



Addressing Climate Change by Promoting
Low Carbon Climate Resilient Development
in the UK Overseas Territories

Needs Assessment:
British Antarctic Territory

Department for International Development

July 2012

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Background and Purpose

Introduction

This report forms one of a suite of 16 individual needs assessments of the UK Overseas Territories (UKOTs) produced as part of the process of developing a DFID/FCO led cross HMG programme design to address climate change by promoting low carbon climate resilient development in the UKOTs. The purpose of this assignment was to identify the scope and best way to deliver an appropriate climate change programme for all UK OTs and develop a business case for it (contract duration Feb – June 2012).

The purpose of the reports was to provide a rapid synthesis of information contained within available documentation and frame this in a way which: helped to establish a clear rationale for a generic framework forming one business case for the UK OTs but not allowing this to exclude targeted and selective action to meet specific needs. They were also designed to provide an evidence base for the later comparative analysis across OTs and subsequent prioritisation of different approaches for the business case, which was going to be designed later in the consultancy

It was agreed in May 2012 by the client and the consulting team that the contract was not fully deliverable as expressed in the original Terms of Reference. Details of the full programme of work and consultation is available in the project Inception Report (29th March 2012) and End of Contract Report (11th June 2012).

These reports now form a standalone output of the abbreviated consultancy.

The Reports

The original purpose of the reports still holds and the reader should recognise that the design and level of analysis in this report was set to be achievable within the time available (2 days of evidence gathering, research and writing against over 150 specific data points) and for the original purposes specified and no other. This report provides a general overview to facilitate future potential decision making and does not constitute a comprehensive nor in-depth analytical climate change report. This is especially true in this particular case; the British Antarctic Territory is at the heart of UK climate science research and this report offers a snap shot of the wide range of work undertaken.

In a process facilitated by the UK Overseas Territories Association, data content in this report has been reviewed by in-country stakeholders via a nominated point of contact, with feedback incorporated if appropriate.

The report is tailored to the data points required to complete a climate change vulnerability matrix (VAM) tool. The VAM is structured around an understanding of four main issues: the exposure of an OT to climate change (threat analysis); adaptation and resilience; low carbon development and UK exposure. Each issue contains a number of subsets and indicators.

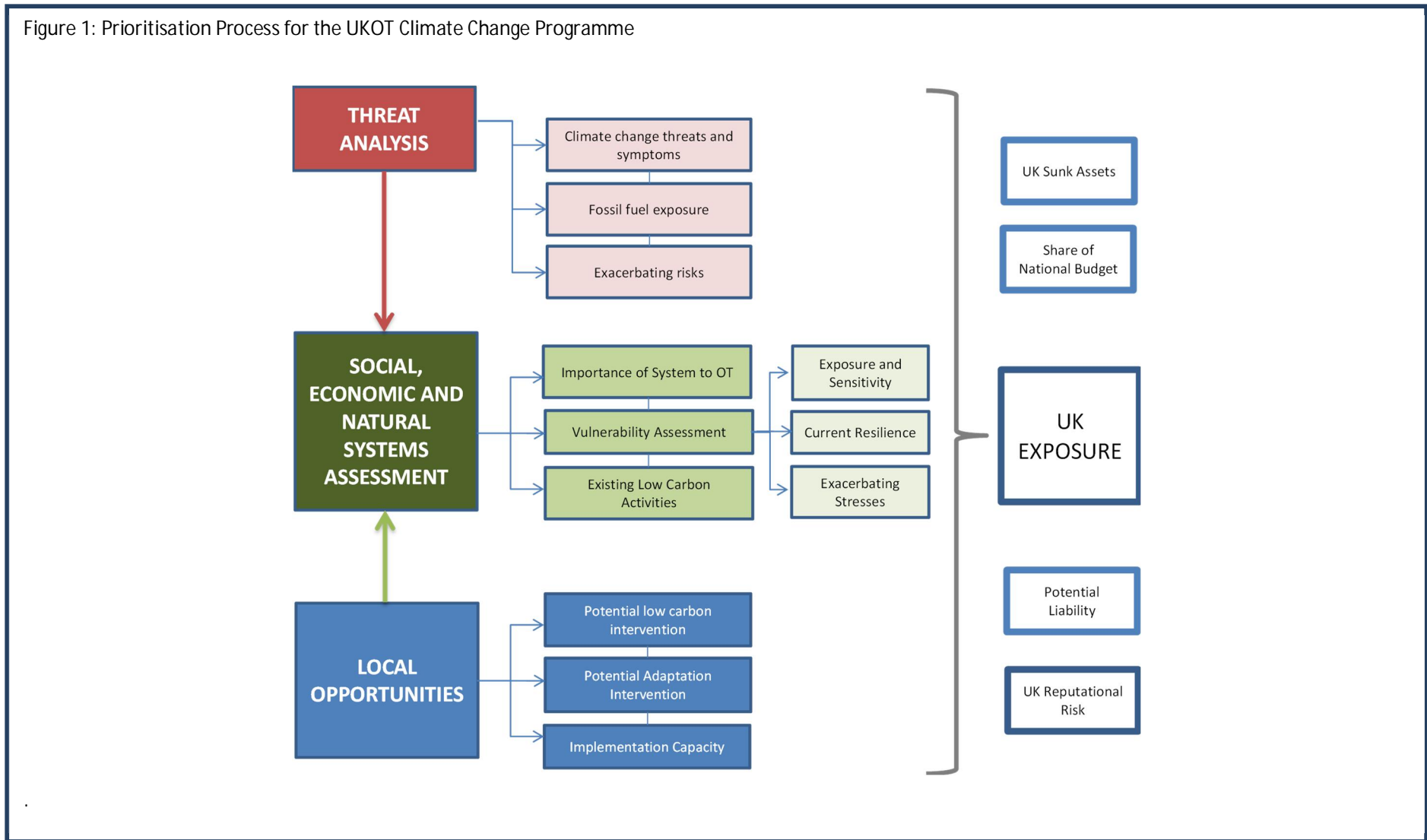
The completed VAM in this report uses a RAG colour coding system to provide a comparative analysis across all of the OTs to feed into the overall programme design. In most cases, data has been included specifically for the later appraisal and business case design process which would have followed.

Attached as annexes to this report are: an associated glossary of terms; a climate change VAM system definitions list; the VAM scoring system (which feeds into the coloured squares in the report text); the scored OT VAM; an initial programme approach table with preliminary sectoral and geographical analysis; and, if relevant, a greenhouse gas emission table.

Figure 1 overleaf illustrates how the data points in the VAM and in this report would have fed into the prioritisation process for a potential UKOT Climate Change Programme and DFID Business Case.

For a full understanding of how the data in this report and the VAM framework has been used, the reader is directed to the programme approaches which are elaborated in the programme Inception Report.

Figure 1: Prioritisation Process for the UKOT Climate Change Programme



Needs Assessment: British Antarctic Territory



KEY INDICATORS

Population:	Maximum 200 (staff).
GDP (\$):	N.A.
Per Capita GDP (\$):	N.A.
ODA Entitled:	No.
UK Annual Budget Support:	0
Value of UK Sunk Assets:	N.A.
Key Economic Sectors:	Scientific research; tourism

Threat Exposure Analysis

Climate Change Exposure

Climate models project significant surface warming over Antarctica to 2100, by 0.34°C/decade over land and grounded ice sheets, within a range from 0.14 to 0.5°C/decade. Despite this change, the surface temperature by 2100 will remain well below freezing over most of Antarctica and will not contribute to melting inland. Model outputs suggest that the snowfall over the continent may increase by 20% compared to current values. Model calculations suggest that deep waters may warm by 0.25°C by 2100. Models suggest that the annual average total sea-ice area will decrease by 2.6×10^6 km², or a significant 33%. The current generation of climate model are not able to provide a precise regional picture of the changes to be expected. It is likely that there will be a reduction in permafrost area, accompanied by subsidence of ground surface and associated mass movements.¹

Surface temperature trends are showing significant warming across the Antarctic Peninsula from the early 1950s: +1.03°C per decade from 1950 – 2006 in winter. Fewer, yet more intense, cyclones have been registered in recent years in the Antarctic coastal zone between 60-70°S. West Antarctica has warmed by about 0.1°C/decade, especially in winter and spring. Snowfall has increased on the western side of the Peninsula. Warming has caused the retreat of ice shelves on both sides of the Peninsula and 212 (87%) marine glaciers in the Peninsula have shown overall retreat since 1953. On Signy Island, ice cover has reduced by around 40%. Between 1990s-2000s the global sea level rose at a rate of 3 mm per year or more but the rate has since slowed to 2.5 mm/yr. The water temperature of the Antarctic Circumpolar Current has increased by 0.06°C/decade at depths between 300 – 1000 m over the 1960s to 2000s, and by 0.09°C/decade since the 1980s. From 1991 to 2007 the concentration of CO₂ in the ocean increased.²

¹ Turner, J. et al., 2009. Ibid.

² Turner, J. et al., 2009. *Antarctic Climate Change and the Environment*. Cambridge, UK: Scientific Committee on Antarctic Research, Scott Polar Research Institute

Resource Exposure



Although there is no permanent population on British Antarctic Territory (BAT), British Antarctic Survey (BAS) have up to 450 staff in the region. BAS activities currently use hydrocarbon fossil fuels as their main source of energy; from heating and lighting Antarctic stations to powering ships, aircraft, electricity generators and scientific equipment.³ Energy consumption estimates are not available.⁴

Two solar heating systems have recently been installed at Rothera and Signy Research stations. In Rothera the system is expected to save over 1000 litres of fuel each year, whereas in Signy it should reduce heating energy requirements by more than 30%.⁵

Water supply and use data was not available.

Adaptation and Resilience

Importance to OT

Importance of System to OT



Natural Systems: The BAT is a unique environment and a relatively pristine wilderness, home to numerous species of fauna, from higher predators such as Killer Whales and Leopard Seals, through Emperor penguins and albatrosses to smaller species such as krill.⁶ Terrestrial biodiversity in the BAT is very limited but one of the higher insect species (the chironomid *Belgica antarctica*) is endemic to the Antarctic Peninsula and South Shetland Islands. In contrast with terrestrial ecosystems, marine diversity is particularly rich with several species of marine birds that forage in the near shore and offshore waters and use ice-free islands and coastal areas as nesting grounds. Penguins and petrels are the most common birds. There are also several species of whale and seal, which take advantage of the fish and plankton-rich waters.⁷

Economic Systems: Income is generated from three primary sources: the sales of stamps and coins both via Port Lockroy and direct to global collectors; income tax (7%) paid by overwintering scientists and investment income on capital reserves. Total income in 2010-11 was £201,145. Tourism has grown over the years, reaching a peak of 46,265 in the 2007/8 season. The vast majority of this tourism takes place within the Antarctic Peninsula.⁸

Total expenditure for 2010-11 was £274,066. A small proportion of expenditure is used to finance the governance of the territory but the majority provides for a range of special projects to underpin good governance and meet the strategic objectives.

Social Systems: There is no permanent population on BAT.

³British Antarctic Survey, 2011. *Energy use and Carbon Management*. [Online] Available at: www.antarctica.ac.uk/about_antarctica/environment/energy/index.php [Accessed on 23 March 2012].

⁴British Antarctic Survey, 2011. *Energy and Technology at BAS*. [Online] Available at: www.antarctica.ac.uk/about_antarctica/environment/energy/technology.php [Accessed on 23 March 2012].

⁵British Antarctic Survey, 2011. *Energy and Technology at BAS*. [Online] Available at: www.antarctica.ac.uk/about_antarctica/environment/energy/technology.php [Accessed on 23 March 2012].

⁶ British Antarctic Territory, 2011. *Environment* [Online] Available at: <http://britishantarcticterritory.fco.gov.uk/en/environment> [Accessed on 23 July 2012].

⁷British Antarctic Territory, 2011. *British Antarctic Territory Research and Discover - Environment*. [Online] Available at: <http://britishantarcticterritory.fco.gov.uk/en/environment/> [Accessed on 24 March 2012].

⁸ British Antarctic Territory, 2011. *British Antarctic Territory Research and Discover - Tourism*. [Online] Available at: <http://britishantarcticterritory.fco.gov.uk/en/tourism/> [Accessed on 20 March 2012].

Vulnerability

Sensitivity to Climate Exposure

Climate warming has already encouraged the growth and spreading of established plants, such as *Deschampsia Antarctica* and *Colobanthus Quitensis*, and increased the establishment of seedlings. Changes in temperature and precipitation have also increased biological production in lakes: with some lakes becoming more saline due to drier conditions. In the past 50 years a decline in krill stocks in some areas, in others an increase in phytoplankton and a southward shift in the population of gelatinous salps have been recorded. All sea-ice related components of the pelagic Antarctic ecosystem have experienced consequences of the regional decrease of sea ice west of the Antarctic Peninsula. An increase of snowfall on the western side of the Peninsula has been linked to decreases in Adélie penguin populations, which prefer snow-free nesting habitat.⁹

An increase in the frequency and intensity of freeze–thaw events could exceed the tolerance limits of many arthropods. With increases in temperature, many terrestrial species may exhibit faster metabolic rates, shorter life cycles and local expansion of populations. Even subtle changes in temperature, precipitation and wind speed could probably alter the catchment of lakes, and the time, depth and extent of lake surface ice cover, water volume and chemistry, with resulting effects on lake ecosystems. Warming also increases the likelihood of invasion by more competitive alien species. If the sea-ice cover continues to decrease, marine ice algae will begin to disappear due to loss of habitat, which may cause a cascade through higher trophic levels in the food web. If surface ocean pH levels become more acid by 0.2 to 0.3 units by 2100 it seems likely that there will be some thinning of the aragonite skeletons of the pteropods that are an important part of the plankton at the base of the food chain; also benthic calcifiers such as corals are potentially threatened.¹⁰

Species such as fur seals are likely to respond most to changes in extreme climate events. A significant decline in sea ice is likely to affect the populations of Emperor penguins and other ice-dependent species, and may lead to true Antarctic species being displaced by immigrating sub-Antarctic species. The reduction in permafrost area implies risks to infrastructure behaviour of organisms.¹¹

The West Antarctic Peninsula (WAP) is an area of recent rapid regional warming and ice loss, and research has provided the early evidence of regional climate warming affecting marine animals living on the Southern Ocean seabed. The research has shown that a significant increase in the frequency of icebergs pounding the shallow seafloor around WAP, as a result of shrinking winter sea ice, has caused the life expectancy of a tiny marine creature (bryozoans) to halve over the last 12 years.¹²

Other research has shown that while Antarctic marine animals can survive short term increases in temperature (over a period of days) but cannot acclimate to longer term increases (over months or years).¹³

Current Resilience Activities

There are twenty-six Antarctic Specially Protected Areas in BAT, in addition to Antarctica's first ever Marine Protected Area. The BAT Government has directly funded a wide range of environmental projects which have contributed towards the protection of biodiversity. Previous projects include production of a Wildlife Awareness Manual, development of a "toolkit" to aid and facilitate management of marine protected areas, a DNA survey to assess distribution of penguin colonies and the impacts of climate change, identification of important bird areas in the Antarctic Peninsula, and identification and development of Marine Protected Areas around the BAT. Finally, the *Polar Science for Planet Earth* programme is in place. It includes six programmes: Chemistry and Past Climate, Climate, Ecosystems, Environmental Change and Evolution, Ice Sheets and Polar

⁹ Turner, J. et al., 2009. *Op cit.*

¹⁰ Turner, J. et al., 2009. *Op cit.*

¹¹ Turner, J. et al., 2009. *Op cit.*

¹² Barnes, David K.A.; Souster, Terri. 2011 *Reduced survival of Antarctic benthos linked to climate-induced iceberg scouring*. Nature Climate Change, 1 (7). 365-368. 10.1038/nclimate1232

¹³ Peck, L.S., Morley, S.A., Portner, H.O., and Clark, M.S., 2007. *Thermal limits of burrowing capacity are linked to oxygen availability and size in the Antarctic clam Laternula elliptica*. Oecologia, 154, No. 3, 479–484.

Oceans. Each programme is funded by a range of Natural Environment Research Council (NERC) core funding and external research funding.¹⁴

The UK has enacted domestic legislation to enforce the provisions of the *Protocol for Environmental Protection to the Antarctic Treaty* through the *Antarctic Act 1994*, which introduced a very tough environmental protection regime.¹⁵ The Protocol establishes a framework for the comprehensive protection of Antarctica, including: a complete ban on all commercial mining; a mechanism to ensure that the environmental impact of all activities undertaken in Antarctica is considered and mitigated as far as practicable; comprehensive protection of Antarctic plants and animals; stringent waste management procedures; and the prevention of marine pollution; and a system to protect the most sensitive and scientifically important areas of Antarctica.¹⁶

Current activities in the sectors of hydrology and water resources and energy supply and use are reported under 'Current Abatement Activities.'

Exacerbating Stresses

Given the slow rates of growth and high degree of endemism in Antarctic species, expanded tourism and scientific activity associated with the effects of climate change may lead to the wider establishment of non-indigenous species by 2100, and consequent reduction or extinction of some locally endemic species.¹⁷ Invasive alien species are considered one of the most significant threats to the unique biodiversity of Antarctica: significantly 70,000 seeds are brought into the continent by tourists and scientists each year.¹⁸

Future Opportunities

Potential Adaptation Interventions

Strengthening environmental management is one way of adopting an eco-systems-based approach to adaptation.

According to the *British Antarctic Territory Strategy Paper 2011 – 2013*,¹⁹ the Territory will seek to commission and support a range of projects across four priority areas every year, including environmental protection and minimising human impacts. Activities promoted include: development of a better understanding of the BAT environment; development and implementation of best Antarctic environmental practices, including an environmental strategy; enhancement of UK expertise on tourism management and minimising human impacts; identification of rare flora and fauna and/or special areas across the BAT and development of protection and conservation measures; proactive management of key Protected Areas in the Territory; identification of future environmental challenges and development of mitigation measures.

The continuation of a research programme aiming at mapping the distribution of emperor penguin breeding colonies through high resolution satellite imagery has already been funded, partially by FCO.²⁰

The implementation of any potential adaptation interventions would have to be undertaken sensitively due to the completing claims to the territory.

¹⁴British Antarctic Survey, 2011. *Polar Science for Planet Earth Programmes*. [Online] Available at: www.antarctica.ac.uk/bas_research/our_research/current/programmes/index.php [Accessed on 20 March 2012].

¹⁵British Antarctic Survey, 2011. *Environmental Policy and Management*. [Online] Available at: www.antarctica.ac.uk/about_antarctica/environment/bas/index.php [Accessed on 20 March 2012].

¹⁶FCO (Undated), found at <http://britishantarcticterritory.fco.gov.uk/en/governance/antarctic-treat> [accessed 23 July 2012]

¹⁷Turner, J. et al., 2009. *Op cit*.

¹⁸British Ecological Society, 2011. *Ecology and Policy Blog*. [Online] Available at: <http://britishecologicalsociety.org/blog/blog/2012/03/06/invasion-of-antarctica/> [Accessed on 24 March 2012]. Source Paper: Chown, S. L. et al., 2012 *Continent-wide risk assessment for the establishment of nonindigenous species in Antarctica*. [Online] Available at: [Chown et al., \(2012\) Continent-wide risk assessment for the establishment on nonindigenous species in Antarctica. PNAS](#)

¹⁹British Antarctic Territory, 2010. *British Antarctic Territory Strategy Paper 2011 – 2013*. Available online at: www.publications.parliament.uk/pa/cm200809/cmhansrd/cm091019/text/91019w0007.htm [Accessed on 24 March 2012].

²⁰British Antarctic Territory, 2010. *British Antarctic Territory Strategy Paper 2011 – 2013*. [Online] Available at: www.publications.parliament.uk/pa/cm200809/cmhansrd/cm091019/text/91019w0007.htm

Implementation Capacity

BAS has been operating in the BAT for over 60 years undertaking the majority of British science regarding the Antarctic and provides a significant repository of high quality climate related data and research. BAS employs over 450 staff and operates five research stations in and around Antarctica. Typically, over 250 personnel visit Antarctica during the summer, but this drops to only around 30 during the Antarctic winter. Two Royal Research Ships, the Ernest Shackleton and James Clark Ross support the work of the stations, providing resupply and re-staffing logistics as well as carrying out scientific research. A fleet of five aircraft is also based at Rothera Research Station during the summer.²¹ BAS's operational structure has two science groups and three support divisions.²²

Funds have been assigned from FCO for the continuation of a research programme aiming at mapping the distribution of emperor penguin breeding colonies and the effect of climate change on their future population levels in BAT.²³

Low Carbon Development (Source)

Current Emissions

Share of Current Emissions

BAT is not covered by the UK GHG Inventory.

GHG Abatement

Abatement Potential

The *British Antarctic Survey's Carbon Reduction Strategy* includes targets for reductions in carbon emissions. Energy use and carbon emissions from BAS stations in Antarctica will be reduced by 20% and from BAS ships by 5% by 2012.²⁴

Current Abatement Activities

Solar heating systems have been installed at Rothera and Signy Research Stations, as part of the *British Antarctic Survey's Carbon Reduction Strategy*. At Rothera, the system of 36 solar panels for solar heating reduces the amount of heat that oil fired boilers need to produce, saving over 1000 litres of fuel each year. Signy has smaller solar heating systems that heat hot water for showers and sinks. These systems are expected to reduce heating energy requirements by more than 30%.²⁵

Other abatement activities conducted in recent years at research stations have included: introduction of sub-metering for more effective monitoring of energy consumption; reduction in the use of electric heating units; introduction of more efficient reverse osmosis plants for water; introduction of LCD screen monitors; removal of inefficient lighting and introduction of water saving flow reduction valves to showers.²⁶

²¹British Antarctic Territory, 2011. *British Antarctic Territory Research and Discover - Science*. [Online] Available at: <http://britishantarcticterritory.fco.gov.uk/en/science/> [Accessed on 20 March 2012].

²²British Antarctic Survey, 2009. *Participants' Handbook - A guide to going south with British Antarctic Survey*. Cambridge: Natural Environment Research Council

²³Parliament, 2012. *Commons Debate*. [Online] Available at: www.publications.parliament.uk/pa/cm200809/cmhansrd/cm091019/text/91019w0007.htm [Accessed: 24 March 2012].

²⁴British Antarctic Survey, 2011. *Carbon reduction Strategy*. [Online] Available at: www.antarctica.ac.uk/about_antarctica/environment/energy/carbon_reduction_strategy.php [Accessed: 22 March 2012].

²⁵British Antarctic Survey, 2011. *Energy and Technology at BAS*. [Online] Available at: www.antarctica.ac.uk/about_antarctica/environment/energy/technology.php [Accessed: 21 March 2012].

²⁶British Antarctic Survey, 2011. *Energy and Technology at BAS*. [Online] Available at:

All infrastructure (facilities, equipment, vehicles, boats etc.) built after 2001 are constructed with best practice in low energy design, these include: enhanced insulations, heat recovery systems and highly insulated windows. They are also designed in order to allow future renewable technologies to be easily retrofitted.²⁷

Recently, the International Maritime Organisation has banned the use of heavy grade fuels by passenger or cargo ships in the Antarctic region.²⁸

Future Opportunities

Potential LCD Intervention

The *British Antarctic Survey's Carbon Reduction Strategy* foresees a series of actions that will be implemented: establishment of a carbon monitoring and reporting system; undertake energy studies to identify opportunities for further efficiencies; provide staff education and implement positive operational changes; implement a programme of energy and water efficiency technology changes; implement renewable and alternative energy technologies where applicable; and, establish research into new technology.²⁹

The Halley research station is in the process of being replaced by a new station (to become operational in 2012) that is being constructed to incorporate many energy efficiency features. A detailed feasibility study for large scale renewable energy installation for Rothera is on-going. The best opportunity for large-scale renewable is in Rothera where both a large wind turbine and solar photovoltaic array are possible. BAS is also undertaking a feasibility study into energy efficient retrofits that may be applicable to the two ships operated by BAS in the Antarctic and is considering the possibility of using unmanned aerial vehicles for airborne survey and other science work which will potentially save a considerable amount of fuel by reducing field and transport energy use.³⁰

Again, the implementation of any potential low carbon development interventions would have to be undertaken sensitively due to the completing claims to the territory.

Implementation Capacity

Science in the BAT has been undertaken on behalf of the UK by the British Antarctic Survey (BAS) for over 60 years. BAS employs over 450 staff and operates five research stations in and around Antarctica. Typically, over 250 personnel visit Antarctica during the summer, but this drops to only around 30 during the Antarctic winter. Two Royal Research Ships, the Ernest Shackleton and James Clark Ross support the work of the stations, providing resupply and re-staffing logistics as well as carrying out scientific research. A fleet of five aircraft is also based at Rothera Research Station during the summer.³¹ BAS's operational structure has two science groups and three support divisions.³²

The FCO's Polar Regions Unit also support a range of projects each year to underpin delivery of the strategic objectives of the BAT; these include projects which contribute to the environmental protection, education and outreach, heritage and governance of the Territory, and many of these are undertaken in partnership with BAS.³³

www.antarctica.ac.uk/about_antarctica/environment/energy/technology.php [Accessed: 21 March 2012].

²⁷British Antarctic Survey, 2011. *Energy and Technology at BAS*. [Online] Available at:

www.antarctica.ac.uk/about_antarctica/environment/energy/technology.php [Accessed: 21 March 2012].

²⁸UN, 2011. *New regulations to reduce marine pollution in Antarctic enter into force*, www.un.org/apps/news/story.asp?NewsID=39201 [Accessed 23 July 2012]

²⁹British Antarctic Survey, 2011. *Carbon reduction Strategy*. [Online] Available at:

www.antarctica.ac.uk/about_antarctica/environment/energy/carbon_reduction_strategy.php [Accessed: 22 March 2012].

³⁰British Antarctic Survey, 2011. *Energy Efficient Technology in the Antarctic*. [Online] Available at:

www.antarctica.ac.uk/about_antarctica/environment/energy/energy_efficient_technology.php [Accessed: 22 March 2012].

³¹British Antarctic Territory, 2011. *British Antarctic Territory Research and Discover – Science*. [Online] Available at:

<http://britishantarcticterritory.fco.gov.uk/en/science/>. [Accessed: 24 March 2012].

³²British Antarctic Survey, 2009. *Op cit*.

³³Hansard, 2009. House of Commons – Daily Hansard

www.publications.parliament.uk/pa/cm200809/cmhansrd/cm091019/text/91019w0007.htm [Accessed 23 July 2012]

Information on funds specifically addressed to low carbon activities is not available.

UK Exposure

UK Sunk Assets

BAS has three research stations within the BAT, two are permanently-manned, Rothera and Halley. In addition to this there is a summer-only research station, Signy. Rothera, the largest BAS Antarctic facility, includes a crushed rock runway, hanger and wharf. Halley is going to be replaced by Halley VI in 2012.³⁴

The value of these assets is unknown.

Absolute Value of UK Transfer

BAT is self-financing and generates revenue primarily from the sales of stamps and coins and from income tax of those stationed on the BAS bases. BAT receives no funding from the UK Government.³⁵ However, the FCO has an annual budget for the territory (in the form of staffing and other costs: £722,000 in 2005-2006.³⁶

Share of National Budget from UK Transfer

BAT is not directly supported by the UK Government.

Potential Liability

Under the umbrella of the *Antarctic Treaty*, further Conventions and Protocols have been developed to address the issues of Antarctic resources and protection of the Antarctic environment: including the *Commission for the Conservation of Antarctic Marine Living Resources* (CCAMLR) and the *Environmental Protocol*.³⁷

BAT is among the signatories of the following multilateral environmental agreements:³⁸

- Basel Convention on the Control of Trans-boundary Movement of hazardous Wastes and Their Disposal;
- Agreement on the Conservation of Albatrosses and Petrels (ACAP)
- Vienna Convention for the Protection of the Ozone Layer
- Montreal Protocol on Substances that Deplete the Ozone Layer

Reputational Risks

Under the terms of the *Antarctic Treaty*,³⁹ all territorial claims remain frozen, allowing the whole of Antarctica to be used as a continent for peace and science. Although the United Kingdom claims sovereignty over BAT (the region south of 60°S latitude and between longitudes 20°W and 80°W), there are overlapping claims by Argentina and Chile, which have the potential for significant future reputational risks.

³⁴British Antarctic Survey, 2009. *Ibidem*

³⁵British Antarctic Territory, 2011. *Economy and Strategy*. [Online] Available at: <http://britishantarcticterritory.fco.gov.uk/en/economystrategy/> [Accessed on 24 March 2012].

³⁶National Audit Office, 2007. *Foreign Commonwealth Office - Managing risk in the Overseas Territories*. London: The Stationary Office, page 29

³⁷ANON., 1959. *The Antarctic Treaty*. [Online] Available at: <http://britishantarcticterritory.fco.gov.uk/en/governance/antarctic-treaty/>. [Access on: 25 March 2012].

³⁸DEFRA, 2012. *The Environment in the United Kingdom's Overseas Territories: UK Government and Civil Society Support*. London, UK: DEFRA

³⁹Secretariat of the Antarctic Treaty, *The Protocol on Environmental Protection to the Antarctic Treaty* <http://www.ats.aq/e/ep.htm> [Accessed 23 July 2012]

Annex One: UKOT Climate Change Vulnerability Analysis Matrix
Glossary of Terms


UKOT Climate Change Vulnerability Analysis Matrix Glossary of Terms

Abatement Potential	(Cost effective) technical potential for reducing emissions within sector.
Absolute GHG Emissions	Annual amount of greenhouse gases (GHG) produced by an Overseas Territory. It is measured as metric tonnes of CO ₂ generated per year.
Absolute Value of UK Transfer	Total amount of funding from UK to an Overseas Territory per year.
Adaptation	The extent to which existing initiatives and measures (projects and programmes) are expected to reduce the vulnerability of natural and human systems against actual or expected climate change effects.
Adaptive Capacity	The ability of a social or natural system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change.
Carbon sink	A natural or artificial reservoir that accumulates and stores some carbon-containing chemical compound for an indefinite period. Natural: Absorption of carbon dioxide by the oceans via physicochemical and biological processes and photosynthesis by terrestrial plants. Artificial: include landfill and carbon capture and storage.
Climate Change	A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.
Climate Change Impact	Consequences of climate change on social, economic and natural systems without considering adaptation.
Climate Change Exposure	The change in climate with a potential adverse effect on social, economic and natural systems.
Current Abatement Activities	Any action that reduces the emissions or emissions intensity (per unit output) of a given sector on-going or completed in UK Overseas Territories as of March 2012.
Current Resilience Activities	Resilience activities on-going or completed in UK Overseas Territories as of March 2012.
Energy Efficiency	Ratio of energy output of a conversion process or of a system to its energy input: measures taken to reduce demand for energy for the same projected level of development.
Energy Import Dependence	Percentage of energy imported from abroad by the single Overseas Territory.
Exacerbating Stresses	Natural or human factors which in isolation or combination have the potential to lead to a change in the severity or frequency of a climate change threat. This may include inter alia a natural hazard, an extreme weather event, social tension or conflict, demographic trends and population characteristics and institutional and/or societal capacity constraints.
Exposure	The sum of the character, magnitude and rate of climate change variation to which a system is influenced by.
Fossil Fuel Dependence	The percentage of total fuel consumption derived from carbon-based fuels from fossil carbon deposits (including coal, oil, and natural gas) and the percentage of that fuel that is imported.
Frequency and Severity	Occurrence and magnitude of an event in UK Overseas Territories.
Future Opportunities	A territory's ability to reduce greenhouse gas emissions or to enhance carbon sink (Potential LCD Intervention) coupled with its potential to plan adjustment interventions in response to the effects of climate change (Potential Adaptation Intervention).
GHG Abatement (Current)	Potential for reducing emissions within sector coupled with any action already in place that reduces the emissions or emissions intensity of a given sector.

Implementation Capacity	Current (March 2012) capacity to design, implement and monitor all related low carbon / adaptive capacity activities. This includes all current resource constraints (i.e. funding, local personnel capacity, lack of personnel, supportive infrastructure etc.) and opportunities.
Importance of system to OT	The value that society and people in an UK Overseas Territory place on the significance of impacts and vulnerabilities (see Vulnerability) on social, economic and natural systems.
Low Carbon Development (Source)	Actions which include making a contribution towards stabilising levels of CO ₂ and other greenhouse gases at a level that will avoid dangerous climate change, through cuts in emissions, demonstrate a high level of energy efficiency, use low-carbon energy sources and/or utilise and enhance carbon sinks.
Magnitude	The area or number of people likely to be affected as a proportion of total population or land area.
Potential Liability	Legal, Financial, Moral and Political exposure arising from the activities of the UK Overseas Territories. This includes UK commitments to legal treaties that extend to the OTs (e.g European Convention on Human Rights) and response to natural and man-made disasters and terrorist events.
Potential LCD Intervention	A territory's ability to reduce anthropogenic CO ₂ and other greenhouse gas emissions or to enhance carbon sinks, where ability refers to skills, competencies, fitness and proficiencies that a territory has attained and depends on technology, institutions, wealth, equity, infrastructure and information.
Potential Adaptation Interventions	The potential for a planned intervention which constitutes or contributes to an adjustment in natural, social or economic systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.
Reputational Risk	Reputation is defined as the social evaluation of the public towards HMG. Risk is the probability that a failure to act will produce harm to that reputation. This reputation may be defined in terms of the potential: loss of HMG ethical (moral) reputation for safe guardianship of its citizens) disruption or distortion of HMG relationship with its citizens in the OTs withdrawal of private sector investment in UK Overseas Territories (investor flight).
Resilience	The ability of a social or natural system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change.
Resource Exposure	Degree at which a system is influenced by a variation in the availability or the price of resources (specifically water and energy).
Resource Use Efficiency	The effective use of energy and water resources – limiting wastage and maximising usable resources.
Sensitivity to Climate Exposure	Affects the magnitude and/or rate of a climate related perturbation or stress and is the degree to which a system [exposure unit] is affected, either adversely or beneficially, by climate variability or climate change. The effect may be direct (e.g. a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise).
Share of Current Emissions	Percentage of OT's Absolute GHG Emissions generated by each sector.
Share of National Budget from UK Transfer	Percentage and amount (at 2011 prices) of the total Overseas Territory Budget which comes from HMG budgetary support.
System (Social, Economic and Natural)	A set of functionally inter-related elements subdivided into Natural (ecosystems and biodiversity) and Social and Economic (Human) elements.
Threat Exposure Analysis	Identification of the threats that may affect a system and evaluation of their frequency and severity.
UK Exposure	Risk to the UK arising from activities in the UK Overseas Territories. It includes UK Sunk Assets, Share of National Budget from UK Transfer, Potential Liability and Reputational Risk.

UK Sunk Assets	UK investments in physical infrastructure in the Overseas Territories which cannot be recovered.
Vulnerability	The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

Key:

 Voice reported in VAM

 Additional voice

Annex Two: UKOT Climate Change VAM Systems Definition

SOCIAL, ECONOMIC AND NATURAL SYSTEMS DEFINITIONS	
Biodiversity and Ecosystems (Marine and terrestrial)	<p>Ecosystems – A community of living (plants and animals) and non-living things (climate, landscape) which interact together and affect each other.</p> <p>Biodiversity – The variety of plant and animal life found in an ecosystem and the variation in their genetic makeup. It is a measure of the health of an ecosystem, with healthy ecosystems having greater variety and variation in plant and animal life than unhealthy ones.</p> <p><i>Source: Brown, 2008ⁱ</i></p>
Hydrology and Water resources	<p>Hydrology - The various systems that are involved in the hydrological cycle (water evaporation, atmospheric circulation of water vapour, cloud formation, precipitation, interception by plant life, land surface runoff, soil infiltrations, groundwater recharge, discharge into streams etc).</p> <p>Water resources – The availability of useful water, often a limiting factor for social and economic development. Sources include groundwater, rainwater and surface reservoirs or rivers.</p> <p><i>Source: Gray, 2010ⁱⁱ; Parry et al., 2007ⁱⁱⁱ</i></p>
Tourism	<p>Comprises the activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purpose</p> <p><i>Source: UNWTO, 2011^{iv}</i></p>
Transportation	<p>A system of conveying people, goods, etc., from one place to another.</p> <p>The definition includes water, air, and land transport.</p>
Agriculture and Fisheries	<p>Agriculture- The science or practise of cultivating the soil and rearing animals</p> <p>Fisheries – The occupation of catching or rearing fish</p>
Forestry	<p>All economic activities that mostly depend on the production of goods and services from forests including commercial activities that are dependent on the production of wood fibre. It also includes activities such as the commercial production and processing of non-wood forest products and the subsistence use of forest products</p> <p><i>Source: FAO, 2004^v</i></p>
Energy Supply and Use	<p>Energy supply - Extraction, conversion, and transportation of fuels and electricity to ultimate end use</p> <p>Energy use - The amount of fuels and electricity utilized during a period of time to provide a useful service such as heating, cooling, or transportation</p> <p><i>Source: Wilbanks et al., 2008^{vi}</i></p>
Industry and Commerce	<p>Industry - Industry includes manufacturing, mining, construction and related informal production activities. Other categories, such as transport, energy supply & demand and processing of forest products have been included in other sectors.</p> <p>Commerce – Commerce is the exchange or buying and selling of commodities. In our definition it includes trade, retail and other commercial activities.</p>
Human Health	<p>Human health includes physical, social and psychological well-being.</p> <p>Society – Society includes <i>infrastructures, human settlements</i> and <i>social issues</i>.</p> <p><i>Infrastructures</i> are systems designed to meet relatively general human needs, often through largely or entirely public utility-type institutions. <i>Infrastructures</i> for settlements and society include both ‘physical’ (sanitation and communication systems) and ‘institutional’ (shelter, health care, food supply, security and fire services and other forms of emergency protection). <i>Human settlements</i> comprise physical capital (buildings) where most of the world’s population live. <i>Social issues</i> include all the factors relating to human society and its members, concerning the way of life of the local population (livelihoods and welfare).</p> <p><i>Source: Parry et al., 2007</i></p>

HDI/ Livelihoods/ Poverty	<p>HDI (Human Development Index) - A summary composite index that measures a country's average achievements in three basic aspects of human development: longevity, knowledge, and a decent standard of living.</p> <p>Livelihoods - A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living.</p> <p>Poverty – A state or condition in which a person or community lacks the financial resources and essentials to enjoy a minimum standard of life and well-being that is considered acceptable in society.</p> <p><i>Source: Chambers and Conway, 1991^{vii}</i></p>
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Note: The sectors considered as potential sources of greenhouse gases in the Low Carbon Development section are the ones reported by Department of Energy and Climate Change, 2009^{viii}.

ⁱ Brown, N., 2008. *Climate Change in Overseas Territories: An Overview of the Science, Policy and You*, Peterborough, UK: Joint Nature Conservation Committee

ⁱⁱ Gray, G. A. L., 2010. *Montserrat National Climate Change Issue Paper*, Montserrat: Ministry of Agriculture, Land, Housing and the Environment

ⁱⁱⁱ Parry, M., Canziani, O. & Palutikof, J. P., 2007. *Climate Change 2007: Impacts, adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press.

^{iv} UNWTO, 2011. *World Tourism Organisation UNWTO*. [Online] Available at: <http://statistics.unwto.org/en>. [Accessed 12 03 2012].

^v FAO, 2004: Trends and Current Status of the Contribution of the Forestry Sector to National Economies, Rome: FAO, available on <http://www.fao.org/docrep/007/ad493e/ad493e05.htm>

^{vi} Wilbanks T. J. et al., 2008. *Effects of Climate Change on Energy Production and Use in the United States*, Washington, US: US Climate Change Science Programme

^{vii} Chambers, R., & Conway, G. (1991). *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century*. [Online] Available at: <http://www.smallstock.info/reference/IDS/dp296.pdf> [Accessed 28 03 2012].

^{viii} Department of Energy and Climate Change, 2009. *5NC - The UK's Fifth National Communication under the United Nations Framework Convention On Climate Change*. London

Annex Three: UKOT Scoring Matrix

ANNEX III: RAG SCORING FOR UKOT VAM

#		Red	Red/Amber	Amber/Green	Green
Threats Exposure Analysis					
	Exposure: Frequency and Severity of climate effects	Current: High Impact 2050: Impact + Confidence	Current: Medium Impact 2050: Impact + Confidence	Current: Low Impact 2050: Impact + Confidence	Current: No impact 2050: No impact
Resource Exposure					
	Exposure: Fossil Fuel and Energy Import Dependence, Resource Use Efficiency and GHG Emission	High Dependency, Emissions and Low Resource Use Efficiency	Medium Dependency, Emissions and low Resource Use Efficiency	Low dependency, emissions and medium resource use efficiency	Low (or No) dependency, emissions, and high resource use efficiency
Importance to Overseas Territory					
1	Importance of System to OT <i>Natural Systems</i> <i>Economic Systems</i>	Bio-diversity characterised by high levels of endemic / endangered species and / or territory with internationally recognised environmental designation ¹ Critical levels of water stress Dominant contribution to OT GDP (>20%)	Bio-diversity characterised by presence of endemic / endangered species and internationally recognised environmental designation Moderate levels of water stress Significant contribution to OT GDP (5%-20%)	Bio-diversity characterised by low levels of endemic / endangered species and no internationally recognised environmental designation Limited levels of water stress Limited contribution (<5%) to OT GDP	Bio-diversity characterised by very low levels of endemic / endangered species and no internationally recognised environmental designation No water stress No contribution (0%) to OT GDP

¹ As identified by IUCN redbook.

#		Red	Red/Amber	Amber/Green	Green
	<i>Social Systems</i>	Per capita GDP (<\$6000) Low life expectancy / High infant mortality rates	Per capita GDP (\$6001 - \$20000) Medium life expectancy / Medium infant mortality rates	Per capita GDP (\$20001 - \$50000) Medium life expectancy / Low infant mortality rates	Per capita GDP (\$50000 +) High life expectancy / Low infant mortality rates
Vulnerability (Current)					
2.1	Sensitivity to Climate Exposure	High sensitivity to climate change exposure/high potential for irreversible impacts	Medium sensitivity to climate change exposure/medium potential for irreversible impacts	Low sensitivity to climate change exposure/low potential for irreversible impacts	No sensitivity to climate change exposure/no potential for irreversible impacts
2.2	Current Resilience Activities	No resilience planning and/or very limited adaptive capacity	Weak resilience planning and/or adaptive capacity	Moderately effective resilience planning and/or adaptive capacity	Strong resilience planning and/or adaptive capacity
2.3	Exacerbating Stresses	Significant exacerbating stresses	Moderate exacerbating stresses	Limited exacerbating stresses	No exacerbating stresses
Future Opportunities					
3.1	Potential Adaptation Interventions	No technical/programmatic opportunities available.	Limited technical/programmatic opportunities available, and significant work/investment required to develop bankable projects or programmes	Technical/programmatic opportunities exist, but only as pilot projects/strategies and require further investment to develop bankable projects or programmes	Technical/programmatic opportunities exist and bankable investments/projects are available for immediate funding
3.2	Implementation Capacity	No technical, political and financial capacity to	Limited technical, political and/or financial capacity to	Moderate technical, political and/or financial capacity to implement and	Strong technical, political and financial capacity to implement

#		Red	Red/Amber	Amber/Green	Green
		implement and monitor adaptation activities, with full UK input required.	implement and monitor adaptation activities, with significant UK input required.	monitor adaptation activities, with moderate UK input required.	and monitor adaptation activities, with limited UK input required
Current Emissions					
4.1	Share of Current Emissions	High (>30%)	Medium (15%-30%)	Low (5%-15%)	None/Marginal <5%.
GHG Abatement					
5.1	Abatement Potential	No abatement potential <10%	Limited abatement potential identified 10%-25%	Moderate abatement potential identified 25%-50%	Significant abatement potential identified E.g. >50% of current levels
5.2	Current Abatement Activities	No low carbon development planning or investment	Weak low carbon development planning and investment	Moderately effective low carbon development planning and investment	Strong evidence of effective low carbon development planning and investment
Future Opportunities					
6.1	Potential LCD Intervention	No technical/programmatic opportunities available.	Limited technical/programmatic opportunities available, and significant work/investment required to develop bankable projects or programmes.	Technical/programmatic opportunities exist, but only as pilot projects/strategies and require further investment to develop bankable projects or programmes.	Technical/programmatic opportunities exist and bankable investments/ projects are available for immediate funding.
6.2	Implementation Capacity	No technical, political and financial capacity to implement and monitor low carbon activities, with full UK input required.	Limited technical, political and/or financial capacity to implement and monitor low carbon activities, with significant UK input required.	Moderate technical, political and/or financial capacity to implement and monitor low carbon activities, with moderate UK input required.	Strong technical, political and financial capacity to implement and monitor low carbon activities, with limited UK input required.

UK Exposure (2012)					
7.1	UK Sunk Assets	>£100m	£20-£100m	£5-£20m	£0-£5m
7.2	Absolute Value of UK Transfer	£500,001 - £1,000,000	£250,001 - £500,000	£100,001 - £250,000	>£100,000
7.3	Share of National Budget from UK Transfer	75%> of national budget for specific system from UK transfer	51% to 75% of national budget for specific system from UK transfer	26% to 50% of national budget for specific system from UK transfer	25%< of national budget for specific system from UK transfer
7.4	Potential Liability	Cost of honouring and implementing legal treaties and other HMG commitments (>£200m)	Cost of honouring and implementing legal treaties and other HMG commitments (>£50m)	Cost of honouring and implementing legal treaties and other HMG commitments (>£10m)	Cost of honouring and implementing legal treaties and other HMG commitments (<£10m)
7.5	Reputational Risks	Irreparable reputational risk in terms of loss of: HMG reputation for safeguarding citizens / climate change and ecosystems; HMG disruption to the relationship with its citizens; and potential to severely disrupt private sector investment in the UKOTs related to specific system.	Serious but not irreparable reputational risk in regards to loss of HMG safeguarding reputation, HMG relationship with citizens or private sector investment related to specific system.	Limited reputational risk in regards to loss of HMG safeguarding reputation, HMG relationship with citizens or private sector investment related to specific system.	No reputational risk in regards to loss of HMG safeguarding reputation, HMG relationship with citizens or private sector investment related to specific system.

Annex Four: British Antarctic Territory - Scored VAM

RED
RED/AMBER
GREEN/AMBER
GREEN

Threat Exposure Analysis		
	Frequency and Severity	
	Current	2050
Climate Change Exposure		
1 Increase in temperature		
2 Increase/decrease/variability in precipitation		
3 Decrease in snow cover and ice		
4 Heat waves		
5 Heavy precipitation events/floods		
6 Extreme storm events		
7 Rising sea levels		
8 Ocean acidification		

Resource Exposure	Current
1 Fossil Fuel Dependence	
2 Energy Import Dependence	
3 Resource use efficiency	
4 Absolute GHG emissions	X

Low Carbon Electricity Resource Potential	Share of Current Electricity Production	Potential
1 Wind	X	Medium
2 Hydro	X	X
3 Solar PV	30 (Signy station)	Medium
4 Geothermal	X	X
5 Biomass	X	X
6 Waste (solid, liquid)	X	X
Low Carbon Heat Potential		
	% of buildings	Potential
1 Solar Thermal	X	X
2 Biomass	X	X
Liquid Fuels		
	% of consumption	Potential
1 Bioethanol	X	X
2 Bio diesel	X	X

British Antarctic Territory

Summary
<p>GENERAL INFORMATION British Antarctic Territory (BAT) covers 1,709,400 sq km (largest British OTs). It comprises sector of the Antarctic south of latitude 60°S and bounded by longitudes 20°W and 80°W. No indigenous population. UK's presence primarily provided by the British Antarctic Survey (BAS), operating three research stations. BAS's personnel over 200 in summer. Main sectors: scientific research and tourism.</p> <p>Threat Exposure Analysis Experienced events: fewer but more intense cyclones; surface warming trends (1.03°C/decade in Antarctic Peninsula); reduction of ice shelves; retreat of 87% of marine glaciers in Antarctic Peninsula; sea level rise higher than 2.5 mm/year; increase in water temperature (0.06 °C/decade) and in CO2 concentration. Expected events: increase in temperature by 0.34°C by 2100; 20% increase in snowfall; bottom water warm by 0.25 °C; 33% decrease in sea-ice area; reduction of permafrost area. Energy mainly produced by fossil fuels; recent installation of solar systems.</p> <p>Adaptation and Resilience Presence of endemic and rare species of flora and fauna. Only activities: scientific research and tourism (growing importance). Heavy effects of changes in temperature, precipitation and ice cover on presence and distribution of flora and fauna. Risk to infrastructure due to reduction in permafrost area. 26 Antarctic Specially Protected Areas; first Marine Protected Area; wide range of environmental projects. Exacerbating risks linked with invasive alien species. Projects addressed to protect environment and minimise human impacts foreseen. Long experience British Antarctic Survey. Limited funds available from FCO.</p> <p>Low Carbon Development BAT not covered by UK GHG Inventory. Energy use and carbon emissions to be reduced by 20% from BAS stations and 5% from BAS ships by 2012. Solar heating systems installed in two stations. Measures of for water and energy efficient consumption adopted. Opportunity for wind turbine and solar photovoltaic array in Rothera and feasibility studies to promote energy efficient retrofits on ships and aerial vehicles.</p> <p>UK Exposure BAT self-financing but receiving £722,000 from FCO in 2005-2006. BAT signatory of several multilateral environmental agreements, as well as conventions and protocols under the Antarctic Treaty. Strategic importance for UK for scientific purposes. Sovereignty issue among UK, Argentina and Chile.</p> <p>Exacerbating risks Spread of invasive species</p>

Additional Potential Classification

High	High levels of cost effective technical potential identified, with strong evidence of associated planning and investment
Medium	Medium cost effective resource potential identified, with medium evidence of associated planning and investment
Low	Limited cost effective technical potential identified, with limited evidence of associated planning and investment
None	No cost effective technical potential identified.

Adaptation and Resilience		Importance to OT	Vulnerability (Current)			Future Opportunities	
		Importance of System to OT	Sensitivity to Climate Exposure	Current Resilience Activities	Exacerbating Stresses	Potential Adaptation Interventions	Implementation Capacity
Natural	Biodiversity and Ecosystems	Red	Red	Orange	Red	Orange	Green
	Hydrology and Water resources	Red	Red	Orange	Green	Red	Red
Economic	Tourism	Orange	Orange	Red	Green	Red	Red
	Energy Supply and Use	Orange	Orange	Green	Green	Green	Orange
	Industry and Commerce*	Red	Green	Orange	Green	Orange	Green

UK Exposure (2012)				
UK Sunk Assets	Absolute Value of UK Transfer	Share of National Budget from UK Transfer	Potential Liability	Reputational Risks
X	Green	Green	Green	Orange
X	Green	Green	Green	Orange
X	Green	Green	Green	Orange
X	Green	Green	Green	Orange
X	Green	Green	Green	Orange

Low Carbon Development (Source)		Current Emissions	GHG Abatement (Current)		Future Opportunities	
		Share of Current Emissions	Abatement Potential	Current Abatement Activities	Potential LCD Intervention	Implementation Capacity
Energy Supply		X	Green	Orange	Green	Orange
	Public*	X	Green	Orange	Green	Orange

Annex Five: UKOT Potential Programme Approaches – Preliminary Sectoral and Geographical Analysis

	Programme Approach	Sectoral and OT Relevance		Activities	
		Sectors	OTs	Current	Potential
1	Adaptation: Needs Focus	Energy Supply and Use	Gibraltar	Replacement of power plants with a power station powered by diesel engines.	n/a
2	Adaptation: Effectiveness Focus	Biodiversity and Ecosystems	Bermuda	Bermuda Biodiversity Action Plan - Activity report 2010; The Bermuda Plan 2008	Stringent water conservation practices; environmentally-sound desalination operations; better weather forecasting; coastal zone management plan (building on Draft Planning Statement (2008))
			Gibraltar	Management and Action Plan for the conservation of Sites of Community Importance enforced; Marine Special Area of Conservation designated; Catalogue of living resources; Habitat and Species Action Plans.	Dolphin study; climate change studies.
3	Mitigation: Needs Focus	Energy Supply	Bermuda	Electricity for the entire Island is produced at BELCO's Pembroke location.	Public land/seabed allocated for utility-scale renewable electricity generation projects; generation licences for power producers and comprehensive interconnection standards; quality standards specifically for distributed renewable energy systems included in building codes; expedited planning processes for small-scale renewable generation; efficiency standards; energy auditing.
			Gibraltar	Replacement of power plants with a power station powered by diesel engines.	The use of biofuels to be encouraged by selling at lower price in petrol stations; adopt biofuels for Govt fleet.
		Transport	Gibraltar	New bus transport system introduced; free to children.	Reduction in the energy used for road transport (9% target for 2016); Car park and park and ride bus shuttle service construction planned; Increase in public transport times/routes; More free public transport.
4	Mitigation: Emissions Reduction Potential Focus	Energy Supply	Gibraltar	New power station has the capability to run on biofuels.	Adoption of renewable energy resources: wind, energy from waste and tidal current all considered technically viable.
			Montserrat	2008 Montserrat Sustainable Development Plan; shortly be upgrading its diesel based power station to more reliable 1.5 MW source	Exploitation of geothermal energy is a stated aim of the National Energy Policy; test drilling 2012; Geothermal energy is proved to be feasible, there is potential to generate up to 50MW of energy, with export of around 40MW to a neighbouring island; potential wind turbine sites at locations within the Blakes Estate although the new National Physical Development Plan for North Montserrat 2012-2022 zones this land for residential and recreational tourism;
		Transport	Gibraltar	Use of private vehicles discouraged	Car park and park and ride bus shuttle service constructed; increase in public transport times/routes; more free public transport.
		Business	Montserrat	New port development at Carr's Bay	Development of new town at Little Bay creates potential for incorporation of passive design principles; GoM Infrastructure Plan includes suite of potential low cost measures: energy efficient fans, water pumps, cooking appliances and behavioural change.
		Land Use, Land Use Change and Forestry	Montserrat	2008 Montserrat Sustainable Development Plan; New National Physical Development Plan for North Montserrat	National Physical Development Plan for North Montserrat 2012-2022
5	Mitigation: Effectiveness Focus	Business	BVI	National Tourism Policy & Development Master Plan; strengthening Building Regulations; Climate Change risk management protocols, Disaster Relief Fund, micro insurance schemes and mutual/cooperative insurance schemes, financing options for renewable energy installations.	Climate Change Trust Fund - funds would meet costs associated with diversifying tourism product; sub-regional/domestic emissions trading scheme that will ensure benefits are flowing from the UK and European carbon trading scheme; Carbon Levy on guests of hotels and charter yachts; Climate Change Financial Risk Management Levy on foreign registered companies and ships
		Residential	BVI	A National Physical Development Plan, Local Area Plans	Medium/long term implementation A National Physical Development Plan, Local Area Plans
		Waste Management	BVI	Energy & water conservation/efficiency standards;	n/a
		Land Use, Land Use Change and Forestry	BVI	National Tourism Policy & Development Master Plan; expanded protected areas; building & disaster management criteria; National Physical Development Plan; Local Area Plans	Medium/long term implementation A National Physical Development Plan, Local Area Plans

6	Standardised Policy Focus	Relevant to all sectors	Relevant to all OTs	Possibilities are: FCO sponsored pilot on environmental mainstreaming; Scaling up of FCO approach to	Mainstream climate change into existing policies and plans
7	Capacity Building Focus	Relevant to all sectors	Relevant to all OTs	Possibilities are: BAT: provision of staff education under the Carbon Reduction Strategy. DFID support via	Prioritise interventions in the draft climate change policy and develop programme of capacity support to take forward
8	Next Step Approach	Relevant to all sectors	Relevant to all OTs	Possibilities are: Falklands: scale up wind farm technologies; Gibraltar: renewable energy legislation. DFID support via the ECACC programme and	Prioritise interventions in the draft climate change policy and develop programme of capacity support to take forward
9	UK Exposure Approach	Biodiversity and Ecosystems	Anguilla	Designation of one nationally protected (wetland) area and allocation of 7.5acre demonstration area for Department of Environment; draft climate change policy drafted and to be adopted in 2012;	Conserve existing wetland (saltpond) ecosystems and encourage wetland migration strategies; approve and implement a National Wetlands Policy; continuous monitoring and development of comprehensive bio-diversity baseline; development of an integrated coastal zone management plan which includes understanding the risk of flooding due to sea level rise and improvements to the national coastal monitoring system and system of beach profile data collection; implement schemes for re-vegetation and re-nourishing beaches
			BAT	26 Specially Protected Areas and Marine Protected Area designated; Penguin distribution study; Wildlife awareness manual; Toolkit for the management of Protected Areas; Identification of important bird areas; Polar Science for Planet Earth project	Proactive management of key Protected Areas; Continuation of the penguin distribution study
			Falklands	Bio-diversity strategy in place. FIG sponsored environmental research, awareness raising, conservation and management activities. OTEP projects to conserve or collect species or restore plant habitats.	Species monitoring and species action plans in place.
			Montserrat	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention); Vienna Convention for the Protection of the Ozone Layer;	protected areas/zoning; in situ conservation of endemic species and control of invasive species; revise port legislation re discharge; ensure protection of ghauts and vegetative strips and enforce all aspects of land use planning
			Gibraltar	Management and Action Plan for the conservation of Sites of Community Importance enforced; Marine Special Area of Conservation designated; Catalogue of living resources; Habitat and Species Action Plans.	Dolphin study; climate change studies
			SBAs	Special protection Areas designated; Turtle projects; Acacia Control Project	Designation of Special Areas of Conservation; MoU for Conservation of Migratory Birds of Prey in Africa and Eurasia
		Hydrology and Water Resources	Anguilla	New desalination water plant	Water harvesting, increased water storage and more effective maintenance of distribution network to reduce leaks; promote the use of water savings devices (low flush toilets etc); develop and implement national outreach and educational programmes; bring efficiencies to water desalination as technology improves and bring renewable energy sources on stream (wind and solar).
			BAT	Introduction of more efficient reverse osmosis plants; Introduction of water saving flow reduction valves	Implementation of a programme of water efficiency technology changes
			Falklands	n/a	Climate change modelling based on collected data.
			Gibraltar	Modernisation of fresh water distribution (saving of energy during desalination; seawater used for conveyance of sewage and other non-domestic purposes; Replacement of sea defences	Flood defences; Improvement of drainage infrastructure.
			Montserrat	Some adhoc water harvesting, (minidams, roof rainwater harvesting). Many assets not maintained and now in disrepair.	Protect groundwater sources from pollution; develop better water resource management and allocation systems; Opportunity for all new build at Little Bay and Carr's Bay.
			SBAs	n/a	Adoption of Concentrating Solar Power technologies for water desalination

		Tourism	BAT	n/a	Enhancement of UK expertise on tourism management
			Montserrat	Potential investments in the new town at Little Bay and the construction of a new port, if affected, would not reflect well in the international press.	Fiscal incentives to encourage sustainable tourism; integrate mainstream CC issues (impact, responses, opportunities) into tourism development strategy; recommended design speeds increased for new tourism-related structures; enhanced reef monitoring systems to provide early warning alerts of bleaching events, and; artificial reefs or fish-aggregating devices
			Gibraltar	n/a	n/a
		Transportation	SBA	n/a	n/a
			Montserrat	Potential investments in the new town at Little Bay and the construction of a new port, if affected, would not reflect well in the international press.	Integrate CC issues into current port design and the master plan development at Little Bay and other infrastructural development projects.
			Gibraltar	New bus transport system introduced; free to children.	Car park and park and ride bus shuttle service construction planned; Increase in public transport times/routes; More free public transport.
		Energy Supply and Use	Anguilla	n/a	Enhance efficiency of diesel power generation. Link into regional sources of energy arising from potential geothermal networks on Nevis and Montserrat. Customer educational policies to encourage energy efficiency; promote energy efficient technologies such as energy efficient light fittings and solar hot water heaters.
			BAT	Solar heating systems installed at 2 stations; Introduction of sub-metering more effective monitoring of energy consumption; Introduction of LCD screens	Adoption of renewable energy sources: wind turbine and solar photovoltaic systems; Energy efficient retrofits for research ships; use of unmanned aerial vehicles
			Montserrat	2008 Montserrat Sustainable Development Plan; shortly be upgrading its diesel based power station to more reliable 1.5 MW source.	Exploitation of geothermal energy is a stated aim of the National Energy Policy; test drilling 2012; Geothermal energy is proved to be feasible, there is potential to generate up to 50MW of energy, with export of around 40MW to a neighbouring island; potential wind turbine sites at locations within the Blakes Estate although the new National Physical Development Plan for North Montserrat 2012-2022 zones this land for residential and recreational tourism.
			Gibraltar	Replacement of power plants with a power station powered by diesel engines.	The use of biofuels to be encouraged by selling at lower price in petrol stations; adopt biofuels for Govt fleet; Adoption of renewable energy resources: wind, energy from waste and tidal current all considered technically viable.
		Industry and Commerce	BAT	All infrastructures constructed with best practices in low energy design.	n/a
			Montserrat	Potential investments in the new town at Little Bay and the construction of a new port, if affected, would not reflect well in the international press.	n/a
			Gibraltar	n/a	Incentives for import and use of highly efficient equipment.
		Livelihoods/Poverty	Anguilla	n/a	n/a
			Montserrat	Invested heavily in irrigation infrastructure, training of farmers, livestock production units and a farmer's resource centre.	Government is investing in improved fisheries infrastructure and training to improve the quantity, quality and presentation of produce.
			Falklands	n/a	n/a
			Gibraltar	n/a	n/a
		Human Health	Anguilla	n/a	n/a
			Montserrat	n/a	Public education and outreach; forecasting systems for Dengue Fever and other vector-borne diseases.
			Falklands	n/a	n/a
			Gibraltar	n/a	n/a
10	Do Nothing Approach	n/a	n/a	n/a	n/a