Department
for Business
Innovation & Skills

MET OFFICE GENERAL REVIEW

Summary

The Met Office is the UK's National Meteorological Service. It is a scientific and public service delivery organisation. It operates as a Trading Fund, with both public and private sector customers. The Secretary of State for the Department for Business, Innovation and Skills (BIS) has overall responsibility and acts as its Shareholder. Earlier this year, BIS and the Met Office jointly led a review to:

- ensure Government fully understands the value of the Met Office's contribution to the UK's economy, including its science and resilience infrastructure; and
- provide a high-quality evidence base for policy makers.

This review was a research project and not intended to make specific recommendations. It forms part of Government's ongoing responsibility to understand the impact of organisations that provide public value and continuously improve the delivery of these vital services. The review project board was chaired by a senior member of BIS and included an independent member. The review included an independent economic analysis conducted by London Economics, which also took account of previous relevant studies. The review did not examine the Met Office's status as a Trading Fund. There are no current plans to privatise the Met Office.

Key observations

- The review noted that the Met Office has a unified weather and climate model and provides a critical national weather and climate capability. It is a key part of the UK's defence, security and civil contingencies infrastructure.
- It also has a global role as one of only two World Area Forecast centres, delivering forecasts globally. It is one of only a small number of national meteorological services that work collaboratively with, and sell services to government institutions in other countries, including Australia, South Africa, South Korea and the US Air Force.
- Two thirds of the Met Office's costs are associated with its core underpinning capability. This includes its contribution to global satellites, running its supercomputer, and research, all of which require long-term investment decisions (5-30 years).
- The review concluded that, taking account of investment already committed, the Met Office would bring some £30 billion of value to the UK over the next ten years – a benefit-cost ratio of around 14:1. Around a third of that value can be attributed to the world-class standard of the Met Office, with its unified weather and climate model.
- This figure excludes the value of the Met Office's international influence, as this, although important, is difficult to quantify and was not in the scope of the Review. It also excludes the value that the Met Office's services bring beyond the UK, to the global economy.

MET OFFICE GENERAL REVIEW: DETAIL

Introduction

1. The Review noted that demands on the Met Office and its services are expanding. Weather plays a key role across public services and the wider UK economy, particularly given the UK's geographical position between the Atlantic Ocean and continental Europe. As the population of the UK rises and climate change leads to more variable weather and increasing costs[1], the demand for high-quality weather forecasting is likely to increase. Furthermore, as science expands its ability to understand and model the complex interrelationships between atmosphere, oceans, land and water, this brings more opportunities to improve our understanding of the impact of weather and climate on society but also increased costs to model and understand these impacts.

2. In view of this, it is vital that Government fully understands the Met Office's overall contribution to the UK, so that it can set priorities and take any future policy decisions based on a robust and high-quality evidence base.

3. This purpose of this review was therefore to assess the value that the Met Office brings to the UK. It considered this in the context of the role, function, funding and operating model of the Met Office and its customers. It also took account of the wider context and future challenges.

Role and functions of the Met Office

4. The Review noted that the Met Office is the UK's National Meteorological Service. It provides a critical national weather and climate capability and is a key part of the UK's defence, security and civil contingencies infrastructure. It operates as a Trading Fund with both public sector customers and private sector contracts. The Met Office's status as a Trading Fund was outside the scope of the Review.

5. The Met Office is one of only two World Area Forecast centres, delivering forecasts globally. It is one of only a small number of national meteorological services that work collaboratively with, and sells services to government institutions in other countries, including Australia, South Korea and the US Air Force. The Met Office represents the UK at international weather and climate fora such as the World Meteorological Organisation (WMO) and European fora such as the European Centre for Medium Range Forecasting (ECMWF[2]), based in Reading. The UK's membership of these is paid through the funding the Met Office receives for the Public Weather Service and in turn, the Met Office receives global data and other benefits that contribute to its forecasting and climate services.

6. Unlike many other countries' meteorological services, the Met Office's public role is not defined in statute[3]. Instead it is defined by a variety of public sector customer agreements, to provide a range of services, singly or in partnership with others, and enable the UK to carry out a number of domestic and international statutory obligations from civil contingencies, flood management, air quality, and cold weather payments for the elderly, through to its climate change policies and its international civil aviation obligations.

[1] As set out in research by Nicholas Stern and reports of the Intergovernmental Panel on Climate Change and Met Office's own climate projections, all cited in the London Economics report.
[2] ECMWF, as a member state organisation, is not an NMS. It does not have to deliver short-range or local forecasts, and so can focus on its medium-range forecast, with the result that it is the most accurate in the world but its models take 8-9 hours to run (and hence would not work for a short range forecast).
[3] Apart from legislation establishing the Met Office as a Trading Fund, its only statutory responsibility is the Public Records Act which requires it to keep meteorological data.

Operating model

7. Unlike other countries' meteorological services, the Met Office has a unified weather and climate model and its weather, climate and commercial services are all provided by the Met Office as a single entity. The Met Office's services are underpinned by a common core capability covering the scientific research and modelling capability which enables the high performance computer (HPC) to turn observations into forecasts. Investment in this core capability impacts the accuracy of forecasts and accounts for some two-thirds of the total costs. A majority of this core capability is funded through the Met Office's Public Weather Service, but a number of other public sector bodies also contribute to funding this core capability.

8. The costs of this core capability are largely fixed (observations, HPC), relate to long-term treaty obligations (eg international subscriptions for satellites) or have a long payback period (research). Therefore business planning requires a long-term approach.

9. The Met Office's services are underpinned by vast amounts of data generated at each stage of the process, from global observations, through to modelling and forecasting. Because the increasingly vast volume of data makes it difficult to disseminate in a way that is still useful, data are increasingly being provided through Application Programming Interfaces (API), which allows the user greater control of what data is requested. The Met Office provides data under Open Government Licence, which is free at the point of use, through Datapoint, the Met Office's API. This data is aimed primarily at the Developer market.

10. Met Office data also underpins the global commercial market, through data sales to other meteorological professionals able to make use of a wider variety of datasets. The Met Office makes data available under a variety of licence terms depending on the use or re-use of that data, including Research Licences. Where appropriate, data are provided under licence and charged for at market prices.

The value of the Met Office to the UK

11. To understand the value of the Met Office's contribution to the UK's economy, BIS and the Met Office jointly commissioned London Economics to undertake an economic analysis. In conducting their research, London Economics took account of prior literature, including public surveys, and conducted new studies to address key gaps. Their analysis estimated that over the next 10 years, taking account of investment already committed, the Met Office will deliver a Net Present Value (NPV) of some £30 billion[4], for a cost of just over £2 billion. This is a benefit: cost ratio of around14:1. This ratio is at the upper end, in comparison with assessments of other meteorological services, but within reasonable boundaries, given that the Met Office has the world's most accurate numerical weather prediction system amongst all national meteorological services, and given its unified weather and climate model.

12. Experts expect that rising global temperatures could lead to increased frequency and intensity of extreme weather for the UK. Therefore London Economics ran sensitivity tests to understand how the value of the Met Office might increase or decrease in the event of potential variations in weather variability. They concluded that the NPV has a 90% chance of falling between £28 billion and £34 billion. In other words, if for example, floods and

[4] London Economics tested their overall figure of £30 billion NPV by conducting a sensitivity analysis of the non-weather assumptions in their analysis. They concluded that the net present value had a 90% chance of lying between £26 billion and £37 billion.

storms become 50% more frequent in the future than currently expected, the Met Office could potentially deliver an additional NPV of some £4 billion.

13. Some of the unique aspects of the Met Office are that it has the most accurate global forecasts[5] of all national meteorological services, and it has weather, climate and commercial services all in a single entity. London Economics' analysis found that providing weather and climate services together produced the highest NPV. It also found that around a quarter of that £30 billion value can be attributed to the UK having invested in "world-class" quality forecasts (relative to a "standard" meteorological service).

Wider benefits

14. London Economics also noted that this £30 billion excludes significant non-quantifiable benefits and wider global benefits. The Met Office is internationally respected for its unified weather and climate model, the accuracy of its weather prediction, its research, and its support for developing countries, saving lives and delivering improvements such as helping to establish local meteorological services. These factors give it considerable international influence, which has strengthened the UK's ability to win contracts overseas, develop mutually beneficial international collaboration (eg by exporting its unified weather and climate model) and influence the broader international debate. These wider benefits cannot be easily quantified but are noted as important aspects of the Met Office's value to the UK.

15. Secondly as the scope of the review was the value of the Met Office to the UK's economy, this overall figure excludes the value of its climate services to the wider global economy, although there is a methodology for quantifying this, cited in the London Economics report.

Partnerships

16. The Review also noted the collaborations and partnerships which underpin the Met Office's services already form a critical element of its operating model, as they enable the Met Office to deliver more with less. The Review looked at in particular the **Natural Hazards Partnership (NHP)** and noted that there is no single UK organisation that can provide Government with a coordinated, authoritative voice on natural hazards. Managing these hazards falls to different parts of Government. The Met Office-chaired NHP provides the Cabinet Office Civil Contingencies Secretariat and emergency responders with a single, valued source of advice, largely on a goodwill basis, funded in-kind by the organisations involved. With investment and a mandate from Government, there could be scope for it to do more by developing an interactive approach, based on modelling and impact assessment of combined hazards (eg rainfall and subsidence). As an Annex to its main work, London Economics carried out a high-level initial estimate of the potential value that investment in a natural hazards centre, on the lines of the Flood Forecasting Centre, could deliver and concluded that it could bring a further £130m NPV over the next ten years (ie above the c£40m NPV it will deliver in its current form). This initial analysis however would need further work if a full business case were required.

[5] Source: WMO's Global Numerical Weather Prediction Index.