

# ICE submission to the Transport Committee on the roll-out and safety of smart motorways

April 2021

## Introduction

Established in 1818 and with over 95,000 members worldwide, the Institution of Civil Engineers (ICE) exists to deliver insights on infrastructure for societal benefit, using the professional engineering knowledge of our global membership.

This response has been informed by ICE's Transport & Mobility Community Advisory Board, which provides the technical expertise and knowledge that supports ICE's activity in the transport sector.

For more information, please contact:

**David Hawkes**, Lead Policy Manager: [policy@ice.org.uk](mailto:policy@ice.org.uk)

## The benefits of smart motorways

The original premise of All Lane Running, either active traffic management (ATM), dynamic hard shoulder (DHS), or smart motorways, has been to maximise capacity on congested sections of the network utilising the existing available pavement width.

It was demonstrated to be more cost-effective on publicly funded projects to implement the white lining and technology changes within the existing highway boundary than the associated impacts of traditional road widening, such as widening significant numbers of structures, land purchase and impacts on adjacent stakeholders (i.e. close residents).

These projects, without land purchase and constructed within the highway boundary, have been delivered much more quickly under the powers already invested by Highways England. In addition, they have relieved congestion and delivered journey time reliability benefits more efficiently.<sup>1 2</sup>

## The safety of smart motorways, the adequacy of safety measures in place and how safety could be improved

The standing remit for smart motorways is reduced congestion on the basis that safety should be made no worse. The side effects of smart motorway implementation have seen reduced congestion, smoother flows and early and improved driver information. This results in less speeding, less tailgating and fewer rapid changes of speed, while providing drivers with more time to react if something happens.<sup>3</sup>

---

<sup>1</sup> Transport Focus (2017) [Getting to the Heart of Smart](#)

<sup>2</sup> The Royal Society for the Prevention of Accidents (2021) [Road Safety Factsheet](#)

<sup>3</sup> Department for Transport (2020) [Smart Motorway Safety: Evidence Stocktake and Action Plan](#)

Significant time is invested in a consistent operational risk assessment approach to smart motorways before the funding is approved for construction through Highways England's PCF Stage Gate processes, including a wide group of stakeholders and safety specialists.

Early ATM projects and DHS projects had significant numbers of camera monitoring and information, refuge areas and spacing as trials. The continuing programme started to build data that led to altering the overall approach to smart motorways, while maintaining the associated safety improvements such as maintenance and emergency response. Further technological developments in CCTV, night-time coverage, and the statistical data from post-opening reports meant overall evolution from original concepts.

### **Whether All Lane Running is the most suitable type of smart motorway to roll out or if there are better alternatives**

ALR is the most suitable type of smart motorway as it gives a consistent approach to the road user on the road layout and environment. DHS can be more confusing, particularly with the overall roll-out/evolution of changes in standards that a road user may encounter on a long journey. The removal of the solid line between Lanes 1 and 2 improved overall lane usage and the understanding of the layout from a driver perspective.

Challenges remain regarding the frequency and size of refuge areas as well as accessibility for emergency responders under ALR, particularly during peak periods. On balance, further opportunities remain in the advent of digital twins, monitoring operations by AI, in-car information and the future roll-out of connected and autonomous vehicles.

### **Public confidence in using smart motorways and how this could be improved**

One of the biggest failings of the smart motorway programme roll-out is the limited public communication of what smart motorways are, how to drive on them and the expectations of what to do in an emergency. However, one of the biggest misconceptions of motorway use is that the hard shoulder was ever a safe place to stop – a review of statistical accident data has proven this not to be the case.<sup>4</sup>

Travel on ALR motorways is very similar to that on all-purpose dual carriageways – the principles of travelling only in a serviceable vehicle, with fuel for the journey and driving to the prevailing conditions. Highways England are maturing very quickly in this space, as can be seen by their recent 'Space Invader' and current 'Go Left' campaigns.<sup>5 6</sup>

The media have focused on the perceived safety issues without a balanced view of incidents on the wider road networks and a focus on the overall reduction of deaths. Motorways remain a very safe environment to connect the travelling public and freight. Highways England themselves could likely have done more in this space to respond with demonstrable safety data.

### **The impact of smart motorways on the usage and safety of other roads in the strategic road network**

The whole premise of smart motorways was to improve the reliability of journey time overall, which – on the basis of evidence – they have succeeded in doing.<sup>7</sup> Their impact and learning have continued evolution in the concept on to expressways.

<sup>4</sup> Department for Transport (2020) [Smart Motorway Safety: Evidence Stocktake and Action Plan](#)

<sup>5</sup> Highways England (2020) [Space Invader](#)

<sup>6</sup> Highways England (2021) [Go Left! Highways England Launches Biggest Ever Motorway Safety Campaign](#)

<sup>7</sup> Transport Focus (2017) [Getting to the Heart of Smart](#)

If the smart motorway programme had not been undertaken, more congestion would have existed on the wider Strategic Road Network, which could have impacted safety.

### **The effectiveness of Highways England's delivery of the smart motorways programme, the impact of construction works, and the costs of implementation.**

The Smart Motorways Alliance initiative has been set up to take forward the smart motorways programme under an alliance model. It uses a modified NEC4 Alliance Contract to bring together Highways England and six long-term partners working in on-site assembly, digitally-enabled design and production management over ten years, stretching into the third road investment period.<sup>8</sup> The Alliance's core aims are to encourage behavioural changes through a "collaborative, value-based delivery model achieved ... as a single integrated organisation". Representatives of the Alliance have cited the programme as a powerful example of encouraging innovation and collaboration within the highways sector.<sup>9</sup>

Highways England have highlighted that the Alliance model has improved design processes and outputs through the use of a Rapid Engineering Model, a digital application that uses data to automatically design an asset, allowing scheme options to be produced and assessed much faster.<sup>10</sup> Indeed, the model has reduced concept design time from nine months to just five days, with the ultimate goal of designing a smart motorway in a single day.<sup>11</sup>

---

<sup>8</sup> Highways England (2018) [Smart Motorways Alliance](#)

<sup>9</sup> ICE (2020) [Civil Engineering Insights on the UK's First Road Investment Strategy](#)

<sup>10</sup> Highways England (2020) [Strategic Business Plan 2020-25](#)

<sup>11</sup> Bryden Wood (2021) [Rapid Engineering Model](#)