

# Sheffield City Council

## Investing In Low Emission Transport

Mark Daly



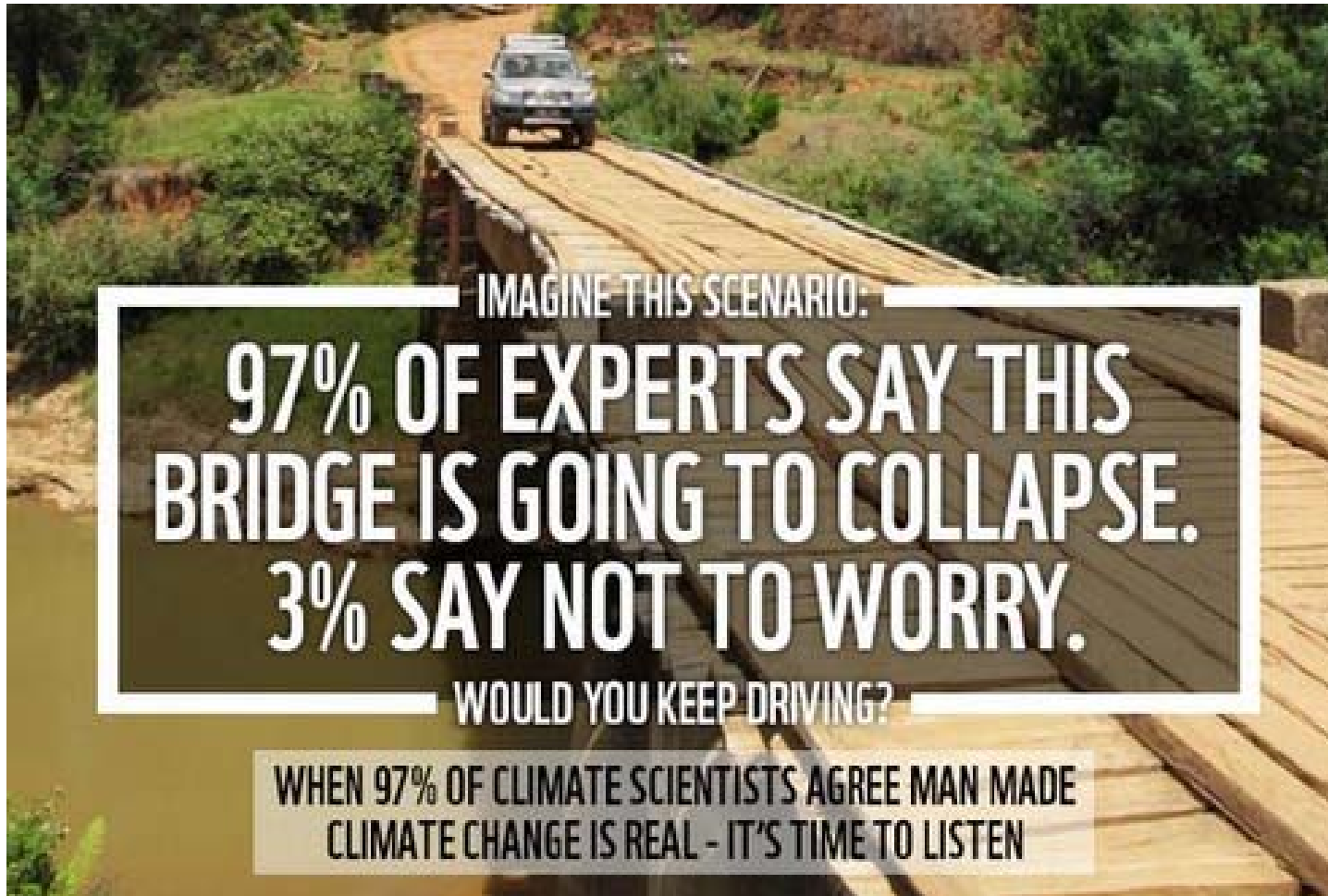
# Air Quality



- All South Yorkshire districts have legally declared air quality management areas due to traffic emissions
- European, National & Regional issue – Sheffield named as a city that needs to take urgent action by EU
- Health impact of bad air similar scale to obesity and passive smoking.
- Each year, the impact of air quality on health costs the Sheffield economy £160m and results in up to 500 early deaths



## Carbon reduction



No Magic Bullet – No 100% right or 100% wrong technology



# No Magic Bullet – No 100% right or 100% wrong technology



But aren't electric cars.....?



THE TIMES  
News

News | Opinion | Business | Money | Sport | Life | Arts | Puzzles | Papers

Welcome to your preview of The Times

Clarkson didn't give our electric car a sporting chance, says Nissan



Ben Webster Media Editor  
Last updated at 12:01AM, August 2 2011

1 of 3

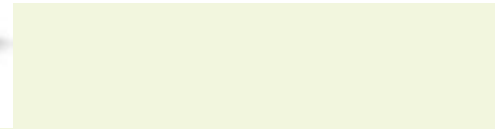
When Jeremy Clarkson claimed on *Top Gear* that owners of electric cars were "more likely to get a girlfriend", regular viewers of the BBC

James May pushes Jeremy Clarkson in a Nissan Leaf during

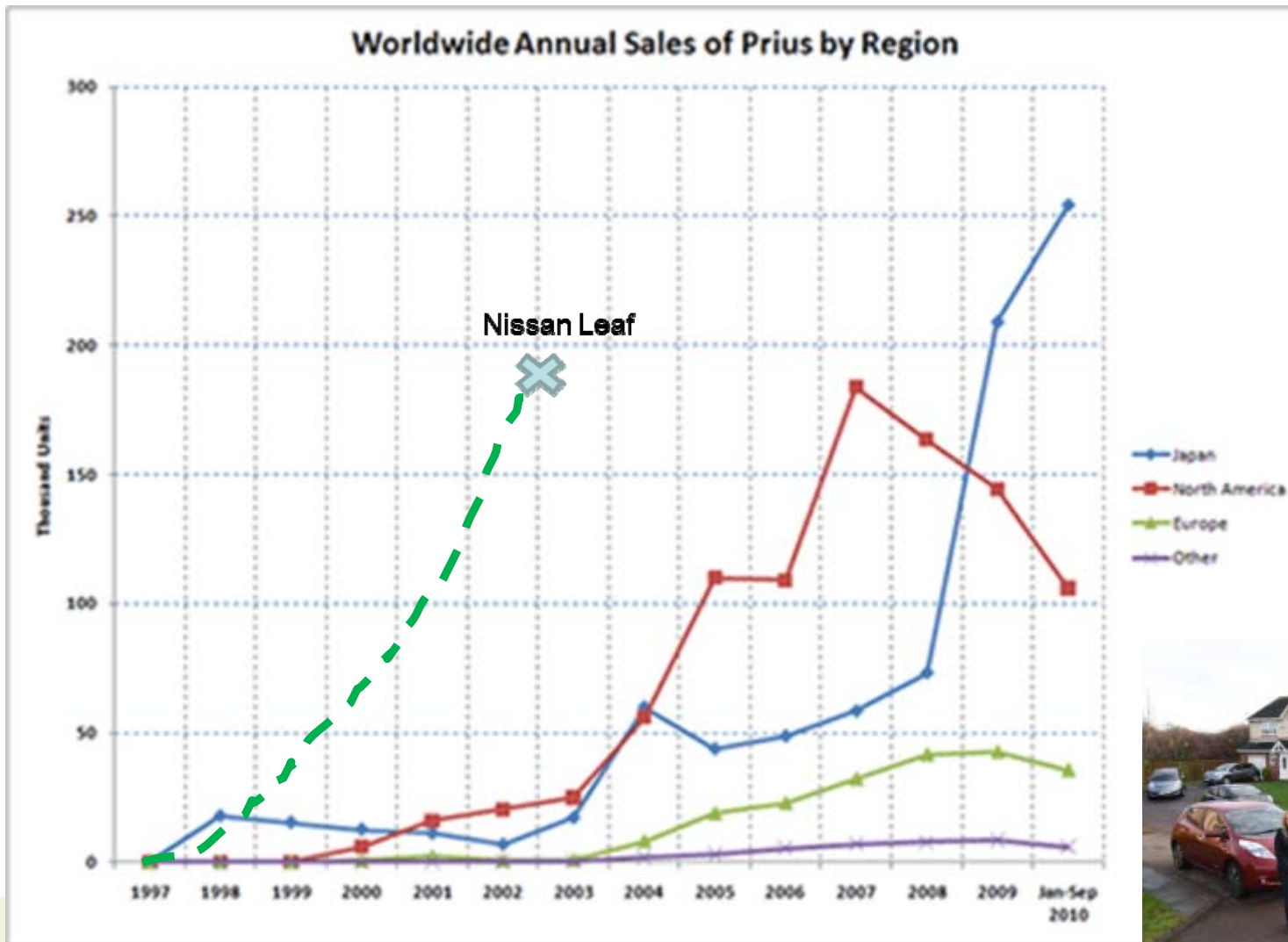
# Electric Vehicles and Infrastructure



No longer niche

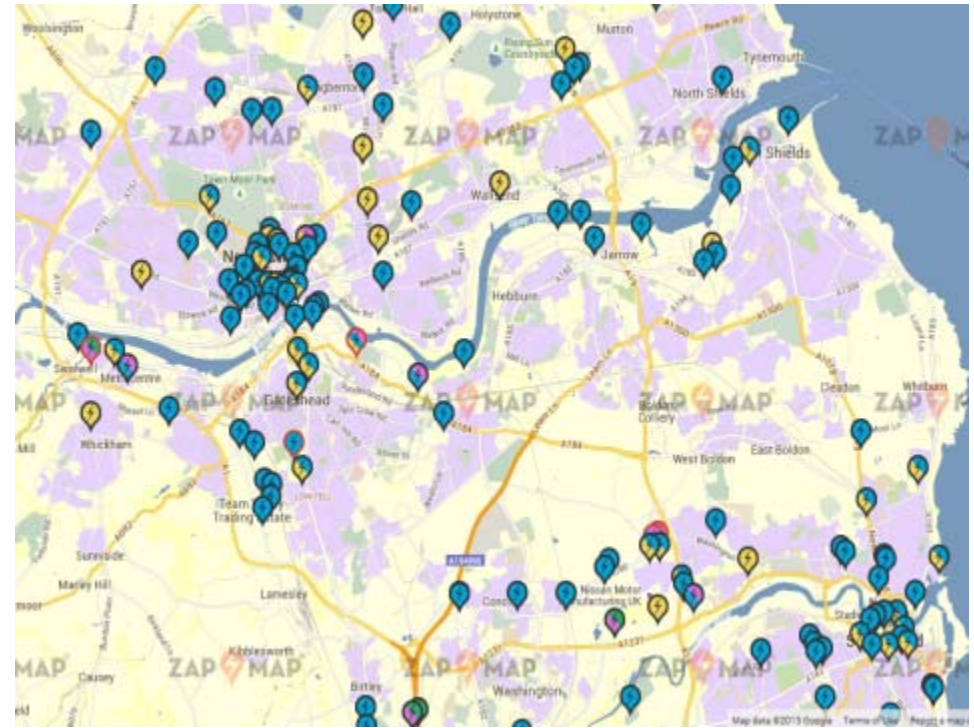
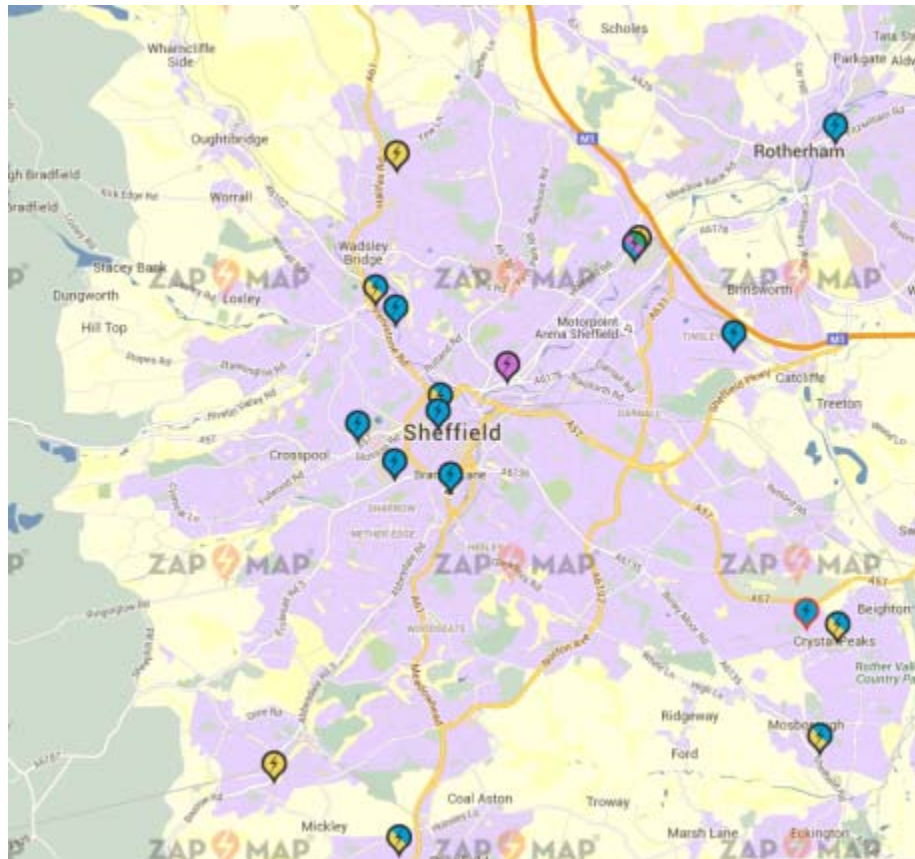


# Electric Vehicles and Infrastructure

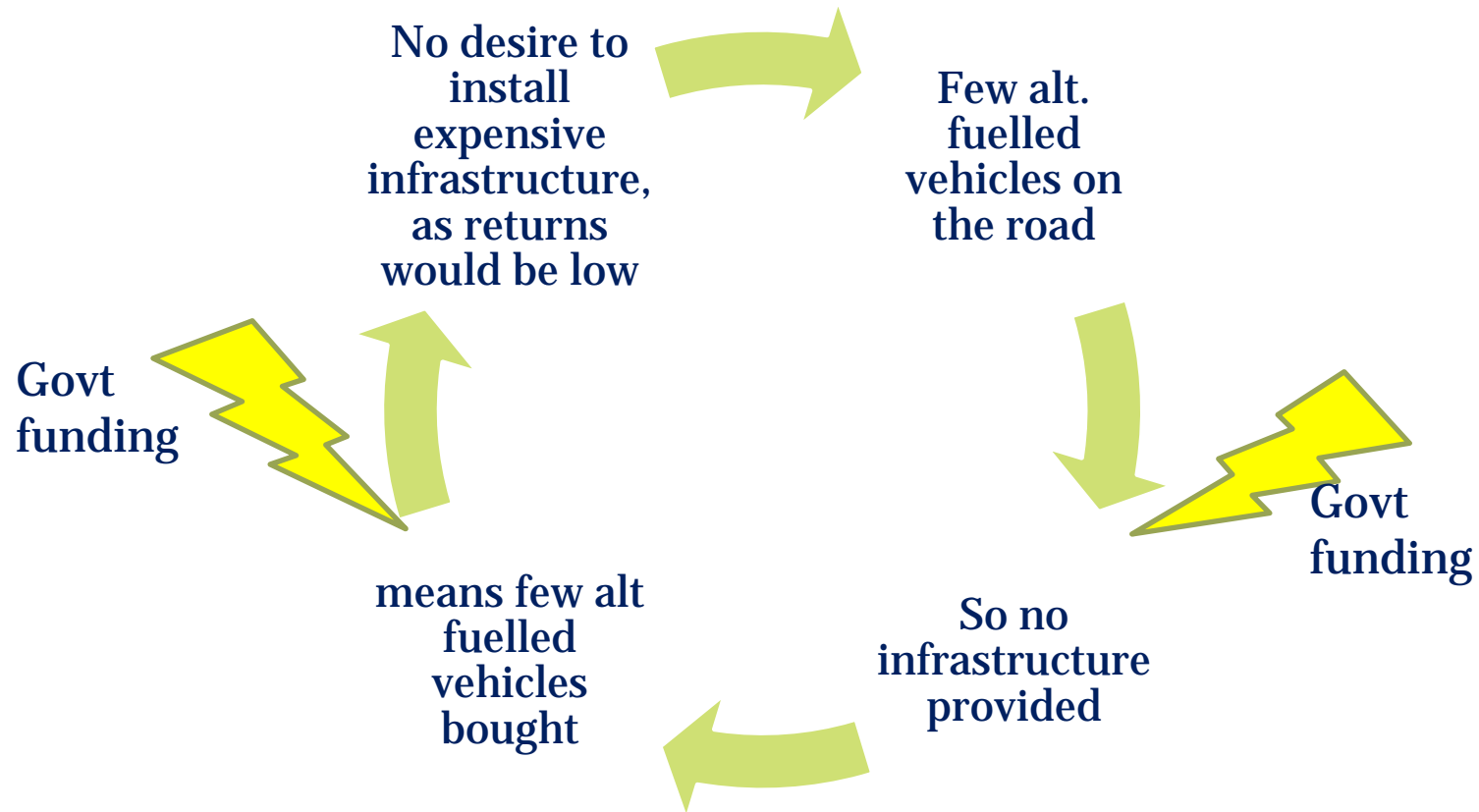




# Sheffield playing catch up



# Vicious Circle



electric vehicles  
*inmotion!*



**Focus on small/medium businesses as likely to have least appetite for risk but very keen to accrue financial savings**

- Provide a grant to lease an EV car/van
- Also link the vehicle grant with a grant for standard charger at businesses location
- Total worth £3.5k on top of Govt grant
- Complement this with rapid and fast charge infrastructure

[www.evinmotion.co.uk](http://www.evinmotion.co.uk)

# Personal experience

## Owning an EV

### Costs

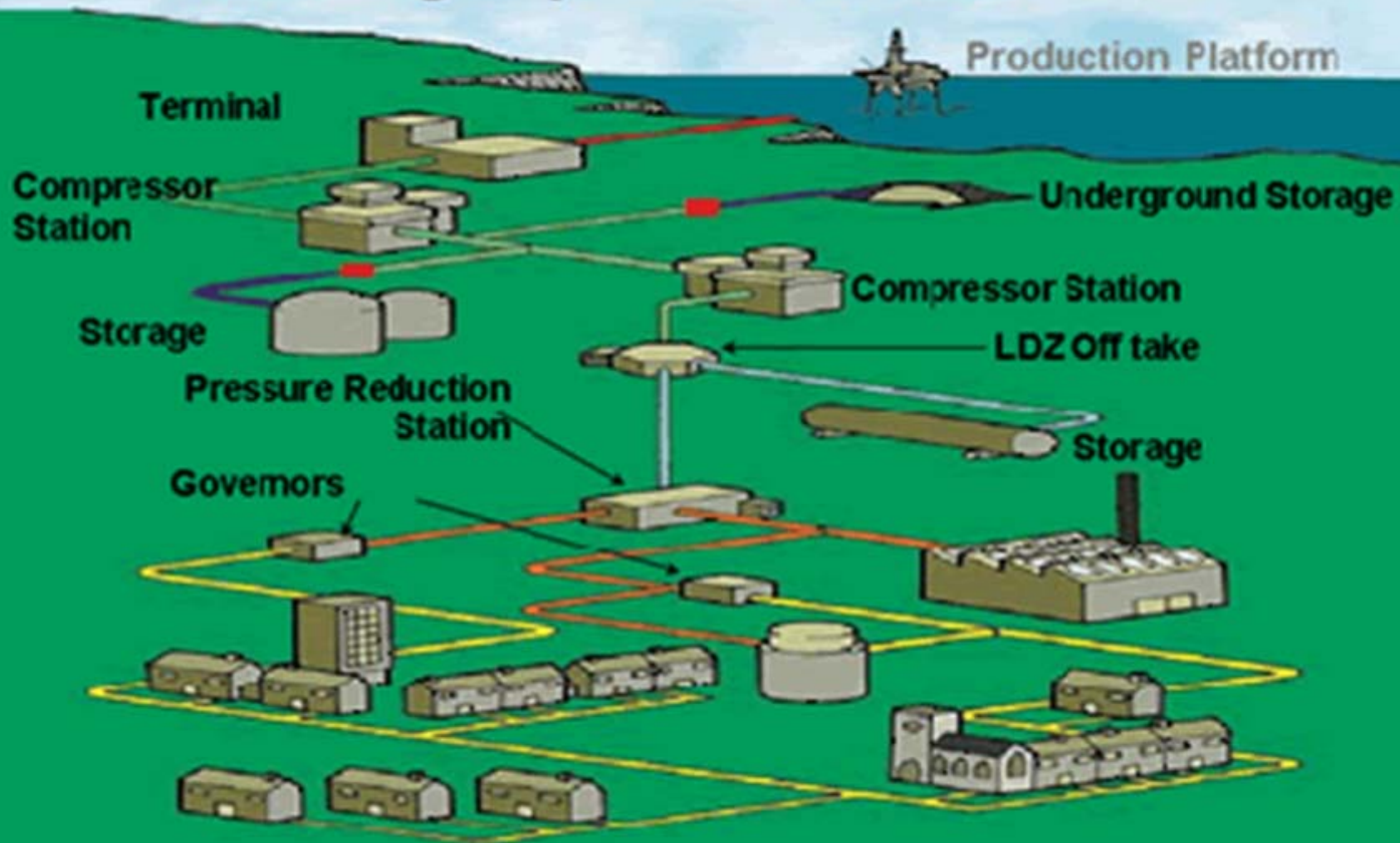
- **Fuel 3p per mile compared to 15p day to day**
- **Driven to London and back 6 times – cost £7.20p (much less than 3pm per mile!)**
- **Time penalty - half to 1 hour**
- **Purchase price now roughly the same as ICE**
- **Insurance same or less**
- **Zero tax, 5% BIK company car tax**
- **Maintenance – nothing so far but only really 1 moving part, no oil filter, air filter, gearbox, clutch or radiator to go wrong**



# Compressed Natural Gas/Biogas



## Natural gas pressure reduction



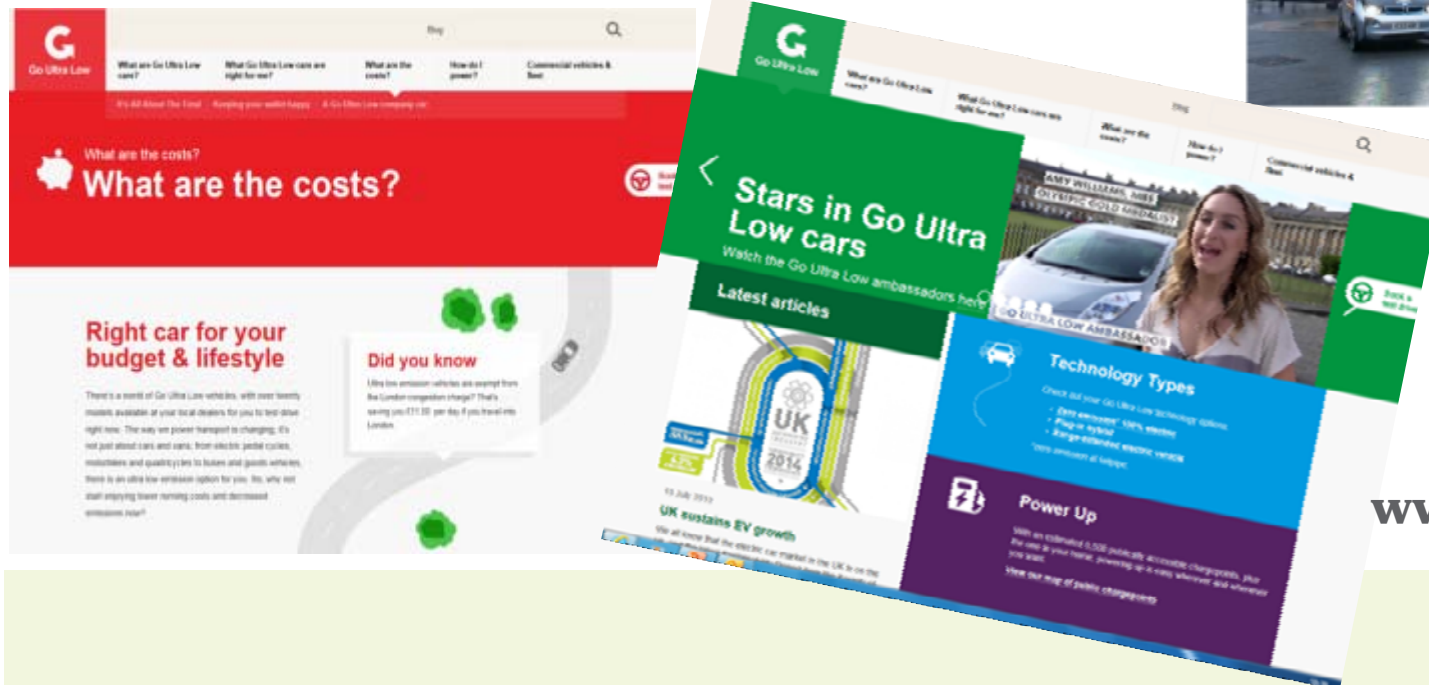
# Hydrogen Fuel Cell Electric Vehicles



## Where next?

Investing in ultra low emission vehicles  
in the UK, 2015 to 2020

- **Govt initiative launched “Go Ultra Low” to encourage further uptake**
- **Sheffield in final shortlist of Go Ultra Low City bid for £35m to be spread amongst 4 UK cities**
- **Looking to put significant numbers of electric vehicles (>50) into Sheffield Council fleet**



**What are the costs?**

**Right car for your budget & lifestyle**

**Did you know**

**Stars in Go Ultra Low cars**  
Watch the Go Ultra Low ambassadors here

**Latest articles**

**Technology Types**

- Zero emission
- EV's starter
- Plug-in hybrid
- Range extended electric vehicle

**Power Up**

**UK sustains EV growth**

[www.goultralow.com](http://www.goultralow.com)



**Questions?**

**Thanks**

**Mark Daly**

**[Mark.daly@sheffield.gov.uk](mailto:Mark.daly@sheffield.gov.uk)**



# Cutting Carbon and Cost from your fleet

Keith Budden, Cenex



**Cenex**

Centre of excellence for low carbon and fuel cell technologies

## Low Emission Van Guide and Tool

# Cenex services and client examples



- 'Not for Profit' Independent Consultancy and Research Organisation
  - Established in 2005 as a Centre of Excellence for low carbon and fuel cell technologies
  - Specialised in low carbon vehicles and energy infrastructure
  - Operate through collaboration and partnership working
  - Manage the UK's largest low carbon vehicle event ([www.cenex-lcv.co.uk](http://www.cenex-lcv.co.uk))
  - UK based, operating primarily in UK but with operational reach in Europe, Japan and USA
- Delivery to clients via

Economic development business case advice, techno-market consultancy, due diligence



Low carbon vehicle and energy infrastructure advice and implementation support for fleets and cities (e<sup>-</sup>, H<sub>2</sub>, CH<sub>4</sub>)



Policy, public affairs and operational 'project brokerage' support, project dissemination including the LCV event





Technology Exhibition



[www.cenex-lcv.co.uk](http://www.cenex-lcv.co.uk)

9-10<sup>th</sup> September 2015



Ride & Drive Activities



Seminar Programme

Expecting;

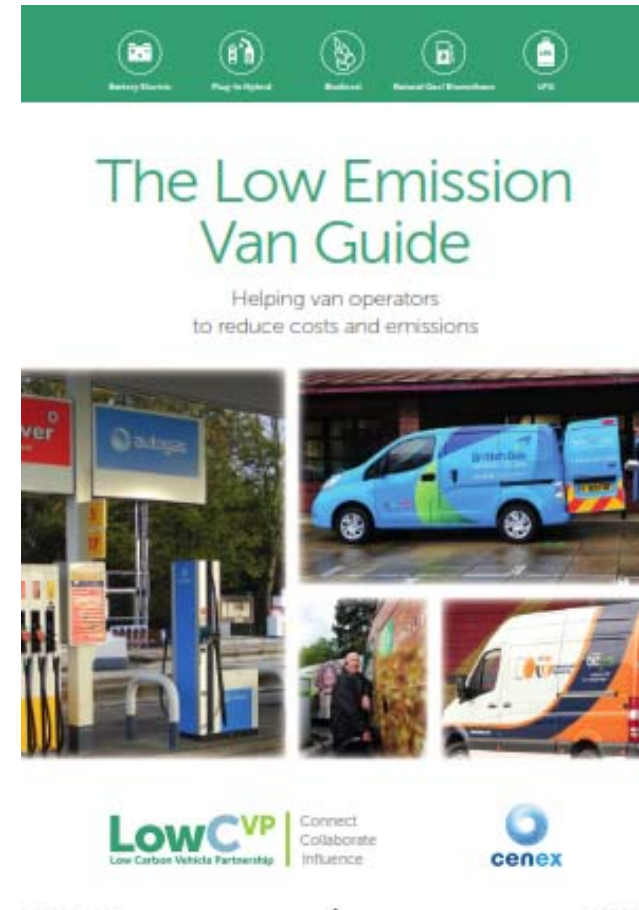
- 2,400+ visitors
- 180+ exhibiting organisations
- 950+ organisations attending

*Now includes Automated Vehicles*



Facilitated Networking

- Why choose a low emission van?
- What to consider?
- Incentives
- Low emission van topic sheets
  - Battery electric vans
  - Plug-in hybrid vans
  - LPG vans
  - CNG / Biomethane vans
  - Biodiesel vans
- Van best practise
- What to do next?



## Factors to consider

*For a fleet of vans it may be possible to specify vehicles differently in order to arrive at a mix of van types to deliver the variety of duties required. This allows low emission vans to play a role in your fleet which is best suited to their capabilities.*

Flexibility

- Technology options
- Daily / annual mileage
- Refuelling and recharging
- Emissions
- Cost
- Dealer support
- Vehicle size
- Payload

### Factors to consider

Payload	<b>What type of goods will be carried, what is the maximum payload required?</b> Payload is often reduced slightly in alternatively fuelled vehicles due to the weight of additional components such as batteries, motors or gas tanks.
Vehicle size	<b>What load space is required?</b> The best way to reduce emissions and cost is to use smaller and lighter vehicles. Downsizing from a larger vehicle will also open doors to more low emission van options, for example most plug-in vans are only available in the smaller van range.
Daily / annual mileage (range)	<b>Local runs or long distance driving? Return to base for refuelling?</b> Refuelling station availability and the time taken to refuel/recharge can vary for the different low emission van options.
Fuel/technology options	<b>What are the benefits of low carbon fuels?</b> Apart from lower emissions and running costs, a quieter vehicle may be beneficial, or you may be looking to improve your company's image.
Local considerations	<b>Is any preferential treatment given for a particular type of vehicle, such as concessionary parking charges or access to low emission zones?</b> Low emission vans are often encouraged into cities by local authorities offering discounted access and parking fees.
Dealer support	<b>Where is my closest trained dealer? Will my warranty be affected?</b> Make sure your local service centre is able to support your alternatively fuelled vehicle. Different service frequencies have to be followed when running on biodiesel. An additional third party warranty may be needed to maintain full warranty cover of an LPG converted vehicle.
Buy or lease	<b>What discount can you get through your dealership? Do you want a guaranteed fixed cost for vehicle ownership?</b> The examples in this guide give whole life costs for vehicle ownership. You should look at both lease rates and ownership costs. Leasing companies can get much bigger discounts on buying vehicles compared to low volume van buyers. They offer convenient fixed monthly charges that can include maintenance. Plus many have specialists offering free advice for customers wanting to switch to lower carbon vehicles. Purchasing the vehicle yourself, especially if you can get a good dealer discount, can be cheaper, although you'll have to absorb some risk when it comes to estimating the value of an alternatively fuelled van in future years when you want to sell it.
Flexibility	<b>Finally, flexible thinking will help.</b> This guide will show you that the cost and emission savings are there, you may just have to rethink how you operate your vans to take full advantage of them.

## Evaluating the cost



*It's easy to fall into the trap of purchasing the lowest cost van available to you.*

- Whole life cost
- Plug-in van grant
- Road tax
- Van benefit charge
- Enhanced capital allowance
- Fuel duty
- Free / discounted parking
- Congestion charge

INCENTIVE	INFORMATION	WHAT'S IT WORTH?
Plug-in van grant	The plug-in van grant currently gives 20% off the cost of a new Ultra-Low Emission Vehicle up to a maximum of £8,000. A van which emits less than 75g CO <sub>2</sub> per km driven is classed as an ULEV.	Up to £8,000
EV charging points	The government offers a grant of 75% towards the cost of charging infrastructure installed at residential addresses.	Up to £750
Road tax	The road tax rate for battery electric vans is £0.	Up to £225 per year
Van benefit charge	Using a company van for significant personal use is a taxable benefit. The government value this benefit at £3,150 per annum and a driver must pay their normal rate of tax on this. Further taxable benefits are imposed if the company also pay for the driver's fuel. The tax payable if a battery electric van is used is reduced and will increase steadily over 5 years before reaching the same level as a conventional van.	£630 for year 2015/16 basic rate (20%) tax payer
Enhanced capital allowance	Zero emission goods vehicles are eligible for 100% first year allowance until 2018. So if your business pays corporation tax at 20%, £20,000 spent on a battery electric van would reduce your tax bill in the year of purchase by £4,000. You cannot claim an enhanced capital allowance if you have received the Plug-in van grant.	£4,000 on a £20,000 purchase
Fuel duty	Some clean fuels such as natural gas, LPG and biomethane are cheaper than diesel and petrol because the government applies less fuel duty to them. In the case of electricity, there is no fuel duty applied at all.	Up to 70% reduction in fuel costs
Free or discounted parking	Some cities offer free or discounted parking at public charge points for electric vans.	Up to £10 per day
Congestion charge	Vans that emit 75g/km or less of CO <sub>2</sub> receive a 100% discount on the London Congestion Charge.	£11.50 per day, or £10.50 if using auto-pay

# Low Emission Van Guide and Tool

## Topic Sheets

(Battery electric, PHEV, CNG / Biomethane, LPG, Biodiesel)



Technology introduction



Quick reference panel

**Technology Introduction**  
Battery electric vans (BEV) operate entirely on electricity using an electric motor instead of a diesel or petrol engine. A high capacity battery usually lithium ion technology, the same as we have in our phones and laptops powers the vans. Battery electric vans are classed as ultra-low emission vehicles.

**Fit for Purpose**  
Electric vans are suitable for regular and are ideal for their limited driving when recharging. They offer up to an 80 mile range in total, which reduces if driven in cold weather or with high heater use. Range can be increased by using driving software to optimise use of the battery. Range can be extended by topping up the battery during the day if normally drive back to base to recharge. The growing number of fast public charging stations also allow top-up charging during the day - links to charging station maps are provided in the What to do next? section at the end of this guide.

**Environmental Performance**  
Electric vans produce zero tailpipe emissions which makes them ideal for improving air quality. BEVs offer CO<sub>2</sub> savings of up to 35% even when production is taken into account.

**Operational Performance**  
Range: Up to 80 miles  
Recharging times: Standard: 10 hrs, Fast: 4 hrs, Rapid: 30 mins  
Ideal operation: City and suburbs, Back to base  
Example fleet: City courier, light delivery and service engineers

Fit for purpose

Environmental

Market status

- Tailpipe
- Fuel life cycle
- AQ
- Range
- Refuelling
- Ideal operation
- Typical fleet

WLC analysis

**Whole Life Cost Example**

	Nissan NV200 1.5dCi Acenta (Diesel)	Nissan e-NV200 Acenta (Electric)	Vehicle: 2.2t Small panel
Vehicle	£24,600	£22,700	Annual mile: 12,000 miles (48 mi)
Plug-in Van Grant Discount		£5,150	Ownership period: 5 years
Fuel costs	£8,301	£1,801	Cost saving: £5,215 rising to £18,340 if used in the London Congestion Charging Zone
Road tax	£900	£0	
Maintenance costs	£1,701	£1,150	
Resale value	£2,701	£3,701	
Life time cost	£31,201	£23,601	
Cost per mile	25.3p	26.3p per mile	
<b>Whole life cost savings</b>		<b>£8,215</b>	

**How we calculated the whole life cost and emissions**  
All costs exclude VAT. Purchase Cost Fleet News Van Running Cost tool. Fuel Consumption manufacturer's estimate with a 20% real-world small van uplift factor applied. Fuel Cost based 2014 average @ £1.10 per litre, electricity @ £0.10 per kWh. Maintenance Cost Fleet News Van Running Cost tool. Resale Value Fleet News Van Running Cost tool. Emissions UK Government fuel emission factors applied to estimated van fuel consumption.

**Case Study**  
Fruit 4 London is a small company, with a big environmental ethos, dedicated to delivering fresh fruit to over 200 London offices every day. Following a successful trial in 2012, Fruit 4 London operates five electric Renault Kangoo ZE delivery vans. The vans typically travel 40 to 70 miles and make up to 60 delivery stops per day. Initially attracted by the environmental benefits of zero emission vehicles, they found it was easy to make the business case work too, as Fruit 4 London director Lutzio Plutsko explains, "Operating in the congestion charging zone saves us nearly £15,000 per year over the five vehicles, we are also saving around 70% fuel savings compared to our two diesel delivery vans". Having operated BEVs for 3 years now Lutzio has also noticed the extra business vehicles are directly responsible for as their customers seek a more sustainable supply chain. Fruit 4 London purchase all their electric vans on a battery leasing model, preferring the financial security and comfort of knowing that the batteries performance and lifetime are guaranteed for as long as they own the vehicles.

**Which other fleets are using electric?**  
British Gas, Birmingham City Council, Gwent Cargo, Loughborough University and more.

**Next step:** Go to the What to do next? section at the end of this guide to find links to advice sites and tools, including public charging station locations.

How we did it?

Case study

Next steps

# Low Emission Van Guide and Tool

## Whole life cost example



Whole Life Cost Example		
	Nissan NV200 1.5dCi Acenta (Diesel)	Nissan e-NV200 Acenta (Electric)
Vehicle	£14,695	£21,720
Plug-in Van Grant Discount		£5,158
Fuel costs	£6,301	£1,911
Road tax	£900	£0
Maintenance costs	£1,716	£1,158
Resale value	£2,718	£3,728
Life time cost	£21,290	£15,904
Cost per mile	35.2p	26.5p per mile
<b>Whole life cost savings</b>		<b>£5,215</b>
<b>If used in the London Congestion Zone (5 days/week)</b>		
Life time cost	£34,244	£15,904
<b>Whole life cost savings</b>		<b>£18,340</b>
<b>How we calculated the whole life cost and emissions</b>		
All costs exclude VAT. <b>Purchase Cost</b> Fleet News Van Running Cost tool. <b>Fuel Consumption</b> manufacturer's literature with a 20% real-world small van uplift factor applied. <b>Fuel Cost</b> diesel 2014 average @ £1.10 per litre, electricity @ £0.10 per kWh. <b>Maintenance Cost</b> Fleet News Van Running Cost tool <b>Resale Value</b> Fleet News Van Running Cost tool <b>Emissions</b> UK Government fuel emission factors applied to estimated van fuel consumption		

**Vehicle:**  
2.2t Small panel van

**Annual mileage:**  
12,000 miles (48 miles per day)

**Ownership period:**  
5 years

**Cost saving:**  
£5,215 rising to £18,340 if used in the London Congestion Charging Zone

*The example shows the economic case for electric vehicles is strong. The plug-in van grant, lower cost fuel, zero road tax, lower maintenance costs and stronger residual value all work together to offer substantial whole life cost savings. When regional incentives, such as free entry into the London Congestion Charging Zone are included the whole life savings available become comparable to the purchase cost of the vehicle!*

### Other areas

- Finance cost
- Infrastructure
- Training
- Night time elec.
- Pollution cost



# Low Emission Van Guide and Tool

## Technology comparison



	Battery Electric	PHEV	CNG	LPG	B30 Biodiesel (30% Biodiesel blend in diesel)
<b>Whole life cost</b>	✓	✓	✓	✓	✓
Cost improvements dependent on annual mileage and ownership period					
<b>Financial incentives</b>	Vehicle and infrastructure funding. 100% London congestion charge discount. Regional council schemes for discounted/free parking.		Reduced fuel duty rate	Reduced fuel duty rate	None
	Enhanced capital allowance OR Van grant on purchase. Reduced van benefit charge until 2020. No fuel duty applied. £0 road tax	No fuel duty applied to electricity			
<b>Market status</b>	Available, around 15 models	One vehicle model only (Outlander 4Work)	Two models available	Conversions available for petrol vans	Some models warranted for biodiesel use
<b>Example vehicles</b>	Nissan e-NV200, Renault Kangoo, Allied eBoxer	Mitsubishi Outlander 4Work	Merc Sprinter, Iveco Daily	Retrofit	Peugeot Partner, Boxer
<b>Ideal operating location</b>	City, suburbs	City, suburbs and occasional motorway	City, suburbs, motorway		
<b>Ideal refuelling location</b>	Back-to-base			No restrictions	Back-to-base

# Low Emission Van Guide and Tool

## Van cost and carbon calculator (VC<sup>3</sup>)



Van Cost & Carbon Calculator

Select Vehicle

Small Van

Large Van

Select your driving habits

Mainly suburban driving

Or choose your own  
All drivecycles must add up to 100%

Urban / Inner-City

Rural / B-road

Motorway / A-road

Van type

Driving habit

% Urban, % Rural, % Motorway

Driving style

Driving Style

Gentle Steady Normal Keen Aggressive

Select your annual mileage

Select your vehicle ownership duration

Advance Customisations (Optional)

Show results

Annual mileage

Ownership period

Advanced options

## Low Emission Van Guide and Tool

# Van cost and carbon calculator (VC<sup>3</sup>)



Van Cost & Carbon Calculator

The screenshot displays the VC3 calculator interface. On the left, a list of van options is shown, each with a 'Saving' amount and CO<sub>2</sub> emissions. On the right, a 'Your selections' panel lists user inputs and fuel prices.

Van Type	Saving	CO <sub>2</sub> Emissions
Electric Small Van	£7,988	7.3 Tonnes CO <sub>2</sub>
Electric Battery Lease Small Van	£5,172	7.3 Tonnes CO <sub>2</sub>
CNG Small Van	£465	0.9 Tonnes CO <sub>2</sub>
Diesel Start-Stop Small Van	£141	0.9 Tonnes CO <sub>2</sub>
Biodiesel (B30) from UCO Small Van	£445	6.4 Tonnes CO <sub>2</sub>
BioCNG (15% biomethane) Small Van	£853	3.4 Tonnes CO <sub>2</sub>

**Your selections**

- Urban / Inner-City: 40%
- Rural / B-Road: 40%
- Motorway / A-Road: 20%
- Driving Style: Normal
- Annual Mileage: 15000 miles
- Years Ownership: 5 years

Fuel prices (excluding VAT):

- Diesel: £1.11 (€ / litre)
- Electricity: £0.10 (€ / kWh)
- Biodiesel (B30) from UCO: £1.07 (€ / litre)
- Natural Gas: £0.85 (€ / kg)
- BioCNG (15% biomethane): £1.00 (€ / kg)

All fuel prices are excluding VAT

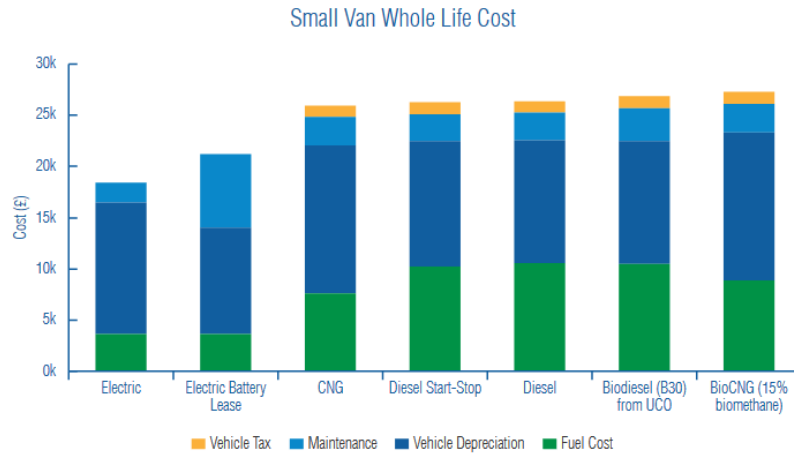
- Results splash screen
- Saving
- Increase

## Low Emission Van Guide and Tool

# Van cost and carbon calculator (VC<sup>3</sup>)



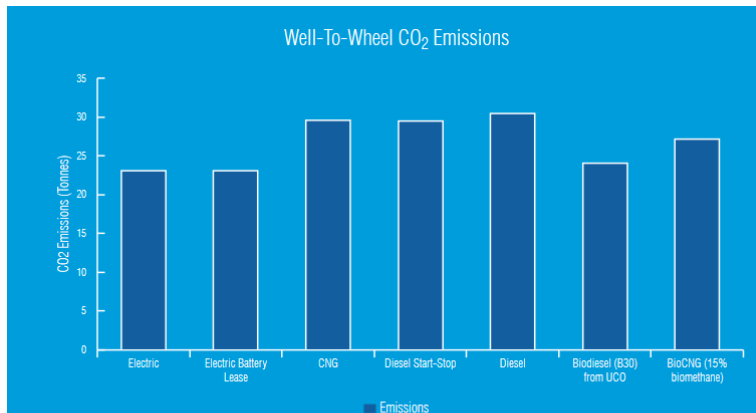
Van Cost & Carbon Calculator



### Whole life costs

- Depreciation
- Tax
- Maintenance
- Fuel

It's easy to fall into the trap of purchasing the lowest cost van available to you. Since your choice of van will determine your business costs for years to come it pays to undertake a whole life cost analysis. This includes not only the purchase cost



### CO<sub>2</sub> Emissions

- Tailpipe emissions
- Well-to-wheel emissions

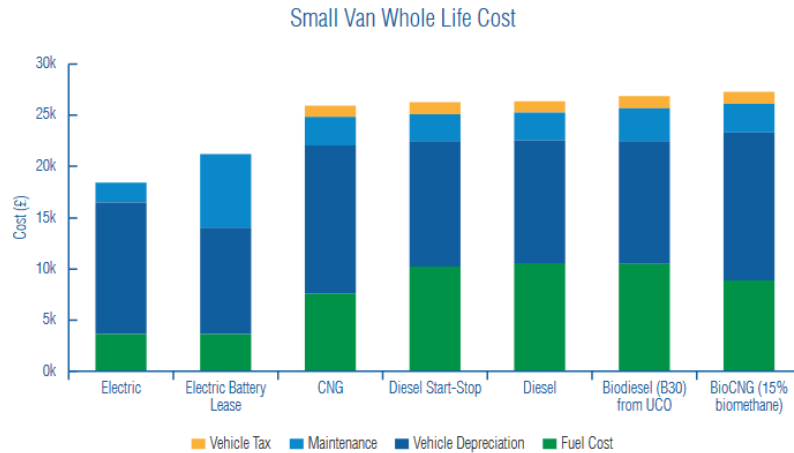
Well-To-Wheel CO<sub>2</sub> is a much better method for understanding the true environmental performance of a fuel. This takes into account the CO<sub>2</sub> emissions associated with the energy used while extracting and processing the fuel as well as the emissions from the vehicle when the fuel is burnt. Renewable biofuels, which are generally derived from plants or waste,

## Low Emission Van Guide and Tool

# Van cost and carbon calculator (VC<sup>3</sup>)



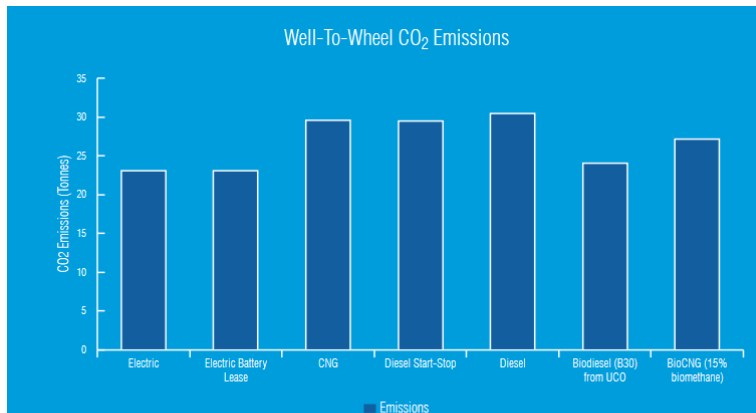
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### CO<sub>2</sub> Emissions

- Tailpipe emissions
- Well-to-wheel emissions

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## Next steps

- Van comparison sites
- Van advise sites
- Refuelling / recharging station locations
- Grants



General Advice And Calculator Tools	
<a href="http://www.cenex.co.uk/vc3">www.cenex.co.uk/vc3</a>	Cenex provide a tool for allowing operators to calculate emission and cost savings available from alternatively fuelled vans
<a href="http://www.lowcvp.org.uk/lev">www.lowcvp.org.uk/lev</a>	The LowCVP provide an advice site for operators looking to make the switch to low emission vans
<a href="http://www.vanchooser.net">www.vanchooser.net</a>	Van chooser allows users to search for a van type that meets their requirements and can display list price, emission performance, fuel costs and much more
<a href="http://www.fleetnews.co.uk/vans/tools/">www.fleetnews.co.uk/vans/tools/</a>	The Fleet News web site has whole life cost and emission calculator tools, best practise case studies and much more
<a href="http://www.ukconversionfactors.carbonsmart.co.uk">www.ukconversionfactors.carbonsmart.co.uk</a>	The UK Conversion factors site provides official UK Government recommended factors for converting your fuel use into carbon emissions
Battery Electric And Plug-In Hybrid Electric Vehicles	
<a href="http://www.zap-map.com">www.zap-map.com</a>	Zap Map contains a list of publically available charge points, vehicle model availability and charge point provider contact details
<a href="http://www.goultralow.com/commercial-vehicles-fleet">www.goultralow.com/commercial-vehicles-fleet</a>	The Go Ultra-Low web site provides information about switching to ultra-low emission vehicles and vehicle availability
<a href="http://www.ukevse.org.uk">www.ukevse.org.uk</a>	UKEVSE, the electric vehicle supply equipment association, provide a guide for procuring charge points including equipment considerations and location choice
<a href="http://www.gov.uk/government/publications/plug-in-van-grant">www.gov.uk/government/publications/plug-in-van-grant</a>	The Office for Low Emission Vehicles (OLEV) provides a list of vans that are eligible for the Plug-in Van Grant
LPG Vehicles	
<a href="http://www.drivelpg.co.uk">www.drivelpg.co.uk</a>	Drive LPG provides advice and information about converting to LPG including a list of approved installers and UK refuelling stations
CNG Vehicles	
<a href="http://www.gasvehiclehub.org">www.gasvehiclehub.org</a>	The Gas Vehicle Hub provides a map of UK CNG refuelling stations, a list of vehicle model availability and gas vehicle case studies plus much more
Biodiesel Vehicles	
<a href="http://www.biodieselfillingstations.co.uk">www.biodieselfillingstations.co.uk</a>	Biodiesel Filling Stations provides a list of filling stations and biodiesel blends available by UK area, with links to suppliers websites where many show pricing and other information

## Low Emission Van Guide and Tool

### RCVs and HGV



- CNG
  - LNG
  - Biomethane
- [www.gasvehiclehub.org/](http://www.gasvehiclehub.org/)



[www.cenex.co.uk/vc3](http://www.cenex.co.uk/vc3)

[www.lowcvp.org.uk/lev](http://www.lowcvp.org.uk/lev)

[www.gasvehiclehub.org](http://www.gasvehiclehub.org)

