

FACT SHEET

The Science of Climate Change

What is 'climate change'?

Climate change refers to the increasing concentration of heat-trapping greenhouse gases (GHGs) in our atmosphere and resulting changes to the Earth's climate – most notably increasing air and water temperatures. Since the mid-1700s, the level of carbon dioxide in the atmosphere has risen 36 percent and methane levels have risen 148 percent. Global average air temperature has risen by 0.6° C since 1900, and is projected to increase another 1.1° to 6.4° C over the next century.

What causes climate change?

Climate change is caused by human activities that result in the release of carbon dioxide and other GHG emissions into the atmosphere -- primarily the burning of fossil fuels and large-scale deforestation. The human cause of climate change has been endorsed by more than 40 scientific societies and academies of science, including all the national academies of science of the major developed countries.

What are the global impacts of climate change?

A change of even a few degrees in temperature destabilizes the delicate balance of the ecological systems on which humans rely. The global impacts of climate change include melting of the Arctic ice sheets, rising sea levels, species extinction, ecosystem disruption and loss, ocean acidification, severe weather events, and wider range of vector-borne disease such as malaria and dengue fever.

How will climate change impact the Islands Trust Area?

Coastal areas like the Islands Trust are particularly vulnerable to the effects of climate change. Local impacts are projected to include:

Freshwater Resources

- Saltwater intrusion into coastal aquifers due to sea level rise
- Changes in groundwater recharge rates and water table depths
- Decrease in available potable water and increased competition for water (drinking, irrigation)
- Increased risk of drought and/or flooding
- Changes in water quality

Marine and Aquatic Ecosystems

- Increased incidents of 'red tide'
- Invasion by exotic species
- Shifts in species range and distribution
- Loss of near-shore habitat due to sea level rise

Coastal Resources and Ecosystems

- Damage to coastal infrastructure and natural features due to sea level rise and storm surges
- Loss of coastal habitats due to sea level rise and erosion
- Increased costs for maintenance and expansion of coastal erosion control
- Loss of cultural and historical sites on coastline to sea level rise and related impacts

Biodiversity

- Shifts in distribution and range of species
- Loss of species not able to adapt to changing climate conditions
- Increased competition from invasive species
- Loss of habitat
- Challenges to maintenance of biodiversity through current protected areas system due to species migration

Protected Areas

- Increased impacts from natural hazards (wind storms, storm surges, droughts)
- Species migration, extinction and increasing competition from exotic species

Forests

- Shift in the distribution and range of species
- Increased risk of pest outbreaks
- Increased risk of forest fire
- Increased competition from invasive species

Agriculture

- Changes in crop yield (will vary by crop) and growing conditions
- Increased demand for irrigation water due to longer and warmer growing season
- Increased risk of pest outbreaks and weeds
- Increased soil erosion
- Saline contamination of low-lying coastal agricultural lands

Energy

- Reduced heating demands during winter months
- Increased cooling demand during summer months
- Increased or decreased hydroelectric generating capacity due to changes in streamflow

Transportation

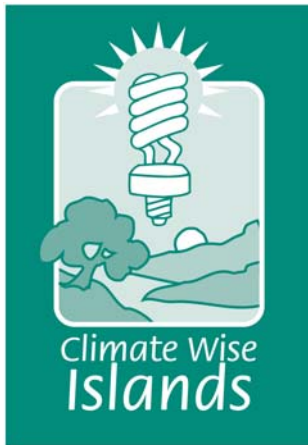
- More travel disruptions associated with extreme weather events on ferry system
- Increased road damage from higher temperatures, increased precipitation, and storm surges

Infrastructure

- More frequent landslides, road washouts and flooding
- Reduced effectiveness of seawalls with sea level rise and storm surges

Health

- Increases in heat related stress, particularly among the young and elderly
- Increased vector-borne illness (e.g. West Nile)
- Reduced summer air quality in urban areas may impact island communities located near major urban centres



FACT SHEET

Islands Trust Climate Commitments

Islands Trust Climate Action

Climate change is a global problem that demands local action. The Islands Trust is committed to taking meaningful action to reduce the carbon footprint of our islands:

Trust Council Resolutions: In March 2005, Trust Council passed a resolution requesting the Executive Committee to undertake advocacy on climate change and energy issues. In September 2006, Council passed a resolution encouraging local governments in the Trust Area to make residents and visitors aware of ways to reduce their GHG emissions.

Trust Council Advocacy: In September 2006, Trust Council called on the federal government to meet Canada's commitment to reduce greenhouse gas emissions, as promised in its ratification of the Kyoto Protocol in 2002.

Carbon Neutral Operations Plan: The Islands Trust has developed a GHG emissions profile of the Trust's corporate operations and an action plan to reduce these emissions.

BC Climate Action Charter: The Islands Trust has endorsed the Climate Action Charter, committing to achieve carbon neutral government operations, measure community GHG emissions, and create complete, compact, and energy efficient communities.

Bill 27: The Islands Trust is committed to meeting the requirements of Bill 27 – the *Local Government (Green Communities) Statutes Amendment Act* – by including GHG reduction targets, policies and actions in all 19 of our Official Community Plans by May 31st, 2010.

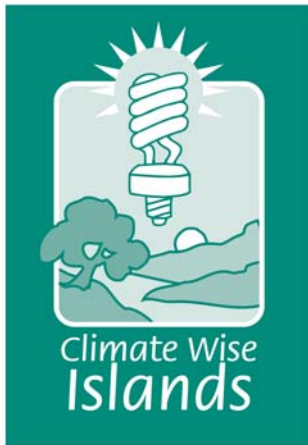
Climate Wise Islands: Launched in September 2009, this new initiative reflects the Trust's long-term commitment to work with other levels of government and local community groups to build sustainable and low carbon island communities through innovative land use planning and advocacy.

Local Trust Committee Climate Action

All Local Trust Committees have made climate change a top work priority and are currently working to amend their Official Community Plans to comply with Bill 27:

GHG Reduction Targets: Local Trust Committees are working to develop meaningful emissions reduction targets to inspire action on climate change and meet Bill 27 requirements.

Climate Change Policies + Actions: To comply with Bill 27, Local Trust Committees are crafting climate change policies that address land use; transportation; building design, siting and landscaping; energy source and supply; food and agriculture, and; natural areas and ecosystems.



FACT SHEET

GHG Emissions Reduction Targets

Bill 27 Target Requirements

Bill 27 requires that each Local Trust Committee (LTC) set greenhouse gas (GHG) emissions reduction targets in their official community plan (OCP). At least one of the targets must be a measurable and numerical emissions reduction target, expressed as a percentage reduction in GHGs. These targets are intended to be challenging and motivating – to inspire community action, rather than be easily achieved.

What reductions are required to avoid the worst effects of climate change?

What is a 'safe' concentration of GHGs in the Earth's atmosphere? Scientific modeling by the Intergovernmental Panel on Climate Change (IPCC) indicates that temperature increases of more than 2-3° C will result in 'dangerous anthropogenic interference with the climate system.' In order to avoid this, the atmospheric level of CO₂ must remain below 440 parts per million (ppm). Studies by other leading climate scientists show that warming over 1.7° C will result in species extinction and ice sheet melting – indicating that 350ppm is the upper limit of 'safe' CO₂. In 2008, atmospheric levels of CO₂ already measured 385 ppm – well above this 'safe' limit.

What emissions reductions are required to achieve this 'safe' level of GHGs? According to the IPCC, GHG emissions reductions of 50-85% below 2000 levels are required by 2050 to achieve a CO₂ concentration of 350-450 ppm. According to this scenario, this reduction will result in global average temperature increase of 2 - 2.4° C above pre-industrial levels and an average global rise in sea level of 0.4 to 1.4 m – excluding contributions from melting ice sheets, glaciers, and ice caps. As this study does not account for all possible feedback loops between the carbon cycle and temperature increases, it is likely that the reductions required to achieve 350ppm are underestimated.

What targets has the Province adopted?

In 2008, the BC government committed to a 33% reduction in provincial GHG emissions from 2007 levels by the year 2020, and an 80% reduction from 2007 levels by the year 2050. Interim targets of 6% by 2012 and 18% by 2016 have also been adopted.

What targets have other local governments adopted?

Many local governments in BC have already set targets. Below is a sampling of these targets:

Bowen Island Municipality: 33% by the year 2020 and 80% by the year 2050 (2007 baseline)

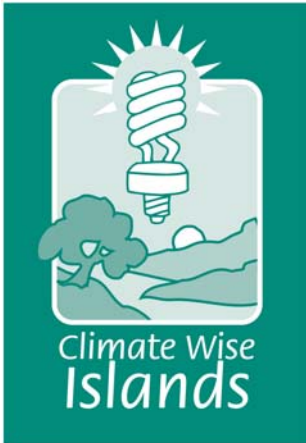
Metro Vancouver: 15% reduction by 2015 and a 33% reduction by 2020 below 2007 levels

CRD: 33% reduction in emissions by 2020 (below 2007 levels)

Comox Valley Regional District: 80% by 2050

City of Colwood: 33% by 2020, relative to 2007 levels

Dawson Creek: 14% by 2012, 33% by 2020, and 85% by 2050



FACT SHEET

Climate Change Policies

Bill 27 Climate Change Policy Requirements

Bill 27 requires each Local Trust Committee to develop policies and actions to reduce greenhouse gas (GHG) emissions and integrate them into their official community plan (OCP). Due to the relationship between land use and GHG emissions, Local Trust Committees can significantly influence future greenhouse gas emissions through Official Community Plan policies.

OCP Climate Change Policy Options

Islands Trust staff have developed a 'menu' of climate change policies in the following areas:

Land Use:

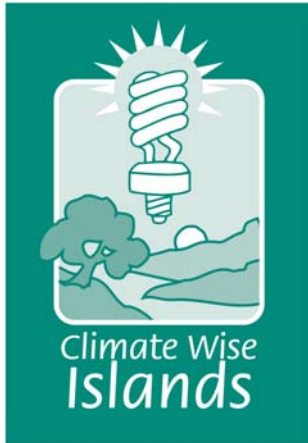
Transportation:

Building Design, Siting, and Landscaping:

Energy Source and Supply:

Food and Agriculture:

Natural Areas and Ecosystems:



FACT SHEET

OCP Climate Change Amendments Process + Timeline

OCP Climate Change Amendments

Bill 27 requires that all Official Community Plans be amended to include greenhouse gas (GHG) emission reduction targets and climate change policies by May 31, 2010.

OCP Amendments: Process

The amendment of an OCP is a multi-month, community-driven process that engages residents and other stakeholders through a variety of public input events.

OCP Amendments: Timeline

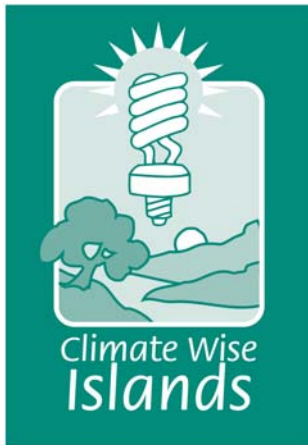
While each Local Trust Committee will follow a slightly different path when amending their OCPs, the following schedule provides a rough timeline process:

Oct-Dec: Planners provide policy options

Nov-Mar: Community + stakeholder consultation

Jan-May: Bylaw process – info meetings, referrals, readings, and public hearings

May 31: Submission to Minister for approval



FACT SHEET

The Land Use-GHG Connection

How can land use decisions impact GHG emissions?

Land use is a key driver of GHG emissions, and shifting land use patterns is one of the most effective ways to reduce a community's carbon footprint. Recent studies have quantified the land use-GHG emission relationship – offering strong evidence that the physical arrangement of roads, buildings, and land use types directly influence GHG emissions.

Clustered and complete communities

Clustered and complete community form – including mixed residential-commercial uses, increased densities in appropriate locations, and road network connectivity – can reduce residents' need to drive while at the same time increasing the convenience and viability of alternative forms of transportation. A land use study on Salt Spring Island found that GHG emissions were 22 percent lower than the baseline when density was clustered around the village cores.

Building Design

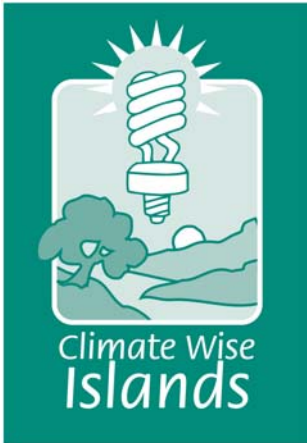
Community design and land use can also substantially lessen residential and commercial building energy consumption through smaller living spaces, shared walls, and district energy systems. Per capita energy consumption and GHG emissions are 2 – 2.5 times higher in low density development.

Green Infrastructure

The GHG impact of green infrastructure and landscaping has been less extensively studied; however, this aspect of land use represents another important opportunity for emissions reductions. For example, green infrastructure – including shade trees over buildings and streets for natural summer cooling, trees and greenery that insulates and breaks wind flow during the winter, green roofs, and community green spaces – can further reduce building energy use and act as carbon sinks.

Land Use Authority in the Islands Trust Area

In the Islands Trust Area, only Local Trust Committees (LTCs) have the authority to control land use. This authority is defined by the *Islands Trust Act* and the *Local Government Act*, and includes the power over official community plan policies, settlement patterns, density, zoning, parking requirements, and screening and landscaping. Bill 27 amended the *Local Government Act* to expand the authority of LTCs to use land use planning to increase energy efficiency and reduce greenhouse gas emissions.



FACT SHEET

Planning Tools to Reduce GHGs

What planning tools can be used to reduce GHG emissions?

A variety of tools exist can be used by Local Trust Committees (LTCs) to develop climate change Official Community Plan (OCP) policies and meet the requirements of Bill 27:

Zoning

Zoning regulations determine where specific types of development occur, as well as building size, setback, and height. An LTC can adjust zoning bylaws to eliminate disincentives and encourage energy efficient building construction and retrofits in a number of ways. For example, an LTC can:

- Exclude features designed to increase energy efficiency from calculation of Floor Area Ratio
- Reduce or eliminate building setbacks to encourage construction of thicker walls
- Exclude renewable energy equipment from height calculations
- Permit small-scale renewable energy equipment in setback area
- Make zoning approval subject to site specific requirements related to GHG emissions

Density Bonus

Established through zoning bylaw, a density bonus allows developers to surpass the allowable density (measured in FAR) in exchange for the provision of community amenities. A community amenity is broadly defined as features that a LTC considers of value to its residents. Amenities related to GHG mitigation include: energy efficient and green building design, use of an alternative energy system, public walking and bicycle trails, tree preservation, and ecosystem restoration. Amenities can be provided on-site or off-site.

Density Transfer

Density transfer is tool that allows the voluntary transfer of the development potential of one property (the 'sending property') to another property (the 'receiving property'). Density transfer can be used to help an LTC gradually move towards a sustainable development pattern and low-GHG build-out plan (e.g. concentrating future development in nodes to increase density, reduce transportation needs, and preserve forested lands). 'Sending' and 'receiving' areas are identified in an OCP, and density transfers are carefully considered on a one-by-one basis.

Design Guidelines

Design guidelines are a set of land use principles established by an LTC to help shape development in a specific area. If desired by an LTC, design guidelines can include an emphasis on energy efficient and low GHG development. While such guidelines are not binding on developers, they can be an effective tool – particularly when designed to complement and expand on zoning requirements.

Development Permit Areas

A development permit area (DPA) is an area identified in an OCP within which all subdivisions, new construction, and building additions or alterations require a development permit. In order to receive a permit, developers must conform to a set of development requirements determined by an LTC. Bill 27 allows local governments to establish DPAs specifically intended to reduce GHG emissions and promote energy and water efficiency. Permit requirements within these DPAs may include stipulations around site landscaping (e.g. natural shading, insulation, and wind-breaks to reduce building energy consumption), siting of buildings, exterior form and design of buildings, equipment and systems external to buildings and other structures, and restrictions on type and placement of trees and vegetation. Requirements such as parking stalls for small electric vehicles and plug-ins can also be required through DPA guidelines. DPAs address land use and exterior building design only, and cannot influence construction standards and interior building design.

Parking Requirements

LTCs have bylaw authority to determine the amount, size, design, surfacing of off-street parking required by a building. Bill 27 expanded parking requirement authority: LTCs can now reduce off-street parking requirements for development that is in proximity to alternative transportation services, and can also require developers to provide cash in lieu of required off-street parking for development of walk ways, bicycle paths, public transit and other alternative transportation infrastructure.

Comprehensive Development Zones

Comprehensive Development Zones (CD zones) are OCP-identified zones in which an LTC can establish guidelines and requirements for all aspects of development in a coordinated and integrated way. This tool can be used to mitigate GHG emissions in a number of ways – for example, CD zones:

- Allow an LTC to establish specific and detailed zoning requirements that support sustainable land use patterns.
- Create opportunity for a LTC to extract commitments for community amenities such as tree retention, green infrastructure, and energy efficient buildings from a developer
- Allow an LTC to cluster development in one area of the development zone to minimize site disturbance and create compact land form

Development Cost Charges (DCCs)

While LTCs do not directly control DCCs, they can encourage regional districts to execute this new DCC authority. DCCs are one-time charges levied on new subdivision and buildings to cover the cost of off-site infrastructure required to service the new development. Bill 27 allows local governments to waive or reduce DCCs for small-lot subdivisions and construction that advances low-GHG development patterns.

Advocacy and Partnerships

While not planning tools per se, advocacy initiatives and partnerships can be effective OCP policies that play an important role in reducing GHG emissions associated with land use.