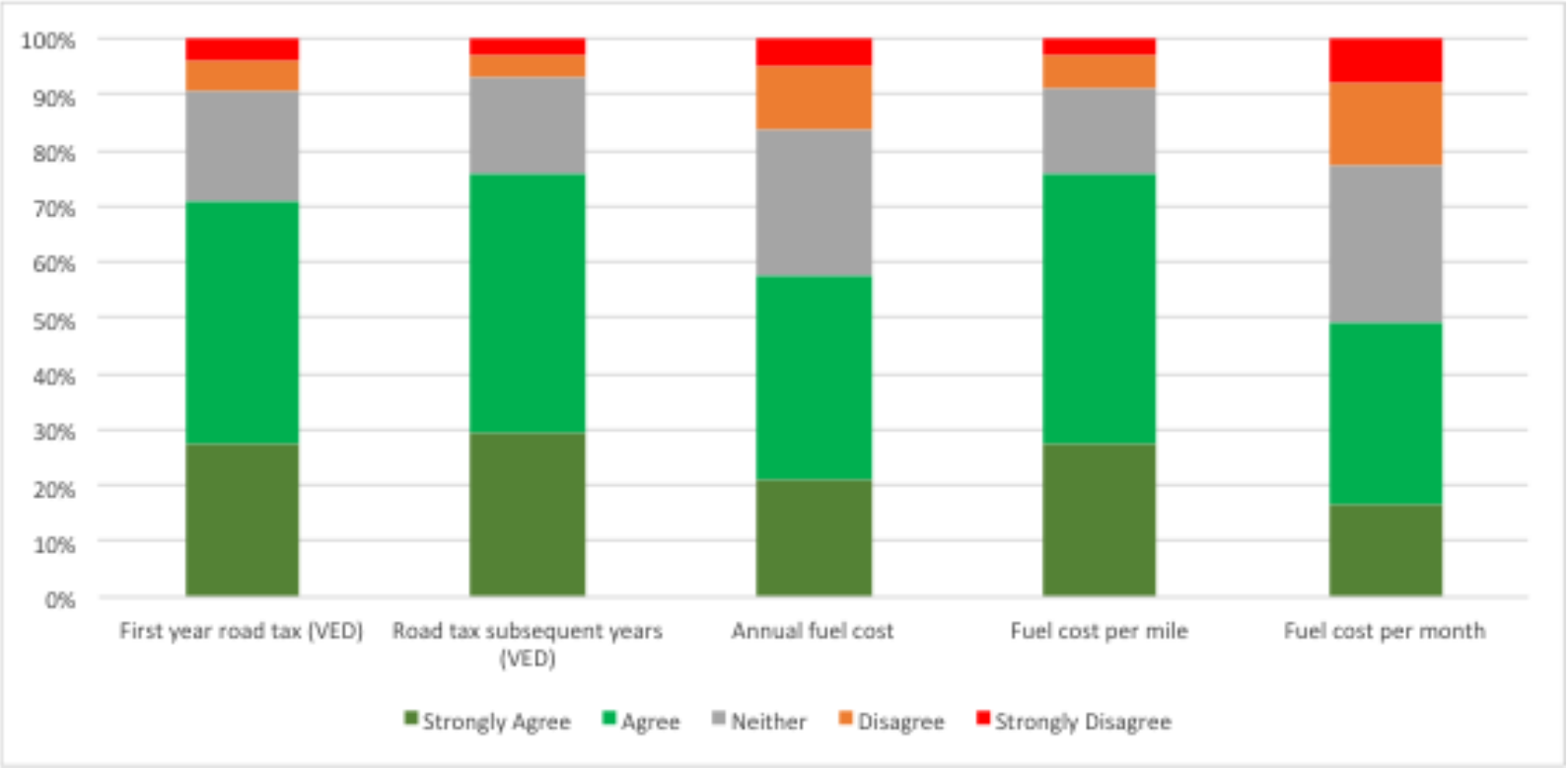
	PHEV/BEV
1	**Reliability**
2	**Safety**
3	**Ability to charge at home**
4	**Purchase cost**
5	**Monthly acquisition cost**
6	**Fuel cost**
7	**Fuel type**
8	Fuel consumption
9	Air pollution
10	CO2 emissions
11	Charge time
12	Electric range
13	Performance
14	Lease cost
15	Location of public chargers
16	Comfort
17	Insurance
18	Road tax
19	Total cost of ownership
20	Size
21	Your type of journey
22	Appearance
23	Style
24	Brand
25	Status

Environmental information of higher importance to electric car drivers

Electric range showed slightly higher importance to BEV drivers

Ability to charge at home highly important to electric car drivers

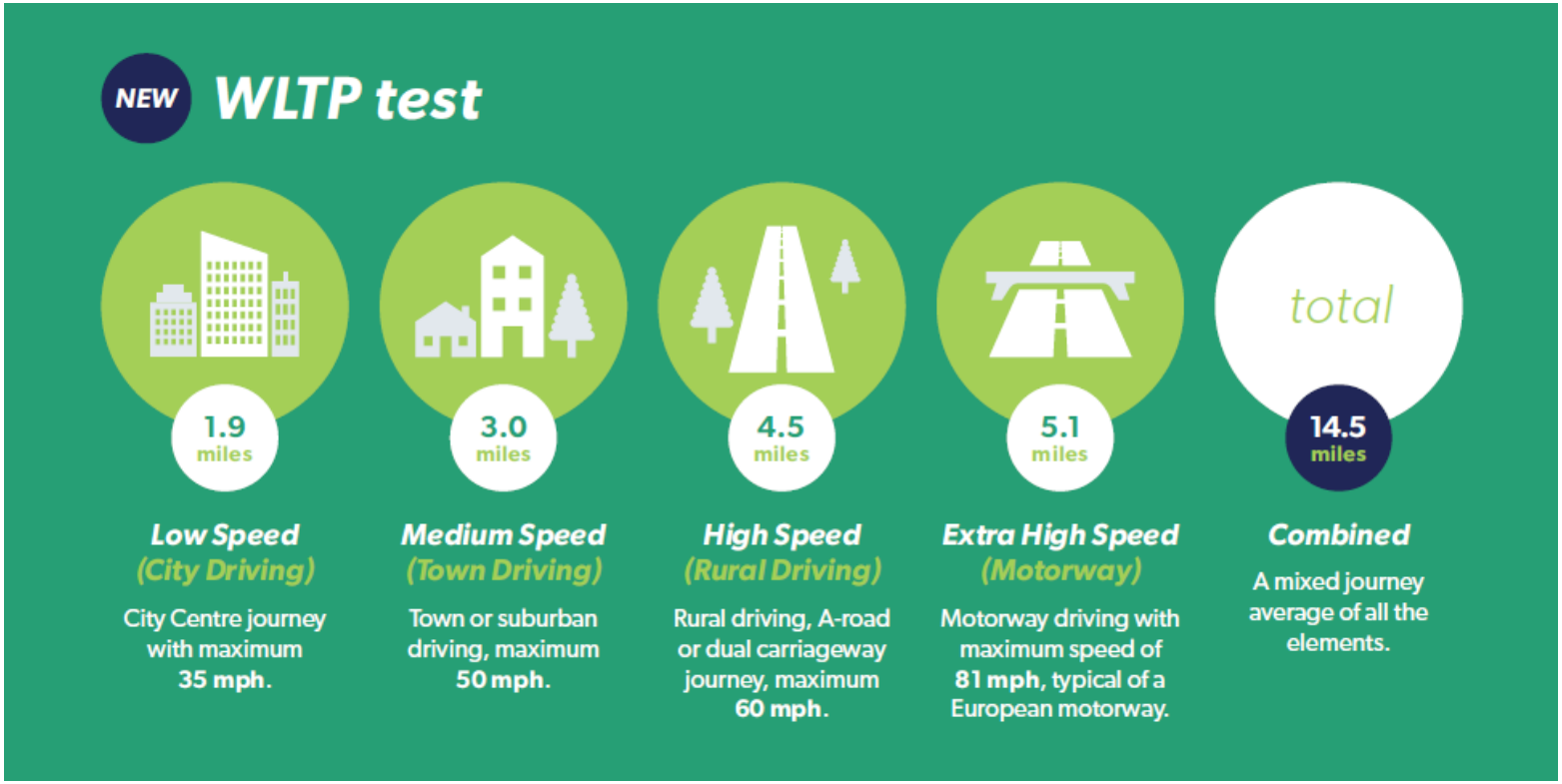
Preference for presenting fuel/VED information - diesel, petrol, hybrid costs



Strong preference for p/mile, followed by annual fuel cost.
Similar results for PHEV/BEV
Company car drivers: preference p/m, BIK first and subsequent years

Other comments: Deprecation and insurance useful, TCO over three years, cost/mile for my journey

Alternative terminology for WLTP drive cycles



Presented alternative terminology linked to journey descriptors to accompany WLTP drive cycle names. The aim is to enable consumers match their typical journey profiles against more representative fuel economy figures. This will aid consumer understand which powertrains and fuel best suit their journey requirements.

Overall consumers found official terminology meaningless, favoured the alternative names for drive cycles.

Focus groups results

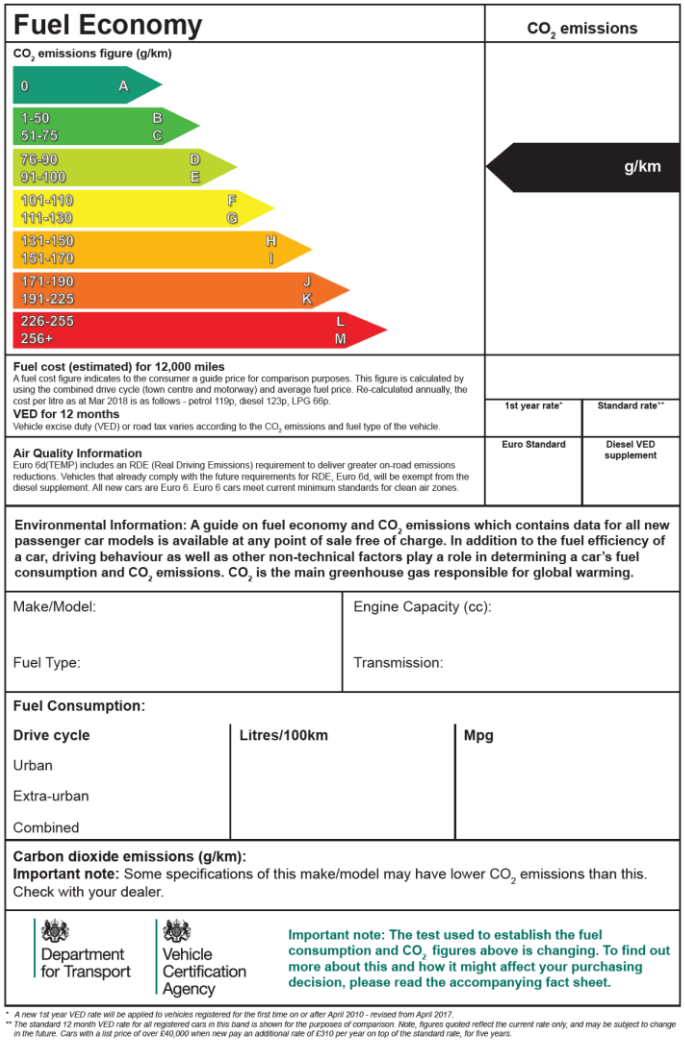
Topic 1 – Exploring existing car labels and perceptions

- Most useful elements - MPG, VED, FUEL cost, understand the colour-coded bandings
- But 'too much information my brain hurts', very busy, cannot absorb everything on the label. Simpler design supported
- Useful to have information on the label about specification on car on show, especially EV.
- Few ask for AQ information (lack of knowledge of CAZ or Euro Standard)
- Diesel VED surcharge looses value of CO_2 bandings
- Title of the car label is disingenuous – improvement - Fuel Efficiency and Emissions Label.

Insights for new car label designs

- Consider how to make the label simple and easy to understand, what are the objectives of the car label
- Consider using the label as a 'top' layer information complemented by electronic displays to find more information and make comparisons.
- Consider creating for more than one 'type' of car label used in various places with slightly nuanced information – on-line, at showroom, retained with the car (electronic version of V5).

Simple alternative car label proposed



Fuel Economy

CO_2 emissions

CO_2 emissions figure (g/km)

0	A
1-50	B
51-75	C
76-90	D
91-100	E
101-110	F
111-130	G
131-150	H
151-170	I
171-190	J
191-225	K
226-255	L
256+	M

g/km

Fuel cost (estimated) for 12,000 miles
A fuel cost figure indicates to the consumer a guide price for comparison purposes. This figure is calculated by using the combined drive cycle (town centre and motorway) and average fuel price. Re-calculated annually, the cost per litre as at Mar 2018 is as follows - petrol 119p, diesel 123p, LPG 66p.

VED for 12 months
Vehicle excise duty (VED) or road tax varies according to the CO_2 emissions and fuel type of the vehicle.

1st year rate* | Standard rate**

Air Quality Information
Euro 6d(TEMP) includes an RDE (Real Driving Emissions) requirement to deliver greater on-road emissions reductions. Vehicles that already comply with the future requirements for RDE, Euro 6d, will be exempt from the diesel supplement. All new cars are Euro 6. Euro 6 cars meet current minimum standards for clean air zones.

Euro Standard | Diesel VED supplement

Environmental Information: A guide on fuel economy and CO_2 emissions which contains data for all new passenger car models is available at any point of sale free of charge. In addition to the fuel efficiency of a car, driving behaviour as well as other non-technical factors play a role in determining a car's fuel consumption and CO_2 emissions. CO_2 is the main greenhouse gas responsible for global warming.

Make/Model: | Engine Capacity (cc):

Fuel Type: | Transmission:

Fuel Consumption:

Drive cycle	Litres/100km	Mpg
Urban		
Extra-urban		
Combined		

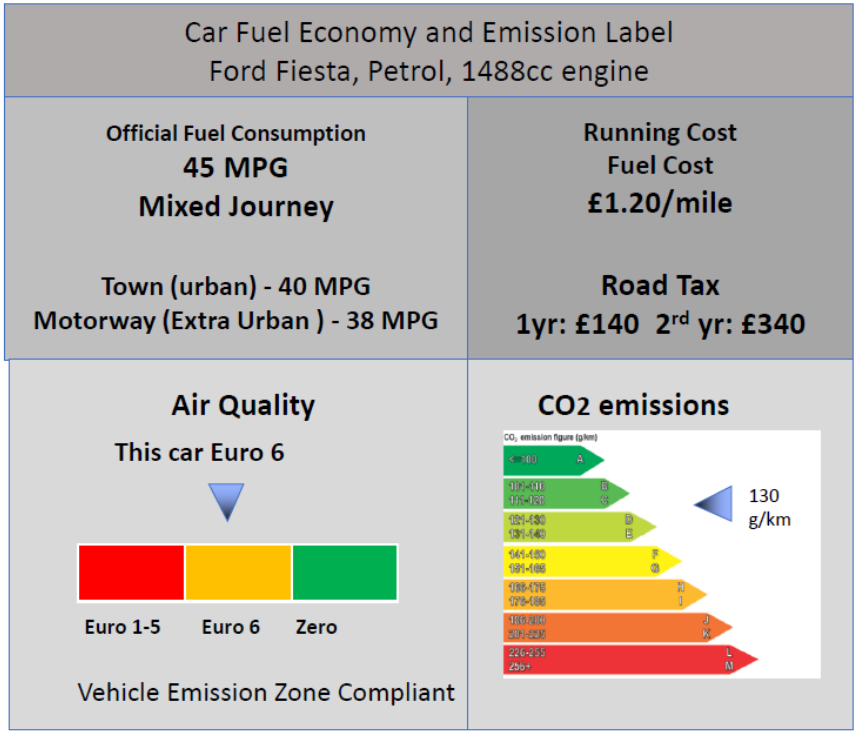
Carbon dioxide emissions (g/km):
Important note: Some specifications of this make/model may have lower CO_2 emissions than this. Check with your dealer.

Department for Transport | Vehicle Certification Agency

Important note: The test used to establish the fuel consumption and CO_2 figures above is changing. To find out more about this and how it might affect your purchasing decision, please read the accompanying fact sheet.

* A new 1st year VED rate will be applied to vehicles registered for the first time on or after April 2010 - revised from April 2017.
** The standard 12 month VED rate for all registered cars in this band is shown for the purposes of comparison. Note, figures quoted reflect the current rate only, and may be subject to change in the future. Cars with a list price of over £40,000 when new pay an additional rate of £310 per year on top of the standard rate, for five years.

"Information overload"



- Liked the simplicity - 'clear and easy'
- Understand all elements – 4 pieces of information is enough
- Liked the journey names – more meaningful
- Can quickly use the pence per mile to compare ICE with BEV
- Liked the idea of the label 'leading' to further info/tools digitally.
- Limited awareness of Euro Standard or 'Clean Air Zones', infographic easier to comprehend.

Topics 2 – Running cost and comparing cars

- Preference for p/mile fuel cost, then monthly
- MPG highlighted as popular comparator but lack of 'trust'
- Difficult to compare miles/kwh for BEV with MPG
- Interest in first year road tax AND subsequent yr cost
- Comparing cars - numerous participants highlight preference for TCO 'more meaningful' – purchase price, depreciation, insurance, tax, fuel, maintenance, service….. Metrics 3yr or p/m.
- One person posts BMW example, highlights this should be available on line and from the dealer.
- Interest cars seeing the 'lowest' running cost
- Welcome understanding where fuel cost 'savings' can be made
- Highlight interest in calculating their own 'journey' fuel cost rather than assumptions
- Interest in 'real world MPG', 'more realistic figures' – less theoretical

THE NEW BMW i3 CHARGING AND OWNERSHIP COSTS.
BENEFICIAL OWNERSHIP COSTS FOR CORPORATE CUSTOMERS.

	BMW i3	BMW i3 Range Extender	VW Golf 2.0 TDI	Audi A3 1.6TDI	Audi A4 2.0 TDIe
Exhaust CO_2 emissions	0 g/km	Sub 20 g/km	106 g/km	99 g/km	115 g/km
3 year fuel/charging cost	£420	£723	£2,763	£2,562	£2,965
BIK Tax % of P11D	0%	5%	16%	14%	18%
3 year BIK cost (40%)	£0	£2,030	£4,542	£3,480	£5,976
3 year ownership costs total	£420	£2,753	£7,305	£6,042	£8,941

- Corporate Write-Down Allowance is guaranteed until at least 2018.
- VED also at £0 per annum over life.

Insights for LowCVP work:

- **How to present fuel cost taking into account WLTP MPG & journey type**
- **How to take into account TCO and fuel savings**
- **Fuel cost calculator linked to the car label or electronic displays at dealer showroom**

Topic 3 - Information relating to BEV/PHEV

- Reasons for purchasing: zero emission, fuel cost savings, '2p/mile', performance.
- Indications of brand preference, did not look elsewhere (BMW/Tesla)
- What information would help their research for a new car? Electric range, speed of different chargers, compatibility with different type of connectors (Type 2, CCS), battery capacity, location of public charging infrastructure, can the vehicle rapid charge
- Do not consider the energy efficiency of different electric cars models, but see value in an energy rating chart like washing machines.
- When asked about 'electricity consumption' ….several people think it's their home electricity consumption rather than the vehicle's ('hardly impacts my bills')
- Limited interest/understanding in m/kwh for BEV/PHEV, electric range more useful
- Like pence/mile comparator
- 4 participants ask for lifecycle CO_2 emission figure to be shown - 'not really zero emission'.
- Majority undertake research on-line and before visiting the dealer.

Insights for label design and improving on-line information

- PHEV are the most challenging powertrain for the car labels, more work required exploring cost presentation and understanding of WLTP data, what is meaningful to the consumer and least confusing.
- Fragmented EV operational information in public domain, requires consistency.
- Focus on highlighting various cost benefits and performance (important across powertrains)

Summary of research findings

- Majority of research carried out **on-line**, consumers need the '**right**' information earlier in car buying process to influence choice towards more efficient cars.
- Manufacturer websites top source of MPG/CO_2 information, as well as EV operational information
- Motoring websites, in particular 'review' sites, are influential, You Tube & forums for EV users important
- Car label is not considered a primary influence in terms of decision making, however the information presented is perceived as useful for explaining the environmental and running cost for vehicle on show
- Identification of popular websites helps identify where LowCVP can promote its WLTP guides and 'best practice' advice on improving consumer information.
- Dealers have an important role both 'information' & 'influence', indications more work **required for ULEVs**
- Important criteria for car purchasing - reliability, comfort, purchase price……MPG lower down the list but highly valued.
- Electric range, speed of different chargers, compatibility with different connectors, battery capacity, location of public charging infrastructure, can the vehicle rapid charge – key information for choosing an EVs
- CO_2 more important to company car than private drivers, strong links with taxation. **Colour-coded emission bandings are quickly understood, easily recognised.**
- MPG continues to be important for comparing cars but presents challenges for BEV – m/kwh hard to understanding for ICE drivers. **Requires a cross powertrain/fuel comparator for label – cost**
- Interest in seeing VED cost **beyond first year**, diesel surcharge weakens CO_2/VED link & only the first year VED is differentiated by CO_2 emission. Consider showing **only 1st yr VED on the label**

Summary of research findings

- Fuel cost - strong preference for **p/m**, followed by annual, consumers like to calculate their own journey cost using 'reliable MPG figures'. **Interest in cost calculators linked to the label.**
- Additional **cost info** - consumers are interested in TCO, challenging to show on a label, could be presented on manufacturers websites or shown electronically at a showroom.
- **Saving money** highlighted as an important factor for choosing electric cars. Also useful for showing improved fuel efficiency. **Use of infographics should be explored.**
- Additional info **BEV/PHEV** - Battery capacity, charging time by type of charger, location of public charging. Difficult to fit onto all onto the printed label – lends to **an electronic dynamic label or electronic display**
- 'Electricity consumption' may require **new terminology** or clarity (too early to compare energy efficiency)
- Consumers require **simple, easy to understand** information
- Integrate **'journey'** terms into presenting WLTP phases – could match with **cost on label**
- Dealership Point of Sale information can be advanced/enhance especially in light of WLTP and variety of different fuels/powertrains, improve means of comparing cars. Think beyond 'printed' label.
- Consumers did not understand that **optional equipment** can affect a vehicle's fuel consumption – requires clear explanation by manufacturers with new WLTP data.

Summary of research findings

Response to perceived journey type

- Customers find it difficult to estimate their average speed.
- Customers calculate their journey speed over the time period of a 'full fuel tank'.
  This creates an artificial average and will inherently create a less useful single figures for MPG and average speed.
- Customers have a distorted view of MPG and journey speed
- If customers don't have a reasonably accurate view of their own behaviour, it's difficult to shift behaviour patterns positively.
- Traffic, congestion or extraordinary conditions are often not accounted for.
- A 'smoothed' average means that many customers average similar speeds irrespective of individual journey type.
  Eg: "I always average 31mph (spent on a roads with 7-10 minutes static traffic at the end of commute)"
- Powertrain decisions are grounded in annual miles travelled – not responsive to individual journey patterns.

Recommendations

- Customers should be provided with individual journey speed and MPG figures
- Accuracy could be based on time/distance spent in each cycle (mapped on to WLTP cycles)
- Could be reflected in 'in-car information display, in vehicle feedback.
- Encourage customers to understand more about their **individual** journeys – could motoring websites provide further advice. This would open up consumers mind set to different powertrains.

Recommendations for improving consumer information to encourage the take up of 'new' lower emission cars.

All powertrains

- Present MPG for all WLTP cycles, aligned with simplified 'LowCVP' journey type terminology. (Provide WLTP data in 'vehicle specification' lists/boxes on-line currently limited to combined MPG, CO_2 emissions.
- Explain the impact of OEM fitted options on vehicle performance and running cost (especially when taxation switches to WLTP CO2), useful to present 'official WLTP data' as 'to and from' to highlight potential range of data.
- Ensure prior to 6 April 2020, NEDC combined (or weight combined for PHEV) CO2 is clearly identified as figure used for taxation (avoid showing two CO_2 figures side by side.)
- Fuel or electricity cost as pence / mile, ideally aligned with WLTP phases/ 'journeys'
- Provide a journey fuel cost calculator on car buying websites and VCA website, allow consumers to add their own mileage and choose journey (WLTP phases) that match their typical driving activities
- Present first year and subsequent year VED
- Present total cost of ownership over 3 or 4 year period, match to consumers journey profile(s)
- Highlight financial savings in terms of the improved fuel efficiency and ULEVs, identify current fiscal incentives purchase and running costs. Identify the most efficient models in a modal range and/or car segment.
- Identify the vehicle is CAZ/LEZ/ULEZ compliant – simply yes or no, consider generic term 'vehicle emission zone' compliant.
- Consistency in Euro standard terminology eg Euro 6d temp followed by Euro 6d

Diesel - Identify whether the vehicle is affected by the diesel VED surcharge

Petrol - identify if the vehicle is E10 compliant

Recommendations for improving consumer information to encourage the take up of 'new' lower emission cars.

Electric vehicles

- Electric range city and combined
- Energy consumption as m/kwh
- Identify type of journeys most suitable for BEVs
- Identify factors influencing range and how to optimise (this should include OEM fitted options)
- Speed of different types of chargers
- Compatibility with different connectors
- Can the vehicle rapid charge
- Whether the vehicle can be charged at home
- Location of public charging points – 'link to zap map'
- Battery capacity
- Is the vehicle a ULEV

PHEV/REEV additional information

- Explanation of 'weighted combined' MPG and CO2
- Weight energy consumption (different to BEV)
- Fuel consumption when operating in ICE only for each WLTP cycle (*challenging*)
- Energy consumption when operating in electric mode only for each WLTP cycle (*challenging*)
- Show fuel cost using weighted combined MPG then entirely electric only operation.
- Present 'actual' electric range, CoC records 'equivalent' electric range, technically not comparable to BEV electric range.

For all car model data shown on-line and in printed media, it imperative that the 'official' EU test cycle (NEDC/WLTP) is clearly identified to ensure transparency and avoid confusion when comparing different car models.

Recommendations for improving the provision car buyer information at dealerships - raising awareness about fuel efficient and ultra low emission cars.

- Design the 'official' car **label to be viewed electronically** in the showrooms. Information could be layered – basic level on printed label, more detailed electronically
- Make the label interactive so customers can obtain more detailed information, for example
  - Show the impact of optional equipment on MPG, CO2 and electric range, identify impacts on taxation when relevant – link to OEM configurator. Identify least and most efficient modals and variants.
  - Connect to public charging infrastructure map (zap map) for EVs
  - Link to short video explaining how EV charges at home, different types of chargers and speeds
  - Connect to a journey fuel cost calculator – user defined input data and link to WLTP cycle data
  - Journey powertrain/fuel tool – how do different powertrains/fuels suit a consumers journey needs with presentation of WLTP fuel/energy consumption figures and TCO. Highlight cost savings
- Make the VCA website accessible at the showroom - enables comparisons between models of different manufacturers.
- Consider an electronic 'car specification label' remaining with the car, available through the vehicle's display panel. Could become an electronic version on the V5 form. This should energy consumption/range and battery performance statistics (useful for second hand EV market).
- Brochures to include QR code – consumer can configure car, go to zap-map, VCA website, more information on EV charger types and speeds.
- Exploit augmented reality to enable customers to 'experience' new powertrain technologies