

NATS



Acting Responsibly:
NATS and the Environment 2009



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Foreword

Paul Barron, Chief Executive



In January 2008, NATS became the first air navigation service provider to set environmental targets both for our own estate and for the ATC service we provide to our customers.

We are on track to deliver a carbon-neutral NATS estate by 2011. From the buildings we work in, to the way we get to and from the workplace, energy efficiency and recycling initiatives – we are already delivering results.

Addressing ATC-related carbon emissions is a more complex proposition. We said it would be the end of 2008 before we knew how we might achieve our targeted reduction of carbon dioxide (CO₂) by an average 10% per flight by 2020.

Our researchers and analysts have now completed their unique and complex task to calculate the amount of CO₂ produced within UK airspace and under NATS' control. This kind of analysis has never been done before. The results have been converted into a baseline for 2006 against which we will drive down CO₂ emissions.

At the same time we've been working up our plan, identifying a palette of potential solutions that will help us achieve our target. One year on from setting our target, we now have a plan for achieving it.



The size of this challenge can be illustrated by the fact that our controllers handled nearly 2.5 million flights last year.

We have established that aircraft under NATS' control emitted 26.3 million tonnes of CO₂ – enough to fill Wembley Stadium more than 3,000 times. Our 10% reduction target means we are seeking to eliminate at least 2.6 million tonnes per annum (based on 2006 levels) from 2020.

That said, our operation has already saved 70,000 tonnes of CO₂ through airspace and procedural changes since this work began in 2008. Where we can achieve quick results, we will.

I don't suggest this will be easy. We have to balance the relative importance, for example, of noise reduction and carbon dioxide cuts. Few people would vote for reduced carbon emissions if it meant more noise over their homes.

We are also required to provide additional capacity to deliver improved service levels and good value for money. Challenging discussions lie ahead to agree inevitable trade-offs.

Having established our baseline and developed our outline plan to 2020, our task now is to engage and enrol our stakeholders to help us prioritise and ultimately work with us in delivering the solutions.

Our airline and airport customers, our regulator and the government will be fully involved. Neighbouring air navigation service providers, lobby groups and academic institutions will all play a part.

We have worked extremely hard over the past year to reach this point and I am extremely proud that we are now able to set out NATS' vision of future environmental performance in air traffic management.

An online interactive presentation – at www.nats.co.uk/environment and <http://natsnet/environment> details some of the individual initiatives within the scope of the work (some examples are lined up along the bottom of this page). They point to projects and areas which we believe can deliver CO₂ reductions now and in the future.



Paul Barron
Chief Executive

March 2009



This document is designed primarily for NATS employees. It is also further evidence for customers and stakeholders that the company is committed to playing its part in the wider industry's drive to reduce CO₂ emissions.

The company has put the environment at the core of its business and has created the Acting Responsibly brand value, from which this document takes its name. The following target is the embodiment of this brand value.

“By March 2020, we will have co-operated with the industry in reducing ATM CO₂ emissions by an average of 10% per flight (against a 2006 baseline). By the end of 2008, clear targets will have been established to deliver this.”

At the same time, goals have been set for the company's energy, waste and transport impacts.

“Through the commitment of our employees, we will have created a carbon-neutral estate by 2011.”

This report is intended to map out how the savings in CO₂ will be made and is the first of its kind in the ATC sector. No other air navigation service provider has attempted this type of work before.

The enormous effort to establish a baseline and a plan of action means there is now a starting line but the path ahead has yet to be fully mapped out. If NATS is to be a truly progressive business, it must take a positive approach to the task of mitigating the environmental impact of ATM. This report summarises how NATS intends to do this.

The first area it will focus on is the research which pinpointed how much CO₂ is produced by NATS' ATC operation. From this comes the understanding of how the company can tackle CO₂ output from its operations in all phases of flight and at airports controlled by NATS.

The second part of this report focuses on transforming this research into action. It describes how action will be driven in specific areas, namely people, airspace, technology, innovation and partnership. For each, NATS people will explain how the changes affect their day-to-day activities and outline their ideas for the future.

To make this vision as accessible as possible, electronic “menu cards” are available online, detailing some of the individual steps and projects which will help progress towards the target. To find out more click on website www.nats.co.uk/environment or intranet <http://natsnet/environment>.

NATS has a key contribution to make in reducing aviation's impact on the environment by improving airspace design, air traffic management, delivering fuel savings and reductions in emissions.

This plan takes into account the strides being made now but is mainly focused on how NATS can co-operate with its partners to ensure the long-term sustainability of the industry. With aviation set to be included in the EU emissions trading scheme by 2012, cleaner operations will benefit the industry as a whole.

At present, aviation is responsible for up to 3% of global man-made emissions, according to the World Resources Institute and International Energy Agency. Whilst this may seem relatively small, it is expected that, even with the current downturn, the long-term trend of aviation growth will continue and with it, the impact of increased CO₂.

The company has always worked with its airline customers to help to deliver improvements of this kind. For example, it pioneered continuous descent approaches into Heathrow and Gatwick to help combat the oil crisis in the 1970s. What is now proposed goes much further than that.

NATS plan is for UK airspace but it is part of a global aviation network. Only by collaborating with its international partners can NATS ensure that aircraft can be controlled in the most environmentally responsible way.

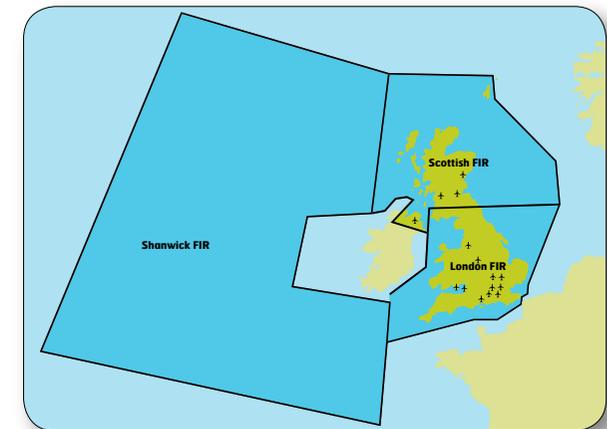
As an active and founder member of Sustainable Aviation, the company has been at the forefront of redefining aviation's response to the climate challenge. Last November, this industry-wide coalition published its first major research project to suggest that, by 2050, CO₂ emissions from aviation will be back to what they were in the year 2000. This plan forms NATS' initial response to the changes that need to happen to deliver a lower carbon future for the industry from an ATM perspective.

The company's growing environmental expertise is also in demand at a global level on ATC best practice through bodies such as the Civil Air Navigation Services Organisation (CANSO) and the International Civil Aviation Organisation (ICAO).

As well as advising and guiding, NATS is also listening to airline customers through regular consultative meetings, and other key stakeholders through NATS Stakeholder Council. Made up of representatives from across the aviation spectrum, the council is an important advisory and sounding board.

The message to NATS' stakeholders is that safety is the first priority but NATS wants environment to become part of the company's DNA in the same way as safety is already.

NATS' CONTROLLED AIRSPACE



Establishing the baseline was a unique challenge requiring bespoke tools – like KERMIT described in the text box BELOW – to be adapted and developed to complete the research. The resulting estimate underpins the entire programme. Namely, aircraft under NATS’ control in 2006 emitted 26.3 million tonnes of CO₂.

Not all of these emissions are a direct result of air traffic management. The CO₂ emitted by aircraft varies depending on many factors including the basic fuel requirement of the aircraft, its weight, routeing, altitude and speed as well as weather conditions and other factors.

NATS’ air traffic operation can be split into three areas:

- Airspace over the UK
- Operations controlled by NATS over the North Atlantic
- Ground movements at UK airports where NATS provides a control service

It is now understood that over 61% of the total CO₂ was released by aircraft operating in domestic airspace, around 33% was generated by aircraft within the North Atlantic area, and the final 6% came from aircraft operating on the ground at UK airports where NATS provides a control service.

NATS’ EMISSIONS BASELINE 2006

	TOTAL CO₂ (MILLION TONNES)	AVERAGE CO₂ PER FLIGHT (TONNES)	PROPORTION
DOMESTIC AIRSPACE	16.2	6.8	61.6%
NORTH ATLANTIC	8.6	23.5	32.8%
NATS AIRPORTS	1.5	0.8	5.6%
TOTAL	26.3		

The CO₂ figures in the above table were modelled using real radar data and reflect the amount of time and the distances flown by aircraft within each of the three areas of airspace. As the results are based on real data, the specific performance, or efficiency of aircraft as they transit through the airspace – the amount of fuel and CO₂ emissions – has been taken into account.

KERMIT – The Kerosene Emissions Research Model including the Terminal Manoeuvring Area was originally designed by NATS to model aircraft fuel burn and related emissions within the complex environment of London’s airports. It builds upon an existing Eurocontrol aircraft performance database to improve the range and type of scenarios that can be modelled. For the last two years it has been used by NATS to assess procedure and airspace change proposals to inform our regulator of their likely impact.

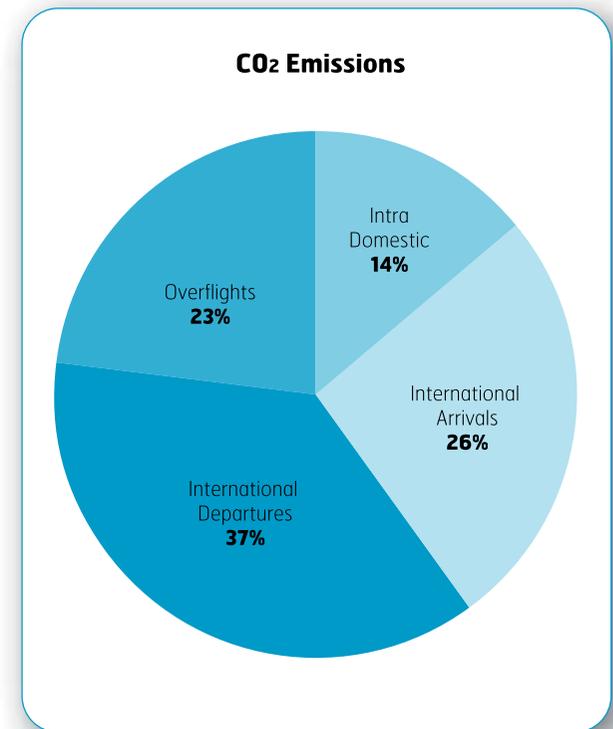
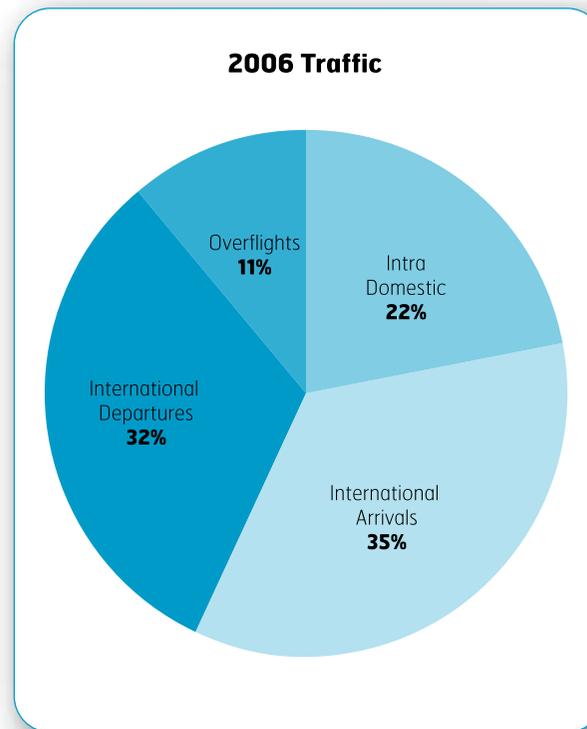
The work to establish the baseline enabled a closer look at the sources of the emissions.

Emissions from overflying, domestic and international traffic

The baseline assessment also identified how the level of CO₂ emissions varies across the different types of operation. This is shown in the charts opposite. The results are largely explained by the different aircraft types and the fuel efficiency of the different phases of flight in each element. However, this information enables informed decisions to be made about how to target improvements to achieve the best reductions in CO₂ emissions.

Emissions from North Atlantic air traffic

Once aircraft enter the North Atlantic region, they are no longer captured by radar surveillance systems and are managed on the basis of procedure. Assessments have shown that flying more fuel-efficient routings across the ocean within the constraints of current separation standards and the oceanic track system could reduce CO₂ emissions by up to 1.5%.



In the next six pages further analyses of the baseline results are explained. On each page, as in the box on the right, the opportunities for future improvement are outlined. To find out how these actions can reduce CO₂ emissions go to NATS' website www.nats.co.uk/environment or intranet <http://natsnet/environment>.

FUTURE OPPORTUNITIES

Technological developments in progress for the future include Reduced Longitudinal Separation Minimum, improving opportunities for pilots to request and receive climbs, and aircraft navigation and surveillance improvements.



Emissions of CO₂ from holding

The baseline work enabled the extent of airborne holding at the main UK airports to be assessed in the context of all of the emissions in NATS' airspace.

These arrivals 'stacks' are widely used as an effective method of managing the inbound flow and safe separation of aircraft. They also help ensure that runway capacity and landing slots are used efficiently. Airports, airlines and air traffic control use stacks to smooth the operation of busy airports.

Much work is already underway to reduce the use of stacks including technological innovations such as arrivals manager (AMAN). The first phase of AMAN was introduced by NATS this year as the first step in helping to reduce the amount of time aircraft spend queuing to final approach. It's all in support of making the system as efficient as possible. But there is more to do.

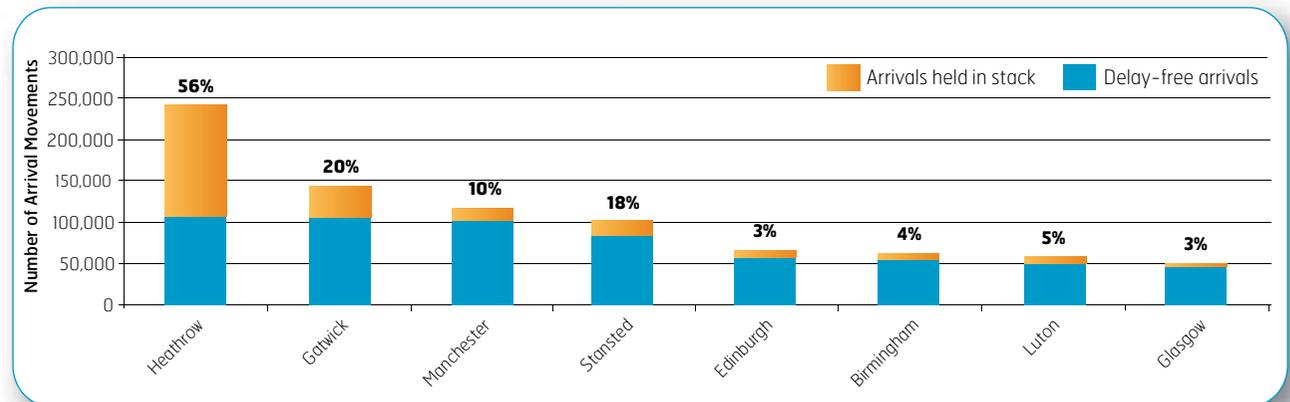
Aircraft circling in the arrival holds before they land are estimated to account for 2% of all of the CO₂ in NATS' controlled airspace.

Three-quarters of these emissions are generated by aircraft arriving at Heathrow, probably a symptom of the airport's runways operating at close to maximum capacity.

The graph below shows the proportion of aircraft held in the arrival holds at each airport during 2006. For example, 56% of aircraft arriving at Heathrow have to wait to land.

Although only a small proportion of the overall baseline, airborne holding results in extra fuel burn and emissions. Stacks are therefore an area where NATS wants to work to minimise these excess emissions.

PROPORTION OF MOVEMENTS HELD IN STACK



FUTURE OPPORTUNITIES

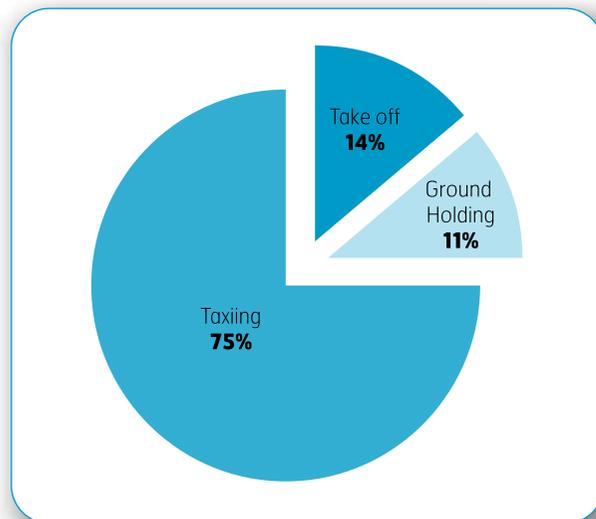
As well as the work described above, future plans to address airborne holding include elements of the following activities:



Aircraft emitting CO₂ at UK airports

The 1.5 million tonnes of CO₂ emitted at the airports where NATS provides a control service can be broken down further into the different phases of ground operation (shown below).

AIRCRAFT EMISSIONS BY PHASE OF GROUND OPERATION



While emissions at airports are just 6% of NATS total baseline, airlines, airport operators and air traffic control are all working to improve the efficiency of ground operations. These efficiencies will save fuel and reduce emissions through individual initiatives as well as joint working groups such as those under the umbrella of Sustainable Aviation. Go to www.sustainableaviation.co.uk for more information.

Examples of some of the innovative work among airlines, airport operators and NATS are: information-sharing through systems such as Collaborative Decision Making, installation of new equipment such as pre-conditioned air to reduce the use of aircraft engines while aircraft are on stand and innovative trials such as towing aircraft to an engine starting point closer to the runway to reduce fuel use. Across the industry, work is in progress to reduce aircraft emissions on the ground.

NATS air traffic controllers have also been co-ordinating with airlines and air traffic control at other airports to hold aircraft on stand when there are known delays at the destination airport. Holding on the ground rather than in the air can save around 250kg of CO₂ per minute. The plan is to do more of this in future.

NATS' role in addressing emissions at the airports where they provide an air traffic control service will require strong partnership with airport operators and airlines.

FUTURE OPPORTUNITIES

Key opportunities for the future include strategic management of delays focusing on on-time arrivals and ensuring timely flow of information between airlines, airport operators, ground crew and air traffic control.



The benchmarking described above has identified the amount of CO₂ in the NATS system. But to understand the efficiency of the airspace, primary research was carried out which was then shared with academic and expert partners to define the best flight profile for fuel conservation – another first in the ATM sector.

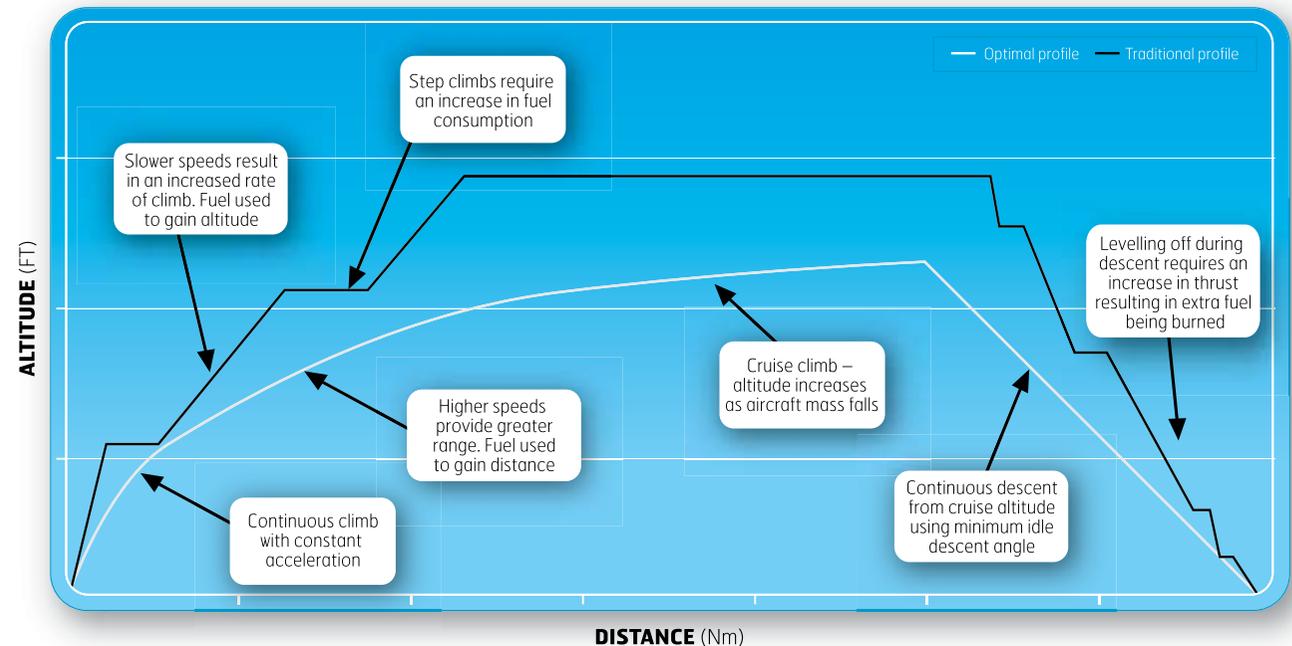
There are good reasons why aircraft may not fly a fuel-optimal profile. Safe separation, tactical and operational demands of airspace boundaries and weather conditions are some examples of factors that need to be considered along with fuel efficiency.

Putting these considerations to one side, NATS researchers were able to identify a fuel-efficient, optimal, profile that would minimise fuel use and emissions. In the diagram opposite, the fuel-optimised profile shown in white is highly dependent on the aircraft type and the distance flown. The graph indicates the nature of an optimised profile, that would increase fuel efficiency and reduce CO₂ emissions, compared to a more traditional profile, in black.

This research offers valuable guidance to NATS' airspace designers, network managers and controllers in providing more environmentally efficient flight profiles.

It is anticipated that aiming for the 10% target will bring flight profiles closer to the fuel optimum. Essentially, part of the change will be in delivering more continuous climb and descent profiles, and in cruise, profiles that are closer to optimum.

FUEL-EFFICIENT FLIGHT PROFILE

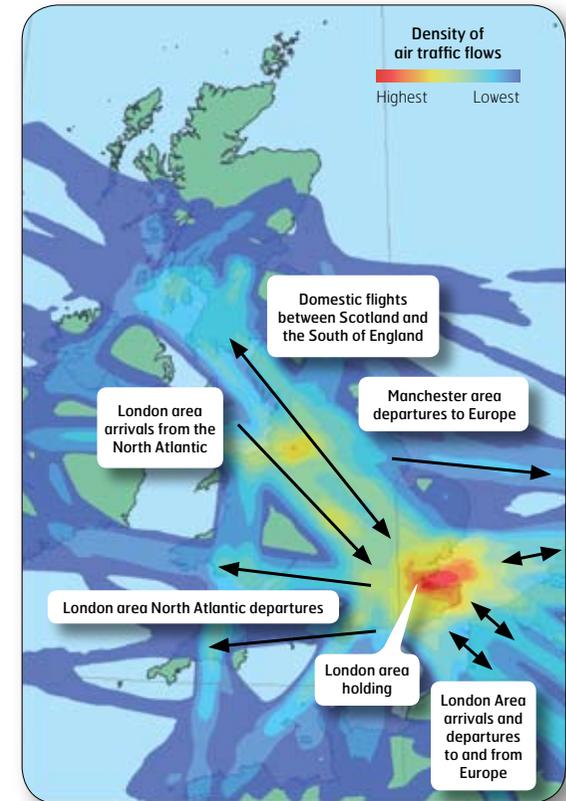


FUTURE OPPORTUNITIES

In the future, new aircraft technologies, improved navigation systems and regulatory change may provide the infrastructure to support radically different procedures which will take us closer to the fuel-efficient profile.



FOCUS AREAS FOR ROUTE NETWORK EFFICIENCY IMPROVEMENTS



Having quantified how much CO₂ was emitted in NATS' controlled airspace, the next step was to take the actual radar data to build a picture of how the network was performing compared to the optimal profile described above.

A staggering volume of information from NATS' surveillance system was assessed. In 2006, the UK route network serviced more than 2.3 million flights between 8,700 cities.

Statistics for the main routes and flows were compiled based on the actual average CO₂ emissions and route usage.

This information was then compared to the theoretical optimum fuel usage for each of the routes to give a measure of fuel efficiency across the network.

Although 100% fuel efficiency cannot realistically be achieved because of factors like bad weather and avoiding military areas, it means that certain inefficient routes between cities can, for the first time, be identified and improvements targeted.

Over the last two years NATS has delivered many network improvements that have enabled better flight planning and increased access to shorter, more direct routes. These have delivered tangible fuel savings and reductions in CO₂ emissions.

The chart on the right shows the density of air traffic which highlights the top six regions identified in this assessment work.

The plan is to assess further the routes in these areas to find out why they are less efficient and begin a programme to remedy those that offer the greatest scope for improvement.

FUTURE OPPORTUNITIES

In future NATS will be building on the efficiency gains already delivered across the route network. For example, with more flight-plannable direct routes, working with the military on flexible use of airspace and with neighbouring air navigation authorities at airspace boundaries.



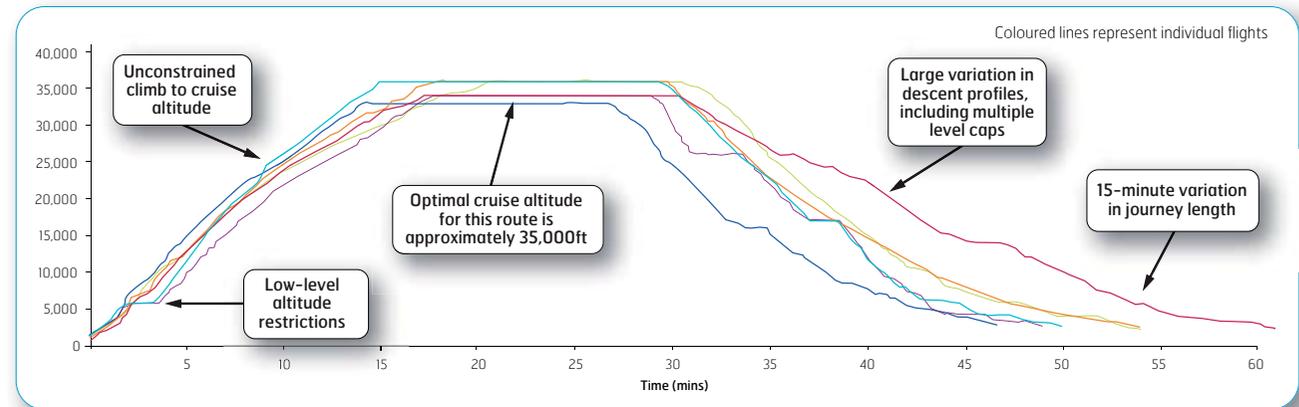
The assessment of NATS' entire route network also enabled characteristics of individual routes to be examined to determine which are performing well and which have scope for improvement.

A common view among air navigation experts is that much of the inefficiency of flight lies in the extra track miles that are flown, the horizontal profile. Our research however has shown that there are opportunities for greater improvement in the vertical profile of flights.

HEATHROW TO EDINBURGH HORIZONTAL PROFILES



HEATHROW TO EDINBURGH VERTICAL PROFILES



Using the radar tracks for some typical flights from Heathrow to Edinburgh as an example (shown in black on the map on the left) these are compared to the most direct route possible (shown in red). This shows that the extra miles flown are relatively small.

But the chart above shows the same flights in the vertical profile, with a large variation in the sample of flights, notably in the form of restrictions preventing a smooth descent and this indicates a variation in fuel efficiency.

The choices made on a day-to-day basis can influence the environmental impact of these flights. Some aircraft are subject to low-level altitude restrictions on departure but most are able to climb without air traffic control restrictions to their cruise altitudes.

NATS' plan is to drive air routes and flight profiles closer to the optimum (discussed on page 12). The data presented here shows how NATS' analysis techniques will inform this by highlighting key routes and phases of flight that can be improved.

FUTURE OPPORTUNITIES

Technological improvement such as the arrivals manager tool (AMAN), which optimises landing sequence, airspace design changes and changes in operational practice could help realise further emissions savings across NATS' route network in the near future.



Targeting improvement by phase of flight

One of the key tasks of the analysis team was to identify what likely savings can be made in each phase of flight. Using the data in this way provides a useful insight into the efficiency of the UK ATM network as a whole, and how NATS could achieve its target of reducing CO₂ emissions by an average of 10% per flight. Below, the 10% target has been split out to indicate the proportion of improvement expected from each phase of flight. These figures specify average savings potential across the UK ATM system. Greater improvement is targeted where it is most realistic, for example, in the descent phase.



Descent – 4.75%

Reducing CO₂ during descent can contribute 4.75% of the total emissions saving. This will include holding.

A motorist going down a hill can be sparing with the throttle yet still achieve acceptable performance. Broadly, the same can be true of aircraft descending towards an airport. However, if due to airspace constraints or congestion in the sky the aircraft has to fly level, or control its speed, extra fuel is often burned.

The aim is to enable aircraft to descend smoothly without using too much thrust, which burns fuel. A key development here is the wish for aircraft to achieve an optimum descent from cruise altitude to the ground. On the way down NATS will do all it can to limit the amount of time aircraft spend holding.



Climb – 3.25%

It is estimated that in the climb phase, on average potential savings of 3.25% could be made. In the climb phase aircraft take off at their heaviest. A full load of fuel means it has to burn more to climb; the thirstiest part of the journey.

In the early years of aviation, aircraft could climb away from airports in a simple continuous climb to make the most efficient use of fuel. However, with increasing air traffic there has been a need to compromise with aircraft being assigned to certain routes and flight levels to keep them separated from other aircraft. These compromises mean that aircraft often climb in a series of steps separated by periods of level flight. This is neither efficient nor environmentally friendly.

NATS will aim to deliver a smooth continuous climb from runway until the aircraft reaches cruise altitude.



Cruise – 1.5%

The cruising phase offers possible savings of 1.5%. The height, speed and the route aircraft take in cruise can markedly affect fuel efficiency and CO₂ emissions. All aircraft have different performance characteristics, and optimum cruise altitude depends on factors ranging from route and aircraft weight, to weather conditions and the airspace they are flying in.

The challenge for NATS is to provide the means for all aircraft to fly as near as possible to their optimum flight profile. This includes taking maximum benefit from wind conditions, and as the optimal altitude changes throughout a flight, allowing aircraft to climb to more fuel-efficient flight levels.



Airport – 0.5%

Potential savings of 0.5% could be had from operations at airports controlled by NATS. The airport sits in the middle of the ATM system and has the potential to contribute noticeably to delays and CO₂ emissions. It is critical that it is optimised in the way assets are used (stands, taxiways etc) and that information is shared to ensure a balance is struck which best meets the safety, operational and environmental needs of all the stakeholders.

Average 10% CO₂ reduction per flight



In summary, the analysis has identified how much CO₂ is emitted from aircraft controlled by NATS, indicating where the inefficiencies in the route network can be tackled, and has informed targets for improvement across the different phases of flight.

So having identified where in the network the benefits lie, the next step is to identify how this translates into action across NATS' business. The next section of this document addresses that – presenting accounts from NATS' people as they describe what this means for them in practice.

Five areas have been identified where savings can be made. Together these will deliver the 10% improvement targeted by 2020. It is also clear that making these reductions will be enormously challenging. The plan will evolve with time as the benefits and potential trade-offs become clearer.

Targeting improvement across NATS' business

Having identified where in the UK network CO₂ benefits could, on average, be achieved and set targets across four different phases of flight, the next step considers how those targets translate into action across NATS' business. In effect this means looking at the 10% from another perspective; how NATS' business can deliver the savings. The box below illustrates how the percentage reductions translate into targets for performance across the areas of people and operations, airspace, technology, innovation and partnership.

People & Operations

NATS people are engaged and aware of opportunities to improve environmental performance and are routinely making safe and informed choices to deliver them

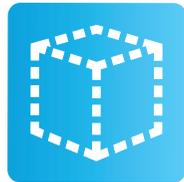


2%

PEOPLE & OPS

Airspace & Procedures

Airspace is designed around environmentally efficient flight. Air routes and procedures are crafted and operated to deliver environmentally efficient flight profiles through climb, cruise and descent phases



4%

AIRSPACE

Technology

Exploiting technology to improve environmental efficiency



2%

TECHNOLOGY

Innovation

Better understanding of the air traffic operation and its environmental impacts, better management of this and informed investment for the future



Feeder to other areas

INNOVATION

Partnership

NATS is working with others to agree priorities and tackle the challenges of improving environmental performance



2%

PARTNERSHIP

Average 10% CO₂ reduction per flight

People & Operations

NATS' air traffic controllers already strive to offer the best possible service. Streaming aircraft, offering access to the best flight levels, managing speeds, offering direct routes and assisting with continuous climbs or descents are all part of the day-job and significantly reduce aircraft fuel use and CO₂ emissions.

Giving controllers the best technology and airspace with which to work means they are able to build on current good practice and identify further opportunities to reduce the impact their actions have on the environment.

Work is taking place across three levels to improve staff environmental awareness.

- For non-operational staff, an introduction to NATS' environmental impact and opportunities for staff to become involved in helping reduce this.
- For those with a key role in delivering the environment plan or leading and engaging others, we will offer more specific training.
- For operational staff and student controllers, a programme of environmental awareness covering NATS targets.

PEOPLE & OPS

What this means for me:

Chris Connell, Air Traffic Controller, Swanwick Area Control



I've worked for NATS for almost ten years and have seven years' operational experience as an Air Traffic Controller on Blue Watch at the Swanwick Centre in Hampshire. Like a lot of people in NATS, I'm increasingly aware of my daily contribution to the environment on a personal level: commuting to and from work, flying away on holiday and the fact that I work in an industry which has a direct impact on it.

Having volunteered to represent Swanwick en route controllers on the environment, I've been involved in developing and delivering environmental awareness presentations, a good practice guide, road shows and newsletters.

Within the ops room we're becoming more aware of environmental factors – maybe this has been a result of the high fuel prices of 2008 and press coverage as well as NATS' launch of our brand values.

For me, the best way to build environment into the mindset of controllers is to begin with our newest recruits at the college at Hurn, near Bournemouth. Our aim is to deliver environmental awareness sessions to all students and instructors at the college as well as newly qualified controllers on their validation courses.

But the most challenging task I believe is to engage existing controllers. Our aim is to draw from their experience and expertise new opportunities for fuel and environmental efficiency. We'll also need their support in implementing new, more environmentally aware ways of working. It's a big task and we're really just at the start.

Changing how controllers work could take us two per cent of the way towards NATS' 10% target. As an ATCO I know it can sometimes be hard to change our ways of thinking and working but that's one of the attractions of this role and I hope I can make a difference.

What this means for me:

Donnie McCaig, Group Supervisor, Swanwick Terminal Control



I've been in air traffic control for 37 years and a Heathrow Approach Controller for the past five years.

Having volunteered as the Swanwick Terminal Control environment rep, I'm hoping my enthusiasm to help reduce NATS' contribution to environmental pollution, both in noise and fuel emissions, will rub off and stimulate action.

Perhaps enough of us will start to think about our actions in our part of the business that we'll create a culture of environmental awareness that transmits into every area.

Most of us have a particular "hobby-horse". Mine happens to be an overwhelming desire to reduce aircraft holding to zero; none, never, not at all! I don't like seeing aircraft going round the arrival holds burning fuel, polluting unnecessarily. Of course, it's not always NATS that creates holding delays, however I would like to see NATS' contribution to these delays reduced to nothing.

I'm convinced that by 2011 we'll be in a better place, our arrival manager tool (AMAN) will be generating the benefits that are envisaged and we'll have better flow management tools which allow us to tailor our traffic demands more closely to capacity. It would be good to think that aircraft would start their descent a long way from their destination and not need to level off until they are on their landing roll.

Above all, I hope that in NATS, every controller, after ensuring safety is not compromised, is considering the environmental impact of every action they take.

What this means for me:

Rob Davies, Watch Manager, Manchester Area Control



Building environment into NATS' culture is something I really believe in. Watching controllers deliver the small day to day things (direct routes, better flight levels, better climb or descent profiles etc) – they are most often unaware that they are also contributing to NATS' effort in reducing CO₂ emissions!

With a little more awareness-raising and sharing best practice, I think we'll see a big change. Taking pride in offering reduced fuel and emissions options to airlines will become a part of our culture, just as we are proud of our excellent safety culture.

At Manchester and Prestwick, we're looking into tracking the number of times an ATCO offers a better fuel-efficient level or more direct route.

We've started discussions with locally based operators on ad-hoc improved climb and descent profiles and will shortly introduce better flight levels for flights between city pairs Manchester, Glasgow and Edinburgh.

In Scottish airspace, there are improved direct routes for flights to/from oceanic airspace. We are also working with the military on freeing danger areas to civilian traffic earlier, giving the opportunity for more direct routes.

The challenge, I believe, will be for our controllers to understand the need to be more flexible in terms of the way aircraft may wish to operate in a culture of understandably safe, pre-determined methods of operations.

However, we will have an ideal opportunity when we look at the re-design of our airspace to think differently and make some big steps by making the environment a key part of the design and perhaps involving airlines in the design process from the outset.

Airspace design

NATS is required under its licence from the Civil Aviation Authority (CAA) to ensure the safety and efficiency of the UK airspace system. A rolling programme of airspace development is necessary to achieve this.

The process set out by the CAA's Directorate of Airspace Policy Airspace Charter means NATS is required to carry out environmental assessments and consultation exercises with airspace users and stakeholders in areas beneath proposed changes.

For many years the focus has been on noise, but increasing understanding of the effect CO₂ emissions have on climate change has shifted the focus to ensure this question plays an equal part in environmental assessment.

Significant opportunities to develop new or replacement route structures or departure and arrivals procedures that minimise impact on the environment have been identified.

Continuous descent approaches (CDAs), continuous climb departures, better flight levels and more direct routes are all now included as airspace design objectives.

But these aims must still be balanced with other priorities – chiefly, protecting safety – minimising delay and the trade-off between noise and emissions.

What this means for me:

Carole Leslie, Airspace Strategy and Concepts Manager



This is a really exciting time for the Airspace Design team because the three key ingredients of airspace developments – safety enhancement, capacity increase and environmental improvement – are really promising to deliver maximum benefits.

In the past, capacity increase to minimise forecast delay has been the main thrust for airspace changes and we have developed such changes with safety as our first priority.

Now, the NATS environmental targets we've set ourselves together with the focus of airlines on emissions and cost savings, mean environmental considerations in airspace design are more important than ever.

When we started the Terminal Control North design process our focus was mainly on noise impact and, as directed by the CAA, we used P-RNAV technology to position routes to avoid areas of dense population, particularly below 4000ft.

Our understanding about the balance between noise and emissions has quickly evolved and NATS uses best practice to ensure each new airspace change maximises the environmental benefits.

Safety is still our primary consideration in airspace design and it's not always possible to increase capacity and reduce environmental impact at the same time due to the complexity of airspace and routes.

So this is where we may need the help of controller tools and airspace systemisation in the future to enable more flights, improve safety and reduce the environmental impact of ATM.

Airspace management

Large parts of UK airspace are allocated to military use either permanently or on a temporary basis. Flying around some of these areas covers more miles and burns more fuel.

In partnership with the Ministry of Defence, NATS has a pioneering approach in the flexible use of airspace and at a technical level works jointly with them through the UK Airspace Management Cell (AMC). Wherever possible this clears the way for civilian aircraft to use areas normally closed to them.

In the last year, the combination of this approach and route management has saved tens of thousands of tonnes of fuel and CO₂ emissions.

The ATC Procedures Team is responsible for the maintenance of safe, effective and efficient air traffic control procedures and the maintenance of the airspace and its sectors.

Further opportunities for environmental efficiency exist for more flexibility to vary speed, flight levels and sector organisation.

What this means for me:

Paul Turner, Pre-Tactical Planner, Network Management



Considering environmental impact is a fundamental part of our work. Our staff are well placed to take a view right across the UK network and we all understand we have a role to play in helping the airlines find an efficient way to fly through our complex airspace network.

One of the challenges is to adapt the way we work to the changing world that our customers are operating in. In 2008, the airlines have been influenced far more by fuel costs than ever before.

We've seen more focus on fuel efficiency and shorter routes and the balance between on-time departure and additional fuel cost has shifted. Airlines are prepared to accept more ground delay before considering re-routes with additional fuel burn.

As a Pre-Tactical Planner, I consider the environmental impact of my actions every day and try to use traffic management measures that will have the lowest impact in terms of fuel burn or extra route mileage.

For example Network Management and Airspace Management Cell (AMC) staff, with the co-operation of military colleagues, have provided the most direct routeings available for Christmas flights from the UK to Lapland.

In addition, buffer times applied on the opening and closing of military danger areas to civilian traffic have been reduced – safely – to increase the availability of short-cut routes.

The AMC has also worked with NATS Customer Affairs to encourage airline operators to make maximum use of these routes.

We've started work on assessing the environmental impact of all the "scenarios" we use including re-routes, level caps and options at the interface of the North Atlantic oceanic airspace and European domestic airspace.

Technology

Air traffic control relies heavily on advanced communication, surveillance and navigation technology to ensure the safe and efficient movement of aircraft.

NATS invests heavily in research and development of tools, systems and procedures to improve the service for airspace users. Many of these improvements also help improve environmental efficiency by enabling aircraft to fly closer to their optimum profile, minimise interaction with other traffic flows and regulate speeds and level changes.

Precision area navigation, arrivals manager, airport ground operations information tools and iFACTS are just some of the technological innovations coming on stream in the short-term. From 2015 onwards, it is expected that further innovations will cut more deeply into NATS' CO₂ emissions.



TECHNOLOGY

What this means for me:

Bob McPike, Head of Oceanic Systems Development



For me, the NATS brand value of “Acting Responsibly” sums up what has to be the foundation of our approach to living on this planet.

We do not own this world, but we have the great privilege of living in it, and that brings with it the responsibility to nurture it and pass it on to our children and grandchildren in the same way we would want to pass on any priceless legacy.

I have been a NATS engineer for 35 years and for most of that time, I’m sorry to say we, along with all other industries, simply viewed the environment as a tool to be used or a challenge to be overcome.

I’m glad that view has now almost completely disappeared from within NATS and has been replaced by a widespread consciousness of our broader responsibilities.

For me this means ensuring the wide open skies over the North Atlantic are used wisely and effectively, not only to ensure that we minimise fuel burn in this airspace, but that we better integrate it with the congested airspace over mainland Europe, to assist our air traffic control colleagues there in eliminating holding and unnecessary manoeuvring of traffic.

My team is working on technological tools to optimise the way oceanic tracks interface with domestic airspace. If we apply our undoubted skills and knowledge wisely, this is a perfectly achievable objective which will pave the way for other improvements in areas far beyond those for which we are immediately responsible.

The prize we are working towards is one from which everyone benefits – passengers will enjoy more timely arrivals, our airline customers will enjoy reduced costs and most importantly of all we will have made a major step towards turning the air transport industry into a sustainable and responsible contributor to our national economy.

Innovation

NATS has a strong track record of innovation to develop bespoke solutions to a range of air traffic related challenges and now, for environmental improvement.

The work underpinning this document is pioneering in its approach and scope and there is a realisation that the momentum must continue – especially when the point is reached for decision-making between environmental or business trade-offs.

The company will also continue to work with independent research groups to validate and stretch the scale of its environmental expertise.

INNOVATION

What this means for me:

Steve Hammond, Senior Research Analyst



Innovation is a cornerstone of everything we do in Operational Analysis. A mathematician by training, my work in developing a bespoke emissions analysis tool has been a great opportunity to apply maths theory to problem solving for environmental efficiency.

Over the last two years, our team of environmental experts has developed and established NATS as a leader in the field of air traffic management environmental research and assessment.

The importance of environmental issues within the company and the desire to capture the benefits of all the quick wins we've delivered has also led to a huge increase in demand for our work.

In the short term, our focus is to roll out our newly developed flight efficiency measures, refine our approach to emissions assessment and to re-run the baseline emissions assessment every year to check progress towards our target.

We'll need to understand the trade-offs that are regularly made not only between environmental factors such as noise, emissions and visual impact, but also between capacity and cost whilst also considering the environment.

This will be necessary to allow NATS' performance to be optimised to meet the needs of our customers, regulator and the general public. New methods of visualising these trade-offs will need to be developed to enable better-informed decisions to be made at the highest levels throughout the business.

In NATS, our ability to innovate to meet these challenges means I'm confident that we'll move forward significantly, with greater understanding not only of the performance of our ATC system but also of our ability to influence this and achieve the outcomes we want to see.

Partnership

NATS can do none of this work alone. Its customers, the airlines, will be working closely with NATS to deliver the environmental performance improvement promised.

Cutting emissions and saving fuel are vital to the business health of air carriers. Airports, too, are committed to reducing their environmental impact and NATS' plan will be in service of their objectives.

In the short-term, we will see fuel saving initiatives that can be achieved solely by NATS. Partnership with airlines, airports, our regulator, government, other air traffic organisations and communities will become increasingly important in helping make progress on some of the more challenging areas such as how to manage a changing number of aircraft with a fixed number of runways and within defined scheduling flight planning arrangements.



PARTNERSHIP

What this means for me:

Andy Shand, General Manager, Customer Affairs



Environment is becoming part of our day to day conversations with airlines. Emissions are recognised as affecting sustainability and growth. More recently the issue has also been around fuel burn because of price rises and the economic downturn.

The airlines are very willing to engage about opportunities to reduce emissions and fuel burn and this was the major topic of discussions at an airline flight operations directors' meeting in 2008.

Our customers are looking to NATS to help provide solutions in addition to their own activity on operational procedures and investment in newer, more efficient aircraft.

They are also working with us to develop ways of measuring flight efficiency that may be included in business reporting in the lead-up to our regulatory Control Period 3 (April 2011 to March 2016), which determines what we can charge customers for that period.

In the near term, we have opportunities to improve tactically. For instance, do we need to keep an aircraft to accepted flight levels at periods of low traffic demand? Can we realise early benefits from arrivals management?

These are just two ideas and no one knows the operation better than the ATCOs and the pilots so let's try and use that experience in our discussions through the Operational Partnership Agreement (OPA) and Safety Partnership Agreement (SPA) to identify more near term opportunities.

In the longer term, we have the scope to optimise our airspace design to take into account new tools and make the most of the aircraft capability in the way they depart.

There are a number of challenges not least of which will be our collective ability to successfully implement change and realise the benefits. For that to happen, everyone needs to pull together.

What this means for me:

Lawrence Hoskins, Chief Executive, NATS Services Ltd



Controlling aircraft at Britain's busiest airports, on the ground, on take-off and on approach means NATS Services Limited (NSL) will be playing a significant part in the overall drive for a 10% reduction in CO₂.

Not only are we working in a commercially competitive arena in what is arguably the globe's premier trade network, but also in a market coming under fierce economic pressure.

Our customers are telling us that, while they will always want value for money, they also want us to innovate and develop new strategies for conserving fuel, creating greater efficiency and reducing emissions and noise.

NSL's airport collaborative decision-making tool is helping to do this; giving real-time data to all airport partners on one web-page, on a mobile phone or computer screen.

It means managers can refine their timings and ensure airfield operations are run as environmentally efficiently and economically as possible. Aircraft can be held on the ground, engines off, instead of firing up at a nominal slot time which may have changed.

NSL's controllers will also be building on the expertise developed in NATS en-route business to maximise the use of continuous descent approaches wherever possible at the airports where NATS provides a control service, helping ensure emissions and noise pollution are kept to an absolute minimum.

These two examples alone significantly contribute to NSL's part in the drive to cut emissions. Further development with our airport stakeholders will realise additional environmental benefits.

What this means for me:

Ian Jopson, Head of Environment and Community Affairs



The focus for us and our customers at the moment is not only on weathering the economic downturn but also the need to take a responsible attitude to our environmental impact as an industry.

There is no doubt now that climate change is a key issue for aviation and I'm delighted to be part of an organisation that is putting environmental issues at the core of its thinking. This is vital for the industry in terms of establishing a sustainable future now and, importantly, when the economy begins to recover.

NATS has, for several years, been at the cutting edge of understanding and delivering environmental improvements to our service.

Last year we helped our customers achieve 70,000 tonnes of CO₂ savings through tactical measures to reduce route length and make better use of the airspace. But if we're to achieve the target of 10% reduction out to 2020, we need a more strategic plan. And that's what we're committing to deliver.

Much of the policy and regulation relating to air traffic management and its environmental impact is now set at European and global level and it's important to be an active voice in this debate.

In Europe, I work closely with Eurocontrol on SESAR's environmental programme and with the European Commission to define environmental best practice in air traffic management.

At global level, my participation on the International Civil Aviation Organisation's environment committee on behalf of air traffic's world body, CANSO, is crucial to ensuring our sector plays its part.

Our plan is for UK airspace but we are part of a global network. It's only by collaborating with our international partners that, in airspace across the world, aircraft are controlled in the most environmentally responsible way.

The main aim of this report is to set out how NATS plans to tackle the emissions which result from its core operation – controlling aircraft safely and efficiently. While this may mean operational eyes are fixed firmly on the sky it must also mean how the company affects the environment and our neighbours on the ground. How do we manage our day-to-day activities and could we do it better? Are our buildings efficient and do we work in them in a smart manner? How well do we integrate with the communities where we live and work? In seeking to be a progressive business, we are working on finding the answers to these questions.

NATS has pledged that its estate will be carbon-neutral by 2011. Set against the ambition of our ATM CO₂ target, this may seem almost incidental but we believe that, if we are to convince our industry partners to help us take the big steps, we must make sure our own house is in order.

NATS owns or runs 168 facilities and secure and plentiful power supplies are needed to run operations 24-hours a day, 365 days of the year. Radar, computer systems, heating, cooling and lighting mean we consume more than the average office.

Initiatives such as car-sharing and cycling, to waste-sorting and recycling, a lighter touch on the thermostat and even solar power and rainwater harvesting to help us run our buildings more efficiently. These are some of the small reductions which add up to significant savings.

Having done all we can to reduce our impact, we will continue to search for alternative sources of energy to reduce our dependence on fossil fuels and offset what carbon remains.

Fostering community ties

Acting responsibly can also be felt beyond reducing carbon production. Responsible businesses foster meaningful relationships with the communities in which their people live and work. At NATS, the emphasis is on forging ties with communities and organisations near our centres, airport towers and radar stations and sites.

In April 2008, we introduced a social responsibility fund to help encourage and support our staff to make these connections. Since its launch, many charities have benefited across the UK.

We aim to give more than money by encouraging, wherever possible, our employees to make a personal connection. This has meant many giving up their own time, for example, to redecorate rooms at a respite care centre, clearing beaches of litter and digging allotments for underprivileged youngsters to grow their own vegetables.

We have joined Business In The Community, an organisation which promotes links between businesses and community programmes. As one of the largest private employers in Hampshire and Ayrshire, and with a presence right across the UK, we believe we can do more to help and will report regularly on our progress.

This is our first air traffic environment update. Our commitment is to provide these on a regular basis.

In 2009 we will continue the drive to engage our staff and external partners in helping to deliver this plan. Some of our immediate priorities are to:

- Expand environmental awareness within our air traffic operation.
- Identify priority areas for improvement across our route network and plan how to address them.
- Continue to deliver emissions benefits now as well as planning for the delivery of longer term opportunities.

THE NATS ENVIRONMENT TEAM



Rachael Reid
Director Corporate,
Customer &
Environmental Affairs



Ian Jopson
Environment &
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James Deeley
Environment &
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Carrie Harris
Environment &
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Karen Caton
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Patrick Horwood
Communications



Hellen Foster
Operational Analysis



Kathryn Walker
Operational Analysis



Steve Hammond
Operational Analysis

- Fully embed environment into our business decision making processes and test this through an annual cycle of business planning and performance reporting.
- Quantify our emissions performance in 2007 and 2008 and complete the emissions assessment of our improvement projects to enable us to track progress towards our target.
- Engage and work with our external partners to add content and focus to the partnership element of our plan.

Get involved

There are opportunities for everyone to contribute to reaching our environment targets so please consider your own role, and how you may be able to encourage others.

We want you to be a part of an exceptional change in the way we run our business. Do get involved; do get in touch. We look forward to hearing from you.

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