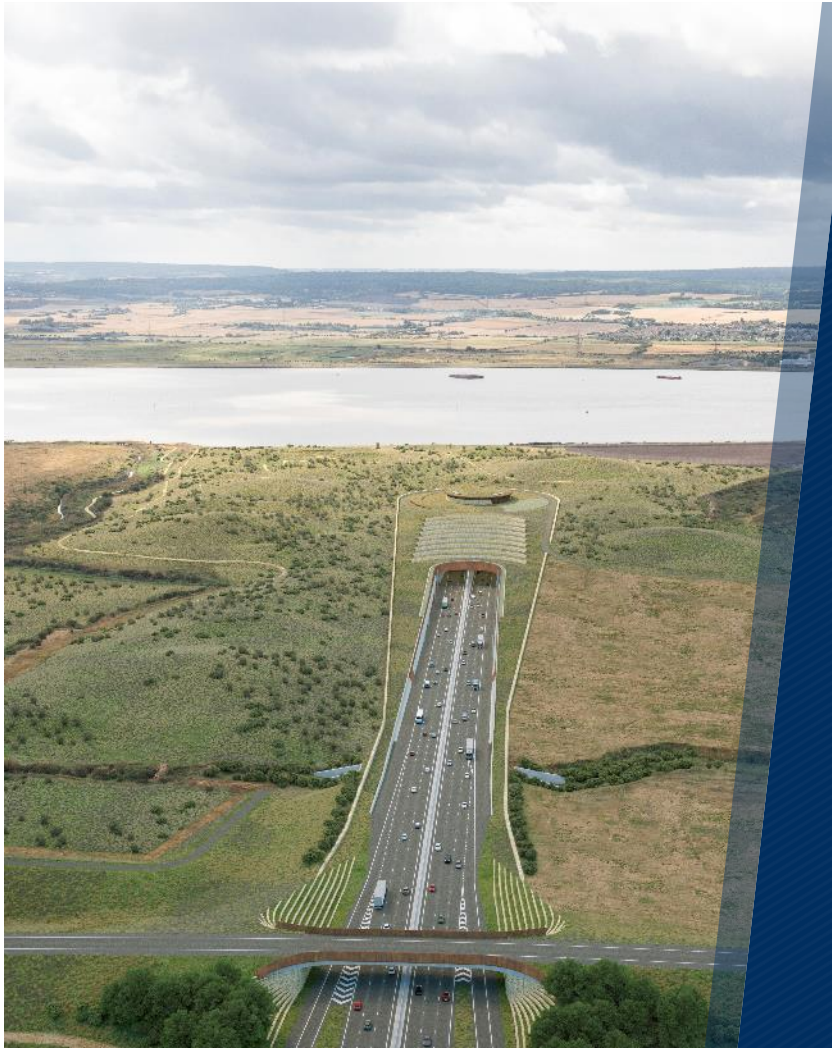


Lower Thames Crossing

Building low-carbon infrastructure in the UK

Keith Bowers
Tunnels and Systems Director

national highways

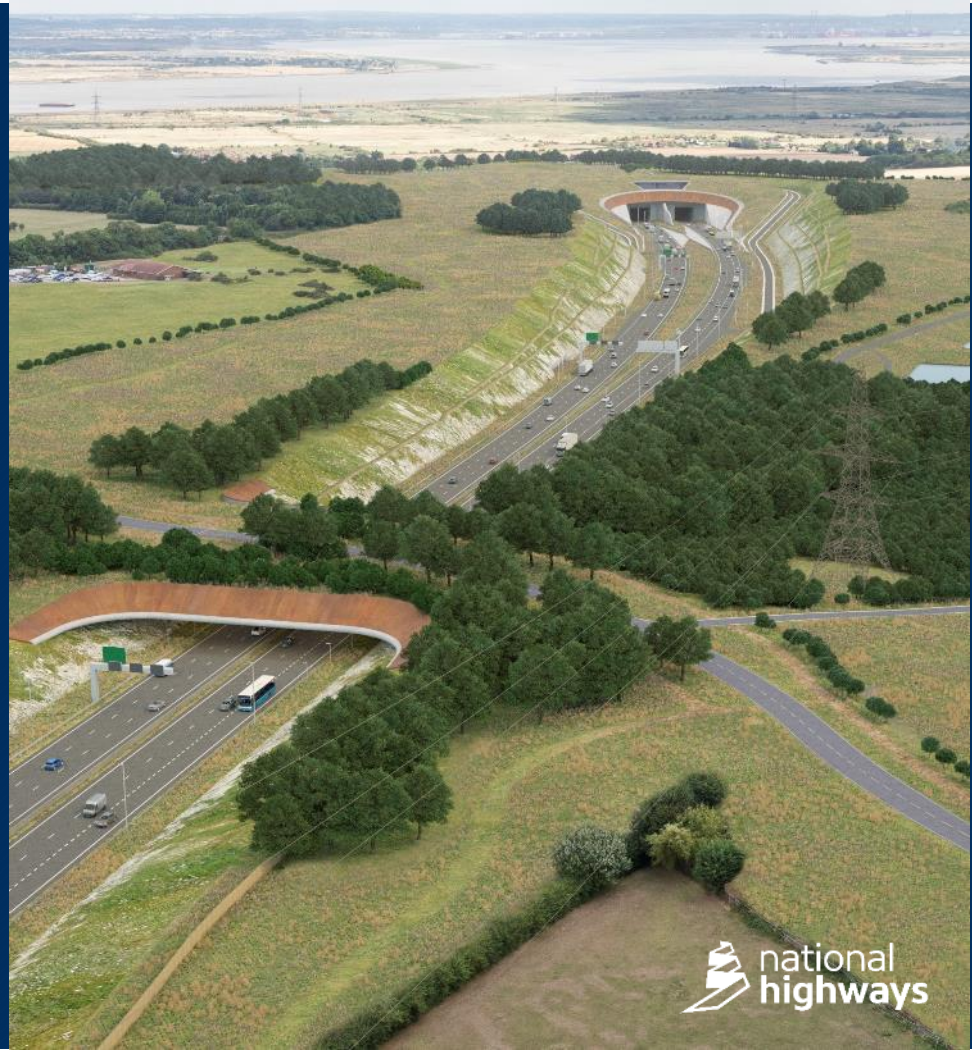
Lower Thames Crossing

The need for the scheme

The proposed solution

Managing the risks

The carbon challenge



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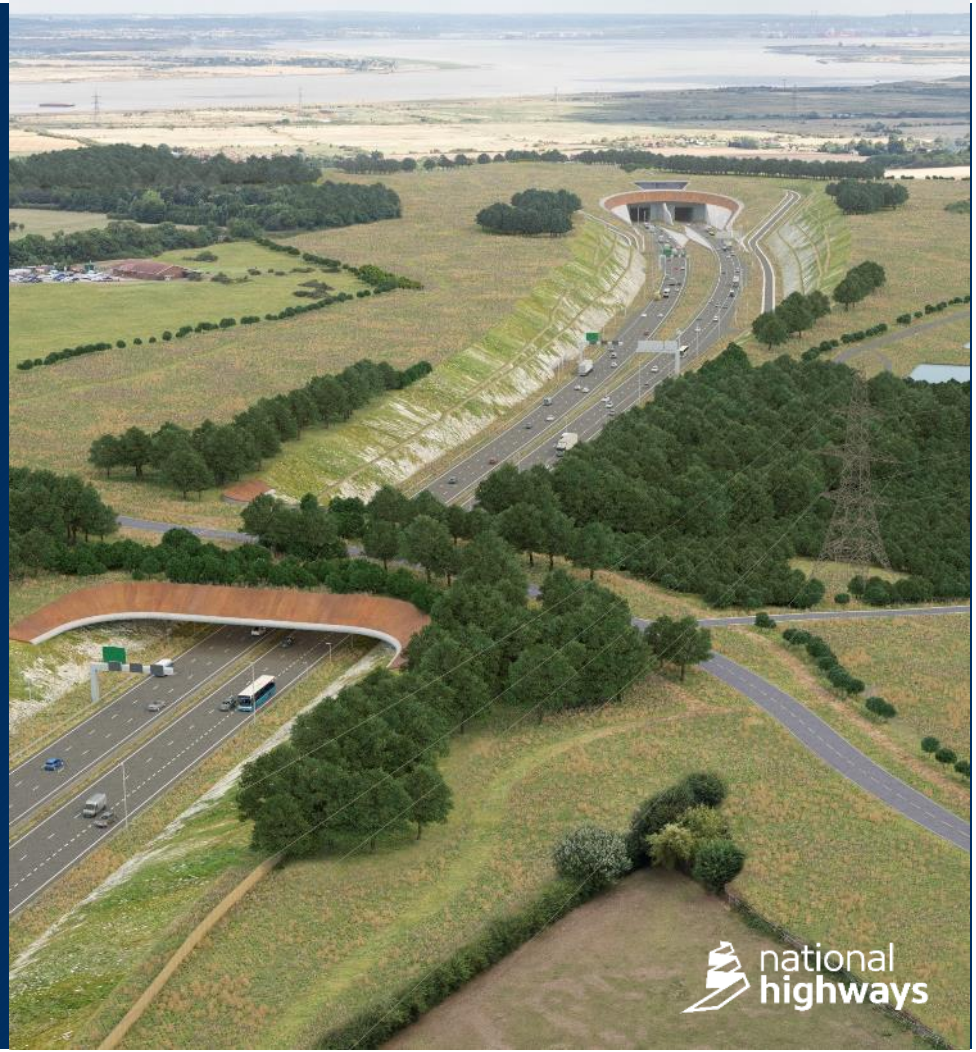
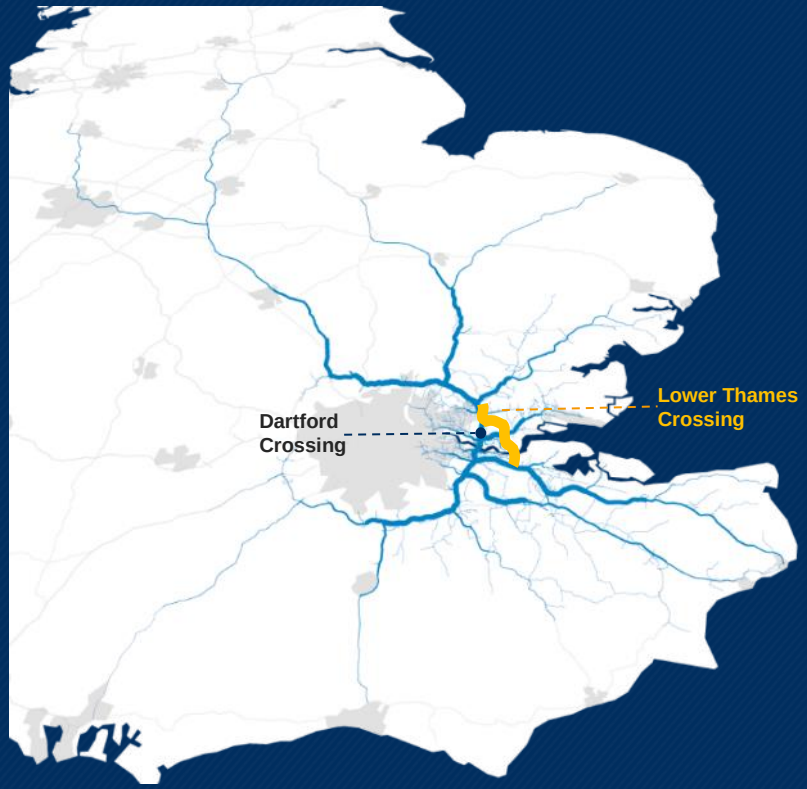


Lower Thames Crossing

national highways

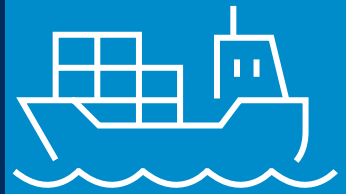
Dartford crossing is vital for UK freight



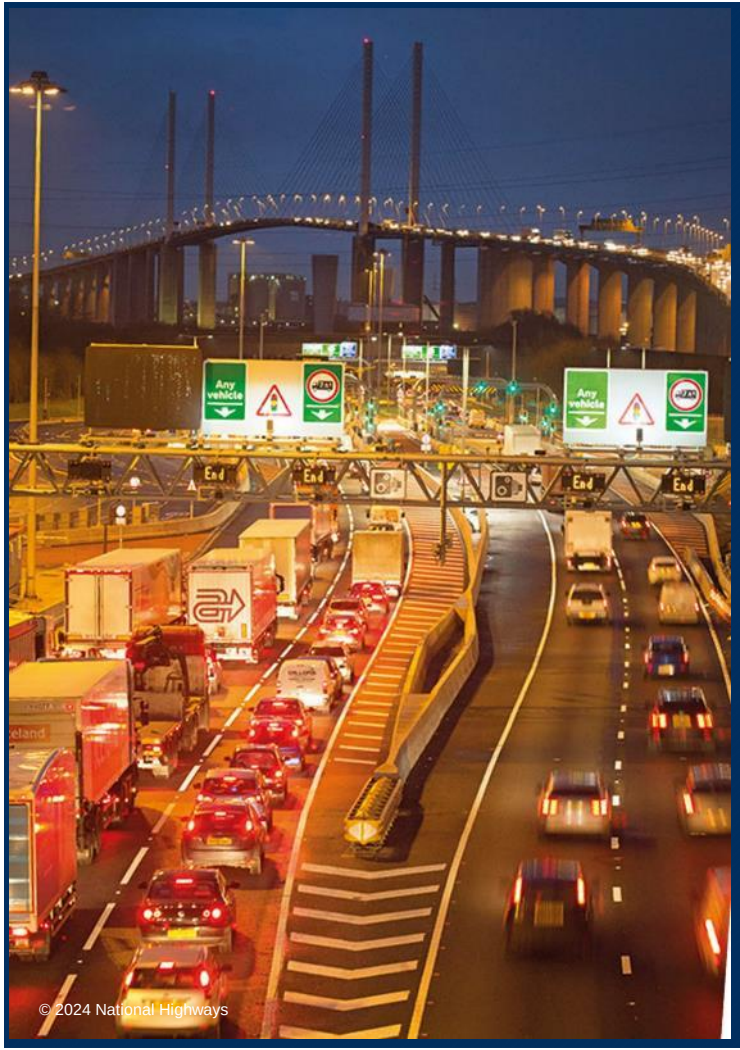
37%

Of vehicles carry goods. About double the national average, and up from 30% in 2019

Significant proportion of all HGV traffic from the Port of Dover and Eurotunnel uses the crossing



national highways



Dartford Crossing today

50 million
crossings a year and traffic volumes are increasing

Designed for
135,000 vehicle crossings a day

Can operate at above
180,000 vehicle crossings a day

Delays cost UK economy £200m a year

national highways

Wildly unreliable journey times

Restrictions on goods in transit

national highways

Dartford is the worst performing part of the motorway network

- It cannot cope with current traffic volumes
- Slow journeys
- Unpredictable journey times
- A huge daily operation to keep the crossing moving
- Hugely disruptive operational constraints

Lower Thames Crossing

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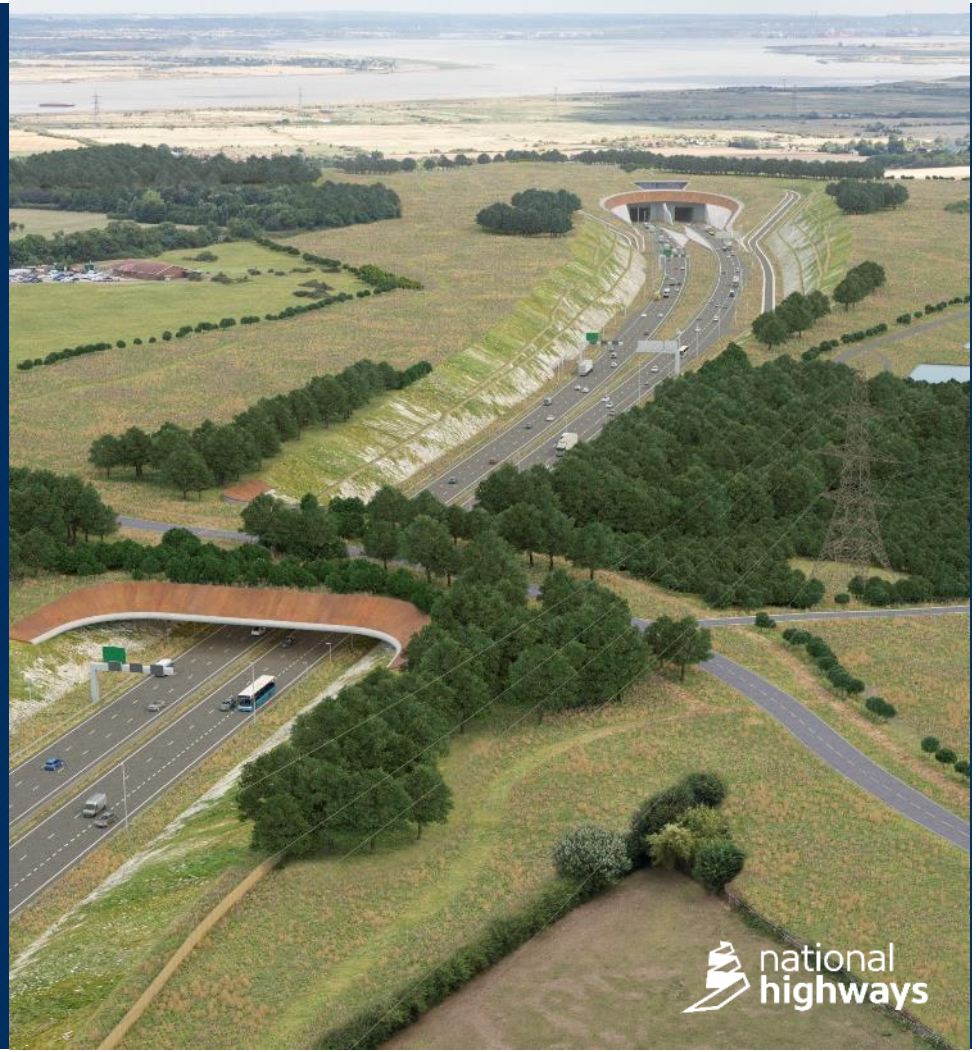


The transport solution

70 mph, high quality, free flow crossing with no vehicle type restrictions

Nearly doubles cross river capacity 3 lanes in each direction

Traffic using Dartford reduced by around 20% while enabling new journeys

Direct connection between Channel ports, the Midlands and the North

20% more jobs within 30-minute commute of workers in Gravesham, Thurrock and Havering

national highways

4.25km tunnel under the estuary and protected wetlands

national highways

The tunnel

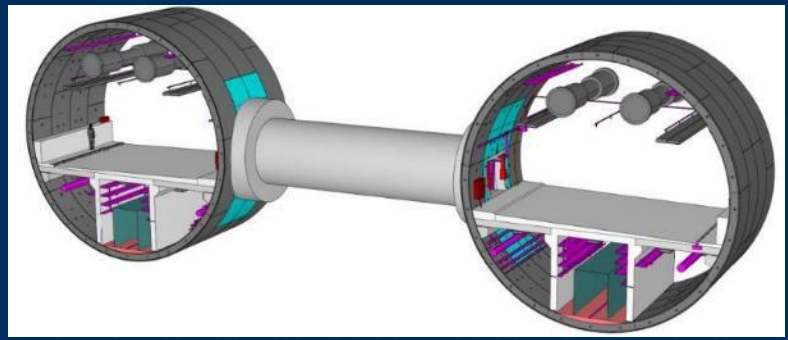
Twin bores, c16.4m O.D.

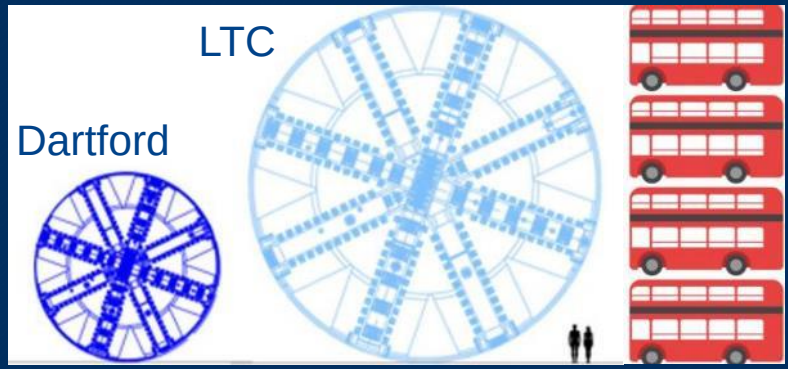
Cross passages

Longitudinal ventilation

500,000m of cable and pipework

Remote operation





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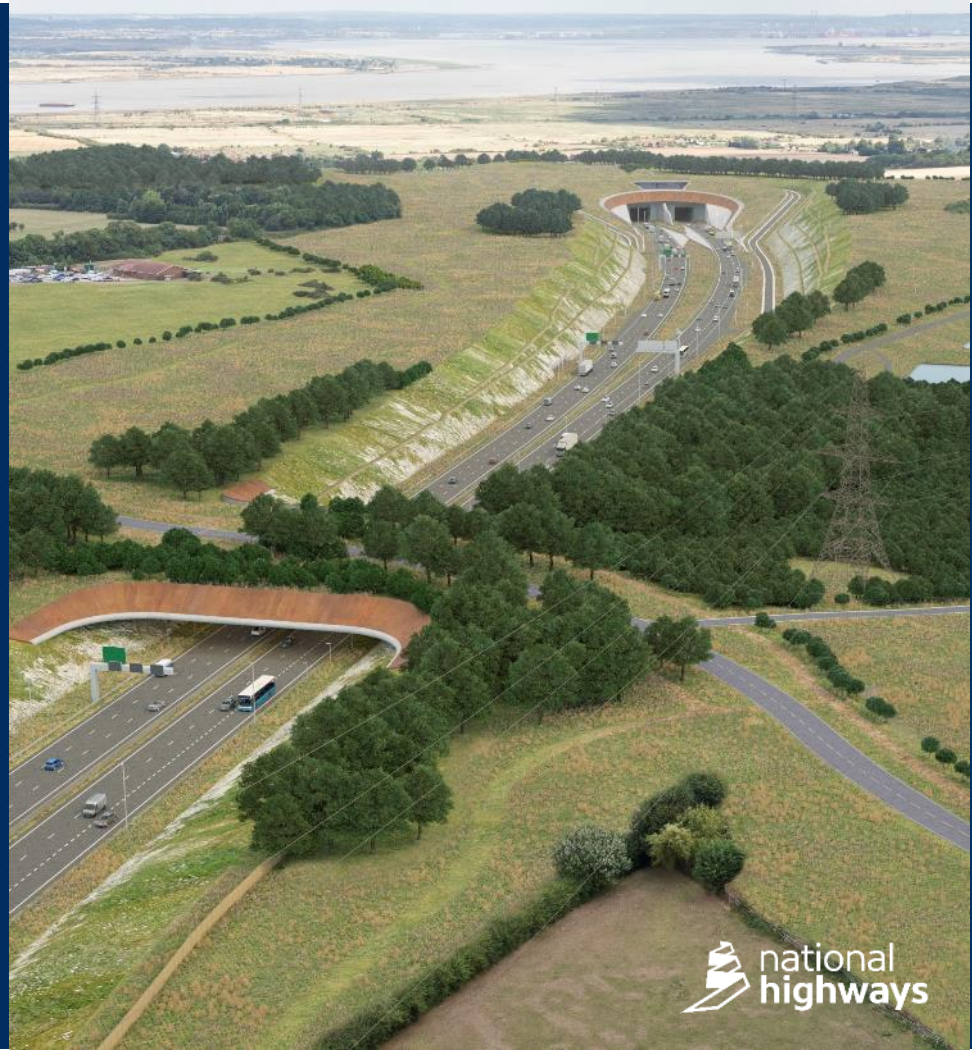
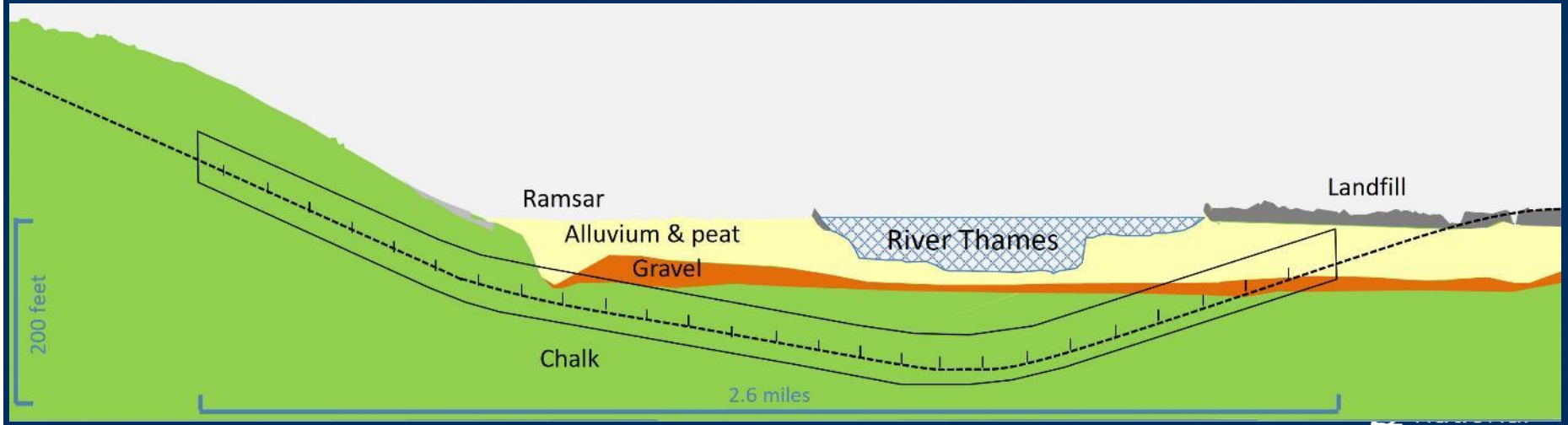


The main civil engineering works

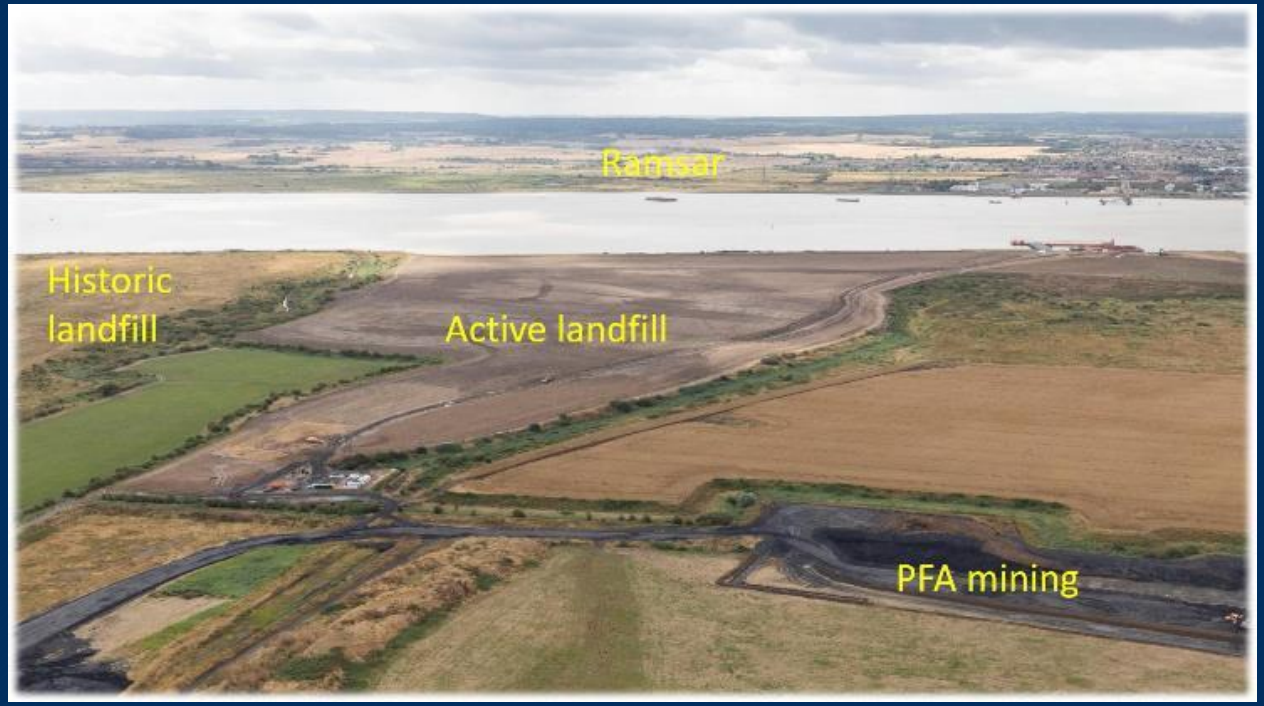
Pressurised face TBM tunnelling

Deep excavations for portals and approaches

Cross passages driven by mini TBM or SCL



The tunnel launch site and the ground



Protected wetlands

Post industrial landscapes

No roads, no water, no electricity

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Preparatory works

Access roads

Utilities

Deep ground treatment

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Supply chain and contract

Client

- Client presently part of National Highways
- Future client may include private finance

Contract

- Design and Build contract (modified NEC4), start January 2024
- Scope includes civils and systems
- Performance based spec – targets high availability

Risk

- Consenting risk held by client
- Geo risk mainly with contractor (but some carve outs)

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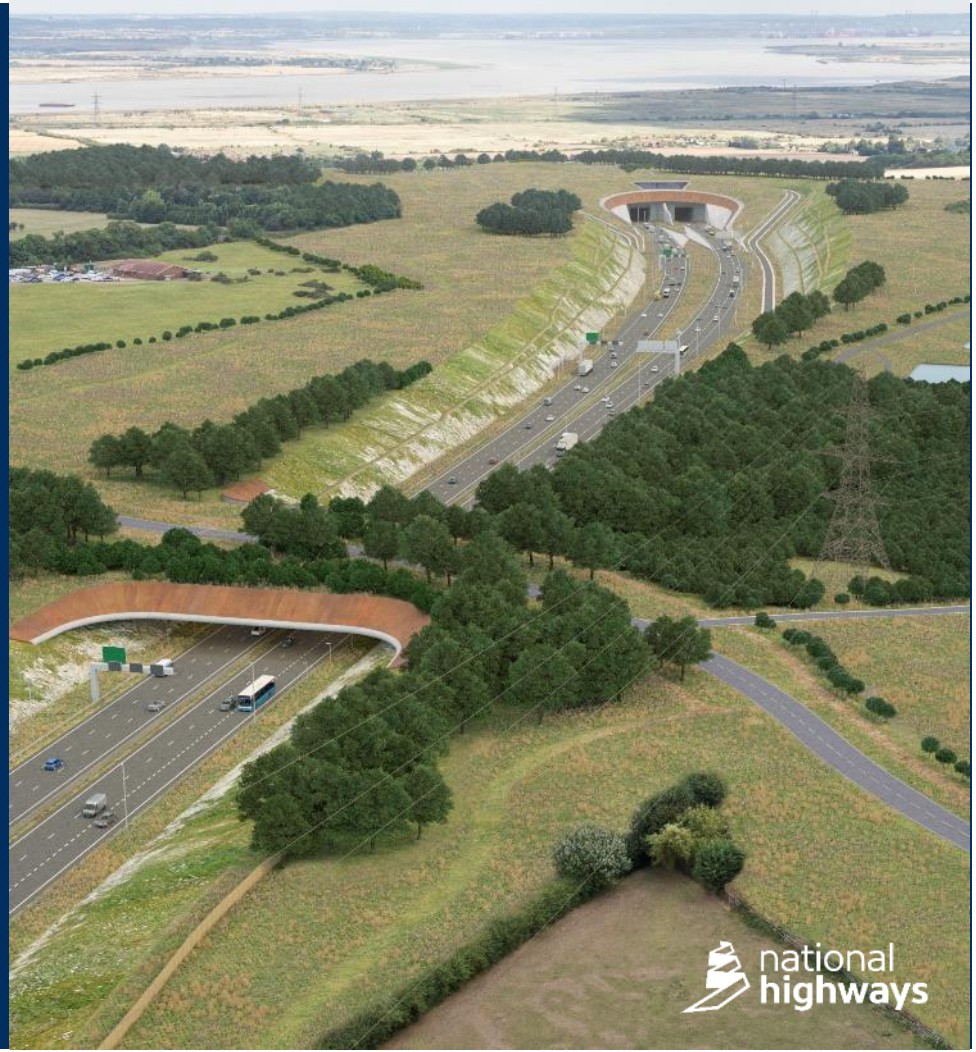

The carbon challenge

Carbon is a risk

- both at a global scale and at a project level

Heathrow third runway ruled illegal over climate change

Appeal court says decision to give go-ahead not consistent with Paris agreement

Plans for a third runway at Heathrow airport have been ruled illegal by the court of appeal because ministers did not adequately take into account the government's commitments to tackle the climate crisis.

The Guardian 27th Feb 2020

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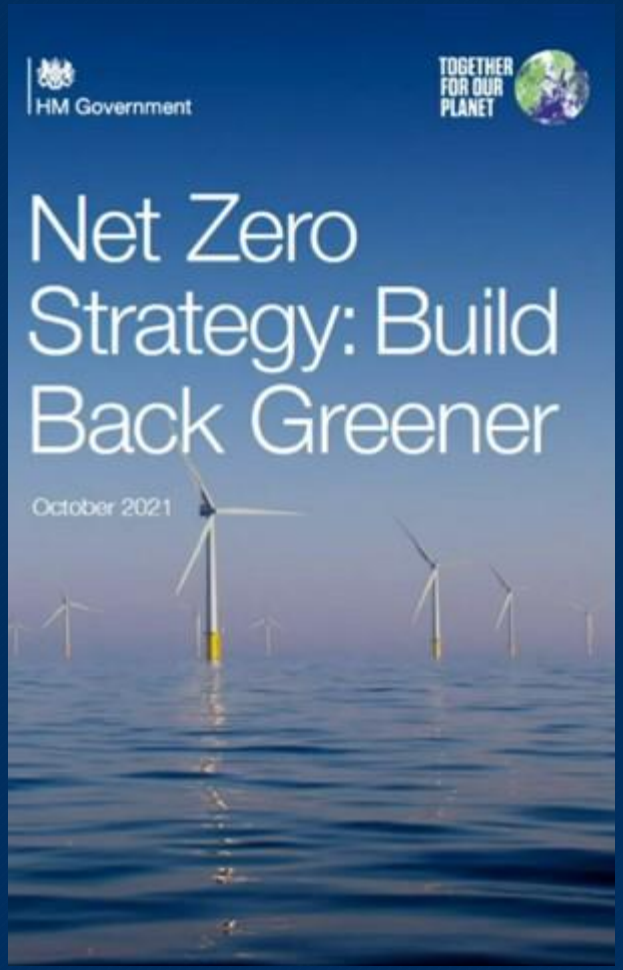

The direction of UK legislation and policy is clear

Net Zero 2050

Roads will be part of a Net Zero future, so we must learn how to deliver the change

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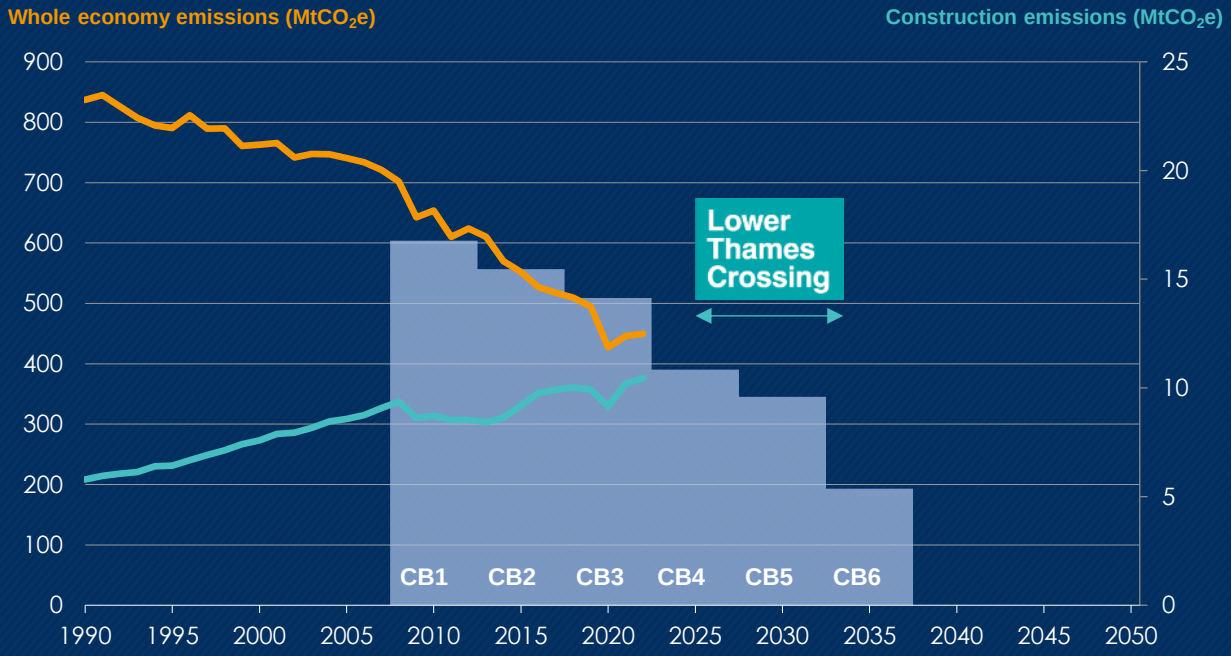
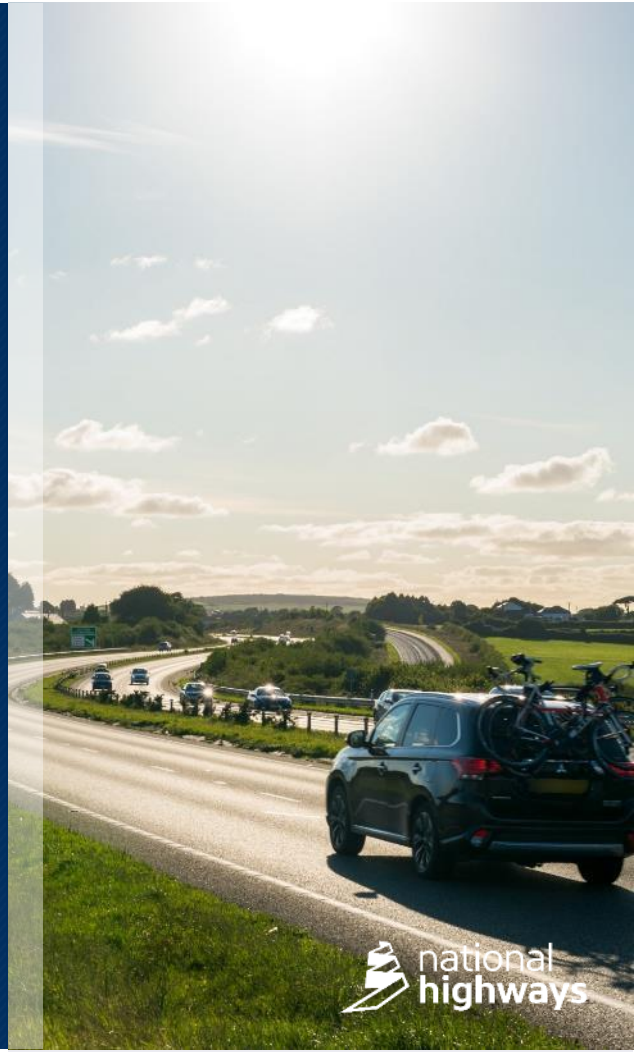
The challenge we face

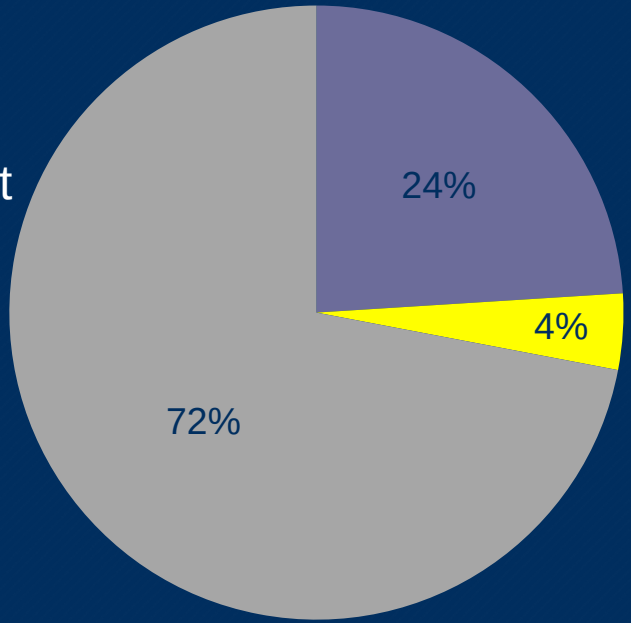




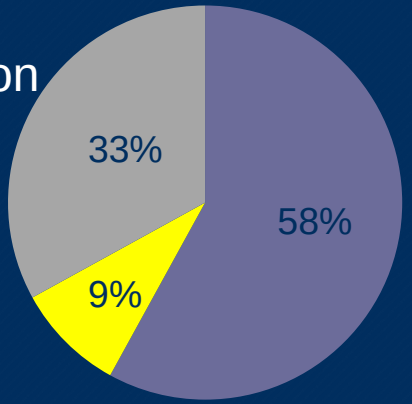
Perspectives on our industry are changing…

…construction needs to change fast

Initial forecast



Today's expectation



Construction Maintenance Road users

national highways

Net Zero Highways: National Highways 2030 – 2040 – 2050 plan

By 2030
Net zero direct emissions

Switching to electric vehicles

Using our green estate

Roadside equipment

By 2040
Net zero construction & maintenance emissions

Materials and plant

How we buy and build

Demonstrator projects

2050
Net zero road user emissions

Customer service for EV users

HGV technology trials

Enabling modal shift

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LTC as a carbon pathfinder project

- Construct Lower Thames Crossing for the **lowest practicable carbon**
- Develop a **local supply chain** and use **low carbon energy**
- **Scale up** use of low carbon materials
- Explore **hydrogen** to replace diesel
- **Leave a legacy** that enables future projects to achieve **carbon neutral construction**

What is LTC doing?

1) Carbon **baseline** established and a **Legal limit** set

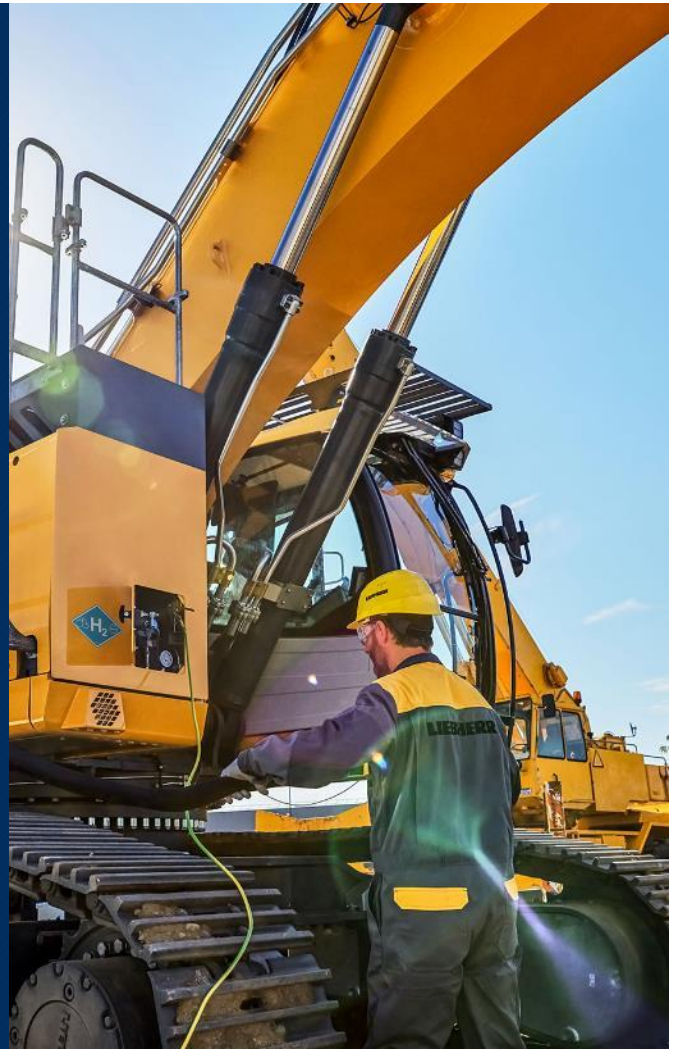
2) Incentivisation in procurement:

- carbon allocated 10% of tender marks
- tenders had to match or beat client's baseline

3) Incentivisation in contract

- payments for further carbon reduction (£30/tonne)
- exceeding the carbon target treated as a defect

4) Carbon literacy training



2020 DESIGN
(1570k tCO_2e)

ITT DESIGN
(898k tCO_2e)

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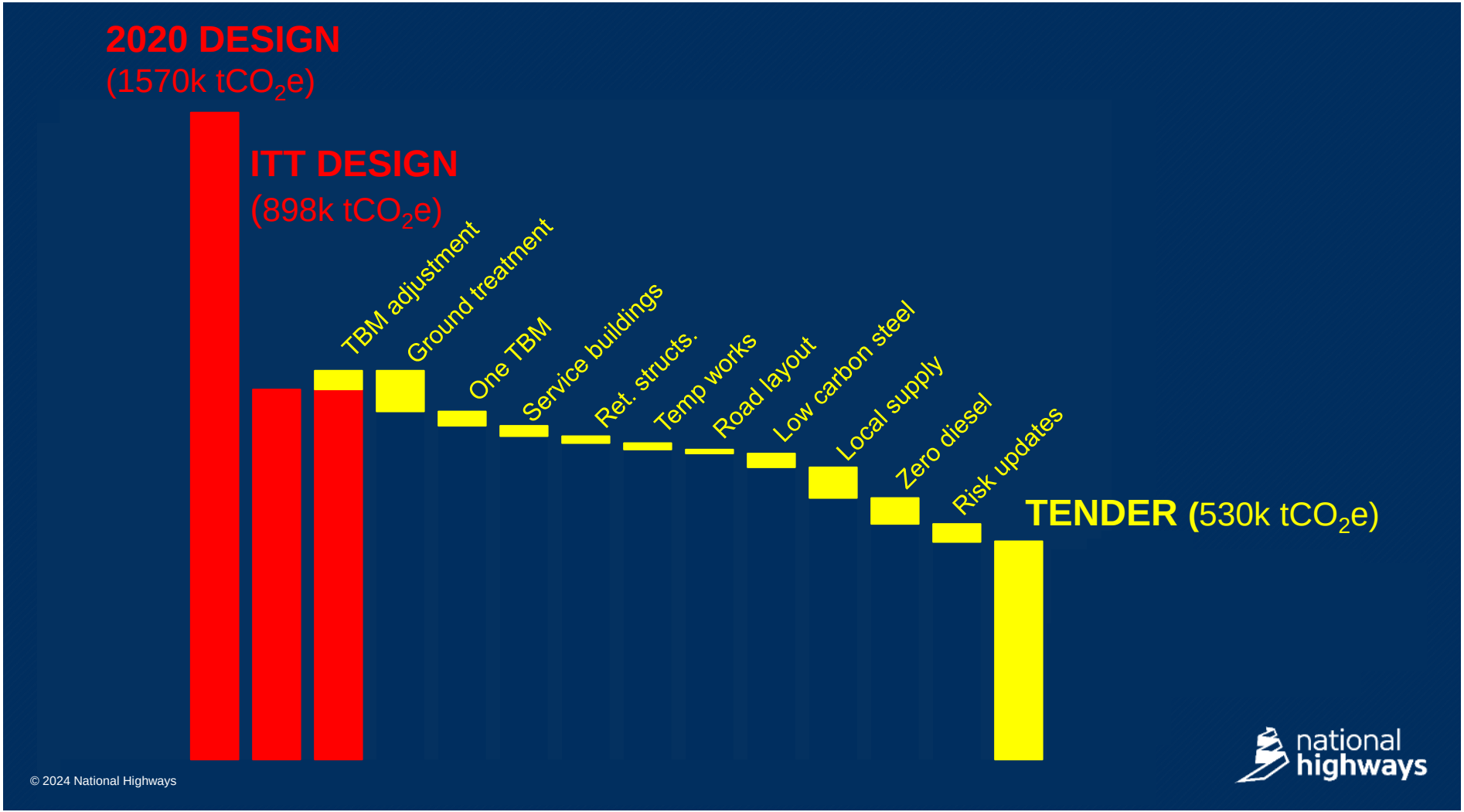

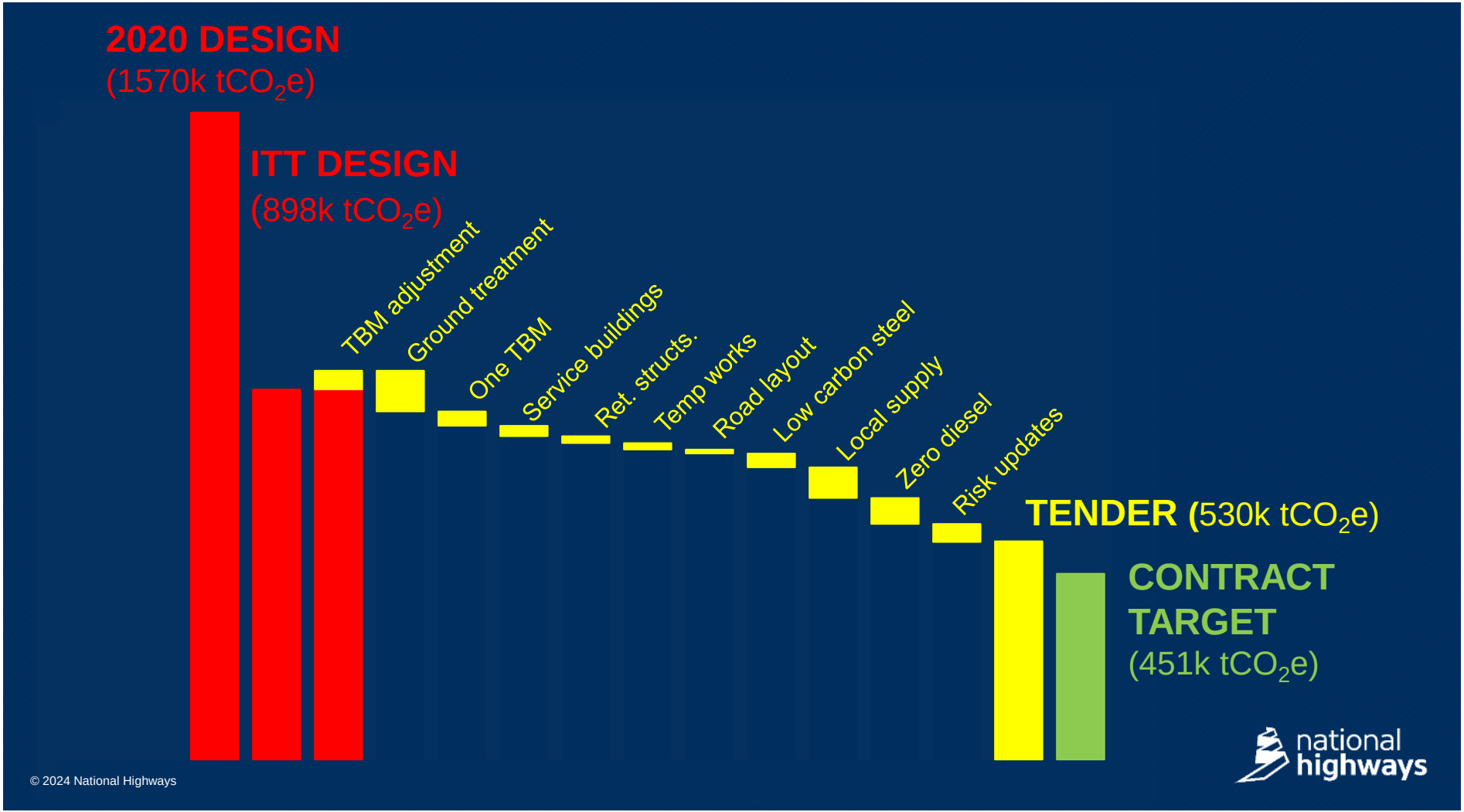

Carbon reduction – the big targets for LTC tunnelling

Emissions source	Priority technologies
Concrete	Design efficiency Production optimisation Cement alternatives and replacements
Steel	Renewable electricity and recycled steel Basalt reinforcement
Diesel	Hydrogenated vegetable oil (HVO) Hydrogen Battery electric and tethered electric plant

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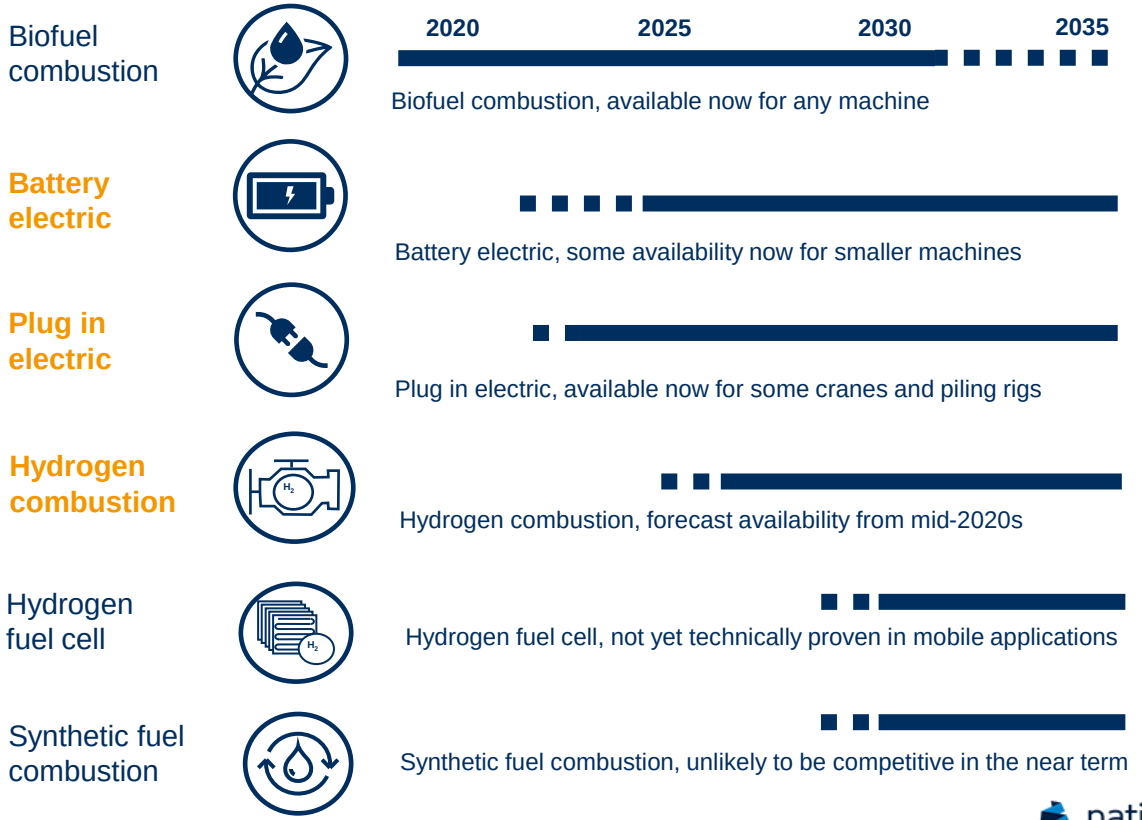
The zero emissions technologies

Most applicable to Non-Road Mobile Machinery (NRMM) within the next five to ten years and on Lower Thames Crossing are:

- **Battery electric** (passenger cars, HGVs, concrete mixers, small excavators)
- **Plug in electric** (mobile crane, piling rigs, tower crane)
- **Hydrogen combustion** (articulated dump trucks, heavy excavators)



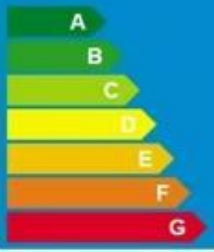
Key lessons for next time

Know your numbers (PAS 2080)

Contract for low carbon

Diesel free sites

Concrete routemap



Green steel

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Thank You
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