

The opportunity of a national low carbon transportation system

Carbon emissions from Highways Agency Corporate activities, the strategic road network Asset Base, and the Road User are presented in this graphic. The carbon emissions values illustrate the scale of emissions in 2013 and the reductions needed to enable the Highways Agency to make a meaningful contribution to the UK Government target of an 80% reduction in emissions vs. 1990 levels by 2050.

The graphic shows the actions required and the scale of change needed to achieve a low carbon transportation system: The values for **Corporate** activity represent the scale of direct organisational action required. The values for **Asset Base** show the changes required to carbon intensity of material supply chains, from better design, and from construction site activity. The values for **Road User** show the changes required in vehicle technology, shifts in customer behaviour, and action

by the Highways Agency on network improvement. Throughout, the values shown are for 2050 unless accompanied by an up arrow (▲) or down arrow (▼), in which case they reflect the change by 2050 compared with 2013.

In the illustrated scenario it is necessary that all actions are undertaken together and that the outcomes shown are all achieved. This will enable the Highway Agency to make a meaningful contribution to the UK Government target of an 80% reduction in emissions.

Carbon emissions sources considered

Corporate

The direct and indirect emissions associated with the operation of the strategic road network by the Highways Agency.

2013 **0.094** MtCO₂e
2050 **0.002** MtCO₂e

Asset Base

The emissions arising as a result of construction and maintenance activity of the strategic road network, and the supply chain that exists to deliver this.

2013 **0.33** MtCO₂e
2050 **0.54** MtCO₂e

Total carbon emissions of the strategic road network Asset Base increase up to 2050, but in contrast the carbon intensity per unit of investment reduces over this period resulting in significant savings

2013 **0.456** 2050 **0.336** kgCO₂/£

Road User

The emissions arising from the use of the strategic road network by parties other than the Highways Agency and its partners, i.e. the public / the Agency's customer base.

2013 **31** MtCO₂e
2050 **5** MtCO₂e

UK carbon emissions

2013 **918Mt**
UK carbon footprint, including imported emissions¹

597Mt
UK carbon footprint, excluding imported emissions¹

338Mt
UK infrastructure emissions²

210Mt
UK Built Environment emissions³

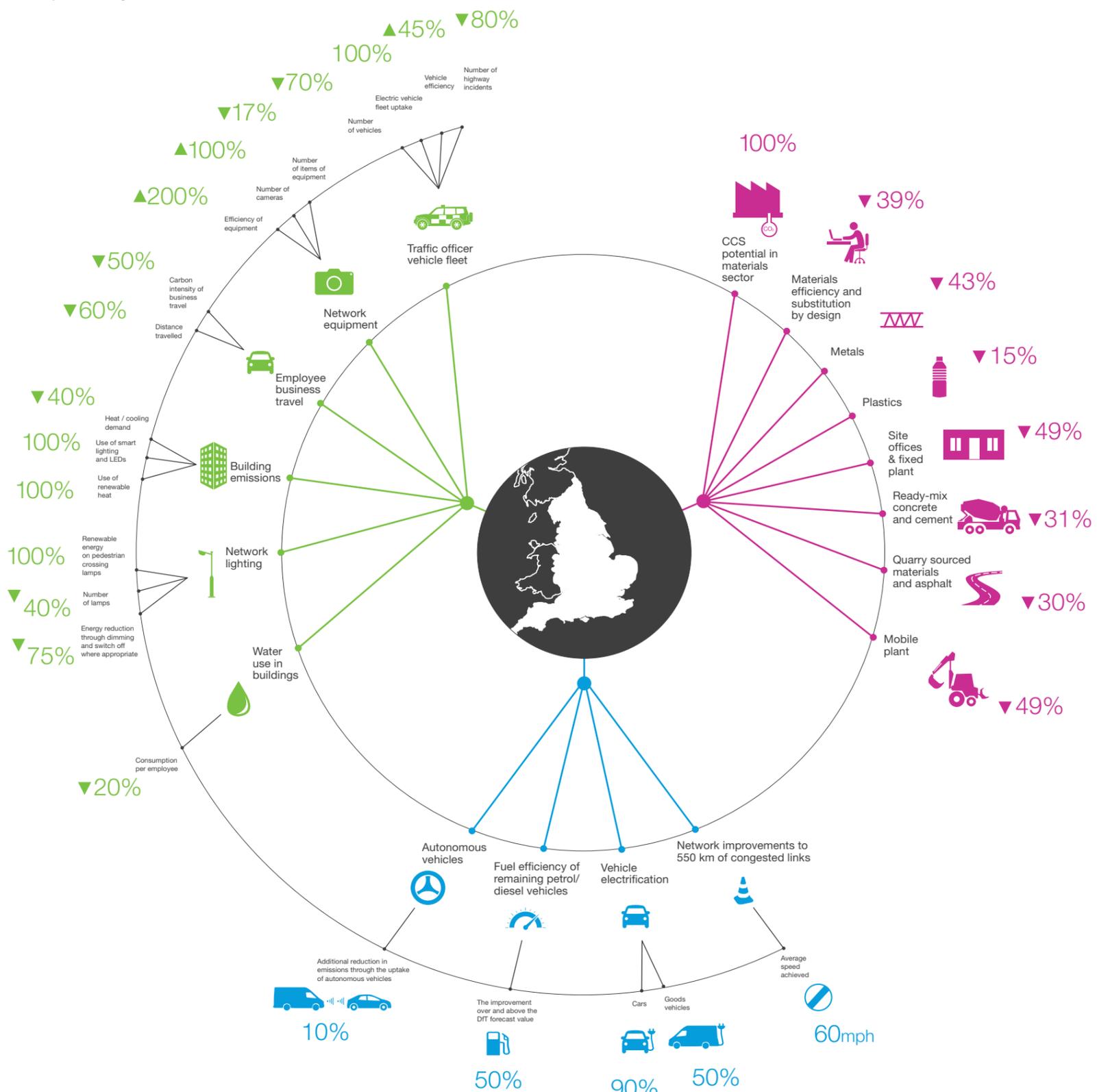
117Mt
UK transport emissions⁴

90Mt
England road transport emissions⁵

31Mt
Strategic road network emissions (including road users)

2050 **156Mt**
UK Govt. 80% emission reduction target vs. a 1990 baseline of 778Mt

How to achieve a national low carbon transportation system

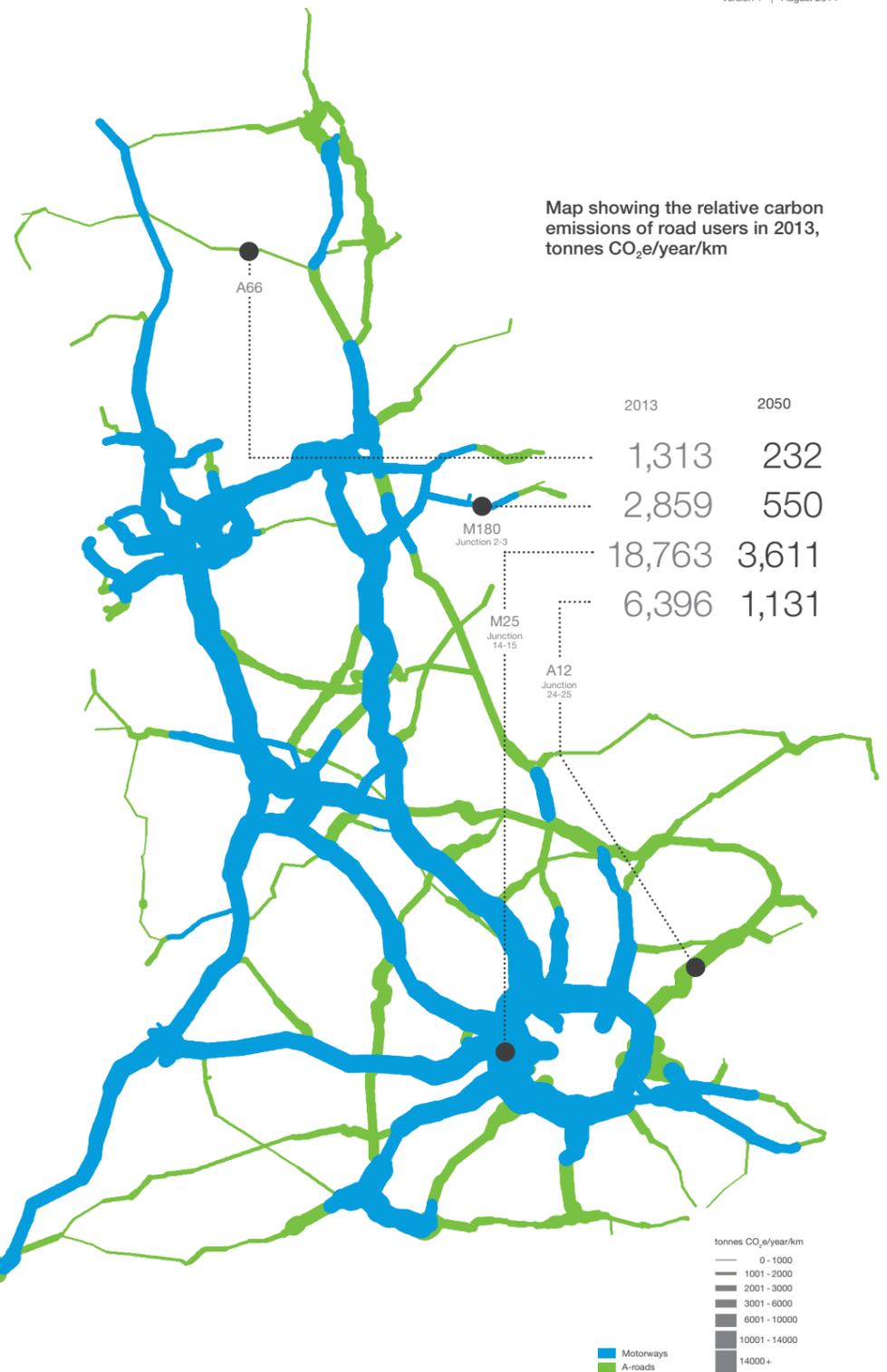


Source:
¹ Infrastructure Carbon Review (ICR)
² ICR, excluding non-infrastructure energy use
³ Green Construction Board built environment low carbon Routemap
⁴ Department for Energy and Climate Change
⁵ National Atmospheric Emissions Inventory

The challenge of influencing road user vehicle emissions

This infographic is based on the Highways Agency carbon Routemap to 2050 to which Arup has provided technical support. The Routemap has been undertaken to inform how the Highways Agency can most meaningfully contribute to the development of a national low carbon transportation system. The study supports this ambition by developing a strategic carbon model to 2050 and a Highways Agency low carbon Routemap to aid with forward planning on carbon emissions management and reduction.

The figures in this infographic refer to the carbon emissions associated with the use of the strategic road network in 2013, and the changes to the system that are necessary to achieve a significant reduction by 2050. The road user emissions model is based on traffic flow and average speed data for all 2,500 links of the strategic road network, along with statistics relating to peak time congestion for these links. The model combines this data with Department for Transport forecasts for vehicle kilometres, and allows for investigation of the effects of changing drivetrain characteristics such as engine type or fuel efficiency, average speeds achieved, speed profile normalisation, targeted improvements to congested links of the highway, and savings due to possible future uptake of autonomous vehicles.



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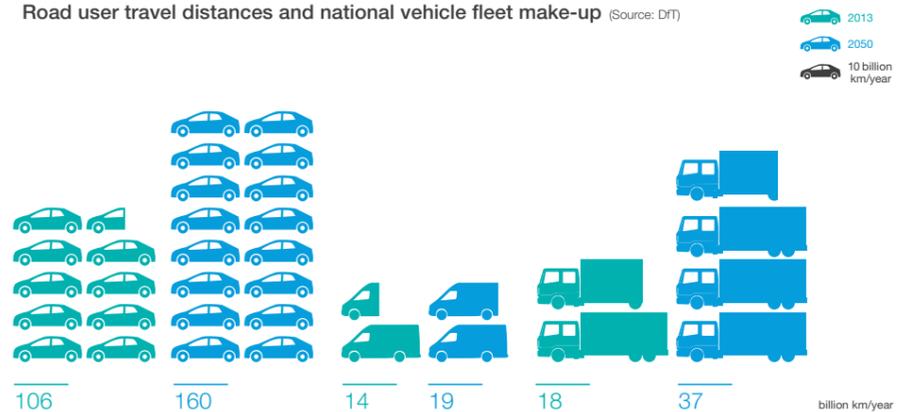
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2050 **5** MtCO₂e

Road user travel distances and national vehicle fleet make-up (Source: DfT)



Vehicle technologies

- 90%** of cars using the strategic road network are electric
- 50%** of goods vehicles using the strategic road network are electric
- 50%** fuel efficiency improvement over and above DfT forecast of remaining petrol and diesel vehicles using the strategic road network in 2050

Speed and congestion

- 110** number of congested links improved by 2050
- 550km** of congested links improved by 2050
- 60mph** minimum speed achieved on previously congested links by 2050
- 10%** additional reduction in emissions achieved by 2050 through uptake of autonomous vehicles