



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

Needs Assessment:  
Gibraltar

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 (29<sup>th</sup> March 2012) and End of Contract Report (11<sup>th</sup> 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.

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.

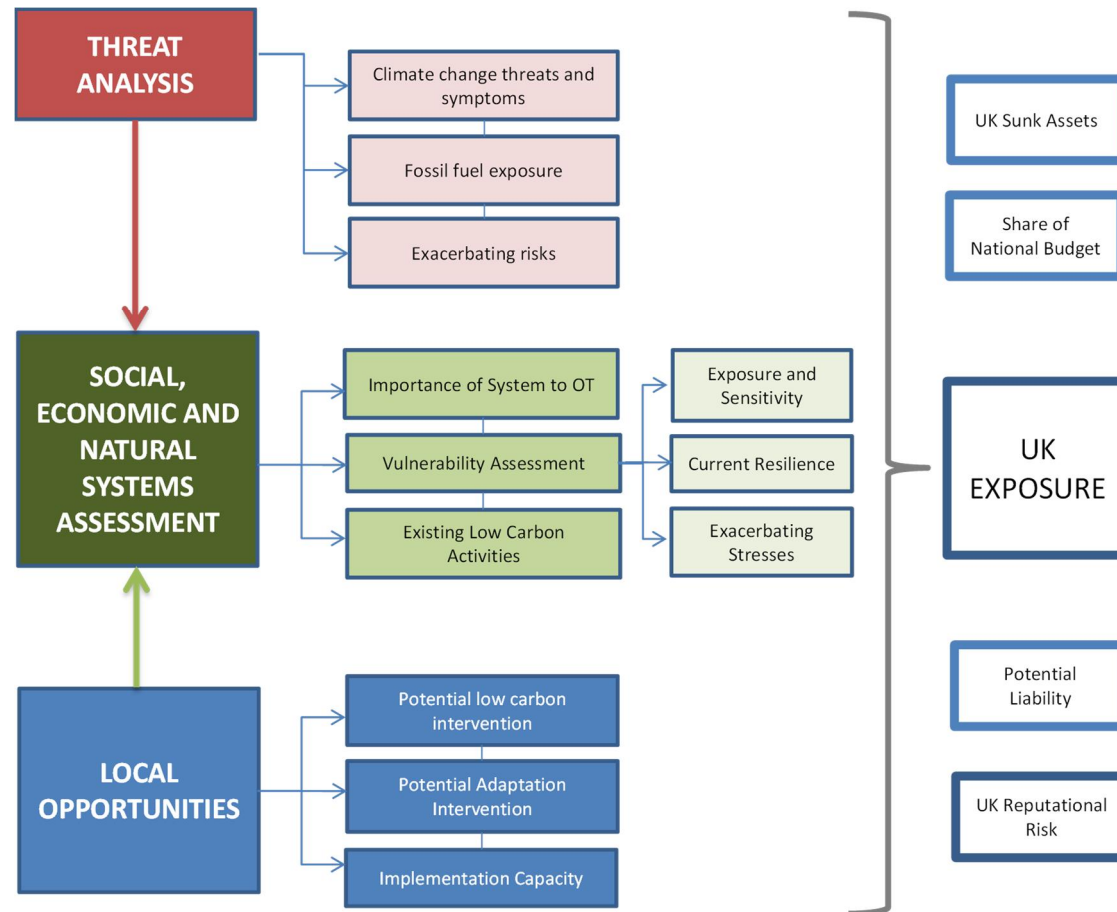
The completed VAM in this report uses a RAG colour coding system to provide a comparative analysis across all of the OTs to feed into the overall programme design. In most cases, data has been included specifically for the later appraisal and business case design process which would have followed.

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: Gibraltar



### KEY INDICATORS

Population:	29,441
GDP (\$):	954.11 m
Per Capita GDP (£):	44,947
ODA Entitled:	No
UK Annual Budget Support:	270 million
Value of UK Sunk Assets:	N.A.
Key Economic Sectors:	Financial Services, Shipping, Tourism

## Threat Exposure Analysis

### Climate Change Exposure

Current projections see a 48cm sea level rise in Gibraltar due to ocean expansion and glacier melt by the end of this century. Given the projected sea-level rises, there is an increased risk of flooding in low lying areas away from the sea due to the increased depth of sea outfalls.<sup>1</sup>

Temperature and salinity recorded at the Straits of Gibraltar show that the deep water outflow through the Straits is warmer (about 0.3°C) and saltier (approximately 0.06 units saltier) than 10 years ago.<sup>2</sup> In the western Mediterranean, low rainfall and warming land temperatures have been experienced.<sup>3</sup>

There is also predicted to be a rise in temperatures, a fall in levels of rainfall, and a change in the intensity and distribution of rainfall creating potential for an increase in floods events and a greater degree of unpredictability in the frequency and duration of extreme weather events.

Potentially lower river flows into the Bay of Gibraltar in summer and subsequent decreased freshwater discharge into the Bay will may affect local sea temperature and affect levels of salinity and acidification. Furthermore, higher temperatures may dry soils and increase salinization and generate a higher incidence of wind-blown soil erosion.<sup>4</sup>

### Resource Exposure

There are currently three installations in Gibraltar producing 32 MW energy (peak demand).<sup>5</sup> These stations provide enough power for all energy consumption in Gibraltar. A new power station is going to be built which will replace these three installations and once operating (2013) will generate of 62.4 MW.<sup>6</sup>

<sup>1</sup> Government of Gibraltar, 2008, Climate Change – The Gibraltar Programme 2008, [www.esg-gib.net/wp-content/uploads/climate-change/GCCP-Govt-Paper-on-Climate-Change.pdf](http://www.esg-gib.net/wp-content/uploads/climate-change/GCCP-Govt-Paper-on-Climate-Change.pdf) [Accessed 19 July 2012]

<sup>2</sup> Moschella, P., 2006. *The new CIESM Tropicalization Programme – effects of climate warming on Mediterranean key taxa*. In Proceedings of Climate Warming and Related Changes in Mediterranean Marine Biota, Helgoland, 27-31 May 2008, p. 47

<sup>3</sup> Brown, N., 2008. *Climate change in the UK Overseas: Territories: An Overview of the Science, Policy and You*. Peterborough, UK: Joint Nature Conservation Committee.

<sup>4</sup> Department of the Environment and Environmental Agency, 2007. *Climate Change – The Gibraltar Programme*, p. 5-6

<sup>5</sup> Government of Gibraltar, 2012. *Department of the Environment* [Online] Available at [www.gibraltar.gov.gi/environment/environment](http://www.gibraltar.gov.gi/environment/environment) [Accessed 21 03 2012].

<sup>6</sup> Gibraltar Chamber of Commerce, 2011. *New power station announced*, [www.gibraltarchamberofcommerce.com/new-power-station-announced/](http://www.gibraltarchamberofcommerce.com/new-power-station-announced/) [accessed 19 07 2012]

In 2010, 1,462,269m<sup>3</sup> of potable water were produced and supplied in Gibraltar. All the potable water is produced through desalination processes in two plants, located at Governor's Cottage and Waterport.<sup>7</sup> In 2008, Gibraltar generated 422,000 metric tonnes CO<sub>2</sub>.<sup>8</sup>

## Adaptation and Resilience

### Importance to OT

#### Importance of System to OT

Natural Systems: Given that 40% of Gibraltar is designated as a national park,<sup>9</sup> the importance of the territory's natural systems to the territory are significant. Gibraltar hosts rare and endemic species of flora and fauna. Within Europe, the endangered species of Barbary Macaques (*Macaca sylvanus*) are unique to Gibraltar.<sup>10</sup> Three plants (*Sileneto mentosa*, *Cerastium gibraltarium* and *Saxifraga globulifera var. gibraltaria*) are endemic to Gibraltar.<sup>11</sup> Four species of bat (*Myotis myotis*, *Miniopterus schreiberi*, *Pipistrellus pipistrellus* and *Tadarida teniotis*) are protected under the Nature Protection Ordinance 1991. Further, Green (*Caretta caretta*) and Loggerhead (*Chelonia mydas*) turtles, which are endangered Mediterranean species, as well as several species of rare cetaceans, occur in the surrounding waters.<sup>12</sup> Gibraltar is also located on an important migration route for seabirds.<sup>13</sup>

Economic Systems: The main sectors in Gibraltar economy are financial services (22% of GDP), shipping (20% of GDP) and tourism (25%). The relevance of the Defence sector has decreased in the last years and now it represents approximately 7% of GDP. Although figures are not readily available, internet gaming accounts for an increasing percentage of Gibraltar's GDP.<sup>14</sup>

Social Systems: Gibraltar has a per-capita GDP of £44,974<sup>15</sup> and a life expectancy of 80.4 years.<sup>16</sup>

### Vulnerability

#### Sensitivity to Climate Exposure

Episodes such as drought are not expected to affect the human population in Gibraltar to a large degree, as potable drinking water is sourced from desalination plants. However, the flora and fauna populations are likely to suffer from decreased rainfall. The alteration of sea conditions will affect marine ecosystems. Increasing drought in the Mediterranean will result in lengthened bird migratory journeys and increase stress to migrants.<sup>17</sup>

Despite the low-lying nature of many parts of Gibraltar the potential for inundation by the sea remains low. There is an increased risk of damage to sea defence structures and temporary flooding of low-lying areas away

<sup>7</sup> *Ibidem*, page 29

<sup>8</sup> United Nations Statistical Division, 2012. *Millennium Development Goals*. [Online] Available at <http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=749&crd=> [Accessed 22 03 2012].

<sup>9</sup> Perez, C. and Bensusan, K., J., 2005. Upper Rock Nature Reserve. Management and Action Plan. GOHNS, Gibraltar. P.263

<sup>10</sup> Brown, N, 2008. *Op cit.* page 25

<sup>11</sup> OTEP, 2012. *Gibraltar*. [Online] Available at <http://dps.plants.ox.ac.uk/bol/gibraltar> [Accessed 22 03 2012].

<sup>12</sup> JNCC, 2012. *Gibraltar*. [Online] Available at [http://jncc.defra.gov.uk/pdf/OT\\_Gibraltar.pdf](http://jncc.defra.gov.uk/pdf/OT_Gibraltar.pdf) [Accessed 22 03 2012].

<sup>13</sup> Government of Gibraltar, 2011. *Southern Waters of Gibraltar Management Scheme E.U. Marine Special Area of Conservation*, Gibraltar.

<sup>14</sup> FCO, 2012. *Gibraltar – Country Profile*. [Online] Available at [www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/country-profile/europe/gibraltar?profile=all](http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/country-profile/europe/gibraltar?profile=all) [Accessed 22 03 2012].

<sup>16</sup> CIA, 2012. *The World Factbook*. [Online] Available at: <https://www.cia.gov/library/publications/the-world-factbook/geos/ax.html> [Accessed 21 03 2012].

<sup>17</sup> Department of the Environment and Environmental Agency, 2007. *Op cit.* page 5-6

from the sea.<sup>18</sup> Heavier rainfall storms could also lead to an increase in flooding that could affect some transport routes and cause damage to ground floors of offices and residential buildings.<sup>19</sup>

### Current Resilience Activities

The recent replacement of sea defences have taken account of potential sea level rise from climate change impacts so that the height of the sea wall is greater than predicted future sea levels, reducing the risk of floods. The Moles, forming the harbour, are also above this predicted level, protecting in-land areas from storm surges.<sup>20</sup>

On-going research projects in Gibraltar include those conducted by Gibraltar Ornithological and Natural History Society (GONHS) and Royal Holloway University of London on climate change which will allow climate modellers to better predict the North Atlantic Oscillation (which controls the long term temperature and rainfall patterns across North-West Europe) and its impact on water availability;<sup>21</sup> the *Gibraltar Biodiversity Project* launched by GONHS in 2004;<sup>22</sup> and the Gibraltar Museum's research in Gornham's Vanguard, other caves and Gibraltar's cliffs.<sup>23</sup>

Although not expressly climate related, recent initiatives create conditions of increasing the resilience of natural systems. Two areas in Gibraltar, Upper Rock and Windmill Hill Flats, have recently been designated as Sites of Community Importance (SCIs) by the European Community under the Habitats Directive 92/43/EEC.<sup>24</sup> A management and action plan for the conservation of Upper Rock Nature Reserve has also being developed.<sup>25</sup> It is estimated that the Upper Rock Nature Reserve Management and Action Plan (2005) would cost £250,000 annually for the conservation of the area, in addition to £363,755 upfront costs (all 2004 prices).<sup>26</sup> The Southern Waters of Gibraltar have also been designated as a Marine Special Area of Conservation, with the aim of protecting underwater habitats and key species such as cetaceans.<sup>27</sup>

### Exacerbating Stresses

Gibraltar is located in an area of seismic activity,<sup>28</sup> with an estimated frequency of approximately one high magnitude event in every 5000 years and a risk of tsunamis of one in every 2000 years.<sup>29 30</sup>

A key phenomena that could exacerbate the effects of climate change on biodiversity and ecosystems are increased development pressure due to population growth. The spread of non-native species will also threaten the biodiversity in Gibraltar.<sup>31</sup>

<sup>18</sup>Gibraltar River Basin District, 2008. *Op cit*.

<sup>19</sup>Entec, 2011. *Preliminary Flood Risk Assessment. Final Report*, Gibraltar.

<sup>20</sup>Entec, 2011. *Op cit*.

<sup>21</sup>Isolas, 2012. *Major study in Gibraltar's caves over climate change*. [Online] Available at [www.panorama.gi/localnews/headlines.php?action=view\\_article&article=500](http://www.panorama.gi/localnews/headlines.php?action=view_article&article=500) [Accessed 21 03 2012].

<sup>22</sup>GONHS, 2012. *Gibraltar Biodiversity Project*. [Online] Available at [www.gonhs.org/biodiversity.htm](http://www.gonhs.org/biodiversity.htm) [Accessed 21 03 2012].

<sup>23</sup>The Gibraltar Museum, 2012. *Research: Gibraltar caves project: the sites – Gorham's cave*. [Online] Available at [www.gibmuseum.gi/Gorhams\\_Project.html](http://www.gibmuseum.gi/Gorhams_Project.html) [Accessed 06 06 2012].

<sup>24</sup>Department of the Environment and Environmental Agency, 2007. *Op cit*. page 8

<sup>25</sup>Perez, C. and Bensusan, K., J., 2005. *Upper Rock Nature Reserve. Management and Action Plan*. GOHNS, Gibraltar.

<sup>26</sup>Perez, C. and Bensusan, K., J., 2005. *Op cit*.

<sup>27</sup>Government of Gibraltar, 2012. *Department of the Environment* [Online] Available at [www.gibraltar.gov.gi/environment/environment](http://www.gibraltar.gov.gi/environment/environment) [Accessed 21 03 2012].

<sup>28</sup>Science Daily, 2008. *Mapping Active Faults In The Gibraltar Arc To Better Predict Earthquake-Prone Regions*. [Online] Available at [www.sciencedaily.com/releases/2008/02/080205092746.htm](http://www.sciencedaily.com/releases/2008/02/080205092746.htm) [Accessed 21 03 2012].

<sup>29</sup>Instituto Geografico Nacional (IGN), 2012: *Servicio de Informacion Sismica*. [Online] Available at: [www.ign.es/ign/layoutIn/sismoListadoMapasSismicos.do](http://www.ign.es/ign/layoutIn/sismoListadoMapasSismicos.do) [Accessed 06 06 2012].

<sup>30</sup>Rodríguez-Vidal, J., Cáceres, L. M., Abad, M., Ruiz, F., González-Regalado, M. L., Finlayson, C., Finlayson, G., Fa, D., Rodríguez-Llanes, J. M., Bailey, G., 2011. *The recorded evidence of AD 1755 Atlantic tsunami on the Gibraltar coast*. *Journal of Iberian Geology* 37 (2), pp. 177-193

<sup>31</sup>Department of the Environment, 2011. *The Environment Matters - Annual Report 2010*. Gibraltar, page 41 - 42



## Future Opportunities

### Potential Adaptation Interventions



The GONHS and Royal Holloway University (London) have been awarded a grant by the UK's Natural Environment Research Council to continue their study on climate change.<sup>32</sup> The research carried out under Gibraltar Caves Project and ecological research run by the Gibraltar Museum is funded by the Government of Gibraltar.<sup>33 34 35</sup>

Several measures for the protection from floods are also expected. The *Gibraltar Programme on Climate Change* (2008) suggests that when a development is proposed in areas considered to be at risk of floods, the applicant will need to demonstrate that it is protected from inundation.<sup>36</sup> Further activities such as flood mapping, reinforcement of sea defences where necessary and improvement of drainage infrastructure are anticipated.<sup>37</sup>

The Cetacean Research and Rescue Unit (CRRU) Gibraltar project aims to studying dolphins (*Delphinus delphis*) in the Bay of Gibraltar. It is anticipated that these studies will be instrumental in the formulation of effective conservation policies and management proposals to protect this dolphin population and the marine environment in this area of the Mediterranean Sea taking into consideration the potential effects of climate change.<sup>38</sup>

Other activities in the sectors of hydrology and water resources, transportation and energy supply and use are listed under 'Potential LCD Intervention'.

### Implementation Capacity



The Government of Gibraltar has a Department of Environment, employing 12 people, as well as a specific Environmental Monitoring Unit. Among its main tasks, the Department is in charge of verifying compliance with all local and applicable EU Environmental Legislation. The Government set up a Climate Change Forum that acts as a technical advisory group to the Government in 2006, which following a four year hiatus in meeting between 2008 – 2012 has recently reconvened.<sup>39</sup>

The FCO provides funds to Gibraltar and has eight UK-based staff dedicated to the territory.<sup>40</sup> The UK's Natural Environment Research Council has recently awarded a grant of £98,000 to GONHS and Royal Holloway University of London on a project on climate change.<sup>41</sup>

There is no information about funds from the FCO which specifically address the implementation of adaptation projects.

<sup>32</sup>Isolas, 2012. *Major study in Gibraltar's caves over climate change*. [Online] Available at [http://www.panorama.gi/localnews/headlines.php?action=view\\_article&article=500](http://www.panorama.gi/localnews/headlines.php?action=view_article&article=500) [Accessed 21 03 2012].

<sup>33</sup>Finlayson, G., Finlayson, C., Giles Pacheco, F., Rodriguez Vidal, F., Carrión, J.S. & Recio Espejo, J.M., 2007. *Caves as archives of ecological and climatic changes in the Pleistocene: the case of Gorham's Cave, Gibraltar*. *Quaternary International*, 181(1), pp. 55–63.

<sup>34</sup>Ferguson, J.E., Henderson, G.M., Fa, D.A., Finlayson, J.C. & Charnley, N.R., 2011. *Increased seasonality in the Western Mediterranean during the last glacial from limpet shell geochemistry*. *Earth & Planetary Science Letters*, 308, pp. 325–333.

<sup>35</sup>Espinosa, F., Rivera-Ingraham, G., Fa, D.A. & Garcia-Gómez, J.C. (2009). *Effect of human pressure on population size structures of the endangered ferruginean limpet: towards future management measures*. *Journal of Coastal Research*, 25(4), pp. 857–863.

<sup>36</sup>Department of the Environment and Environmental Agency, 2007. *Op cit*.

<sup>37</sup>Gibraltar River Basin District, 2008. *Op cit*.

<sup>38</sup>Cetacean Research & Rescue Unit (CRRU), 2012. *CRRU Gibraltar*. [Online] Available at <http://crru.org.uk/gibraltar.asp> [Accessed 21 03 2012].

<sup>39</sup>Government of Gibraltar, 2012. *Department of the Environment* [Online] Available at [www.gibraltar.gov.gi/environment/environment](http://www.gibraltar.gov.gi/environment/environment) [Accessed 21 03 2012].

<sup>40</sup>National Audit Office, 2007. *Foreign Commonwealth Office - Managing risk in the Overseas Territories*. London: The Stationary Office.

<sup>41</sup>Isolas, 2012. *Major study in Gibraltar's caves over climate change*. [Online] Available at [www.panorama.gi/localnews/headlines.php?action=view\\_article&article=500](http://www.panorama.gi/localnews/headlines.php?action=view_article&article=500) [Accessed 21 03 2012].

## Low Carbon Development (Source)

### Current Emissions

#### Share of Current Emissions

According to US Energy Information Administration, currently per capita Gibraltar has the highest carbon emissions in the world.<sup>42</sup> Although this is relative to population size, there are caveats since the figure includes international bunker (fuel) sales (the majority of fuel sales in Gibraltar are not consumed nationally but form part of the international shipping industry).<sup>43</sup> This is reflected in the 2008 emissions data presented below.

The sectors responsible for most of the 422,000 metric tonnes CO<sub>2</sub> produced by Gibraltar in 2008 were international marine (53%), public electricity and heat production (32%) and road transport (9%). Commercial/institutional and aviation (both civil and military) accounted respectively for 3% and less than 2%.<sup>44</sup>

### GHG Abatement

#### Abatement Potential

The Government of Gibraltar has recently issued its new renewable energy targets, aiming for 15% of its energy to be produced from renewable sources by 2020, in accordance with the 2009/28/EC Directive.<sup>45</sup> The previously adopted target was planned to be reached through a reduction in the energy used for road transport by 2016 –this target is now going to be revised.

The three current power stations located in Gibraltar participate in the EU Emissions Trading Scheme and are therefore exempt from the emission reduction strategy.<sup>46</sup>

#### Current Abatement Activities

The Government of Gibraltar is promoting energy efficiency in the residential sector. Since legislation on energy performance in buildings was introduced in 2009, 269 properties have been issued with Energy Performance Certificates.<sup>47</sup>

A new free bus transport system has been introduced and a modernisation programme of fresh water distribution system is on-going, which will result in a saving in energy during the desalination process. Campaigns for encouraging waste reduction and the introduction of further recycling points aim to reduce the amount of waste going to landfill. The Government is currently reviewing available waste treatment technologies with a view to establish a sustainable waste management option for Gibraltar, which allows for maximum recycling. Thousands of trees have been planted at the eastside sand slopes in Gibraltar, reducing its carbon footprint.<sup>48</sup>

<sup>42</sup> See [www.eia.gov/environment/](http://www.eia.gov/environment/) for the related data.

<sup>43</sup> Cortes (Gibraltar's Minister for Health and Environment), 2012. Letter to the Guardian, [www.guardian.co.uk/environment/2012/jul/16/gibraltar-carbon-emissions-distorted-table](http://www.guardian.co.uk/environment/2012/jul/16/gibraltar-carbon-emissions-distorted-table)

<sup>44</sup> Department of the Environment and Environmental Agency, 2007. *Op cit.*, page 16, modified

<sup>45</sup> Department of the Environment, 2011. *Op cit.*, page 48

<sup>46</sup> Ministry of Environment, 2008. *Gibraltar Energy Efficiency Action Plan 2009*. Gibraltar, page 9.

<sup>47</sup> Department of the Environment, 2011. *Op cit.*, page 48

<sup>48</sup> Department of the Environment and Environmental Agency, 2007. *Op cit*

## Future Opportunities

### Potential LCD Intervention

LCD Interventions in the energy supply sector include the replacement of the three existing power plants with a new power generation facility. Alternative energy will also be part of the package.<sup>49</sup> The adoption of renewable energy resources, namely wind-energy, energy from waste and tidal current, considered technically viable for Gibraltar, is also being investigated.<sup>50</sup>

The Government is undertaking a sustainable traffic and transport study for Gibraltar with a view to reduce traffic and congestion and increase energy efficient measures encouraged in the transport sector, for example the building of a large (100 space) car park with a bus shuttle service into town and the increase of public transport times/ routes. The use of biofuels will be encouraged by selling it at lower price at local petrol stations and their use will be adopted in the Government fleet.<sup>51</sup>

In residential, business and public sector, the import and use of highly efficient equipment (class A) will be encouraged.<sup>52</sup>

The Government will also establish an Environment Park to promote the sorted collection of waste. As regards land use, the Development and Planning Commission requires two trees to be planted for every tree cut down and favours the beneficial use of removed soil.<sup>53</sup>

### Implementation Capacity

See 'Implementation Capacity' above. There is no evidence regarding funding of low carbon development projects.

## UK Exposure

### UK Sunk Assets

While the overall UK sunk assets figure in Gibraltar is unknown, the Ministry of Defence maintains a garrison and military infrastructures, air and naval bases.<sup>54</sup>

### Absolute Value of UK Transfer

The UK provides £81,000 annually to support civil aviation in Gibraltar but it is expected to phase this payment out. Additionally, total costs of pensions payable to Spanish pensioners have been estimated in the region of £100,000.<sup>55</sup> The UK transfer from HMG (FCO) amounted to £290,000 in 2005-2006.<sup>56</sup>

### Share of National Budget from UK Transfer

Less than 1% of the budget of Gibraltar's national budget comes from its UK HMG transfer.<sup>57</sup>

<sup>49</sup> Department of the Environment, 2011.

<sup>50</sup> Department of the Environment and Environmental Agency, 2007. *Op cit.*

<sup>51</sup> *Ibidem*

<sup>52</sup> Environmental Safety Group, 2011. *On Climate Change*. [Online] Available at <http://www.esg-gib.net/> [Accessed 21 03 2012].

<sup>53</sup> Department of the Environment and Environmental Agency, 2007. *Op cit.*

<sup>54</sup> Ministry of Defence (MOD), 2012. *MOD Gibraltar*. [Online] Available at [www.mod.uk/DefenceInternet/DefenceFor/ServiceCommunity/OverseasPosting/Gibraltar/](http://www.mod.uk/DefenceInternet/DefenceFor/ServiceCommunity/OverseasPosting/Gibraltar/) [Accessed 21 03 2012].

<sup>55</sup> *Ibidem*

<sup>56</sup> National Audit Office, 2007. *Op cit.*

<sup>57</sup> Searle, D., 2010. *Gibraltar Government delivers latest budget*. [Online] Available at [www.gibraltarlawyers.com/news/all/100](http://www.gibraltarlawyers.com/news/all/100). Modified [Accessed 22 03 2012].

## Potential Liability



Gibraltar is the only UK overseas territory which is located within the EU. As such, the Government of Gibraltar is subject to certain EU obligations, including most EU environmental legislation.<sup>58</sup> This has a knock-on effect for potential UK liabilities as the UK is ultimately responsible for the implementation of European law in Gibraltar.<sup>59</sup>

Gibraltar is a signatory of numerous multilateral environmental agreements, these include:<sup>60</sup>

- Convention on Biological Diversity (CBD);
- Convention on International Trade in Endangered Species (CITES);
- Convention on Long-Range Trans-boundary Air Pollution;
- Convention on the Conservation of Migratory Species of Wild Animals (CMS);
- African-Eurasian Migratory Waterbird Agreement (AEWA);
- EUROBATS;
- Ramsar Convention on Wetlands of International Importance;
- Vienna Convention for the Protection of the Ozone layer; and the,
- Montreal Protocol on Substances that Deplete the Ozone Layer.

## Reputational Risks



Gibraltar has strategic importance for the UK both militarily and shipping purposes. Its communication systems, runway facilities and harbour also make it an important base for NATO.<sup>61</sup> The issue of Gibraltar represents a sensitive and politically contentious issue between UK and Spain.

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<sup>58</sup> DEFRA, 2012. *The Environment in the United Kingdom's Overseas Territories: UK Government and Civil Society Support*. London, UK: DEFRA

<sup>59</sup> National Audit Office, 2007. *Op cit*.

<sup>60</sup> DEFRA, 2012. *Op cit*.

<sup>61</sup> Army, 2012. *The British Army in Gibraltar*. [Online] Available at [www.army.mod.uk/operations-deployments/22730.aspx](http://www.army.mod.uk/operations-deployments/22730.aspx) [Accessed 22 03 2012].

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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 <sub>2</sub> 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 <sub>2</sub> 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 <sub>2</sub> 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.

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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



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## 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, 2008<sup>i</sup></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, 2010<sup>ii</sup>; Parry et al., 2007<sup>iii</sup></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<sup>iv</sup></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<sup>v</sup></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<sup>vi</sup></i></p>
Industry and Commerce	<p>Industry - Industry includes manufacturing, mining, construction and related informal production activities. Other categories, such as transport, energy supply &amp; 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<sup>vii</sup></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<sup>viii</sup>.

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

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

<sup>iii</sup> 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.

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

<sup>v</sup> 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>

<sup>vi</sup> 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

<sup>vii</sup> 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].

<sup>viii</sup> 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
<b>Threats Exposure Analysis</b>					
	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
<b>Resource Exposure</b>					
	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
<b>Importance to Overseas Territory</b>					
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 <sup>1</sup>  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

<sup>1</sup> 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
<b>Vulnerability (Current)</b>					
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
<b>Future Opportunities</b>					
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
<b>Current Emissions</b>					
4.1	Share of Current Emissions	High (>30%)	Medium (15%-30%)	Low (5%-15%)	None/Marginal <5%.
<b>GHG Abatement</b>					
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
<b>Future Opportunities</b>					
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.



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## Annex Four: Gibraltar - Scored VAM

RED
RED/AMBER
GREEN/AMBER
GREEN

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

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

Low Carbon Electricity Resource Potential	Share of Current Electricity Production	Potential
1 Wind	X	Medium
2 Hydro	X	X
3 Solar PV	X	X
4 Geothermal	X	X
5 Biomass	X	X
6 Waste (solid, liquid)	X	Medium
<b>Low Carbon Heat Potential</b>		
	% of buildings	Potential
1 Solar Thermal	X	X
2 Biomass	X	X
<b>Liquid Fuels</b>		
	% of consump	Potential
1 Bioethanol	X	X
2 Bio diesel	X	High

## Gibraltar

Summary
<p>Gibraltar covers 6.5 sq km at the entrance of the Mediterranean in the Iberian Peninsula. Financial sector, tourism and shipping mainly contribute to GDP (\$954.11m). Population of 29,441. Mediterranean climate with hot summers and mild winters.</p> <p><b>Threat Exposure Analysis</b>                      Low rainfall; land warming trends; deep water temperature increased by 0.3°C and deep water salinity increased by 0.06 units. Sea level rise in Gibraltar in the order of 0.28-0.58 m estimated. Rise in temperature, lower levels of rainfall and greater unpredictability of extreme events very likely. Gibraltar fossil fuel self-sufficient. Water produced through desalination. 422,000 metric tonnes CO2 generated in 2008.</p> <p><b>Adaptation and Resilience</b>                      Presence of endemic and endangered species of flora and fauna. Main economic sectors: financial services (22% GDP), shipping (20% GDP) and tourism (7%). Per-capita GDP of £44,947 and life expectancy of population 80.4 years. Two Sites of Community Importance and a Special Marine Area of Conservation designated. Sea defences built considering sea level rise. Studies on-going and planned for the protection of endangered species. Measures for flood protection to be adopted by law. Climate Change Forum set up. FCO staff specifically working on Gibraltar but no funds addressed to adaptation projects.</p> <p><b>Low Carbon Development</b>                      Transport sector responsible for more than 60% of total emissions. Relevant contribution also from energy supply (32%). 15% of energy to be produced from renewables. Limited Low Carbon activities in residential, transport, waste management and land use sectors. Several interventions for increased energy efficiency in energy supply, transport, residential, public and business, waste management and land use foreseen in Gibraltar Climate Change Programme and Energy Efficiency Action Plan.</p> <p><b>UK Exposure</b>                      UK transfer to Gibraltar (entirely from FCO) was equal to £290,000 in 2005-2006 (less than 1% of Gibraltar National Budget). The UK is responsible for the implementation of European law in Gibraltar. Gibraltar is a signatory of several multilateral environmental agreements. Strategic importance for UK for military and shipping purposes. Sensitive political issue between UK and Spain regarding sovereignty.</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	Yellow	Red	Green	Yellow
	Hydrology and Water resources	Green	Green	Green	Red	Green	Orange
Economic	Tourism	Red	Orange	Green	Yellow	Orange	Orange
	Transportation	Red	Green	Red	Yellow	Green	Orange
	Energy Supply and Use	Orange	Orange	Red	Yellow	Green	Orange
Social Systems	Industry and Commerce	Red	Green	Green	Green	Orange	Orange
	HDI /Livelihoods/Poverty	Green	Green	Green	Yellow	Red	Orange
	Human Health	Green	Green	Orange	Yellow	Red	Orange

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	Orange	Orange
X	Green	Green	Orange	Orange
X	Green	Green	Orange	Orange
X	Green	Green	Orange	Orange
X	Green	Green	Orange	Orange
X	Green	Green	Orange	Orange
X	Green	Green	Orange	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	Red	Orange	Red	Green	Orange
Transport	Red	Orange	Green	Green	Orange
Public	Green	Orange	Orange	Orange	Orange
Business	Green	Orange	Orange	Orange	Orange
Residential	Green	Orange	Orange	Orange	Orange
Waste management	Green	Orange	Orange	Orange	Orange
Land Use, Land Use Change and Forestry	Green	Red	Orange	Orange	Orange

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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 fo 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

## Annex Six: Emissions Data



