COMMUNITY ENERGY AND CLIMATE ACTION PLAN

The Resort Municipality of Whistler | July 2016

WHISTLER

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1 EXECUTIVE SUMMARY

Whistler's Vision is to be the *premier mountain resort community as we move toward sustainability*. Implied in this vision is a journey — **an understanding that it will take continued commitment to get to our intended destination**. Whistler also understands that on this journey we will have to find a way to do things more efficiently. The good news is that Whistler has already achieved strong progress in this regard, that many practical solutions already exist to take next steps, and that this Plan provides a solid approach to help transition from organizational commitment to real action across the community.

We live in an era of climate responsibility; climate change is a certainty, as is the human responsibility for it. Reducing our greenhouse gas emissions is one of the most significant moral actions we can take as a community to maintain our leadership role in solving the global climate crisis. This era of responsibility is further demonstrated by recent changes in the geo-political landscape as most evidenced by the recent COP21 outcomes. Never before has such shared political will been achieved with respect to the climate challenge.

We as a community expect continued commitment to climate leadership, and this leadership will require ongoing action by all involved – by community members, by business owners and entrepreneurs, by visitors, and by all three levels of government.

Fortunately, as a mountain town, Whistler has long been particularly committed to taking action on climate change. The winter mountain landscape is our greatest asset, both socially and economically. Outdoor tourism-based communities, including ski resorts like Whistler, have economies and cultures that are closely connected to stable environmental conditions and more vulnerable to a changing climate. The impacts of a changing climate have the potential to significantly impact Whistler's primary economic engine – tourism. Informed, strategic planning and a commitment to action will help to ensure that Whistler is best positioned to remain successful into the future.

This Community Energy and Climate Action Plan (CECAP) is an update and expansion of the 2004 Resort Municipality of Whistler (RMOW) Integrated Energy, Air Quality and Greenhouse Gas Management Plan. The CECAP sets out strategic directions and practical actions to reduce Whistler's contribution to climate change, as well as recommending prioritized adaptation strategies to prevent or minimize the key potential impacts of projected local climate changes. More than 30 leaders from across the community have worked together with the RMOW project management team to develop this long-term mitigation and adaptation strategy. The implementation of this Plan will take a similarly broad community commitment to ensure that Whistler moves quickly towards its climate action and energy goals.

The solar thermal and geo-exchange installation at Meadow Park Sports Centre (2009) has reduced facility emissions by more than 400 tCO2e per year, catalyzed savings of $125,000 per year, and represents a major reason why the RMOW's corporate emission footprint is now 38% below 2008 levels.

GHG Emissions and Energy Consumption Reduction (Mitigation) Targets are powerful motivating forces for driving action. As such, this Plan reconfirms the existing community greenhouse gas (GHG) emissions and energy reductions targets, and expands current aspirations to include a new renewable energy target. These targets are informed by widespread scientific consensus, community

input, relevant best practices, and Provincial precedents. These targets are established with an acute understanding that continued growth and anticipated expansion of the local economy is directly dependent on a stable climate. In fact, recent research identified 21 countries experiencing positive economic growth since 2000 while at the same time meaningfully reducing carbon emissions – some dramatically.

Specifically, this plan outlines actions to move the community toward the following targets:

- A 33% reduction in GHG emissions by 2020, an 80% reduction by 2050 and a 90% reduction by 2060 – all relative to 2007 levels.
- A 10% reduction in total community energy consumption by 2020 – relative to 2007 levels
- Derive 100% of the energy used in Whistler from renewable sources by 2060

Whistler's progress toward its emission reduction targets started strong (see Section 5). In fact, by 2013, Whistler had already achieved an estimated 18% reduction[1] versus 2007 emissions levels. More recently however, reduction progress has slipped from the earlier pace. 2014 and 2015 data now demonstrate that community emission levels have stalled at approximately 16% below 2007 levels, slipping significantly from the required pace to achieve the 2020 target.

While there are many possible reasons for the recent performance decline (increased visitation, community growth, achievement of low-hanging fruit), the purpose of this Plan is to present a series of practical and ambitious recommended actions to improve Whistler's overall performance and to regain a trajectory toward both the 2020 energy and GHG reduction targets.

Built on a detailed analysis of community energy and GHG emission trends over the last 15 years, this Plan proposes a series of phased initiatives designed to reduce energy consumption and significantly decrease GHG emissions. Progressive initiatives are proposed for all sources and segments of Whistler's community profile – from the building sector (both new and existing, as well as across residential, commercial and institutional/industrial properties), to mobile emissions related to the use of passenger and fleet vehicles, to those emissions associated with the use and management of solid waste streams (especially compostable organic waste).

Key recommended energy and GHG emission reduction initiatives included within this Plan range from support for expanding access to mass transportation services and growing electrification of transportation more broadly, to homeowner and commercial sector incentives for improving the energy efficiency of our built environment. While the reduction of transportation-based emissions associated with passenger vehicle use are the top priority of this Plan, a full list of recommended energy/GHG reduction actions covering all sectors is included in Section 6 of this document.

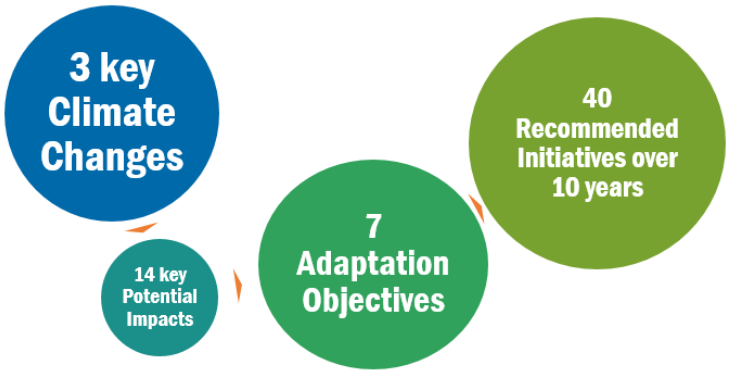
The reality is that collectively these recommended initiatives can make a meaningful reduction in Whistler's emissions. However, the suite of actions included in this Plan is not forecast to be

[1] And 23% below 2000 levels.

sufficient to meet the community's identified targets. **Without the alignment and collaboration of senior levels of government through federal and provincial programs, regulations, incentives and other jurisdictional tools, as well as the continued committed leadership of the private sector, Whistler will not meet its 2020 emission reduction targets.** Building on current momentum across jurisdictions both within Canada and beyond, a shared commitment to take meaningful action at all levels of government, and across both the public and private sector has never been stronger. Working together, the path toward our shared climate targets is possible. An approach that leverages both existing technologies, ongoing advocacy, partnership and deliberate, informed policies has the collective potential to drive meaningful progress toward all of the energy and emissions goals noted within this Plan.

Climate Change Resilience (Adaptation). Climate change is projected to have significant environmental, economic and social impacts on a global scale, including mountain tourism-based communities. Anticipated climate change impacts present risks to community sectors and values of interest, such as infrastructure, tourism and outdoor recreation, social and cultural values as well as the natural environment and biodiversity. Climate change is a reality, and it is critical that all key community stakeholders continue to take steps to assess the potential local impacts of climate change, and strategically adapt infrastructure, systems and management approaches to increase the resilience of the resort community over time. The CECAP represents Whistler's first formal strategic, consolidated approach to climate change adaptation planning undertaken collectively by the community.

To be relevant and effective, adaptation efforts require an understanding of anticipated future climate changes, vulnerabilities and risks in a way that enables the resort community to confidently adapt, plan and make decisions. Historical rates of climate change and variability are no longer an accurate gauge for forecasting future climate conditions. Detailed climate forecast models specific to Whistler were developed with the assistance of the Pacific Climate Impacts Consortium (PCIC) at the University of Victoria to ensure that this document was based on the best available information, and to support ongoing informed planning.



Detailed modelling and associated analyses has projected the following key climate changes for Whistler over the next 25 to 55 years:

1. **Increase in the frequency and intensity of heavy rain events.**
2. **Longer, hotter and drier summers.**
3. **Milder winters, with increased precipitation falling as rain near valley bottom, while snow pack at higher elevation sees limited change.**

A vulnerability and risk assessment of potential impacts related to these forecasted climate changes was undertaken to distill and prioritize the most pressing potential impacts related to these climate changes for Whistler. To address these key impacts, the CECAP establishes a series of adaptation objectives and priority recommended actions to increase Whistler's resilience in the face of climate

change. The effective implementation of these adaptation measures will position Whistler to meet the challenges of a changing climate as we move toward our broader community goals and Whistler2020 vision.

Key recommended adaptation initiatives included within this Plan range from renewing our integrated storm water management, water conservation and wildfire protection plans, to increasing access to weather independent attractions in the Valley and increasing communication and engagement around climate and energy related issues. More detail on the recommended Adaptation action plan can be found in Section 8 of this Plan.

Summarizing the Approach. Mitigation efforts to reduce GHG emissions are required so as not to contribute further to the problem of climate change, while adaptation efforts are necessary to support our resilience to the climate changes that are expected and already underway. As mitigation and adaptation measures sometimes overlap and complement each other, dual benefit actions are highlighted as a priority within this Plan.

For both mitigation and adaptation, many simultaneous initiatives will be required for effective outcomes. This Plan concentrates on the highest priority strategic actions that will set Whistler on a path towards success in addressing climate change at the local level, while concurrently increasing resilience to future potential changes in our local climate.

Finally, to support the effectiveness of the Plan, and to support related work to advance our community toward our climate action goals, the following Implementation guidelines are intended to apply across all recommended actions. Actions and initiatives:

a. should be based on the most currently available peer-reviewed scientific data,
b. should be supported by ongoing performance monitoring and reporting systems,
c. should seek to maximize co-benefits across other sectors and minimize any potential negative impacts,
d. should seek to catalyze collective action and shared responsibility across the community, the region, and across our visitor base,
e. should be both cost effective and affordable, and
f. wherever possible, the RMOW shall seek to lead by example across its corporate operations.

Navigating this Document. Sections 2 and 3 of this Plan provide an overview of the pressing challenge of climate change, as well as a summary of the vision - including specific targets - for a low carbon resort community. Sections 4 and 5 of the Plan cover a short history of Whistler's climate and energy management progress as well as detailed performance over the last 15-20 years. Sections 6, 7 and 8 include the main body of recommended mitigation and adaptation initiatives as well as the associated rationale. Nearing the end, Section 9 provides an overview of the planned implementation approach including a proposed approach for ongoing monitoring and reporting. Finally, a series of appendices are included for additional detail in support of various sections of the Plan.

2 THE CHALLENGE OF CLIMATE CHANGE

Climate change is a challenge for all communities. Undertaking mitigation initiatives to support local, national and global greenhouse gas (GHG) emissions targets; understanding local implications of changing climate regimes; identifying vulnerabilities and risks of climate impacts and working to improve community resilience – these are complex tasks that require resources, strategic planning, collaboration and commitment. All across BC, Canada and the world, communities like Whistler are taking on the challenge to do their part to take action on climate change.

Addressing climate change requires communities to consider both mitigation and adaptation, two key components of a comprehensive approach. Mitigation entails taking steps to reduce our GHG emissions. Mitigation is necessary to ensure that we don't continue to make the problem worse. Adaptation involves taking action to reduce vulnerability and risks associated with the impacts of climate change. Adaptation efforts increase the resilience of our natural, built and socio-economic systems to the impacts of changes that we know are coming (or are already underway).

Climate modelling projections for Whistler include increased intensity and frequency of rain storms, longer, hotter, drier summers and milder winters with anticipated changes from historic snowfall regimes. Potential impacts of these climate changes may affect the resort community in numerous ways, ranging from risks to the integrity of infrastructure and transportation systems, health and safety risks, threats to the natural environment and biodiversity, and small and large-scale economic impacts.

As a tourism-centred mountain town, Whistler has a particular interest in addressing the issue of climate change. Whistler welcomes over 2.7 million visitors annually and we place significant reliance on snow and weather for our outdoor tourism and recreation-based economy. The potential impacts of a changing climate, such as threat of wildfire, changes in snow conditions, and seasonal weather instability, could put Whistler's economic engine at significant risk. The resort community's special dependence on snow and weather patterns connects us strongly to our shared responsibility to manage greenhouse gas emissions, and renders us more sensitive to the reality of potential impacts if we do not. Furthermore, Whistler may also experience broader effects related to changing tourism trends and other economic patterns associated with the global impacts of changing climate.

Within the challenge of addressing climate change, there also lies opportunity – an opportunity for the RMOW to accelerate Whistler's path toward sustainable solutions, to demonstrate leadership in community energy planning, to increase Whistler's resilience and continued success, to improve collaboration with partners in pursuit of shared local and global sustainability goals, and to advocate for climate action beyond the borders of the resort community.

The Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report concludes that climate change is unequivocal. Changes are observed in all geographic regions: the atmosphere and oceans are warming, the extent and volume of snow and ice are diminishing, sea levels are rising and weather patterns are changing.

Climate Change: Implications for Tourism,
Key Findings from the IPCC AR5
University of Cambridge

3 A VISION OF A RESILIENT, LOWER CARBON COMMUNITY

Plan Vision: *A resilient, lower carbon Whistler*

Whistler is a low-carbon community that is well prepared for, and resilient to, the impacts of climate change. Residents and businesses across Whistler are increasingly reducing energy and emission levels, while thriving as a resort community. Through proactive planning, Whistler is strategically adapting to a changing climate, minimizing risks of potential impacts and protecting key community assets. Whistler effectively delivers higher-quality but lower-energy use experiences for residents and visitors alike – successfully decoupling economic growth with ongoing increases in carbon emissions.

This section includes Whistler's community targets for GHG emissions, energy consumption and renewable energy, in addition to climate change adaptation goals. These targets are informed by widespread scientific consensus, community input, relevant best practices, and Provincial precedents. Moreover, they are established with an acute understanding that continued growth and of the local economy can be achieved at the same time as the community strives to meet its science-based reduction targets. Evidence abounds that economic growth does not need to be premised on increasing emissions. As previously noted, recent research identified 21 countries that demonstrated positive economic growth since 2000 while at the same time meaningfully reducing carbon emissions - some dramatically. It will however take more than vision alone, it will take concerted commitment to make it a reality.

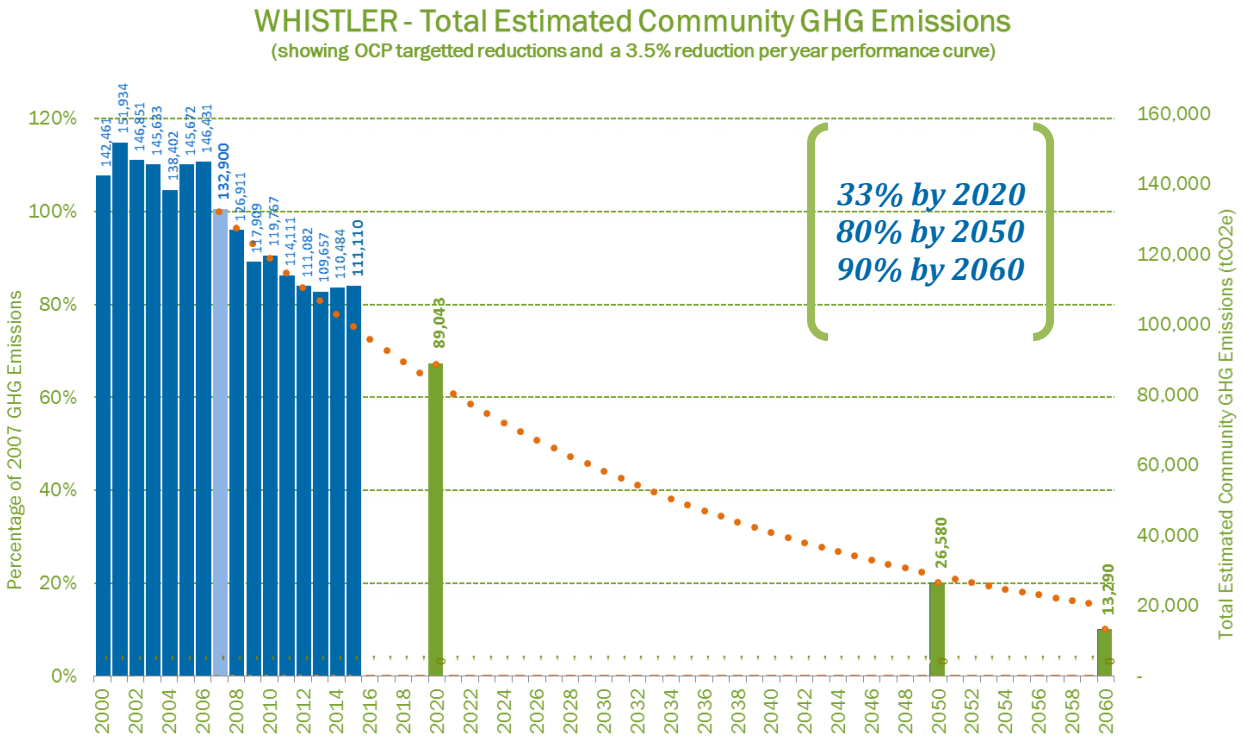
Even with confidence that economic growth can be achieved while concurrently moving toward absolute emissions reductions, Whistler has a structured growth management strategy that establishes a bed unit policy and associated framework for controlling the physical growth of the resort community, This framework is supportive of thoughtful development decisions, and designed to avoid the potential for unrestrained growth and related emissions.

3.1 GHG Emission Targets

Whistler has had formal GHG reduction targets since 1997. The current GHG reduction targets are included in the community's Official Community Plan (Bylaw No 1021, 1993):

> *As a signatory to the BC Climate Action Charter the Council of the Resort Municipality of Whistler has expressed its understanding that anthropogenic emissions of greenhouse gases are affecting the global climate; that reducing these emissions is therefore beneficial and important to all citizens; and that governments must act promptly to mitigate climate change. The Municipality considers it appropriate to adopt targets, policies and actions intended to reduce the emission of greenhouse gases within Whistler and resulting from activities related to the ongoing operation of the resort community. The targets are stated below, along with related policies and actions. Other relevant policies and actions are found throughout the OCP, because the Municipality recognizes that reducing greenhouse gas emissions can be achieved by all sectors of the resort community, and in all aspects of its operation.*
>
> **TARGET**
>
> **Compared to GHG emissions measured in tonnes of eCO_2 in 2007, the Municipality has established the following targets for reducing the community's GHG emissions:**
>
> - 33% by 2020
> - 80% by 2050
> - 90% by 2060

If it is anticipated that the attainment of these targets is achieved at a consistent rate (or pace) over the coming decades, these targets translate into an **annual GHG reduction of approximately 3.5% per year**. The following chart illustrates the potential achievement of this 'target' over time. The chart presents the community targets (green bars), the historic community emissions levels (blue bars) as well as an indication of the annual reductions that would be required to achieve the prescribed targets using a constant rate of improvement model (orange dots).



As demonstrated on the chart above, the community of Whistler managed to remain generally on pace towards the targets for the first five years of the target period. GHG emission reductions achieved during these five years (2008-2011) were impressive – averaging approximately 4,300 tonnes of reductions annually over the five year period.

It is worth noting however, that the primary sources of the reductions over the first four years were generally **one-time** only events:

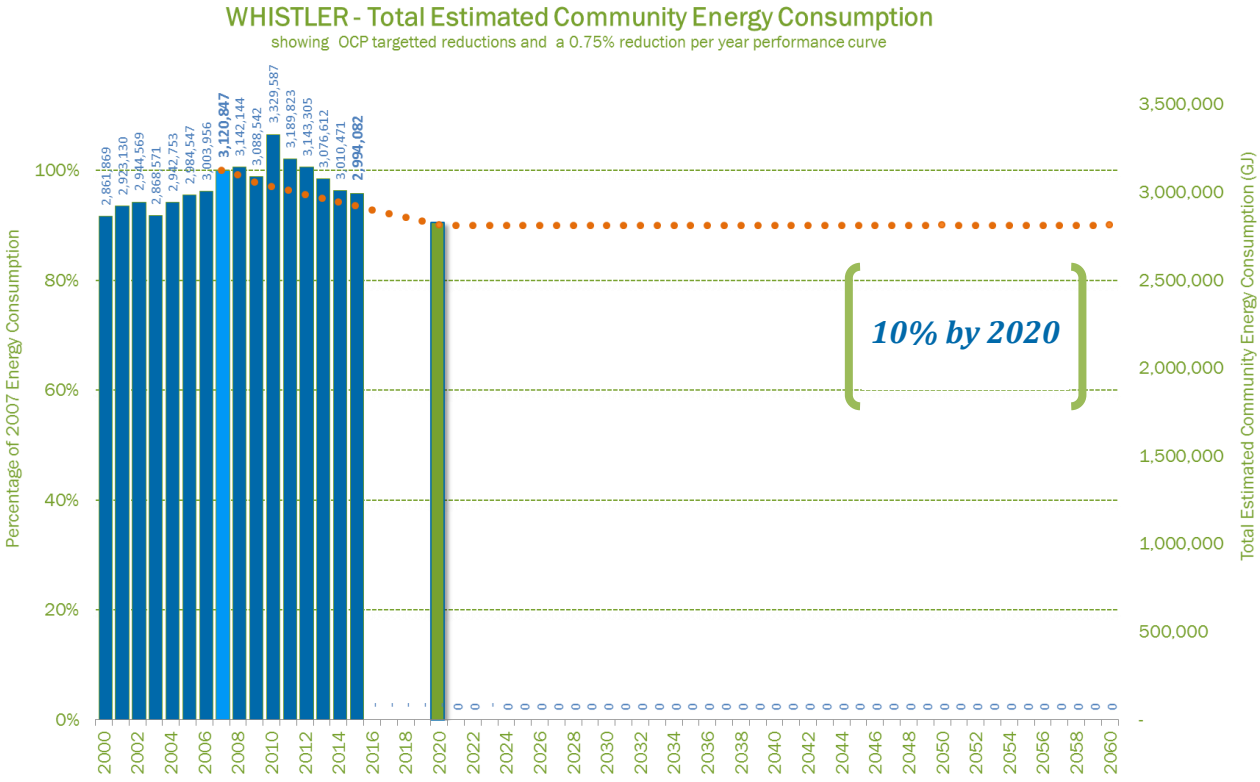
1) the changes to Whistler's waste management processes (i.e. landfill closure, landfill gas management, organics recycling and the switch to the use of the advanced landfill management systems at Rabanco);
2) the switch from piped propane to natural gas across the community;
3) the changes brought about through the provincial low-carbon fuel standards for gasoline and diesel;
4) the decrease in GHG intensity (GHG/kWh) of BC Hydro supplied electricity, and
5) the reduction in diesel consumption associated with the hydrogen transit bus pilot project, (Note that pilot project has since ended, resulting in an increase in diesel consumption in 2014)

3.2 Energy Consumption Targets

The Official Community Plan (OCP) Amendment Bylaw 1983, 2011 includes the Objective: '*Make Energy Conservation the Core Strategy and Highest Priority for Achieving Our Greenhouse Gas Emission Reduction Goals'*. To this end, the OCP Amendment Bylaw also includes a community-scale energy reduction target:

TARGET:
"The municipality will lead a community-wide effort to reduce total energy consumption to a level 10% lower than 2007 by 2020".

This proposed policy introduces Whistler's first comprehensive energy reduction target – and one of the first by a local government in BC. Similar to the chart in the section above, if it is assumed that this energy reduction target will be achieved at a consistent pace over the next decade, this target translates into a 0.75% annual energy consumption reduction over the target period (2011 – 2020). A visual presentation of this rate of reduction is included below for clarity.



As evidenced in the chart above, historic energy consumption has not followed the same trajectory as community GHG emissions during the period between 2007 and 2013. **In fact, the 2010, 2011 and 2012 energy consumption levels were the highest three years of energy consumption ever recorded in Whistler.** However, community-wide energy consumption has continued to decrease over the last four years, and if this trend continues the community may meet the anticipated 10% reduction target by 2020 Currently, Whistler's total energy consumption is still 55,000 GJ higher than target path levels for 2015.

3.3 Renewable Energy Target

Many city and regional governments across the globe are formalizing various types of long-term 100% renewable energy targets (Aspen, Banff, City of Vancouver, as well as many others). Through this Plan, Whistler commits to initiating the journey towards becoming a 100% renewable energy community as well.

TARGET:
"Derive 100% of the energy used in Whistler from renewable sources by 2060" – the same year the community is targeting a 90% reduction in its annual GHG emission levels.

3.4 Adaptation Goals

Adaptation planning recognizes that climate changes are underway and will continue to evolve. As such, it is important for communities to understand the potential impacts of climate change at the local level and prepare accordingly to minimize risks and protect key community assets.

High-level goals are an important means of articulating the extensive aims of climate change adaptation plans. The development and implementation of this Plan is aimed at achieving the following overarching adaptation goals:

1. Increase the resilience of Whistler's infrastructure, natural environment, socio-economic systems and assets to the key potential impacts of projected local climate changes in order to avoid, prevent or moderate harm and optimize beneficial opportunities.
2. Promote and facilitate the incorporation of climate change information and consideration into the planning and activities of the RMOW and other resort community organizations.

4 WHISTLER'S HISTORY OF ACTION ON CLIMATE & ENERGY

Whistler2020: Sustainability Planning

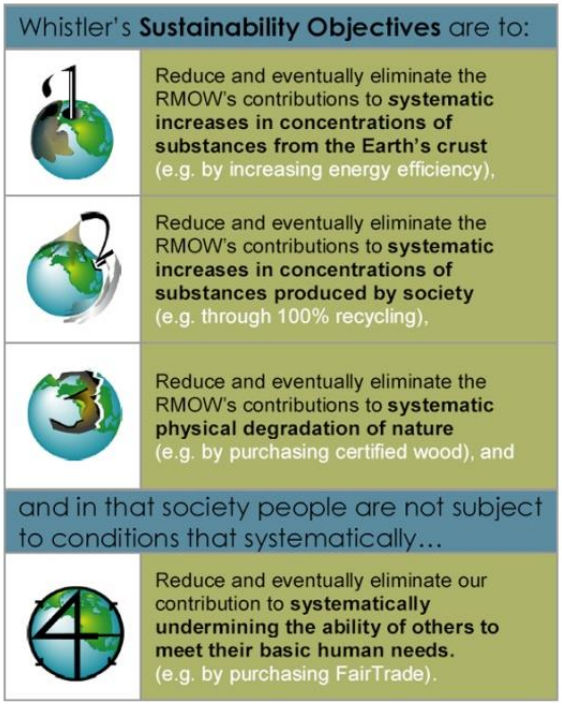
The Whistler community understands that sustainability is not just about the environment; that three concepts – ecological integrity, fiscal viability, and social justice – point to a larger and integrated strategy, and that these three concepts are not as strong in isolation as they are when considered together. In 2005 the RMOW adopted Whistler2020, the community's comprehensive, long-term sustainability plan, as direction setting policy.

Whistler2020 is the product of thousands of voices across our resort community coming together to **articulate the vision of the resort community we aspire to be.**

The broad community vision articulated within Whistler2020 is organized around the following five priorities:

1. **Enriching Community Life**
2. **Enhancing the Resort Experience**
3. **Ensuring Economic Viability**
4. **Protecting the Environment**
5. **Partnering for Success**

Whistler2020 imbeds and integrates four science-based Sustainability Objectives premised on the Natural Step principles (see box on the right) into the vision and the framework for making decisions. In this sense, these Sustainability Objectives act as a compass to help frame and guide decision-making and ongoing planning.



Working within the Whistler2020 framework, the community has aimed to steadily integrate the Sustainability Objectives broadly into all aspects of community planning and development strategies – from Energy and Transportation strategies, to Economic and Visitor Experience strategies. Through the consistent application of the four shared Sustainability Objectives, our community is striving to integrate climate change mitigation into all community policies and operational practices.

Community Energy Planning

Whistler committed to its first greenhouse gas emission reduction targets in 1997. In that year, Whistler Council endorsed the Kyoto Protocol target of having our community's emissions at 6% below 1990 levels by the year 2012. For municipal (corporate) emissions, Council also committed to being a part of the "20% Club", committing to reducing corporate emissions 20% below 1990 levels by 2012 — two aspirations that the community of Whistler did not achieve.

Following up on these commitments, the RMOW initiated involvement within the Federation of Canadian Municipalities' (FCM) Partners for Climate Protection (PCP) program. The PCP program was launched by FCM as an extension of ICLEI's (Local Governments for Sustainability) Cities for Climate Protection program in the United States. Partner cities become members in a network of municipalities that began working toward the achievement of the five management-based milestones of the program. The milestones were designed to create tools and processes that were easy to understand and implement, and also provide effective guidance for municipalities to take serious steps toward climate action.

To meet the commitments of the Partners for Climate Protection program process, the RMOW developed the first Integrated Energy, Air Quality, and Greenhouse Gas Management Plan in Canada in 2004.

FCM/ICELI Partners for Climate Protection

The five milestones of the Partners for Climate Protection program are:

1. Create a greenhouse gas emissions inventory and forecast;
2. Set an emissions reductions target;
3. Develop a local action plan;
4. Implement the local action plan or a set of activities; and
5. Monitor progress and report the results.

In 2007, the Resort Municipality of Whistler became the first community in Canada to complete all five milestones for both community and corporate emissions.

In September of 2007, at the Union of BC Municipalities (UBCM) conference in Vancouver, Whistler was one of original sixty-two[2] local governments in BC that signed on to the Province's voluntary BC Climate Action Charter. The Charter opens with the following statement, agreed to by all signatories, **"Scientific consensus has developed that increasing emissions of human caused greenhouse gases (GHG), including carbon dioxide, methane and other GHG emissions, that are released into the atmosphere are affecting the Earth's climate."[3]** Currently approximately 180 BC communities have become signatories to the Charter. By signing, local governments agreed that the Charter is a voluntary agreement designed to bring local government support for the Province's broader overall climate action strategy of reducing emissions 33% (from 2007 levels) by 2020.

Enacted in 2008, Bill 27, *the Green Communities Act*, requires local governments to include (among other things) greenhouse gas emission targets, policies and actions in their Official Community Plans and Regional Growth Strategies. In response to the *Green Communities Act*, the RMOW has integrated specific targets (discussed later in this report), policies, and actions within its Official Community Plan, and developed a Carbon Neutral Operations Plan.

Current detailed performance tracking indicates that Whistler is not expected to meet existing OCP targets related to energy and GHG emissions reduction. This updated Plan is required to identify the appropriate steps to achieve our targets, as well as to ensure that the community undertakes adaptation planning that protects critical infrastructure and relevant community systems from the likely impacts of a changing climate.

[2] The BC Climate Action Charter was eventually signed by more than 170 local governments across British Columbia.
[3] The British Columbia Climate Action Charter, Section 1

Climate Change Adaptation Planning

This Plan represents Whistler's first effort to comprehensively and strategically examine and address the potential impacts of climate change for the resort community. That said, many activities already underway within the resort community are helping to increase Whistler's resilience to climate change, such as municipal integrated storm water management, invasive species management, water conservation, emergency preparedness and wildfire protection measures. Furthermore, some key resort partners have already taken deliberate, significant steps toward climate change adaptation. For example, Whistler Blackcomb released its *Climate Change and Resource Efficiency Strategy* in 2013, which aims to address the impacts of climate change on the ski area and beyond through assessment, action (both reduction (mitigation) and adaptation) and advocacy.

This Plan takes a comprehensive approach to identify key issues and recommend priority strategic adaptation actions to prepare for and manage the projected impacts of climate change. Through the implementation of the Plan, Whistler will become more resilient to the impacts of climate change and maintain progress toward the broader community vision; Whistler2020.

4.1 The Community Energy and Climate Action Plan Update

The CECAP represents an update of the 2004 RMOW Integrated Energy, Air Quality and Greenhouse Gas Management Plan. This Plan sets out strategic directions for mitigating Whistler's contribution to climate change as well as recommending adaptation strategies to prevent and minimize the risks of potential climate change impacts.

Climate change adaptation is a new addition to the Plan and reflects recognition of the need for the resort community to understand and prepare to adapt to the potential impacts of local climate changes.

It should be noted that air quality is not considered in the CECAP, as it was in the 2004 plan. The Sea to Sky Clean Air Society has taken regional leadership on air quality issues in the airshed and the RMOW participates as a member of this organization, actively supporting the implementation of the Sea to Sky Air Quality Management Plan (AQMP). It is anticipated that many of the recommended actions in this Plan which target climate change mitigation and adaptation will contribute to long-term positive air quality results. To ensure focused efforts on air quality issues in Whistler, the RMOW and the Sea to Sky Clean Air Society will meet at biannually to review local AQMP implementation, including alignment and coordination with CECAP recommendations and other related initiatives.

The CECAP was initiated in early 2015 and developed through the leadership of the RMOW and the support of a community-wide advisory group.

4.1.1 Community Engagement

The impacts of climate change potentially affect all sectors of the resort community. Although the RMOW convened the CECAP process, resort partners and community stakeholders have a critical role to play in developing and implementing the Plan to help ensure Whistler's continued success. To facilitate the engagement of these important stakeholders, an external Community Advisory Group (CAG) was assembled in April 2015 to support the development of the CECAP. The CAG is comprised of representatives from a broad spectrum of sectors with a stake in local climate change mitigation and adaptation issues. Appendix A provides a list of the sectors and organizations represented on the CAG. The CAG has met several times since its inception, both as a full group and in the form of mitigation and adaptation sub-committees with a focus on specific issues.

Community-wide public input on the plan also was sought through a public Open House and an online public comment period which included a detailed survey. Over 40 members of the public attended the CECAP public Open House, which featured a gallery walk of information boards (24 content posters) and a 45-minute overview presentation of the draft Plan. Attendees also had significant discussion opportunities with key members of the CAG and CECAP project team. Comments were collected via flip charts and from direct conversations with the project team. Flip charts were available with prompts towards generating ideas not already addressed by the Plan. Attendees were also urged to complete the online survey.

The online public comment period ran from May 18 to June 20, 2016 at https://www.whistler.ca/climateaction and featured the full draft CECAP along with a 12-question feedback survey which included rating and open questions. 60 respondents completed the survey.

Here are some highlights from the CECAP online public survey results:

- 80% of respondents (agree/strongly agree) believe that climate change is already impacting Whistler and will continue to affect the security of our community and our quality of life.
- 76% of respondents agree/strongly agree that the Plan is a useful resource that should guide community decision-making over the long term.
- 33% of respondents ranked Transportation Solutions as the most important/exciting to them, followed by Wildfire/Ecosystem Solutions (18%) and Renewable Energy Solutions (16%).
- 85% of respondents support actions that reduce the use of single-occupancy vehicles throughout Whistler.
- 88% of respondents (agree/strongly agree) expect the RMOW and partner organizations to take a leadership role on climate change action.
- 90% of respondents (agree/strongly agree) are committed to making changes that reduce their GHG footprint to prepare for climate change impacts.

Public input on climate change mitigation and adaptation was also sought at the RMOW Community Forum held on June 15. Over 100 citizens attended and participated in round-table discussions on themes including energy and climate change, transportation, wildfire, water, tourism economy and housing issues. Input from the Forum was collected and provided to the CECAP project team to consider suggestions and comments relevant to the CECAP draft.

Through all of these public input opportunities (Open House, online survey and Community Forum), community citizens provided over 175 comments and action ideas for the CECAP, indicating strong interest in how the community is addressing the issue of climate change. In response to the public input received, the project team has considered all comments and made revisions to the Plan accordingly.

5 WHISTLER'S CURRENT ENERGY & EMISSIONS PROFILE (2000-2015)

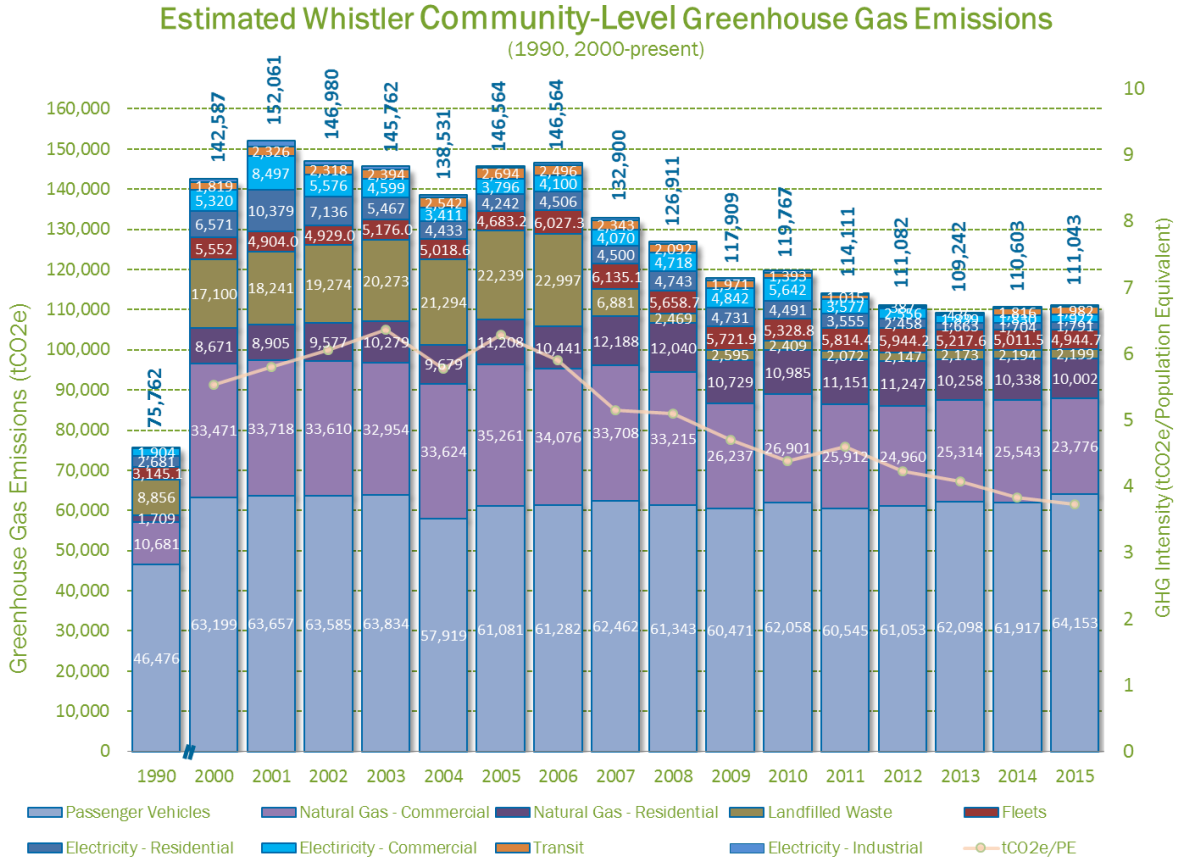
Since the year 2000, RMOW staff have tracked and compiled community energy consumption, energy expenditure and GHG emission data. At the community level, primary sources of data to support this inventory are accessed from local utilities (BC Hydro and FortisBC), as well as from local traffic counter data (both provincial and municipal) and annual RMOW waste and recycling performance tracking. The following section of this Plan summarizes the most current performance trends for the resort community.

The energy and emission performance outcomes presented within this section of the Plan are based on carbon accounting practices consistent with the BC Ministry of Environment's *BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions (Including Guidance for Public Sector Organizations, Local Governments and Community Emissions).* The Best Practices outlined within the BC Methodology Guidance:

> ...draws heavily on protocols established by the World Resources Institute and the Climate Registry, and published emission factors from authoritative sources such as: Natural Resources Canada, Environment Canada, the US Environmental Protection Agency and the UK Department of Environment, Food and Rural Affairs.
>
> BC Methodology for Quantifying Greenhouse Gas Emissions, 2012

5.1 Greenhouse Gas Emissions Trends

Total community emissions in 2015 were estimated to be **111,042 tCO2e**[4]. This level is approximately 16.5% lower than 2007 levels, 22% lower than 2000, but **0.5% above 2014 levels** and above our current community target levels.



From a GHG emissions intensity perspective, 2015 GHG emissions per population equivalent[5] decreased to 3.7 tCO2e/PE. This level is 3% below 2014 levels and the lowest annual per capita measure since detailed record keeping began in 2000. This is primarily driven by an increase in population equivalent in the 2015 year. Stated another way, while total community emissions went up somewhat, the number of people in the resort increased more significantly, hence the ratio, or the emissions/person went down.

As noted above, the primary drivers of reductions in previous years have been the changes to the local waste management system (especially landfill gas capture); the switch from piped propane to piped natural gas, the BC Transit Hydrogen Transit Fleet pilot project (which has since ended), and

[4] Note that the final 2015 emission level may be slightly revised once BC Hydro releases their annual 2015 emission intensity. Current estimates are based on a rolling three year average intensity rate with an estimated 2015 value used as a placeholder until the final rate is received.

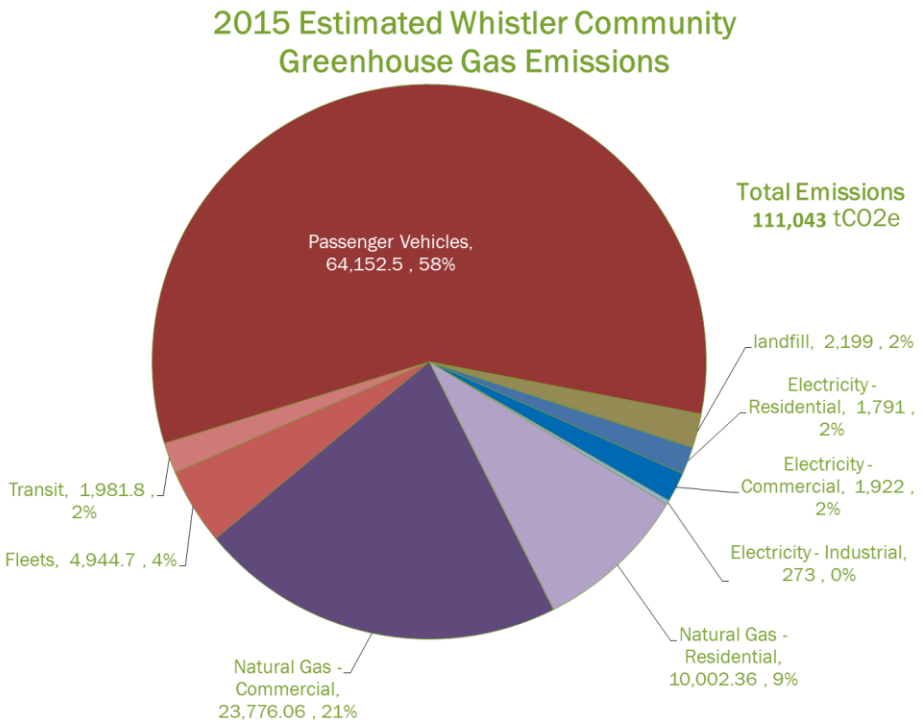
[5] The nature of Whistler being a tourism community means the number of people in Whistler on any given day is generally far greater than the population counts provided Canada Census or BC Statistics estimates. The total Population Equivalent is an estimate of the total number of people in Whistler on an average annualized basis. The indicator is often used in 'per capita' measures to normalize the data and make it comparable to other communities. More detail on the composition of the Population Equivalent can be found at: http://www.whistler2020.ca/whistler/site/genericPage.acds?instanceid=2985334&context=2985223

more recently, the provincial low carbon fuel standards and the decreasing GHG intensity of BC Hydro electricity.

As further one-time changes such as those noted above become less available to our community, **Whistler will no longer achieve reductions without substantive, community-wide 'energy conservation' becoming the core driver of further emission reductions.**

Distribution of Emissions

Greenhouse gas emissions in Whistler are made up of emissions from stationary sources (buildings and infrastructure systems), mobile sources (passenger vehicles, fleets, and transit), as well as emissions from landfill waste. The approximate share of each of these sources is presented in the following chart.



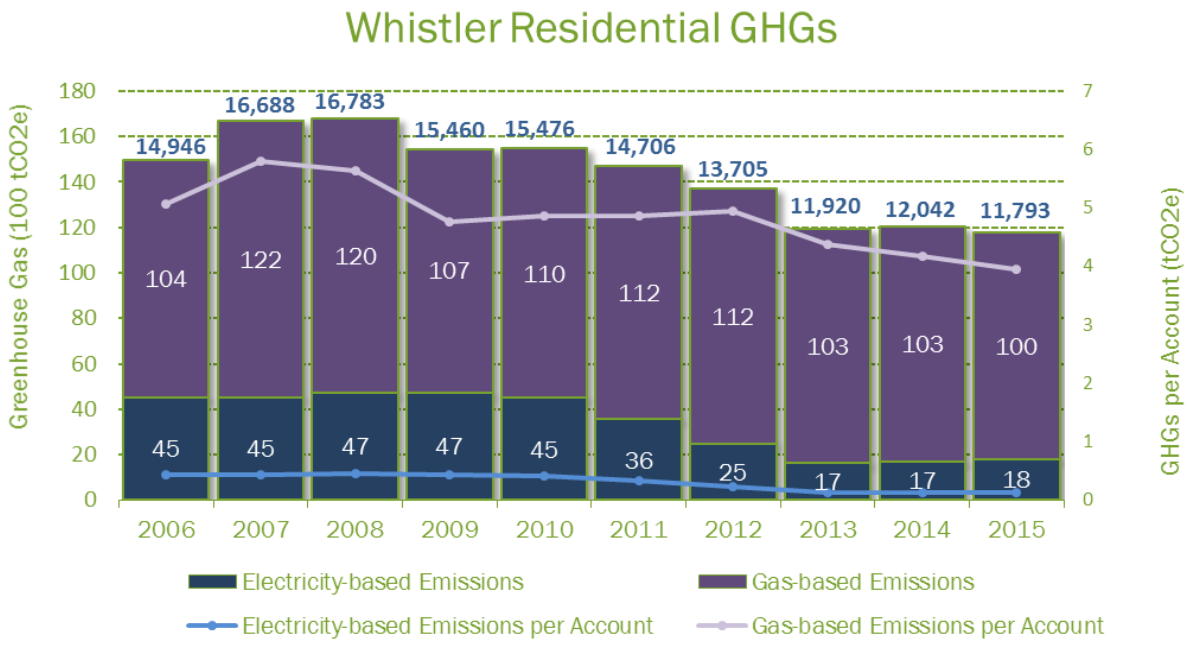
Passenger Vehicles

Passenger vehicle transportation within RMOW boundaries continues to represent the largest share of the overall emission footprint (58%), followed by natural gas consumption at 30% (primarily used for space and water heating).

Whistler Buildings - GHGs

The following two charts show the changes in greenhouse gas emissions from key segments of the community building inventory.

Residential GHG Emissions



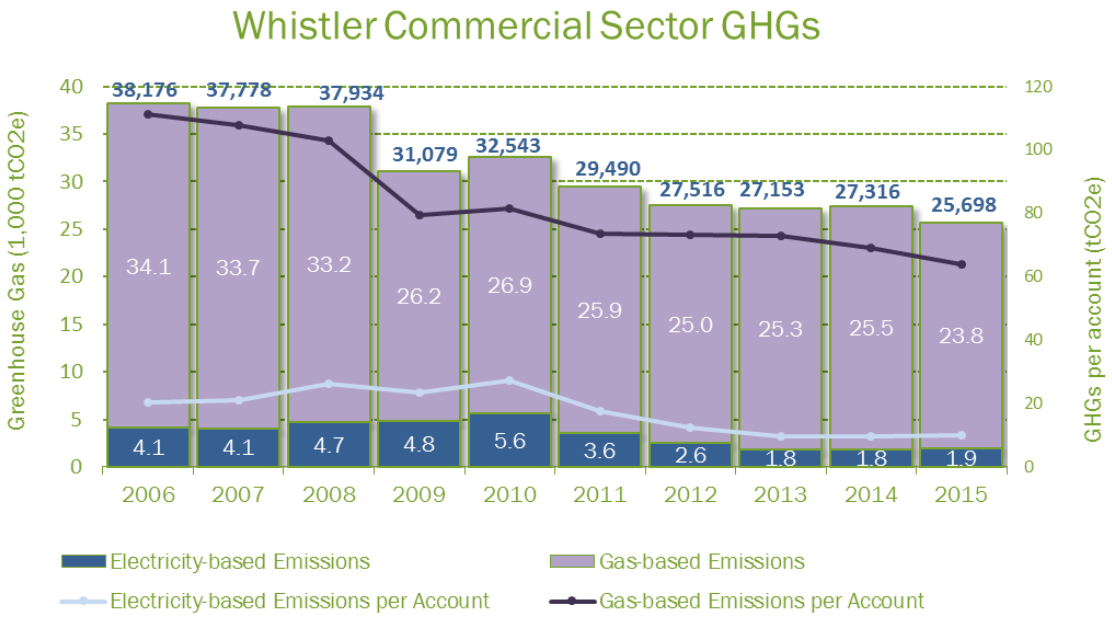
Residential Natural Gas Emissions

Natural gas based GHG emissions across the residential sector have decreased by 3% year over year. Additionally, 2015 natural gas emissions per residential account decreased year over year, and due to a larger reduction in 2014, this figure is currently the lowest on record.

Residential Electricity Emissions

Electricity-based emissions have increased in the residential sector on both a total basis, as well as an emissions per account basis. While total electrical consumption decreased in 2015 (-1%), the primary driver of decreasing electricity-based emissions over the past few years is the reduction in system-wide BC Hydro GHG emissions intensities.

Commercial GHG Emissions



Commercial Natural Gas Emissions

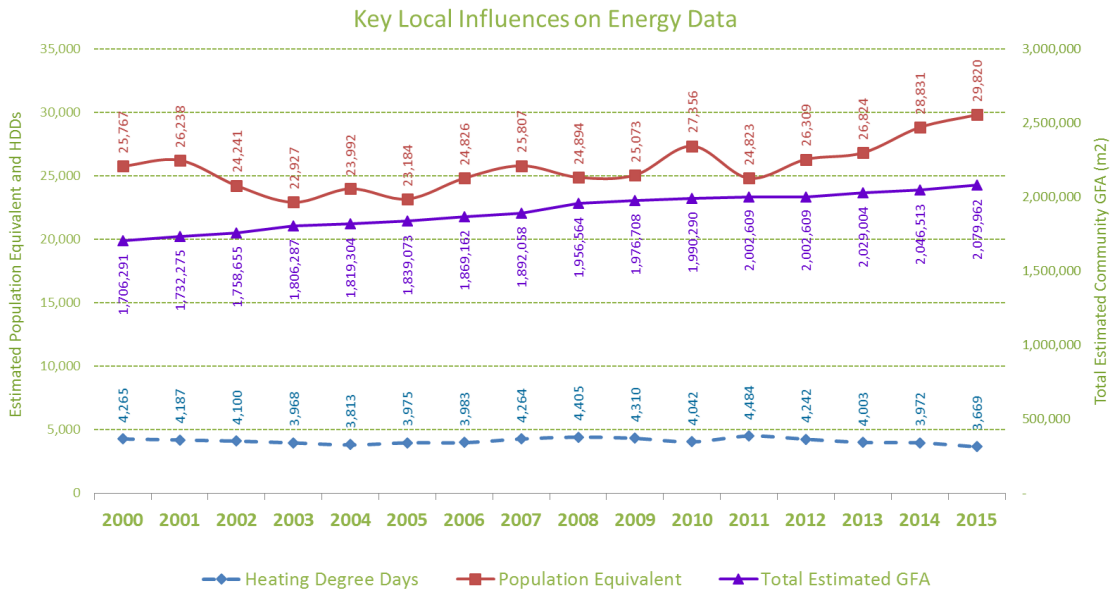
Commercial sector GHG emissions have decreased substantially since the conversion from propane to natural gas was finalized in 2009 (commercial heating gas emissions have declined by 28% versus 2006 levels). Most recently however, commercial natural gas emissions have remained steady during 2012-2014 and remained approximately 27% lower than pre conversion 2007 levels. 2015 levels had a large decrease of 6% year over year, which is 32% below 2007 levels. This may reflect the fact that it was less cold and that building are becoming more energy efficiency due to improvements. Commercial heating gas emissions per account are also currently at all-time lows.

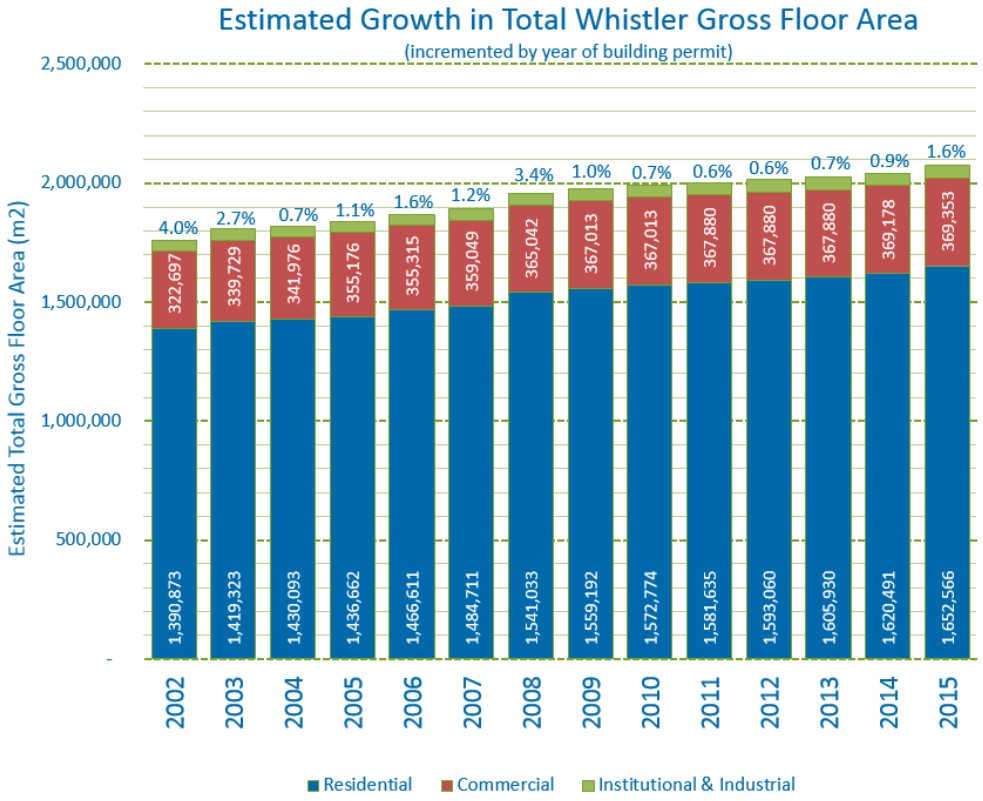
Commercial Electricity Emissions

Over the last 10 years, GHG emissions from electricity consumption remained relatively steady until the 2010 Olympic Games year. Since the Games year, emission levels have decreased substantively for each of the following three years. These reductions are partially driven by a small drop in electrical consumption post Games (though still higher than pre-2010), but are primarily driven by generally decreasing GHG intensity levels across the BC Hydro system (i.e. reductions driven by forces outside our community).

Emissions per account have followed patterns similar to that described above.

The following three charts provide detail regarding the primary influences on energy consumption and emissions trends over time. These data are useful for the exploration of possible explanations for observed change over time. It is however important to note that Whistler's **emission reduction targets are set at total emission levels** – targets are not at set at per-capita or per-ft^2 intensity levels. In the end, intensity measure may help us understand which factors are driving changes in performance, but it is only the total parts-per-million (ppm) of carbon in the atmosphere that defines and shapes the impacts of climate change. It is for this reason that Whistler chose to set total emission targets rather than emission intensity targets.





BC Hydro Emission Factor Comparison (tCo2e/GWh)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
3 year rolling average	40.7	34.7	23.7	24.7	26.3	24.7	26.0	25.3	25.3	19.0	13.7	10.0	10.7

5.1.1 Key Community GHG Performance Insights

To assist with interpretations, throughout this section red arrows indicated insights of concern, green arrows denote positive trends while yellow arrows are points of caution that will require ongoing monitoring.

Total GHG Emissions

- 58% of all estimated community-level emissions (~64,000 tonnes annually) are produced by passenger vehicle transportation within municipal boundaries. The passenger vehicle sector provides a critically important opportunity for future community emission reductions.
- For the second year in a row, emission levels have risen year over year, resulting in the fact that **the community is no longer on the anticipated statistical path to achieve our 2020 emission reduction goals.**
- Moreover, the lack of additional, significant one-time changes (i.e. low hanging fruit like the propane to natural gas conversion project) will mean that future progress toward our 2020 target is possible but will require broader involvement from the entire community.

Commercial Buildings GHG Emissions

- Total emissions and emissions per commercial account are the lowest since detailed record keeping began (74 tCO2e/commercial acct).
- Collectively, commercial building emissions have decreased by 32% from the 2007 year – as such this sector is maintaining a strong trajectory toward the 2020 target (-33%). There was a slight decrease in commercial building emissions in 2015 (6%).

Residential Buildings GHG Emissions

- Total residential GHGs have dropped from 2007 levels by 29% (primarily due to the shift to natural gas from propane and the decrease in BC Hydro GHG intensity – collectively cleaner fuels). This level of progress positions the residential building sector well for meeting the 33% reduction by 2020. However, year over year emissions remained relatively steady at a decrease of 2%, and further reductions will be required to remain on target.
- The primary source of emissions across the residential inventory remains natural gas consumption (~85%).
- The shift to natural gas (from propane), and the decreasing GHG-intensity of BC Hydro electricity are the primary reasons for the strong GHG reductions in this sector. It should be noted that energy consumption across the sector has only decreased by 10% since 2007 (highlighting the role that cleaner fuels have contributed to the 29% GHG reduction noted above).

Transportation GHG Emissions

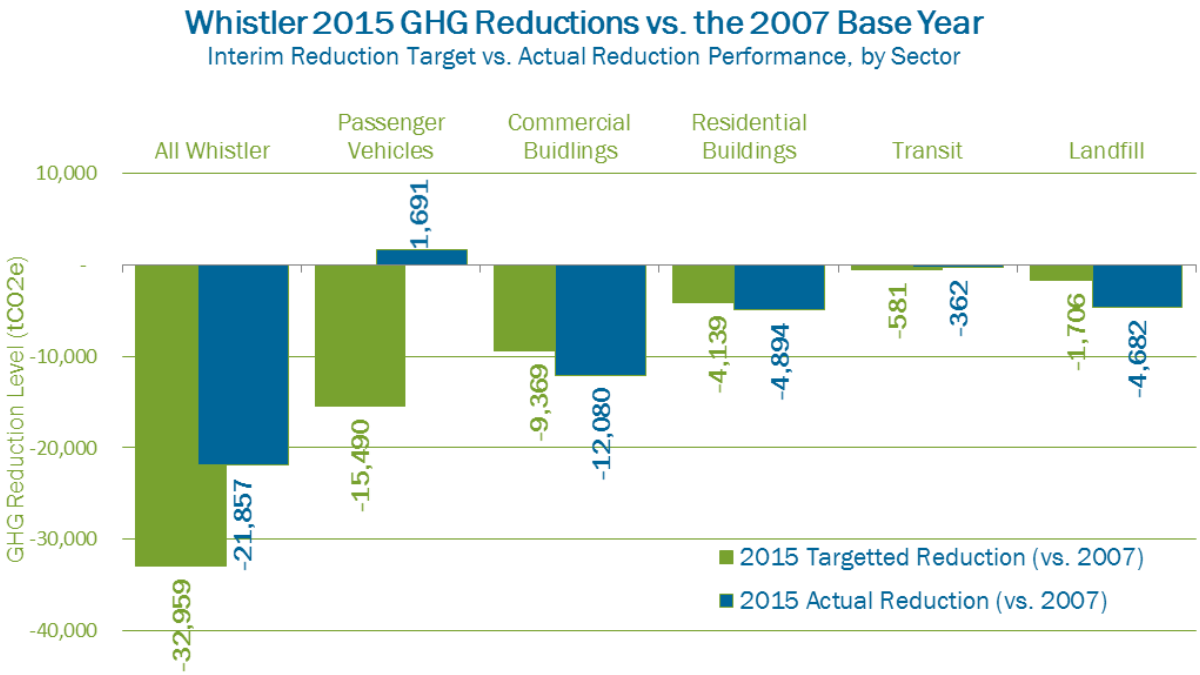
- Low carbon fuel standards have helped to mitigate the emissions from both gasoline and diesel consumption (5% ethanol blend in gasoline, and 4% biodiesel blend in diesel).
- Estimated total vehicle kilometers travelled (VKT) in Whistler (locals and visitors combined) has continued to increase over the last 10 years
- The average fuel efficiency of BC registered vehicles has only improved by ~3-4% over the last 10 years. This change has slowly reduced emission levels per kilometer driven from 2000 levels, but not by enough to cause sector-wide reductions in total estimated emissions. Moreover, recent trends indicate that lower gasoline prices may be contributing to an increase in the purchase of light duty trucks and SUVs, and a concurrent decrease in smaller passenger vehicle – a trend that works counter to the increased efficiencies noted above.
- The new fuel standards and the increases in vehicle efficiency are still far too small to move passenger vehicle emissions to the targeted reduction levels. Much more efficient vehicles, fuel

switching to lower carbon fuel sources, and/or a decrease in VKT per person will be required to catalyze required emission reductions in this sector.

- **Estimated passenger vehicle emissions have remained at the same level as 2007 base year (vs. the 24.8% interim target level). This difference (17,181 tCO2e in unmet reductions) represents the single largest reason why the community is failing to maintain interim target reduction levels.**

Looking Ahead

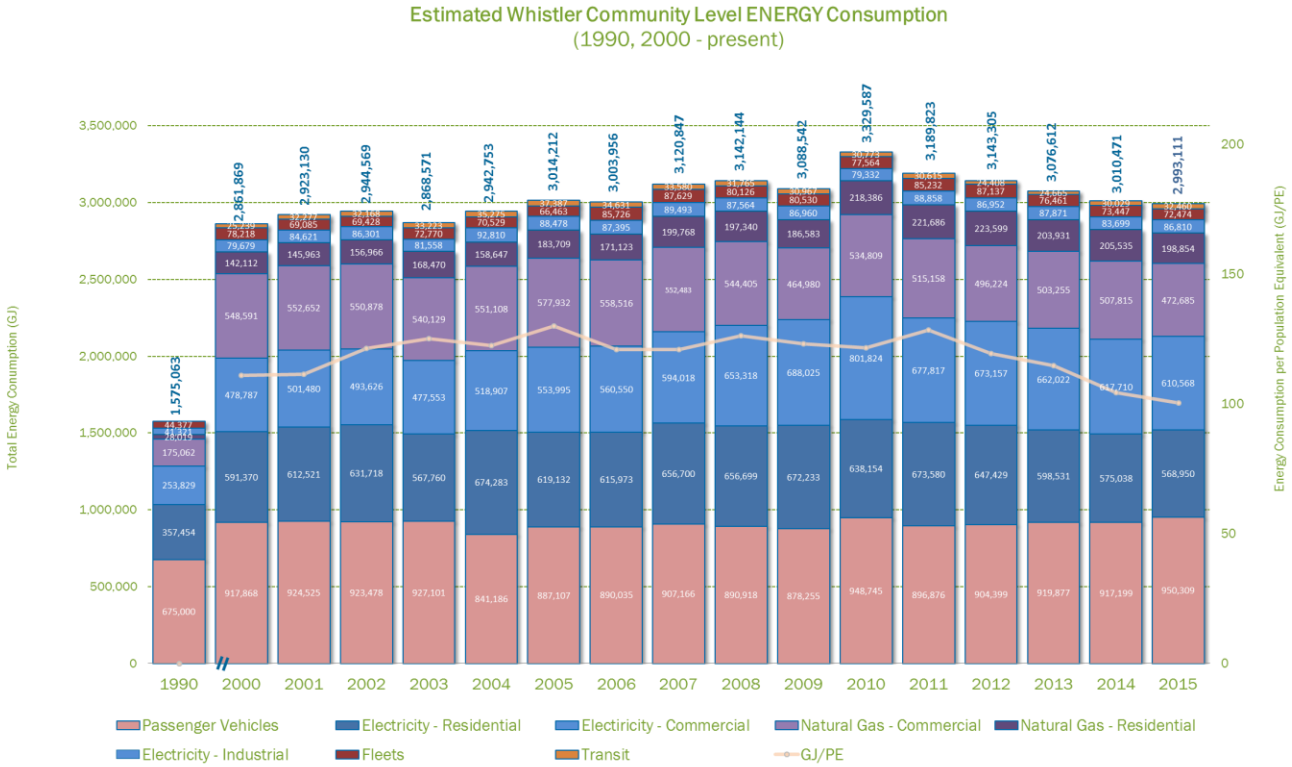
- As previously noted, the key challenge for our community moving forward, will be regaining the rate of reduction achieved over the five years of the commitment period. This is due to the fact that further 'one-time changes' are, for the most part, no longer readily available.
    - Future reductions will need to be primarily premised on actual energy conservation and efficiency rather than one-time technological changes in community systems.
    - As seen in the chart below, the greatest need (and opportunity) for ongoing emission reductions is in the **passenger vehicle sector**.



Finally, emissions from our corporate and community inventories are not the only emissions related to the activities of our community – as a community premised on destination tourism, there are significant emissions associated with the travel to, and from Whistler. While precise data on the scale of these emissions is difficult to quantify, the research undertaken during the creation of our existing Integrated Energy, Air Quality and GHG Emissions Management Plan did endeavor to estimate the approximate level of these emissions. By using visitor point-of-origin data from Tourism Whistler research and applying typical distance-based emission factors for various travel modes, a total estimate of 'inter-community' estimated GHG emissions was calculated for the year 2000. Assuming a relatively stable point-of-origin mix, and then applying total annual visitation numbers, inter-community travel emissions have been coarsely estimated for each year from 2001 through 2014. In approximate terms, inter-community travel emissions likely represent 5-10 times the total footprint included within our community inventory. Given its scale and relation to our community economic engines, this is an issue that should not be overlooked within Whistler's ongoing discussions of climate mitigation and adaptation approaches.

5.2 Energy Consumption & Expenditure Trends

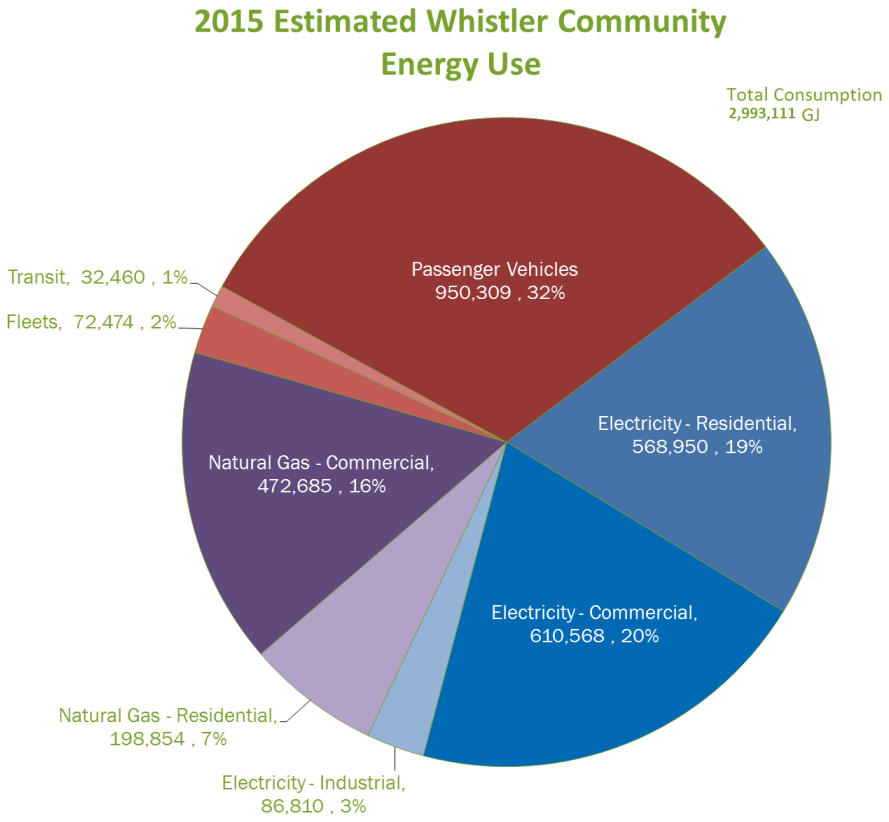
Energy consumption in Whistler includes consumption from stationary sources (buildings and infrastructure), as well as mobile sources (passenger vehicles, fleets, and transit). Total community energy consumption in 2015 was estimated to be **2.99 million GJ** (down 4% from 2007 levels, and 0.6% below 2014 levels). Energy consumption per population equivalent has decreased over the last few years as well, with 2015 showing a marked improvement over the 10 year average, and the single best performance level since detailed reporting began in 2000.



To summarize, 2015 total energy consumption is lower than the 10 year average and the current trend suggests that it is possible to meet our 2020 goal if this improvement continues. Year over year consumption continues to show signs of modest improvement (~0.6%/yr), and per population equivalent levels have improved over each of the last three years.

Electricity is the most prevalent type of energy consumed in Whistler at 42% of the total consumption (slightly down from previous year), followed by vehicle fuels (~35%), and natural gas at approximately one quarter of total consumption. It is worth noting that due to the fact that different energy sources have differing carbon content, GHG emissions are much more heavily associated with consumption of fossil fuels (i.e. gasoline, diesels, and natural gas). This fact accounts for the differences in relative proportions depicted in this chart as compared to the similar chart presented in Section 3.1.2.

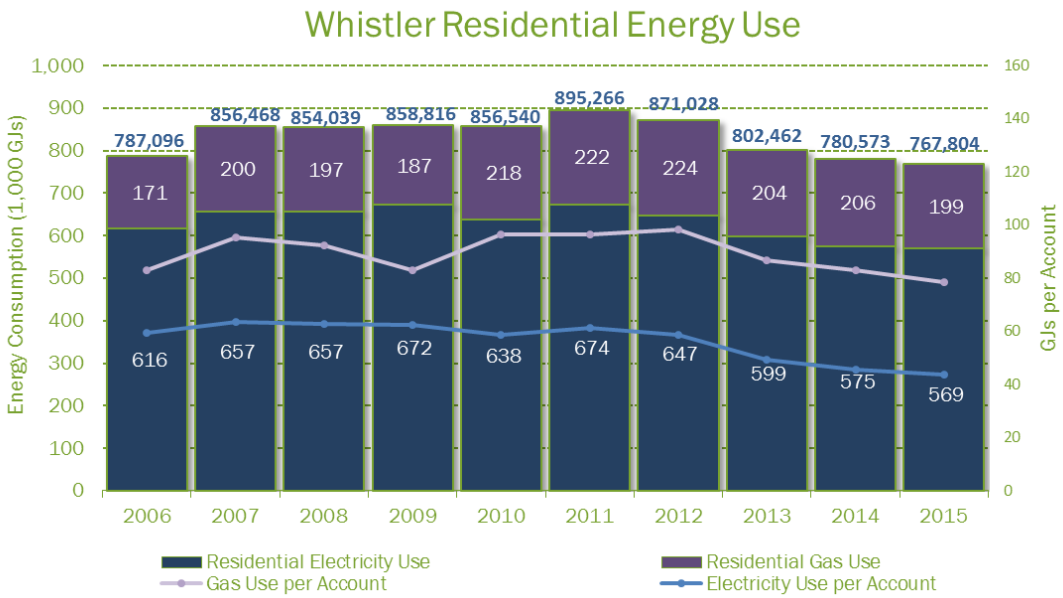
Though overall energy consumption has decreased year over year (0.6%), GHG emissions have increased (0.4%). In 2015, there was a decrease in consumption of natural gas (~42,000 GJ, -2,000 tCO2e) and a decrease in electricity consumption (~10,000GJ, +200 tCO2e). Additionally, there was a small decrease in fleet vehicle usage (down ~1,000 GJ, ~70 tCO2e). Passenger vehicle usage increased substantially by ~33,000 GJ, which corresponded with a 2,000 tCO2e increase in emissions. There was also an increase in consumption by Transit buses (~2,000 GJ), which was also associated with an increase in emissions (+200 tCO2e).



Whistler Buildings – Energy Consumption

Total energy consumption across Whistler's buildings is presented in the following two charts.

Residential Building Energy Consumption



Residential electricity consumption decreased in 2015 both in total volume and on a per account basis. Total 2015 residential energy consumption was the lowest since 2005 at 767,804 GJ (down 9% versus the average of the previous 5 years). This change reflects decreases in both electricity and gas consumption across the residential sector and may be partially explained by a slightly warmer winter in 2015 versus the average of the previous five seasons.

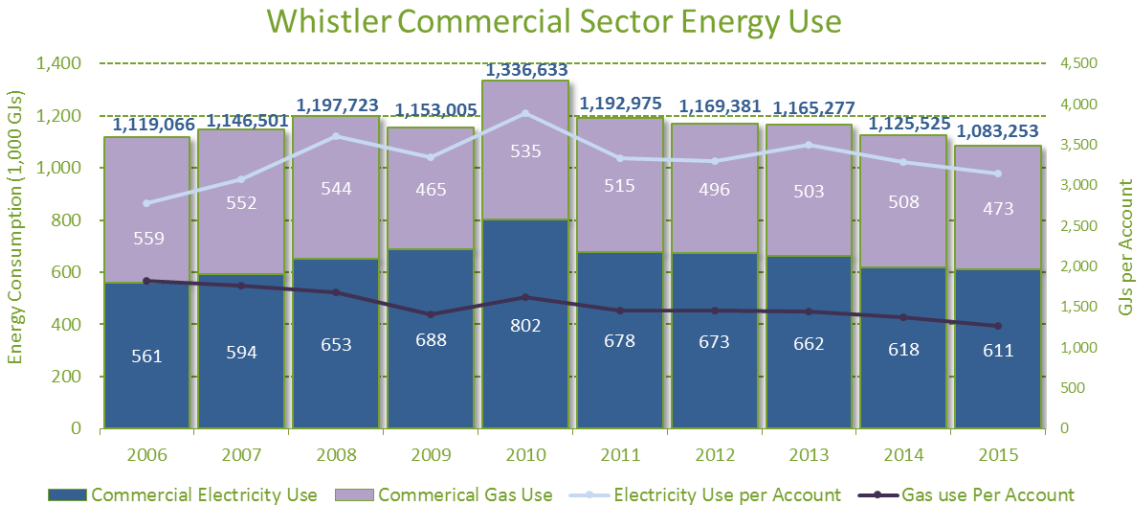
Residential Natural Gas

2015 natural gas consumption per account is 13% below the 10 year average consumption levels. Currently, the data may be beginning to suggest that Whistler homes served by natural gas are, on average, becoming slightly more (gas) efficient over time.

Residential Electricity

Residential electricity consumption per account decreased in 2015 to the lowest levels in the last decade.

Commercial Building Energy Consumption



2015 results indicated that there has been a 4% decrease year over year in overall energy consumption by the commercial sector.

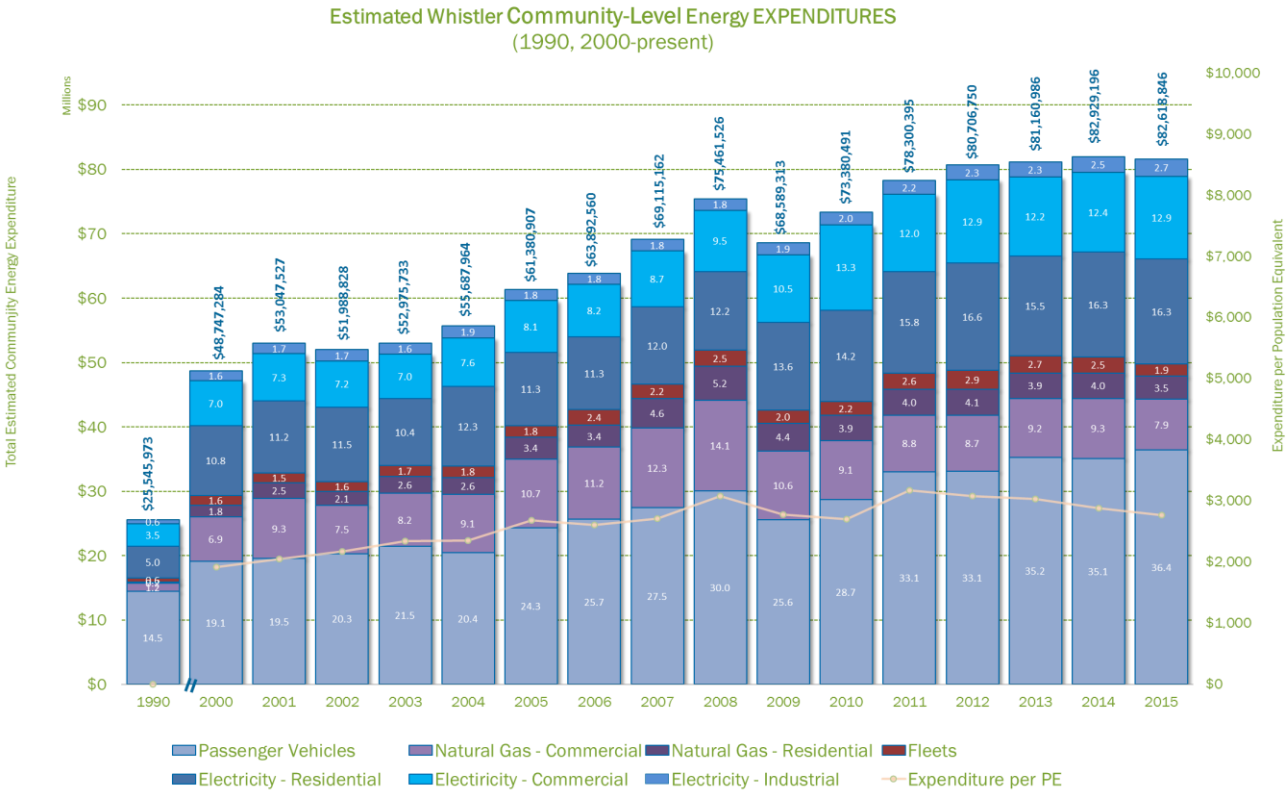
Commercial Natural Gas & Electricity

The period from 2003 through to 2008 saw a significant shift in commercial energy consumption trends. This period saw decreases in propane use at the same time as commensurate increases in electricity use across the sector. In sum, energy consumption was little changed, but the 'fuel-shift' did lead to lower overall GHG emissions. The primary reason for this shift was likely attributable be the increased use of hybrid electric boilers for space and water heating loads in the large hotel sector (i.e. a fuel shift from natural gas/propane to electricity for space and water heating loads in the commercial sector).

Given the recent change in rate structures in Whistler, it will be important to track this trend into the future. It is quite possible that a shift back to natural gas from electricity may occur. If this effect is observed, the net effect would likely be an increase in GHGs associated with this sector.

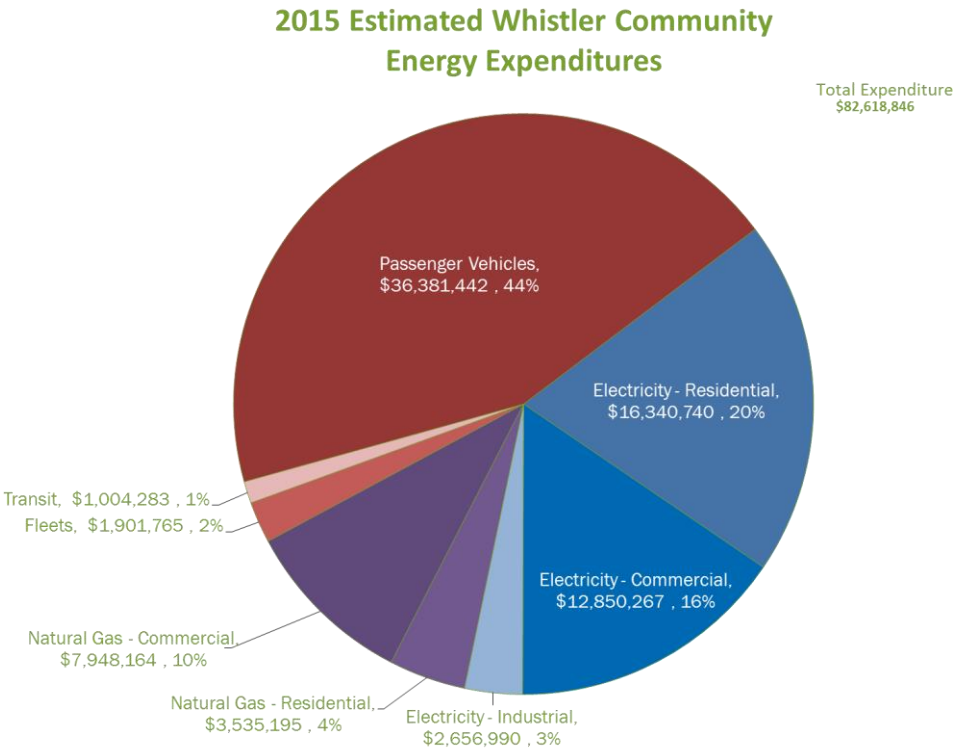
Energy Expenditures

The estimated annual collective energy expenditure within Whistler[6] has increased by more than $34 million between 2000 and 2015 ($83 million vs. $49 million). Increases in energy rates continue to outpace the rate of inflation, so **it is expected that the collective community energy expenditure will continue to rise faster than our collectively ability to pay for it – a trend that underscores the importance of increasing both energy conservation and energy efficiency across the community.**

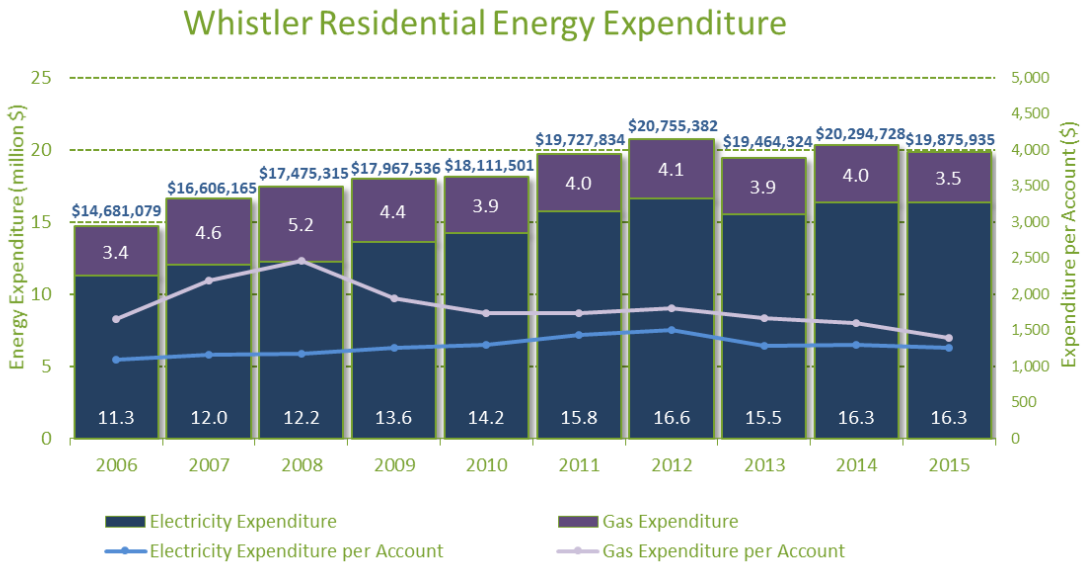


Energy expenditures for buildings (both commercial and residential) have remained relatively constant since 2008 at approximately $42-44 million/year with electricity expenditures increasing by a margin nearly equal to the drop in natural gas expenditures. Fuel prices for gasoline increased markedly in 2012 and 2013, resulting in significant increases in total passenger vehicle estimated expenditures (2013: $35M vs. 2009: $25.5 M). However, gasoline prices dropped in the latter half of 2014, which resulted in constant expenditures for passenger vehicle fuels year over year. Gas prices were low in 2015, however the increase in passenger vehicle traffic may have led to the increase in expenditure in this area.

[6] Note that this number includes an estimate of the consumption of gasoline for all vehicle kilometres travelled within Whistler's municipal boundaries. As such it includes a portion (i.e the portion within municipal boundaries) of the incurred costs of energy consumption associated with both visitors arriving by automobile, as well as commuting employees from neighbouring communities.

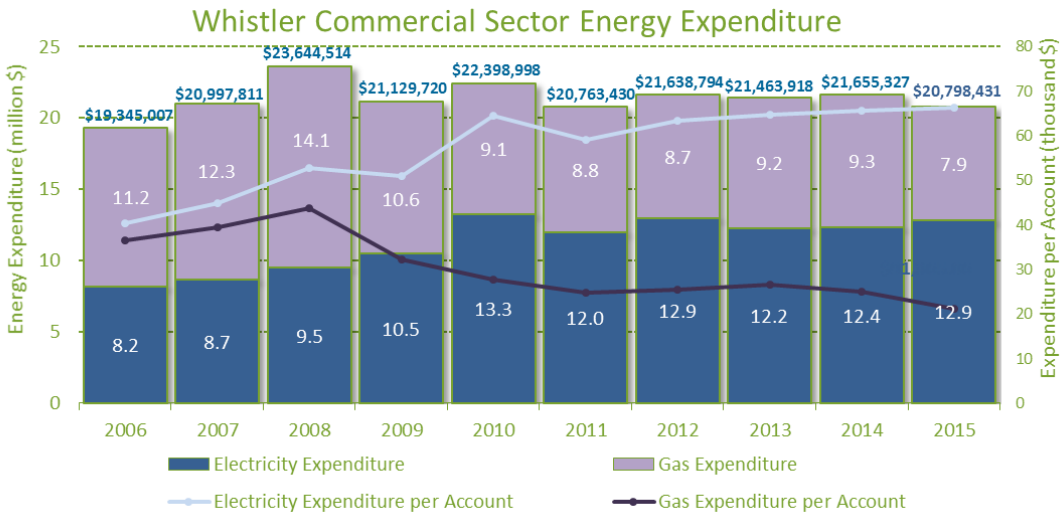


The final two charts in this section present the ten-year trend in cumulative energy expenditures across Whistler's key building inventory. Despite the decrease in the price of natural gas (versus propane) in 2009 and 2010, 2014 total expenditures in the residential sector continued to demonstrate an upward trend. Residential expenditures exceed $20 million/year, and commercial expenditures were slightly above $21 million. In 2015, there was a decrease in expenditure in both commercial and residential sectors.



Rate escalation expected electricity over the next number of years will average approximately 5% per annum. However, given the recent British Columbia Utilities Commission (BCUC) amalgamation ruling, it seems that a 30-40% reduction in local natural gas pricing has begun its three year-phase-in process (Jan, 2015).

Residential building expenditures decreased in 2013 for the first time in a decade due to a reduction in total energy consumption across this sector. However, expenditures increased again in 2014 despite a continued reduction in overall consumption. This is due to the fact that rates increased (primarily electricity) by a margin in excess of the per cent reduction in 2014 consumption levels. In 2015, expenditures decreased. Electricity remained constant, however gas expenditure decreased by $500,000.



Total commercial energy expenditures remained constant 2012 - 2014 despite continued reductions in overall consumption. There was a small decrease in 2015 commercial building energy expenditures of 5% year over year. There was an increase of electricity expenditure by 4% year over year, and a decrease in natural gas expenditure by 15%.

5.2.1 Key Community Energy Consumption & Expenditure Performance Insights

Total Energy Consumption

- Total community energy consumption decreased each of the last five years. 2015 levels were 0.6% below 2014 levels.
- Community energy consumption trends were on track to meet OCP targeted levels if the community continues to reduce consumption by ~2% each year. Reductions slowed to below 1% in 2015 and if this is continued (or increased), the community will miss the 2020 target.
- Current community energy consumption levels (2.99 million GJ/yr) are approximately 7% higher than the recommended forecast in the RMOW's 2003 Integrated Energy Plan.

Residential Energy Consumption

- 2015 residential energy consumption decreased in both total terms, as well as on a per account basis.

- 2015 was the lowest level of residential energy consumption since 2003 – this trend is driven primarily by lower levels of electricity consumption in the sector, as gas consumption remains slightly higher than the 10-year average.

Commercial Consumption

- 2015 commercial consumption levels have decreased by 3.8% year over year and are slightly below the 10-year average.
- There was a marked shift from natural gas consumption to electricity consumption in the commercial sector between 2005 and 2012, then in 2013 and 2014 natural gas consumption increased while electricity consumption decreased. This trend changed in 2015 and natural gas was at its lowest levels since 2009 with a 7% year over year decrease in emissions.

Passenger Vehicles

- Despite increases in vehicle fuel efficiencies, estimated energy consumption associated with passenger vehicles has not changed significantly since 2000. In 2015, there was a 3.6% year over year increase – this is the primary reason that GHGs within this sector have lagged so far behind all other sectors with respect to meeting the reduction targets.

Total Energy Expenditures

- Though overall consumption levels continue to decline, low fuel and electricity rates have combined to be the first year since 2009 that saw a drop in total energy expenditures ($82.6M/yr)
- Gasoline expenditures associated with passenger vehicle increased slightly year over year. Despite a marked drop in gasoline prices in 2015, yearly expenditure rose to ~$36.4M.
- Declining natural gas rates contributed to lower total natural gas expenditures over the years since the conversion to natural gas from propane (now at $11.4 M/yr).

Residential Building Sector Expenditures

- 2015 residential electricity expenditures remained level year over year making this year one of the second highest year on record ($16.3M/yr).
- Residential gas expenditures decreased by $0.5M/yr.

Commercial Building Sector Expenditures

- Total 2015 commercial energy expenditures decreased by $900,000.
- 2015 commercial electricity increased by 4% year over year despite a decline in the price of natural gas.
- Due to low natural gas rates, gas expenditure decreased by 15% year over year.

Looking Ahead

- The data suggests that there is some increasing energy efficiency in the residential sector, but more years of consistent trend data is required to confirm. Opportunities exist to catalyze further gains in this sector.
- The commercial sector has made progress toward decreased energy intensity across its collective inventory. However, further energy reduction initiatives are required to keep this sector on track to meet 2020 goals.
- **Passenger vehicle trends have fallen far behind targeted levels of reductions – this fact represents a critically important opportunity to target future improvements.**

6 ENERGY & GREENHOUSE GAS REDUCTION PLAN

Thorough review of Whistler's energy and emission performance trends, input from staff and community advisory group experts, as well as a review of best practices from leading jurisdictions, resulted in the series of phased actions recommended within this Plan.

All actions included are presented alongside key lead organizations, an estimate of the required implementation resources, as well as the estimated annual greenhouse gas and energy reductions associated with the successful execution of the recommended action. It should be noted that the modeling process for each action was done carefully and with the best available data. However, large variability remains inherent within the modeling process. The modeling process evaluated the forecasted impact of each of the recommended actions. Sector-specific assumptions were applied to each action to estimate the total energy and emissions reductions that would be associated with each. Assumptions varied in terms of the size of the target population that the action would impact (physical form, zone, age or user group); the likely uptake levels based on precedent projects; the fuel type (and associated emission intensity), background rates of technology or policy change (building code, federal standards) as well as the estimated performance improvements themselves.

Despite this analytical effort, the greatest strength of the modeling process is in demonstrating the relative difference between recommended actions. The specific modeled value should be understood in all cases to be an 'estimate', and caution should be used when interpreting the specific estimates included within the following tables.

All estimated energy and emission reductions are presented consistent with the following legend:

Action Impact Legend[7]

GHG Reduction Potential (per year)		Energy Reduction Potential (per year)	
2%+	2,000 tCO_2e+	2%+	60,000 GJ +
1%-2%	1,000 - 2,000 tCO_2e	1%-2%	30,000 – 60,000 GJ
0.5-1%	500 – 1,000 tCO_2e	0.5-1%	15,000 – 30,000 GJ
0.2%-0.5%	200 – 500 tCO_2e	0.2%-0.5%	6, 000 – 15,000 GJ
<0.2%	< 200 tCO_2e	<0.2%	< 6,000 GJ
0%	0 tCO_2e	0%	0 GJ
Foundational – no direct reductions		Foundational - no direct reductions	

Phasing and Resource Legend

Lead	**The organization identified to 'lead' the execution of the associated action.** All acronyms used in the following tables are outlined in Appendix A. *Note that other organizations will often need to be involved in project design, support and delivery in order to successfully execute on many of the recommended action opportunities.*
Timing	**Short**: Initiate within 2 years **Med**: Initiate within 2-5 years **Long**: Initiate in 5 years or later
Resources	🕐 primarily time **$-$$$** relative expenditure level
	$ < $25,000 **$$** $25,000 - $100,000 **$$$** > $100,000
Dual Benefit	This symbol indicates that the recommended action will help move the community to **both** identified energy/GHG reduction goals and climate adaptation goals.

[7] tCO2e refers to tonnes of CO2 equivalent – the accepted unit employed to compare the relative emissions footprint of a wide variety of greenhouse gas impacts. GJ refers to the metric unit of gigajoules – one GJ is approximately the same amount of energy as 25 litres of gasoline. Finally, Foundational elements are those recommended actions that are designed to strategically 'enable' further progress towards energy and emissions reductions, but do not, of themselves, result in direct emission reductions.

6.1 Mobile Energy Use – Transportation-based GHG Emissions

The most significant source of emissions in Whistler is associated with the use of mobile fuels for passenger vehicles and fleet vehicles. Reduction actions recommended within this section target both reductions in the total amount of vehicle-kilometers travelled (i.e. increasing use of mass and self-propelled transportation options, compact land use patterns, avoided trips etc.) as well as reductions in the emissions produced per kilometer travelled (i.e. lower carbon fuel options, electrification, higher efficiency vehicles, etc.).

In addition to the actions outlined in Section 6.1 below, the community of Whistler must also maintain projects, strategies and initiatives that have proven results; a successful local transit system, a commitment to the self-propelled Valley Trail system, support for electric vehicle charging infrastructure, and parking controls, to name just a few.

It is also important to recognize that actions recommended within this section of the Plan have, in many cases, significant co-benefits that include: improved public health, air quality improvements, traffic congestion reduction, personal fitness gains, and quite often both individual and public cost savings.

Over the ten year modeling period, **mobile emissions are targeted to reduce community-based emissions by more than any other single source**. As such, Whistler's ability to meet its long-term reduction targets is very much dependent on successfully achieving reductions in the mobile fuel sector. In order to meet Whistler's long-term targets, it is clear that there will need to be large-scale shifts to clean/low carbon vehicles, as well as significant reductions in in total number of vehicle-kilometers travelled.

6.1.1 Design Land Use for Location Efficient Living, Working and Playing

	Recommended Action	Reduction Potential: GHG	Reduction Potential: Energy	Resources	Timing	Lead
6.1.1.1	Continued commitment to ensuring that Whistler is made up of increasingly complete and compact neighbourhoods.			$	Short	RMOW REX
6.1.1.2	Investigate raising the target for the number of employees, especially full-time employees, living locally. (i.e. > than the current 75%)[8]			$	Short	RMOW REX
6.1.1.3	Adhere to the Whistler Urban Development Containment Area (WUDCA) as a means of reducing automobile trip distances.			$	Short	RMOW
6.1.1.4	Ensure that whenever possible, new development or significant redevelopment is concentrated in existing neighbourhoods or settled areas that are well-served by transit, pedestrian and cycling routes, amenities and services; and are characterized by increased residential density.			$	Short	RMOW REX
6.1.1.5	Explore opportunities to expand live-work use designations within existing zones where this inclusion would not have adverse impacts on the neighbourhood's character.			$	Short	RMOW REX
6.1.1.6	Proposals for significant new development or redevelopment should be required to quantify future GHG emissions and energy consumption impacts (including transportation-based) and incorporate measures to minimize and/or mitigate projected increases.			$	Short	RMOW REX

6.1.2 Advance Local and Regional Mass Transportation Service

	Recommended Action	Reduction Potential: GHG	Reduction Potential: Energy	Resources	Timing	Lead
6.1.2.1	Work with regional passenger carriers and provincial regulatory bodies to encourage greater frequency and more affordable choices for regional bus travel.[9]			$$	Short	RMOW IS
6.1.2.2	Support the expansion, promotion and increased convenience of mass transportation services between Vancouver and Whistler.[10]			$$	Short	RMOW IS, TW
6.1.2.3	Develop a public realm with improved multi-modal integration and comfortable, convenient transition areas – Bus Loop/taxi loop.[11]			$	Short	RMOW IS

[8] It is possible that this action may lead to more significant reductions in emissions as well as energy savings within other jurisdictions.
[9] It is possible that this action may lead to more significant reductions in emissions as well as energy savings within other jurisdictions.
[10] It is possible that this action may lead to more significant reductions in emissions as well as energy savings within other jurisdictions.
[11] It is possible that this action may lead to more significant reductions in emissions as well as energy savings within other jurisdictions.

	Recommended Action	Reduction Potential GHG	Reduction Potential Energy	Resources	Timing	Lead
6.1.2.4	Advance a community-based social marketing research project to determine the key perceived barriers and benefits of increased use of mass transit transportation. Based on the associated results, develop and execute targeted community-based social marketing campaign and other relevant, practical solutions to increase use of mass transit.			$$	Short	RMOW IS, TW, WB
6.1.2.5	Advance all potential opportunities to avoid increases in local transit fares.			$	Short	RMOW IS
6.1.2.6	Continue to pass the infrastructure, maintenance, congestion, environmental and land costs of road and parking infrastructure onto users.			$	Med	RMOW IS, WB
6.1.2.7	Optimize the road network and highway to prioritize the flow of high occupancy vehicles (HOVs).			$$$	Med	RMOW IS, BC MOTI
6.1.2.8	Strategically expand transit system service levels and frequency where possible and affordable.			$$$	Med	RMOW IS
6.1.2.9	Explore and consider opportunities to link Whistler Blackcomb and other local business products with (discounted) local and regional mass transit passes.			$$	Med	RMOW IS, WB
6.1.2.10	Continue to encourage the provincial government and private sector to pursue the return of higher-volume, affordable and more frequent passenger rail service to Whistler.			$$$	Long	RMOW Chamber
6.1.2.11	Ensure that any potential investigation into new regional air service or a new airport facility includes a full assessment of the GHG emissions balance of the proposed project.			$	Long	RMOW TW

6.1.3 Activate Walking, Biking and other Forms of Healthy Transportation

	Recommended Action	Reduction Potential: GHG	Reduction Potential: Energy	Resources	Timing	Lead
6.1.3.1	Prioritize the recommendations of and regularly update the Whistler Transportation Cycling Plan and the Whistler Recreational Cycling Plan in planning for the pedestrian and bicycle network.			$$	Short	RMOW IS, HAW
6.1.3.2	Consider opportunities to permit the repurposing of existing village parking to other purposes to support preferred modes of transportation (i.e. bike parking, end of trip facilities).			$	Short	RMOW IS, HAW
6.1.3.3	Advance a community-based social marketing research project to determine the key perceived barriers and benefits of increased use of active transportation. Built upon the findings of the research, develop and execute targeted community-based social marketing campaign and other practical relevant solutions to increase use of active transportation			$$	Short	RMOW IS
6.1.3.4	Where opportunities exist, prioritize the optimization and enhancement of pedestrian infrastructure and safety throughout the community.			$$	Med	RMOW IS

6.1.4 Support Electrification, and the Adoption of other Low Carbon Transport Options

	Recommended Action	Reduction Potential: GHG	Reduction Potential: Energy	Resources	Timing	Lead
6.1.4.1	Support the development of, and increased access to, reduced-carbon mobile fuel options such as natural gas, appropriate biofuels, and electrical charging stations across the community.			$$	Short	RMOW CAO
6.1.4.2	RMOW to aggressively advance the average fleet GHG and energy efficiency of the municipal vehicle fleet.			$	Short	RMOW IS
6.1.4.3	Champion and support inter-community travel providers (including airlines) that are progressive leaders in energy and GHG innovation through preferred marketing relationships and other in-kind partnership opportunities.[12]			$	Short	RMOW CAO/REX, TW, WB, HAW
6.1.4.4	Integrate electric and/or lower carbon fuel vehicles into existing private and public fleets (transit/delivery/taxis/shuttles).			$$	Med	TAXIs, HAW, WB

[12] It is possible that this action may lead to more significant reductions in emissions as well as energy savings within other jurisdictions.

	Recommended Action	Reduction Potential GHG	Reduction Potential Energy	Resources	Timing	Lead
6.1.4.5	Support the use of 'appropriate' electric assist bicycles on Whistler's roads, and Valley Trail network, and support appropriate opportunities to increase secure storage and charging infrastructure in the Village.			$	Med	RMOW IS
6.1.4.6	Explore opportunities to structure local incentives to support electric vehicle use within and to/from Whistler.(i.e. preferred or reduced parking fees for electric vehicles)			$	Med	RMOW CAO/IS, HAW, WB
6.1.4.7	Profile ultra-low emission private vehicle fleets (hotels, commercial recreation, as appropriate).			$	Med	RMOW IS/CAO, WB, HAW
6.1.4.8	Increase the enforcement of the Whistler anti-idling bylaw.			$	Med	RMOW CAO/IS
6.1.4.9	Invest in electric vehicle integration across municipal fleet.			$	Med	RMOW IS
6.1.4.10	Encourage local commercial recreation and leisure operators to minimize the GHG emissions associated with their activities.			$	Med	RMOW CAO
6.1.4.11	Develop a social marketing initiative to drive the use and purchase of more efficient vehicles.			$	Long	RMOW CAO
6.1.4.12	Explore opportunities to effectively support and encourage the development of a new car co-op/car-sharing program in Whistler, in addition to promoting ride-share and carpool programs.			$	Long	WCSS, RMOW IS AWARE

6.2 Stationary Energy Use – Buildings & Infrastructure GHG Emissions

Buildings contribute approximately one third of all GHG emissions in Whistler. Reduction actions recommended within this section target existing buildings as well as new buildings across both the residential and commercial/institutional sectors.

In addition to the actions outlined in Section 6.2 below, the community of Whistler must also continue to commit to the type of initiatives that have led to strong performance in the stationary energy use sector over the past decade - green building support and innovation (both in public sector and private), municipal energy assessment rebates, preliminary public education and communication programs, low carbon district energy development as well as aggressive efficiency upgrades to municipal buildings and infrastructure.

Much like in the mobile energy use section above, it is important to recognize that actions recommended within this section of the Plan also have ancillary benefits that can include: healthier indoor air quality, increased comfort levels, and significant utility cost reductions.

6.2.1 Improve the Energy Efficiency and Comfort of Existing Buildings and Infrastructure

Existing Residential Buildings

	Recommended Action	Reduction Potential: GHG	Reduction Potential: Energy	Resources	Timing	Lead
6.2.1.1	Continue to support and enhance the social marketing campaign to increase uptake of enhanced incentive programs and associated energy efficiency performance improvements.			$$	Short	RMOW CAO, Utility Partners
6.2.1.2	Support and encourage EnerGuide energy performance labeling on homes for sale.			$	Short	Whistler Realtors
6.2.1.3	Expand the integration of climate change, energy efficiency and water conservation literacy into school programs and curriculum.			$	Short	SD48
6.2.1.4	Profile a deep energy retrofit as an example of what can be done to promote energy efficient retrofits in existing homes.			$	Short	RMOW CAO, CHBA
6.2.1.5	Continue to optimize performance outcomes of the Cheakamus Crossing District Energy System and apply learning to future projects.			$	Short	RMOW IS, 2020 Dev
6.2.1.6	Advance opportunities to reduce the direct heating of outdoor areas (i.e. heated driveways, heated stairs, patio heaters, outdoor gas fireplaces).			$	Long	RMOW CAO/REX, Chamber, CHBA
6.2.1.7	Encourage existing multi-tenant or multi-owner residential buildings to maintain or add individually metered energy consumption for individual properties (i.e. encourage user-pays principle).			$	Long	RMOW CAO, Utility Partners

Existing Commercial/Institutional Buildings and Infrastructure

	Recommended Action	Reduction Potential		Resources	Timing	Lead
		GHG	Energy			
6.2.1.8	Actively investigate the development of new district energy system for Whistler Village that increases energy efficiency, increases the share of energy production from renewable sources, reduces operating costs and decreases GHG emissions.			$$	Short	RMOW CAO, HAW
6.2.1.9	Develop and implement a social marketing campaign with incentives to increase audits, uptake of incentive programs and associated energy efficiency performance improvements.			$$	Short	RMOW CAO
6.2.1.10	Support and improve staff training on energy efficiency practices across hotel operations (start-up practices, etc).			$	Short	RMOW CAO, HAW
6.2.1.11	Advance a system of voluntary and mandatory energy benchmark reporting across Whistler's large energy consumers (leverage NRCAN Portfolio Manager updates into Canada).			$	Short	RMOW CAO, WB, HAW
6.2.1.12	Promote increased awareness of Energy Performance Contracting and other energy efficiency opportunities for commercial sector properties.			$	Short	RMOW CAO, HAW
6.2.1.13	Support the reestablishment of the former Whistler Facility Managers Association (WFMA).			$	Short	RMOW CAO, HAW, TW
6.2.1.14	Encourage approaches that reduce the direct heating of outdoor areas such as through open shop doors, patio heaters and heated driveways (i.e. explore the potential to create and enforce a closed door - energy waste bylaw in commercial and retail zones).			$	Med	RMOW CAO
6.2.1.15	Encourage existing multi-tenant or multi-owner commercial buildings to maintain or add individually metered energy use (i.e. encourage user-pays principle).			$$	Med	RMOW CAO
6.2.1.16	Catalogue and develop strategies for maximizing the re-use of waste heat resources across the resort community.			$	Med	RMOW CAO

6.2.2 Ensure the Most Energy Efficient and Comfortable New Buildings and Infrastructure as Possible

New Residential Buildings

	Recommended Action	Reduction Potential		Resources	Timing	Lead
		GHG	Energy			
6.2.2.1	Support the trades, sub-trades, developers and building community with programs and initiatives designed to increase the uptake of energy efficient residential building designs, programs and technologies in Whistler.	—	—	$	Short	RMOW CAO/REX, CHBA
6.2.2.2	Streamline the development of passive house-certified, and net-zero residential buildings using tools such as accelerated permit processing.	—	—	$	Short	RMOW REX
6.2.2.3	Explore the feasibility for requiring energy modeling for new residential buildings and significant renovations at building permit phase.	—	—	$	Med	RMOW REX
6.2.2.4	Maintain and update the RMOW Green Building Policy to require higher energy performance standards during rezoning for new residential buildings.	—	—	$	Long	RMOW CAO/REX
6.2.2.5	Encourage new multi-tenant or multi-owner residential buildings to have individually metered energy use (i.e. encourage user-pays principle).	—	—	$$	Long	RMOW CAO, Utility Partners

New Commercial/Institutional Buildings

	Recommended Action	Reduction Potential: GHG	Reduction Potential: Energy	Resources	Timing	Lead
6.2.2.6	Designate Whistler Village as a District Energy Investigation Area to encourage flexible building systems for future potential District Energy System connectivity.	—	—	$	Short	RMOW REX
6.2.2.7	Streamline the development of certified high-performance commercial buildings and/or significant renovations using tools such as accelerated permit processing.	—	—	$	Short	RMOW CAO/REX
6.2.2.8	Explore the feasibility of requiring energy modeling for new commercial buildings and significant renovations at building permit phase.	—	—	$	Med	RMOW REX
6.2.2.9	Support the trades, sub-trades, developers and building community with programs and initiatives designed to increase the uptake of energy efficient commercial building designs, programs and technologies in Whistler.	—	—	$$	Med	RMOW CAO/REX, CHBA
6.2.2.10	Update the RMOW Green Building Policy to modernize the framework, and ensure that opportunities to increase energy performance outcomes are identified and leveraged during permit approval and rezoning processes (commercial, institutional and residential).	—	—	$	Long	RMOW CAO/REX
6.2.2.11	Encourage new multi-tenant or multi-owner commercial buildings to have individually metered energy use (i.e. encourage user-pays principle).	—	—	$$	Long	RMOW CAO, Utility Partners

6.3 Renewable Energy and Energy Supply Alternatives

Renewable energy development has the potential to significantly reduce the carbon content of existing fuels and energy sources in Whistler. Renewable energy is generally defined as energy that is collected from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. Renewable energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation, and rural (off-grid) energy services. Technology improvements have advanced to the point that many renewable energy options are cost competitive with current energy sources while concurrently reducing associated emissions. Options are available at both the building-level and grid or system level, and each can contribute to the positive benefits of this growing sector.

This Plan includes the stated aspiration that by the year 2060 Whistler would access 100% of its energy requirements from renewable energy sources. Achievement of this target will require progress at all levels of renewable energy deployment and across all key energy consuming systems and fuel types. While this Plan recommends initial steps along this journey to 100% renewable energy, a more detailed and comprehensive planning process will be required to accelerate the changes needed to achieve this ambitious goal.

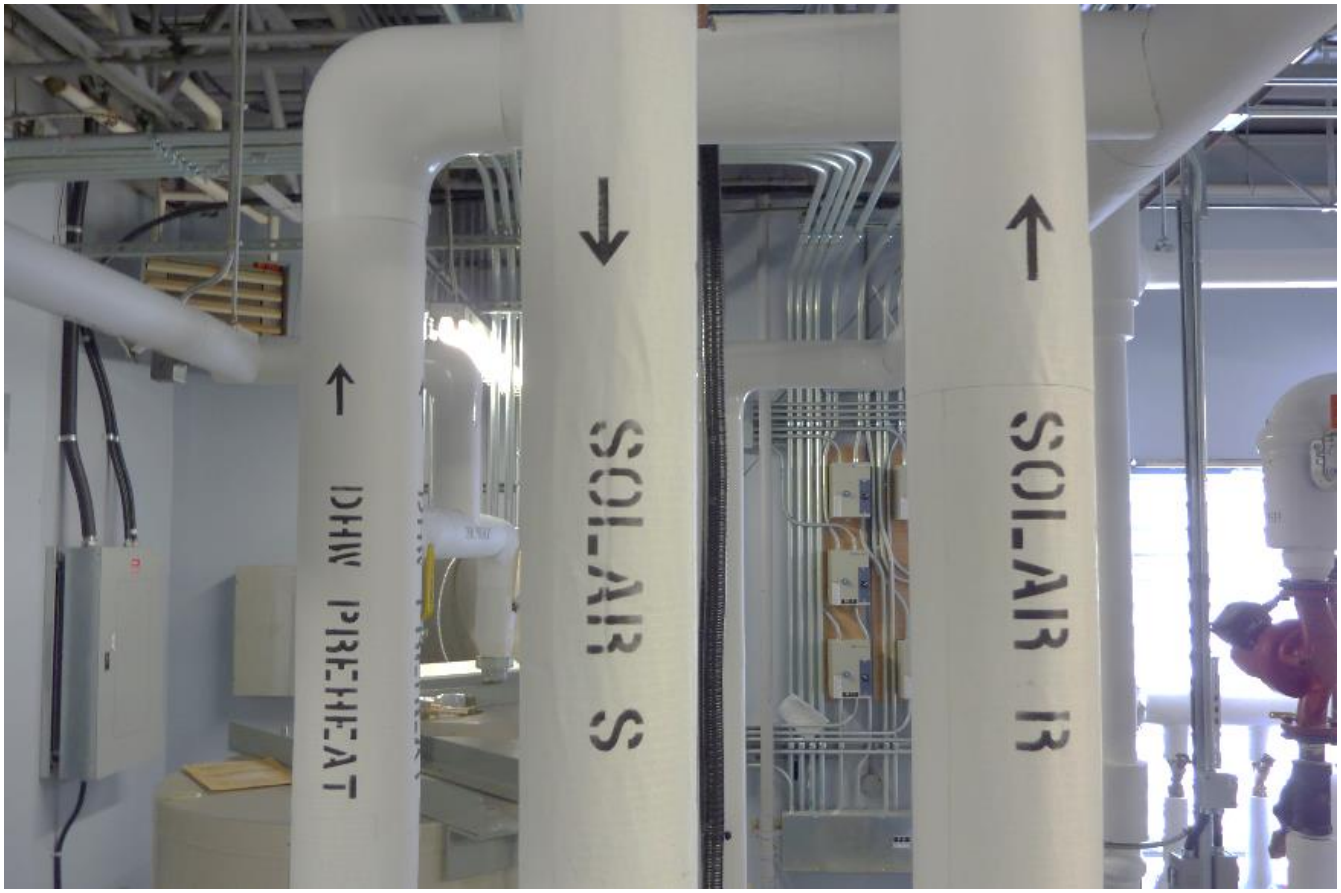
6.3.1 Encourage the Use of Renewable Energy across the Community

	Recommended Action	Reduction Potential: GHG	Reduction Potential: Energy	Resources	Timing	Lead
6.3.1.1	Encourage the use and fair commodity pricing of 'renewable' natural gas.	▬	–	$	Short	RMOW CAO
6.3.1.2	Investigate and advance opportunities to incent electric heat pump systems to replace existing gas/propane/basic electric heating systems.	▬	▬	$$	Short	RMOW CAO
6.3.1.3	Evaluate the potential for including support for local renewable energy installations within future energy and/or climate related community-based social marketing campaigns.	▬	–	$$	Short	RMOW CAO
6.3.1.4	Support provincial building code extensions and other tools that maximize the extent that local building regulation can require or support increased energy efficiency or renewable energy systems in local development and construction.	▬	–	$	Short	RMOW CAO/REX
6.3.1.5	Develop a Renewable Energy Strategy to move Whistler toward the new 100% renewable energy target	▬	–	$	Med	RMOW CAO
6.3.1.6	Undertake a research study to evaluate the best opportunities for developing and expanding renewable energy production in Whistler.	▲	–	$	Med	RMOW CAO

	Recommended Action	Reduction Potential GHG	Reduction Potential Energy	Resources	Timing	Lead
6.3.1.7	Develop and/or expand renewable energy pilot installations on appropriate municipal buildings and facilities	▬	–	$	Med	RMOW CAO

6.3.2 Encourage the Addition of Responsible, Regional Renewables

	Recommended Action	Reduction Potential GHG	Reduction Potential Energy	Resources	Timing	Lead
6.3.2.1	Support local and regional renewable electricity production opportunities that include a careful assessment of potential negative impacts on ecosystem function, wildlife values, air quality, community character and visual aesthetics.	▬	–	$	Short	RMOW CAO
6.3.2.2	Partner with utilities to provide feedback on the Integrated Resource Plans, and advocate for the inclusion of renewable energy provisions.	▲	–	$	Med	RMOW CAO



6.4 Solid Waste System-based GHG Emissions

Emissions associated with Whistler's solid waste management systems represent approximately 2% of the community's total emission. Despite this relatively small share of the community's emission profile, the upstream emissions from the material refining, product production, and shipping of products contributes significant impacts to global emissions and associated environmental footprints. As such, reductions from the 'materials, and solid waste' sector can be achieved through improvements in materials management (especially the diversion of compostable material from the landfill stream), but also includes potential reduction in material throughput within our community. Decreasing consumptive lifestyle habits through increases in the re-use of products, the use of more durable products and growth of the sharing economy can all contribute positively to emission reductions within this sector[13].

6.4.1 Materials Minimization and Diversion

	Recommended Action	Reduction Potential: GHG	Reduction Potential: Energy	Resources	Timing	Lead
6.4.1.1	Support the implementation of a strong SLRD Solid Waste Management Plan - with strong targets and actions, regional collaboration, and continued avoidance of waste/garbage incineration as part of the Plan.	▬	–	$	Short	RMOW IS
6.4.1.2	Support the expansion of local compost diversion programs (marketing, education, pricing, infrastructure, etc.)	▬	–	$	Short	RMOW IS, Carney's S2S Soils
6.4.1.3	Evaluate opportunities to require new development or significant redevelopment to incorporate meaningful measures to minimize solid waste during design and construction, deconstruct rather than demolish, and encourage alternative and evolving methods of waste diversion during building operation.	▬	–	$	Short	RMOW REX
6.4.1.4	Continue moving towards the Zero Waste goal endorsed in 2005, and update the municipal solid waste strategy to advance zero-waste goals, planning and actions.	▬	–	$	Med	RMOW IS
6.4.1.5	Support and promote the increased use of the Sustainable Events Guide and monitor performance outcomes for all key events.	▬	–	$	Med	RMOW REX
6.4.1.6	Evaluate and support implementation of efficient and convenient methods of collecting solid waste, recyclables and compost for people utilizing preferred methods of transportation.	▬	–	$	Med	RMOW IS

[13] Despite the potential for upstream emission reductions noted above, it should be noted that that the reduction potential presented in the tables below refers only to the emission reduction potential associated with Whistler's direct emissions (i.e. Scope 1 emissions).

	Recommended Action	Reduction Potential GHG	Reduction Potential Energy	Resources	Timing	Lead
6.4.1.7	Encourage the private sector to develop and/or participate in innovative, cost-effective and environmentally sustainable solid waste and recycling programs in support of achieving our Zero Waste goal.	▬	–	$	Med	RMOW IS, HAW, Strata Mgmt WB
6.4.1.8	Implement standardized SLRD signage across Whistler to improve recycling and composting rates.	▬	–	$	Med	RMOW IS

6.4.2 Reduce Upstream Emissions from Goods and Services[14]

	Recommended Action	Reduction Potential GHG	Reduction Potential Energy	Resources	Timing	Lead
6.4.2.1	Support the creation of a 'sharing economy' working group to explore the best opportunities for sharing locally available skills and equipment as a means of increasing affordability, reducing new consumption and decreasing local waste production.	–	–	$	Short	AWARE WCSS Library
6.4.2.2	Encourage the use of the Re-Build-It Centre and Re-Use it Centre for the reuse of building materials, products and to support community services.	▬	–	$	Short	WCSS RMOW
6.4.2.3	Promote opportunities for education and learning related to food production and associated GHG and environmental impacts.	–	–	$	Short	AWARE, EarthSave Whistler, Farmer's Market, RAW
6.4.2.4	Promote and facilitate opportunities to shorten food supply chains and that support less GHG intensive food growing and menu choices.	–	–	$	Short	AWARE, EarthSave Whistler, Pember-ton Farmer's Institute, Farmer's Market, RAW

[14] These actions mostly focus on reducing manufacturing/production emissions and are outside the scope of municipal climate planning. These emissions can be significant, and empowered consumers can dramatically reduce these emissions through personal purchasing choices.

6.5 Enabling Energy Reduction and Climate Change Mitigation

A host of activities and resources are required to catalyse the GHG reduction and mitigation objectives outlined above. Some of the activities which are controlled by other levels of government may in fact have a greater impact on local reductions than the actions recommended above. Enabling actions include activities for governance, funding mechanisms, support from other levels of government, ongoing advocacy, alliances and partnerships.

Whistler has been successful working on these types of initiatives over the years, with examples including the carbon offset development with the Cheakamus Community Forest, energy utility support and alignment, Provincial and Federal funding programs, UBCM and FCM involvement as well as a series of engagements and work between public and private stakeholders throughout the community and the region.

6.5.1 Ensure Adequate Governance and Funding for ongoing Climate Action progress

	Recommended Action	Reduction Potential		Resources	Timing	Lead
		GHG	Energy			
6.5.1.1	Create a 'Climate Leadership Committee' as a select committee of Council.	▲	▲	$	short	RMOW CAO
6.5.1.2	Investigate and advance opportunities to fund expanded local energy efficiency incentive programs with the annual RMOW corporate carbon tax rebate (CARIP).	▲	▲	$	short	RMOW CAO
6.5.1.3	Create a Climate Action Coordinator position on municipal staff to lead the coordination and implementation of this CECAP and related energy and climate management responsibilities at the RMOW.	▲	▲	$$	short	RMOW CAO
6.5.1.4	Review and consider the implementation of a FortisBC franchise fee and dedicate the incremental funds to energy efficiency programs.	▲	▲	$	short	RMOW CAO, FortisBC
6.5.1.5	Consider use of cash-in-lieu parking fees for improvement of pedestrian, cycling, and transit infrastructure.	▲	▲	$	short	RMOW IS

6.5.2 Actively Work With Other Levels of Government to Advance Shared Climate Goals

	Recommended Action	Reduction Potential		Resources	Timing	Lead
		GHG	Energy			
6.5.2.1	Lobby the Provincial government for further systematic increases in the BC Carbon Tax, and for a shift toward VKT-based car insurance structures (vehicle-kilometers-travelled-based).	▲	▲	$	short	RMOW CAO
6.5.2.2	Lobby the Provincial government for further systematic improvements to the BC Building Code that focus on energy efficiency.	▲	▲	$	short	RMOW CAO/REX
6.5.2.3	Lobby senior governments to encourage increased energy and GHG innovation in the automotive and aviation sectors.	▲	▲	$	short	RMOW CAO/IS

	Recommended Action	Reduction Potential GHG	Reduction Potential Energy	Resources	Timing	Lead
6.5.2.4	Increase collaboration with neighbouring Sea to Sky communities and the SLRD on climate-related issues.	▲	▲	$	short	RMOW AWARE
6.5.2.5	Work with other groups and jurisdictions (i.e. BC Mayors Climate Leadership Council, City of Vancouver and other leading communities) toward advancing Whistler's 100% renewable energy goals.	▲	▲	$	med	RMOW

6.5.3 Support High Quality, Third-Party Verified Local Offset Products

	Recommended Action	Reduction Potential GHG	Reduction Potential Energy	Resources	Timing	Lead
6.5.3.1	Encourage local organizations to support local carbon reduction projects like the Cheakamus Community Forest offset project.	▲	▲	$	Short	CCF, Whistler Chamber
6.5.3.2	Encourage local accommodation providers and booking companies to provide options for purchasing local offset products.	▲	▲	$	Short	RMOW CAO, TW, WB, HAW, CCF
6.5.3.3	Continue to meet municipal carbon neutral commitments through the purchase of locally and regionally sourced high quality, externally verified offset products (i.e. Cheakamus Community Forest).	▲	▲	$	Short	RMOW CAO

7 ENERGY & EMISSION FORECASTS

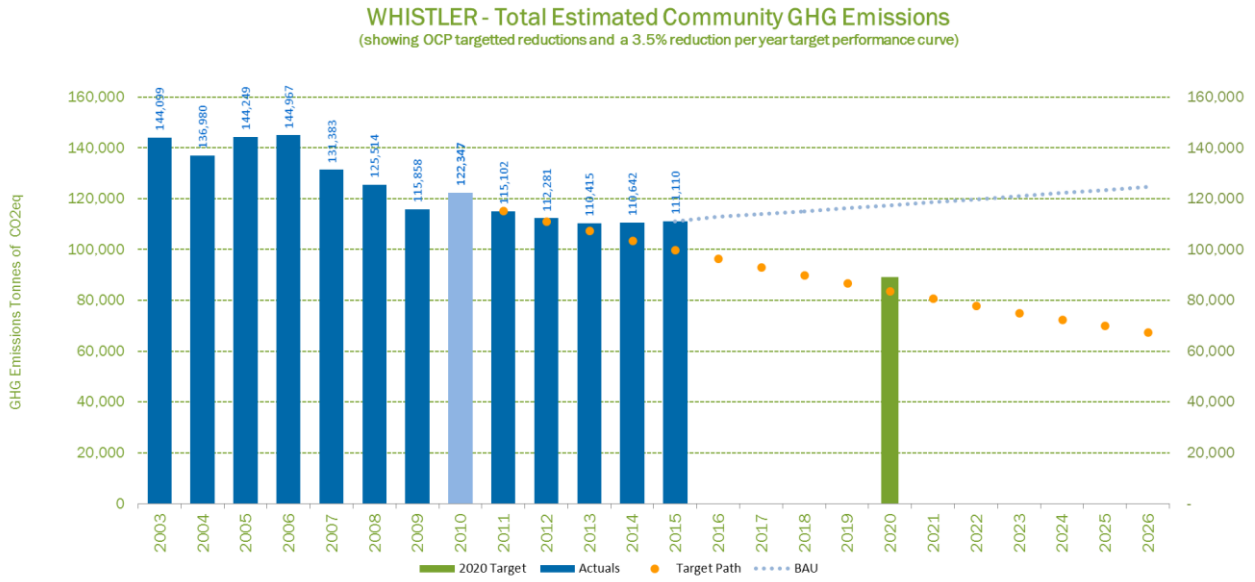
The following section provides an overview of the collective forecasted impact of the recommended actions outlined within this Plan.

7.1 Greenhouse Gas Emissions

7.1.1 GHG Forecast – Business as Usual (BAU)

The following chart shows Whistler historic GHG emission levels (2000 to present) as well as the most probable 'business-as-usual' (BAU) forecast for the community. The BAU forecast considers current and historic emissions trends, forecasted growth in visitation to the resort, the impact of ongoing new construction consistent with the community's current Official Community Plan and associated growth management plans, as well as conservative assumptions related to future technological improvements.

All considered, it is estimated that the BAU emission increases average approximately 1% per annum for the duration of the planning period (to 2026). See the chart below for a visual representation of the forecasted 'business-as-usual' scenario.



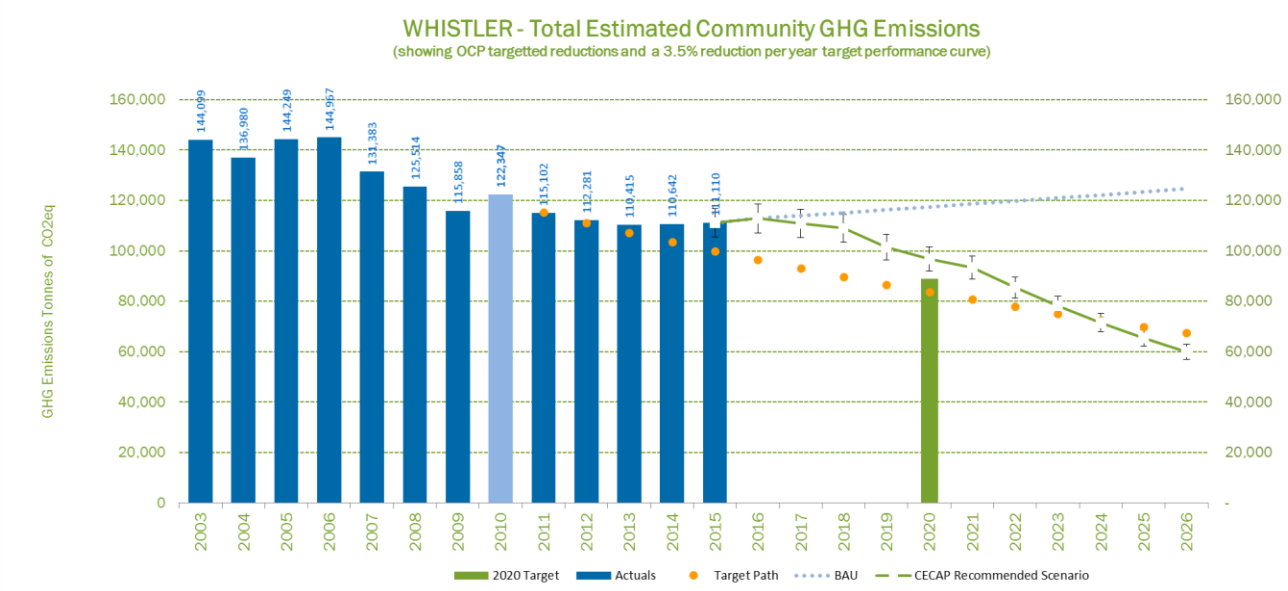
As can be seen in the chart above, without substantive incremental action within the community, Whistler is not expected to meet its 2020 greenhouse gas emission reduction target (89,000 tCO2e, or 33% below 2007 levels).

7.1.2 Recommended CECAP Scenario – Forecasted GHG Emission Levels

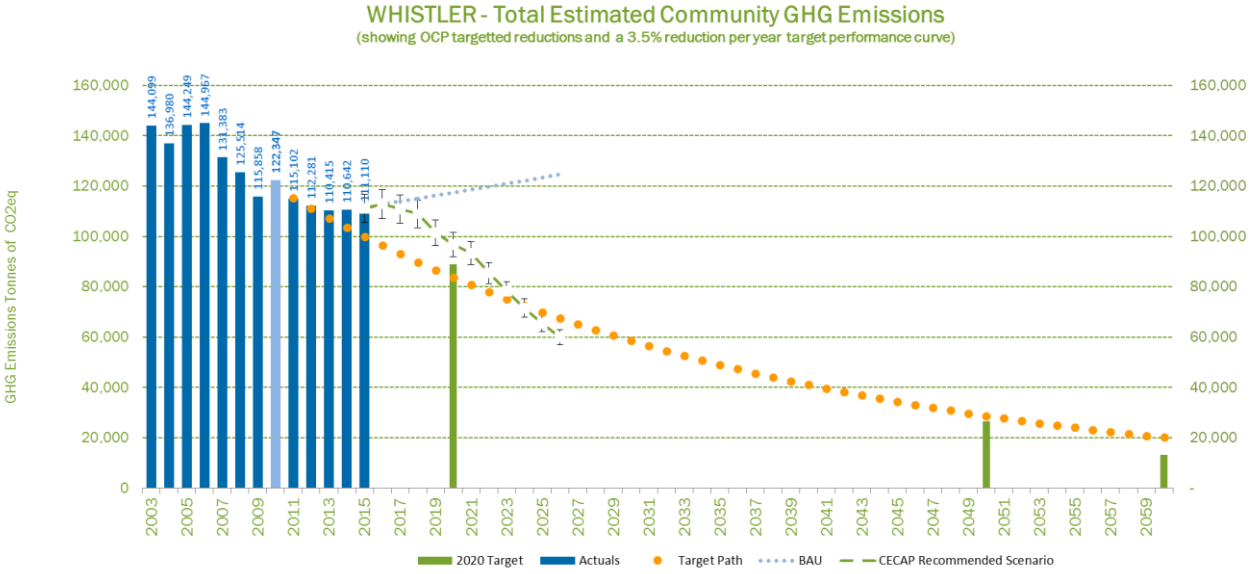
The chart below indicates the anticipated cumulative net result of implementing the actions recommended within this Plan. The results are based on the suggested phasing included within the Plan as well as the individual and collective reductions estimated for each of the recommended actions.

It should be noted that the modeling process for each action was done carefully and with the best available data. However, large variability remains inherent within the modeling process. The specific modeled value should be understood in all cases to be an 'estimate', and caution should be used when interpreting the specific estimates.

Importantly, the cumulative action scenario recommended within this Plan is estimated to fall short of the 2020 GHG reduction Target by approximately 2-3 years, but may regain alignment with the broader target reduction curve by the end of the planning period (2026).



A longer term representation of the same modeled outcomes is shown below.



The table below outlines the cumulative anticipated resultant reductions associated with the full implementation of the entire suite of actions recommended within this Plan (by emission source). Note that the results are subject to the same cautionary interpretation notes as outlined above.

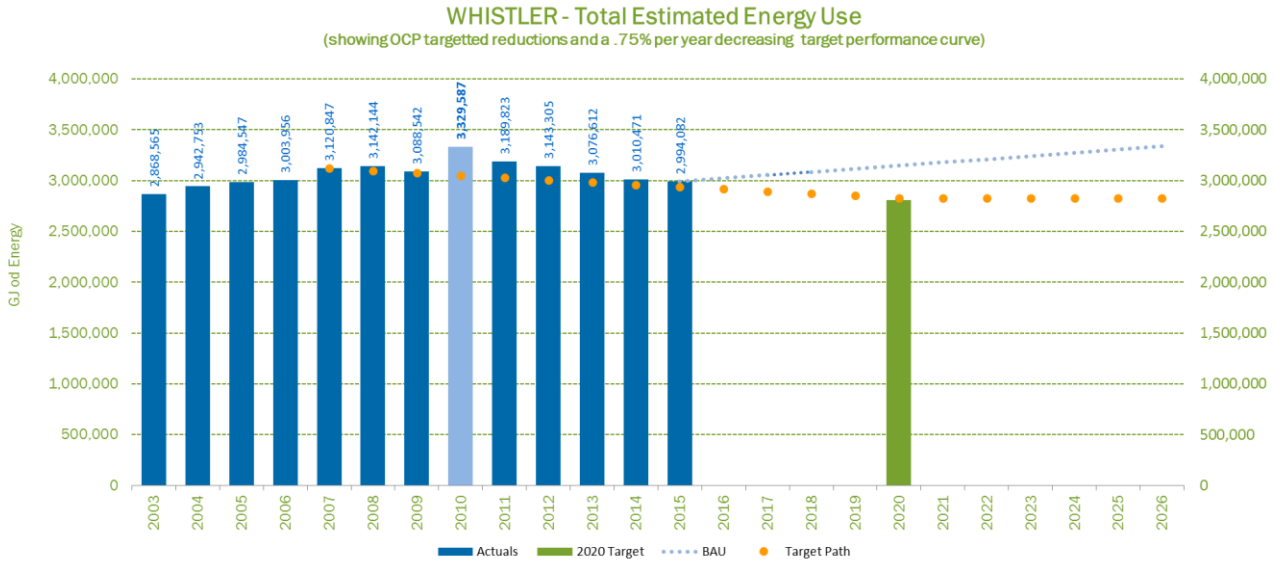
As seen in the table, the Action Plan initiates with shorter-term outcomes associated with stationary reductions and then builds toward more significant mobile reductions by 2020 and beyond.

Reduction Source	Estimate Annual GHG Reductions (Tonnes CO2e)			Remaining (Tonnes CO2e)
	2018	2020	2026	2026
Mobile	-2,000	-12,000	-44,000	33,000
Stationary	-4,000	-8,000	-20,000	25,000
Solid Waste	-100	-1,000	-1,300	1100
Grand Total	-6,000	-21,000	-65,000	59,000

7.2 Energy Consumption

7.2.1 Energy Consumption Forecast – Business as Usual

Similar to the 'business-as-usual' emissions forecast presented above, without concerted incremental energy reduction programs and initiatives, the community of Whistler is expected to increase total energy consumption by approximately 1% per year (primarily driven by increased visitation). Note that the chart below includes all types of energy (mobile fuels, electricity and thermal gases).

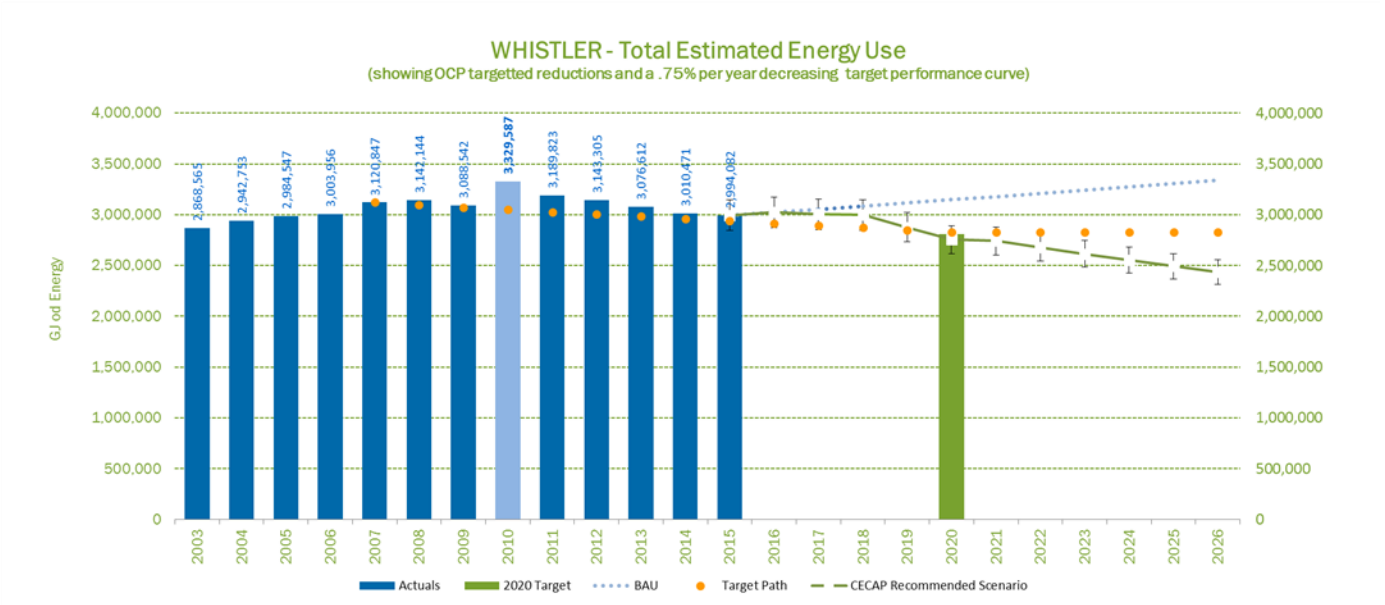


7.2.2 Energy Consumption Recommended Scenario

The chart below presents the anticipated result of implementing the entire suite of actions recommended with this Plan. As shown below, current modeling forecasts indicate that successfully implementing the full suite of actions included within this Plan is likely sufficient to meet the community energy consumption targets by 2020.

Moreover, reducing energy consumption to the levels forecasted within the Action Plan scenario would avoid an estimated total of $200 million in energy costs spent between 2017 and 2026– approximately $40 million from in building-based savings and approximately $160 million in parallel transportation-based energy savings[15]

[15] Assumes a 2% increase in annual energy rates from now until 2026.



Note that additional detail related to energy source-specific BAU and recommended scenario forecasts are included for reference and consideration in Appendix B.

8 ADAPTATION PLAN

Although global mitigation efforts are taking place to curb greenhouse gas emissions, climate change is already underway and communities must take action to adapt to the changes that are already in motion, as well as those anticipated in the future.

Climate change adaptation refers to actions taken to respond to the impacts of climate change by taking advantage of potential opportunities or reducing potential risks. The most widely used definition of climate change adaptation is from the Intergovernmental Panel on Climate Change:

> *Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.*

The Intergovernmental Panel on Climate Change (IPCC) definition of adaptation states:

- adaptation involves "adjustment," or change;
- both natural and human systems adapt;
- systems adapt to climate change and/or to its impacts;
- adaptation includes adjusting to actual climate change after the fact, and also preparing for expected climate change before it happens; and
- adaptation can moderate harm or take advantage of new opportunities (IPCC 2007).

In general, climate change adaptation planning is aimed at:

- preventing the risk of damage/impacts posed by key climate change impacts;
- minimizing the extent of damages/impacts posed by key climate change impacts; and
- reducing vulnerability and increasing resilience by preparing adequately to deal with lesser risks and opportunities presented by climate change.

Climate change adaptation engages an extensive range of issues, such as emergency management, health, environmental management, economic drivers and infrastructure improvements related to the vulnerability and resilience of communities to key climate change impacts. There is significant overlap between climate change adaptation, mitigation and sustainability measures, such as those found in Whistler2020, Moving Toward a Sustainable Future.

Adaptation Vision

The Plan establishes the following simple Adaptation Vision for the resort community:

A resilient, lower carbon Whistler

The development and implementation of the Plan is targeted at achieving the following adaptation goals:

1. **Increase the resilience of Whistler's infrastructure, natural environment, socio-economic systems and assets to the key potential impacts of projected local climate changes in order to avoid, prevent or moderate harm and optimize beneficial opportunities.**
2. **Promote and facilitate the incorporation of climate change information and consideration into the planning and activities of the RMOW and other resort community organizations.**

8.1 Climate Adaptation Planning

Increasing awareness of the effects of climate change are spurring communities and countries around the globe to prepare climate adaptation plans. The adaptation component of this Plan will support Whistler in effectively dealing with the impacts, risks and opportunities posed by a changing climate. It does not reduce the need to mitigate the causes of climate change. However, scientific evidence indicates that, no matter how successful mitigation efforts are, the impacts of climate change will be felt for a long time, possibly beyond the next century. As such, adaptation planning and actions are needed now and into the future. The adaptation component of this Plan addresses the key climate changes and key impacts facing Whistler. It prioritizes these impacts, establishes objectives and recommends a comprehensive action plan to increase Whistler's resilience in the face of climate change.

Climate change affects the entire municipality and will continue to affect it over the long term. **Adaptation planning is not the domain of any specific department or agency but requires considerable cooperation across the community**. The adaptation actions recommended here are similarly spread over the entire municipality. The recommendations of the CECAP will find their way into other municipal planning documents, such as emergency preparedness plans, transportation plans, and the economic development strategy, as well as into the plans and activities of other Whistler organizations.

For local governments, putting climate change adaptation into practice means enhancing the resilience of the built and natural environments within their jurisdictions, managing risk, making sound capital investments, managing infrastructure costs, ensuring service continuity, advancing public health and safety, reducing liability, and maintaining or enhancing the liveability of communities. For private and other community organizations, many of these aspects of climate change adaptation are also very relevant.

Adaptation actions can include changes in local government policy, technology, behaviour, management, or regulation. While many of the tools used by local government and other organizations to adapt to climate change will be familiar ones, there are some important considerations:

- The time horizon for adaptation planning will in many cases be much longer than the typical five-year cycles of official community plans or financial plans;
- The past will no longer be a reliable indicator of the future, particularly with respect to natural hazards and conditions and the demands they place on infrastructure;
- While there is uncertainty about future climate change impacts, scientific information about trends is available and in most cases enough to begin preparing; and
- Community consultation and engagement in solutions will be more important than ever, particularly because of the potential trade-offs that will be required.[16]

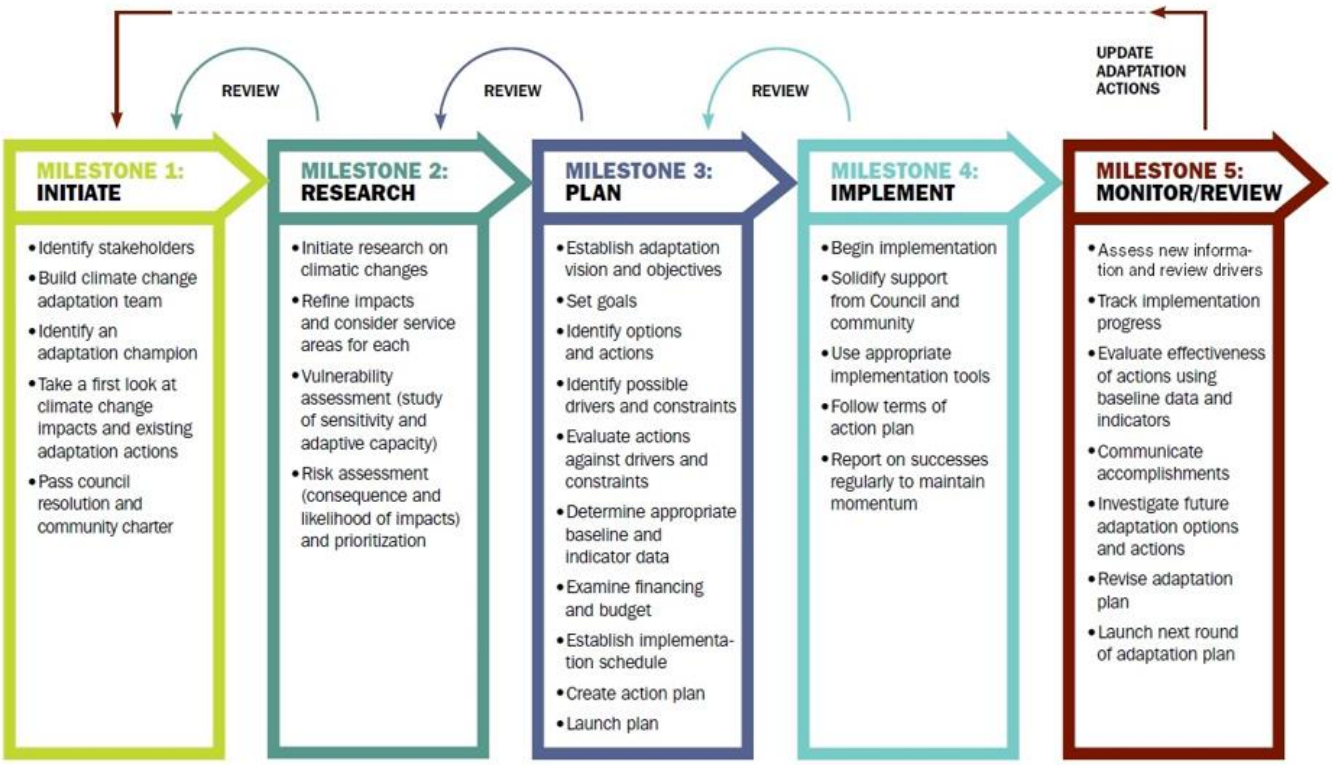
Planning Model

This development of this Plan benefited significantly from the climate adaptation planning methodology and resources developed by the International Council for Local Environmental Initiatives (ICLEI). ICLEI was founded in 1990 with the goal of connecting leaders, accelerating action and acting as a gateway to environmental and sustainability solutions. ICLEI's Five Milestones for Climate

[16] Preparing for Climate Change: An Implementation Guide for Local Governments in British Columbia, 2012, http://wcel.org/sites/default/files/WCEL_climate_change_FINAL.pdf

Adaptation methodology provides a structured approach to adaptation planning which guides a local government through a series of defined, progressive milestones-based steps.

A conceptual overview of the ICLEI methodology is provided below:



8.2 How Is Whistler's Climate Expected to Change?

To be relevant and effective, adaptation efforts require an understanding of potential future climate changes for a region or community. The RMOW contracted the Pacific Climate Impacts Consortium (PCIC) to develop future climate projections specific to the Whistler area.

PCIC is a regional climate service centre at the University of Victoria that provides practical information on the physical impacts of climate variability and climate change in the Pacific and Yukon region. PCIC performs quantitative research on the regional impacts of climate change and provides analytical tools to provide a better understanding of climate change within British Columbia. Map-based products provide overlays of historical climate and climate projections for a variety of scenarios. PCIC's work supports stakeholders by supplying practical localized information needed to develop adaptation plans to reduce risks associated with climate change.

Throughout this Plan, PCIC's climate change projections for Whistler are based on a 30-year historical baseline period from 1971-2000 and all future projections are forecasted averages between 2041 and 2070.

Climate Forecast Assumptions. PCIC's modeling analysis for Whistler is based on a subset of relevant global climate models selected from the Coupled Model Inter-comparison Project Phase 5, following the Representative Concentration Pathway 8.5 (RCP 8.5). RCP 8.5 corresponds to the scenario with

the highest greenhouse gas emissions of the formal IPCC future emission scenarios and is often referred to as the "business as usual" estimate of future greenhouse gas emissions. RCP 8.5 combines assumptions about high population, modest rates of technological change and energy efficiency improvements and minimal climate change policies, resulting in continually increasing emissions. The conservative nature of this scenario makes RCP8.5 the most appropriate scenario to use for climate adaptation planning.

Additional information regarding PCIC's modelling outcomes can be found in Appendix C.

8.2.1 Key Climate Changes Anticipated for Whistler

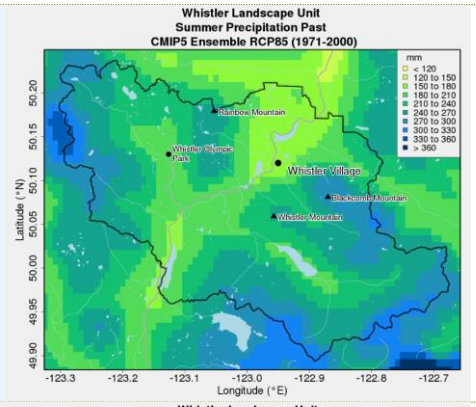
Adaptation to climate change in the Whistler area requires specific information such as how warming and changes in precipitation may differ throughout the seasons and how it will translate into indices of climate extremes. BC and Whistler's climate is already changing and even more significant change is anticipated in the future.

PCIC's modeling results project the following three key climate changes for Whistler over the next 25 - 55 years:

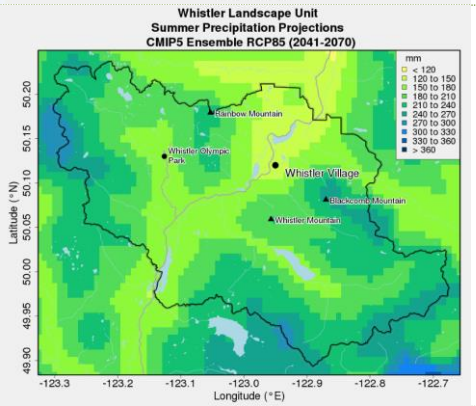
1. **Increase in the frequency and intensity of heavy rain events.**
2. **Longer, hotter and drier summers.**
3. **Milder winters, with increased precipitation falling as rain near valley bottom, while snow pack at higher elevation sees limited change.**

Overall, the annual average temperature in the Whistler region is projected to warm by about 3°C by the 2050s compared to the recent past. Annual precipitation is projected to increase by 7%. Despite increased winter precipitation, milder winters outweigh potential gains in snowpack on average – an effect concentrated at valley-bottom elevations. In Whistler Village, the 2040 - 2070 average snowpack is projected to decrease by 60-70% from historical values. At higher elevations, projected decreases in snowpack become much smaller (0 - 10%) as these locations remain cold enough on average that the great majority of precipitation falls as snow (small increases in both snowpack and rainfall in the alpine are possible in the future).

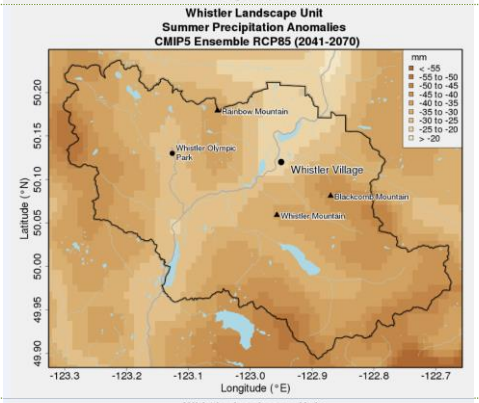
An example of the PCIC climate model outputs (summer average precipitation) is shown below for reference. More detail is provided in Appendix C for reference.



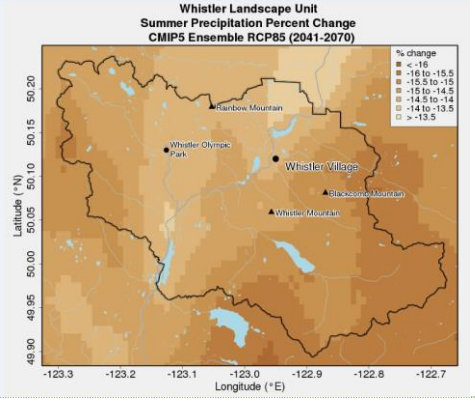
Average daily summer precipitation levels (June – Aug).
1971-2000



Forecasted average daily summer daily precipitation levels (June – Aug).
2041-2070



Difference in average daily summer precipitation levels **(mm)** between the historic and forecasted periods.



Difference in average daily summer precipitation levels **(%)** between the historic and forecasted periods.

The following table provides a snapshot of key projected climate changes for Whistler. Note that all relative references compare the historical dataset from 1971 - 2000 with the forecasted period between 2041 and 2070.

Climate Variable	Snapshot of Projected Changes
1. Increase in the frequency and intensity of heavy rain events	
	• Total annual precipitation is projected to increase by approximately 100mm per year (~7%) • Maximum 5-day total precipitation levels are projected to increase by 4-6mm, or 8 - 10% • Maximum 1-day total precipitation levels projected to increase by approximately 2 mm, or 10% • The total annual amount of precipitation that is projected to fall in one-day events greater than or equal to the 95th percentile one day event from the historic period is expected to increase by 30 - 40% • Total winter precipitation is projected to increase by 3 - 4% (25 - 40mm) • The size of the one-day precipitation event that will constitute a one-in-20 year event is projected to increase by 25-30% (i.e. current one-in-20 events are projected to happen considerably more often than 5% of the time)
2. Longer, hotter and drier summers.	
	• Average annual daily maximum temperatures are projected to increase by 2.8 to 2.9 °C • Average summer daily maximum temperatures are projected to increase by 2.2 to 2.3°C • Total summer precipitation levels are projected to decrease by approximately 15% • Projections forecast a 171% increase in number of summer days above 25°C, from 10 days historically to 27 days projected • Cooling degree days are projected to increase by 25 - 30% • Maximum length of dry spells projected to increase by 15% • The size of the one-day maximum temperature event that will constitute a one-in-20 year event is projected to increase by approximately 4.5°C (i.e. current one-in-20 events are projected to happen considerably more often than 5% of the time) • Growing Degree Days (GDDs) are forecasted to increase by 35-50% across the valley bottom
3. Milder winters, with increased precipitation falling as rain near valley bottom, while snow pack at higher elevation sees limited change.	
	• Average annual daily minimum temperatures are projected to increase by 2.9 to 3.0 °C • Average winter daily maximum temperatures are projected to increase by 3.6 to 3.7 °C • Average winter daily minimum temperatures are also projected to increase by 2.9 to 3.0°C • At Whistler Village elevation (675m), snowpack is projected to decrease by 60-70% from historical values, however changes in the alpine are only projected to decrease by 0-10%. • 25% decrease in annual number of days with frost, from 212 days historically to 159 days projected • 39% decrease in annual number of icing days (when the daytime high is below freezing) from a 80 days historically to a 49 days projected

It is important to note that climate variability is ongoing and will continue (i.e. short-term climate patterns rising above/below long-term trend lines, such as the El-Niño Southern Oscillation). All forecasted changes noted above and within this Plan must always be interpreted as an average over a 30-year period and that there will always be short-term variability that may affect any given year. Despite this ongoing short-term variability, the longer-term trends included within this research provide critical, proactive management insights to dominant trends and changes expected within the region.

8.3 Key Potential Impacts

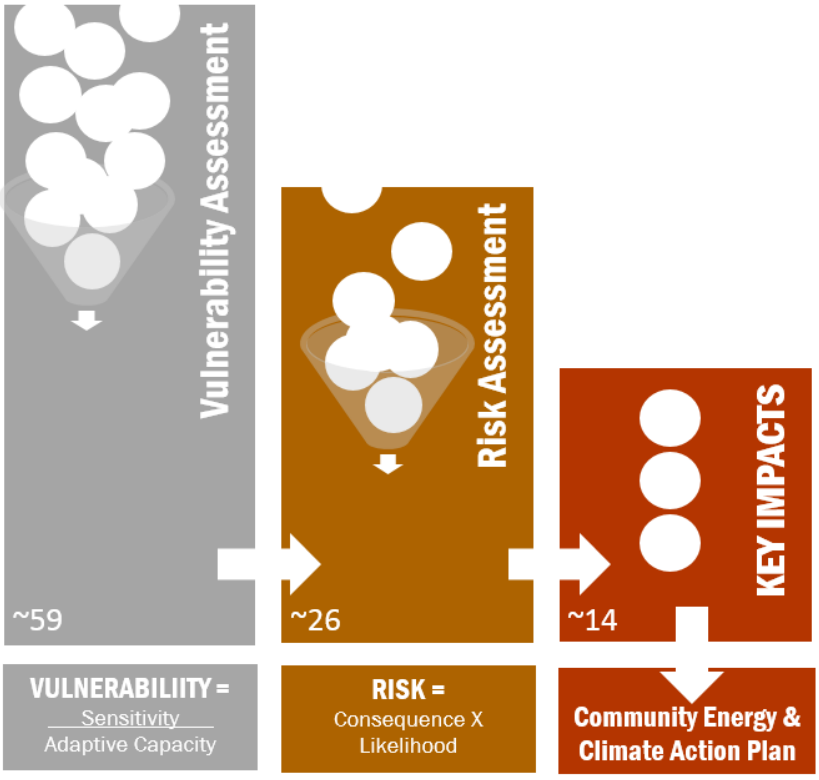
Through internal and external consultation, a preliminary list of potential impacts related to the three key climate changes projected for Whistler was developed. Discussions about potential impacts were organized around the following community sectors:

- **Land Use and Built Environment** – housing and accommodation, commercial cores, transportation infrastructure and other buildings.
- **Public Health and Safety** – health issues related to climate change impacts, emergency management systems and services.
- **Water Infrastructure and Management** – water supply, water quality, wastewater management, storm water, flood levels, hydrology.
- **Recreation, Tourism and Economic Development** – skiing, golfing, hiking, biking, water-based recreation, parks, festivals and events, Cheakamus Community Forest management, Olympic sport legacies, affordability, asset protection and management.
- **Ecology** – biodiversity and ecosystem health, watershed hydrology, species at risk, invasive species, conservation areas, wildlife and habitat.
- **Energy Systems** – heating and cooling, power, non-renewable and renewable sources, efficiency initiatives.

8.3.1 Vulnerability and Risk Assessment

A preliminary list of 59 potential impacts across the six sectors listed above was developed in relation to the three key climate changes anticipated for Whistler. A vulnerability and risk assessment was then conducted to prioritize the key impacts to be addressed in this Plan.

Process Model for Prioritizing Key Impacts of a Changing Climate



The initial **vulnerability** component of the assessment considered the **sensitivity** of each identified potential impact as well as the **adaptive capacity** of the community to respond or adapt to the impact. Each impact was considered over the entire period extending to 2070.

Sensitivity rating scale:

1 = low chance of harm
5 = very high chance of harm

Adaptive capacity rating scale:

1 = cannot adapt and/or very high cost
5 = straight forward and/or relatively low cost

After the vulnerability assessment, the potential impacts that were rated *Medium, High* or *Very High* advanced to the structured risk assessment phase. Through this process, 26 impacts moved to the risk assessment phase. Concurrent with this process, further efforts were undertaken to refine and distill the impacts and their wording to minimize redundancy and increase clarity.

Potential impacts were evaluated through the risk assessment phase. The **risk** component of the assessment considered both the severity of the **consequence** and the **likelihood** of occurrence for each impact. Each impact was considered over the period extending to 2070.

Through this process, each potential impact was evaluated with respect to the level of 'consequence' that each potential impact, if realized, would be likely to exert across each of the following five independent sectors:

- Public safety
- Local economy and growth
- Community and lifestyle
- Environment and sustainability
- Public administration

Consequence severity rating scale:

1 = negligible
5 = catastrophic

Likelihood rating scale:

1= rare
5 = almost certain

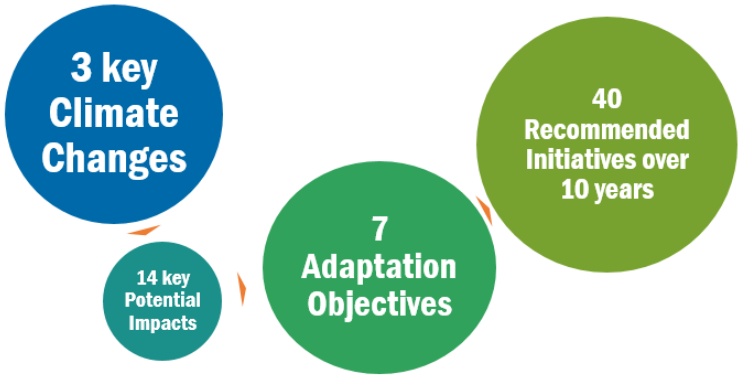
RISK =
Consequence X
Likelihood

The risk and vulnerability assessment resulted in an overall numerical risk rating for each of the potential impacts (see ranking scale below). All potential impacts rated *Medium Low* or higher on the rating scale were then identified as the highest priority impacts for further management evaluation. It should be noted that no impacts were rated *High, Very High* or *Extreme* as a result of the risk assessment.

Figure 5: Risk assessment ranking scale

8.3.2 Key Potential Impacts

Ultimately, the following 14 potential impacts were identified through the vulnerability and risk assessment as the highest priority impacts to be addressed by this Plan. The following summary table is colour coded such that each of the 14 identified 'Key Potential Impacts' are associated with the primary climate change impact.



Key Climate Changes

1. Increase in frequency and intensity of heavy rain events (blue)
2. Longer, hotter and drier summers (orange)
3. Milder winters, with increased precipitation falling as rain near valley bottom, while snow pack at higher elevation sees limited change (green)

	KEY POTENTIAL IMPACTS	RISK RATING
1	Increased wildfire and interface fire threats to property, infrastructure, and human health and safety, including: - air and water supply quality impacts from smoke and ash - loss of tourism and recreation revenue (i.e. campfire bans, smoke, trail closures) - associated costs of prevention, response and damages	Medium High
2	Substantially increased summer traffic on Highway 99 leading to increased travel times, more congestion, and decreased highway travel satisfaction	Medium High
3	Civic infrastructure damage and transportation disruptions from flooding, landslides, debris flow and storm water overflows	Medium High
4	Water supply shortages and associated impacts (i.e. firefighting capacity, potable water provision)	Medium High
5	Significantly increased demand on spring and summer recreation assets, especially waterfront parks	Medium
6	Private property damage and associated costs from flooding, landslides, debris flow and storm water overflows	Medium
7	Degradation of recreational assets due to the impacts of extreme rain events	Medium
8	Economic impacts related to the changing nature of alpine and cross-country ski season and terrain, including: shorter ski season; less skiable terrain at lower elevations; stranded lower elevation assets, variable skiing conditions; reputational risks; and/or associated revenue loss	Medium
9	Less opportunity for non-skiing snow-based outdoor activities in the valley	Medium
10	Tourism revenue loss from bad weather and associated media coverage	Medium
11	Increased threats from invasive species, pests and disease outbreaks and associated risks to ecosystems, biodiversity and Cheakamus Community Forest assets	Medium
12	Opportunities provided by increased demand for summer season tourism offerings, marketing and associated potential increase in tourism revenues	Medium Low
13	Shorter river recreation season due to low flows	Medium Low
14	Wildfire threats to species, habitat and biodiversity	Medium Low

8.3.3 Impacts Beyond Whistler

The scope of this Plan is limited to the Whistler region in terms of its assessment of key climate changes, potential impacts and recommended actions. However, discussions throughout the development of this Plan often touched on climate change impacts occurring outside of Whistler but that have the capability of impacting the resort community.

For example, if food production sources were significantly impacted by climate-related events or trends, Whistler's food supply could be at risk and as such it may be prudent for the resort community to increase its capacity for self-sufficient food production and/or supporting regional agriculture.

Another aspect of broader global climate change is the potential for tourism trends to change and potentially impact Whistler's visitor numbers, origins and characteristics. To name one possible example, increasingly expensive air travel may reduce certain visitor segments while regional visitor numbers may increase. If impacts are distributed unevenly across competing resort destinations (disrupting core products in other jurisdictions), it may also be possible that visitation pressures could increase.

The likelihood of climate and weather events causing disruption to certain areas of the world is high and many types of support should be anticipated. Whistler may be well-positioned to provide leadership and/or offer various forms of support to those significantly affected by climate change. Although these types of considerations may have impacts on Whistler in the future, they are difficult to anticipate and are not currently within the scope of this Plan.

8.4 Adaptation Objectives

In order to meet the challenges of climate change and achieve Whistler's adaptation vision and goals as laid out in this Plan, a series of adaptation objectives are presented**. These objectives directly respond to the key potential impacts to Whistler as refined and prioritized through the risk assessment process and reflect the current highest priority climate change adaptation issues facing Whistler.** In Section 8.5, each objective is followed by a series of recommended actions. The actions form the core content of the adaptation plan and include proposed lead implementation organizations, timing, as well as an estimate of the resourcing requirements for each action.

The **adaptation objectives** are as follows, not in prioritized order:

1. Minimize the threats posed by wildfire and interface fire to human health and safety, private property, infrastructure, wildlife, habitat and biodiversity.
2. Minimize traffic congestion and delays on Highway 99 through emphasis on mass transit and alternative transportation solutions.
3. Prevent and minimize damage and disruptions to civic infrastructure, private property and recreational assets caused by heavy rain events and associated effects.
4. Ensure adequate drinking water and firefighting water supply at all times through expanded water conservation measures and infrastructure upgrades.
5. Enhance, diversify and promote Whistler's supply of weather-independent and all-season tourism and recreation opportunities.
6. Adjust and improve alpine and nordic ski infrastructure, services, events and communications in consideration of winter weather variability and climate change.
7. Minimize threats such as invasive species, pests and disease posed by climate change to ecosystems, biodiversity and the Cheakamus Community Forest.

8.5 Recommended Action Plan

To meet the adaptation Vision, address the key potential impacts related to anticipated climate changes, and to deliver on the adaptation objectives noted above, a series of recommended actions have been developed. These actions are presented beneath the objective that each action primarily addressed (it should be noted that some actions support multiple objectives).

Phasing and Resource Legend

Lead	**The organization identified to 'lead' the execution of the associated action.** All acronyms used in the following tables are outlined in Appendix A. *Note that other organizations will often need to be involved in project design, support and delivery in order to successfully execute on many of the recommended action opportunities.*
Timing	**Short**: Initiate within 2 years **Med**: Initiate within 2-5 years **Long**: Initiate in 5 years or later
Resources	🕐 primarily time **$-$$$** relative expenditure level **$** < $25,000 **$$** $25,000 - $100,000 **$$$** > $100,000
Dual Benefit	This symbol indicates that the recommended action will help move the community to **both** identified energy/GHG reduction goals and climate adaptation goals.

8.5.1 Minimize Wildfire Threats

Objective 1	Potential Impacts Addressed by this Objective: Primary	Secondary
Minimize the threats posed by **wildfire and interface fire** to human health and safety, private property, infrastructure, wildlife, habitat and biodiversity.	1. Increased wildfire and interface fire threats to property, infrastructure, and human health and safety 14. Wildfire threats to species, habitat and biodiversity	n/a

	Recommended Action	Resources	Timing	Lead
8.5.1.1	Continue to implement the Community Wildfire Protection Plan, including emphasis on public education and engagement.	$$$	short	RMOW CCS RMOW CAO RMOW COM
8.5.1.2	Prioritize the implementation of the landscape-level wildfire management plan for the Cheakamus Community Forest area.	$$$	short	RMOW CAO
8.5.1.3	Increase municipal and collaborative efforts around wildfire prevention with key corridor partners (i.e. MFLNRO, Sea to Sky fire rescue services, SLRD, Vancouver Coastal Health).	$$	short	RMOW CCS VCH
8.5.1.4	Continue to review and update pre-incident and emergency response plans and communication protocols for wildfire situations.	🕓	short	RMOW IS RMOW CCS
8.5.1.5	Develop private property wildfire risk reduction guidelines and implement through municipal policy and/or procedures.	$	short	RMOW CCS
8.5.1.6	Review existing and consider more restrictive campfire and backyard fire bans and increase the enforcement of fire bans and ticketing/fines for offenses during high fire risk periods.	🕓	short	RMOW CCS
8.5.1.7	Consider creating Development Permit Areas for wildfire protection.	🕓	short	RMOW REX RMOW CCS
8.5.1.8	Lobby Provincial and Federal governments to increase funding for community and landscape level wildfire fuel reduction and response.	🕓	med	RMOW CCS
8.5.1.9	Encourage private operators to implement wildfire prevention best practices for outdoor tourism and recreation facilities, particularly in and around high-risk interface areas.	$ 🕓	med	RMOW REX Private
8.5.1.10	Enhance collaborative efforts with regional partners to prevent and respond to wildfires (i.e. MFLNRO, Sea to Sky fire rescue services, SLRD, Vancouver Coastal Health).	🕓	long	RMOW CCS
8.5.1.11	Lobby the Province to incorporate FireSmart principles into the BC Building Code.	🕓	long	RMOW CCS

8.5.2 Minimize Congestion on Highway 99

Objective 2	Potential Impacts Addressed by this Objective: Primary	Potential Impacts Addressed by this Objective: Secondary
Minimize traffic congestion and delays on Highway 99 through emphasis on mass transit and alternative transportation solutions.	2. Substantially increased summer traffic on highway 99	n/a

	Recommended Action	Resources	Timing	Lead
8.5.2.1	Facilitate, develop and promote alternative and mass transportation options to and from Whistler.	$$$	short	RMOW IS TAG

8.5.3 Minimize Damage from Heavy Rain Events

Objective 3	Potential Impacts Addressed by this Objective: Primary	Potential Impacts Addressed by this Objective: Secondary
Prevent and minimize **damage and disruptions** to civic infrastructure, private property and recreational assets **caused by heavy rain events** and associated effects.	3. Civic infrastructure damage and transportation disruptions from flooding, debris flow and storm water overflows 6. Private property damage and associated costs from flooding, debris flow and storm water overflows 7. Degradation of recreational assets due to the impacts of extreme rain events	8. Economic impacts related to the changing nature of alpine and cross-country ski season and terrain 10. Tourism revenue loss from bad weather and associated media coverage

	Recommended Action	Resources	Timing	Lead
8.5.3.1	Continue to conduct annual assessments of significant waterways to identify and mitigate high risk flood locations while respecting in-stream and riparian habitat regulations.	$$	short	BC MFLNRO RMOW IS RMOW REX
8.5.3.2	Complete and implement a comprehensive update of the Whistler Integrated Stormwater Management Plan (ISMP) that accounts for future climate change and related hydrologic changes within the lifespan of all existing and new infrastructure, buildings and developments. The ISMP should include key components of leading best practices in stormwater management planning and risk assessment.	$$$	med	RMOW IS RMOW REX
8.5.3.3	Complete and/or update floodplain mapping for all significant Whistler watersheds. Amend zoning and/or policies as needed to reflect adequate flood protection measures.	$	med	RMOW IS
8.5.3.4	Follow changes in risk-based insurance premiums and overland flood insurance and adapt as needed to changing context and regulations.		med	RMOW IS
8.5.3.5	Review and adapt as appropriate emergency planning protocols for extreme weather occurrences and related impacts, in consideration of projected climate changes.	$$	med	RMOW IS
8.5.3.6	Improve the design and maintenance of current and future outdoor recreation assets to better absorb heavy rain events (i.e. trails, roads and other activity infrastructure).	$$	med	RMOW REX Private

8.5.3.7	Consider improvements to signs and lighting for Highway 99 and municipal bridges with respect to weather and flooding alerts. Explore new or additional tools for monitoring at-risk areas.	$$	med	RMOW IS BC MOTI
8.5.3.8	Update relevant policies and plans aimed at protecting Whistler's potable water supply from contamination (i.e. 21 Mile Watershed Protection Plan and Groundwater Protection Plan) to consider additional potential impacts related to projected local climate changes.	$	long	RMOW IS VCH
8.5.3.9	Explore opportunities to improve sediment and erosion control requirements during development and construction.	$	long	RMOW IS RMOW REX
8.5.3.10	Join the UN campaign "My City's Getting Ready!"	🕓	long	RMOW REX

8.5.4 Ensure Adequate Water Supply

Objective 4	Potential Impacts Addressed by this Objective: Primary	Secondary
Ensure adequate drinking water and firefighting water supply at all times through expanded water **conservation measures** and **infrastructure upgrades**.	1. Increased wildfire and interface fire threats to property, infrastructure, and human health and safety 4. Water supply shortages and associated impacts	n/a

	Recommended Action	Resources	Timing	Lead
8.5.4.1	Continue to update and prioritize implementation of the Comprehensive Water Conservation and Supply Plan focused on municipal conservation and infrastructure improvements, in addition to relevant policies, community-wide regulations and enforcement. The plan should be updated as needed to include or consider best practices in water conservation and supply management.	$$	short	RMOW IS
8.5.4.2	Enhance public engagement, communications and social marketing initiatives to optimize water conservation efforts and emergency preparedness related to water shortages.	$	short	RMOW IS RMOW COM
8.5.4.3	Explore opportunities to improve municipal irrigation systems to maximize efficiency and reduce irrigation needs.	$$	short	RMOW REX RMOW IS
8.5.4.4	Consider opportunities to increase and promote rainwater and grey water capture and use in public and private infrastructure.	$	long	RMOW IS RMOW REX

8.5.5 Enhance Weather Independent Tourism Opportunities

Objective 5	Potential Impacts Addressed by this Objective	
	Primary	Secondary
Enhance, diversify and promote Whistler's supply of **weather-independent** and all-season tourism and recreation **opportunities**.	9. Less opportunity for non-skiing snow-based outdoor activities in the valley 10. Tourism revenue loss from bad weather and associated media coverage 12. Increased demands for summer season tourism offerings	8. Economic impacts related to the changing nature of alpine and cross-country ski season and terrain 13. Shorter river recreation season due to low flows

	Recommended Action	Resources	Timing	Lead
8.5.5.1	Consider the development of a comprehensive resort-wide product enhancement, communications and marketing strategy to improve and promote the range of weather-independent and all-season tourism and recreation opportunities.	$$	short	RMOW CAO RMOW COM TW Chamber
8.5.5.2	Explore possibilities to secure additional appropriate waterfront areas for parks and recreation as needed (according to carrying capacity research) to support long-term growth in summer visitation, while preserving the environmental values of new site(s).	$$$	short	RMOW REX
8.5.5.3	Continue to advance both cultural tourism development and the expansion of complementary learning and education initiatives.	$$	short	RMOW REX
8.5.5.4	Explore opportunities to develop easily-accessible and affordable non-skiing, snow-based winter activities above the valley.	$$	med	RMOW REX WB
8.5.5.5	Explore opportunities to accelerate Whistler Blackcomb Bike Park and other multi-use trail expansion in both physical footprint and length of season.	$$	med	RMOW REX WB
8.5.5.6	Place emphasis in relevant municipal policies on re-purposing existing under-used space to diversify tourism economy and provide non-snow-dependent recreation opportunities; remove barriers and encourage innovation.	🕓	med	RMOW REX

8.5.6 Improve Ski Infrastructure for Weather Variability

Objective 6	Potential Impacts Addressed by this Objective: Primary	Potential Impacts Addressed by this Objective: Secondary
Adjust and improve alpine and nordic ski infrastructure, services, events and communications **in consideration of** winter **weather variability and climate change**.	8. Economic impacts related to the changing nature of alpine and cross-country ski season and terrain	7. Degradation of recreational assets due to the impacts of extreme rain events 10. Tourism revenue loss from bad weather and associated media coverage

	Recommended Action	Resources	Timing	Lead
8.5.6.1	Anticipate snowline changes and consider building, improving and/or moving lifts, trails and other infrastructure accordingly to maintain and enhance terrain quality and user experience.	$$$	short	WB RMOW REX Private
8.5.6.2	Continue to improve summer/fall grooming, trail surfacing and snowmaking operations at lower elevations to facilitate more effective snow management in low-snow conditions for alpine and cross-country ski trails.	$$	med	RMOW REX WB Private
8.5.6.3	Consider the potential to offer a Whistler Blackcomb combination ski/bike park pass and promote the overlap of recreation offerings earlier and later in the respective seasons.		med	WB
8.5.6.4	Investigate potential land exchanges to optimize potential ski terrain.		long	WB
8.5.6.5	Investigate opportunities to develop and/or improve policies related to alpine land use and development, with emphasis on enhancing recreation offerings and protecting the environment.	$	long	WB RMOW REX

8.5.7 Minimize Threats to Ecosystems, Biodiversity and the CCF

Objective 7	Potential Impacts Addressed by this Objective: Primary	Potential Impacts Addressed by this Objective: Secondary
Minimize threats such as invasive species, pests and disease posed by climate change to **ecosystems, biodiversity** and the **Cheakamus Community Forest**.	11. Increased threats from invasive species, pests and disease outbreaks and associated risks to ecosystems, biodiversity and Cheakamus Community Forest assets	n/a

	Recommended Action	Resources	Timing	Lead
8.5.7.1	Improve invasive species management efforts related to increasing pressures associated with a changing climate.	$$	short	RMOW REX SSISC
8.5.7.2	Develop and implement a Biodiversity Conservation Strategy that considers climate change and includes recommendations to monitor and protect ecosystem health and biodiversity from pressures including climate change.	$$	med	RMOW REX
8.5.7.3	Conduct research and modify Cheakamus Community Forest management plans and practices to minimize risks related to climate change.	$	med	CCF RMOW REX

9 IMPLEMENTATION APPROACH

The recommended actions included within this Plan are the product of a community-wide planning effort and represent the best way forward to increase the resilience of Whistler in the face of climate change. As such, the execution of these actions will be shared by organizations and businesses across the community, and not by any one entity on its own.

The previous sections have identified actions recommended to help move Whistler toward its stated energy and climate change reduction and adaptation goals and objectives. While each of these actions are presented in association with a 'lead organization,' the implementation of many of them will take the combined input, support and, in many cases, resources of multiple partners.

Each organization represented on the CECAP CAG possesses skills, experience, qualifications, and both in-kind and financial resources – individually and in some cases across their broader memberships. It will take commitment across varying levels of these organizations to effectively ensure the ongoing implementation of this Plan.

The coordinating and monitoring role of Whistler's municipal government is an important one as outlined within this Plan. The ability to successfully execute on the required coordination, tracking and leadership responsibilities will require both coordinated and dedicated resources within the municipal team.

The phased approach included in this Plan outlines the targeted implementation timelines, lead organizations, and general resource implications for each of the recommended actions. The RMOW will assume responsibility for managing the Plan, coordinating internal initiatives and maintaining momentum for action among stakeholders.

Annual reporting on implementation progress and results will be completed (see Section 9.1), In addition to annual reporting, the CECAP will be comprehensively reviewed and revised every five years and subsequent iterations will evaluate progress and include changes in approach, climate modeling projections, and other content as needed. The phasing of actions will also be re-evaluated and revised upon each update of the Plan. This approach is consistent with international climate change planning organizations.

Coordinating, monitoring and reporting on CECAP implementation will be a primary responsibility of a municipal staff member, as per recommended action 6.5.1.3.

The RMOW will update the OCP to further address climate change and drive mitigation and adaptation solutions that align with the vision and priorities of the community, and it will encourage other communities in the Sea to Sky corridor to do the same. The RMOW will also regularly update the OCP to reflect new information generated through CECAP.

The RMOW will develop indicators (process-based and/or outcome-based) to monitor the implementation and effectiveness of climate reduction and adaptation measures to help develop future measures, and incorporate them into the Community Monitoring program as appropriate.

9.1 Measuring and Reporting

Progress toward the goals and objectives included within this Plan will be tracked through multiple monitoring and reporting mechanisms. Broadly speaking, these mechanisms fall into two categories: those that track action implementation and those that monitor progress towards key performance outcomes and associated targets.

Action implementation will be tracked via the following two methods:

1. The recommended actions that are included within this Plan will be tracked by the CECAP Project Management Team and by associated lead organizations where relevant. The Project Management Team will monitor and report implementation progress to Council on a regular basis. These progress reports will be available to the public.
2. Actions that are integrated into the RMOW Corporate Plan will be tracked and reported annually through the existing established Corporate Plan reporting processes.

With respect to monitoring progress towards key targets (primarily relating to the GHG emissions and energy reduction aspects of the plan), reporting will occur through existing mechanisms such as the Community Performance Indicators program (whistler.ca/monitoring) and the annual Energy Consumption and GHG Performance Trends report. As such, energy and emissions performance will benefit from annual, specific targeted energy and climate action reporting mechanisms as well as broader community monitoring programs and engagements initiatives. Should additional indicators become relevant, they may be integrated into the Community Performance Indicators program.

As implementation progress and results become evident, it will be critical to take an adaptive management approach. Monitoring and results will help inform us about the effectiveness of specific actions and where improvements or modifications to the plan may be necessary.

9.2 Ongoing Climate Advocacy

Whistler's significant international profile, and its commitment to sustainability and the initiatives born around this commitment, have often positioned the resort community in a leadership role, where the power of advocacy is possible and tangible. The legitimacy formed by Whistler's sustainability initiatives to date help form a basis from which to address the significant issue of climate change at a local level and beyond.

While fairly new to comprehensively addressing climate change adaptation, Whistler has shown much leadership to date in reducing GHG emissions. Through this Plan, Whistler reaffirms climate change as a key issue facing the resort community and beyond. The resort community recognizes the need to allocate the necessary resources to maintain a leadership role in local climate change mitigation and adaptation.

With this important step of addressing climate change issues at the community level, Whistler can also leverage its status as a premier mountain resort and its economic contribution to the Province of BC to elevate the climate change conversation and inspire and support action by others. Whistler embraces the opportunity to play a role in promoting lower carbon, climate-smart initiatives.

As part of this advocacy, the RMOW will develop and deliver a communications and engagement program to promote a clear understanding about the potential impacts of climate change to Whistler, the community's progress and responsibility to reduce emissions and increase energy efficiency, and targeted calls to actions for resort community residents and visitors. Moreover, the Whistler community needs to both understand and leverage the potential that hosting 2.7 million visitors annually presents for raising climate literacy and energy efficiency leadership.

10 CONCLUSIONS

As previously stated, Whistler has long been committed to taking action on climate change. The winter mountain landscape is our greatest asset, both socially and economically. Natural resource-based communities, including ski resorts like Whistler, have economies and cultures that are closely connected to stable environmental conditions and more vulnerable to a changing climate. The impacts of a changing climate have the potential to significantly impact Whistler's primary economic engine – tourism. As such, informed, strategic planning and a commitment to action will help to ensure that Whistler is best positioned to remain successful into the future.

We as a community expect continued commitment to climate leadership, and this leadership will require ongoing action by all involved – by community members, by business owners and entrepreneurs, by visitors, and by all three levels of government. The implementation of this Plan will take a similarly broad community commitment to ensure that Whistler moves quickly towards its climate action and energy goals.

This Plan sets out strategic directions and practical actions to reduce Whistler's contribution to climate change, as well as recommending prioritized adaptation strategies to prevent or minimize the key potential impacts of projected local climate changes.

The actions recommended within this Plan can make a meaningful reduction in Whistler's emissions footprint. However, the suite of actions included in this Plan is not forecast to be sufficient to meet the community's identified targets. Without the alignment and collaboration of senior levels of government through federal and provincial programs, regulations, incentives and other jurisdictional tools, as well as the continued committed leadership of the private sector, Whistler will not meet its 2020 emission reduction targets. This fact further underscores the urgency of encouraging and advocating other levels of government action on the climate challenge and leadership toward a renewable energy future.

Fortunately, technical and policy-based solutions are available, and Whistler has historically been a leader on this front. This Plan presents an important description of the path forward toward both continued climate leadership and ongoing community economic success.

As a community we accept this challenge, understand the importance of the issues at hand to our viability, and collectively commit to climate change action.

On behalf of the Resort Municipality of Whistler, we would sincerely like to recognize and thank the generous individual contributions of the Community Advisory Group members. Without their commitment to this community, to informed climate and energy management planning and to the ongoing spirit of partnership, the development process and the contents of this Plan would not have been possible.

11 APPENDICES

Appendix A	CECAP Community Advisory Group Members
Appendix B	Summary of Key Organizational Acronyms Used within the Plan
Appendix C	Summary of Key Emission Factors
Appendix D	Summary of Additional Reduction Modeling – Recommended Scenario
Appendix E	PCIC Memo – Summary of Climate Projections for Whistler
Appendix F	PCIC Climate Modeling Maps

Appendix A. CECAP Community Advisory Group Members

Sector	Organization	Name
Alpine ski operators	Whistler Blackcomb	Arthur DeJong
Forestry	Cheakamus Community Forest	Sue Maxwell
Local government	RMOW Council	Sue Maxwell
ENGO – general	AWARE	Claire Ruddy
Golf	Whistler Golf Course	Stu Carmichael
Development	Canadian Home Builders Association	Derek Venter
Real estate	Real Estate Association of Whistler	Ray Longmuir
Commerce / Business	Chamber of Commerce	Val Litwin
Community Health	Vancouver Coastal Health	Laura Chow / Marta Jaeckel
ENGO – invasive species	Sea to Sky Invasive Species Council	Clare Greenberg
Utilities	BC Hydro	Robyn Wark
Utilities	Fortis BC	Vladimir Kostka
Hotel / Accommodation	Hotel Association of Whistler	Peter Humig / Douglas Hart
Food & Beverage	Restaurant Association of Whistler	Kevin Wallace
Retail	Whistler Association of Retail Merchants	James Retty
ENGO – air quality	Sea to Sky Clean Air Society	Kim Slater
Resort Planning	Brent Harley and Associates	Carlos Zavarce
Environmental consulting	Cascade Environmental Resource Group	Dave Williamson
Motorized winter recreation	Powder Mountain Snowmobile Club	Ryan Thorley
Cross-country ski operators	Whistler Olympic Park	Soren Robinson
Facilities	Whistler Facilities Managers Association	Mark Wrightson
Community sustainability planning	Whistler Centre for Sustainability	Dan Wilson
Property management	Whistler Resort Management / Summit Strata	Barry Burko
Energy management	Energy Assessment/ Management Professionals	Luke Dolan
Citizen at Large	Provincial GHG expert	Colin Rankin
Citizen at Large	Resident / professional planner (risk hazard management)	Jessica Shoubridge
Citizen at Large	Resident / Durfeld Construction / Board of Canadian Passive House Institute West	Lydia Durfeld

Appendix B. Summary of Key Organizational Acronyms used within the Plan

Acronym	Organization
AWARE	Association of Whistler Area Residents for the Environment
BC MFLNRO	BC Ministry of Forests, Lands and Natural Resource Operations
BC MOTI	BC Ministry of Transportation and Infrastructure
CAG	Community Advisory Group
CCF	Cheakamus Community Forest
Chamber	Whistler Chamber of Commerce
CHBA	Canadian Home Builders Association
HAW	Hotel Association of Whistler
IS	RMOW Infrastructure Services Division
RAW	Restaurant Association of Whistler
RMOW	Resort Municipality of Whistler
RMOW CAO	RMOW Chief Administrative Officer Division
RMOW CCS	RMOW Corporate and Community Services Division
RMOW COM	RMOW Communications Department
RMOW IS	RMOW Infrastructure Services Division
RMOW REX	RMOW Resort Experience Division
SD#48	School District #48
SSISC	Sea to Sky Invasive Species Council
TAG	Transportation Advisory Group
TW	Tourism Whistler
VCH	Vancouver Coastal Health
WB	Whistler Blackcomb
WCSS	Whistler Community Services Society

Appendix C. Summary of Key Emission Factors

Summary of Emission Factors

based on 2012 BC Best Practices Methodology for Quantifying GHG Emissions, BC Ministry of Environment (Sept, 2012)

Stationary Emissions

Source Fuel	TOTAL (Petro)		Key Conversion	
	t CO2e/GJ	tCO2e/litre		
Natural Gas	0.0503	n/a		
Propane	0.0610	0.001544	0.025310	GJ/litre
Diesel (B0)	0.0728	0.002790	0.038300	GJ/litre

Mobile Emissions

Light Duty Vehicles

Source Fuel	TOTAL (Petro)		TOTAL (Bio)		TOTAL (All)		Key Conversion	
	t CO2e/GJ	tCO2e/litre	t CO2e/GJ	tCO2e/litre	t CO2e/GJ	tCO2e/litre		
Gasoline (E0)	0.0709	0.00248	0.00000	0.0000	0.0709	0.002483	0.03500	GJ/litre
E5 Gasoline	0.0675	0.00236	0.00319	0.0001	0.0707	0.002436	0.03500	GJ/litre
E10 Gasoline	0.0641	0.00224	0.00638	0.0001	0.0705	0.002389	0.03500	GJ/litre
Diesel (B0)	0.0713	0.00273	0.00000	0.0000	0.0713	0.002732	0.03830	GJ/litre
B4 Diesel (RLCFR)	0.0685	0.00262	0.00275	0.0001	0.0713	0.002722	0.03830	GJ/litre
B5 Diesel	0.0678	0.00260	0.00343	0.0001	0.0712	0.002720	0.03830	GJ/litre
B10 Diesel	0.0643	0.00246	0.00687	0.0002	0.0711	0.002707	0.03830	GJ/litre
B20 Diesel	0.0572	0.00219	0.01373	0.0003	0.0710	0.002681	0.03830	GJ/litre
Propane	0.0605	0.00153	0.00000	0.0000	0.0605	0.001532	0.02531	GJ/litre
Natural Gas	0.0562		0.000000	0.0000	0.0562		0.05379	GJ/kg

Light Duty Trucks (incl. SUVs & Minivans)

Source Fuel	TOTAL (Petro)		TOTAL (Bio)		TOTAL (All)		Key Conversion	
	t CO2e/GJ	tCO2e/litre	t CO2e/GJ	tCO2e/litre	t CO2e/GJ	tCO2e/litre		
Gasoline (E0)	0.0720	0.00252	0.00000	0.0000	0.0720	0.002519	0.03500	GJ/litre
E5 Gasoline	0.0685	0.00240	0.00319	0.0001	0.0717	0.002471	0.03500	GJ/litre
E10 Gasoline	0.0650	0.00228	0.00638	0.0001	0.0714	0.002422	0.03500	GJ/litre
Diesel (B0)	0.0713	0.00273	0.00000	0.0000	0.0713	0.002733	0.03830	GJ/litre
B4 Diesel (RLCFR)	0.0685	0.00262	0.00275	0.0001	0.0713	0.002722	0.03830	GJ/litre
B5 Diesel	0.0678	0.00260	0.00343	0.0001	0.0713	0.002720	0.03830	GJ/litre
B10 Diesel	0.0643	0.00246	0.00687	0.0002	0.0712	0.002707	0.03830	GJ/litre
B20 Diesel	0.0572	0.00219	0.01373	0.0003	0.0710	0.002681	0.03830	GJ/litre
Propane	0.0605	0.00153	0.00000	0.0000	0.0605	0.001532	0.02531	GJ/litre
Natural Gas	0.0562		0.000000	0.0000	0.0562		0.05379	GJ/kg

Heavy Duty Vehicles

Source Fuel	TOTAL (Petro)		TOTAL (Bio)		TOTAL (All)		Key Conversion	
	t CO2e/GJ	tCO2e/litre	t CO2e/GJ	tCO2e/litre	t CO2e/GJ	tCO2e/litre		
Gasoline (E0)	0.0672	0.00235	0.00000	0.0000	0.0672	0.002352	0.03500	GJ/litre
E5 Gasoline	0.0640	0.00224	0.00319	0.0001	0.0672	0.002235	0.03500	GJ/litre
E10 Gasoline	0.0607	0.00212	0.00638	0.0001	0.0671	0.002117	0.03500	GJ/litre
Diesel (B0)	0.0708	0.00271	0.00000	0.0000	0.0708	0.002712	0.03830	GJ/litre
B4 Diesel (RLCFR)	0.0680	0.00260	0.00275	0.0001	0.0708	0.002722	0.03830	GJ/litre
B5 Diesel	0.0673	0.00258	0.00343	0.0001	0.0707	0.002720	0.03830	GJ/litre
B10 Diesel	0.0638	0.00244	0.00687	0.0002	0.0707	0.002707	0.03830	GJ/litre
B20 Diesel	0.0568	0.00218	0.01373	0.0003	0.0705	0.002681	0.03830	GJ/litre

Off Road Vehicles

Source Fuel	TOTAL (Petro)		TOTAL (Bio)		TOTAL (All)		Key Conversion	
	t CO2e/GJ	tCO2e/litre	t CO2e/GJ	tCO2e/litre	t CO2e/GJ	tCO2e/litre		
Gasoline (E0)	0.0675	0.00236	0.00000	0.0000	0.0675	0.002361	0.03500	GJ/litre
E5 Gasoline	0.0642	0.00225	0.00319	0.0001	0.0674	0.002243	0.03500	GJ/litre
E10 Gasoline	0.0609	0.00213	0.00638	0.0001	0.0673	0.002125	0.03500	GJ/litre
Diesel (B0)	0.0785	0.00301	0.00000	0.0000	0.0785	0.003007	0.03830	GJ/litre
B4 Diesel (RLCFR)	0.0754	0.00289	0.00275	0.0001	0.0782	0.002722	0.03830	GJ/litre
B5 Diesel	0.0746	0.00286	0.00343	0.0001	0.0781	0.002720	0.03830	GJ/litre
B10 Diesel	0.0707	0.00271	0.00687	0.0002	0.0776	0.002707	0.03830	GJ/litre
B20 Diesel	0.0630	0.00241	0.01373	0.0003	0.0767	0.002681	0.03830	GJ/litre

Appendix D. Summary of Additional Reduction Modelling – Recommended Scenario

Energy and emission reduction modelling was completed for 'Business as Usual' (BAU) forecasts and for each of the recommended actions in order to help prioritize actions. Actions align with either mobile or stationary reduction strategies, as such the anticipated reduction from each action relies on some base assumptions for modelling.

Base assumptions are consistent across all sectors

- The base year used for modelling was 2014
- BAU growth for both energy and GHG emissions is 1%/year over the planning period for all sectors.
- Growth and reductions are only based on local actions and do not account for significant changes to GHG or energy policy with other levels of government.
- Scope 1 and 2 emissions are the only emissions considered in modeling. It is recognized that some of the actions may have reductions in Scope 3 emissions.
- Hydro emission factors remain consistent across the planning time frame based on 2014 factors.
- Second homeowners are grouped in with residents for modeling impacts of actions.
- Social Marketing actions lead to increasing reductions during the timeframe that they are implemented and reductions stabilize after the implementation time period.
- Estimated reductions for actions are based on the best estimates available at the time using current research from literature review or feasibility work previously completed where feasible.

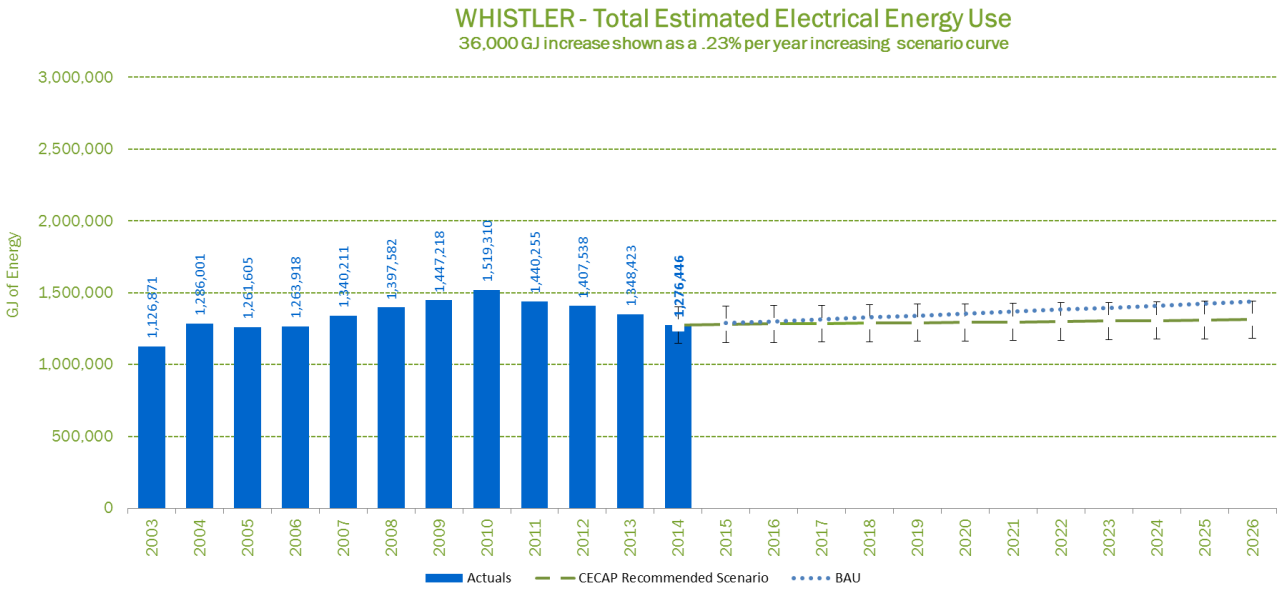
Mobile Emission Reduction Modelling

- Reductions in vehicle emissions are not directly offset by minor increases in emissions from other types of transportation such as transit. It is expected some minor increases might occur as these shifts take place.
- Actions that lead to shifts in vehicle use and GHG reductions are applied to the 60% of locals or 60% visitors who indicate that a vehicle is their primary mode of travel.
- Actions do not take into account synergies or overlap with other actions, this may lead to under or over reporting in modelling the impacts of all actions.
- Reductions only take into account the emissions associated with the target audience impacted by the action. Audiences include; visitors, residents/2nd homeowners, commuters

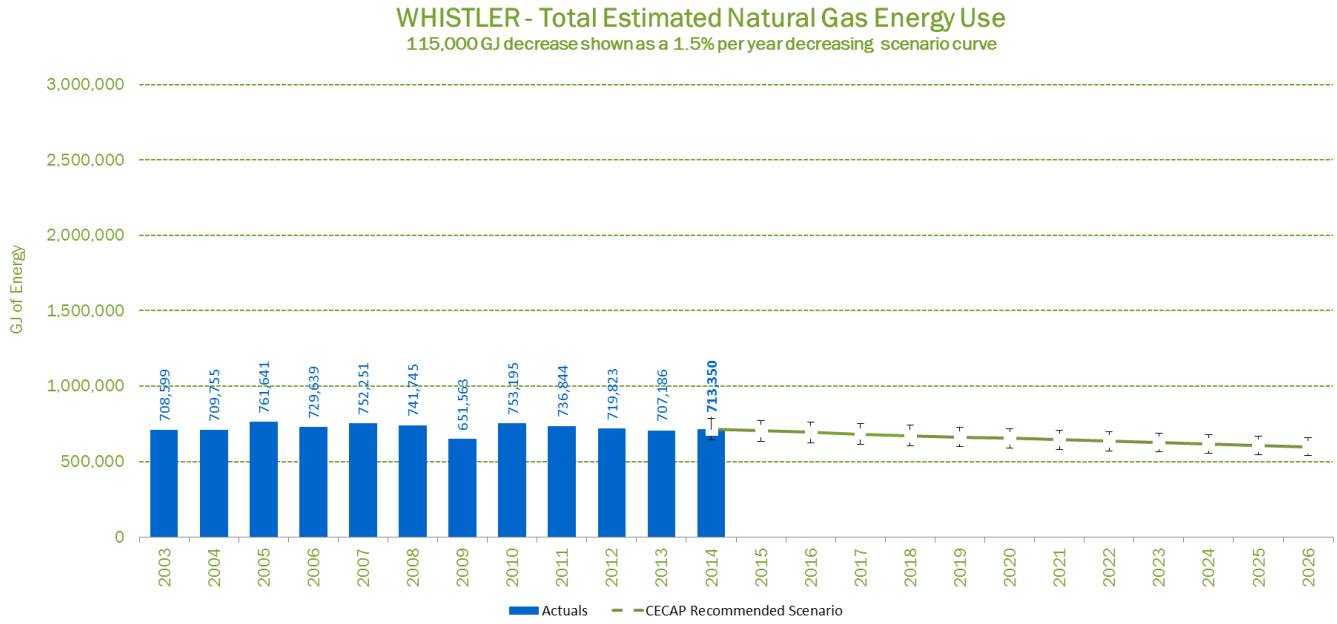
Stationary Emission Reduction Modelling

- Energy and GHG reductions from efficiency actions are split between electricity and natural gas based on the proportion of each energy type used by the sector
- Shifts to renewable energy are split 50/50 between electricity and natural gas despite the proportion of energy type used by each sector.

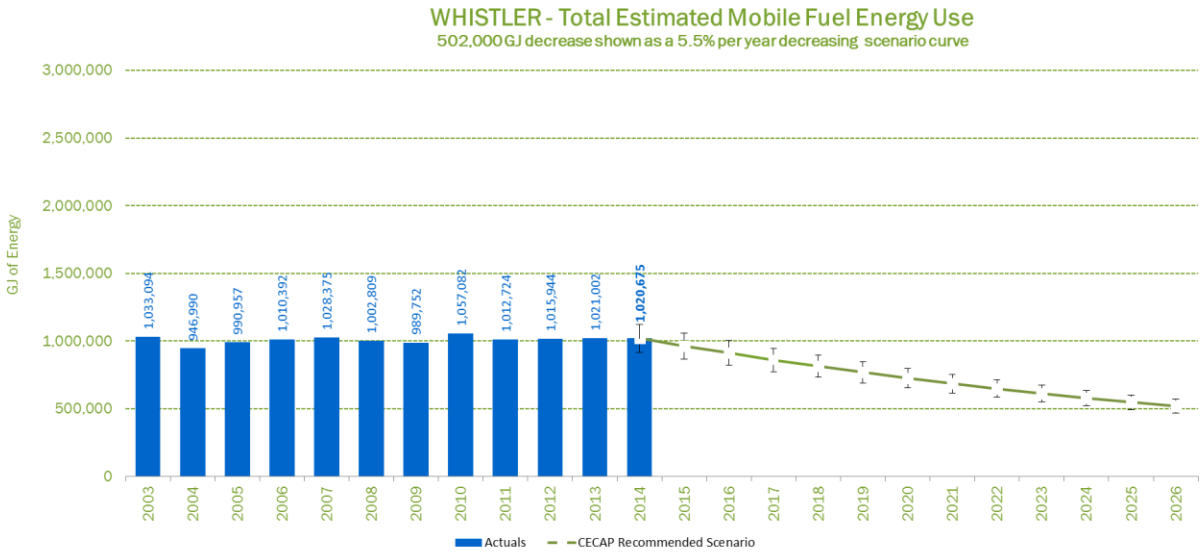
Based on the CECAP recommended scenario, annual electrical demand is expected to grow by approximately 36,000 GJ by 2026 or about .23% per year. The recommended scenario forecasts electricity reductions associated with increased electric energy efficiency and conservation, however the recommended scenario modelling also forecasts new incremental load from electric heat pumps and electric vehicles.



Based on the CECAP recommended scenario, annual natural gas demand is expected to shrink by approximately 115,000 GJ by 2026 or about 1.5% per year. The recommended scenario forecasts natural gas reductions associated with increased efficiency, conservation and some fuel switching to electricity operated heat pumps.



Based on the CECAP recommended scenario, annual mobile fuel demand is expected to shrink by approximately 502,000 GJ by 2026 or about 5.5% per year. The recommended scenario forecasts fuel reductions associated with increased vehicle efficiency, modal shifting from cars to buses and/or bike/walking as well a fuel switching to electricity.



Appendix E. PCIC Memo – Summary of Climate Projections for Whistler Area

PACIFIC CLIMATE IMPACTS CONSORTIUM | University of Victoria | WHISTLER

Summary of 2050s climate projections for Whistler area

The annual average temperature in the Whistler region is projected to warm by about 3°C by the 2050s compared to the recent past. This projection is based on the average of a set of climate model projections, with projected warming ranging from 1.8°C to 4.0°C. Annual precipitation is projected to increase by 7%, with a range of 0% to 10%.

Adaptation to climate change in the region requires more specific information, however, such as how warming and changes in precipitation may differ throughout the seasons, and how it will translate into indices of climate extremes. To assist with this, the Pacific Climate Impacts Consortium provided maps and tables of projected climate change including indices of extremes for the region to the Resort Municipality of Whistler. For more details see methodology below and http://etccdi.pacificclimate.org/list_27_indices.shtml for definitions of indices.

The purpose of this memo is to summarize some of the key information for adaptation. In particular, projected changes fall into three main categories:

1. increase in the intensity and frequency of heavy rain events
2. longer, hotter, drier summers
3. milder winters with reduced snowpack at lower elevations

For example, despite only a modest increase in annual precipitation, the projected increase in the amount of precipitation that will be received on very and extremely wet days is considerable, 40% (9% to 61%) and 74% (38% to 99%) for the R95p and R99p indices, respectively (these indices reflect the combined effect of changes in the intensity and frequency of heavy precipitation). The increase in the magnitude of annual maximum one-day precipitation (1 year return period) is 13% (6% to 17%), while the 20-year return period event is projected to increase by 32% (11% to 51%). Note that these indices reflect only the intensity of the 1-year or 20-year event.

Despite the projected increase in wet events, the maximum length of dry spells (CDD) is also projected to increase, by about 15% (-2% to +40%), on average. Average summer precipitation is projected to decrease according to most models: by 17% (35% decrease to 2% increase). In addition, the projected warming is associated with an increase in summer days above 25°C (index SU) from 10 days per year on average for the region as a whole in the past to 27 (20 to 36) days per year, an increase of 171% (96% to 242%).

Despite increased winter precipitation, milder winters offset potential gains in (December-January-February) snowpack on average throughout the region. Changes in snowpack depend considerably on elevation. At Whistler Village, for example, total projected decreases are around 50 to 100 cm (about 60% to 70% reductions relative to historical values). At higher elevations, projected decreases in snowpack become smaller in absolute terms as these locations remain cold enough on average that most precipitation falls as snow in future (note that increases in both snowpack and

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rainfall are possible in these cases). This effect is exaggerated in terms of relative decrease because absolute changes are smaller and these locations have more historical snowfall. At the highest elevation locations with multi-year snowpack and glacier-conditions (shown in white on maps), large reductions in snowfall and snowpack could occur, but the specific numbers at the fringes of the white areas should not be taken as quantitative projections as assumptions in the snowpack model used to produce the maps break down in these locations.

Projected warming in the cold season also translates into changes in several indices of importance to ecosystems: a 30% (19% to 45%) increase in the length of the growing season (GSL) which was historically 141 days per year, a 25% (19% to 32%) decrease in the number of days with frost (FD) from a historical baseline of 212 days per year, and a 39% (35% to 50%) decrease in icing days (when the daytime high is below freezing; ID) from 80 days per year historically.

While the changes projected for Whistler are consistent with the rest of British Columbia in terms of heavy rain, coastal areas in terms of drier and hotter summers, and milder winters with reduced snowpack mostly at the lower elevations, the combination of these three main effects in one area is remarkable.

Methodology

The results in this memo are based on a subset of climate models selected from the Coupled Model Intercomparison Project 5 following the "business as usual" estimate of greenhouse gas emissions, Representative Concentration Pathway 8.5 (RCP8.5). Adaptation planning typically makes use of this business as usual RCP8.5 projections. The historical baseline period is 1971-2000 and the future projections are for the 2050s (2041-2070). All results reported here are averaged over the Whistler Landscape Unit.

The CMIP5 climate models were first screened according to their historical skill and then an ensemble of 12 models was chosen to provide the widest range of projected change for a set of climate parameters. These projections were downscaled to a 10 km grid by making use of a historical daily time series (ANUSPLIN) in conjunction with the climate model projections (using the BCCAQ statistical downscaling which is a hybrid climate analogue / quantile mapping method). Daily temperature and precipitation observations and future projections at 10 km resolution were then draped over an 800 m grid of 1971-2000 average temperature or precipitation to generate high resolution maps. All values reported in this memo are given as the median value projected by the 12 models, with the range given in brackets of the 10th to 90th percentiles. This range arises from both climate variability and climate model uncertainty.

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Appendix F. PCIC Climate Modeling Maps

Summary of Projections by Key Climate Change

The following pages provide detailed geospatial climate projections[17] for the Whistler Area. Each page includes a presentation of the indicator data for the historic period (1971-2000), the projection period (2041-2070), as well as a summary of the projected change both in real terms (i.e. mm or degrees Celsius), as well as by percentage (%).

Increase in the Frequency and Intensity of Heavy Rain Events

- Total Annual Precipitation
- Total Winter Precipitation
- Annual Maximum 5-Day Precipitation
- Annual Maximum 1-Day Precipitation
- R99 (99th Percentile) Precipitation
- R95 (95th Percentile) Precipitation
- 20-Year Precipitation

Longer, Hotter, Drier Summers

- Annual Maximum Temperature
- Summer Maximum Temperature
- Summer Minimum Temperature
- Summer Precipitation
- Warm Days
- Hottest Days
- Growing Degree Days
- Cooling Degree Days
- 20-Year Maximum Temperature
- Annual Minimum Temperature

Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

- Annual Minimum Temperature
- Whistler Snowpack
- Winter Maximum Temperature
- Winter Minimum Temperature
- 20-Year Minimum Temperature
- Cool Nights
- Heating Degree Days
- Freezing Degree Days
- Coldest Days

[17] Note that each projection presents the forecast as modeled using CIMP5 Ensemble, RCP85.

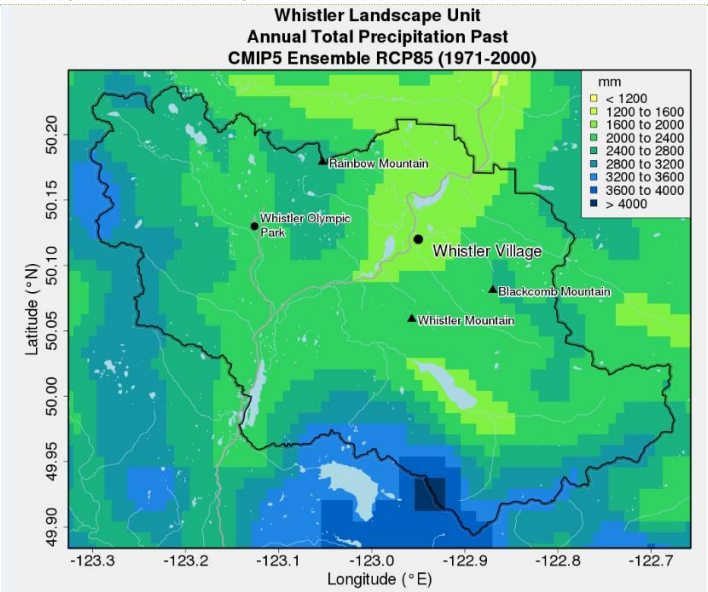
Increase in the Frequency and Intensity of Heavy Rain Events

Total Annual Precipitation

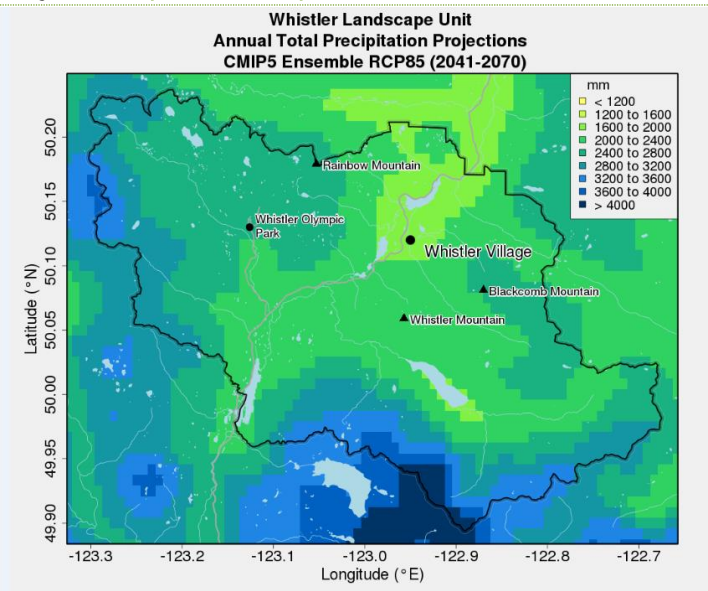
CIMP5 Ensemble RCP85

Total annual precipitation measures the total amount of precipitation falling within the Whistler Landscape Unit over one year (then averaged over the 30 year period shown). Precipitation is defined here as any kind of water that falls from clouds as a liquid or solid.

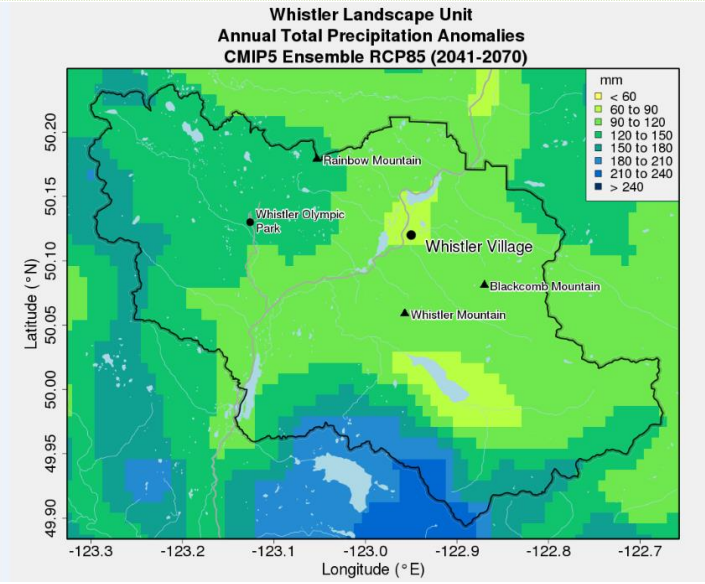
Past (1971 – 2000)



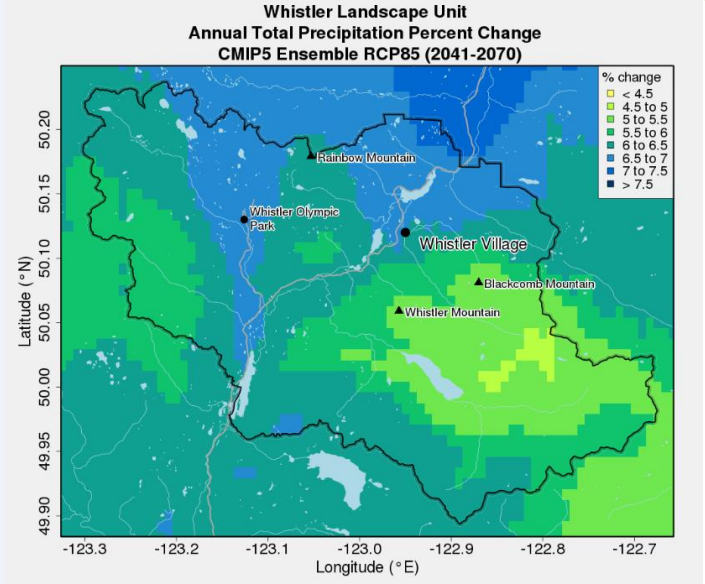
Projections (2041-2070)



Projected Change (mm)



Projected Change (%)



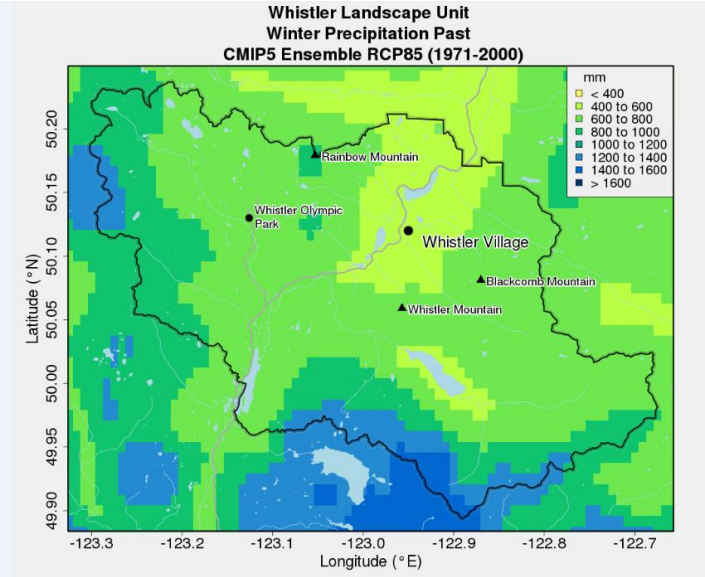
Increase in the Frequency and Intensity of Heavy Rain Events

Total Winter Precipitation

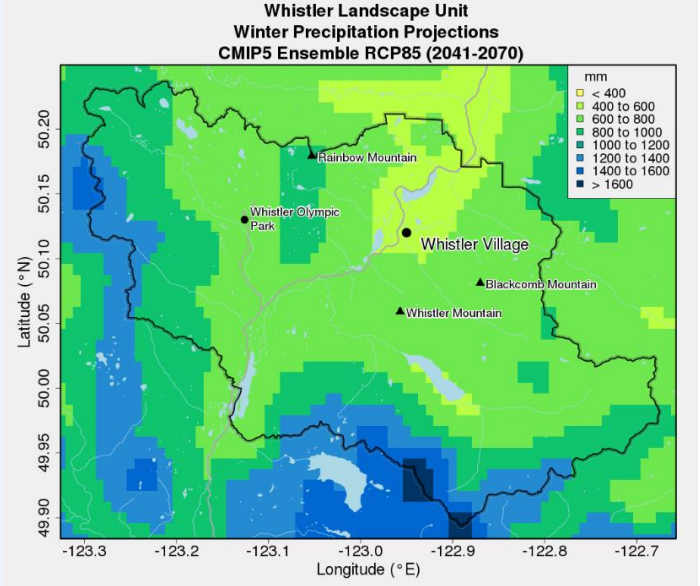
CIMP5 Ensemble RCP85

Total winter precipitation measures the total amount of precipitation (liquid or solid) falling within the Whistler Landscape Unit in December, January and February.

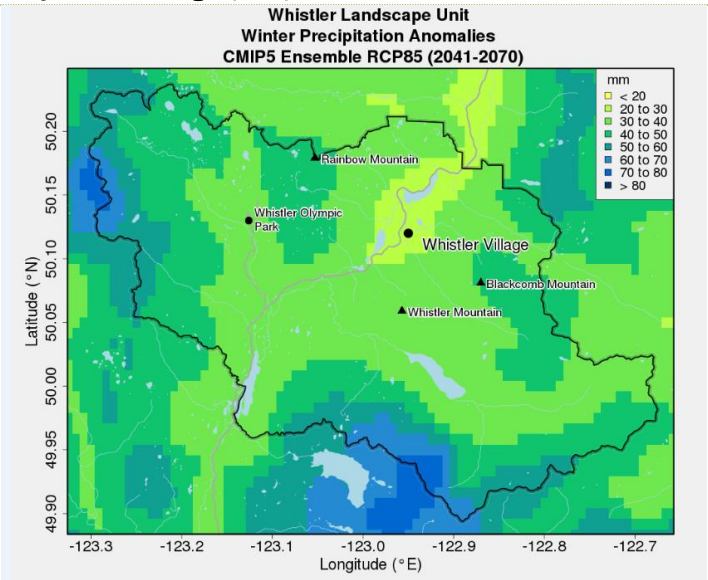
Past (1971 – 2000)



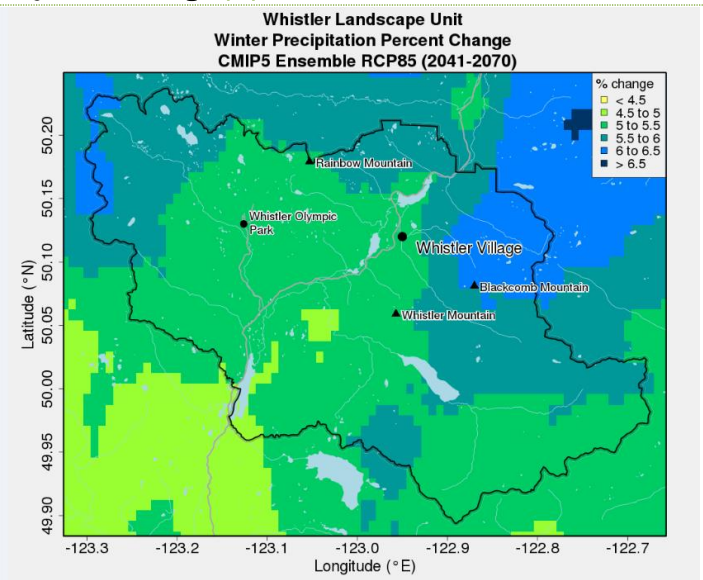
Projections (2041-2070)



Projected Change (mm)



Projected Change (%)



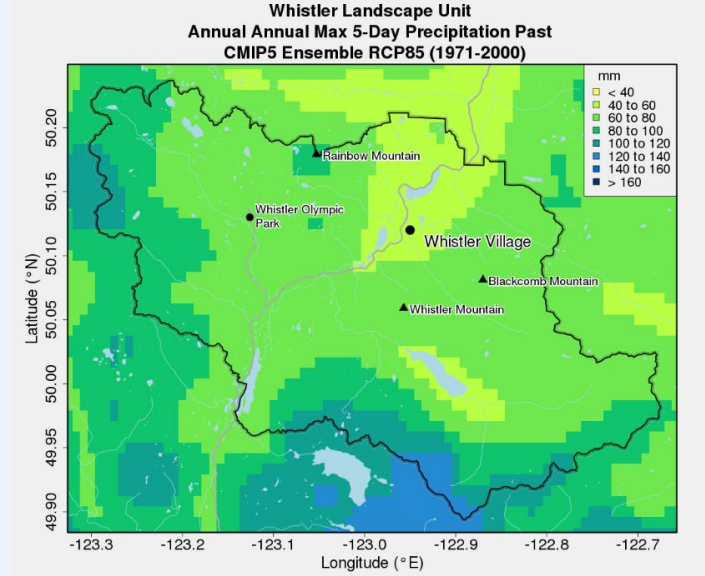
Increase in the Frequency and Intensity of Heavy Rain Events

Annual Maximum 5-Day Precipitation

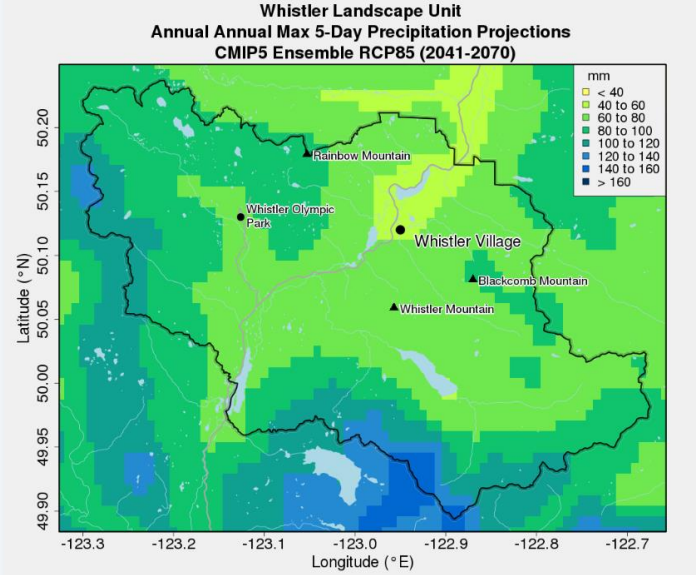
CIMP5 Ensemble RCP85

Annual maximum 5-day precipitation measures the maximum precipitation during a 5-consecutive-day period in a year.

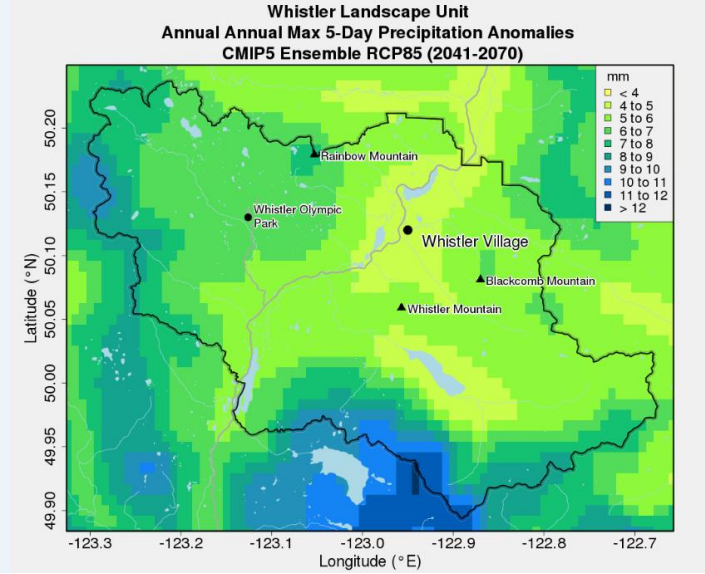
Past (1971 – 2000)



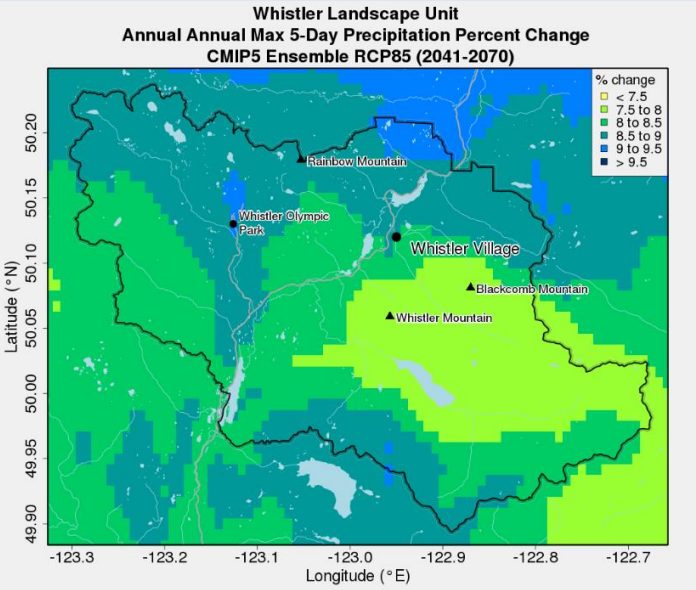
Projections (2041-2070)



Projected Change (mm)



Projected Change (%)



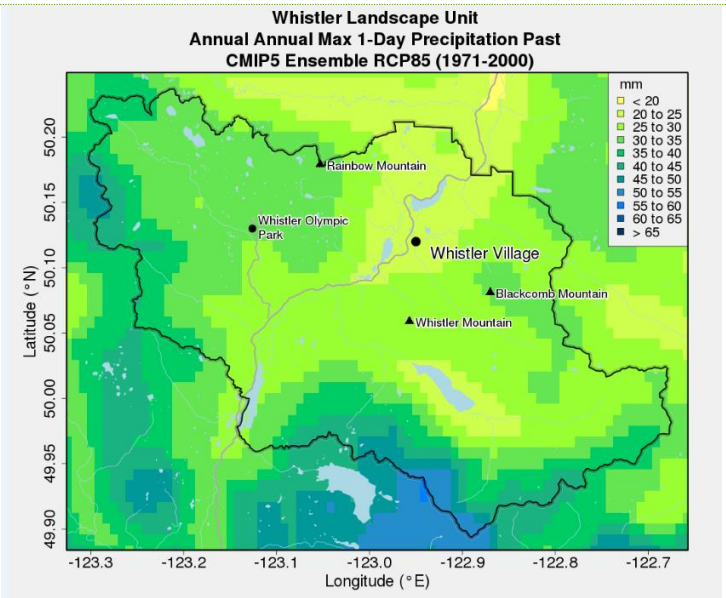
Increase in the Frequency and Intensity of Heavy Rain Events

Annual Maximum 1-Day Precipitation

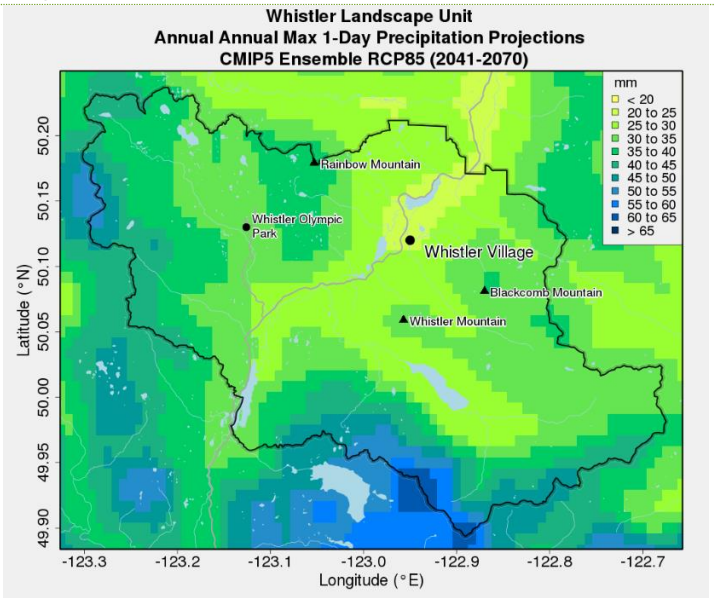
CIMP5 Ensemble RCP85

Annual maximum 1-day precipitation measures the maximum precipitation during a 1-day period over the year.

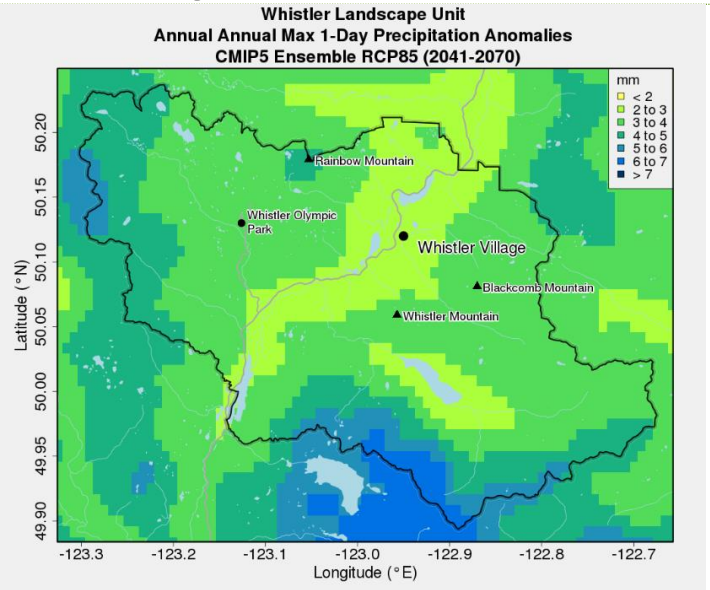
Past (1971 – 2000)



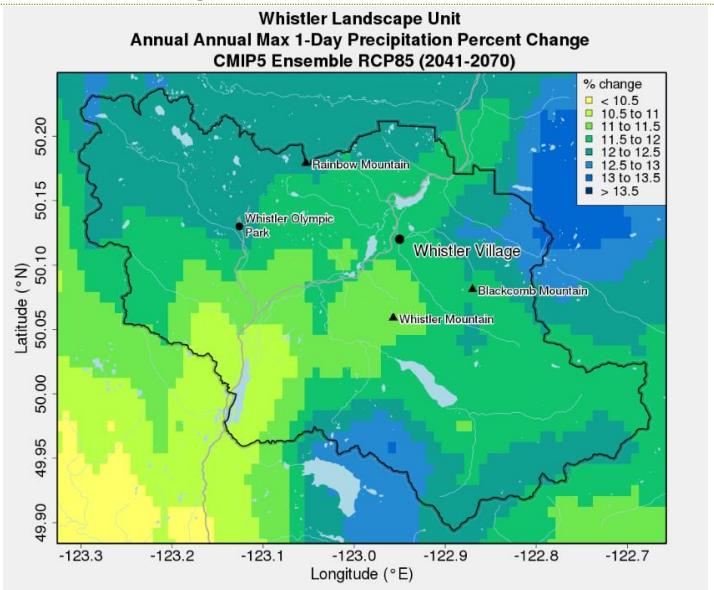
Projections (2041-2070)



Projected Change (mm)



Projected Change (%)



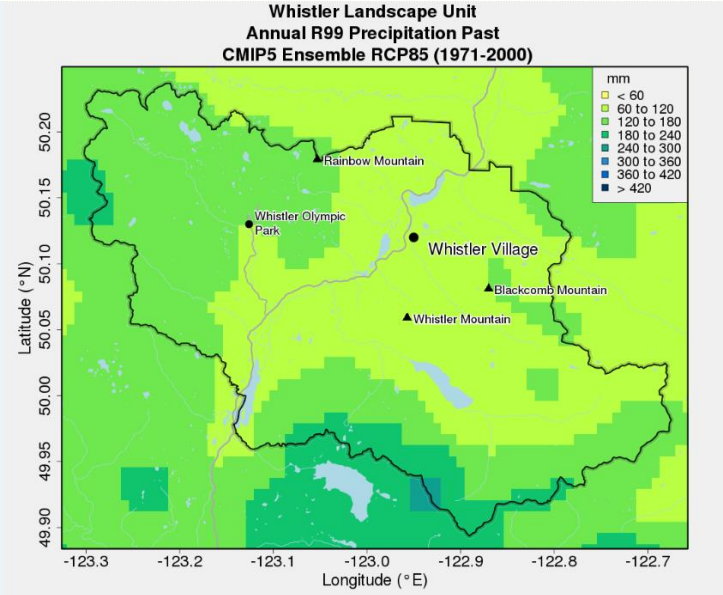
Increase in the Frequency and Intensity of Heavy Rain Events

R99 (99th Percentile) Precipitation

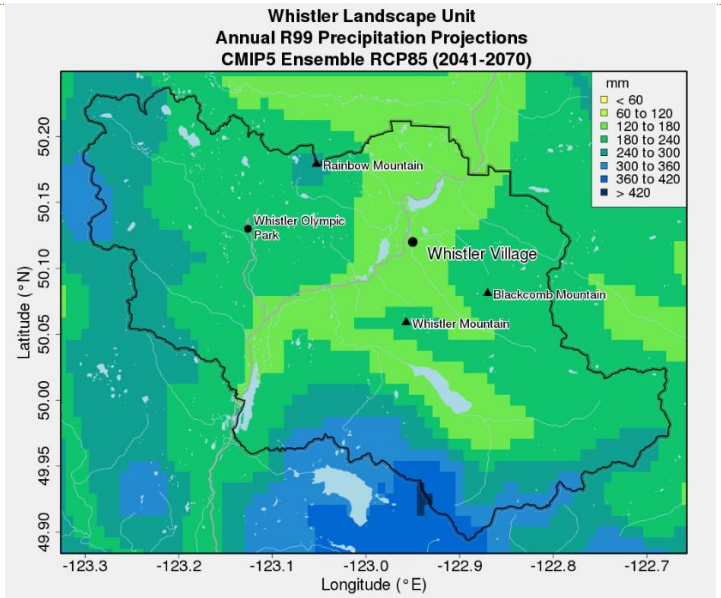
CIMP5 Ensemble RCP85

R99 (99th percentile) precipitation measures the total amount of precipitation that occurs per year during events in which daily precipitation exceeds the 99th percentile of all wet days (with precipitation above 1mm). This measure indicates how much of the total precipitation in a year falls during these heavy events, which is a combination of both how often events occur that exceed baseline 99th percentile and the size of these events.

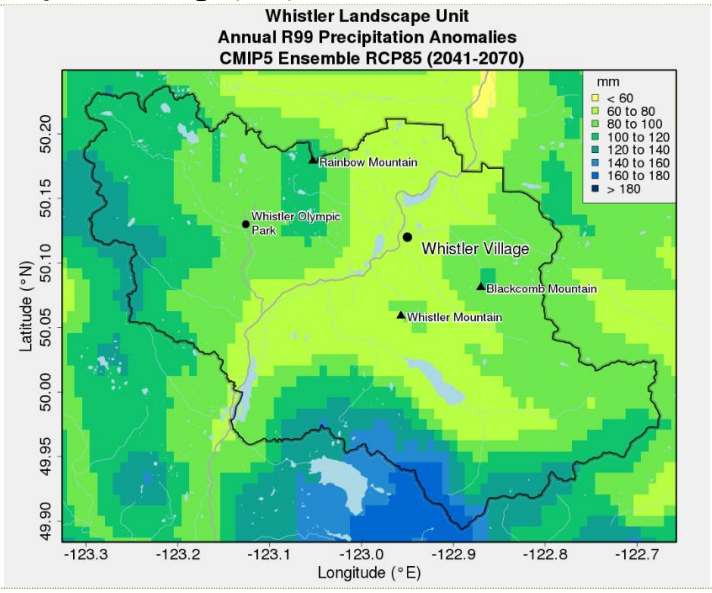
Past (1971 – 2000)



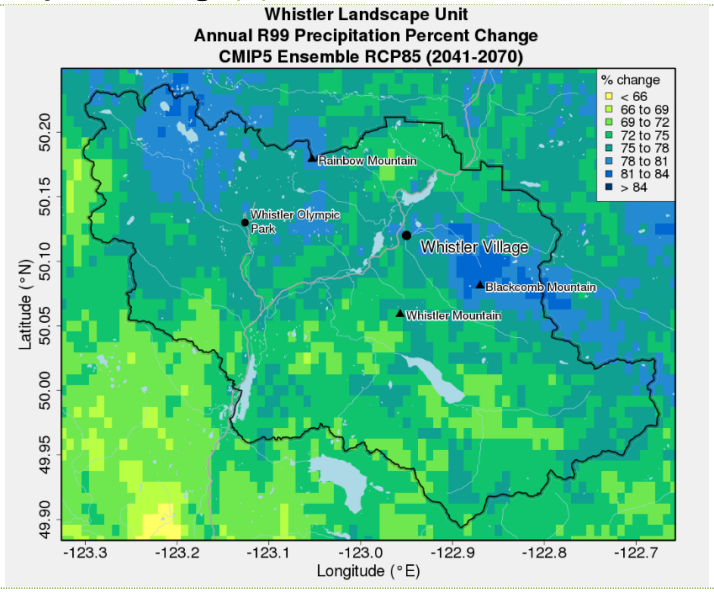
Projections (2041-2070)



Projected Change (mm)



Projected Change (%)



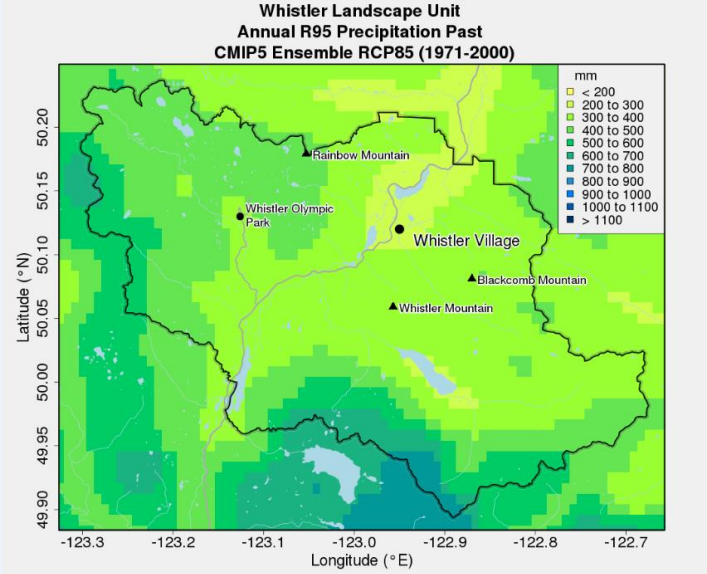
Increase in the Frequency and Intensity of Heavy Rain Events

R95 (95th Percentile) Precipitation

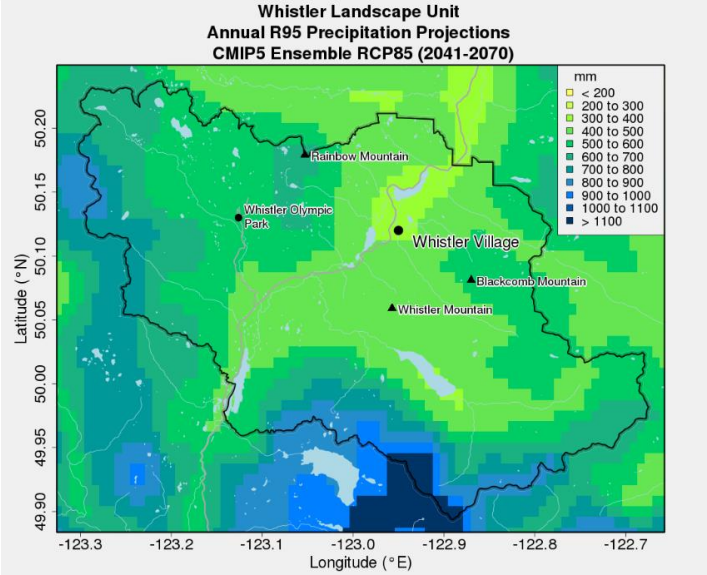
CIMP5 Ensemble RCP85

R95 (95th percentile) precipitation measures the total amount of precipitation that occurs per year during events in which daily precipitation exceeds the 95th percentile of all wet days (with precipitation above 1mm). This measure indicates how much of the total precipitation in a year falls during these heavy events, which is a combination of both how often events occur that exceed baseline 95th percentile and the size of these events.

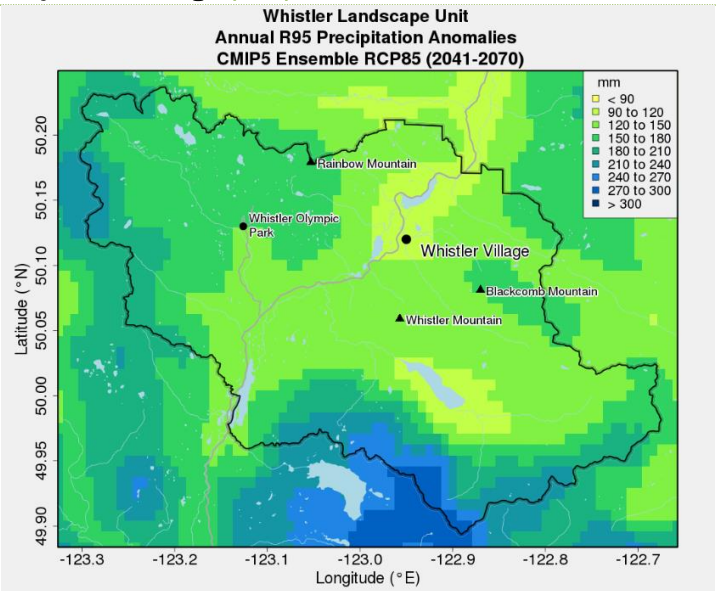
Past (1971 – 2000)



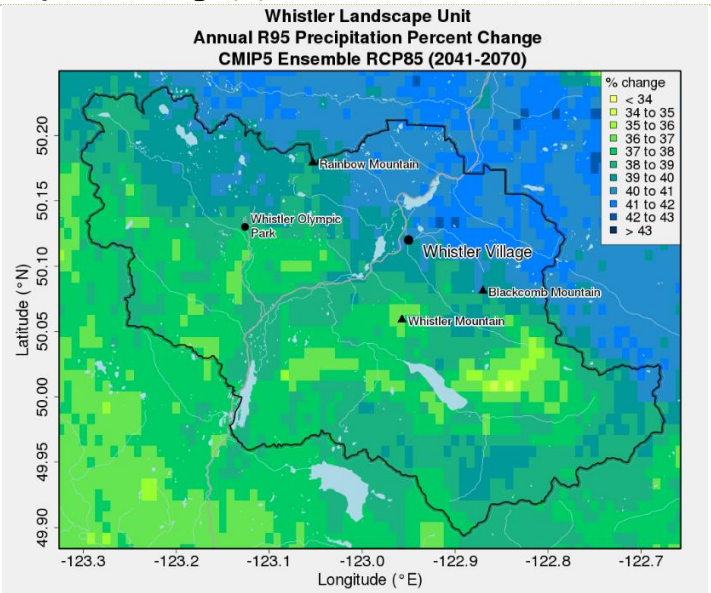
Projections (2041-2070)



Projected Change (mm)



Projected Change (%)



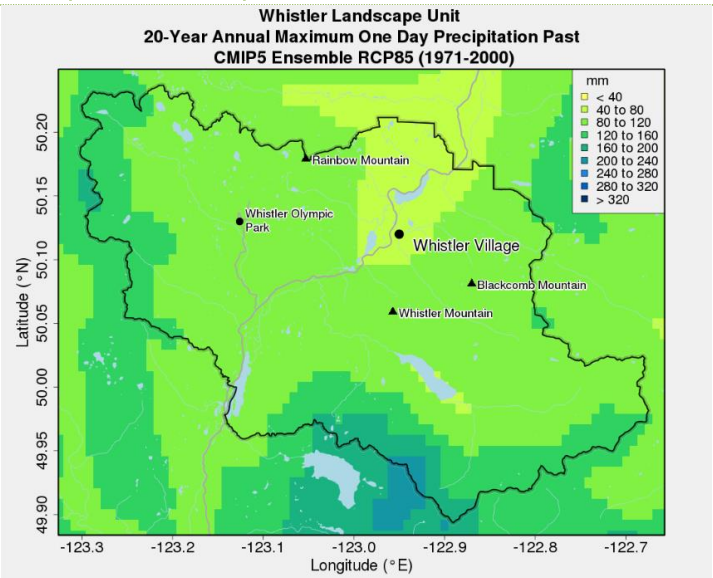
Increase in the Frequency and Intensity of Heavy Rain Events

20-Year Precipitation

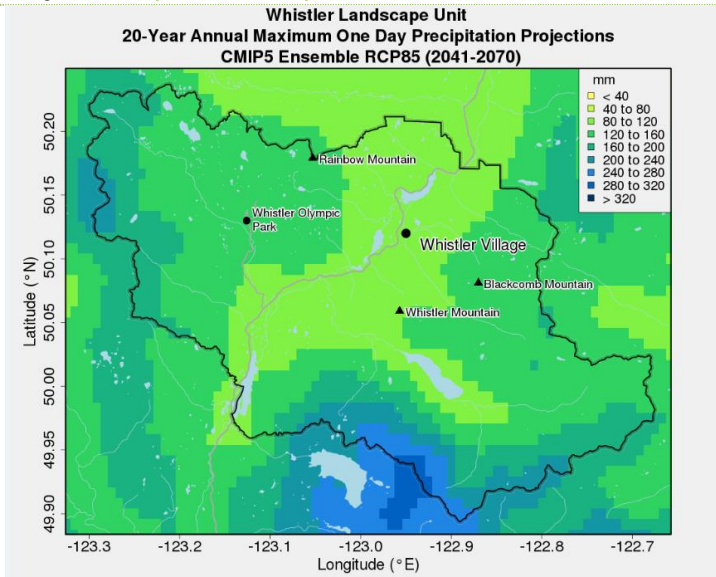
CIMP5 Ensemble RCP85

20-year precipitation measures the maximum daily precipitation expected to occur on average once in 20 years. This index reflects only the intensity of that event.

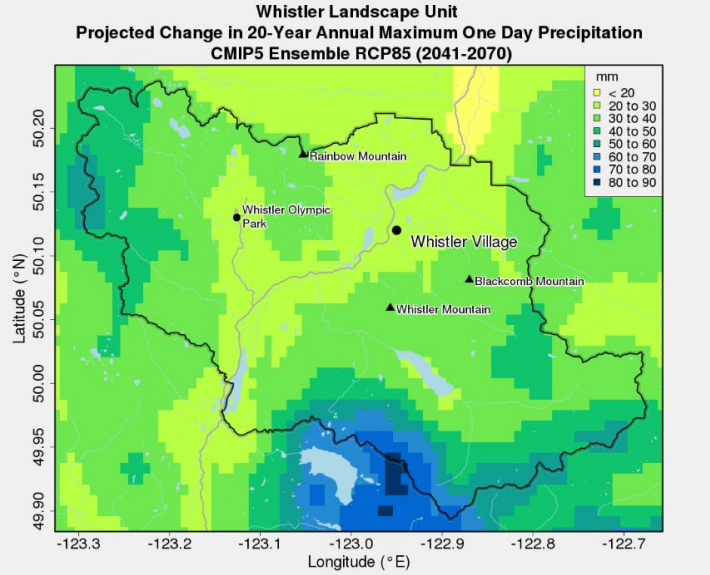
Past (1971 – 2000)



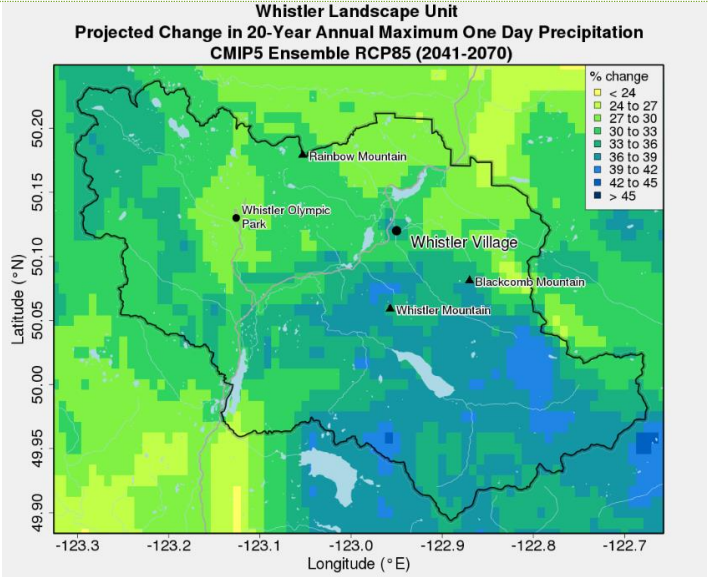
Projections (2041-2070)



Projected Change (mm)



Projected Change (%)



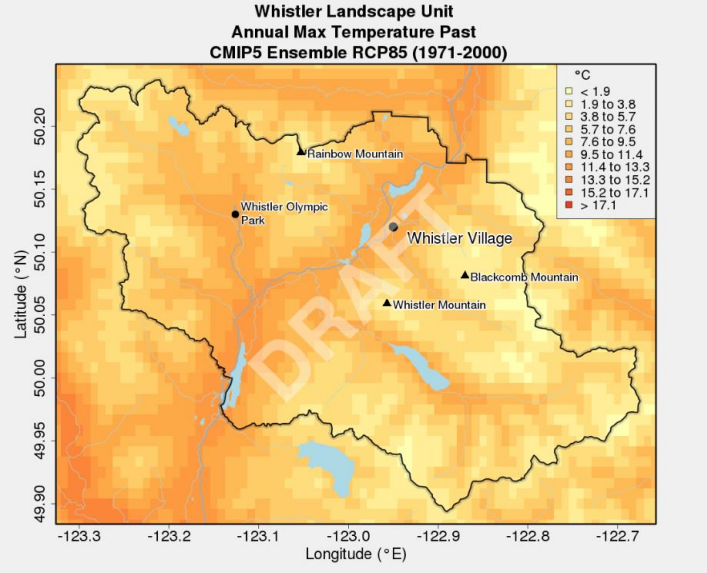
Longer, Hotter, Drier Summers

Annual Maximum Temperature

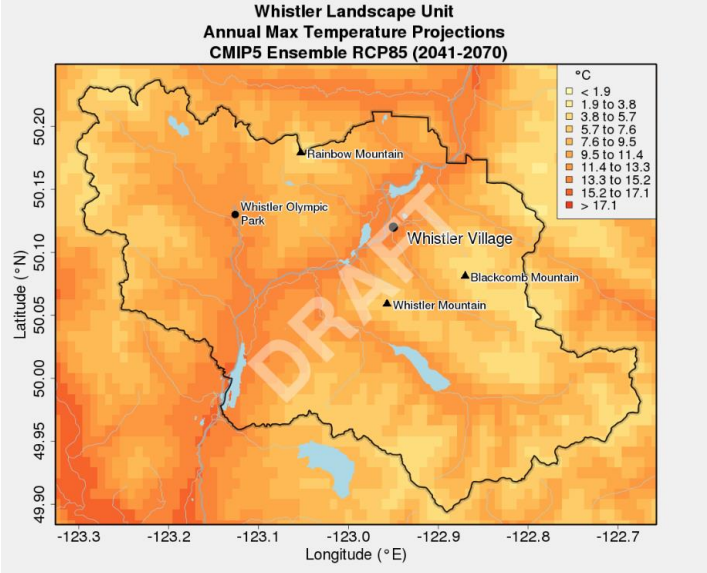
CIMP5 Ensemble RCP85

Annual maximum temperature refers to the maximum daily temperature (daytime high) averaged over the calendar year.

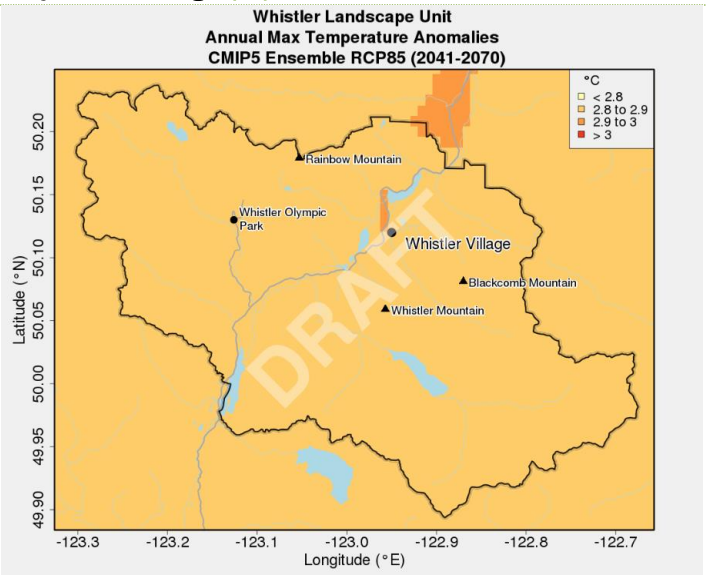
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



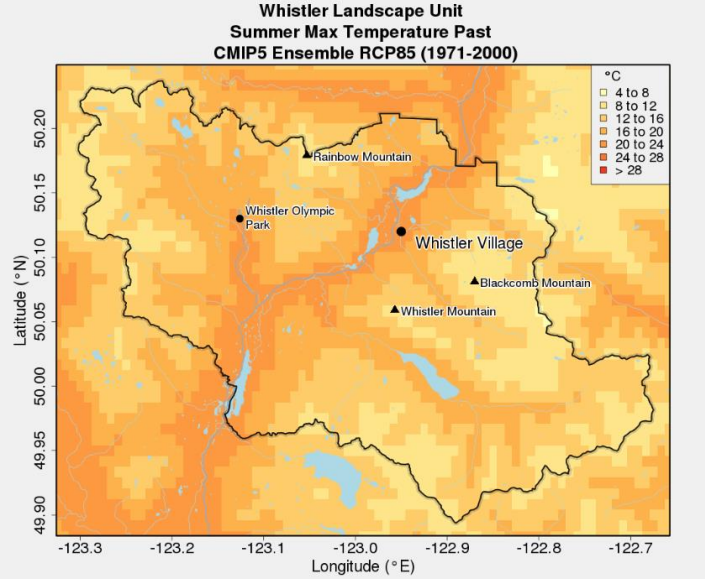
Longer, Hotter, Drier Summers

Summer Maximum Temperature

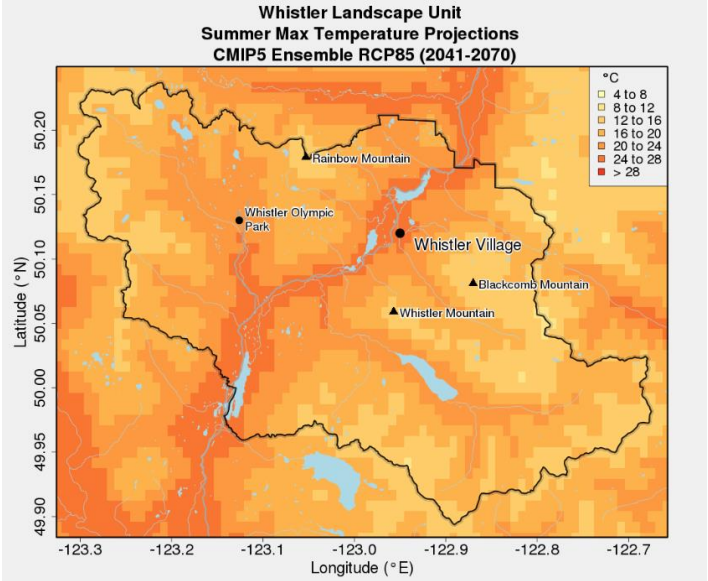
CIMP5 Ensemble RCP85

Summer maximum temperature refers to the maximum daily temperature (daytime high) averaged over all days in June, July and August.

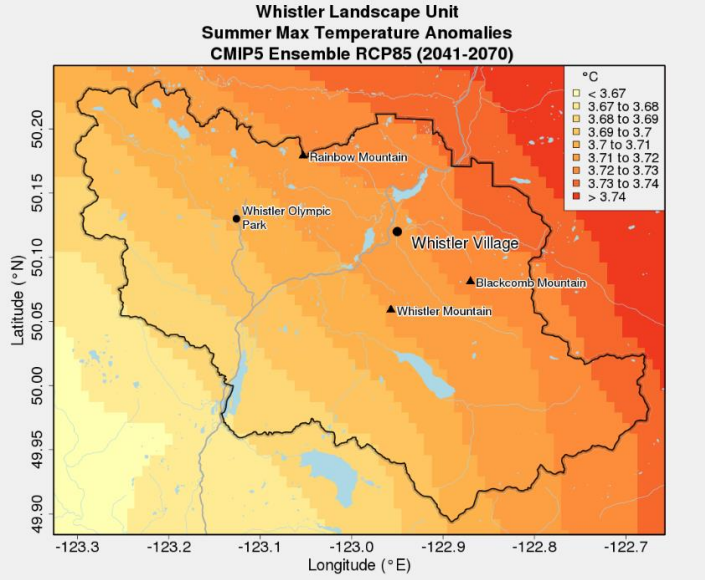
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



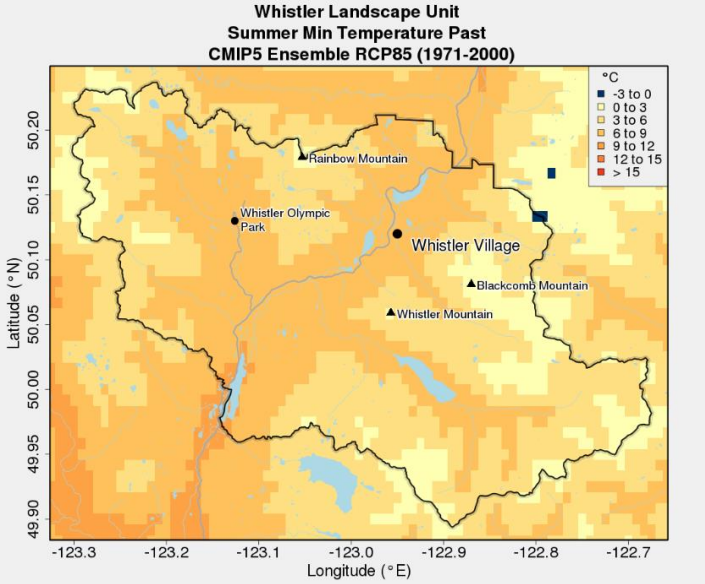
Longer, Hotter, Drier Summers

Summer Minimum Temperature

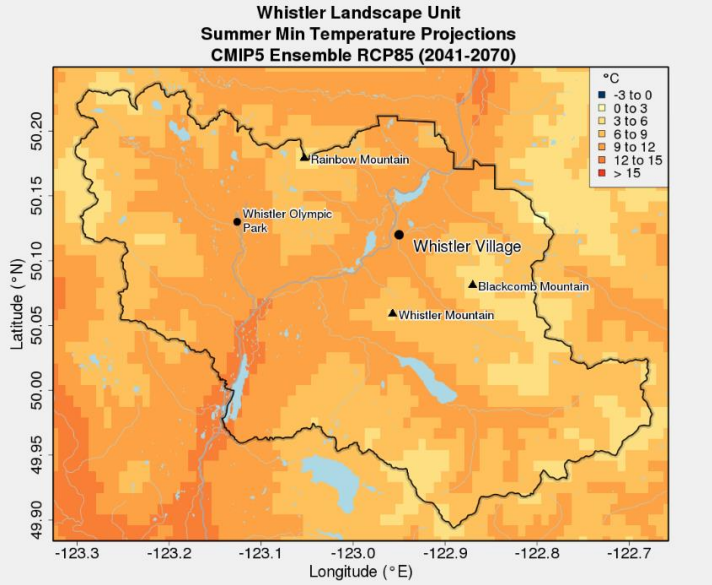
CIMP5 Ensemble RCP85

Summer minimum temperature refers to the minimum daily temperature (night-time low) averaged over all days in June, July and August.

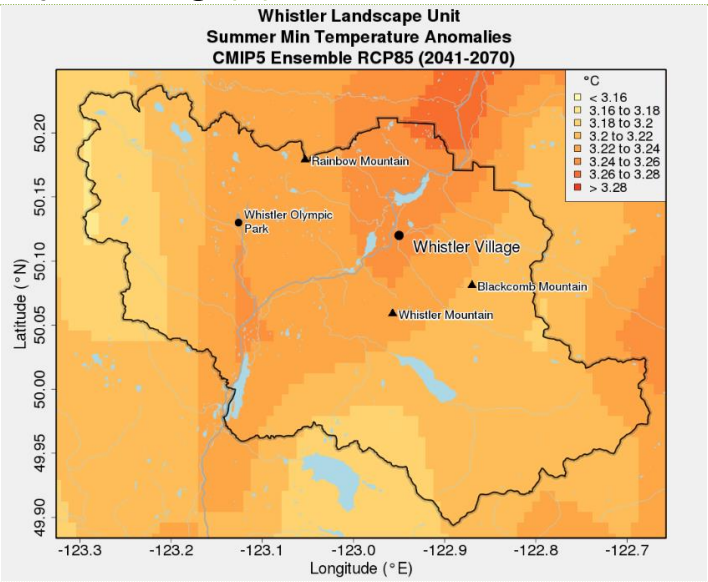
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



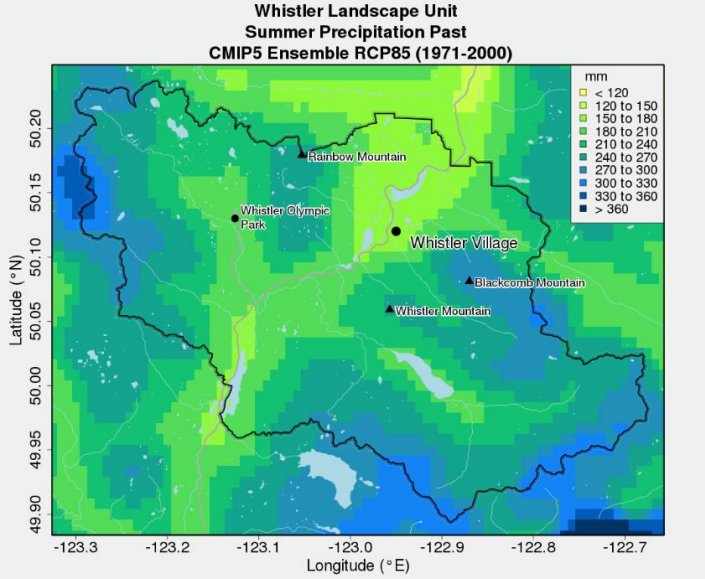
Longer, Hotter, Drier Summers

Summer Precipitation

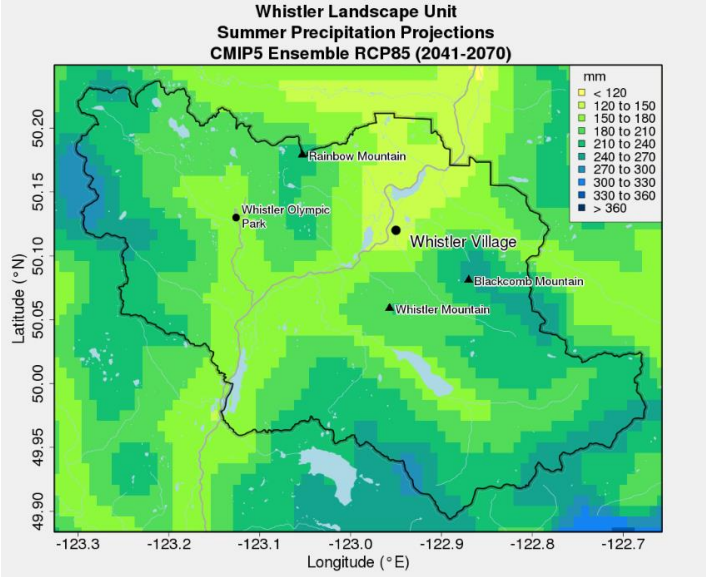
CIMP5 Ensemble RCP85

Summer precipitation measures the total amount of precipitation (liquid or solid) falling within the Whistler Landscape Unit over June, July and August.

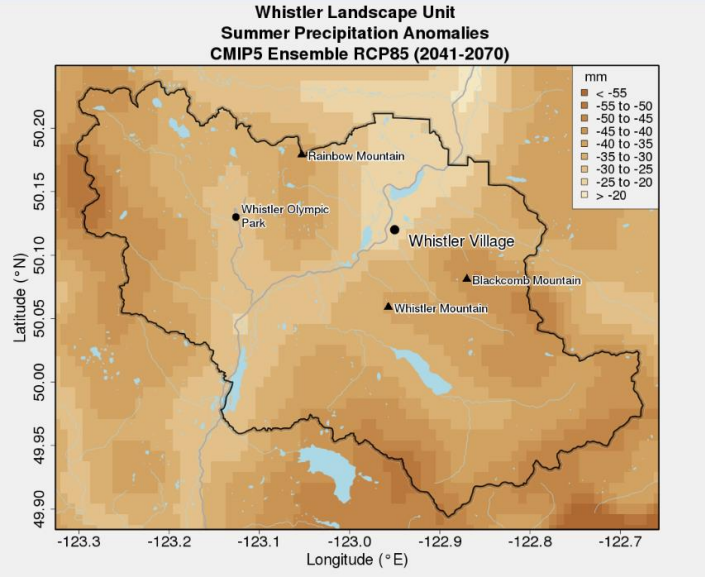
Past (1971 – 2000)



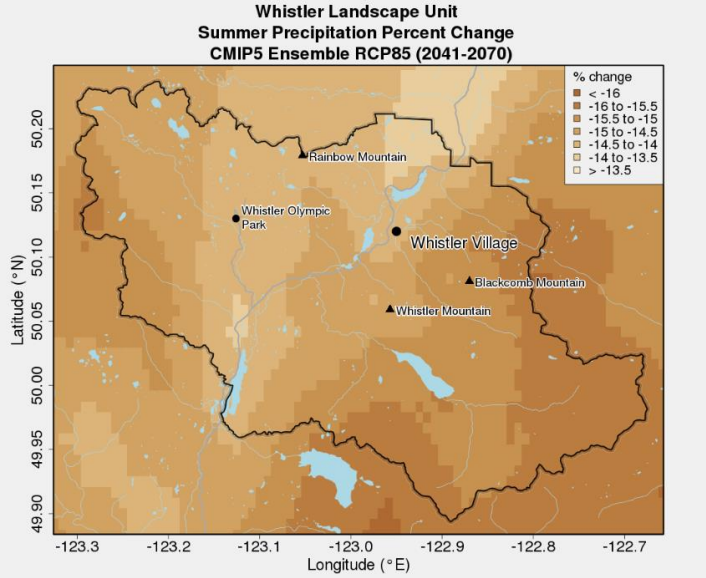
Projections (2041-2070)



Projected Change (mm)



Projected Change (%)



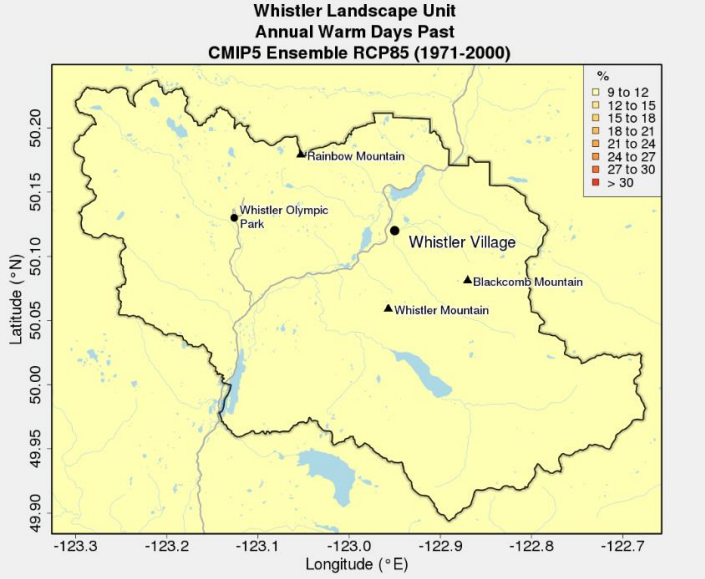
Longer, Hotter, Drier Summers

Warm Days

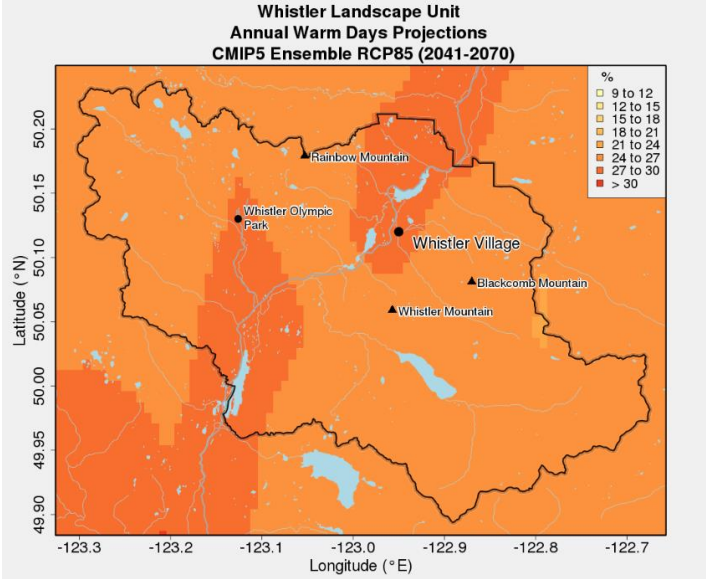
CIMP5 Ensemble RCP85

Warm days measures how often the historical 90th percentile of daytime high temperatures (for each day of the year) occurs on average. By definition, this occurs 10 percent of the time in the past.

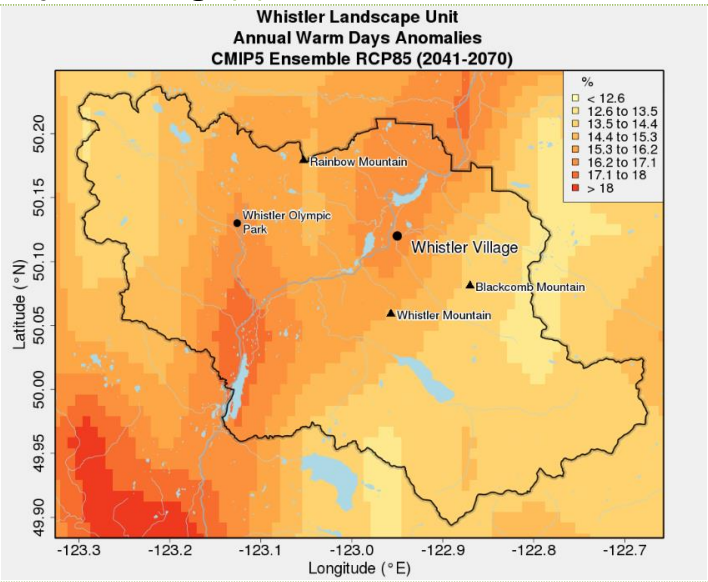
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (%)



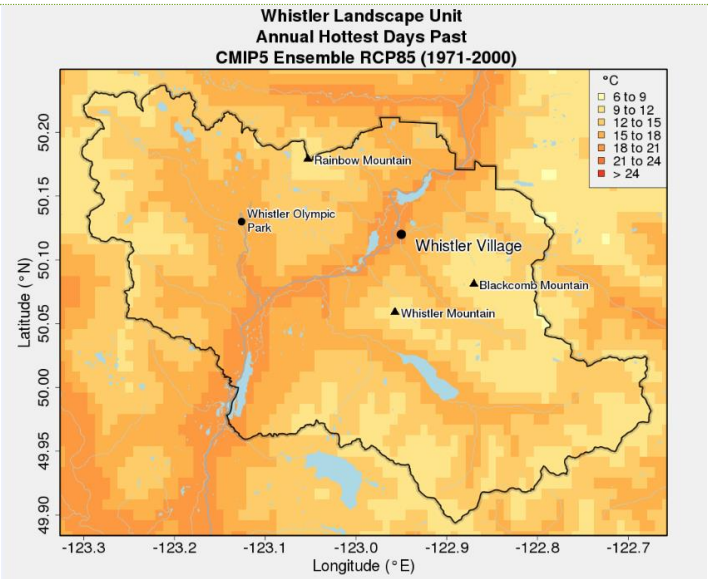
Longer, Hotter, Drier Summers

Hottest Days

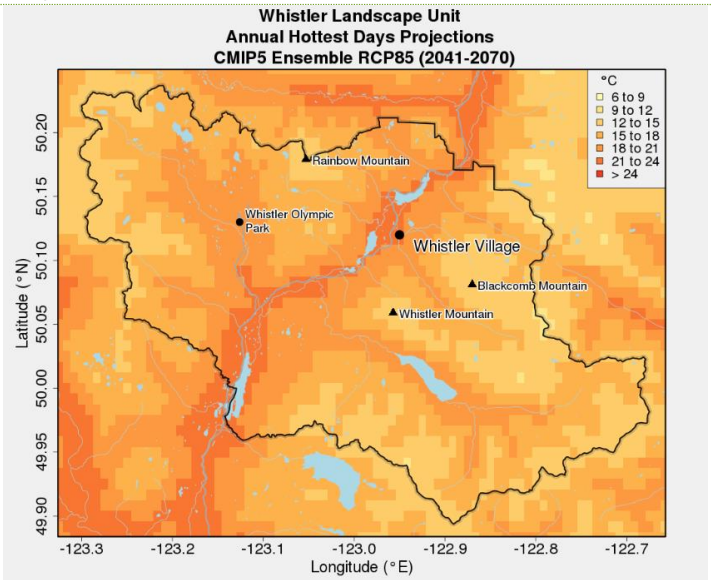
CIMP5 Ensemble RCP85

Hottest days measures the temperature of the hottest day of the year, on average.

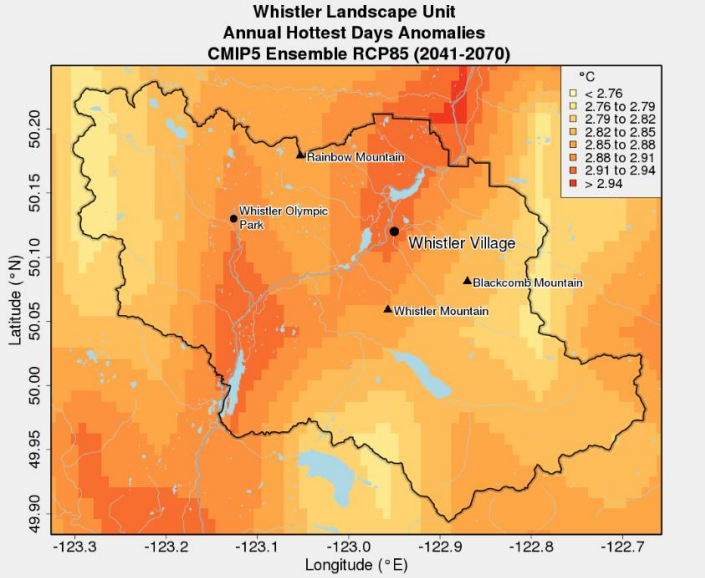
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



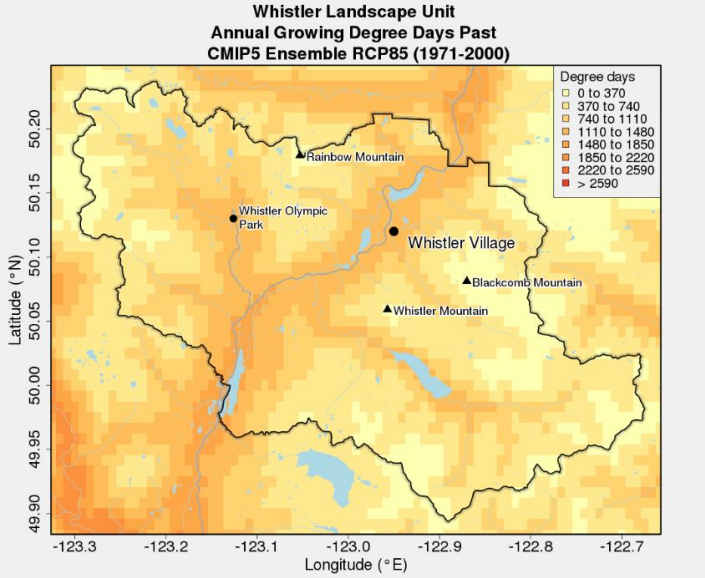
Longer, Hotter, Drier Summers

Growing Degree Days

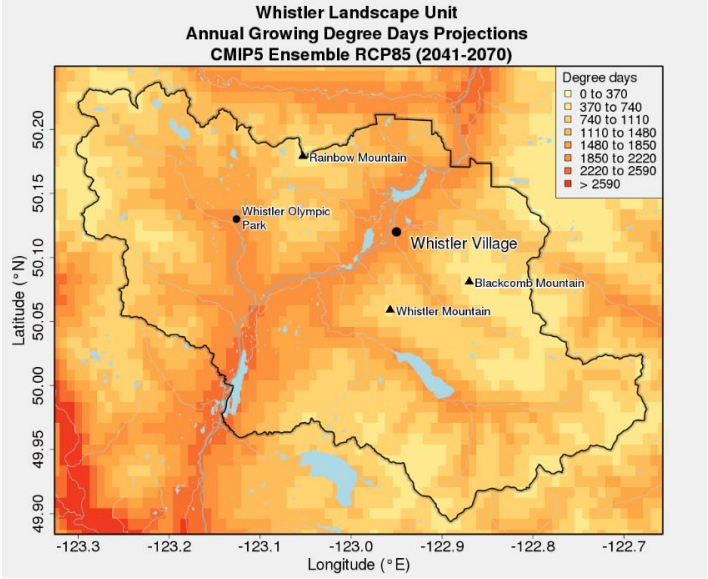
CIMP5 Ensemble RCP85

Growing degree days is a derived variable that measures the total of the number of degrees above 5 °C that occur daily, summed over each day of the year, averaged over the period. Growing degree days indicate the amount of heat energy available for plant growth, useful for determining the growth potential of crops in a given area. It is calculated by multiplying the number of days that mean daily temperature exceeded 5 °C by the number of degrees above that threshold.

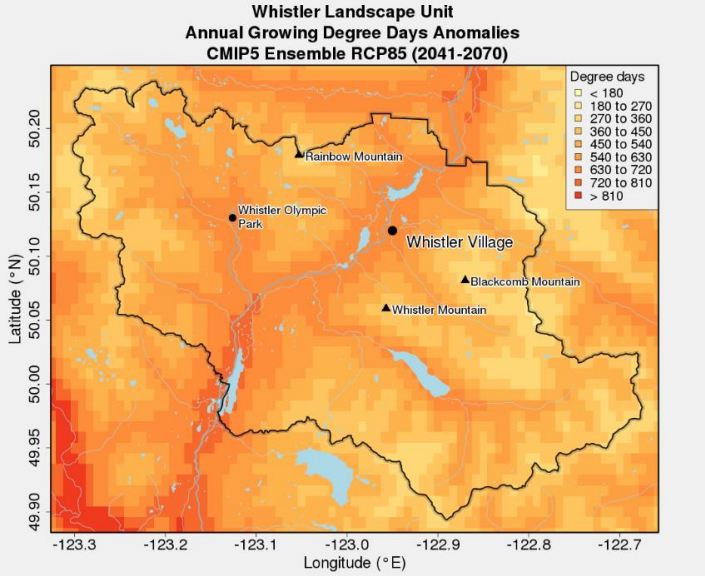
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (#)



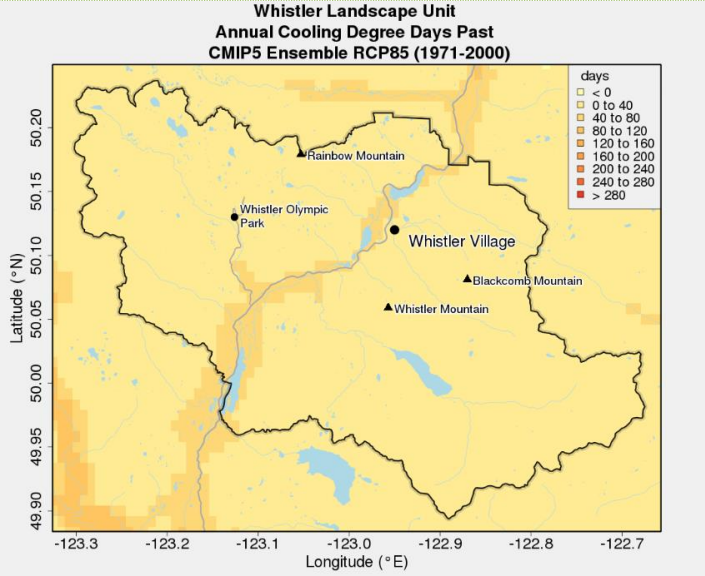
Longer, Hotter, Drier Summers

Cooling Degree Days

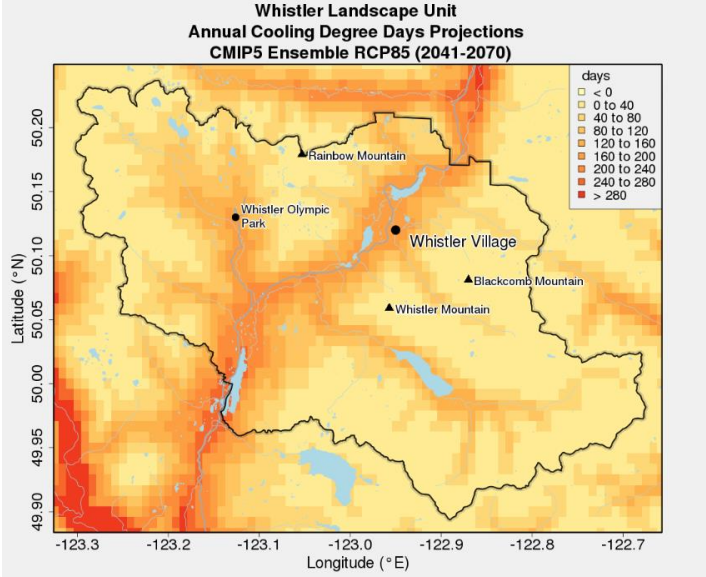
CIMP5 Ensemble RCP85

Cooling degree days measures the total number of degrees above 18°C that occur daily, summed over each day of the year. It is useful as an indicator for cooling demand (i.e. the need to cool homes, etc).

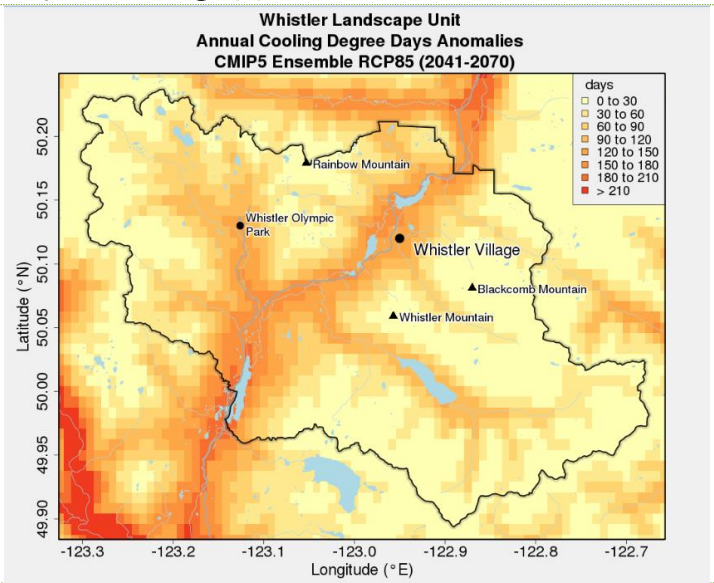
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (#)



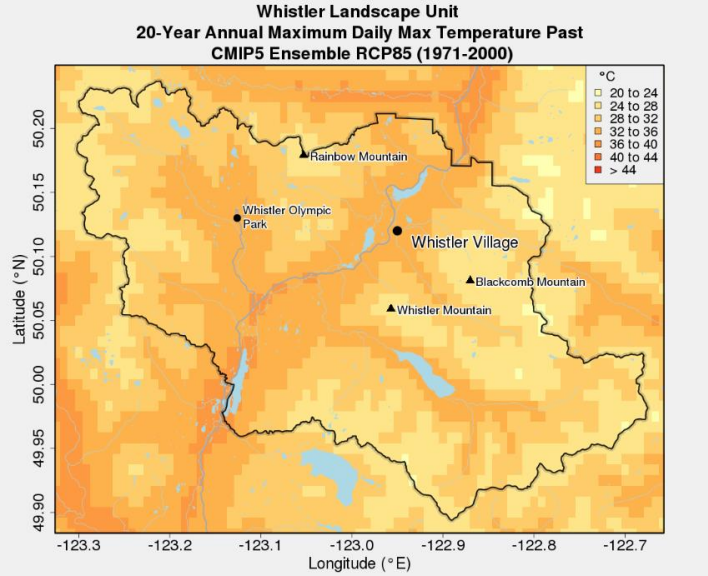
Longer, Hotter, Drier Summers

20-Year Maximum Temperature

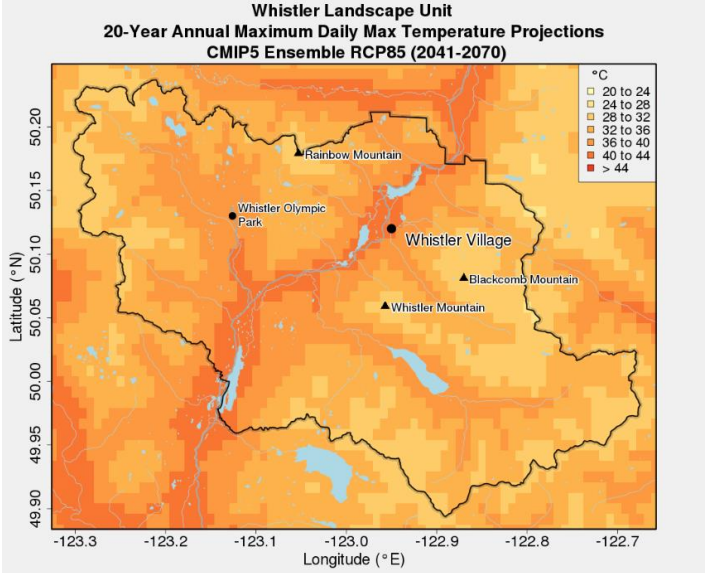
CIMP5 Ensemble RCP85

20-year maximum temperature indicates the maximum daily temperature expected to occur on average once in 20 years.

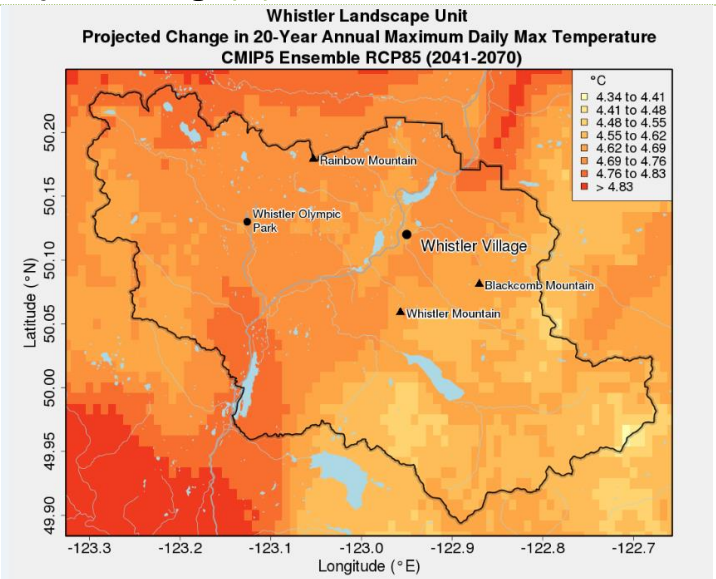
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



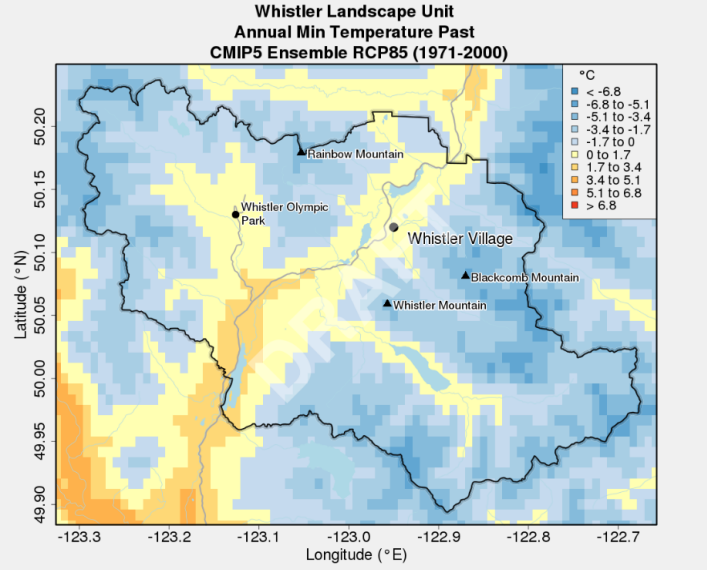
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

Annual Minimum Temperature

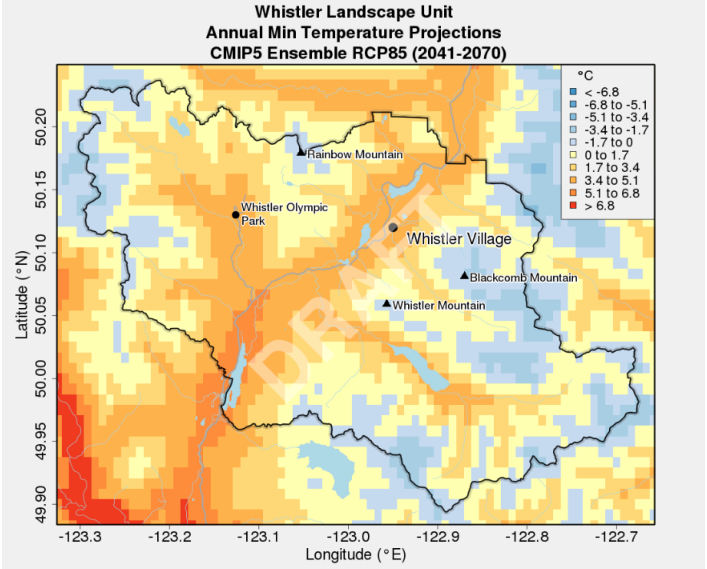
CIMP5 Ensemble RCP85

Annual minimum temperature refers to the minimum daily temperature (night-time low) averaged over the calendar year.

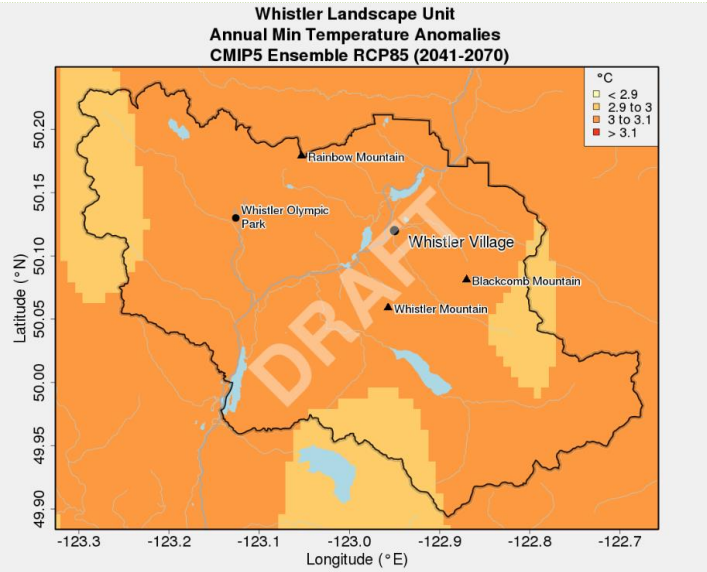
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



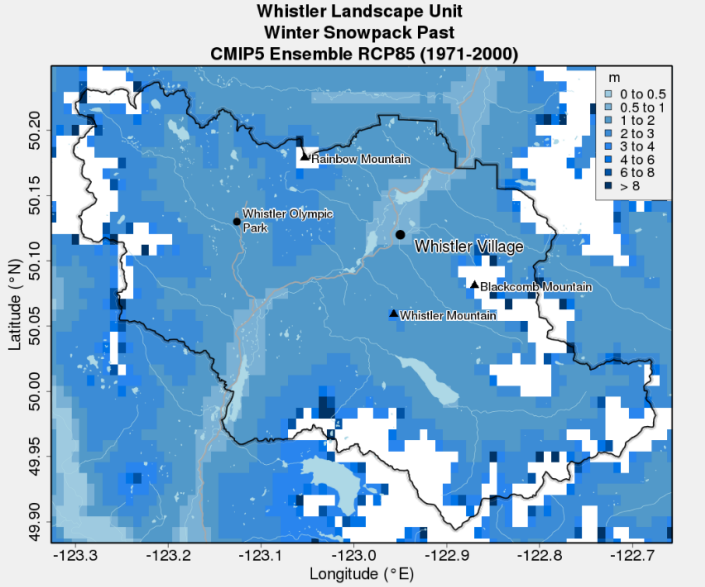
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

Whistler Snowpack

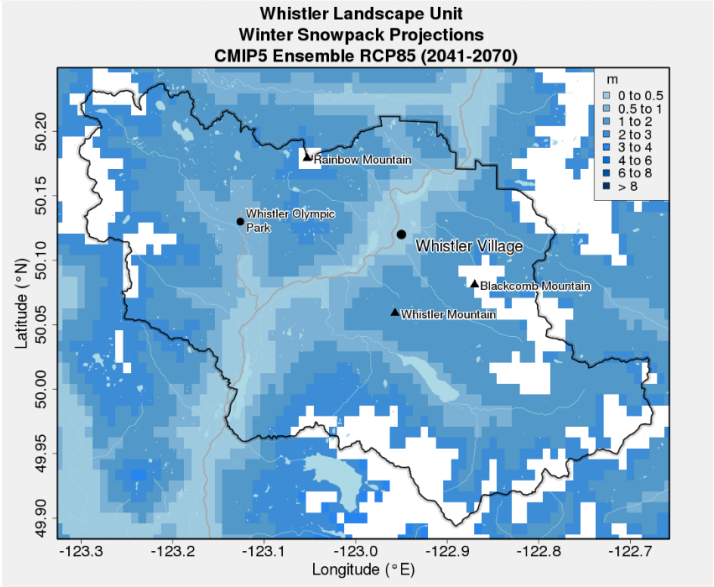
CIMP5 Ensemble RCP85

Whistler snowpack measures the depth of the snowpack in December, January and February.

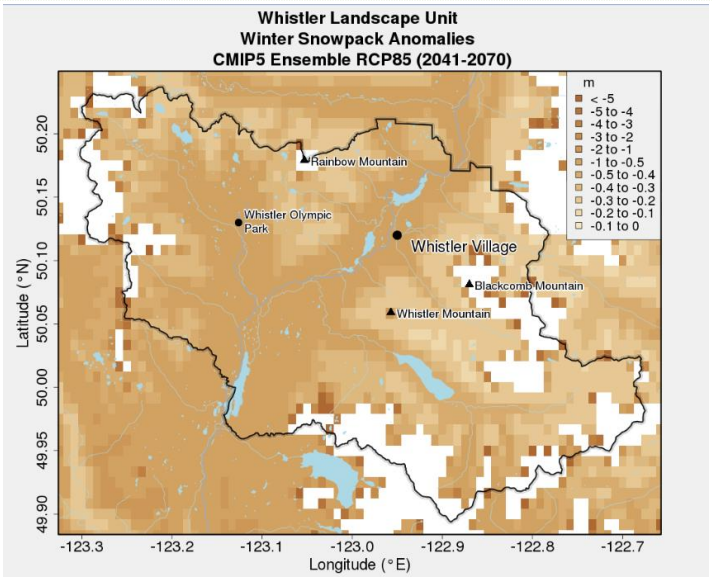
Past (1971 – 2000)



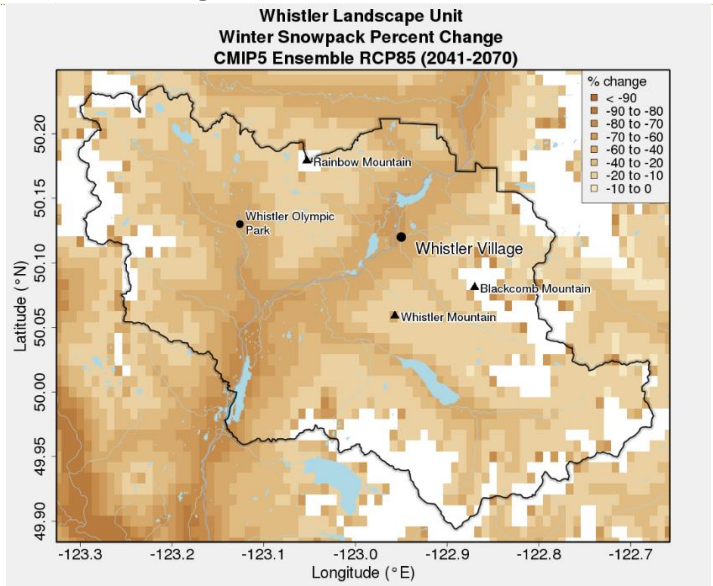
Projections (2041-2070)



Projected Change (m)



Projected Change (%)



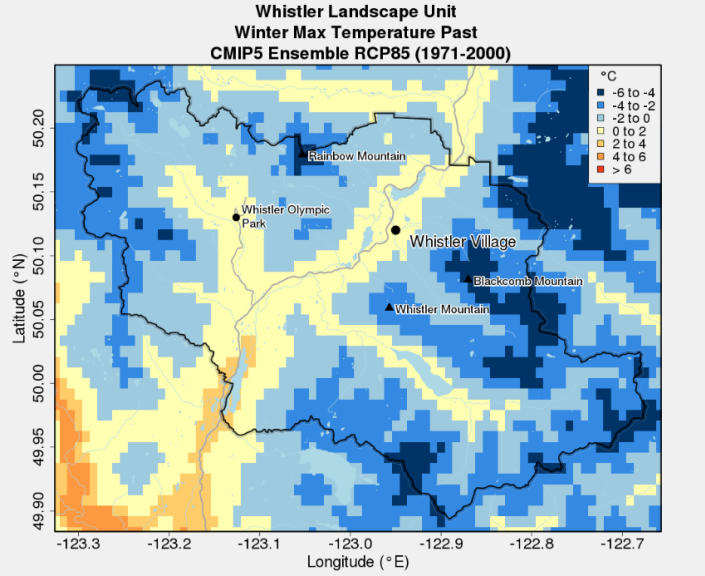
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

Winter Maximum Temperature

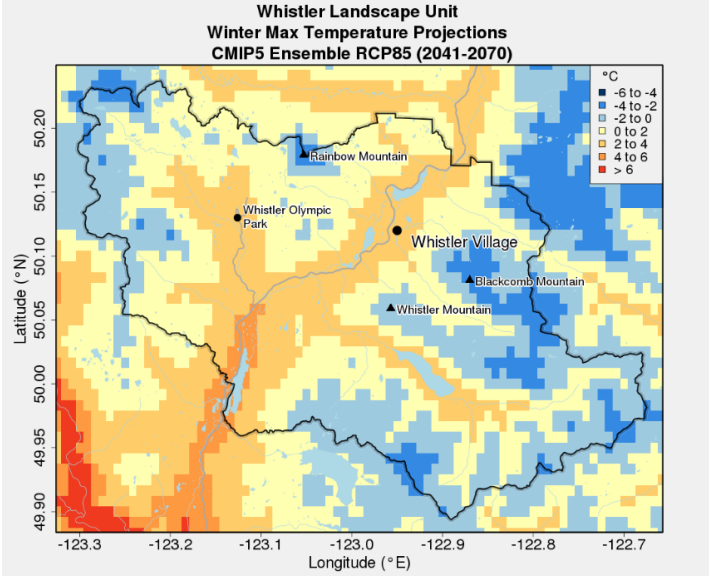
CIMP5 Ensemble RCP85

Winter maximum temperature refers to the maximum daily temperatures (daytime high) averaged over all days in December, January and February.

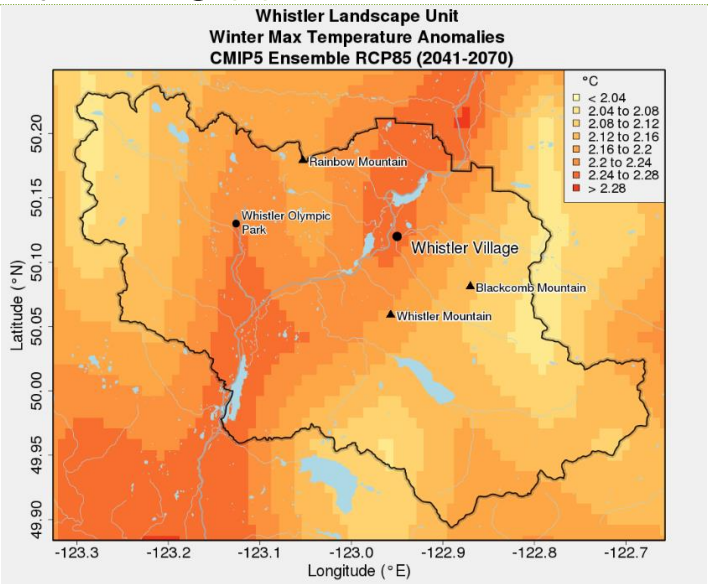
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



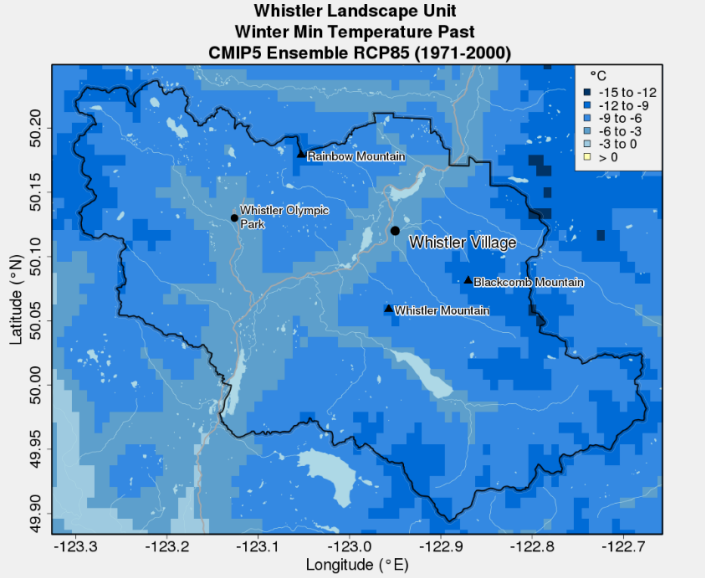
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

Winter Minimum Temperature

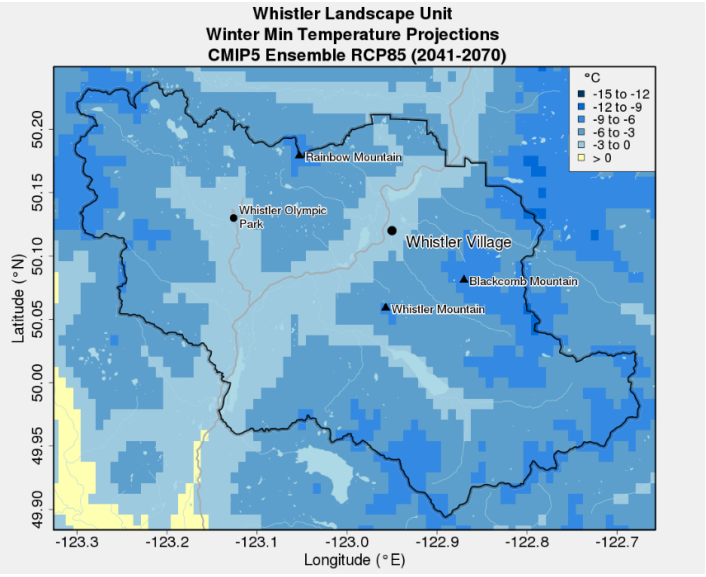
CIMP5 Ensemble RCP85

Winter minimum temperature measures the minimum daily temperatures (daytime high) averaged over all days in December, January and February.

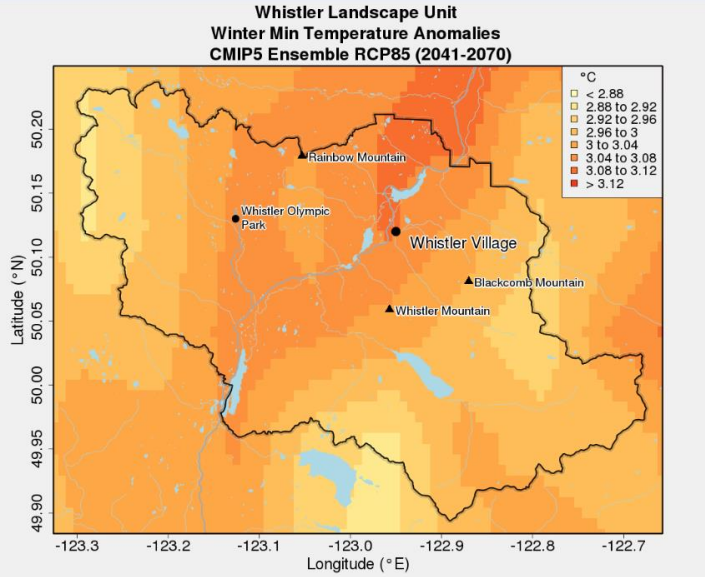
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



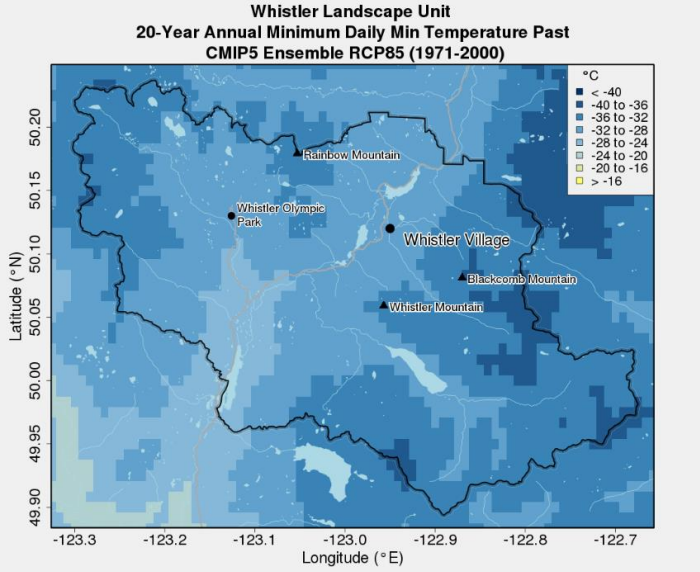
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

20-Year Minimum Temperature

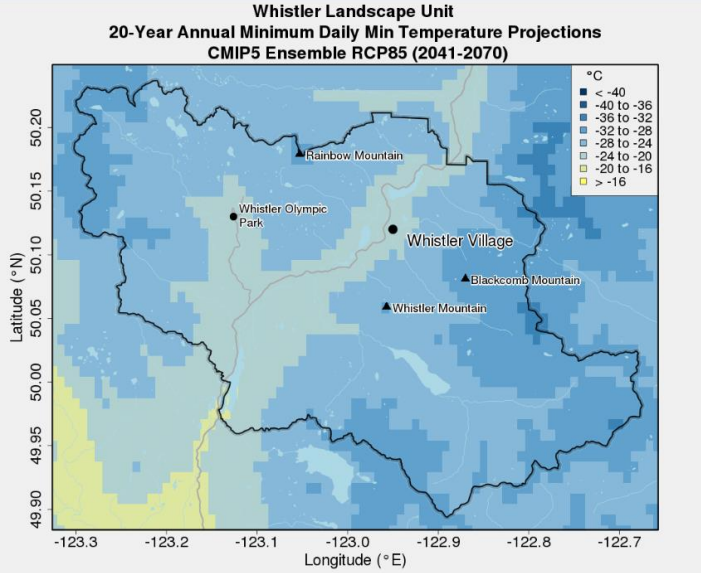
CIMP5 Ensemble RCP85

20-year minimum temperature indicates the minimum daily temperature expected to occur on average once in 20 years.

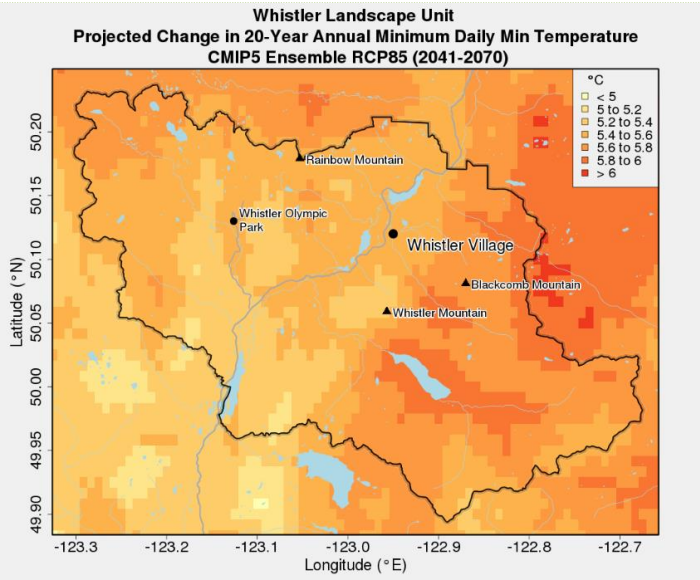
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



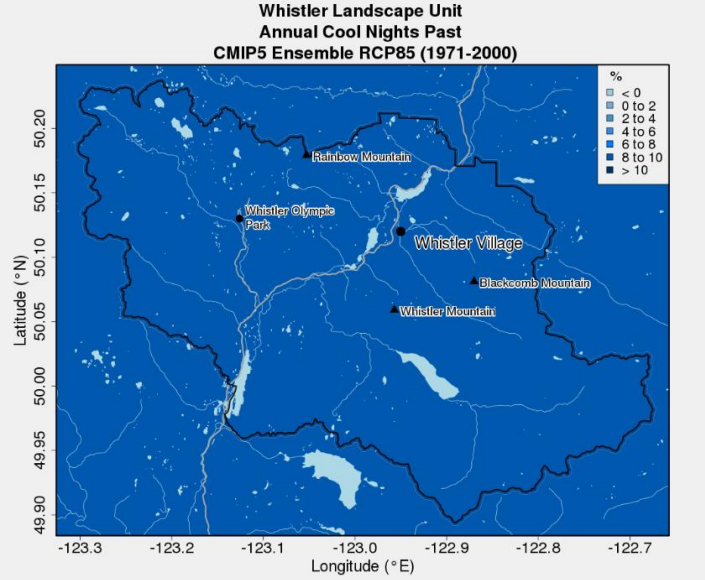
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

Cool Nights

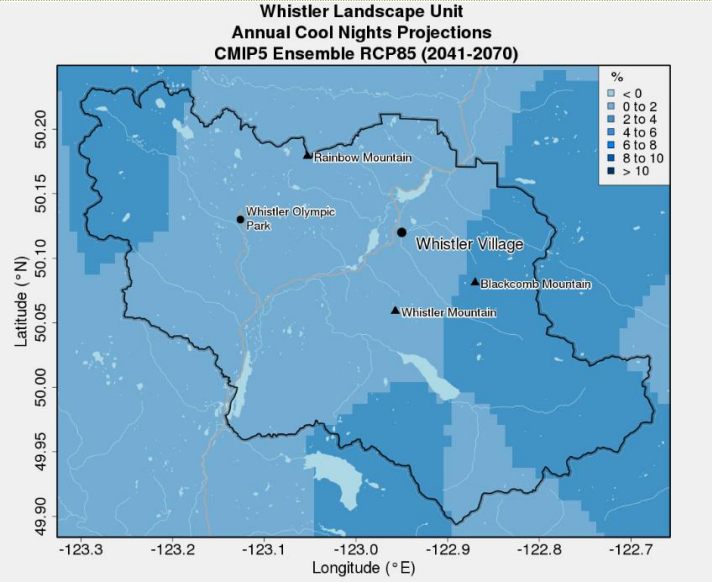
CIMP5 Ensemble RCP85

Cool nights measures how often the historical 10th percentile of night-time low temperatures (for each day of the year) occurs on average. By definition, this occurs 90 percent of the time in the past.

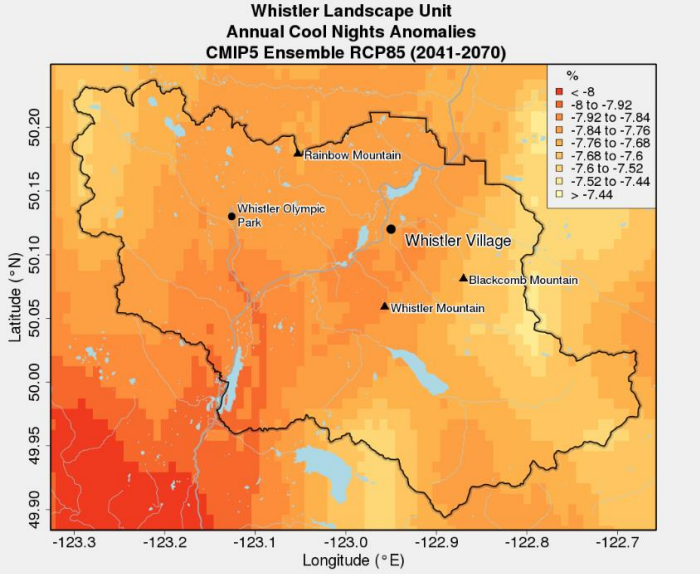
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (%)



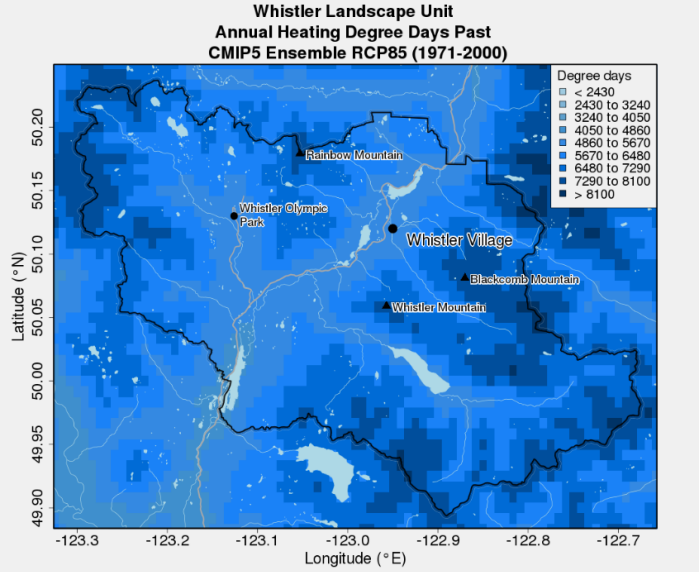
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

Heating Degree Days

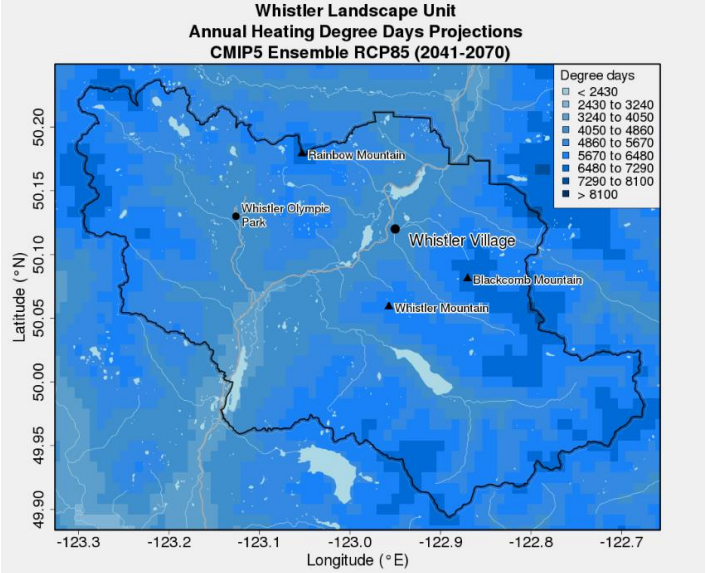
CIMP5 Ensemble RCP85

Heating degree days is a derived variable that can be useful for indicating energy demand (i.e. the need to heat homes, etc). It is calculated by multiplying the number of days that the average daily temperature is below 18 °C by the number of degrees below that threshold.

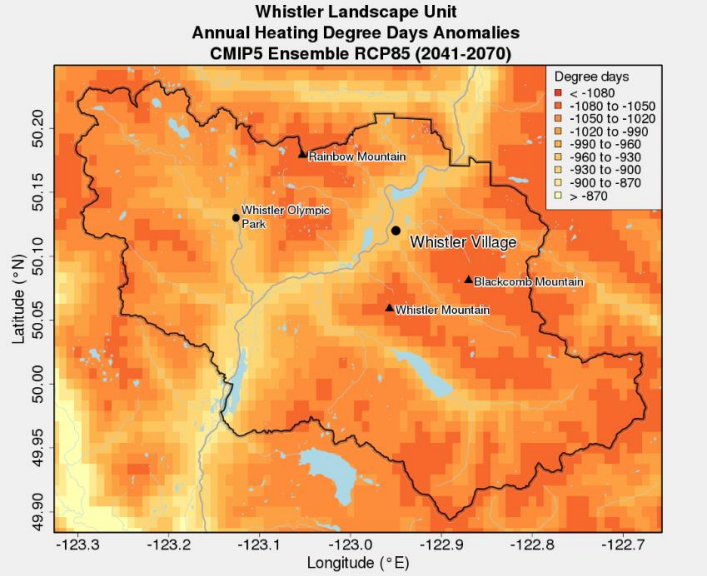
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (#)



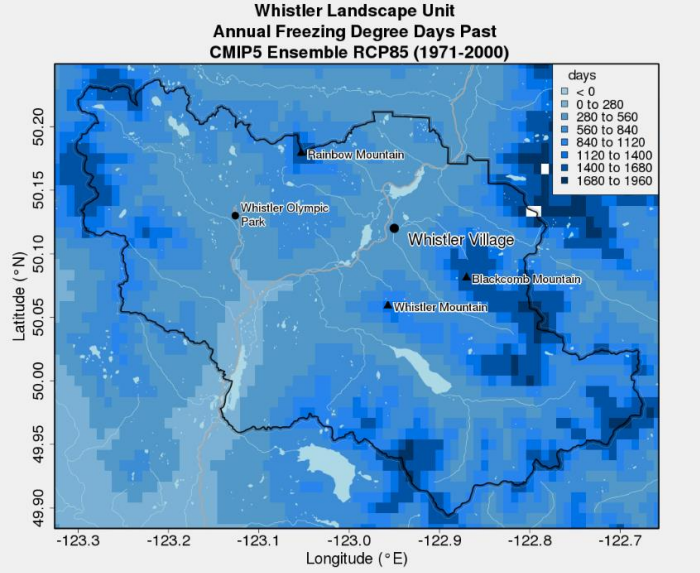
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

Freezing Degree Days

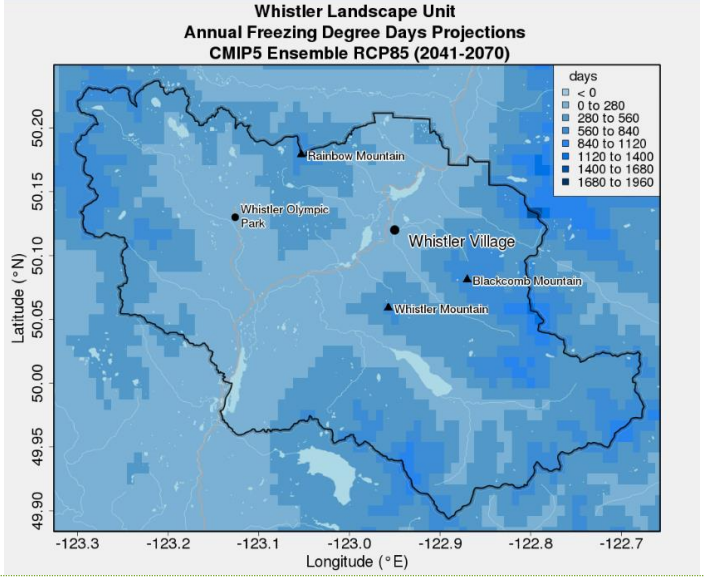
CIMP5 Ensemble RCP85

Freezing degree days is calculated as a sum of average daily degrees below freezing. This is a useful measure of how cold it has been and for how long.

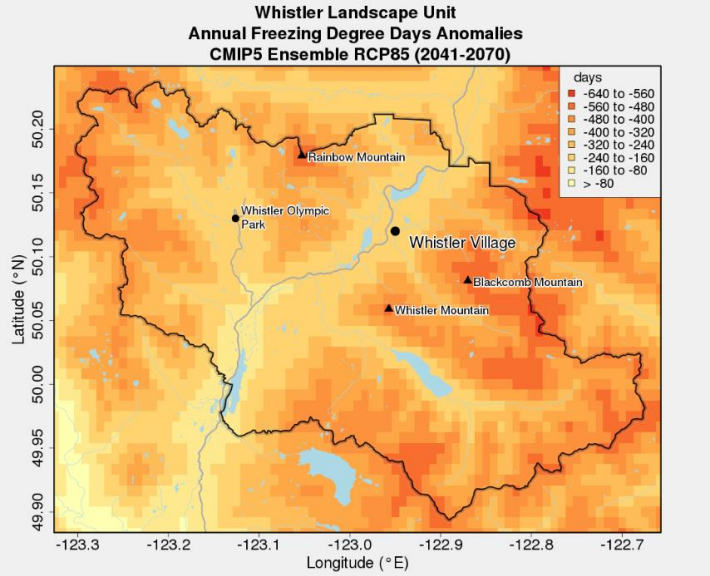
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (#)



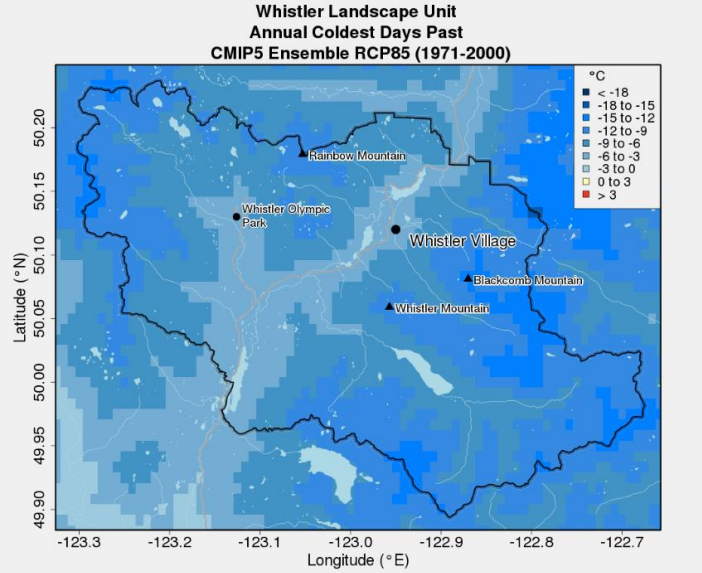
Milder Winters with Increased Precipitation Falling as Rain Near Valley Bottom, while Snow Pack at Higher Elevation sees Limited Change.

Coldest Days

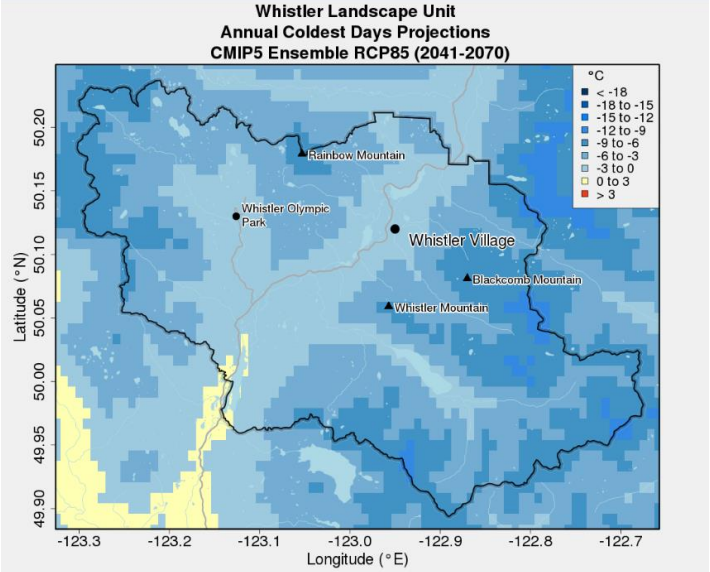
CIMP5 Ensemble RCP85

Coldest days measures the temperature of the coldest day of the year, on average.

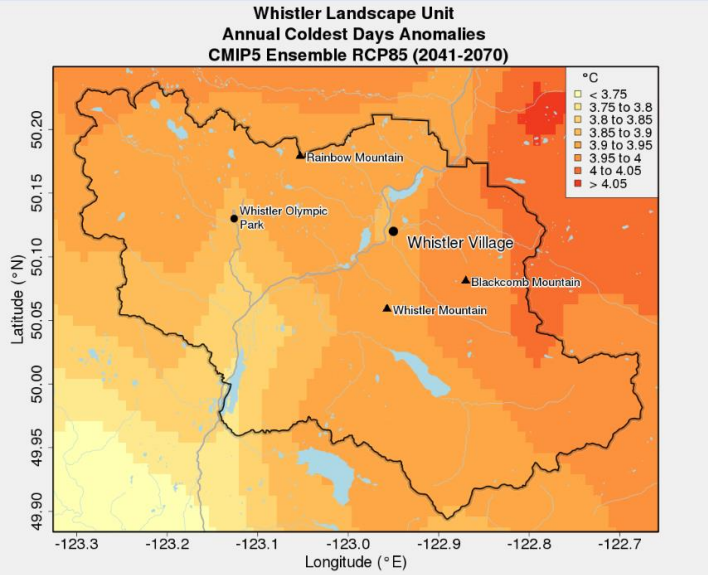
Past (1971 – 2000)



Projections (2041-2070)



Projected Change (°C)



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