Sustainable Antarctic station design: Reducing contributions to climate change

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**Working Paper submitted by New Zealand and the United Kingdom**

Summary

New Zealand and the United Kingdom note that when Parties are undertaking modernisation or infrastructure projects in Antarctica, sustainable design standards are available for the design, construction and operation of Antarctic infrastructure, to support reducing contributions to climate change from these activities.

Context

In 2009, SCAR presented the Antarctic Climate Change and the Environment (ACCE) Report (IP 5, ATCM XXXII/CEP XII, 2010). In one of the recommendations, “SCAR encouraged all treaty parties to assess the contributions that their Antarctic operations make to global warming with a particular regard to greenhouse gas emissions and to adopt suitable mitigating protocols commensurate with the potential for impact.”

The Parties undertook Decision 1 (2009) ‘to convene a Meeting of Experts under the provisions of Recommendation IV-24, with the aim of discussing relevant matters related to implications of climate change for management and governance of the Antarctic region.’ The Antarctic Treaty Meeting of Experts (ATME) was held in Svolvær, Norway on 7-9 April 2010 and the Meeting reached agreement on 30 recommendations (WP 63, ATCM XXXIII/CEP XIII, 2010). Of relevance to Antarctic infrastructure, the following recommendations are noted:

* Recommendation 4: The ATME recommends that Parties be requested to:
  + acknowledge and encourage continuing efforts in developing and exchanging experience of energy efficiency and alternative energy practices so as to promote reduction of the carbon footprint of activities in Antarctica and cut fossil fuel use from stations, vessels, ground transportation and aircraft.
* Recommendation 5: Recognizing the importance of emission cuts in Antarctica and their symbolic value in the global context, the ATME recommends that the ATCM encourage COMNAP to work with national programmes to use consistent methods to quantify and publish savings made by energy efficiencies, and which contribute to both (a) reducing carbon footprint, and (b) reducing fuel consumption and operating costs.
* Recommendation 7: Welcoming the risk assessment approach taken by Australia to identify potential climate change implications for current and future Antarctic infrastructure, logistics and environmental values, the ATME recommends that Parties be encouraged to undertake and report on appropriate risk assessment processes.
* Recommendation 8: In developing EIAs for new facilities, the ATME recommends that Parties be requested to take climate change considerations into account.

With regards to Recommendation 8, ATCM XXXIX/CEP XIX (2016) adopted Revised Guidelines for Environmental Impact Assessments (Resolution 1 (2016)) in which the guidelines emphasized that, ‘as far as possible, consideration should be given to anticipated/potential environmental consequences of climate changes in the location of the proposed activity, and over the timeframe of the proposed activity, including the decommissioning phase where relevant.’

Recommendation 19 of the 2010 ATME ‘recommended that the CEP consider developing a climate change response work programme (CCRWP).’ The first edition of the CCRWP was adopted in 2015 (Resolution 4 (2015)), updated in 2016 (CEP XIX Final Report, Appendix 2) and the Subsidiary Group on Climate Change Response (SGCCR) was established in 2017 to facilitate the efficient and timely implementation of the CCRWP.

Climate change impacts to the built (human) environment is considered an issue in the workplan with a gap/need and action around identifying impacts on infrastructure and ways to mitigate or counteract those impacts.

IP47 (ATCM XLII/CEP XXII, 2019) reported that 73% of the COMNAP Member National Antarctic Programs are currently planning or in the process of modernisation of their station or stations. A further seventeen percent (17%) indicated they may be in the process of modernisation of their station or stations at some point in the near future. Noting the likely increase in the need for new and upgraded Antarctic infrastructure, this paper discusses principles in sustainable design which support consideration of reducing contributions to climate change from new or upgraded infrastructure projects in Antarctica.

Sustainable Design Standards

Sustainable design is the concept of designing the built environment in a manner that conforms to the principles of sustainability. A sustainable building is a building that, in its design, construction and operation and decommissioning/deconstruction, reduces or eliminates negative impacts, and can create positive impacts on our climate and natural environment. Sustainable buildings are also designed to improve our quality of life. Sustainable buildings may contain some or all of the following features[[1]](#footnote-1):

* Operational efficiency, including energy, water and other resources;
* Quantification of the impact on climate change through lifecycle assessment including embodied carbon of products and materials;
* Use of renewable energy;
* Pollution and waste reduction measures;
* Healthy indoor environmental air quality;
* Use of materials that are non-toxic, ethical and sustainable;
* Consideration of the environment in design, construction and operation and decommissioning/ deconstruction;
* Consideration of the quality of life of occupants in design, construction and operation; and
* A design that enables adaptation to a changing environment.

Sustainable buildings have many benefits including environmental protection, efficient operations (i.e. reducing water and energy consumption, the use of renewable energy and waste reduction measures), reduced emissions of greenhouse gases (which may result in economic benefits due to cost savings) and supporting the health and wellbeing of people who work or live in these buildings.

The principals of sustainable design can be verified through the use of design standards. Some well-known global sustainable design standard examples include:

* Leadership in Energy and Environmental Design (LEED);
* Building Research Establishment Environmental Assessment Method (BREEAM);[[2]](#footnote-2)
* Green Star – Green Building Council[[3]](#footnote-3)
* Civil Engineering Environmental Quality (CEEQUAL)[[4]](#footnote-4)
* Publicly Available Specification 2080 (PAS 2080)[[5]](#footnote-5)

Existing design standards are generally specific to the urban environment, where the majority of buildings and infrastructure projects occurs. Assessing the risk of climate change, reducing carbon emissions, and managing sustainability issues of buildings in Antarctica is complex. Existing design standards are therefore not applicable to the built (human) environment in Antarctica.

In addition to the EIA process, the UK has worked towards changing its approach to sustainable design and adopting best practice. In the past 5 years, British Antarctic Survey (BAS) has worked with the Building Research Establishment (BRE) to tailor BREEAM for polar environments. BAS currently uses a bespoke “Tailored Appendix” for the BREEAM International scheme for new buildings which has adapted many of the standard criteria to achieve the best possible outcome with the most appropriate approach for the climate and latitude. Infrastructure and civil engineering projects implement CEEQUAL and undergo an extensive scoping exercise to ensure appropriateness of the criteria. A minimum rating of BREEAM or CEEQUAL Excellent is required by BAS policy in all new build projects.

BAS is also developing internal processes to further support and embed best practice in sustainable design and integrate sustainable decision making throughout project management. BAS currently implements a Sustainability Strategy with bespoke Sustainability Management Plans for individual projects to track sustainable decision making across the design and build of a project. Additionally, every construction project will also produce a carbon report using the PAS 2080 standard, to outline how carbon is being managed at every stage and how a project contributes to carbon targets.

The benefits of using both internal and externally validated sustainability processes is delivering benefits across BAS in terms of better quality design, a better user experience as well as helping meet carbon reduction ambitions.

New Zealand collaborated with the New Zealand and Australian Green Building Councils to develop a custom sustainable design standard (Green Star Antarctic Tool), to independently verify the proposed Scott Base Redevelopment building design (WP XX). The tool utilises internationally recognised standards for addressing a projects contribution to climate change, assessing the life cycle impacts of materials and construction efforts, and enhancing operational efficiency of buildings. The tool is an internationally recognised system that verifies design and construction practices that reduces contribution to climate change. Further information on the application of the Green Star Antarctic Tool is presented in IP XX. The tool can be shared with Parties and updated for any Antarctic building or modernisation infrastructure project by a Green Building Council.

Recommendation:

New Zealand and the United Kingdom recommend the CEP advises the ATCM to recommend that Parties:

1. Consider the use of a sustainable design standard for the design, construction and operation of new buildings or modernisation infrastructure projects in Antarctica;
2. Note the availability of a custom Green Star Antarctic standard and tailored BREEAM tools, which may be shared with Parties, and adopted and adapted for any Antarctic building or modernisation infrastructure project;
3. Consider adopting the PAS 2080 standard, or similar standard, to manage and reduce the carbon emissions resulting from construction projects;
4. If full sustainable design standards are not available, consider developing internal sustainability processes that are aligned to local, national and/or global sustainability initiatives; and
5. Encourage COMNAP to continue to share sustainable design practices for station modernisation projects.

1. World Green Building Council - https://www.worldgbc.org/what-green-building [↑](#footnote-ref-1)
2. https://www.breeam.com/ [↑](#footnote-ref-2)
3. <https://www.nzgbc.org.nz/> [↑](#footnote-ref-3)
4. <https://www.ceequal.com/> [↑](#footnote-ref-4)
5. <https://www.bsigroup.com/en-GB/our-services/product-certification/product-certification-schemes/pas-2080-carbon-management-in-infrastructure-verification/> [↑](#footnote-ref-5)