Sharing the Air

State of the Sea-to-Sky / Howe Sound Airshed

2008

Annual Report

Executive Summary

An Air Quality Management Plan (AQMP) was developed for the Sea-to-Sky/Howe Sound airshed between 2002 and 2005 as a proactive measure to ensure clean air is maintained throughout the airshed, in particular due to the projected high levels of growth and development for the region. The AQMP identifies actions that help maintain healthy air through an integrated planning approach that addresses area, point and mobile sources in the airshed. This report, which is the first annual report for the AQMP, focuses on two aspects: the quality of the air in the airshed and the implementation process for the 2008 calendar year.

An implementation framework document was created in spring of 2008, which marked the start of implementation of the AQMP. This built on the process already established through the development of the AQMP and formation of the AQCC. Several actions are now underway through the implementation process to protect air quality.

The quality of the air throughout the airshed was generally good in 2008, shown by data collected and analysed for six air quality indicators. Although the air quality is generally good at present, it is important to continue implementation of the AQMP because:

- Continued increases in transportation and space heating due to growth and development would result in deteriorating air quality without action to keep the air clean;

- There are no safe levels of certain pollutants, and research suggests human health impacts are occurring in sensitive individuals at levels that are currently being measured in the airshed;

- Typical summer air quality conditions measured in the airshed do approach levels that would warrant the issuance of an air quality advisory; and

- The region is known for outdoor recreational opportunities, which are important to the local economy. When air quality is considered poor, air quality advisories are issued that recommend refraining from such activities. Poor air quality conditions may therefore have an impact on the local economy.

Highlights from the First Year of Implementation

Actions in progress: Four high priority actions were identified as areas for immediate action by members of the AQCC and are currently in the process of being implemented:

- Action #1: Integrate transportation in the airshed. This includes improving transit between communities, and integrating transit schedules with ferry schedules for communities that rely on ferry transportation.

- Action #4: Reduce vehicle idling through education and bylaws. Anti-idling bylaws and campaigns were initiated in most of the municipalities in the airshed by the end of 2008.

- Action #8: Develop airshed-wide smoke control strategy. A study has been initiated on alternatives to open burning of wood debris, including a lifecycle assessment and investigation into efficient technologies for producing energy from burning.

- Action #14: Share successes via the airshed website. The airshed website (www.seatoskyairquality.ca) was redeveloped to use Word Press, making it easy for any AQCC member (or municipal staff) to update content.

In addition to the four "actions in progress" listed above, several community initiatives were underway in 2008 that relate to other high priority actions in the plan.

AQCC Meetings: Three Air Quality Coordinating Committee (AQCC) meetings were held in 2008 for the Sea-to-Sky/Howe Sound airshed. The AQCC meetings created an excellent opportunity for participants to share their communities' air quality initiatives, priorities, and concerns with the rest of the members. This helped build awareness between communities of ongoing activities, identify points of collaboration and learn from other experiences.

Evaluation: An evaluation of the first year of implementation was conducted in February 2009 by means of telephone interviews with the funding members of the AQCC. The feedback and outcomes of the interviews focused on the administration of the AQMP and implementation of actions. Recommendations and initiatives that resulted from this evaluation include:

- Formulate a terms of reference (TOR) for the AQCC to formalize the current structure, roles and responsibilities. This was in response to a general feeling of uncertainty about the AQCC structure, its authority and its decision-making methods for the implementation phase. A sub-group has taken on this initiative and is currently formulating a TOR.

- Involve more community organizations and other agencies in the process, where appropriate, to implement actions. This can help alleviate already fully allocated municipal resources. Furthermore, this may be an effective way to implement initiatives that go beyond municipal boundaries to a more regional or airshed scale.

- Have a representative from the AQCC provide updates about the AQMP at every Howe Sound Community Forum. In order to keep political representatives apprised of the AQMP activities, the AQCC have agreed to provide regular updates at HSCF meetings.

- Increase communication among AQCC members through email and website updates to help transfer knowledge about best practices and technologies between municipalities.

- Have a central repository of air quality information and initiatives for the airshed.

Indicators for the Sea–to–Sky AQMP

Ten indicators have been identified to gauge whether air quality is improving or deteriorating in the airshed. Two of these indicators provide context by measuring population and tourism growth in communities throughout the airshed. The remaining eight indicators look at air quality conditions by analysing data from ambient air quality monitoring stations in the airshed and other sources. Data was not reported for two of the air quality indicators (AQ-2: Economic Impacts and AQ-4: Visibility).

In addition, three performance measures were developed to track the implementation of actions across the region. Data for one of the performance measures was not reported (PFM-4: Website Usage).

The following summarizes the baseline measures for each of the indicators. For a more detailed review of the indicators, please refer to the main report.

Context Indicators

Resident Population: CTX-1

Purpose: A significant proportion of air quality and greenhouse gas emissions in the Sea-to-Sky airshed can be attributed to transportation and space heating. Both of these are directly dependent on the size of the resident population.

Results: Resident population in the Sea-to-Sky airshed has increased almost 5 per cent over the last 3 years.

Visitor Population: CTX-2

Purpose: Tourism is a vital part of the economy in the airshed, and the level of tourism has a strong impact on energy demand in the airshed – both with respect to transportation and space heating for accommodations.

Results: The visitor population through the airshed was high in 2006, and then dropped by approximately five per cent in 2007 and 2008, compared to 2005 according to visitor centre visits.

Air Quality Indicators

Health Reference Levels (HRL): AQ-1

Purpose: The HRL is a measure of particulate matter (PM), which is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. PM contributes to poor air quality which can negatively affect human health.

Results: Based on a rolling 24-hour average from continuous monitoring, there were (a) 64 days on which the HRL for PM_{10} was exceeded and (b) 3 days on which the HRL for $PM_{2.5}$ was exceeded in the airshed in 2008.

Using a 24-hour or "daily" average, considering all particulate matter (PM) monitoring in the airshed, there were (a) 43 exceedances of the PM_{10} HRL, and (b) 5 exceedances of the $PM_{2.5}$ HRL.

Greenhouse Gases (GHGs): AQ-3

Purpose: The use of natural gas, gasoline, diesel and other fuels along with landfill gas emissions result in greenhouse gases being emitted to the atmosphere. Monitoring GHG emissions provides a measure of regional energy efficiency and contributions to global climate change.

Results: In 2007, on-road transportation emissions were the largest contributors to greenhouse gas (GHG) emissions in the airshed. The transportation sector accounts for 53% of the emissions, emissions from energy use in buildings account for 30% of the total and emissions from solid waste decomposition account for 17%.

Odour: AQ-5

Purpose: Clean, fresh-smelling air is a vital component of the fresh-air experience boasted by the Sea-to-Sky/Howe Sound airshed for both its residents and guests.

Results: Howe Sound Pulp and Paper reported receiving 8 odour complaints in 2008. The Ministry of Environment recorded 2 odour complaints in 2008 for this airshed.

There were 3 exceedances of the Odour Index in 2008.

Canada-wide Standards (CWS): AQ-6

Purpose: Air pollution has been shown to have detrimental effects on human health – particularly to at risk persons such as those with respiratory and cardiovascular ailments, children and the elderly. The CWS standard has set thresholds for particulate matter and ground-level ozone because they are the pollutants of most concern.

Results: $PM_{2.5}$ – No exceedances. The 3-year average for 2008 at the Whistler ambient air monitoring station was 9.9 $\mu g/m^3$.

Ground-level ozone – No exceedances. The 3-year averages for 2008 were 50 ppb at the Squamish ambient air monitoring station and 56 ppb at the Whistler ambient air monitoring station.

Air Quality Index (AQI): AQ-7

Purpose: The main purpose of the AQI is to inform the public, on a daily basis, about the present state of air quality.

Results: Across the airshed, there were no occasions on which the AQI exceeded 50 in 2008. No air quality advisories were issued in 2008 for the airshed.

Continuous Improvement: AQ-8

Purpose: Most measures used to describe air quality describe whether pollutant levels are high over short periods of time. However, it is also important to track long term trends of air quality in the region since long term exposure may also affect health.

Results: The differences in air contaminant concentrations are relatively small and therefore no clear trend was apparent between the baseline year and 2008. The largest reductions occurred at Squamish where ground-level ozone decreased away from the CWS between 2005 and 2008, and at Langdale where NO_2 levels showed a decrease between 2004 and 2008.

The largest increases in emissions were found at Whistler where NO_2 levels in 2008 were elevated compared to the 2007 averages.

Performance Measures

Action Plan Implementation Progress: PFM-1 and PFM-2

Purpose: Tracking the completed actions provides an indication of progress in implementing the AQMP. This measure will help the AQCC determine whether the approach to implementation and structure of the organization is effective in carrying out the identified actions.

Results: Implementation of the AQMP started in 2008 and several actions were initiated. It is too early in the implementation process to have completed any actions. Fourteen high priority actions were identified and targeted to begin in the first year of implementation. Four of these are considered "actions in progress". There are also a number of ongoing community initiatives that

relate to other actions in the plan; however, these do not have a clear champion on the AQCC. All of the high priority actions have some related community initiatives taking place.

AQCC Involvement: PFM–3

Purpose: This measure provides an indication of the level of involvement of identified stakeholders in the process.

Results: The AQCC had excellent participation rates for the meetings held in 2008. 75% of funding members were represented at all three meetings held throughout the year, and 100% of funding members participated in at least one of the three meetings.

In 2008, 64% of other (non-funding) members that are included in all meeting invitations participated in at least one of the three meetings held throughout the year.

Next Steps

- Currently, Terms of Reference (ToR) for the AQCC are being developed by committee volunteers to clarify the roles, responsibilities and activities of the AQCC and committee members. The ToR will help to ensure that the implementation of the AQMP continues.

- The AQCC expects to meet twice in the 2009-2010 budget cycle, a reduction from the previous three meetings per year.

- An annual report will continue to be produced to track changes in the identified context and air quality indicators, and implementation performance measures.

- The first five-year report is scheduled for 2013. The five-year report will provide the AQCC with an opportunity to revise actions or add new ones in order to achieve the vision and goals of the AQMP by 2025.

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1 Introduction

1.1. Background

The Sea-to-Sky/Howe Sound airshed encompasses the region from Bowen Island to just north of Pemberton. It includes the following communities along the eastern and western shores of Howe Sound: parts of West Vancouver, Bowen Island, Gibsons, Langdale, Lions Bay, Squamish, Whistler and Pemberton. The Squamish-Lillooet Regional District (SLRD), the Sunshine Coast Regional District (SCRD) and Metro Vancouver all have residents in the airshed. See Figure 1 for a map that outlines the airshed boundaries. The airshed boundaries are defined by a combination of topography, meteorology and climate considerations that contain a shared air mass. All activities that emit pollutants anywhere in the airshed mix into to the air being breathed by everyone that lives in or visits the region.

The B.C. Ministry of Environment (MoE) monitors ambient air quality, provides data and technical expertise, and carries out regulatory activity throughout the province. In the late 1990s and early 2000s, MoE identified that certain pollutants in the airshed (e.g. particulate matter and ground-level ozone) were approaching levels of concern to human health[1] and the impacts were expected to grow as population and tourism increase. A significant portion of these emissions were from mobile sources (e.g. transportation) and area sources (e.g. space heating and wood burning)[2] which are beyond the traditional regulatory role of MoE.

The Sea-to-Sky Air Quality Management Plan (AQMP) was developed between 2002 and 2005 using a community-based approach to form a comprehensive plan to protect air quality by addressing these area and mobile sources as well as point sources in the airshed. Through the AQMP, with the involvement of all stakeholders in the airshed, emissions could be addressed through actions that could be carried out by municipalities, non-governmental organizations, industry, members of the public and other relevant agencies and organizations.

1.2. How was the AQMP developed?

The Sea-to-Sky AQMP was created in a series of four phases.

Phase 1 involved the evaluation of the opportunities to build an AQMP by supporting existing community-based initiatives. Specifically, this phase identified stakeholders, evaluated potential benefits of existing programs, and led to the development of a community-based process for creating the AQMP. The report titled "Sharing the Air: A Community-based Approach to Airshed Management in the Sea-to-Sky Corridor"[3] details the results of this phase.

Phase 2 continued the stakeholder engagement process and established the Air Quality Coordinating Committee, the group responsible for developing and implementing the AQMP.

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[1] Ambient Air Quality Monitoring Report for Whistler, B.C.; B.C. Ministry of Water, Land and Air Protection (now MoE) November 2002.
[2] 1995 Sea–to–Sky Airshed Emissions Inventory of Common Air Contaminats, B.C. Ministry of Water, Land and Air Protection (now MoE).
[3] Report prepared by The Sheltair Group for the B.C. Ministry of Water, Land and Air Protection (now MoE), March 2004.
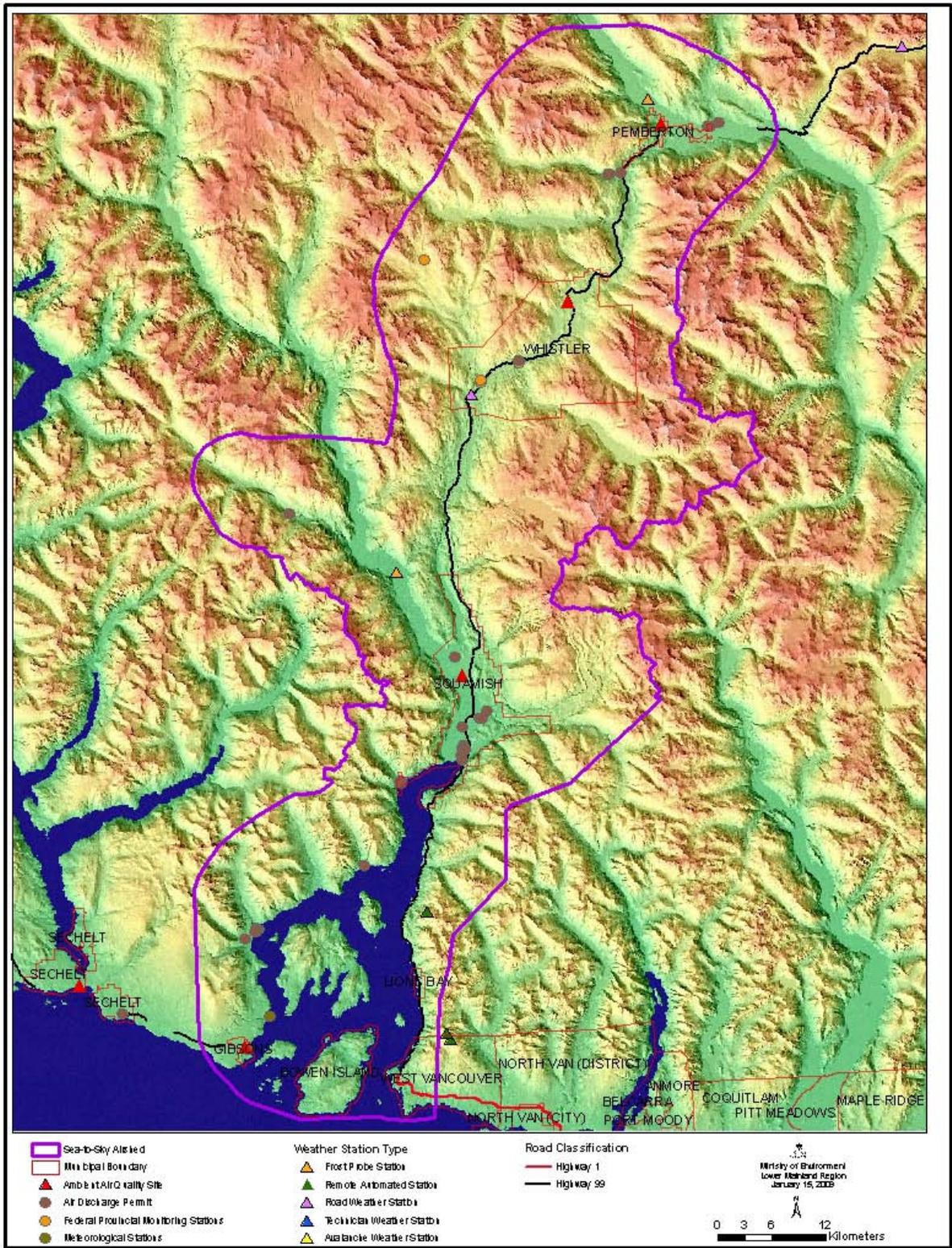
Figure 1: The Sea-to-Sky/Howe Sound Airshed

During **Phase 3**, the AQCC collectively built the AQMP through a series of meetings. The planning framework developed in Phase 1 was provided to the group to help them organize their work. The AQMP underwent public consultation, in the winter of 2006-2007 and the revised plan was presented to councils and boards in April and May 2007.

Phase 4 involves the development of an AQMP implementation strategy and ongoing monitoring and reporting. The AQCC monitors progress toward the goals outlined in this plan through annual and five-year reports. MoE will continue to support to the AQMP by providing technical expertise in air quality monitoring and reporting, communication and outreach about pollution sources and management strategies, and regulatory activities.

1.3.   Report Objectives

Annual and five-year reporting is important to keep both the AQMP and the actions relevant to the current situation in the airshed. The annual report focuses on the status of the actions and the air quality in the airshed. Reporting is based on the calendar year. This allows nationally accepted air quality calculations to be used in reporting but it should be noted that the budget and meeting schedule are currently organised on an April to March financial year basis.

The five year update report provides an opportunity to re-evaluate the AQMP and its actions, updating or adding actions where necessary. The annual reports will help to inform the five-year update report by identifying which actions have been completed and reporting on the progress towards the vision and goals (see Figure 2).
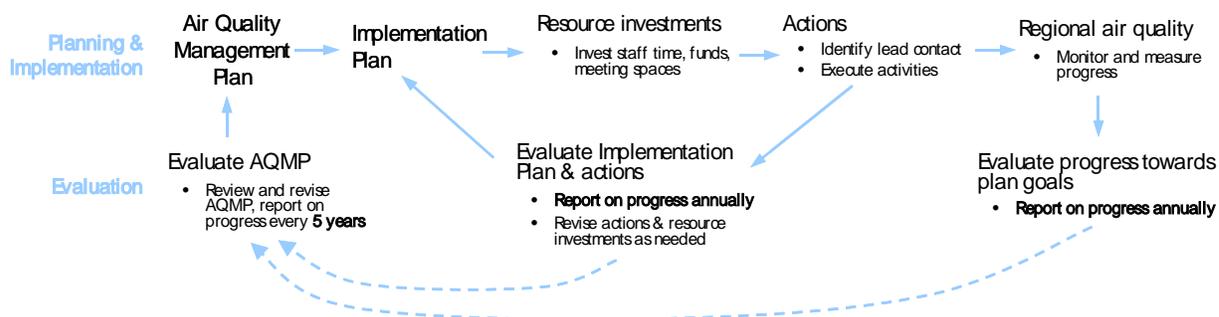

Figure 2: Reporting and Evaluation

The development and approval of the AQMP has proceeded as outlined in the timeline in Figure 3. The current phase (2008-2009) involves the implementation of early and high priority actions and monitoring and reporting on progress made to date. Mid and longer term actions are expected to begin in 2009 and beyond.
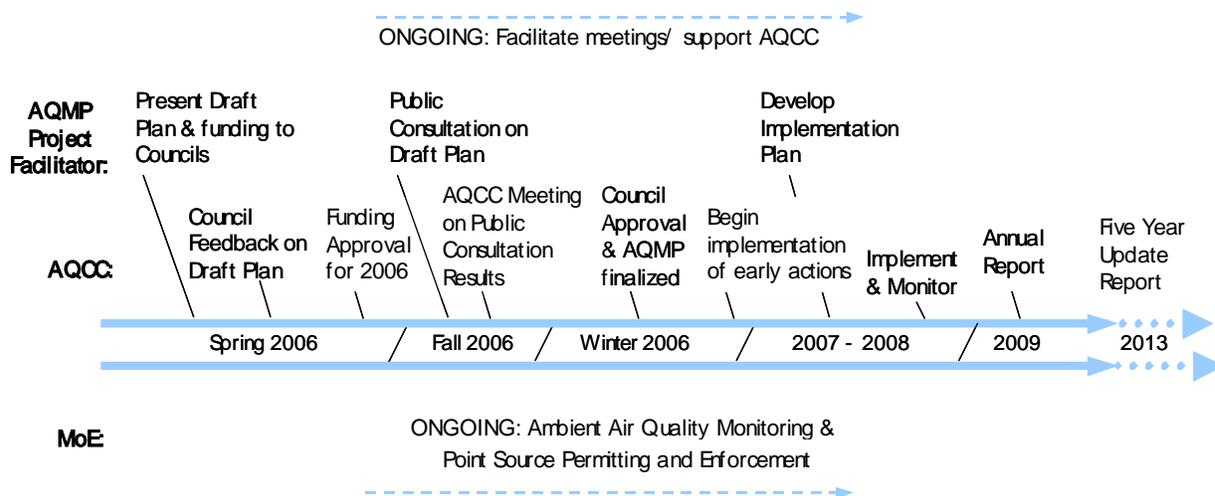
Figure 3: AQMP Implementation Timeline

This document represents the First Annual AQMP Progress Report and was prepared by The Sheltair Group. It is expected that the AQCC will take on this responsibility in future years.

1.4.   About the AQCC

The Air Quality Coordinating Committee (AQCC) was established to guide the development of the AQMP for the Sea-to-Sky/Howe Sound airshed. Since the publication of the AQMP, the AQCC has continued to meet throughout development of an implementation plan and now the implementation of this plan. The AQCC is an integrated committee of representatives from local and regional government, First Nations, utilities, transit providers and the B.C. Ministry of Environment and other agencies. There are currently eight funding members of the AQCC: Town of Gibsons, Bowen Island Municipality, Village of Lions Bay, District of Squamish, Resort Municipality of Whistler, Village of Pemberton, Squamish-Lillooet Regional District, and MoE. The Sheltair Group (now Stantec) has facilitated the process to date.

1.5.   Provincial Role

MoE is responsible for monitoring and reporting on ambient air quality and regulatory activities associated with point sources, some area sources and some motor vehicle related emissions under the Environmental Management Act. Recognizing that air quality is an issue with many contributing factors, MoE proposed the development of airshed based planning to address non-permitted emission sources, including transportation (mobile sources) and area sources (electricity use, space heating, agriculture, etc.) at the local level.

The development and implementation of the Sea-to-Sky AQMP has enabled the provincial government to work with local and regional level governments, First Nations and other stakeholders to address air quality issues. A regional approach is important since air quality should be managed across the entire airshed to be most effective.

2 AQMP Vision & Goals

The AQMP vision and goals were developed by the AQCC and are provided here for reference purposes. The AQCC is collectively responsible for ensuring that progress is made on actions outlined in the plan. The full version of the AQMP can be found at http://seatoskyairquality.ca/reading-room/r-quality-planning-reading-room/. The plan provides a framework and initial direction for achieving the identified vision and goals. Specific actions may change over time to align with other processes and initiatives occurring in the region, as long as the activities align with the vision and goals developed in the AQMP process. These initiatives may include SmartGrowth activities, municipal and regional district energy planning, the Howe Sound Community Forum, and others as they are identified.

2.1. Vision

The AQCC envisions that in 2025:

> *Communities in the Sea-to-Sky/Howe Sound airshed will enjoy clean air that sustains and contributes to the health of our residents and guests, our economy, and our environment and wildlife.*

In 2025, residents and guests throughout the Sea-to-Sky/Howe Sound airshed will enjoy clean mountain air, crisp scents of ocean and forest, crystal clear views and vistas, and abundant, diverse wildlife. Clean air will contribute to our residents' and guests' enjoyment of the natural surroundings and help them to maintain a healthy lifestyle. Due to the cleaner air, everyone will benefit from improved quality of life and visitors will come here to breathe our fresh air and enjoy our panoramic views.

Despite continued growth in the airshed, air quality will improve beyond 2005 through the use of good planning principles such as Smart Growth, new technologies, and clean energy sources. We will continue to consider air quality and its contributions towards our goals in all planning processes, such as climate change initiatives. All residents and businesses will recognize that the quality of air is connected to all aspects of communities' activities.

Exceptional air quality and visibility in the airshed will continue to generate many economic opportunities for local businesses and will, in part, build on our multi-season outdoor tourism opportunities. We will develop new technologies and industries that contribute to healthy air as well as to our diverse and sustainable economy.

We will continue to identify and develop innovative best practices for air quality management. We will share results of actions we have already implemented and those that will be implemented through the AQMP, nationally and internationally. In 2010, at the sustainable Winter Olympics, and beyond we will be internationally recognized for our clean air, crystal clear views, our leading edge initiatives, and progressive management of air quality.

2.2. Goals

We will strive towards our vision by meeting these goals by 2025:

To address **Human Health**, we have improved regional air quality so there are substantially fewer incidences of respiratory related medical visits and health care costs.

To address **Ecosystem Health**, we have continued to maximize green space and vegetation in community planning and land development to help maintain healthy air.

To address **Economic Health**, we have a strong and sustainable local economy having a positive impact on air quality.

To address **Climate Change**, we have managed the airshed's air emission contributions to climate change and its effects.

To address **Visibility**, we have maintained, protected and are improving aesthetic viewscapes and vistas through management of the emissions contributing to poor visibility events.

To address **Odour**, we have controlled the emission of odour causing substances that negatively impact on human, economic and ecosystem health.

To demonstrate **Leadership**, we have showcased our AQMP, partnerships and resulting successes regionally, nationally and internationally, and have maintained the perception of clean, healthy air for which we are recognized.

3 Highlights from the First Year of Implementation

The AQMP was adopted in principle by the funding members of the AQCC by the fall of 2007. At the same time, an implementation framework was developed to determine priorities and timelines for implementing the 18 actions identified in the AQMP. The implementation of the AQMP began in spring 2008 when this framework was finalized.

3.1. AQCC Meetings

Three AQCC meetings were held in 2008. The AQCC meetings created an opportunity for participants to share information about their communities' air quality initiatives, priorities, and concerns with the rest of the members. This helped build an awareness of ongoing activities, identify points of collaboration and learn from other experiences. A summary of outcomes from these three meetings is provided:

Budget

- Adoption of the budget for 2008 occurred at the February 2008 meeting. The total budget for the year was agreed to be $42,210, including a $20,000 contribution from MoE. The 2008 budget included:
  - o Facilitation and food costs for three meetings
  - o Consulting fees for liaison between AQCC members
  - o Website maintenance
  - o Development of support materials for air quality initiatives and meetings
  - o Performance monitoring and an annual report on AQMP progress in 2008
  - o NOTE: MoE also provided an estimated in-kind contribution of $25,000
- Adoption of the budget for 2009 occurred at the December 2008 meeting. The total budget for the upcoming year was agreed to be $27,835, including an expected contribution from MoE of $20,000. The 2009 budget includes:
  - o Facilitation and food costs for two meetings
  - o Consulting fees for liaison between AQCC members
  - o Development of support materials for air quality initiatives and meetings
  - o Performance monitoring and an annual report on AQMP progress in 2009
  - o NOTE: MoE will also provide an estimated in-kind contribution of $25,000
- Additional funding from MoE of up to $50,000 for one year (up to March 2009) was announced at the June meeting. This funding was part of the provincial government's Air Action Plan and was directed toward implementation of actions in the AQMP.

Committee Structure

There were several discussions at AQCC meetings about the structure of the AQCC as the AQMP transitioned from the planning phase into implementation. One alternative put forward was to transform the AQCC into a non-profit organization to oversee the implementation of the AQMP. Options were considered by each funding member council and the majority decided to maintain a government roundtable structure for the time being. It is expected that this issue will need to be revisited in the future.

3.2. Actions in Progress

Four high priority actions were identified as areas for immediate action by members of the AQCC:

Action #1: Integration of transportation in the airshed is a top priority. This includes improving transit between communities, and integrating transit schedules with ferry schedules for communities that rely on ferry transportation. Initial steps were taken to form a Transportation Working Group, though the group has not yet been formalized.

Air Quality Benefit: Improvements in transit connections are expected to reduce vehicle emissions, which are the largest source of air emissions in this airshed.

Action #4: Anti-idling bylaws and campaigns were a key area of action in most of the municipalities in the airshed in 2008. Activities included:

o District of Squamish, Resort Municipality of Whistler, and MoE jointly coordinated the hiring of an Idle-Free Ambassador for the airshed. This ambassador attended events at communities throughout the airshed in the summer of 2008 to spread the Idle-Free message.

o Coordination with MoE to supply Idle-Free signage to several communities in the airshed. B.C. Ministry of Transportation also posted signs on Highway 99 between Lions Bay and Whistler.

o Ongoing education and enforcement of anti-idling bylaws.

o Fleet training organised by Resort Municipality of Whistler

Air Quality Benefit: Idling campaigns lead to reduced vehicle emissions, which are the largest source of air emissions in this airshed.

Action #8: Part of the additional implementation funding provided by MoE for 2008 will fund a study on alternatives to open burning of wood debris, including a lifecycle assessment and investigation into efficient technologies for producing energy from burning. Peter Frinton from Bowen Island is leading this initiative.

Air Quality Benefit: Finding alternatives to open burning will lead to reduced fine particulate matter emissions, a pollutant of particular concern to at risk individuals.

Action #14: The airshed website (www.seatoskyairquality.ca) was redeveloped to use Word Press, making it easy for any AQCC member (or municipal staff) to update content. Julie Saxton at MoE led this initiative.

Air Quality Benefit: Education and awareness are an important component of successfully implementing a plan, particularly where changes in behaviour are key to the plan's success.

3.3. Community Initiatives Related to Other High Priority Actions

In addition to the four "actions in progress" listed above, there were several community initiatives underway in 2008 that relate to other high priority actions in the plan. In order to facilitate sharing of information between communities in the airshed, a list of these initiatives was developed. The list is provided in Appendix A and will be posted on the AQMP website (www.seatoskyairquality.ca).   It is intended to be a "living document" that communities can use to identify partners that are undertaking similar initiatives and/or to learn from others who have already undertaken certain initiatives.

3.4. Evaluation of the First Year

An evaluation of the first year of implementation was conducted in February of 2009 through telephone interviews with the funding members of the AQCC. Feedback from the interviews was discussed at the February 2009 AQCC meeting. The evaluation questions were designed to:

- Identify potential enablers and barriers to implementing the AQMP, and
- Develop recommendations to decrease barriers to future implementation of actions in the AQMP.

The feedback from the interviews can be grouped into two categories: administration of the AQMP and implementation of actions.

Administration of the AQMP

Enablers identified:

1. Regular AQCC meetings are instrumental in maintaining momentum on air quality issues in the airshed. They provide excellent sharing and learning opportunities between local governments.
2. Process and meetings allow for some "piggy-backing" between municipalities with certain activities. There is an interest in more of this, possibly with enhanced use of the website.

Barriers identified:

1. Uncertainty about the AQCC structure, its authority and its decision-making methods. Regardless of the longer-term structure chosen for the AQCC, there is an immediate need to clarify the structure, roles and responsibilities.
2. Process does not adequately accommodate municipal budget cycle planning; therefore, actions do not get incorporated into following year's budget.
3. Members of AQCC include either staff or council, but usually not both, from each local government. These can lead to a disconnection between the political level and the process.

Outcomes from AQCC discussion and feedback:

1. At the February meeting members agreed to formulate a terms of reference (TOR) for the AQCC to formalize the current structure, roles and responsibilities.
2. The TOR should address timing of municipal budget planning to ensure air quality actions have opportunity for inclusion in municipal activities.
3. The TOR may also wish to address roles of staff and council members on the AQCC.

4. The AQCC should update politicians at each <u>Howe Sound Community Forum</u> on current air quality activities in the airshed. Council members that regularly sit on the AQCC should provide these updates.

5. Each AQCC member will take more responsibility for keeping politicians in his/her local government up to date on air quality initiatives and priorities.

6. AQCC email contact list and communications should always include both staff and council.

Implementation of Actions

Enablers identified:

Several initiatives have been undertaken that address actions in the plan (see Section 3.2 for details). There were two key drivers identified that enable implementation of these initiatives:

1. Continued council and board commitment to the AQMP process.

2. Access to external funding (e.g. additional funding from MoE for 2008 implementation).

Barriers identified:

1. Implementing initiatives that go beyond municipal boundaries (to a more regional or airshed scale) can be challenging and time consuming.

2. Municipal staff is already at maximum capacity and cannot undertake additional activities.

3. Air quality is not necessarily the highest priority at this time, though it aligns with other high priority activities such as energy and transportation planning.

4. There may be a lack of expertise for some of the actions.

5. Some actions fall outside the municipal mandate or jurisdiction, especially the regional actions. It is therefore unclear what kind of role municipalities can play in implementing these actions.

Outcomes from AQCC discussion and feedback:

1. Because municipal staff is at maximum capacity, there is a desire to <u>involve more community organizations</u> and other agencies in the process, where appropriate, to implement actions. There has been interest expressed by some non-profit organizations in becoming more involved (in particular, the Squamish River Watershed Society and the Squamish Environmental Conservation Society).

2. To maintain momentum and keep the issue on the political agenda, a representative from the AQCC should provide updates about the AQMP at every <u>Howe Sound Community Forum</u>.

3. There is a desire to <u>increase communication among AQCC members</u> through email and website updates to help transfer knowledge about best practices and technologies between municipalities. Sharing information may reduce the research time required at each municipality and alleviate some staff time requirements.

4. Ideally there would be a <u>central repository of air quality information and initiatives</u> for the airshed. Currently this should be fulfilled through the website (<u>www.seatoskyairquality.ca</u>), the Sheltair Group, and for technical expertise, MoE. In future this role may be filled by a dedicated air quality coordinator position for the airshed.

3.5.   Air Quality Newsletters

Interested members of the public can sign up to receive newsletters through the AQMP website. In 2008, MoE provided funding for a series of air quality newsletters that were sent via email to the newsletter mailing list. These newsletters were themed on vehicle idling, air quality and climate change information and wood burning:

- Idle-Free in the Sea-to-Sky Airshed

- Air Quality and Climate Change – What's the Difference?

- Wood Burning Awareness – Indoors and Outdoors (spring 2009)

4   Indicators and Targets

4.1.   The Importance of Using Indicators to Monitor Progress

An indicator is a measure that reveals a condition, a trend, or an emerging issue. Its purpose is to reveal the direction the community is moving in. More specifically, indicators can show if the community is moving towards meeting the air quality goal or away from it. Indicators are tools that help track changes over time and are a yardstick for measuring future change relative to a baseline.

Indicators also provide an opportunity to identify and address policy gaps, shortfalls in implementation, or trends that may affect air quality. The presentation of indicators and trends helps decision makers, businesses, and residents see where changes are needed and desired.

Monitoring is a critical activity as it shows changes over time and identifies things that are working (what we should celebrate and protect) and areas where we are not making progress (where we need to direct more resources). Indicators provide feedback on how the community is doing through ongoing monitoring and feedback. Feedback in itself does not facilitate change as it merely indicates past performance. Learning from the feedback is required to allow the community to "correct its course" by modifying and adjusting its actions as it goes forward.

Three types of indicators have been developed for this airshed: context, air quality and performance measures. Context and air quality indicators are used to evaluate the progress towards or away from the air quality goals whereas the performance measures allow us to evaluate progress on plan implementation. These are described in more detail below.

> "What gets measured tends to get done. If you don't measure results, you can't tell success from failure. If you can't recognize success, you can't reward it. If you can't recognize failure, you can't learn from it."
>
> David Osborne and Ted Graebler (Reinventing Government, 1992) suggesting why indicators are important for making progress.

- Context indicators are important indicators that provide context for the other indicators, but in themselves are outside the sphere of influence of local government or other organizations.

- Air quality indicators directly measure the state of air quality in the airshed and are important for tracking trends and monitoring progress.

- Performance measures track the actions that are being implemented across the region. Performance monitoring is different from the indicators and targets outlined in the AQMP.

Limitations of Indicators

There are limitations to the use of indicators. A community or region comprises many subsystems with complex relationships and interdependencies. Indicators can only show one thing within an individual system and therefore are simplified. They do not explain the workings of a system, causality or the reasons for a particular condition or trend. Many of the indicators are too crude to capture any type of site-specific condition or qualitative condition. They also rely on "after-the-fact" information. As such, they are useful for basic information provision, but should be supplemented by observation, studies, survey research, and more detailed assessment and analysis.

4.2.   Indicators for the Sea-to-Sky AQMP

Overview

To gauge the direction of air quality in the Sea-to-Sky/Howe Sound airshed, ten indicators were identified to be tracked on an ongoing basis.

Two indicators provide context, by measuring population and tourism growth in communities throughout the airshed. The remaining eight indicators look at air quality conditions, by analysing data from ambient air quality monitoring stations in the airshed and other sources.

Each indicator is discussed by answering the following questions:

- What is being measured?
- Why is this indicator important?
- What is happening?

Baseline Year

The baseline year for monitoring air quality in the Sea-to-Sky airshed is 2008; however, data for greenhouse gases (AQ-3) was only available for 2007[4] and data for continuous improvement (AQ-8) is reported for 2005 and 2008. The baseline year for the performance measures is 2008, the first year of implementation.

Context Indicators

This section presents the two context indicators outlined in Table 1.

Table 1: Context Indicators (CTX)

	Context Indicators	Units	Rationale	Targets
1	**Resident Population:** (a) Total population of airshed by community (b) % total population growth change	# of people, % change	Measure of population growth	Not applicable
2	**Visitor Population:** (a) Total visitor population of airshed by community (b) % visitor population growth	# of people, % change	Measure of tourism growth	Not applicable

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[4] MoE, as part of the Community Energy and Emissions Inventory (CEEI) initiative, has recently begun preparing an inventory of community energy consumption and greenhouse gas (GHG) emissions for each community in BC. This initiative will provide each community in the province with standardized greenhouse gas inventories. The CEEI initiative does not include certain contributors to greenhouse gases, such as agricultural activities and, in many cases, industrial activities.

CTX-1: Resident-Population

What is being measured?

There are two components to this context indicator:

a) The number of people residing in each community, according to B.C. Stats population estimates. These estimates are derived from Statistics Canada Census data and are updated annually.

b) The percentage change in population in the entire airshed over time.

Why is this indicator important?

A significant proportion of air quality and greenhouse gas emissions in the Sea-to-Sky airshed can be attributed to transportation and space heating. Both of these are directly dependent on the size of the resident population. As the population continues to grow, there will be increased demand for energy and transportation.

What is happening?

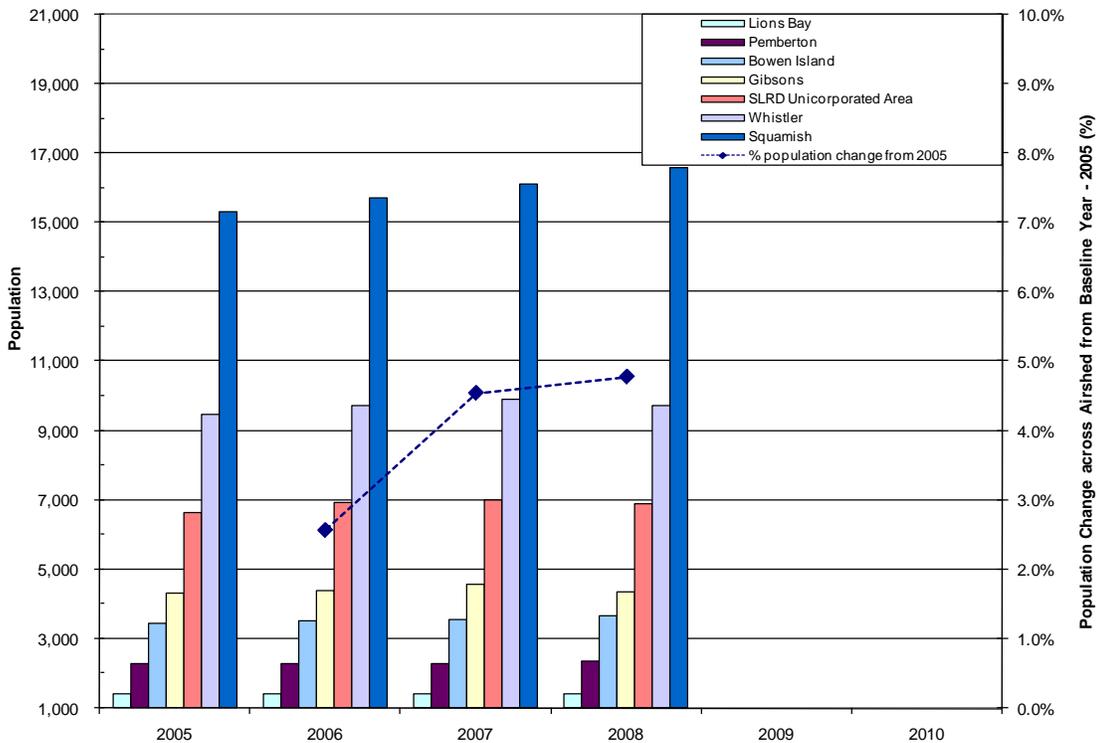The population of the airshed has increased almost 5 per cent over the last 3 years, as shown in Figure 4.

Figure 4: Population by Community and Total Population Change in the Airshed (2005 to 2008)

CTX-2: Visitor Population

What is being measured?

There are two components to this context indicator:

a) The total visitor population by community is reported using visitor counts from Tourism BC visitor centres. These visitor counts are tracked and reported annually. There are visitor centres located in Bowen Island, Gibsons, Pemberton, Squamish and Whistler.

b) The percent change in visitor population over time is also reported. Although visitor centre data does not provide a full estimate for the number of visitors in the airshed, looking at the change in numbers of visitors over time may provide insight into the changing pressure due to tourism. These counts can provide a very general guideline only, as there are several factors that may influence the counts beyond the number of tourists visiting the area.[5]

Why is this indicator important?

Tourism is a vital part of the economy in the airshed, and the level of tourism has a strong impact on energy demand in the airshed – both with respect to transportation and space heating for accommodations. Tracking visitor population in addition to resident population will provide a more complete picture of the demand for energy in the airshed, and the potential additional pressure placed on the region's air quality.

What is happening?

The visitor population through the airshed was high in 2006, then dropped by approximately five per cent in 2007 and 2008, compared to 2005 (see Figure 4). This suggests that tourist visits are currently decreasing, thus having a slightly lower impact on the region's air quality. However, other explanations, such as increasing use of web based resources, and access changes due to highway construction, may also account for change in visitor centre numbers without an actual reduction in visitor numbers. The large increase in Pemberton numbers is influenced by the Pemberton Festival in 2008.

Visitor numbers are expected to increase in 2009 in the lead up to the 2010 Olympic Games. Though other factors, such as the state of the global tourism industry may have a downward influence on visitor numbers.

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[5] BC Stats regional data was also examined for this indicator. The hotel room revenue recorded in 2006 and 2007 showed slight increases from 2005, as opposed to slight decreases shown in visitor centre counts.
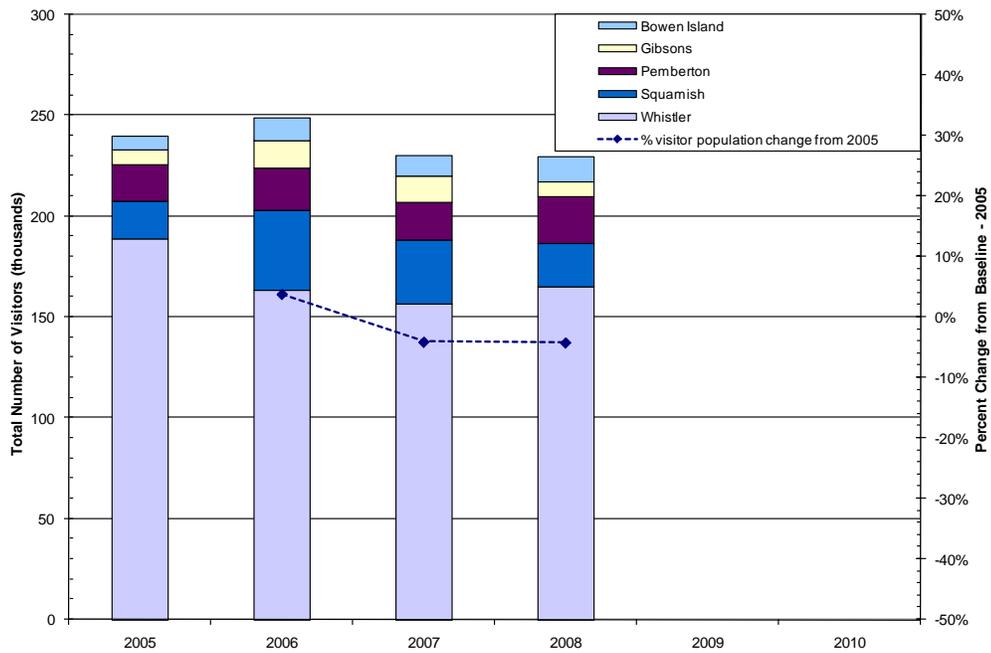
Figure 5: Number of Visitors (thousands) and Percent Change from 2005

Air Quality Indicators and Targets

This section presents the eight air quality indicators outlined in Table 2. At this time, there is no method available for measuring economic impacts of air quality in this airshed (AQ-2). Ideally this indicator will be measured in the future to provide a summary of the impact of air quality on the economic health of the region.

Table 2: Air Quality Indicators (AQ)

	Air Quality Indicators	Units	Rationale	Targets
1	**Health Reference Levels (HRL)** Number of 24-hour periods per year in which the Health Reference Level[6] for: (a) PM_{10} is greater than 25 µg/m^3 (b) $PM_{2.5}$ is greater than 15 µg/m^3	# of 24-hour periods	Indication of health risk	Annual reduction in the number of 24-hour periods exceeding the HRL
2	**Economic Impacts** (an ideal indicator to be measured in the future)[7] Economic cost of air quality impacts (health & business) per capita	Cost ($); $/capita	Influence of air quality on economic health of the region	Reduction in costs
3	**Greenhouse Gases** (a) Total GHG emissions by sector/source, and (b) Per capita GHG emissions, by municipality	Tonnes, and tonnes per person	Indicator of regional energy efficiency and contribution to global climate change	Decreasing trend from baseline year (2007)
4	**Visibility**[8] Number of poor or compromised visibility events per year	# of poor visibility days	Visual measure of compromised air quality which can effect tourism, recreational activities (site-seeing) and public perception	Zero poor visibility events in a year
5	**Odour** (a) Number of odour complaints per year by municipality, and (b) Number of hours per year where Odour Index is above 25	#	B.C. Odour Index is an indicator of sulphurous odours (mainly a result of pulp mill operations). Odour complaints may give an indication of municipal type odours (wastewater treatment, composting operations, municipal solid waste treatment).	(a) Zero odour complaints per year (b) Zero exceedances of B.C. Odour Index level of 25

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[6] The HRL is the level of pollutant at which there is a demonstrated statistical effect on health.
[7] The calculation of this indicator is challenging, as it requires labour intensive full cost accounting methods.
[8] Method to assess visibility as related to air quality is still under development.

	Air Quality Indicators	Units	Rationale	Targets
6	**Canada-wide Standards (CWS)** Number of occurrences of: (a) $PM_{2.5}$ exceeding the CWS exposure limit (30 µg/m^3), or (b) Ground-level ozone (O_3) exceeding the CWS exposure limit (65 parts per billion)	3-year average in µg/m^3 or ppb	All communities in Canada must aim to meet CWS by 2010, and those already below CWS levels must demonstrate commitment to continuous improvement and keeping clean areas clean. This indicator allows for national comparison of $PM_{2.5}$ and ground-level ozone levels.	Zero exceedances of standard
7	**Air Quality Index (AQI)**[9] Number of hours per year in a community when the AQI is greater than 50.	hours	An AQI of 50 is equivalent to the National "maximum acceptable" level for all CACs. An air quality advisory is issued whenever the AQI>50. AQI is useful in analysing short-term air quality episodes.	Zero hours per year
8	**Continuous Improvement**[10] Trends for 3-year annual average of (a) 8-hour maximum daily level for O_3 (b) Annual 24-hour average level for PM_{10} (c) Annual 24-hour average level for $PM_{2.5}$ (d) 8-hour maximum daily level for NO_2	3-year average in µg/m^3	Long term average which has a smoothing effect on short-term air quality episodes. Useful in determining the long term trends of air quality in the region.	Decreasing trend from baseline year (2005)

[9] The AQI is a dimensionless index in which air contaminant concentrations are used to define the level of air quality. The AQI scale range is: Good: 0–25; Fair: 26–50; Poor: 51–100; and Very Poor: >100. The Air Quality Health Index (AQHI) may replace the AQI. The AQHI is a new index that correlates ambient air quality with health effects. The AQHI is based on a combination of factors. The older AQI from any given station is based on the value of the single highest air contaminant at that particular station. The AQHI has been implemented at one station in the airshed (Whistler) but the AQI also remains in place at Whistler, Squamish and Langdale.

[10] This measurement is currently recommended in the CWS draft guidelines for Keeping Clean Areas Clean/Continuous Improvement. SO_2 is not included in the continuous improvement metrics since current levels of this pollutant in the Sea–to–Sky Airshed have decreased and are now extremely low. Levels are expected to continue to decrease and it is unlikely that in the future there will be any significant new sources of SO_2 in the airshed. CWS is not an exposure limit; it is a standard. There are still health effects below the CWS levels.

Target

Annual reduction in the number of 24-hour periods exceeding the HRL.

Trend

This is the first year data is being reported. Future reports will be able to indicate the trend over time.

What is being measured?

Particulate matter with an aerodynamic diameter of 2.5 micrometres or smaller (called $PM_{2.5}$) and particulate matter with an aerodynamic diameter of 10 micrometres or smaller (called PM_{10}) are measured at various monitoring stations in the Sea-to-Sky/Howe Sound airshed.

This indicator measures exceedance of the Health References Levels (HRL) for $PM_{2.5}$ and PM_{10} as recommended in the National Ambient Air Quality Objectives for Particulate Matter published in 1998.

The HRLs that trigger an exceedance are:

a) PM_{10} concentration greater than 25 µg/ m^3

b) $PM_{2.5}$ concentration greater than 15 µg/ m^3

Air quality monitoring stations in the Sea-to-Sky sky airshed use two different methods to monitor HRLs: 1) using a rolling 24 hour average, and 2) using a midnight to midnight 24 hour or "daily" average. Although "rolling" averages are capable of capturing additional exceedances that are not captured in "daily" averages, certain locations only have <u>non-continuous</u> samplers, and therefore are only included in the "daily" totals. Therefore, both methods are reported in an effort to represent HRLs across the airshed.

Why is this indicator important?

Particulate matter (PM) is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. It contributes to poor air quality which can negatively affect human health. The Canada-wide Standard is often used to assess air quality (see AQ-6).

Current research shows that there is no safe level (threshold level below which there are no effects) for particulate matter.[11] Despite this, reference levels are established for measurement and comparison purposes.

What is happening?

Based a rolling 24-hour average from continuous monitoring, there were (a) 64 days on which the HRL for PM_{10} was exceeded and (b) three days on which the HRL for $PM_{2.5}$ was exceeded in the airshed in 2008, as shown in Figure 6.

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[11] Environment Canada, Clean Air Online, Pacific and Yukon Region. www.ec.gc.ca/cleanair-airpur/Clean_Air_Picture-WSE59D691A-1_En.htm (Accessed May 2009)
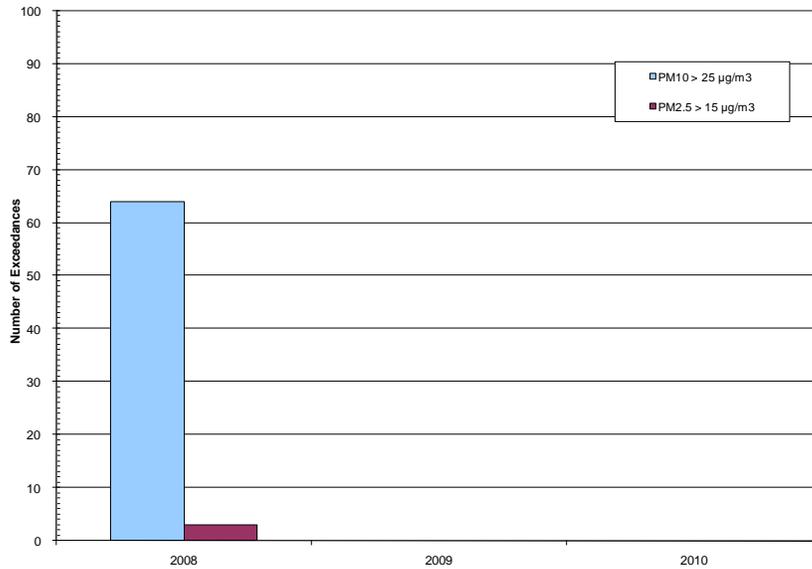
Figure 6: Number of 24–hour periods per year in which the Health Reference Level are exceeded over a rolling 24–hour average

Using a midnight to midnight 24-hour or "daily" average, considering all PM monitoring in the airshed, there were (a) 43 exceedances of the PM_{10} HRL, and (b) five exceedances of the $PM_{2.5}$ HRL, as shown in Figure 7.
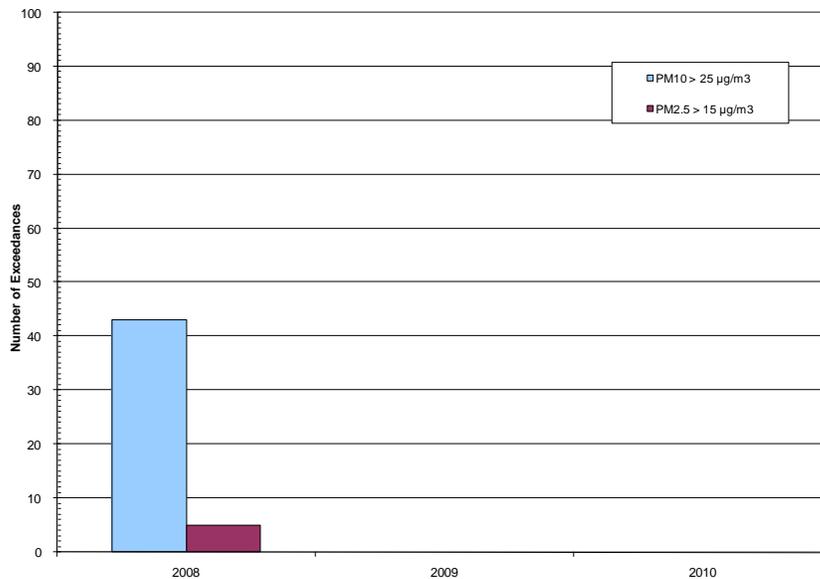

Figure 7: Number of 24–hour periods per year in which the Health Reference Level are exceeded over a rolling 24–hour average

Future long-term ambient air quality calculations for $PM_{2.5}$ and PM_{10} will assist in evaluating the exposure of Sea-to-Sky residents and visitors to these air contaminants.

Economic Impact: AQ-2

Target

Reduction in costs from baseline year.

Status

This indicator will not be reported for 2008.

Greenhouse Gases (GHGs): AQ-3

Target

Decreasing trend from baseline year (2007).

Trend

This is the first year data is being reported. Future reports will be able to indicate the trend over time.

What is being measured?

The primary sources of greenhouse gas emissions are from transportation, the energy we use in our buildings, and from the solid waste that is disposed of in our landfills. This indicator measures greenhouse gas emissions from each of these sources for the airshed as well as total per capita greenhouse emissions for each municipality in the airshed.

The greenhouse gas emissions indicator was calculated using data from the Ministry of Environment's 2007 Community Energy and Emissions Inventory. This is the baseline year for this data.

Why is this indicator important?

The United Nations Intergovernmental Panel on Climate Change (IPCC) report in November 2007 draws three key conclusions: that the Earth's climate is changing, that the change is being caused by human activities, and that its effects will worsen if no action is taken. The use of natural gas, gasoline, diesel and other fuels along with landfill gas emissions result in greenhouse gases being emitted to the atmosphere. Monitoring GHG emissions provides a measure of regional energy efficiency and contributions to global climate change. These measures can help us assess our efforts to reduce our emissions by monitoring our greenhouse gas emissions.

What is happening?

In 2007, estimated on-road transportation emissions were the largest contributors to greenhouse gas emissions in the airshed (53% of the emissions). Emissions from energy used in buildings accounted for 30% of the GHG emissions and emissions from solid waste decomposition accounted for 17%. This is illustrated in Figure 8.
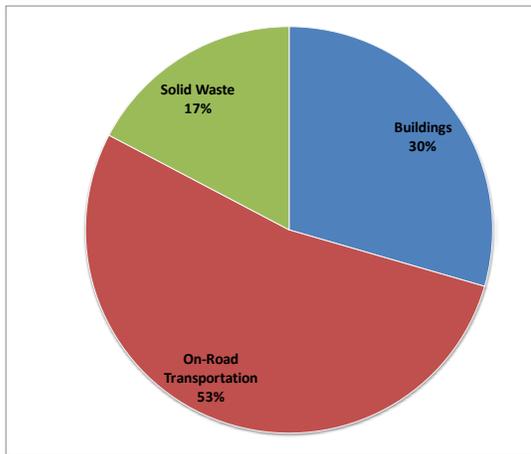
Figure 8: Greenhouse Gas Emissions, by sector (2007)

GHG emissions on a per capita basis are shown in Figure 9. Per capita GHG emissions were higher in Gibsons and Whistler than in other municipalities within the airshed. In Gibsons, per capita emissions were 11 tonnes of CO_2eq per person. Estimated on-road transportation emissions accounted for 78% of the total of Gibsons' GHG emissions. In Whistler, per capita emissions were 10 tonnes of CO_2eq per person. Building emissions account for the majority of Whistler's emissions (52%). Bowen Island, Lions Bay and the unincorporated areas of the SLRD have the lowest GHG emissions; 4 tonnes of CO_2eq per person, 4 tonnes of CO_2eq per person and 3 tonnes of CO_2eq per person, respectively[12]. On-road transportation emissions are the largest source of emissions for each of these areas. Per capita emissions for the entire airshed are 7 tonnes of CO_2eq per person.
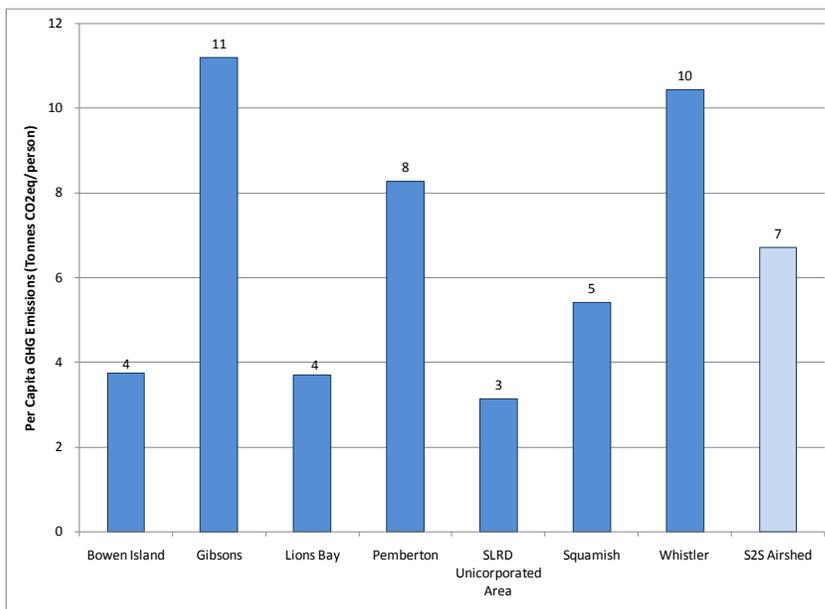

Figure 9: Greenhouse Gas Emissions per Capita, by municipality (2007)

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[12] The lower GHG emissions in these communities may be related to a higher use of wood–fired heating. Although wood–fired heating is considered GHG neutral, other emissions are released (e.g. Fine Particulate Matter) that have a negative impact local air quality.

Visibility: AQ-4

Target

Zero poor visibility events in a year.

Status

This indicator will not be reported for 2008.

Odour: AQ-5

Target

(a) Zero odour complaints per year.

(b) Zero exceedances of B.C. Odour Index level of 25.

Trend

This is the first year data is being reported. Future reports will be able to indicate the trend over time.

What is being measured?

This air quality indicator has two components:

a) The number of odour complaints, as reported by i) Howe Sound Pulp and Paper, and ii) the B.C. Ministry of Environment.[13]

b) Number of hours per year where Odour Index is above 25. This index is developed by the Ministry of Environment and is based on ambient monitoring station measurements of sulphurous odours.

Why is this indicator important?

Clean, fresh-smelling air is a vital component of the fresh-air experience boasted by the Sea-to-Sky airshed for both its residents and guests.

What is happening?

a) Howe Sound Pulp and Paper reported receiving 8 odour complaints in 2008. The Ministry of Environment recorded two odour complaints in 2008.[14]

b) There were 3 exceedances of the Odour Index in 2008.

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[13] Municipalities in the airshed were contacted but do not record odour complaints
[14] Complaints to the mill and the Ministry of Environment may in some cases be recorded from the same incident.

Canada–wide Standards (CWS): AQ–6

Target

Zero exceedances of standard.

Trend

This is the first year being reported. Future reports will be able to indicate the trend over time.

What is being measured?

This indicator measures any exceedance of the Canada-wide Standard (CWS) for either particulate matter with a diameter of 2.5 micrometres or smaller ($PM_{2.5}$) or ground-level ozone (O_3).

According to the CWS:

a) $PM_{2.5}$ must not exceed 30ug/ m^3 in a 24-hour period; on the annual 98th percentile value, averaged over 3 consecutive years.

b) O_3 must not exceed 65ppb based on 8-hour moving averages; on the 4th highest annual ambient measurement, averaged over 3 consecutive years.

Data for this indicator was available from two monitoring stations:

- $PM_{2.5}$ is measured at a monitoring station in Whistler, and

- Smog or ground-level ozone (O_3) is measured at monitoring stations in Whistler and Squamish.

Why is this indicator important?

Air pollution has been shown to have detrimental effects on human health – particularly to at risk persons such as those with respiratory and cardiovascular ailments, children and the elderly. The CWS standard has set thresholds for particulate matter and ground-level ozone because they are the pollutants of most concern from a human health perspective:

- Particulate matter can impair respiratory function. Natural processes contribute to increases in particulate matter (e.g., forest fires, volcanic ash and dust storms), but a particular concern arises from combustion-based particulate which is composed of extremely small particles that can travel deep into the lungs.

- Ground-level ozone (i.e. smog) can cause decreased lung function and inflammation in the lungs. Some at risk people may experience difficulty breathing. Smog is formed when NO_x and VOCs react in the atmosphere in the presence of sunlight. Concentrations are typically higher in the summer.

Monitoring long-term ambient air quality levels, especially ground-level ozone and particulate matter concentrations, helps to evaluate the overall exposure of the population to contaminants.

What is happening?

a) $PM_{2.5}$ – No exceedances. The 3-year average for 2008 at the Whistler ambient air monitoring station was 9.9 μg/ m^3.

b) Ground-level ozone – No exceedances. The 3-year averages for 2008 were 50 ppb at the Squamish station and 56 ppb at the Whistler station.

Air Quality Index (AQI): AQ-7

Target

Zero hours per year during which the AQI exceeds 50.

Trend

This is the first year data is being reported. Future reports will be able to indicate the trend over time.

What is being measured?

The AQI describes both the measured air quality and the publicly perceived air quality at any given time.[15] The AQI values are sorted into 4 categories, Good, Fair, Poor and Very Poor, where:

- 0 to 25 is GOOD,
- 26 to 50 is FAIR,
- 51 to 100 is POOR, and
- 100+ is VERY POOR.

The AQI reaches 50 when the concentration of at least one air contaminant exceeds its ambient objective. There are objectives for particulate matter (PM_{10} and $PM_{2.5}$), ground-level ozone, nitrogen dioxide and sulphur dioxide. An air quality advisory is issued whenthe AQI exceeds 50.

This indicator measures the number of hours per year in a community where the AQI is greater than 50.

Why is this indicator important?

The main purpose of the AQI is to inform the public, on a daily basis, about the current state of air quality. It enables the public to draw comparisons between the measured air quality and what they directly sense. At risk people and other concerned residents can use this information to modify their behaviour as necessary. For example, in a situation where the AQI is high (above 50) those with respiratory problems may choose to refrain from strenuous exercise or temporarily avoid the polluted region. The AQI is useful in analysing short-term air quality episodes.

What is happening?

Across the airshed, there were no occasions on which the AQI exceeded 50 in 2008. No air quality advisories were issued in 2008 for the airshed.

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[15] The Ministry of Environment has recently started using a new a new air quality measure called the Air Quality Health Index. The Air Quality Health Index (AQHI) is a new public information tool developed by Health Canada and Environment Canada, in collaboration with the provinces and key health and environment stakeholders. The AQHI is not being reported in this report because Whistler is currently the only location with AQHI reporting in the Sea-to-Sky/Howe Sound airshed.

Target

Decreasing trend from baseline year (2005).

Trend

Trends emerge after several years of data collection. Currently, data is reported for 2005 and 2008. It is therefore too early to infer a trend. Future reports will be able to indicate the trend over time.

What is being measured?

Continuous Improvement measures the continual incremental reductions in both the higher and the everyday concentrations of ground-level ozone, $PM_{2.5}$, PM_{10} and NO_2 over the long term. The continuous improvement indicator measures the 3-year annual average (in µg/ m^3) of four different air contaminants:

1) 8-hour maximum daily level for O_3

2) Annual 24-hour average level for PM_{10}

3) Annual 24-hour average level for $PM_{2.5}$

4) 8-hour maximum daily level for NO_2

There are three monitoring stations in the airshed that collect the air quality data, however each station does not measure all the contaminants:

- O_3 is measured at the Squamish and Whistler monitoring stations,

- PM_{10} is measured at the Squamish and Langdale stations,

- $PM_{2.5}$ is measured at the Whistler station, and

- NO_2 is measured at all three stations.

The 3-year annual average uses the baseline year of 2005 to calculate the continuous improvement of the above air contaminants, however, not all parameters were available at each station for 2005. Where a 3-year average could not be calculated for 2005, the first year for which a 3-year value could be calculated is shown. [16]

Why is this indicator important?

Most measures used to describe air quality describe whether pollutant levels are high over short periods of time. These measures are important because high pollution levels over short periods of time, even less than a day, can result in adverse health effects. It is also important to track long term trends of air quality in the region since long term exposure may also affect health. Long term

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[16] Using the CWS calculation methodology, a 2-year average is permitted when 3 years of valid data is not available. It is noted when this alternative average has been used.

trends are also important to determine how effectively air quality is being managed in the airshed, and can provide direction for future AQMP activities.

What is happening?

The differences in air contaminant concentrations are relatively small and therefore no clear trend was apparent between the baseline year and 2008 (see Figure 10). The largest reductions occurred at Squamish where ground-level ozone decreased further away from the CWS between 2005 and 2008, and at Langdale where NO_2 levels showed a decrease between 2004 and 2008. The largest increases in emissions were found at Whistler where NO_2 levels elevated between the 2007 and 2008 averages.

Particulate matter readings show very slight decreases at the Whistler and Langdale stations, and a very slight increase at the Squamish station. However, longer-term data is required to identify a clear trend.
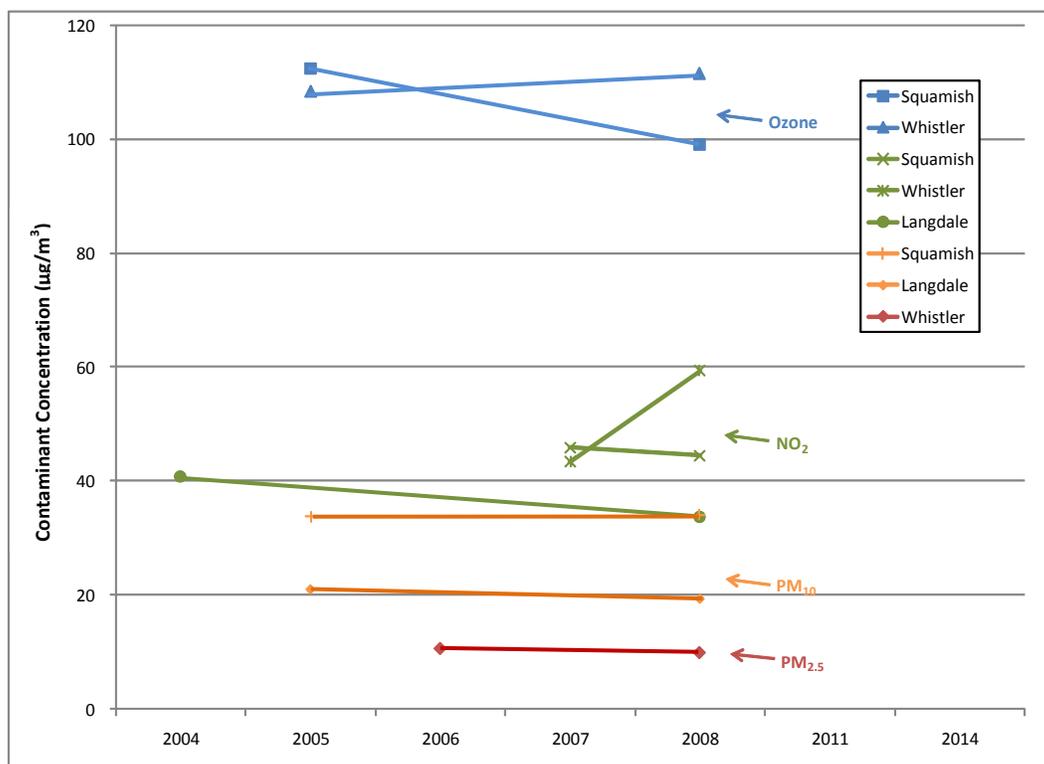

Figure 10: Continuous Improvement trends for 3-year average concentrations of Ground-level ozone, NO_2, PM_{10} and $PM_{2.5}$

4.3. Performance Measures

As part of the monitoring and reporting process, four performance measures have been developed to enable the tracking of actions that are being implemented across the region.

Performance monitoring is different from the indicators and targets outlined in the AQMP. The indicators in the AQMP will be used to evaluate the progress towards or away from the air quality goals whereas the performance measures allow us to evaluate progress on plan implementation.

Table 3: Performance Measures (PFM)

	Performance Measure	Units	Rationale	Targets
1	Plan Progress Number of actions completed	# of actions; percent complete	Indicator of plan progress to date	Not applicable
2	Plan Progress Number of actions in progress	# of actions	Indicator of progression of plan	5 per year
3	AQCC Involvement Percentage of AQCC members participating in meetings (average of yearly meetings)	%	Indicator of level of engagement among core AQCC members	80%
4	Website Usage Number of website visitors annually	Number of visits; annual percent increase	Measure of website use and usefulness of information	5% annual increase in visitors

Plan Progress – Number of actions completed: PFM-1

What is being measured?

This indicator tracks the total number of actions from the AQMP that are considered complete for the airshed as a whole.

Why is this measure important?

Tracking the completed actions provides an indication of progress in implementing the AQMP. There is no target for this indicator.

What is happening?

Implementation of the AQMP started in 2008 and several actions were initiated (see indicator PFM-2). It is too early in the implementation process to have completed any actions.

Plan Progress – Number of actions in progress: PFM-2

Target

Five actions in progress per year.

What is being measured?

This performance measure reports on the number of actions that are in progress. Actions that are in progress typically have a clear champion leading them, and have been identified by the AQCC as a priority to implement.

Why is this measure important?

This measure identifies how many AQMP actions are being undertaken. This will help the AQCC determine whether the approach to implementation and structure of the organization is effective in carrying out the identified actions.

What is happening?

Fourteen high priority actions were identified to begin in the first year of implementation. Four of these are considered "actions in progress". There are also a number of ongoing community initiatives that relate to other actions in the plan, however, these do not have a clear champion on the AQCC. All of the high priority actions have some related community initiatives taking place (see the list in Appendix A).

AQCC Involvement - Percentage of AQCC members participating in meetings: PFM-3

Target

80% of AQCC members participating in meetings.

What is being measured?

This performance measure indicates the level of involvement of the AQCC members in the implementation process. It measures the percentage of AQCC members that participate in AQCC meetings on an annual basis. Participation in meetings is defined by having had at least one representative of the organization attend (this individual may be staff, council, or other) an AQCC meeting. The measure is split into two categories: funding members of the AQCC and other members.

Why is this measure important?

This measure provides an indication of the level of involvement of identified stakeholders in the process.

What is happening?

For 2008, 75% of funding members were represented at all three meetings held throughout the year, and 100% of funding members participated at least one of the three meetings. This shows a high level of commitment to the process. Some municipalities have very limited resources, and travel to meetings is time consuming, particularly if traveling by ferry.

For 2008, 64% of other (non-funding) members participated in at least one of the three meetings held throughout the year. As implementation progresses, it is anticipated that there will be more involvement of other stakeholders as partners in implementing actions. This may be reflected in involvement at AQCC meetings, or perhaps in working group meetings and other correspondence. Table 4 shows the non-funding members that attended at least one meeting, and the non-funding members that were invited but were not available to attend any meetings.

Table 4: Involvement of non-funding AQCC members at meetings in 2008

Attended at least one AQCC meeting	Invited but did not attend any AQCC meetings
Squamish First Nation	Lil'wat First Nation
Metro Vancouver	District of West Vancouver
Sunshine Coast Regional District	Howe Sound Pulp & Paper
BC Ferries	Terasen Gas
BC Transit	Squamish/Whistler Transit
Vancouver Coastal Health-Coast Garibaldi Health Services	Translink
B.C. Ministry of Transportation	
VANOC	
Smart Growth BC	

Website Usage - Number of website visitors annually: PFM-4

Target

5% increase in visitors annually.

What is being measured?

The number of hits to the Sea-to-Sky air quality website (www.seatoskyairquality.ca) on an annual basis.

Why is this measure important?

This measure allows the AQCC to determine if the website is being well-used, either by the public for educational purposes, or by AQCC members to exchange information.

What is happening?

Due to ongoing website development in 2008, this indicator is not reported.

5 Next Steps

5.1. 2009: Second Year of Implementation

The AQCC expects to meet twice in 2009, a reduction from the previous three meetings per year. This reduction is due to municipal budget constraints. Currently, Terms of Reference for the committee are being developed by committee volunteers to clarify the roles, responsibilities and activities of the AQCC members.

5.2. Annual Reporting

An annual report will continue to be produced to track changes in the identified context and air quality indicators, and implementation performance measures.

5.3. Five-Year AQMP Update Report

The Five-year report will provide a summary of past years and include a review of the actions completed, in progress and outstanding. The review of actions will provide the AQCC with an opportunity to revise actions or add new ones in order to achieve the vision and goals of the AQMP by 2025. The first Five-year report is scheduled for 2013.

An outline of the Five-Year AQMP update report is provided here. Note that a template for this report has not been developed as it is anticipated that changes may be made over the next five years. The proposed outline is as follows.

State of the Sea-to-Sky Airshed: Five Year AQMP Update Report - outline:

1. Introduction – background, about the AQCC and process to date
2. Where are we now?
    a. Indicator results and progress towards targets
    b. Review of Actions
        i. Completed
        ii. In Progress
3. Where are we headed?
    a. Current and future airshed context (e.g. increased traffic, more future development, etc)
    b. Proposed New Actions (if necessary)
4. Next Steps
    a. Results
    b. Recommendations

6   Conclusions

This report focused on two aspects:

a) the implementation process for the 2008 calendar year, and

b) the quality of the air in the airshed.

The implementation of the AQMP began in spring of 2008 with the development of an implementation framework document. Actions are now underway through the implementation process to protect the air quality in the airshed. The AQCC has continued to work effectively together to keep air quality concerns integrated into local government planning and priorities. It is currently too early in the process to determine how successful implementation activities have been in protecting air quality and addressing identified air quality issues in the airshed.

There has been no significant deterioration in the quality of the air throughout the airshed, based on the available data. However, this is a dynamic environment in which development is changing the way people live, work, play and travel in the area. It is necessary to remain vigilant because of the sensitivity of the air we breathe to such changes. Baselines have now been established for this airshed that will allow progress to be monitored as the airshed management process proceeds.

Appendix A: Community Initiatives

The following table outlines the air quality and energy initiatives occurring in communities in the airshed as they relate to actions in the AQMP. Note that actions shaded in gray are considered "Mid-term" and "Longer-term" actions that are not expected to begin implementation until 2009 and beyond. The "Gaps" column lists activities that were identified in the AQMP implementation plan that are not currently being addressed.

	Action	Realm	Related Initiatives	Gaps
1	Integrate Transit Systems	Regional	• Squamish-Whistler Commuter Transit Service became year-round service in April 2008 – 4 trips per day reducing to 3 per day through spring, summer, fall (due to construction road closures); BC Transit provided 3 new Nova buses • Bowen Island was in discussions with BC Ferries and Translink about aligning schedules • Pemberton was in discussion with Whistler about a connecting route • Lions Bay worked with Translink to increase transit frequency over last two years; now looking to create a transit connection to Squamish	• Establish Transit Working Group (TWG): Municipalities, regional districts, BC Transit, Whistler Transit, Translink, BC Ferries, B.C. Ministry of Transportation, VANOC • Evaluate feasibility of direct link from YVR to Whistler • Evaluate feasibility of integrating Bowen Island, Horseshoe Bay, and SCRD Transit
2	Lobby transit providers to reduce emissions from transit vehicles	Local	• WAVE (Whistler and Valley Express) converted 18 old buses into 18 new Nova buses that meet 2007 efficiency standards • Whistler worked with BC Transit to obtain a fleet of 20 hydrogen buses (expected arrival is November 2009) in preparation for Olympics; Whistler to review VANOC transportation plan to extend adopted measures into March 2010 and beyond • Bowen Island began a review of transit service on the island to improve efficiency and effectiveness	
		Regional		• Participate in TWG • Review existing pilot programs re: hydrogen fleet and other emission reduction programs
3	Promote opportunities for resident and visitor access to public transportation & other transportation alternatives	Local	• Construction of corridor trail began in 2008 (community-wide commuter trail); council identified improved bike lanes as a priority (Squamish) • A trails master plan was created in 2008 (Pemberton)	• Actively promote transportation alternatives and use events as public education tools (e.g. Car Free Day, Canadian Environment Week, Bike to Work Week, Clean Air Day)

	Action	Realm	Related Initiatives	Gaps
4	Reduce vehicle idling through education & bylaws	Local	• Idle-free ambassador program (MoE): Brooke Carere was based in Squamish and worked with staff from Squamish, Whistler and MoE during the summer of 2008 on idle-free initiatives throughout the airshed • Anti-idling signage for the airshed was provided to be installed in Bowen Island, Squamish, Whistler, Gibsons and at VANOC sites in Whistler • Enforcement of anti-idling bylaw outside ferry terminal was ongoing; stickers were made available for fleet vehicles; promotional material (key chains, candy, etc.) was distributed • New anti-idling bylaw which included boats (Bowen Island) • New anti-idling policy and movement towards bylaw; bi-weekly recycling pick-up replaced centralized recycling (significant idling) (Squamish) • Anti-idling bylaw revised (Whistler) • Lions Bay made plans to add an anti-idling bylaw in 2009 • School program developed in Whistler	
5	Promote use of best available technology and practices for construction and related equipment	Local +	• Built mini transfer station and installed solid waste compacting unit to reduce number of trips for hauling solid waste off island (Bowen Island) • Diesel Oxidation Catalysts (DOCs) put onto generators to reduce emissions (Whistler) • VANOC: Implemented a series of Environmental Management Plans for the construction phase, some specific to air quality management. These EMPs are not public documents, but they include best practices around dust control (e.g. covering piles of dirt), no vehicle/ equipment idling, vegetation debris management. • Information was shared by Whistler on use of DOCs for portable generators. VANOC was particularly interested in the experience Whistler had with this.	• Share VANOC's air quality specifications for construction to ensure continuity throughout the airshed • Seek partners (e.g. Metro Van) to lobby federal government for tighter emission standards. Bring action to HSCF.
6	*Investigate the impact of off-road vehicle emissions*		• *Whistler: DOCs put onto generators to reduce emissions* • *Whistler: Expecting to replace gas weed-eaters with electric ones (pending funding from MoE)*	

	Action	Realm	Related Initiatives	Gaps
7	Promote improvement of vehicle emissions performance	Local +	• Options to encourage low-velocity electric vehicles were investigated– e.g. preferred parking, providing plug-in station, incorporating into new development (talking to manufacturers). (Bowen Island) • Hybrid vehicles purchased for fleet (Squamish) • Fleet training & E3 rating for fleet, ongoing monitoring and reporting for fleet was carried out and established (Whistler). • ZEV bylaw – reviewed and adopted Nov 17/08 (Whistler) • RMOW worked with William Edmondson to see how RMOW can help him promote his business (Transphat) and support his green-taxi initiative which will be fuelled by local restaurants (Whistler) • E3 Fleet - tracking and reduction of emissions and GHG of vehicles - purchase policy was developed (Gibsons) • Electric Vehicle Bylaw - instigated in December – First Reading (Gibsons)	• Compile a list of municipal and corporate vehicle emission best practices and programs most relevant to S2S airshed • Replace/retrofit fleet vehicles to reduce emissions (+ fleet smart training) • Petition Air Care On Road Program to do spot checks of heavy-duty vehicles on Sea-to-Sky highway
8	Develop airshed-wide Smoke Control Strategy	Local	• Open burning control bylaws previously developed in Squamish, Gibsons, Whistler • Open burning control bylaw was amended in 2008 (Squamish) • Residential Backyard Burning Bylaw Amendment 1085 - no open residential burning except cooking and ceremonial was passed (Gibsons) • Regulation Amendment 1086 - no other burning without a permit was passed (Gibsons) • Began developing bylaw for wood smoke control and distribution of a template to all other municipalities (Bowen Island) • Wood waste LCA study was proposed(Bowen Island)	
		Regional		• Develop a formalized regional smoke control strategy (specify open burning management zones, tools, wood stove emissions management program) • Educate AQCC & stakeholders about alternatives to open burning – presentations and consultation with regional stakeholders

	Action	Realm	Related Initiatives	Gaps

9	*Assist in the development of GHG emission reduction targets and plans*		• *All municipalities and regional districts in the airshed signed the Climate Action Charter (CAC) committing to be carbon neutral in operations by 2012*
			• *SLRD included new strategic direction in the RGS: explore feasibility of climate strategy*
			• *Squamish continued developing an Energy Strategy , including:*
			  o *Green buildings policy*
			  o *Detailed audit of municipal buildings and recommendations for energy savings*
			  o *Developing 'green' density bonus zone for part of downtown*
			  o *To develop a concept for multi-modal transportation hub*
			• *GHG - Inventory was conducted and targets were established - (20% reduction of 1998 levels by 2017) in Gibsons*
			• *VANOC: Carbon management team scoped estimated emissions and figured out methodology to track actual emissions, in addition to researching offset options. As the carbon responsible program is refined and revealed, there will be opportunities to share learnings with partners and others.*
				[note – currently identified as longer-term action]

10	Ensure power generation in the airshed supports the AQMP goals	Local		• Keep informed of local issues regarding power generation and upcoming potential projects
		Regional		• Consider developing a position or policy on preferred types of power generation • Maintain open dialogue (with BC Hydro, IPPs)
11	Work with the local pulp and paper industry to identify opportunities to reduce lifecycle emissions	Regional		• Continue efforts to decrease emissions from HSPP operations • HSPP: participate in AQCC meetings and provide regular progress reports
12	*Expand current community-based air quality initiatives within the airshed*			
13	Promote use of alternative energy sources and systems	Local	• District Energy System was under construction for athletes' village (Whistler) • Commercial composter at Callaghan was opened– may produce useable biofuel for commercial applications (Whistler) • Full feasibility study for District Energy System was pursued (Squamish) • Development of business case for options for burning wood waste for energy was proposed (Pending funding) (Bowen Island) • A Green Energy Panel to investigate alternative energy was created(Lions Bay)	• Seek education opportunities for residents / businesses about alternative energy systems

	Action	Realm	Related Initiatives	Gaps
		Regional / Committee		• Circulate relevant information and invite guest speakers to AQCC meetings re: alternative energy systems • Create a S2S airshed strategic plan for independent power producers
14	Share successes and information via the Sea-to-Sky Air Quality Website	Committee	• Website re-developed so that updating is simple for any member of the AQCC • Step-by-step guide created to facilitate updates	• Website content re: current initiatives in municipalities and process is not up to date
15	Implement an airshed-wide public outreach and education campaign	Local	• School presentations on idling & students creating an idling campaign project was initiated – waiting to hear from the teachers at WSS to set date (Whistler) • Municipal website was updated to include links to seatoskyairquality.ca and other information (Lions Bay)	• Promote energy saving devices at community events
		Regional	• [see Action 14 – Sea-to-Sky website] • Anti-idling signage for airshed was provided to be installed in Bowen Island, Squamish, Whistler, Gibsons • Anti-idling messages on electronic overhead highway signs (B.C Ministry of Transportation) • Sea-to-Sky Air Quality E-Newsletters: 2 sent	• Use S2S website as a tool to share information in the campaign • Develop a cross-airshed community challenge • Develop S2S specific education materials
16	Coordinate air quality initiatives with other organizations	Regional	• VANOC attended AQCC meetings • Individuals interested in AQMP activities received newsletters • MoE representative maintained connections with other provincial staff working on airshed planning through Clean Air communications and the Clean Air Forums.	• Participate in other organizations' air quality programs • Invite other agencies to participate and/or present at AQCC meetings, as needed • Provide resources to complementary initiatives that promote AQMP goals • Connect with other provincial AQMP programs and processes
17	Develop business cases for air quality actions	Committee		• List actions that need business cases developed and develop each case through working groups of 2 to 3 AQCC members • Provide staff or funding to develop specific business cases
18	*Incorporate the AQMP vision into other planning processes*			

Appendix B: Indicator Meta Data

Meta data for all indicators is included with the final report in electronic format.