Predicting the future

With another unpredictable winter ahead, road forecasts are more important than ever for the Highways Agency. The Met Office has just started work on a new £97 million super-computer, which will offer more robust prediction models, while the Agency is investigating route-based freezing point forecasting

The weather is an uncontrollable beast: heavy rain, high winds or snowfall are unpreventable and can cause major disruption to roads. The Highways Agency works around the clock to mitigate the impact of severe weather on our network, keeping roads safe and accessible for road users.

This requires precision timing, robust action plans and as much predictive and real-time data as we can gather.

Weather forecasts play a vital role in our winter operations. So, the Met Office's announcement that it is investing £97m in a new super-computer has been welcomed across the Agency.

The super-computer will be based at the Met Office and Exeter Science Park, and, once finished, will be capable of performing 16,000 trillion calculations per second.

"It is estimated that the benefits to the UK economy will be around £2 billion…"

It will be 13 times more powerful than the Met Office's current systems and will weigh 140 tonnes (the same as 11 double decker buses).

The upgrade will allow the Met Office to provide more accurate forecasts, clearer predictions of severe weather events, and look ahead over a much longer time period.

It is estimated that the benefits to the UK economy will be around £2 billion – as network operators will have stronger data to boost preparation and contingency plans.

David O'Connor, weather information services project sponsor at the Highways Agency, explained: *"They're talking about introducing 13 times the capability of their current system.*

"This is a timely investment in weather information and infrastructure overall. The more lead-out we have on events that are likely to have an impact on the network, the more visibility we have in terms of moving forecasts – from three to five days, five to seven days, seven to 10 days and all the way up to seasonal forecast. This allows us all to do our jobs more efficiently, because we are better informed about our network.

"These are really intrinsic areas that should be supported by continued investment – and this super-computer will help provide world class forecasting, to support world class network operators."

Met Office chief executive Rob Varley said: *"The new super-computer, together with improved observations, science and modelling, will deliver better forecasts and advice to support UK business, the public and government. It will help to make the UK more resilient to high impact weather and other environmental risks."*

Analysing data

The Highways Agency takes a continuous learning approach to winter – this means collecting and analysing data from previous winters, identifying vulnerable locations and patterns and using on-road weather stations to provide real-time data about road conditions.

This approach also means we are always looking for new technology to feed into our weather operations – and one thing currently being considered is route-based freezing point forecasting. This essentially aims to increase the accuracy of road weather forecasts by providing more data than traditional domain-based forecasts. For example, instead of using 20 strategic observation points around a network to provide a blanket area forecast, route-based uses scientific modelling to provide a higher number of forecast points along actual routes on the network.

"It will be 13 times more powerful than the Met Office's current systems…"

O'Connor continued: *"Domain-based and route-based forecasts have a place within the market. They're already being utilised on a day-to-day basis by various service providers – some lean towards one, some lean towards the other. There are strengths and areas for improvement in both.*

"We expect further improvements with more investment in science and research in tandem with investment in computing power and technology – and we are analysing the data available from various systems. This is the key to us really finding out whether one of

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these forecasting models is preferable – or whether a third way may be delivered in due course."

Temperature-wise, last year's winter was relatively mild. The traditional smattering of snow and ice didn't really materialise and instead, we saw a relatively large number of storms.

Given the unseasonably warm temperatures in October and November, this winter may well be similar to last year. The Highways Agency has robust plans in place to ensure roads remain open, whatever the weather.

Contractors have worked to identify and fix the cause of flooding at vulnerable locations on our network, and have identified and managed trees along the network.

Our control centres are able to close roads as a precaution in high winds (though this is reserved for more exposed parts of the network), and we have a new high-volume pump, stationed in the north east, to help deal with localised flooding.

O'Connor added: *"In terms of what we're doing, we're developing our own weather information services to improve our capability to manage the network. We have 250 weather stations up and down the network which provide real-time information on road surface temperatures and other metrics.*

"We use this information in tandem with Met Office forecasts, other forecasts and historical information to help create severe weather plans that can be enacted immediately.

"But any investment that introduces further forecasting innovations in the market place, to stabilise and improve the forecast models and a greater level of detail and granularity in forecasts, is bound to improve how we operate."

The Highways Agency has welcomed the Met Office's £97 million investment in a super-computer that will provide more accurate weather forecasts

GRITTING IN PROGRESS

Predictive and real-time data is collected by the Highways Agency in an effort to help it keep the network running