Considering the Channel Islands' indirect GHG emissions

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1 Introduction

The Channel Islands have an impact on local and global greenhouse gas (GHG) emissions and the environment. Local actions and choices can have impacts across the globe, though the investments and goods purchased by and shipped to Islanders, and emissions related to potentially global supply chains. It is therefore important to look beyond the just local emissions and to consider a more complete carbon footprint of the Channel Islands.

This requires analysis further and deeper than the emissions covered in the GHG inventory. The Islands' GHG inventories currently capture only those emissions produced within the island boundaries and therefore do not capture indirect emissions. This is dictated by the international reporting rules. Accounting for all indirect emissions beyond this definition is challenging due to the large amounts of data required and would produce inaccurate estimates because of limited availability of this data. However, even without quantified impacts it is still important to consider what the sources of emissions are and how they can be reduced.

There is no single act to stop climate change and so significant global cooperation and coordination will be required. Island and coastal communities are at a greater risk of the effects of sea levels rising, increased flooding, extreme and more volatile storms and weather events. Early action increases the chance that the cost of action will be less than the cost of adapting to the consequences of climate change. Many jurisdictions have recognised the urgent threat from climate change, declaring climate emergencies. As of December 2019, 1261 jurisdictions across 25 countries have declared a climate emergency[1], including at national and local government[2] scale.

In 2019, Jersey declared a climate emergency with a goal to be carbon neutral by 2030. As part of Guernsey's 'Future Guernsey Plan', the Committee for the Environment & Infrastructure will develop a climate change policy and a 'Climate Change Action Plan', prioritising the mitigation of climate change for the Island. This report helps to start identifying potential actions and initiatives which could aid both Islands in reducing their wider impact.

For the purposes of this report, the impacts that we are considering are limited to indirect greenhouse gas emissions, i.e those emissions that are outside the scope of the current annual greenhouse gas inventory. This report seeks to start answering the following questions:

- What are the possible approaches for evaluating indirect greenhouse gas emissions?
- What are the possible types of indirect GHG emissions related to the Chanel Islands?

[1] https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/
[2] https://www.climateemergency.uk/

2 Approaches to evaluating indirect greenhouse gas emissions

There are a variety of ways to approach the topic of indirect greenhouse gas emissions. The following sections introduce a few of these, moving from the greenhouse gas inventory (Scope 1) and broadening out the scope of emissions that are included. The approaches we discuss are, in order of increasing breadth of environmental impact:

- Current Greenhouse gas inventory
- Scope 3 emissions
- Consumption-based accounting
- Life-cycle analysis
- Ecological footprint and biocapacity (considering broader environmental impact, not just greenhouse gas emissions)

Each of these approaches to assessing impact have their own set of advantages and disadvantages. Equally, each method has an associated set of uncertainties, that will each differ in nature and magnitude.

Table 1 gives an overview of the different emissions scopes, ranging for the greenhouse gas inventory (Scope 1) to wider greenhouse gas emissions (Other Scope 3). The GHG Protocol for Cities (which equally applies to the Channel Islands in this context) splits Scope 3 emissions into "Scope 3" and "Other Scope 3"[3]. This is because of the need to limit the "Scope 3" emissions so that they can be better defined and more easily measured, whilst the "Other Scope 3" emissions cover a broad range of emissions source such as those related to the production of goods purchased and are difficult to calculate.

Table 1 - Description of different emission scopes according to the GHG Protocol for Cities

Category	Description	Example sources
Scope 1: Direct emissions	Emissions from all activities that occur within the reporting jurisdiction, including operations that are owned or controlled by the jurisdiction	• All modes of transport, including cars, lorries and trains • Combustion in houses and commercial buildings e.g. for cooking and heating • On-island electricity generation
Scope 2: Indirect emissions	Emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting jurisdiction	• Emissions associated with electricity that is imported
Scope 3: Indirect emissions	GHG emissions that occur outside of the island boundaries as a result of activities that take place on-island	• Transboundary transport • Waste treatment and disposal outside the island boundary • Transmission and distribution losses from grid-supplied energy
Other Scope 3	Additional Scope 3 emissions that occur due to on-island activities. These are harder to measure and calculate and are not so well defined	• Embodied emissions in fuels, water, food and construction materials

[3] https://ghgprotocol.org/sites/default/files/standards/GHGP_GPC_0.pdf

When considering impact, we can also consider the spheres of influence (**Figure 1**) in relation to individuals or organisations**.** There are three spheres of influence which increase in size in turn. Each sphere encompasses those spheres within it, for example the concern sphere encompasses both the influence and control spheres. Although this concept is most often associated with individual actions, it could be applied at all scales. The spheres are:

- Control: Things that can be directly controlled by the individual or organisation
- Influence: Things that can influenced but not directly controlled by an individual or organisation, for example an individual or organisation can influence the choices and actions of some people and the systems that are operating within
- Concern: This is everything that concerns an individual or organisation including things that cannot be controlled or influenced, for example international politics, natural events and the weather.

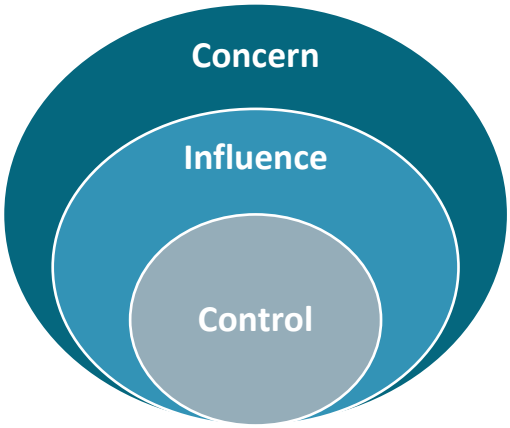

Figure 1 - Spheres of influence

2.1 Current greenhouse gas inventory

The current Channel Islands' GHG inventories provide data on the emissions total for the Scope 1 GHG emissions in Jersey and Guernsey. The current inventory covers the six Kyoto Protocol greenhouse gases: Carbon dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur Hexafluoride (SF_6). The inventory provides estimates of direct emissions occurring on the Islands from various sectors including: Agriculture, Business, Energy Supply, Land Use Change, Residential, Transport and Waste Management. The inventory includes all emissions arising from activities within the boundaries of each jurisdiction as shown in **Figure 2**. Some sectors are excluded because of international methods, such as international aviation and shipping.

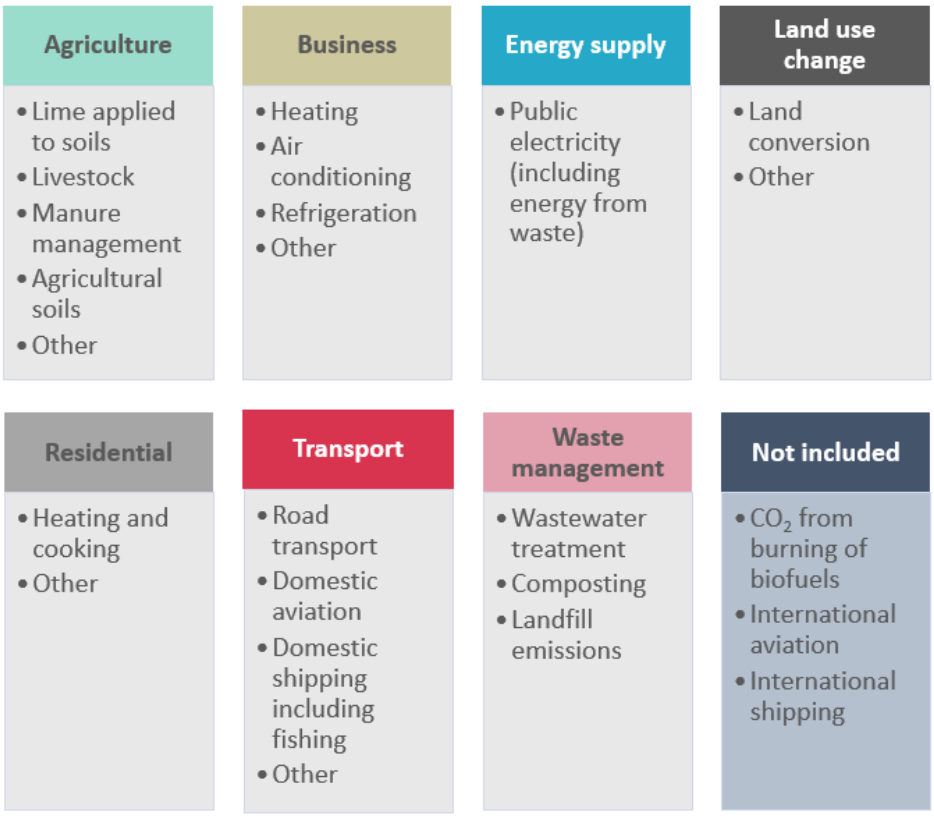

Figure 2 - Overview of activities covered in each sector of the current GHG inventory

2.2 Scope 3 emissions

One way of considering indirect GHG emissions, beyond those included in the GHG inventory is to calculate Scope 3 emissions – those emissions that occur outside of the island boundaries but are the result of on-island activities. Scope 3 emissions are most commonly calculated on an organisation basis and there are examples of companies based on the islands calculating their Scope 3 emissions, such as Jersey Electricity[4].

As mentioned in **Table 1**, Scope 3 emissions can be split into two categories; "Scope 3" and "Other Scope 3". Scope 3 emissions include emissions from transboundary transportation, off-island waste treatment and disposal and transmission and distribution losses from the supply of grid energy. When defined in this way, Scope 3 emissions could be relatively straightforward to calculate as they are well defined.

The Other Scope 3 emissions category includes embodied emissions from goods and services such as fuels, food and construction materials. These are more complex to define and can be difficult to calculate and this would require a lot of data that may not be available.

Another way of referring to this process is the concept of **carbon footprinting** which considers the total amount of greenhouse gas produced directly and indirectly as a result of human activities and is typically expressed in equivalent tonnes of carbon

[4] https://www.jec.co.uk/about-us/responsibility/environment/

dioxide (tCO_2e[5]). These human activities include a person, organisation, event or product.[6]

Carbon footprinting considers all six of the Kyoto Protocol greenhouse gases: Carbon dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur Hexafluoride (SF_6). Calculating the carbon footprint of a person, organisation or territory is a useful tool as it produces one value which encompasses all direct and indirect greenhouse gases, allowing for effective comparison between organisations and territories.

2.3 Consumption-based GHG Accounting

Consumption-based GHG accounting primarily focuses on what goods and services are consumed by the residents of a jurisdiction (in this case an individual island). GHG emissions are therefore reported by consumption category rather than GHG emission source category[7]. This type of accounting captures all direct and lifecycle GHG emissions of goods and services and ensures that the final GHG emissions are allocated to the final consumer rather than the producer[8].

Currently in Jersey and Guernsey's GHG inventory, only emissions from goods and services produced on the island are included (i.e. Scope 1 - emissions from imported energy covered under 'Scope 2'). As the Channel Islands imports many of their manufactured goods and products, their consumption-based emissions will be significantly higher than sector-based emissions. Therefore, by using this consumption-based accounting, it would allow for a more holistic assessment of GHG emissions and captures these emissions arising from imports.

Consumption-based accounting however would not include emissions from exported goods, as these are consumed outside the Islands' boundaries. This approach also requires a large amount of data and there are complex requirements for defining the scope.

Figure 3 outlines the basic equation for consumption-based accounting.

Figure 3 - Consumption-based accounting equation

2.4 Life Cycle Assessment

A 'life cycle assessment' approach can be taken to assess the environmental impacts associated with all stages of a product's life. It can include greenhouse gas emissions alongside an analysis of other environmental impacts such as changes to ecosystems and impact on water quality. For emissions, this involves calculating all the emissions attributed to the 'life cycle' of a certain good or product, from raw material extraction

[5] Emissions of different GHGs are converted to tonnes of carbon dioxide equivalent using Global Warming Potentials: http://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf
[6] https://www.carbontrust.com/resources/guides/carbon-footprinting-and-reporting/carbon-footprinting/
[7] https://www.c40.org/researches/consumption-based-emissions
[8] https://www.c40.org/consumption

through material processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling (**Figure 4**). This assessment allows for a comprehensive overview of the environmental interactions that take place when individual goods and products are made and used, and helps to avoid the shifting of burden from one life-cycle stage to another. The Research Triangle Institute (RTI) describes it as a 'cradle-to-grave' analyses of production systems, which includes all upstream and downstream energy inputs.

Figure 4 - The components in a Life Cycle Assessment

Example: Life cycle analysis of electric vehicles[9]

Life cycle stage	Main activities	Possible environmental impacts
Raw materials	Mining of raw materials Processing of raw materials into a useable form	Extraction, separation and refining processes are energy intensive Possible contamination of land, water and ecosystems from release of toxic substances
Manufacture	Production of key vehicle components Production of the battery	Emissions fuel combustion for energy intensive production processes
Distribution	Transporting the vehicle from the factory to the forecourt Transport of raw materials	Emissions from transportation vehicles
Use	Driving the vehicle	PM emissions from brake and tyre wear Emissions associated with electricity generation
End of life	Disposal of vehicle body and components Disposal of batteries	Emissions from end of life processing activities Possible release of harmful substances Reuse and recycling could have benefits for this stage and the raw materials stage

[9] European Environment Agency 2018 report on electric vehicles from life cycle and circular economy perspectives: https://www.eea.europa.eu/publications/electric-vehicles-from-life-cycle

2.5 Ecological Footprint and Biocapacity

The Ecological Footprint concept is not related to carbon footprinting and moves away from analysing only indirect greenhouse gas emissions. It measures the impact of human activities in terms of the area of biologically productive land and water required to support them. It can be used to compare demand on and supply of natural resources.

The footprint itself is an absolute measure of demand. It measures the ecological assets that a given population or person requires to produce the natural resources that it consumes, and to absorb its waste (**Figure 5**). This can be compared to biocapacity, which is a measure of supply. It measures the ability of ecological assets to produce useful biological materials and absorb human waste products (within a defined geographical area). Taken together, ecological footprint compares the rate at which we consume resources and generate waste (expenditure) with the rate at which nature can absorb our waste and generate new resources.

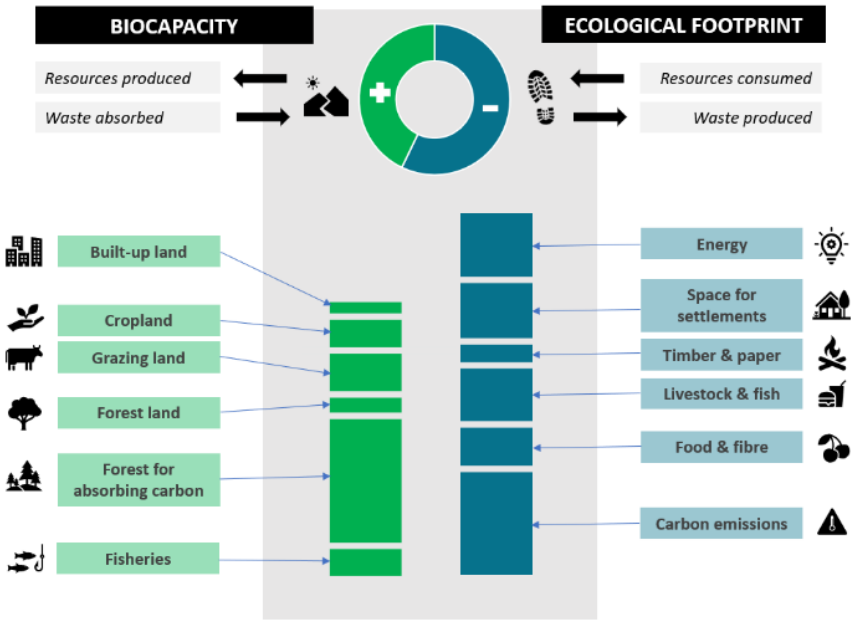

Figure 5 - A representation of the balance between ecological footprint and biocapacity. The proportions demonstrated by the diagrams are purely illustrative[10].

2.6 Summary of approaches to assessing wider GHG emissions

Table 2 considers the advantages and disadvantages to each approach for analysing wider greenhouse gas emissions, beyond the greenhouse gas emissions inventory.

[10] Based on the Global Footprint Network website: https://www.footprintnetwork.org/

Table 2 - Comparison of the different approaches to assessing impact

Approach	Advantages	Disadvantages
Scope 3 emissions	• Allows comparability between territories • Single unit indicator which can be disaggregated • Can be used to compare Scope 1 and Scope 3 emissions • Includes indirect emissions which aren't covered in normal inventory	• Other Scope 3 emissions would be difficult to calculate as they are not well defined and require lots of data • Scope 3 can be a challenging concept to communicate to the public • Risk of double counting
Consumption-based accounting	• Includes indirect emissions from imports which are not covered in the inventory • Particularly applicable for Islands as many goods are imported	• Emissions from exported goods not included • Large data requirement • Complex requirement for defining scope
Life-cycle analysis	• More holistic overview of broader environmental impacts	• Difficult to calculate and can be complex, as it involves including emissions released before and after the manufacturing process
Ecological footprint	• Useful communication tool which can be used by policy makers • Relatively easy to use and calculate[11] • It can be used at any scale • Widely used and often thought to be intuitively clear	• Not assessing emissions but a broader environmental impact • It can oversimplify resource use (it is not a precise measure of sustainability) • Hypothetical (and theoretical) in its approach to land uses • It does not present policy solutions • It does not cover all human impact on the environment – for example, its accounting for non-renewable resources is limited • Only recognises universal types of bioproductive areas

[11] https://evidentiary101.wordpress.com/2015/05/13/part-2-the-strengths-and-weaknesses-of-the-ecological-footprint-analysis-as-an-indicator/

3 Conclusions and Recommendations

This report has considered the sources of indirect greenhouse gas emissions associated with the Channel Islands. It considered a number of approaching for assessing greenhouse gas emissions beyond those recorded in the greenhouse gas inventory, such as considering Scope 3 emissions.

Recommendations for individuals and companies

All these actions begin with the need to prioritise sustainability when making choices about our lifestyles. It is important that individuals and companies value environmental impact and factor this into decisions alongside other priorities such as money and time.

Recommendations for the further research and action

This report has outline potential ways to assess wider greenhouse gas emissions. The next steps are to choose the scope of wider greenhouse gas emissions for interest for the Channel Islands and to consider how to quantify them. Further actions could include:

Quantifying broader impact – To quantity wider GHG emissions the Channel Islands needs carry out one of the methods of analysis proposed in Section 2. For example, such as calculating a limited number of sources of the Scope 3 emissions.

Further research on the impact of the financial sector – Given the importance of the finance sector in the economy, the governments of Jersey and Guernsey should engage with the financial sector to jointly investigate the broader impacts of the sector and identify actions to reduce this impact.

Further research and action on education and awareness raising – the governments of Jersey and Guernsey should continue to educate the public on environmental issues, raise awareness of key issues in the Channel Islands and provide accessible advice on possible actions. The governments should do more research into the best ways to incentivise more sustainable lifestyle choices. There may also be a need to provide support for education in specialist areas that will grow as sustainability becomes more of a priority, for example renewable energy.

About the authors

Kathryn Hampshire: Kathryn specialises in emissions inventories and data visualisation. She has led work to compile and QA/QC greenhouse gas inventories for the UK Oversees Territories and Crown Dependencies and the Devolved Administrations as part of the UK emissions inventory programme. She has recently been working with Jersey, Guernsey and the Isle of Man creating technical reports, reports for the general public and visualisations of emissions data to increased understanding of emissions data and facilitate stakeholder engagement.

Henry Irvine: Henry has a range of experience in working with Local Authorities on climate action, following declarations of climate emergency. Most recently he has provided technical input to a critical review of the London Borough of Newham's climate action plan, the compilation of the baseline and projected emissions scenarios for Cherwell District Council, and he has engaged with stakeholders in the development of the London Borough of Merton's scope of emissions inventory and targets. Henry has also contributed to the development of a database for a Sankey diagram of global GHG emissions by source, sector and gas.

Justine Raoult: Justine has experience in core inventory compilation, the measurement, verification and reporting (MRV) of greenhouse gases, and data visualisation. She has first-hand experience in GHG compilation having compiled the inventory for the Devolved Administrations, specialising in fuel combustion and assisting in writing the technical report. Justine is leading on the compilation of the GHG inventory for Overseas Territories and Crown Dependencies (OTsCDs), which requires coordinating a team, carrying out compilation in the agricultural sector, and completing the rigorous QA/QC processes.

Katie King: Katie is a Company Director at Aether and has been involved in the compilation of emissions estimates for 15 years, focused in particular at the local level through spatial mapping of emissions. Katie is Knowledge Leader for Local Authority carbon emission data as part of the UK NAEI programme, overseeing the production of the LA level CO_2 dataset for DECC each year. Katie has much experience in data evaluation for emissions estimates, advising on and reviewing the work of the National Atmospheric Emissions Inventory emissions mapping team covering many sectors.

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