The Little Book of Live Labs 2

Department for Transport

ADEPT LIVELABS2 Decarbonising Local Roads

Cut costs







Save time



Reduce carbon







LIVELABS Tried & Tested

£30 million | 7 Live Labs | 4 Interconnected Themes | 4 Nations

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Live Labs 2 in context

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Local highways

are the UK's biggest asset, critical to every economic and social activity.

262k+

miles of local roads in the UK, **97%** of the network.

All

journeys start and end on a local road. They carry **79%** of traffic volume each day.

£4bn+

spent maintaining and improving local highways every year.

2050



The Prime Minister has recommitted to Net Zero by 2050.

200+

local authorities in the UK look after, improve and maintain them.

1.5m

tonnes of carbon is estimated to be emitted while doing that.

OVER 85%

of local authorities have declared a climate emergency.

DfT

has invested in ADEPT's carbon leadership programme and embedded carbon measurement in local transport plan guidance.



Click here to see

Tactical interventions that make a difference

If we don't act now, as vehicles in the UK become electrified, local highways could be the largest source of transport emissions in the UK.

Unless we cut the embodied carbon from building and maintaining our local roads, the roads themselves could become the biggest source of transport emissions in the UK.

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What if there was another way for local roads?

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Local roads are essential to every person, every day. We know money is scarce and we all need to do more for less.

Live Labs 2 is an innovation programme that over its three years has **demonstrated cost, time, carbon and wider benefits**.

It has done this through collaboration across the whole UK local highways sector. Its practical learnings, data and thinking are open source for the whole of the sector across the UK. **The benefits and savings could be significant if scaled across the UK and built into everyday practice.**



What if we could maintain and improve our local roads differently?

What if large scale innovation in local highways maintenance and improvement could also save money, save time and build in resilience?

What if we could get better value and cut carbon at the same time?

Live Labs 2 has spent three years testing and proving exactly that.

LIVELABS Tried & Tested

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This document is aimed at budget holders, decision makers, practitioners and influencers across the local highways sector and beyond.

It sets out what Live Labs 2 has learned and aims to encourage the sector to adopt and scale proven innovations that cut cost, time and carbon.

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What is Live Labs 2?

Funded by the Department for Transport, delivered by ADEPT and overseen by a Commissioning Board of public, private and sector experts, the Live Labs 2 programme put new ideas to the test on real roads.

Over three years its focus was to investigate new ways of working, accelerate learning and de-risk innovation. It brought local authorities, industry, academia and highways sector specialists together to explore new materials, methods and approaches.

Each Live Lab developed a business case and a carbon case, where carbon was considered alongside cost, performance and delivery from the start. The result? Much more than seven individual projects. It is a growing evidence base of practical approaches that local highway authorities can use **right now**.

The investment has been made. The testing has been done. Now we need to scale these solutions.

£30 million | 7 Live Labs | 4 Interconnected Themes | 4 Nations

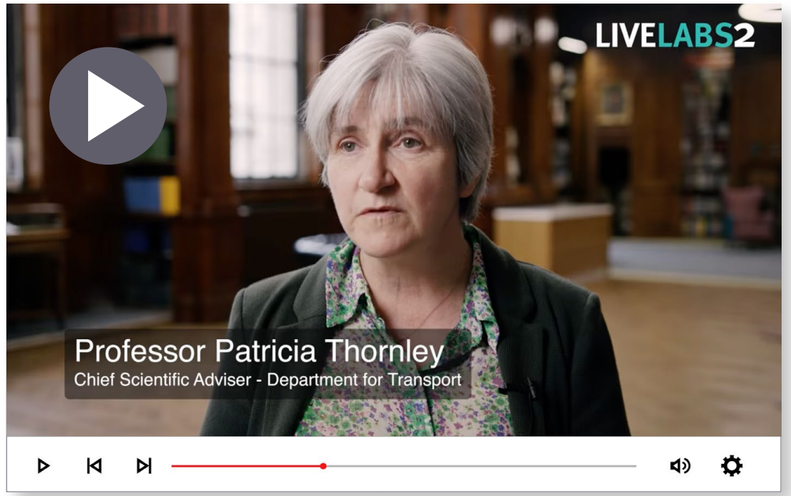
Covering **three areas of highway activity** - construction, maintenance and management - the programme addressed four key themes:

1. A new Centre of Excellence for Decarbonised Roads (UK Centre of Excellence for Materials)
2. Rethinking street lighting (Future Lighting Testbed)
3. Green assets and infrastructure (Green Carbon Laboratory)
4. Corridors and places (Corridor and Place-Based Decarbonisation)

Live Labs 2 started out with a carbon focus, but quickly found that there were additional benefits in terms of cost, time, safety, nature and communities. We call this looking through a **systems lens**: considering the whole picture together, rather than one issue in isolation. Whatever the local political picture, these cost, time and wider environmental benefits can apply to every local authority and public body across the UK - because they benefit everyone in every community and help authorities do more for less.

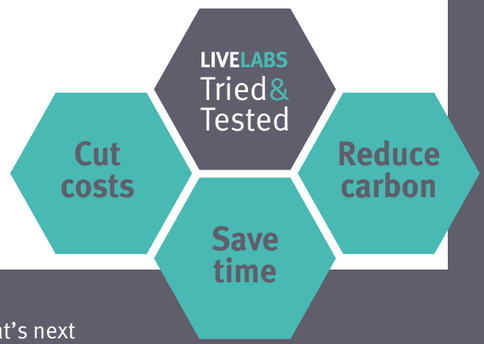
The Live Labs 2 project delivery ended in March 2026. Full findings will be reported to DfT in Spring 2027, with the projects being monitored for a further four years.

Find out more: use our website AI feature to find the solutions that meet your needs



systems lens

considering the whole picture together, rather than one issue in isolation





The BIG ideas

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There are two strands of innovation that have resulted from the Live Labs 2 findings: strategic and tactical.
The big strategic ideas below can be used by local highway authorities right now. They have been tried, tested and de-risked and can be adapted to meet the needs of any area.

Idea 1 Review and update procurement rules to unlock better solutions

Procurement is often seen as a barrier to innovation, but it doesn't have to be. Liverpool's Sustainable Procurement and Contracting Toolkit is an interactive resource that helps embed carbon reduction solutions into UK highways contracting. Covering each stage of procurement and the contract lifecycle, the Toolkit clarifies the relevant legal and administrative requirements, shows how procurement can drive innovation rather than hinder it and includes practical advice on drafting technical and contract documents. Although the Toolkit's lessons are drafted in a highways context, they are also applicable across other sectors.

Idea 2 Adopt de-risked solutions without repeating the testing

There's no need to spend time and money testing products when the work has already been done and the results have been proven. This open source Knowledge Bank showcases low carbon highway maintenance solutions bringing together a wide range of products, their benefits and real world performance. Designed for local authorities, it supports better decision making. Users can explore and review material options, compare applicability and access practical insights from case studies and carbon reports. The platform helps local authorities address maintenance challenges while cutting carbon. Built collaboratively, it grows with industry input and shared innovation.

Idea 3 Use cost and carbon data to make better investment decisions

The Carbon Hierarchy Lens Toolkit and Options Configurator Tool provide early whole life cost and carbon data before money is committed, ensuring carbon hierarchy principles are integrated into business as usual decision making. By helping authorities avoid unnecessary construction and select lower carbon interventions across design and maintenance, Liverpool's project has delivered measurable savings across the network.

Idea 4 Make decisions that balance cost, time and carbon

The Highways Doughnut Toolkit helps highway authorities make better informed decisions by assessing schemes through both social and environmental lenses. It translates Doughnut Economics into a practical, repeatable framework for use at strategic and project level. The toolkit provides a structured, evidence based way to understand trade-offs, risks and opportunities and supports alignment with wider policy goals such as net zero, biodiversity and social value. Developed and tested across Cornwall, Somerset and Hampshire, it is designed to be adaptable and scalable.





Idea 5 Rethink how new roads are designed and built

Devon's A382 Live Labs project aims to reduce carbon on a new road construction scheme through changes in materials, design and processes. These changes will apply to all parts of the project, combining nature based solutions as well as innovations to alter how road schemes are delivered in the future.

Idea 6 Plan major works differently to save time and money

Devon has deliberately broken away from the traditional business as usual model of managing major highway works. Instead of relying on temporary traffic lights, which is the standard, accepted method, the Devon team has adopted a bold strategy by implementing a full road closure for the scheme. This will result in one year of construction time being saved on the project, reducing traffic congestion and delays for local communities.

Idea 7 Rethink lighting for safer streets and lower costs

In East Riding, the project replaced traditional street lighting on major A roads and inter urban routes using low carbon and low cost alternatives to give the road user the visual prompts they need to navigate safely. Using a risk-based approach supported by a world first thermal imaging AI driver safety system, the project gathered evidence to conclusively show that the replacement of street lighting with low carbon alternatives can maintain and, in some cases, improve road safety. The project installed specific lighting systems where needed for pedestrians, motorists and cyclists to provide the right light, at the right place, at the right time while reducing carbon and costs.

Idea 8 Manage verges differently to reduce maintenance and support nature

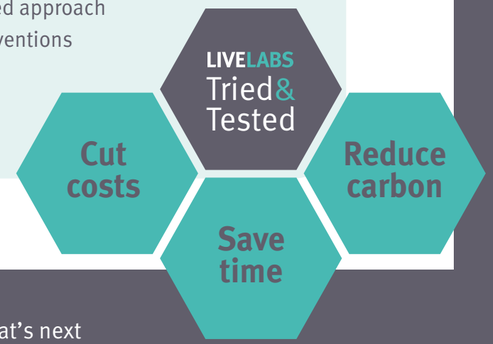
The Greenprint project used consultations with local stakeholders and mapping of existing green assets to select suitable trial plots and investigated the impacts of changing verge maintenance from cut and leave, to cut and collect. This project considered verge types, safety constraints and current cutting costs, fuel use and carbon emissions. Changes in these factors were tracked and recorded with sample sites selected for biodiversity and soil carbon monitoring. All outcomes were shared with the local communities and parish councils involved and performance data was published to provide evidence of the cost, carbon and ecological benefits.

Idea 9 Turn highway waste into useful products

As part of the Greenprint project, instead of leaving cuttings to decompose, cut grass from highway verges and public open spaces is processed using low carbon technologies including anaerobic digestion and pyrolysis. Anaerobic digestion converts grass cuttings into biogas, which can be used to generate renewable electricity or heat. Pyrolysis - heating material to high temperatures without oxygen - transforms the grass cuttings into biochar, a stable form of carbon that can be used to improve soils and sequester carbon. By turning a routine maintenance waste product into a renewable energy source and useful biochar, the project reduced emissions linked to highways maintenance while demonstrating scalable, place based green innovation.

Idea 10 Set a carbon budget and prioritise interventions to achieve the greatest impact

The Carbon Budget Toolkit enables highway authorities to plan and manage their activities within defined carbon limits. It applies carbon budgets and trajectories to highways services, programmes and corridors. The toolkit provides a consistent, evidence based approach to financial budgeting. It helps identify carbon hotspots and prioritise interventions to achieve the greatest impact. Tested by the Wessex project, it supports systematic, data led decarbonisation decisions.



Tactical interventions that make a difference

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In addition to the big ideas, we have developed a portfolio of 9 practical products, materials and techniques which have been tried and tested across our Live Labs.
Each delivers its own mix of cost, time, carbon and wider benefits: all are proven to make a difference. The list below highlights where these innovations can be used:

1

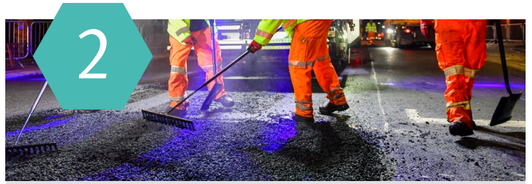


Make roads last longer between repairs

These innovative treatments are designed to extend highway asset life, improve durability and reduce the frequency and carbon impact of maintenance. They include alternative surface treatments, road surface preservation techniques and longer lasting repair solutions.

Fewer repairs mean less material consumption, fewer vehicle movements, less construction activity and lower lifetime costs while maintaining or improving highway performance.

2

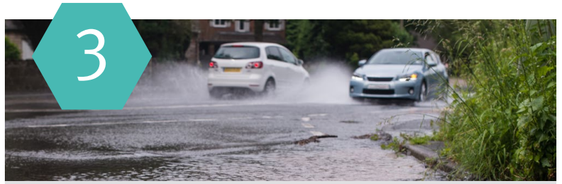


Resurface roads with less carbon impact

These alternative materials and construction techniques for road surfaces reduce embodied carbon, while maintaining required engineering performance. Innovations include recycled and reclaimed materials, warm mix asphalt, alternative binders and in situ recycling.

They reduce the need for virgin aggregates, minimise haulage and waste, and can deliver longer lasting, lower carbon road surface solutions.

3

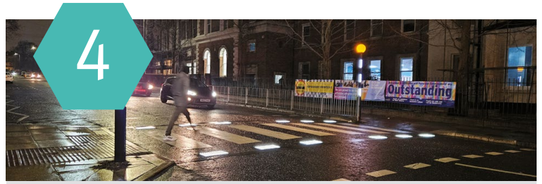


Manage water and drainage to protect your network

A range of new drainage products and techniques designed to manage surface water more effectively and protect the network from flooding, with less construction and maintenance.

Solutions include alternative drainage systems, sustainable drainage approaches and improved water management techniques. They can reduce flooding and surface water problems, improve highway resilience and potentially reduce materials, excavation, maintenance activity and associated carbon emissions.

4



Choose smarter markings, signs and visibility for safer roads and less maintenance

New materials and technologies for road markings, signs and visibility infrastructure, to improve durability, performance and safety while reducing maintenance.

They include new marking materials and technologies, enhanced visibility treatments and solar or glow in the dark solutions. Because they last longer, they can reduce material consumption, traffic management, maintenance visits and carbon.

See 5 more tactical interventions on the next page...

LIVELABS Tried & Tested

Cut costs

Reduce carbon

Save time

More tactical interventions

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5



Choose intelligent lighting that saves energy, carbon and maintenance

Technologies designed to reduce the energy and carbon associated with highway lighting while maintaining appropriate safety and visibility.

Innovations include intelligent controls, adaptive lighting, solar powered systems and alternative visibility technologies.

They offer opportunities to reduce electricity consumption, infrastructure requirements and maintenance, while making lighting more responsive to location, conditions and demand.

6



Switch to cleaner, more efficient plant and vehicles

Innovative equipment, machinery and vehicles make highway construction and maintenance more efficient and less carbon intensive.

Examples include electric maintenance vehicles, alternative power systems and more efficient construction plant.

They can reduce fuel use, emissions, labour requirements, site occupation, vehicle movements and construction or maintenance times.

7



Choose recycled and reused materials, to reduce waste, cost and carbon

These products and processes keep materials in use on our roads, instead of sending them to waste.

Examples include recycled asphalt, reclaimed road materials, recycled aggregates and products manufactured from difficult-to-recycle waste.

These approaches reduce virgin material extraction, waste disposal, haulage and embodied carbon while creating opportunities for more resource efficient highway construction.

8



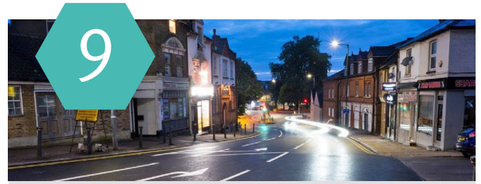
Manage verges and green spaces to cut maintenance and boost nature

New ways of managing highway verges, vegetation and green infrastructure to reduce carbon, while delivering wider environmental benefits.

Approaches include reduced mowing, cutting and collecting grass and putting the cuttings to good use.

They can reduce maintenance and emissions, while improving biodiversity, supporting nature recovery and potentially turning grass cuttings into useful products.

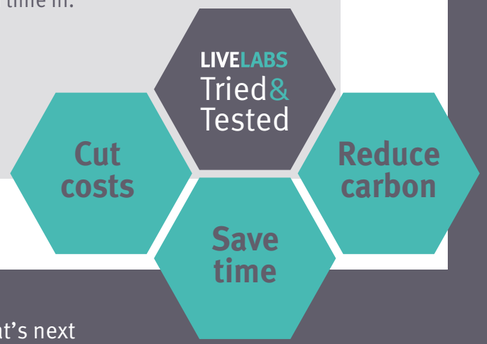
9



Design streets that work better for people

These physical improvements make streets better for pedestrians, cyclists and communities, while using fewer resources and needing less maintenance. They include improved street environments, accessibility measures and innovative highway furniture or infrastructure.

The emphasis is to deliver multiple benefits from highway investment: lower carbon, safer streets, better access and quality places people want to spend time in.



Cost benefits

There is a long-held perception that low carbon options cost more.

Many of our Live Labs have proven that this isn't true when considering a whole service and that scaling up across UK industry can bring significant cost savings.

In East Riding **£1.2m** has been saved with their new approach to lighting highways, split 70% capital and 30% revenue budget savings. This is expected to grow to **£5m** over ten years as the scheme expands to over 70 further sites.

The North Lanarkshire part of the Centre of Excellence for Decarbonised Roads saved **£0.3m** compared to their business as usual approaches over the project period. If scaled across all applicable roads in their network and those in the West Midlands it could save **£15m operating costs**.

When complete, the Devon integrated approach to delivering the A382 major scheme will **significantly reduce costs** by reusing excavated material, reducing groundworks, avoiding disposal and using alternative construction methods.

Recycling materials in situ in Wessex **avoided the purchase of new aggregates and other materials**, saving money and bringing wider benefits.

Several of our Live Labs have used asphalt rejuvenators, which restore ageing road surfaces. They are expected to **reduce future maintenance costs and disruption, and defer the need for bigger, more costly repairs**.

Liverpool's Live Lab has shown that **low carbon interventions don't have to mean higher costs**, using innovations such as whole life carbon optioneering, recycled highway materials, low carbon surfacing and smart asset monitoring.



Time and productivity benefits

Live Labs 2 innovations are also saving time, both by changing how work is done and by removing the need for some tasks altogether.
Time savings free up staff for other work and boost productivity.

By rethinking how major road schemes are delivered, the Devon Live Lab expects to take an estimated **one year off the construction programme** for the A382 project.

In East Riding **three weeks** of inspection time a year has been saved and, when scaled, this could increase to **17 weeks** on inspection time, equating to **a third of a Full Time Equivalent role**.

If the Centre of Excellence for Decarbonised Roads' learnings and methods were adopted across all suitable roads in North Lanarkshire and the West Midlands around **150,000 operational hours** could be saved over 10 years.

Greenprint's approach to verge management **increases biodiversity** and **reduces maintenance activities**.

The Centre of Excellence for Decarbonised Roads' Knowledge Bank means **local authorities don't have to repeat the same research, testing and evaluation of products in the UK marketplace**. It reduces duplicated effort and repeated trials, builds confidence and reduces risk and provides every local highway authority with a shared, industry wide, evidence base.



Carbon benefits

Live Labs 2 was set up to reduce carbon and the programme has delivered a wide variety of carbon savings, both individually and combined.

Live Labs such as East Riding and Wessex have illustrated the significant savings that come from taking a whole service approach, while Liverpool's portfolio of interventions shows how lots of 'marginal gains' can add up to large benefits.

Liverpool's portfolio approach of 26 interventions saved **901 tonnes of carbon** across the project over its period, which scales to **9,000 tonnes of carbon over 10 years**.

The new approach to lighting highways in East Riding has saved over **134 tonnes of carbon** over the project. It is now being rolled out to a further 70 sites in the area, which is expected to save over **240 tonnes of carbon in 10 years**.

The new approach to managing verges in South Gloucestershire and West Sussex could save over **347 tonnes of carbon a year** across both local authorities' green estates.

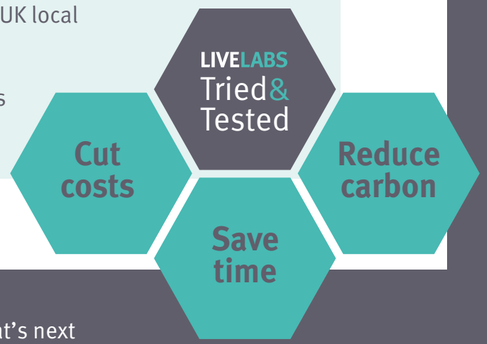
If the materials and solutions proven through the Centre of Excellence for Decarbonised Roads were used on all suitable local roads in North Lanarkshire and the West Midlands, an estimated **11,000 tonnes of carbon** could be saved.

In Wessex **Carbon Budgeting** and **Doughnut Economics** principles are radically changing how investment decisions are made and the carbon benefits they deliver.

Note - We use 'carbon' as shorthand for carbon dioxide equivalent (CO_2e), which includes all greenhouse gases.

Wider benefits

- By looking at challenges through a **systems lens**, considering cost, time, carbon, people and places together, the Live Labs programme has also uncovered a wider range of benefits. In **East Riding driver speeds have been reduced by 10%, near misses reduced by 12% and collisions down by 33%**.
- In Devon, **2,000 trees and shrubs were transplanted** to a nursery and 80% have survived long term, preserving nature. locking in carbon and changing how we think about Biodiversity Net Gain.
- The Greenprint project (South Gloucestershire and West Sussex) has proven that grass cuttings, previously worthless waste, can be turned into **biochar, a valuable product** used across numerous sectors.
- The whole service approach in Wessex is now delivering significant benefits for their **winter maintenance activities, making networks more resilient**.
- Liverpool demonstrated **enhanced collaboration across the supply chain**, bringing together local authorities, contractors, consultants, researchers and communities.
- **Encouraging SME activity and confidence** in the UK local roads sector.
- **Community support** for new ways of doing things such as verge management and street lighting.



Five things we learned

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1

Low carbon doesn't always cost more

Often it costs less, both upfront and over time.

2

Data is still a major challenge

Many organisations can't yet measure their carbon accurately. Data quality varies widely and ‘greenwashed’ product claims make comparisons hard.

3

The biggest barriers are behavioural

The products work and the evidence exists. The harder part is changing habits, processes, attitudes to risk and how decisions are made. See the Behavioural Insights Team (BIT) report on how behaviour change can help decarbonise the UK’s local roads and the work by North Lanarkshire.

4

Sharing speeds things up

Local authorities save money and move faster when they learn from each other. Industry achieves more when it shares knowledge and data. Guarding information doesn't solve shared problems.

5

Innovation is stuck in silos

The UK is full of innovation, but initiatives rarely connect or share what they learned once the funding ends.



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Innovation to adoption

The strategic and tactical innovations from Live Labs 2 can only deliver their full benefits if the way we work changes too.

Here are six lessons from our Live Labs, on moving from innovation to adoption:

› Involve everyone from day one

Change happens faster when legal, procurement, finance and delivery teams are in the room together from the start and understand the goals and potential benefits.

››› Measure first

Set a baseline for carbon and other benefits before you change anything, or you can't prove what you've saved. The Carbon Leadership Programme can help you gather carbon data and offers valuable, practical guidance.

››› Give people permission to fail

A trial that doesn't work, shared openly, saves everyone else time and money.

›››› Count every benefit

Consider cost, time, wider benefits, not just carbon. Saving time and money benefits everyone, everywhere.

››››› You don't need to start from scratch

Someone has probably tried it already, so don’t waste your time, money and resources.
Use the Knowledge Bank and talk to the Live Labs 2 project teams.

›››››› Start small, then scale

Prove it on one street, one verge or one contract, then roll it out across your area and your region.

The hard work of testing has been done.

The evidence is published and the experts who have lived and breathed this are ready and waiting to help.



The next step is putting the learning into practice.

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Our recommendations

Cutting costs, saving time and reducing carbon on local roads are shared challenges: no single organisation can solve them on its own. Real progress depends on government, local highway authorities and industry working together towards a common goal.

The Commissioning Board is calling on local highway authorities and industry to act:

Local highway authorities

- **Use the evidence and work together**. Test what's already been proven against your own circumstances, rather than repeating work done elsewhere.
- **Back the Knowledge Bank**. Make it the sector's go-to comparison website, with performance ratings that push suppliers to do more.
- **Build carbon into routine decisions and procurement**. The cost, time and environmental benefits apply everywhere, whatever your politics.
- **Collaborate rather than repeating work that has already been done elsewhere**. Set up a cross sector innovation group with DfT's arm's length bodies to share learning, methods and data.

Industry

- **Share robust product and performance data**.
  Guarding performance data doesn't solve shared problems - holding it back slows everyone down.
- **Help build confidence through verified evidence**.
  Carbon isn't a sales gimmick. Verified product data, such as Environmental Product Declarations (EPDs), builds trust and growth.
- **Work with the public sector to challenge standards and practices that prevent better solutions being adopted**.
  This includes the Design Manual for Roads and Bridges (DMRB) and the Traffic Signs Regulations and General Directions (TSRGD).
  Give local roads a bigger say in the design standards that hold back change.

Government

Government also has a vital role to play in supporting innovation, bringing the sector together and embedding these changes for the long term.

The programme's full recommendations for government will be included in the Live Labs 2 final report to DfT in Spring 2027.



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Can you afford not to do this?

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Together we could:

- **Save BILLIONS OF POUNDS over future decades, in better infrastructure and reduced maintenance costs.**
- **Save MILLIONS OF HOURS, freeing up overstretched staff for other work.**
- **Save MILLIONS OF TONNES OF CARBON by scaling up proven solutions to reduce local highways impacts.**
- **Enhance the UK's industrial offer through scaled products and services, which improve skills.**
- **Give new and growing small and medium sized enterprises the confidence to invest in UK local highways.**

So, what's next?

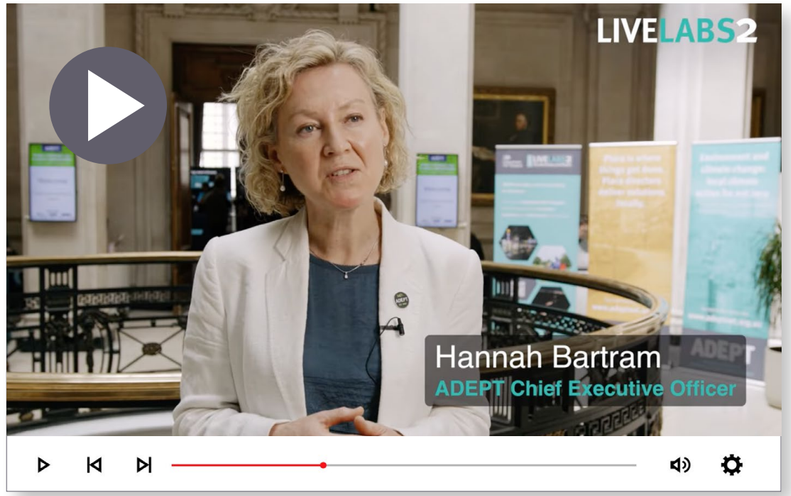
We need to turn proven innovation into everyday practice.

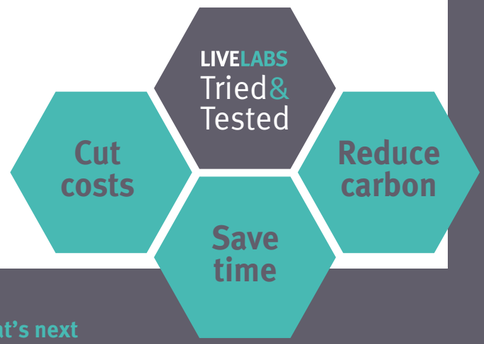
Live Labs 2 is supporting that shift through a further £300,000 DfT investment in sharing what we've learned and speeding up adoption, including workshops, practitioner support, collaboration and targeted engagement.

We are here to help.

We are monitoring the long term impact of the programme on the UK local road sector and will report change periodically. Over 75 programme and project outputs can already be explored through the Live Labs 2 website's AI query tool.

Join us on the journey





Published October 2026

Department for Transport

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About Live Labs 2

ADEPT Live Labs 2: smarter spending for the sector. The UK wide Department for Transport funded programme to cut carbon emissions and save money on local roads.

The £30 million programme has tested carbon saving ideas right across the UK. Seven local authorities led projects with four interconnected themes and worked with commercial and academic partners. The programme ran until March 2026 testing ways to cut carbon emissions caused by infrastructure and assets associated with local roads.

The programme was managed by the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the voice of local authority place directors and their teams.

www.adeptnet.org.uk/livelabs2

Commissioning Board

Live Labs 2 is overseen by an independent Commissioning Board:

ADEPT (chair), AtkinsRéalis, Construction LCA, Core Highways, County Surveyors' Society (CSS) Wales, Department for Infrastructure Northern Ireland, DfT Roads, DfT SciTech, Kent County Council, Kier Highways, National Highways, Open Data Institute, Ringway, Society of Chief Officers of Transportation in Scotland (SCOTS), Transport for London, CIHT, LGTAG, LCRIG and WSP.

Savings from different Live Labs cover different assets, baselines and timescales, so they can't be added together. Figures described as scaled are projections rather than measured results. Devon's A382 is still in delivery and some of its benefits have yet to be fully costed.

About ADEPT

The Association of Directors of Environment, Economy, Planning and Transport (ADEPT) is the voice of local authority place directors and their teams.

Our members manage vital local services - from highways, waste, recycling and planning - while also preparing for the challenges and opportunities of the future.

www.adeptnet.org.uk



Next steps

Download data and documents or use the AI feature on the website to find out more.

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