



Space Solutions for Climate Challenges



Welcome

Welcome to the Parliamentary Space Committee's special space perspective on the 2008 G8 summit. Growing global pressures on energy, food and water impact on us all. As the G8 gathers in Japan to consider these issues, this leaflet offers a fresh perspective. Satellite based tools can help monitor and deliver our common vision of a sustainable, low carbon society.

Over the last 25 years, global satellite measurements have proven that our climate is already changing. Increasingly, however, the requirement is to assess the risks. Satellites monitor illegal logging, observe changes in terrain, inspect natural disasters, speed crisis response and predict severe weather. Now, advances in satellite technology provide policy makers with reliable, independent tools for monitoring compliance of agreements on cutting greenhouse gases.

Space is no stranger to the G8. In 2005, the Gleneagles communiqué on climate change declared the G8's support for creating a global health check for Planet Earth. Europe's contribution is GMES, the world's biggest environmental monitoring programme.

This leaflet showcases the best of British innovation. We hope you share our vision of UK science, innovation and politics combining to assist in Britain's response to tackling the impact of global warming.

Handwritten signatures of Ian Taylor and Bill Oiner in white ink on a dark background.

Ian Taylor MP, Bill Oiner MP
Co-chairs, Parliamentary Space Committee



Overview

Kyoto has left the world with an enduring challenge – how to monitor compliance with agreed targets. As the UN recently stated, the “relatively weak system for enforcing compliance with agreed targets” remains one of the biggest issues on the post-Kyoto political table. As the same UN paper on climate change acknowledges, a related challenge “likely to become steadily more difficult in the future relates to monitoring, reporting and verification – which are essential to making future climate agreements work effectively.” In short, there is an urgent need to create a global monitoring system so that we can “know with any degree of certainty what the world’s total emissions are and hence whether it is on track for the overall target.”

Satellites are a vital part of a global monitoring system. They remain the only way of monitoring gradual environmental change at a global level. But they also play a critical role in filling what the UN in June 2008 described as “the most important gap” in our monitoring – the varying impacts of climate change on individual countries and regions. Recent advances in satellite technology now allow policy makers to measure man-made emissions at a regional level, in real-time, providing the first global tool for monitoring compliance and assessing risks. They are also providing some of the solutions to climate change – for instance rerouting aircraft and traffic intelligently to reduce emissions, and providing low carbon, solar powered communications.

Satellites are trusted technology; independent, accurate, and operate on a global basis. They allow scientists to take measurements which would be impossible by other means, and have underpinned much of the evidence base behind our understanding of climate change.



A health check for Planet Earth

Satellites can now monitor a host of global atmospheric changes, including aerosols, clouds, precipitation, ozone, earth radiation budget, trace gases and temperature. They are also essential for tracking sea-surface height and temperature. They can help assess the carbon content of forests. They can police illegal logging and land use change, and they can warn of impending disasters and guide aid efforts as well as providing advanced imaging and communications to aid the response effort.

The real monitoring challenges today are to monitor compliance with agreed targets and to accurately predict the regional impacts of climate change. The solution is to develop a total Earth monitoring system, a health check for Planet Earth. No single Government can afford to build and maintain a system of systems that is complex enough to understand the interaction of the Earth's elements. That is why the UK, the G8, and over 50 other countries as well as 40 international organisations, have committed to supporting the development of a Global Earth Observation System of Systems (GEOSS).

Global Monitoring for the Environment and Security (GMES) is Europe's contribution to making GEOSS happen. It is the biggest and most ambitious environmental monitoring programme in the world and is supported jointly by the European Union and European Space Agency.

GMES uses observation data from new and existing satellites and ground based sources to build up an accurate picture for policy-makers of how the Earth is evolving, in particular with regards to the environment and the long term effects of climate change.

To date, UK support for GMES has not been as strong as other EU members. Indeed, the UK would need to raise its support from less than £3 million to around £20 million a year if it is to equal the levels of support of other nations (proportionate to GDP).



UK leadership

The UK's leadership in satellite monitoring technology and associated ground data processing systems, combined with our leadership in climate science and climate change policy is the best opportunity for Britain to ensure that the world's biggest environmental monitoring programme meets our needs.

In recognition of UK's leadership, Europe has offered to create a new international facility in Britain to lead Europe's climate and environmental monitoring and to build on UK leadership in the science and engineering of climate change. The UK also has the opportunity to lead the atmosphere monitoring missions within GMES – the core climate change monitoring service. These opportunities will not be realised if the UK does not reverse its low funding for GMES in November 2008.

"The Government also recognises the need for and supports a robust and accessible evidence base to support adaptation to climate change impacts, including an established monitoring network for detecting changes in biodiversity, and an improved and wider understanding of the impacts that climate change could have on stability and security in other parts of the world."

Public Service Agreement 27: Lead the global effort to avoid dangerous climate change, Comprehensive Spending Review 2008–11, HM Treasury.

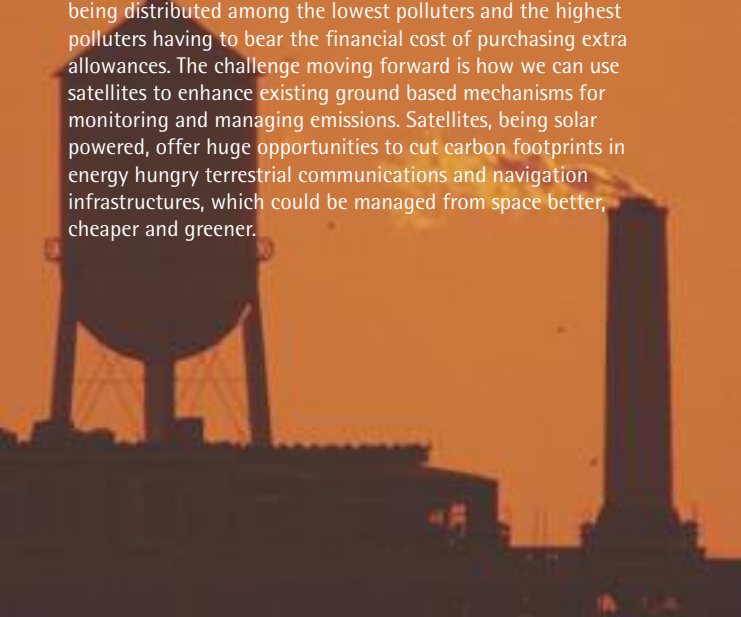
Case study: Developing a low carbon society

One of the key themes for discussion at the G8 summit is the creation of a low carbon economy – how countries can meet their overall emission reductions targets agreed under the UN's Kyoto Protocol.

To help achieve this, Emissions Trading Registries have been set up both globally and at country level to allow companies to trade emissions allocations. The registry sets up a market, allowing lower polluting companies to sell excess allocations to higher polluters, thus rewarding greener firms while regulating the total amount of pollution.

This is an area where the UK is already taking a leadership stance. As well as its work helping global brands like Ford monitor their emissions, UK-headquartered Logica is maintaining the global CO2 emissions transaction registry for the United Nations Climate Change Secretariat. At country level, Logica has built CO2 emissions registries for Australia, France, Italy and the Czech Republic, and is working on more. Effective emission monitoring requires accurate data from satellites and other sources to support compliance assessment.

The benefits of creating a low carbon economy by facilitating the trading of carbon allocations are clear, with the rewards being distributed among the lowest polluters and the highest polluters having to bear the financial cost of purchasing extra allowances. The challenge moving forward is how we can use satellites to enhance existing ground based mechanisms for monitoring and managing emissions. Satellites, being solar powered, offer huge opportunities to cut carbon footprints in energy hungry terrestrial communications and navigation infrastructures, which could be managed from space better, cheaper and greener.



Case study: Early warning and crisis response

Around 200 million people a year are affected by disasters, many of these exacerbated by climate change. And yet, as the UN recently stated, "perhaps the most important gap" in our understanding of climate change is how it will impact different countries, especially in the developing world. In a world competing for increasingly scarce resources, disasters threaten economies, populations and the sustainable development of developing countries.

An integrated international approach to disaster risk management is required that includes preparedness, response, recovery and risk mitigation. Significant problems remain, and G8 has rightly focused on issues including better early-warning for natural disasters and capacity building in developing countries to help them safeguard their people and their habitats from the worst effects of climate change.

From Space, Earth observing and communications satellites have a major role to play. The UN International Strategy for Disaster Reduction highlights "space-based earth observations and technologies" as a major priority.

In the event of a major disaster, UK company DMCii Ltd. coordinates the DMC (Disaster Monitoring Constellation) within the 'International Charter' to deliver timely information from the world's satellites. UK company Infoterra Ltd. leads 20 international partners in the GMES Respond project, which will form a key part of Europe's forthcoming GMES Emergency Response Core Service. GMES Respond provides rapid mapping services such as damage assessment and refugee information. Both activities support the need of governments, NGO's and the UN.

UK support for integrated Earth observing and telecommunication systems built by government and private entities, and operating within frameworks such as the European Space Agency's GMES and the International Charter: "Space and Major Disasters", are critical to these efforts.

Case study: Monitoring our emissions

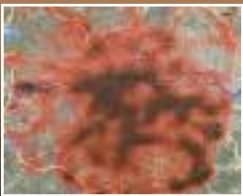
Perhaps the greatest challenge in making emissions targets binding is agreeing a system to monitor compliance. Satellites play a critical role, at a local, regional and global level.

In March 2007, London saw the launch of a new capital wide pollution monitoring system that alerts subscribers by text, voicemail or email to dangerous levels of air pollution. Airtext was developed by the European Space Agency and Cambridge Environmental Research Consultants and uses satellite data combined with ground based monitoring and traffic forecasts to its subscribers. The system, first piloted in Croydon for the previous two years, is targeted at helping sufferers of asthma, bronchitis, emphysema, heart disease or angina reorganise their day to avoid the worst effects of air pollution. London's then Deputy Mayor, estimated that 1,000 people die prematurely in the capital every year from air based pollution.

More information is available at www.airtext.info

Another key UK emissions monitoring initiative is the MESSAGE project – a £4.1 million research project, jointly funded by the Department for Transport and the Engineering and Physical Science Research Council, aimed at reducing traffic pollution through the use of mobile sensors. It uses pedestrians and vehicles to act as mobile sensors, collecting vital real-time air quality data, and makes effective use of the available data to show how variables such as weather, street design and driving behavior affect traffic pollution levels.

One of the challenges is how to handle the very large amounts of varied real time data from multiple sources and turn it into a viable solution. Logica was chosen as the industry advisory partner to bring its expertise in information management and integration, as well the experience it could bring from satellite data processing and location based initiatives.



Case study: Preventing illegal logging

Rainforests are under attack from logging, agriculture, industry and population growth. The Stern Review estimates that deforestation is responsible for 20% of greenhouse gas emissions and loss of irreplaceable biodiversity. Continued deforestation will increase carbon emissions and could worsen climate change dramatically.

Illegal logging, which contributes significantly to deforestation in the vast tropical forests of the Amazon, Congo and Indonesia, needs to be arrested. But at the heart of the world's fight against the illegal loggers, local Governments desperately need better access to regular and accurate monitoring.

Satellite surveillance is acknowledged as the only practical method of monitoring entire rain forests. Satellite imagery provides the kind of hard, evidence-based data to support political decisions aimed at improving management of natural resources. Since 2005 the UK has achieved considerable success in annual monitoring of the Amazon rainforest through the DMC constellation of satellites. Radar satellites such as TerraSAR-X also offer the invaluable opportunity of all weather imaging, through clouds and at the dead of night.

To extend satellite surveillance to the world's forests, and to do so with an increased frequency requires significant funding which the rainforest nations cannot yet afford. UK leadership in innovation and in green politics offer Britain an opportunity to lead the world in the race against time to save our last remaining rainforests.



Next steps

Europe has committed to developing the biggest environmental monitoring programme in the world, GMES. France and Germany have committed 14 and 18 times more than the UK to the current phases of GMES, and the EC has set aside €1.2 billion. Britain's policy focus on climate change has ensured that GMES now includes a set of instruments that will ensure continuity in CO2 monitoring until 2020. However, unless the UK reverses its current minimal funding to GMES, the UK's climate priorities within GMES will not happen.

A proportionate contribution to GMES, relative to the size of other economies, would cost the UK around £20 million a year over seven years.

In November 2008, European ministers meet to agree how to turn the vision of a global health check for planet Earth into a reality. Unless the UK funds GMES at a level consistent with our economic size, UK science, engineering and political leadership will be sidelined in the biggest environmental monitoring programme in the world. Britain's policy towards GMES is led by the Department for Environment, Food and Rural Affairs.

About UK Space

UK Space is one of the UK's biggest success stories.

UK Space adds £7 billion to the economy, supports 70,000 jobs, is growing 4 times faster than the rest of the UK economy, has the most highly skilled workforce in manufacturing, and enjoys 7% of the global space market forecast to be worth £543 billion by 2020 (Source: UK Space Strategy).

UK Space is a world leader in environmental technologies. UK designed instruments are monitoring sea surface temperatures to better than 0.1 degrees accuracy. A UK science led mission will use radar from space to monitor the melting ice caps to sub millimetre accuracy. Telecom satellites run on sunshine, helping to cut the world's carbon footprint. UK Space is committed to helping make Britain the most dynamic low-carbon economy in the world.

About the Parliamentary Space Committee

The Parliamentary Space Committee exists to raise awareness in Parliament of the benefits to Britain of its world-class space industry. Recent PSC events have covered themes as varied as Africa, space finance, the Olympics, Astronauts and promoting women into science, engineering and technology. The PSC is one of the oldest and most established all-party groups in Parliament with over 100 members in both houses.



Parliamentary
Space Committee



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