Board Meeting

December 13, 2017

McDougall Centre - Calgary

455 6 St SW

Memorandum

9915 108 ST, 1400
EDMONTON AB T5K 2G8
CANADA

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Date: **November 29, 2017**

From: **Andre Asselin, Executive Director**

To: **CASA Directors & Alternates**

Subject: **CASA Board Meeting – December 13, 2017**

Attached are the draft agenda and briefing materials for the next meeting of the CASA Board of Directors, which is scheduled from **9:00am to 3:15pm** on Wednesday, December 13, 2017. Please feel free to make the information available to any members of your sector who need to review the material. The Caucus meetings will be held from **8:00am to 9:00am**. The meeting will be held at:

McDougall Centre
Rosebud Room (4th floor)
455 6 St SW
Calgary, Alberta T2P 4A2

You will need to provide photo identification at the security desk at the building entrance when you arrive. A continental breakfast will be available outside the Rosebud Room starting at 7:30 a.m. We have allocated time for broad categories to caucus immediately prior to the meeting and rooms have been booked for this purpose.

CAUCUS MEETINGS

- Industry Caucus – Siksika Room (3rd floor)
- ENGO Caucus – Lougheed 1 Room (3rd floor)
- Government Caucus – Black Diamond Room (3rd floor)

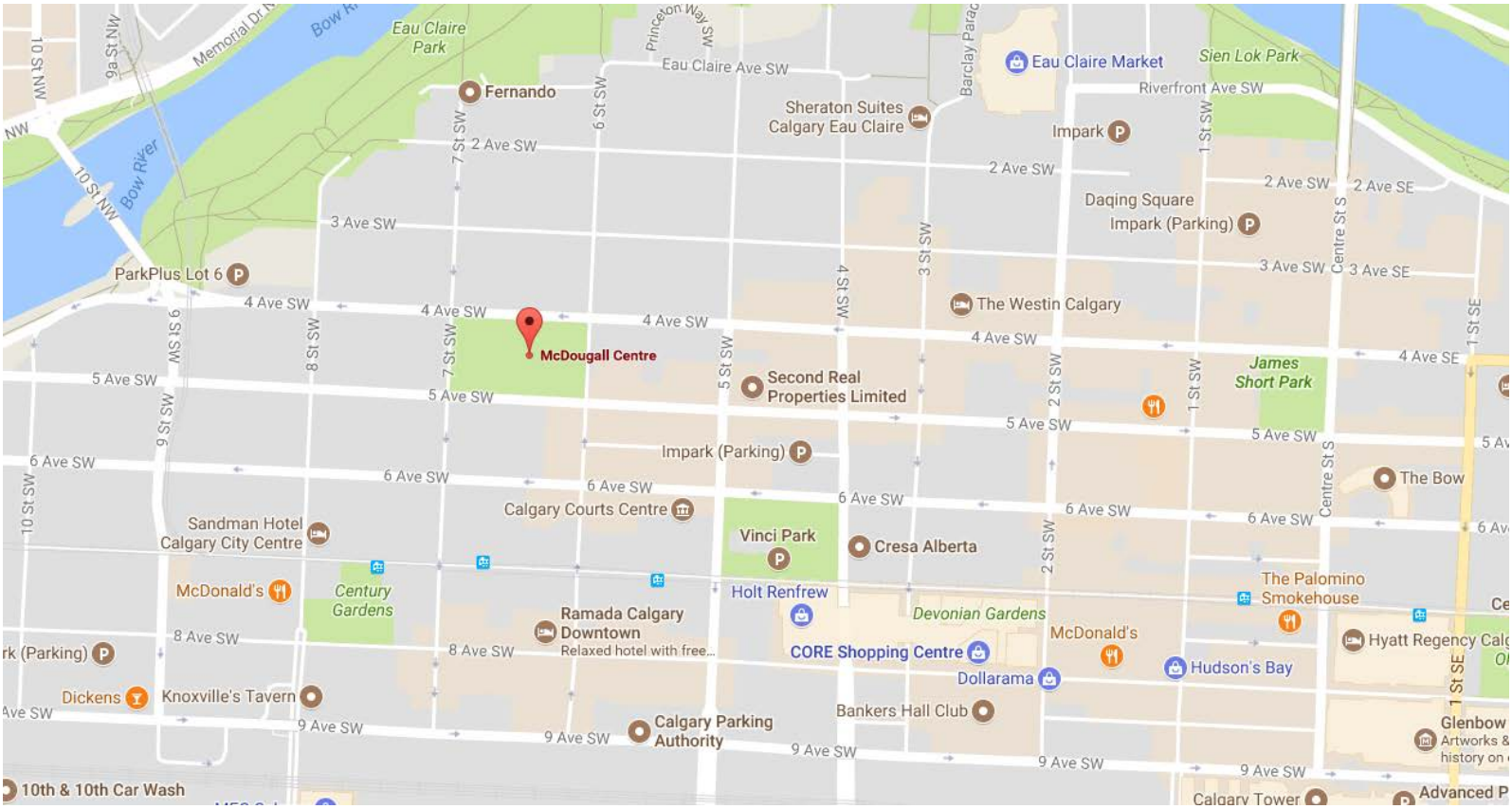
Kindly respond to the meeting invitation sent by Cara McInnis no later than **Friday December 1**. We look forward to seeing you at the meeting. If you have any questions or require additional information, please contact me or Cara at cmcinnis@casahome.org.

Sincerely,

Andre Asselin
Executive Director
Clean Air Strategic Alliance
780-644-7381

Logistical Information
McDougall Centre – Calgary
455 – 6th Street SW
Calgary, Alberta

The McDougall Centre is located in downtown Calgary.



Parking
Paid parking is available at McDougall Parkade.

Public Transportation
McDougall Centre is accessible by:

- Calgary Transit bus routes 1, 4 and 90
- C-Train routes 201 and 202, within the free zone

More information on public transport is available from Calgary Transit.

Accommodations

The McDougall Centre is within walking distance of a number of hotels. Members will be on their own to find accommodations. Members who plan to claim travel expenses to attend the meeting are encouraged to look for reasonably-priced room rates.

Downtown Hotels:

- **Ramada**
  708 8th Avenue SW
  403-879-1781

- **International Hotel of Calgary (Downtown)**
  220 4th Avenue SW
  403-265-9600

- **Regency Suites Hotel**
  610 4th Avenue SW
  403-231-1000

- **Holiday Inn Express Hotel & Suites Calgary Downtown**
  1020 8th Avenue SW
  403-269-8262

- **Best Western Suites Downtown**
  1330-8th Street SW
  403-228-6900

- **Sandman Hotel Downtown Calgary**
  888 - 7th Avenue SW
  403-237-8626

Northside Hotels:

- **Royal Executive Inn**
  2828 23rd Street NE
  Toll Free: 1-888-388-3932

- **Greenwood Inn**
  3515 26th Street NE
  403-250-8855

- **Days Inn Calgary Airport**
  2799 Sunridge Way NE
  403-250-3297

Southside Hotels:

- **Holiday Inn Calgary Macleod Trail South**
  4206 Macleod Trail South
  Toll Free: 1-877-660-8550

- **Travelodge Hotel Calgary Macleod Trail**
  9206 Macleod Trail South
  403-668-2923

- **Days Inn Calgary South**
  3828 Macleod Trail South
  403-243-5531

Clean Air Strategic Alliance
Board of Directors Meeting
December 13, 2017
Calgary

Table of Contents

Acronyms Commonly Used by the Clean Air Strategic Alliance

AAC	Alberta Airsheds Council
AAF	Alberta Agriculture and Forestry
AAAQO	Alberta Ambient Air Quality Objectives
ACAA	Alberta Capital Airshed Alliance
ADM	Assistant Deputy Minister
AEN	Alberta Environmental Network
AEP	Alberta Environment and Parks
AEPEA	Alberta Environmental Protection and Enhancement Act
AER	Alberta Energy Regulator
AHS	Alberta Health Services
AMD	Air Monitoring Directive
AMSP	Ambient Monitoring Strategic Planning
AOPA	Agricultural Operation Practices Act
AQI	Air Quality Index
AQHI	Air Quality Health Index
AQMS	Air Quality Management System
ARIES	Alberta Regional Inventory Emissions System
AUC	Alberta Utility Commission
AWC	Alberta Water Council
AWN	Alberta Wilderness Network
AZBC	Airshed Zones Board Committee
BATEA	Best Available Technology (or Treatment) Economically Achievable
BLIERS	Base-level Industrial Emission Requirements
BPC	Business Planning Committee
C3	Climate Change Central
CAMS	Comprehensive Air Quality Management System
CAPP	Canadian Association of Petroleum Producers
CARA	Clean Air Regulatory Agenda
CAS	Clean Air Strategy
CC	Communications Committee
CCS	Carbon Capture and Storage
CCME	Canadian Council of Ministers of the Environment
CEMA	Cumulative Environmental Management Association

CEN	Canadian Environmental Network
CEPA	Canadian Environmental Protection Act
CFO	Confined Feeding Operations
CRAZ	Calgary Region Airshed Zone
CDW	CASA Data Warehouse
DoE	Department of Energy
EEC(F)	Energy Efficiency and Conservation (Framework)
EECA	Energy Efficiency and Conservation Act (*also* Authority)
EFR	Electricity Framework Review
EPT	Electricity Project Team
EXEC	Executive Committee
F&V	Flaring and Venting
FAP	Fort Air Partnership
FVPT	Flaring and Venting Team
GHG	Greenhouse Gases
GoA OR GOA	Government of Alberta
HAHT	Human and Animal Health Implementation Team
I&T	Alberta Infrastructure and Transportation
IAFE	Institute for Agriculture, Forestry and the Environment
IAQ	Indoor Air Quality
IUAPPA	International Union of Air Pollution Prevention and Environmental Protection Association
JSC	CASA and Alberta Airsheds Council Joint Standing Committee
LICA	Lakeland Industry and Community Association
LUF	Land Use Framework
MKLW *OR* MLW	Martha Kostuch Legacy Workshop
MRP	Media Relations Rating Points system
NPS	Non-point source
OSC	Ambient Operations Steering Committee
PAMZ	Parkland Airshed Management Zone
PAS	Palliser Airshed Society
PAMZ	Parkland Airshed Management Zone
PAZA	Peace Airshed Zone Associaton

PGC	Procedural Guidelines Committee
PM	Project Manager
PM & O_3 *OR* PMO	Particulate Matter & Ozone
PMC/S	Performance Measures Committee /Subcommittee
PSW	Priority Setting Workshop (for Ambient Objectives)
PSWC *OR* PSC	Priority Setting Workshop Committee
RAPID	Residents for Accountability in Power Industry Development
RE	Renewable sources of Energy
RE&A (REA)	Renewable and Alternative sources of Energy
RHA	Regional Health Authority
SFC	Strategic Foresight Committee
SoO	Statement of Opportunity
SRR	Substance Release Regulation
VET	Vehicle Emissions Team
VET	Vehicle Emissions Team
VOCs	Volatile Organic Compounds
WBEA	Wood Buffalo Environmental Association
WCAS	West Central Airshed Society
WCC	Water Council Collaboration
WPAC	Watershed Planning and Advisory Council
ZIC	Zones Issues Committee

Clean Air Strategic Alliance Board Meeting Agenda
December 13, 2017
McDougall Centre - Rosebud Room (4th Floor)
455 6 St SW Calgary, AB T2P 4A2

7:30	**Continental breakfast available outside Rosebud Room**
8:00 – 9:00	**Caucus Meetings** • **Industry Caucus – Siksika Room (3rd Floor)** • **ENGO Caucus – Lougheed 1 Room (3rd Floor)** • **Government Caucus – Black Diamond (3rd Floor)**

9:00 – 9:45 **1.0** **ADMINISTRATION** *45 min*

1.1 Convene Business Meeting and Approve Agenda
Approve agenda

1.2 Actions and Minutes from September 13, 2017 Board Meeting
Review action items and approve minutes from the previous meeting

1.3 Executive Director's Report
Receive a report from the executive director

1.4 Core Budget 2018
Approve the proposed budget for 2018

1.5 Setting Meeting Dates for 2018
Approve meeting dates for 2018

1.6 Signing authority
Approve changes to signing authority

9:45 – 10:15 **2.0** **GoA Update** *30 min*
Hear an update on the GoA's priorities

10:15 – 10:30 **BREAK** *15 min*

10:30 – 11:15 **3.0** **Coal to Gas Project Team Final Recommendation** *45 min*
Receive and approve the final recommendation

11:15 – 12:00 **4.0** **Ambient Air Quality Objectives Project Team** *45 min*
Receive an update and approve the Project Charter

12:00 – 1:00 **LUNCH** *60 min*

1:00 – 2:00 **5.0** **Non-Point Source Project Team Final Report** *60 min*
Receive and approve the final report from the Non-Point Source Team

2:00 – 2:15 **BREAK** *15 min*

2:15 – 3:00 **6.0** **Information Presentation from Alberta Climate Change Office** *45 min*
Receive a presentation on the work of the Climate Change Office

3:00 – 3:05 **7.0** **ROVER III Status report** *5 min*
Opportunity for questions about the early work of the Rover III working group

3:05 – 3:15 **8.0** **New/Other Business** *10 min*
Introduce new business and/or complete any unfinished business of the day.

Evaluation Forms
Provide time for board members to fill out their evaluation forms.

ADJOURN

CASA September 2017 Meeting Action Log

No administrative action items were noted for this meeting.

CASA Board of Directors Meeting

September 13, 2017, Edmonton, Alberta

In attendance:

CASA Board Members and Alternates:

Ahmed Idriss, Utilities
Andrew Read, NGO Industrial
Ann Baran, NGO Rural
Bill Calder, NGO Urban
Brian Ahearn, Petroleum Products
Carolyn Kolebaba, Local Government-Rural
Cheryl Baraniecki, Federal Government
Claude Chamberland, Oil and Gas Large Producers
David Spink, NGO Urban
Holly Johnson-Rattlesnake, Samson Cree Nation
Jim Hackett, Utilities
Keith Murray, Forestry
Leigh Allard, NGO Health
Martin Van Olst, Federal Government
Peter Noble, Petroleum Products
Rich Smith, Agriculture
Ruth Yanor, NGO Industrial
Stacey Schorr, Provincial Government-Energy
Wayne Ungstad, NGO Rural
Andre Asselin, CASA Executive Director

CASA Secretariat:

Matthew Dance, Katie Duffett, Cara McInnis, Karen Bielech, Kim Sanderson

Guests:

Marie-Claire St.-Jacques and Anuja Ramgoolam, Alberta Water Council
Karla Reesor, Alberta Airsheds Council
Kaylyn Buffalo, Samson Cree Nation
Merry Turtiak, Alberta Health
Sharon Willianen, Celeste Dempster, David Lyder, Randy Dobko, Alberta Environment and Parks

Presenters:

Andre Asselin, *Executive Director's Report* (Item 1.4); *Strategic Planning* (Item 2.3); *CASA/Alberta Airsheds Council Update* (Item 2.7)
Laura Blair, *Ambient Air Quality Objectives Committee Update* (Item 2.1)
Rhonda Lee Curran, *Non-Point Source Project Team* (Item 2.2); *Statement of Opportunity—ROVER III* (Item 2.4)
Sheila Lucas, Statement of Opportunity—*NOx Emissions from Upstream Oil and Gas* (Item 2.4)
Ruth Yanor and Marilea Pattison-Perry, *Performance Measures* (Item 2.5)
Fred Wrona and Bob Myrick, *Alberta's Air Quality and Deposition Monitoring Program* (Item 2.6)

Regrets:

Andre Corbould, Provincial Government-Environment
Brian Gilliland, Forestry
David Lawlor, Alternate Energy
Dawn Friesen, Provincial Government-Health
Mary Onukem, Aboriginal Government-Métis
Rob Beleutz, Mining
Scott Wilson, NGO, Consumer
Terry Rowat, Chemical Manufacturers

Clean Air Strategic Alliance
Board of Directors Meeting
September 13, 2017

Executive Summary

The CASA board welcomed Andre Asselin as the new executive director, serving both CASA and the Alberta Water Council. Andre will also serve a two-year term as CASA's secretary-treasurer.

The Ambient Air Quality Objectives Project Team was directed to address concerns raised about the role and process of the board in approving materials produced by the team. The board recognized that the process and mandate of this team differ from the usual CASA approach and asked the team to a) provide more clarity in its charter about the expected process, and b) ensure it includes a touchpoint with the board prior to any reports going to Alberta Environment and Parks (AEP).

The Non-Point Source Project Team reported that it is very close to completing its work but needs an additional two months to finalize its report. No additional funds are required. The board approved this amendment to the team's charter.

The board received and approved the 2016 report from the Performance Measures Committee, and also agreed to establish a new Strategic Planning Steering Committee to recommend a path forward at the December board meeting.

A substantial amount of time was dedicated to hearing two Statements of Opportunity (SOO) from AEP. CASA has capacity to begin one new project now, and can take on another one around the middle of 2018. The board agreed to launch a working group for the ROVER III project, focusing on measuring NOx, VOCs and $PM_{2.5}$ emissions from the on-road transportation sector, particularly diesel-fuelled trucks, to help achieve the CAAQS in Alberta. The second SOO proposed a project to manage NOx emissions from the conventional upstream oil and gas sector. Although the board agreed in principle that this was an appropriate project for CASA, the scope needs to be revised. The secretariat will facilitate a collaborative discussion to revise the scope and present it at a future meeting. Other priority projects could emerge from the strategic planning process so a decision on the second piece of new work will be made in 2018 when that process is complete.

The board heard a presentation and engaged in discussion with Dr. Fred Wrona and Bob Myrick with AEP's Environmental Monitoring and Science Division (EMSD). In addition to its air monitoring and reporting activities, the EMSD is working to provide additional analysis and evaluation of air data and is developing a five-year Air Quality and Deposition Monitoring Plan. The board stressed the need for good stakeholder engagement as the plan is prepared and indicated its hope that CASA would be involved in a timely manner.

Clean Air Strategic Alliance
Board of Directors Meeting
September 13, 2017

Minutes

Peter Noble convened the meeting at 9:07 a.m. and reviewed safety aspects and logistics. Those present introduced themselves.

1 Administration

1.1 Approve Agenda

The chair reviewed the agenda which was approved as distributed.

1.2 Minutes and Action Items from June 14, 2017

The minutes from the June 14, 2017 meeting were approved by consensus and will be posted to the website. Andre Asselin directed the board to the summary in the briefing package for updates on the four action items from the last meeting.

1.3 New Representatives

Peter formally introduced Andre Asselin as CASA's new executive director. Andre will allocate 50% of his time to CASA and 50% to the Alberta Water Council (AWC). Stacey Schorr was welcomed to her first board meeting and she noted Alberta Energy's ongoing support for CASA and the important voice it provides to the Government of Alberta (GOA).

1.4 Executive Director's Report

Andre directed the board to his report in the briefing package and touched on the highlights. He thanked staff, contractors, executive members and the board for helping him get grounded in CASA during a very busy summer. He acknowledged Keith Denman for his professionalism and contributions, stressing Keith's commitment to CASA during his tenure. Amalgamation of CASA and the AWC is progressing and a full report will be presented to the board in December, summarizing cost savings, workplan and other administrative and operational items. CASA has received its core operations funding cheque and Andre thanked AEP staff for their support in moving things forward. In response to a question, he reminded the board that CASA and the AWC will remain separate legal entities. The two budgets will identify shared items and internal processes will ensure appropriate cost sharing. He expects the annual budget will be about $750,000 for each organization, which should be sufficient to achieve respective mandates, but work will have to be very focused.

1.5 Change in Signing Officer, Board Secretary-Treasurer

The chair referenced the decision made electronically after the previous board meeting to approve Andre Asselin as signing officer and CASA secretary-treasurer.

2 Project Management and Strategic Planning

2.1 Ambient Air Quality Objectives (AQO) Project Team

Laura Blair presented background on the project and formation of the AQO project team noting that the CASA process is replacing the AEP multi-stakeholder committee that did this work

previously. She reviewed the draft terms of reference (TOR) and described the timelines and process for each of the three subgroups. One issue was subsequently identified, related to the process for approving the team's reports that will be used to inform AEP's decision on how to proceed. This team has taken a different path than what CASA normally follows, and plans to submit its reports directly to AEP as a means to expedite the process. The concern was that the work of all CASA teams should be approved by the board as these reports are considered CASA products and it would not be appropriate to submit a report directly to a stakeholder as a CASA product without prior board review and approval. The concern that this approach was too far outside the accepted CASA process did not emerge until after the board book was distributed. A two-page document with proposed text to address these concerns and define clear accountability between the team and the board was reviewed during the discussion.

CASA has a consensus model and if it needs to be changed, that can be done but, until then, the existing process should be followed. One component of the proposal for consideration is whether board approval of the team's materials could be done electronically rather than wait for the next board meeting. CASA has used this technique for other issues, but not for anything as significant as approving a team report. Further, if the team does not have consensus, the different views will be described but the board would not attempt to resolve any non-consensus items; it could approve a consensus or a non-consensus report. If the board feels it needs more discussion, work could occur offline or the item could be deferred to the next board meeting.

Discussion

Board members provided the following comments on this matter:

- The executive committee could ask for electronic approval on an as-needed basis. It is important that we don't set up precedents and build another process in addition to what we have. If we want to expedite, we need to develop a process for that.
- We don't want to have teams dictating board governance. There has to be a board review of team work, but we don't need to specify the process.
- The ENGO caucus did not have a problem with the TOR as currently written. The original Statement of Opportunity (SOO) envisioned a committee that would be under the auspices of CASA but not a formal CASA project team. The SOO was clear that TOR would be followed and we are now looking at changing this. The concern is that this is a technical group involving all stakeholders and it will try to reach consensus. If it can't, it will still produce a report. If the board gets involved, it may delay the work and lead to circular discussions. The new wording acknowledges the need to move quickly. These reports are technical reports and I worry that they could become politicized. As soon as the board gets involved and there is no consensus, it puts another flag on non-consensus. That added flag could have political implications, and that's not where this committee should be going. The proposed re-wording was not circulated until just now so caucuses should discuss it before a decision is made.
- Teams that are struck by CASA report to CASA and there needs to be some accountability between the team and the board. This team is replacing an AEP process. The board is not looking to debate technical merits; it can respect if the committee disagrees and the reports can still go on to AEP. There just needs to be a "touch" by the board as this will be seen as a CASA product.
- We should be true to the CASA process.

- If reports come to the board there is no reason to use an electronic process. It should be used as little as possible for simple yes or no things, and more complex matters should be dealt with at a board meeting. We know we need to be nimble. This project came to CASA for good reasons, and we should not avoid doing things differently if they will make us more nimble. Finally, the products will be used at AEP's discretion for consultation before final decisions are made; they won't be endorsed or implemented by stakeholders. If the team does not have consensus, materials can still be passed onto AEP and they can decide how to handle them.
- This is not about implementation. For AQOs, stakeholders implement what the government direction is. It's important to note the difference in this case—even if there is consensus by the team, it doesn't necessarily mean stakeholders will implement.
- Not all team reports are approved by the board; e.g., the NPS technical reports are public and did not come to the board. They are purely informational. Concerns should have been flagged when the AQO SOO came to us. If GOA is happy with the proposed changes, that's their position, but that's not what they brought to us.
- If a report is solely for information, that's one thing, but if the goal is to have consensus recommendations, the board should discuss it. What role do we see for CASA with respect to air policy—input or consensus recommendations? We need to be clear on this and I'm not sure we are.
- We are proposing that the AQO team process add a touch with the board; we don't need to change and review or edit the report and we want to get products quickly to GOA. We are asking for a change from the original GOA request in the SOO.
- GOA: The GOA's interest is to ensure this work gets done in a fairly expeditious manner as there is pressure to develop the AQOs. We expect the team to bring forward several recommendations on substances and we know this differs from the usual CASA process. When the previous multi-stakeholder working group came up with recommendations, they went out for public consultation, and we took input and adjusted if needed.
- GOA: The GOA supports having a touch with the board.
- The board can review material as it is developed—we don't have to wait for the 20th recommendation to deal with the first one or two. If this is a CASA-commissioned entity, we need to follow the CASA process and if we can do it expeditiously, we should.
- If we defer to December, the group could proceed with its work. We want to avoid a policy level discussion at the board and not detract from the value of the technical products. If we can clarify what we mean by a board "touch" that would help.
- We can ask for a different kind of review with a short timeline and a requirement for reviewers to justify their comments. We have dealt with non-consensus before and the GOA has the ultimate authority to make the decision.
- If we agree today that the board should be involved in this process, then we can work offline to sort it out. In the original TOR, there was no board touch at all. Do we agree that the board needs to be involved?
- The board will be involved by having the team provide reports on what it's doing. That is the minimum level. Would a light touch be that the team gives the board notice that it might not reach consensus or does it have to be more than that?
- The board would not try to resolve non-consensus issues; AEP would address those. If the committee can't agree, that is okay although if there are very large differences of opinion, a bigger discussion might be needed. We don't want to unravel their work.

- The process should be to communicate findings to the board. At least some board members don't feel they have the expertise to assess technical aspects anyway.
- We fail in our responsibility as a board if we don't review the material and that would create a bad precedent.
- The project timelines line up with board meetings. The technical expertise on the subgroups is very valuable and that work can stand. But if work is done under the CASA banner, it's important for the board to understand what is going out the door. It could be as simple as an update to keep us informed.
- The outstanding issue is whether the CASA process should be used for this project; that is, should the board be involved and how.

No concerns were identified regarding the overall content of the team's work. It was noted that each substance will be considered individually because that is the way the health literature treats them. There will be separate reports on individual substances as the work is finished. Board members informally agreed to discuss this matter further over lunch and revisit this item at the end of the meeting.

The ENGO caucus subsequently advised that it would agree to a revised process where the board is involved with approving the subgroup reports prior to them going to AEP for a decision on the AQO, recognizing that this is a different approach than CASA usually takes. As the charter is developed, additional clarity should be provided on the process. The caucus does not see a need to use electronic voting and thinks the board should be involved in the usual way.

The project team was directed to draft a charter, reflecting and addressing the process concerns raised by board members in this discussion. The charter will include a section describing the team's approach and what the board's role will be with respect to the team's reports. In particular, the team will propose text that defines an appropriate role for the Board given their accountability for all work produced by CASA. The draft charter will be presented to the board at the December meeting. In the meantime, the team will continue its work and is expected to have its first report ready by March 2018.

2.2 Non-Point Source (NPS) Project Team

Rhonda Lee Curran reviewed the original project schedule and the amended schedule for the NPS team. The team is in the final stages and is finalizing its report but needs two more months to complete its work. No additional funding is requested. She described in detail the adjusted timeline to finalize the report and the detailed budget breakdown will go to the board in December.

Decision: The board agreed by consensus to extend the timelines and amend the project charter for the Non-Point Source Project Team.

2.3 Strategic Planning

Andre Asselin provided background on strategic planning at CASA. Three-year strategic plans have guided the direction of the organization; the previous plan ended in 2016 and development of a new plan was delayed at that time for various reasons. He reviewed recent history, current challenges and opportunities, all of which have created some uncertainty. The executive

committee has discussed the current situation and how to move forward. The proposal is to strike a small steering committee (SC) of three to six members to look at what is going on inside and outside CASA and recommend a path forward for presentation to the board in December. The strategic planning work would begin early in 2018 with the goal of completion by June 2018.

Discussion

Board members noted the following points in discussing this item:

- Will we be able to take an integrated look at both air and water? I would have some concerns around capacity.
    - Andre Asselin (AA): The strategic plan will identify priorities and what can be done with existing capacity. There shouldn't be a big problem with a multi-media approach. The eventual goal is to have CASA and AWC project managers provide some cross pollination and collaboration. The executive director will be an active member of the SC and can provide a link to the AWC executive. AWC will be doing a strategic plan in the next year too.
- Could this work not be done by the executive committee rather than a new group?
    - AA: Executive members thought there was a need for wider involvement but they could certainly participate. We need to look at everything we are doing and whether we are doing it effectively. We expect there will be two or three meetings before December and some reading. Face to face meetings are best, but we could arrange teleconferences if a member could not be there in person.
- A lot of provincial and federal legislation is pending between now and the end of 2017 so we don't want to be premature. We need to keep on top of what governments are doing.
    - AA: The SC can look at these aspects and advise if the plan should be deferred. The SC will not develop new goals, etc. but rather a plan. If the board agrees with the proposed process, the secretariat will follow up with a call for members.

Decision: The board agreed by consensus to strike a strategic planning committee to review relevant information and recommend to the board an approach to CASA's next multi-year strategic planning, which should occur in 2018.

2.4 Statements of Opportunity

The board received two SOOs from AEP: 1) the ROVER III project (on-road vehicle emissions testing study and path forward for highest emitters), and 2) Managing NOx Emissions from the Conventional Upstream Oil and Gas Sector. Both SOOs were presented, with questions for clarification, then the board considered if they could be approved as potential CASA work.

Rover III Project

Rhonda Lee Curran presented the ROVER III SOO, which was informed by the NPS project and the importance of managing both point and non-point sources. She described the major NOx emission sources and noted that the proposed project would help manage NOx as well as VOCs and $PM_{2.5}$ from the on-road transportation sector, especially diesel-fuelled trucks. This work would not be done for compliance purposes but to gather data to effectively target management actions. She described the resources needed in terms of expertise and information, stakeholders, and funding (rough estimate of $100,000). This is expected to be about a 12-month project with sequential objectives. The location would depend on what the working group decides, to get the

"biggest bang for the buck." The proposal is to focus on both light-duty and heavy-duty trucks but to test emissions from any vehicle (i.e. not exclude passenger cars).

Discussion

Q: Is this primarily an urban project?
A: We will look at what is the best location to get the data we need. If trucks only use one route in rural locations we could look at it but a gravel road would not be ideal. The expectation is that we would focus on highways and the urban environment as the CAAQS results focus on urban areas.

Q: Environment and Climate Change Canada has guidelines for heavy-duty vehicles. Will the focus be on emissions forecasts, anti-tampering, etc.? What might the final recommendations be?
A: We are looking to get data on the existing in-use vehicle fleet, not new vehicles; e.g., are particular model years or types of vehicles of most concern? We want to characterize the existing fleet to help target management actions.

Q: Regional plans indicate what emissions come from different sources. Will the project look at content of the regional plans?
A: Yes. In some places, the relative contributions from vehicles are higher due to less industrial sources in the area but vehicles are an important emission source across the province.

Q: Are there any plans to expand the focus to other trucks or vehicles beyond diesel-fuelled trucks?
A: The project is not limited to diesel-fuelled trucks. They were highlighted as the focus because their total emissions contribution is higher.

Q: In what season would ROVER operate?
A: Technology is limited when it rains, and in the summer we could get more vehicles from other provinces. The timing would be determined during development of the Project Charter.

Board members noted that the ROVER project is a good opportunity to showcase CASA and to fulfill one of the recommendations on NPS.

Decision: The board agreed by consensus to approve the ROVER III statement of opportunity as potential work.

Managing NOx Emissions from the Conventional Upstream Oil and Gas Sector
Sheila Lucas presented the SOO on Managing NOx Emissions from Conventional Upstream Oil and Gas Sector. Preliminary estimates show that, in a business as usual scenario, Alberta will have air zones in the orange and red management levels in terms of the NO_2 CAAQS. A large portion of Alberta's NOx emissions come from the conventional oil and gas sector and she described a range of activities that would be considered as upstream and conventional. There was particular consideration for work that could be done in one year and that would have potential

co-benefits to reduce other pollutants like $PM_{2.5}$ and ozone. The intention of the SOO is to collaborate to develop options to reduce NOx emissions. The expectation is that in-kind resources would be used and no additional funding would be required.

Discussion

Q: Do you envision looking at existing sources as well as potential new sources (e.g., equipment) and what NOx standards should be for that equipment? I like the idea of looking across sectors.
A: The scope can be further defined by the working group, but we want to look at this sector. Some information is available now but we need to better understand the type of equipment that is in place and being installed, and identify reduction solutions. Unlike other sectors that fall under EPEA approvals, there is no way to get this information.

Q: Is the main focus then on non-EPEA approval holders?
A: EPEA approved facilities are in scope but special consideration is given to non-EPEA approval holders. The working group could further clarify the scope.

Q: What will the end result be? We don't want to see facilities shut down because they can't afford to lower their emissions.
A: We want to inform policy options to reduce NOx to help Alberta achieve the CAAQS. This is one approach. The intent is not to shut down facilities.

The board then discussed this SOO in more detail:

- CAPP members noted three areas of concern: 1) Under multi-sector air pollutant regulations, are some BLIERS that specifically address emissions from this sector. They come into effect in 2021 and will yield a 40% reduction in NOx emissions by 2025. As such, CAPP sees this SOO as duplication of effort. We should wait to see the impact of these regulations. 2) CAPP does not view this as a real multi-stakeholder project as essentially just one section of one sector would be at the table. That would be the first CASA team with just one industry member. 3) The end game is compliance with the NO_2 and other CAAQS and this SOO seems to imply that this will be achieved only by looking at this sub-sector; an answer is proposed without clearly laying out the question. CAPP members would favour a broader look at the problem; e.g., take a fresh look at data and do the modelling to look at overall NOx emissions in Alberta and where there is non-compliance. CAPP is not convinced the proposed approach will achieve NOx reductions, especially in urban areas. If this SOO is chosen, the scope should be reviewed carefully to get better data, look at where the problem is in terms of monitoring station locations, impact of BLIERS, etc.
- Yes, we are looking at just one slice of the NOx emissions pie, but if the modelling and monitoring indicate that new NO_2 CAAQS will put most or all of the air zones in the orange or red management level, we need to decide where our efforts go. We have limited capacity and resources and want the biggest bang we can get. A lot will likely improve with BLIERS, but they are a minimum. Where we do have air quality under pressure, we all recognize that we will have to go beyond BLIERS and, in some cases, a lot more than what BLIERS requires. BLIERS aims to get 40% but maybe we should be

looking at 50%. I would support this SOO with some of the issues raised by CAPP to be addressed in the project charter.

- AEP has a number of levers it can use to reduce NOx with EPEA holders, but not with non-EPEA holders, which is why this SOO came to CASA.
- Projections are that many regions will exceed CAAQS but we are looking at stringent regulations on large engines in the sector and this is where most NOx emissions come from. Given the one-year timeline for this SOO and reliance on existing in-house experts, it's hard to see how this group could come up with something else. This is not the best use of CASA resources and the multi-stakeholder process.
- We are talking about a NOx reduction framework and one is already in place for the electricity sector. It seems we need more clarity on scope to ensure there is no duplication.
- Waiting is not an option. Part of the charter could focus on coordination with other initiatives to ensure efficient use and application of all the approaches.
- This is an opportunity for all stakeholders to look at this sector and see what can be done to reduce emissions and if we can enhance existing measures to get more reductions.
- Clearly more refinement of the scope is needed but if this work does not occur in CASA, it could be done elsewhere with less opportunity for multi-stakeholder participation.
- The idea from AEP was to bring this SOO to the CASA board for discussion and the working group could refine the scope with attention to ideas presented today and subsequently. AEP is open to this discussion and has interests to bring to the table too. This project would help achieve the CAAQS and we are not interested in duplicating work. We want to do it collaboratively and nimbly. If the scope did change to require hiring a consultant or extra funds for other work, we would have to come back to the board as the current SOO does not account for that.

Decision: Recognizing that the scope of the project needs to be reworked, the board agreed by consensus that the SOO on Managing NOx Emissions from Conventional Upstream Oil and Gas Sector is appropriate potential work for CASA.

The board then moved into a discussion on sequencing future work. CASA has capacity to start a new project now, and should be able to take on another one by next summer. However, additional new priorities could emerge from strategic planning.

- The scales are different. ROVER is a relatively light project that would be easier to do and resource, while the NOx project is more substantial.
- The NOx project would likely give us more rewards although it is more complex.
- GOA is prepared to support both projects, but it seems more work is needed on the NOx project. We want to ensure we can deliver something in the timeframe needed.
- If we want timely deliverables showing how we will address potential NO_2 exceedances, ROVER has more potential. It is likely to take at least two years to see results from the other project.
- We also don't want to jeopardize any other recommendations that come from the NPS team if we take on ROVER now. That is not expected to be an issue.

Decision: The board agreed by consensus to a) launch a working group for the ROVER III project that will come back to the board with a draft charter at the December meeting; and b)

ask the secretariat to facilitate a collaborative discussion on a new scope for the NOx emissions SOO that can be presented again to the board at a future meeting.

2.5 Performance Measures Committee

Ruth Yanor and Marilea Pattison Perry presented the 2016 report from the Performance Measures (PM) Committee. 2016 was the second year in which the revised PMs were used. Ruth presented a high-level summary of the PM results, directing board members to details in the full report. The Committee suggested assessment of PM 3b be deferred to next year. Marilea presented results of performance indicators related to air quality, noting overall trends.

Discussion

The following points emerged in the board discussion:

- The board had requested the addition of PM 3b awhile ago, but there are now four years of data to get through. Strategically, is this still something we want to track?
- This is not our role and this should not be continued.. How will it inform us to make improvements?
- Are these recommendations for others to do something? If so, do we want CASA to be accountable for the actions or inaction by others?
    - There was a desire to determine what happened to recommendations that were not just substantive and related to air quality, but also those that were more related to process or engagement. It might be useful to assess it once as it could affect the types of recommendations teams make. Then we can decide whether to keep it based on the results.

The board agreed that PM 3b would be assessed next year and then the board can decide whether to keep it.

Decision: The board agreed by consensus to approve the 2016 Performance Measures Committee report.

2.6 Environmental Monitoring and Science Presentation

Dr. Fred Wrona, head of the Environmental Monitoring and Science Division (EMSD) in AEP, presented a brief overview of the current air monitoring system and why air quality is monitored. He described his roles and responsibilities as chief scientist, noting that data and reporting are key parts of his mandate. Bob Myrick, also with EMSD, looked in more detail at how air quality is monitored and the different technical approaches, including non-routine monitoring. He noted the work of existing airsheds and the fact that Alberta still has a substantial area not covered by airsheds. The EMSD is also working to provide additional analysis and evaluation of air data. The presentation concluded with information on development of the five-year Air Quality and Deposition Monitoring Plan to adapt the air quality and deposition monitoring networks design. The aim is to have a clearly defined scientific purpose for the monitoring that is done and an indication of what needs to be done each year. The intent is to finalize the plan in the summer of 2018. Copies of the presentation slides were circulated along with a draft annotated table of contents for the five-year Air Quality and Deposition Monitoring Plan.

The board then engaged in discussion with the two speakers:

Q: Compliance with CAAQS under the national system relies on data from the National Air Pollution Surveillance System (NAPS). Will NAPS stations be under the Air Monitoring Directive and if so how many will we have in Alberta?

Bob Myrick (BM): With NAPS, we have a memorandum of understanding with Environment and Climate Change Canada whereby they provide equipment and we provide data back to them. The NAPS stations in Alberta are primarily in urban areas. About 15 of our 60 stations are part of NAPS. We use data from them as well as from all the airshed stations that meet specified criteria. Only if a station is located inside a fenceline do we not use that data. Reporting is based on all stations.

Q: My issue is how the planning is being done. The earlier CASA process to do the Air Monitoring Strategic Plan (AMSP) was very good; stakeholders talked about how, where and when to monitor. One recommendation that everyone supported was that another team would form in five years to review and update the AMSP. In the interim, we had AEMERA and now we have the EMSD. There is a real need to engage stakeholders at this table to help build the monitoring plan.

BM: The first one was done through CASA and was a good process but it took too long to do. In the CASA process, you feel like people are lobbying and sometimes the person who speaks loudest holds sway. We had a lot of ambitious recommendations that the government of the day had no plans to implement. This time we want to do a plan that will be implemented.

Fred Wrona (FW): We are still thinking about how to do this. It's not intended to be an EMSD plan, nor will it be. We are required to ensure appropriate stakeholder discussion and input to the integrated system. With this exercise, we want to ensure it's not just a strategic direction but also very pragmatic, and that we have an implementation plan that says "here's what we'll monitor and for what purpose" so we can justify where our resources are going. For this plan to work, we do need to have stakeholder input as part of the process. We will take this input back on how to improve our process and ensure we have timely and appropriate engagement. We are building new scientific capacity in Alberta but funding is tight so we also want to look at innovative funding models.

Q: Where do you see the proper level of engagement with CASA occurring?
FW: There should be points in the process in various areas where CASA and airsheds could be part of the development; e.g., a special set of sessions on how to improve public reporting in Alberta. We don't have timelines for all the pieces yet but we do need to look at a five-year plan regarding priorities and key questions that an air monitoring network needs to address, among other things. We hear that CASA wants to be involved at an early stage; we are not planning to table ideas and ask for comment. We are running an adaptive program that has to deal with current and emerging issues and we see enhancing it on an ongoing basis.

Q: My concerns relate to the gap in airshed coverage, the requirement to have three years of data to determine ozone exceedances and lack of follow up if there is an issue.

FW: We recognize we have some issues. Do we need a study to look at what went wrong in certain situations and how do we deal after the fact with mitigation, reporting, etc.? There is also the issue of timeliness; e.g., is releasing a report in 2017 that is based on 2013 data the best we can do to inform the public? We have to do a better job of getting information to the public. We have a lot of data going in that we can't access and that needs to be addressed too.

Q: What is driving the timeline to have the plan done by summer 2018?

FW: We know there is a need to have a system for the province. We set ambitious timelines to get the process going and some areas may take longer. We would rather have aggressive timelines to work toward. The sooner we can inform various processes the better, but we don't set timelines at the expense of getting it right.

The chair thanked Fred and Bob for their presentation and noted that CASA welcomes the commitment to look at the timeline and hopefully involve CASA earlier. The December board meeting might be one opportunity to talk about the substance in the draft report with information provided in advance to the board to enable useful feedback.

2.7 Alberta Airsheds Council (AAC) Update

Andre Asselin provided a short update. He met with Karla Reesor and Gary Redmond to review the history and evolution of airsheds. At this time, there is still a lot of uncertainty regarding the role of airsheds and the relationship with CASA. In light of CASA's pending strategic planning work, this discussion will be put on hold until the strategic planning work is completed.

3 New/Other Business

3.1 New/Other Business

No new or other business was identified.

3.2 Evaluation Forms

Members were asked to complete meeting evaluation forms for review by the executive.

The next CASA board meeting will be December 13, 2017 in Calgary.

The meeting adjourned at 2:53 p.m.

Executive Director Report September 14 – November 23, 2017

Amalgamation with AWC

We have been making steady progress and expect office administration to be amalgamated by January 1. One of the biggest tasks and areas of greatest cost savings is largely complete. Our financial administrator Sunny Yeung modernized CASA's financial administration and it is running efficiently and smoothly. Starting in 2018, payroll will be run internally rather than through a third party.

Another big piece remaining is the IT system amalgamation, which is underway but will move at full speed following this upcoming board meeting. I expect to be up and running with a single IT system January 1. Some capital expenditures and costs related to bringing the IT systems together are required, but there are unspent funds from 2018 for these unbudgeted expenses. CASA will regain these expenses through attained cost efficiencies by mid-2019.

Staff continue to finalize changes to the physical space in the office. As discussed at the previous meeting, harmonizing the HR policies is important and underway. I am eagerly expecting to hire an operations manager in early 2018.

Project Team Deliverables for the Board Meeting

The various project teams have been making good progress since our last meeting and I am looking forward to hearing updates and approving final reports.

I have been particularly impressed by our members' and staff' (including contractor Matt Dance) dedication and effort to deliver the Coal to Gas Project report. This high priority work from the GoA was brought to us with a very compressed timeline and CASA is on track to deliver on the requested timeline. The team needs a bit more time to complete their discussions and will be providing their report and a decision sheet as a supplementary package that will be distributed to you no later than December 6.

The Strategic Planning Steering Committee has not met and will not be able to provide the recommendation to the board as discussed at the September meeting. Other high priority pieces of work have prevented me from giving this the attention required to move it forward. I intend to pick this work up following the board meeting with the intent to bring forward an approach to the board at the spring meeting.

Finances

CASA is in a good position leading into 2018. We had significant carry over from the previous grants received from Energy to cover core operations and amalgamation costs, and AEP's grant of $650,000 to support our 2017 fiscal year arrived in September. As of November 1, we had $793,759 available for core operations (internal). The attached summary shows core operations

expenses up to October 31, 2017 of $544,602 and I am projecting CASA will spend approximately $750,000, well below our budget of $850,000. Our wind down fund is well supplied at $228,835. The Non-point Source Team came in under its external budget estimate. There are external project team funds available at this time to support other project work, however, the Electricity Management Framework Review and the ROVER III project teams that are expected to run in 2018 and 2019 will need significant external funds to complete their work.

The draft core operating budget for 2018 will be $750,000, as was noted in our previous grant application to AEP.

Other CASA staff activities:

- Staff and contractors continue working hard and meeting with stakeholders to ensure project work continues to move on pace
- Andre presented an update to the Crop Sector Working Group and attended an Alberta Airsheds Council meeting in the CASA office.
- Following our presentation from EMSD in September, staff areworking with Bob Myrick to host an electronic platform this month where they can engage the air community to seek input on the monitoring plan and follow up with results and next steps in the future. and

Respectfully submitted,

Andre Asselin
Executive director

CASA Operational Plan 2017 – November Update Summary

Project/Initiative	Timing	Objectives	Original timeline	Status
Board of Directors	Q1	Receive 2016 Financial Statements	March Board Meeting	Complete
	Q2	Annual General Meeting	June Board Meeting	Complete
		Review 2017 Budget	June Board meeting	Complete
		Approve 2016 Financial Statements	June Board meeting	Complete
	Q3	Report from NPS Project Team	September Board meeting	Team is bringing the final report for approval in December.
	Q4	Approve 2018 Draft Budget	December Board Meeting	On track
Executive Committee	Q1	Review 2016 Draft financial statements	February meeting	Complete
		Consider need for renewed strategic plan (2017 – 2021) based on results of CASA 2.0 Work	February meeting	Strategic planning will occur in 2018. A steering committee will recommend a path to the board in March 2018. CASA will likely hold a workshop in September.
		Performance Review/process for Executive Director	February meeting	Complete
	Q2	Review 2017 Budget	May Meeting	Complete
		Review and Approve 2016 Financial Statements	May meeting	Complete
	Q4	Approve 2018 Draft Budget	November meeting	On track
Strategic and Operational Planning	Q1	Consider need for renewed strategic plan (2017 – 2021) based on results of CASA 2.0 Work	March Board Meeting (depending on discussion at Executive)	Strategic planning will occur in 2018. A steering committee will recommend a path to the board

				in March 2018. CASA will likely hold a workshop in September.
	Q2	Review Operational plan, budget update	For June Board meeting	Complete
	Q4	Draft 2018 Operational Plan	For December Board meeting	Plan to present draft for approval in time for March 2018 board meeting, after budget is approved.
Secretariat	Q1	Assess workload and budget, decide on need for new project management resources (staff or contract) as projects move forward	Will depend on actual grant and workload, may be reassessed during the year.	New project started in September. Carrying fairly full workload with contractor support. New hires will determine potential workload along with strategic planning in 2018.
	Q1/2??	Move to South Petroleum Plaza		Complete
Communications	Q1	Develop listing of Clean Air Day activities	January ff (Note very little activity reported last year)	Complete
	Q2	Coordinate CASA involvement in Board member activities and plan CASA Clean Air Day activity		Complete
		Annual Report	Draft Content for June Board meeting, distribution July/August	Annual Report is undergoing final layout edits and will be released prior to December 13 board meeting.

	Ongoing	As available, provide educational and workshops on CASA's work and other air topics for board members and beyond (more and smaller) As requested, provide educational sessions on Interest Based Negotiation, CASA products (e.g. Odour Guide) Provide materials for stakeholders to assist in their communications activities in which CASA plays a role. Renew Twitter account and work to develop interest in stakeholders and air community		Executive Director provides updates to groups on CASA's work as requested. In 2018, intend to host a workshop on an air topic to the air community. Two day interest-based negotiation training workshop held in Spring (Calgary). ED has offered to provide IBN support to Airsheds. However no requests have been received. Ongoing Ongoing
Outreach	Q1- Q4	Continue relationships with the Alberta Water Council, Land Use Secretariat, IRMS Office, Alberta Airsheds Council, etc. Assess opportunities to determine roles, responsibilities and new collaborative options.		Ongoing. ED is on AWC executive committee and board providing constant line of communication. Regular meetings with AEP policy staff. Participated in airsheds meeting. Direct conversations with all directors RE: Coal to Gas work.
Performance Measures Committee	Q1	Evaluate 2016 Performance Results, prepare report for June Board meeting, Annual Report		Board approved report in September which is informing the Annual Report

Non-Point Source	Q1 – Q3	Project will work throughout 2017	Team is planning to report to the September Board meeting. Recommendations for follow up work are anticipated.	Team is bringing the final report for approval in December.
Possible work from CASA 2.0 work (Air monitoring strategy?)	Q1	Based on CASA 2.0 work and discussion with Environment and Parks, draft a Project Charter	Timeline may be dependent on feedback from Monitoring and Science – may include staged work. Aim at Project Charter for March Board meeting	Complete. Team has met twice.
	Q2	Assuming Project Charter accepted, Project Team struck in April and begins work.	Timelines may be compressed if required.	Complete. Work informing systems mapping. Team has met twice.
	Q3,Q4	Project Team at work		CASA 2.0 report will inform strategic planning in 2018
Odour Management	Ongoing	Distribute GPG, based on Communications plan	Underway – has been presented to SPOG, Airsheds	Team complete. GPG available online and as requested
IRMS "Road Map"	On Hold	On hold pending further direction from the government	May not proceed. Remove for 2018?	On hold
Unknown Shorter Term work from CASA 2.0		Conference or workshop style event on air research needs or health-related or a focused piece of work done in a shorter time frame.	TBA	High priority work identified: ROVER III working group launched and Coal to Gas Project underway with compressed timeline.

Clean Air Strategic Alliance
Internal Core Expenses Oct 31/2017

Expense Account			Expenditure to date	Budget Jan 2017
Supplies & Services				
	Advertising		0	5,000
	Bank and Finance Charges		861	1,498
	Computers & IT		20,454	29,122
	Courier		39	400
	Depreciation		0	0
	Development- Stakeholders		5,000	0
	Furniture & Display		0	5,000
	Office Move		3,131	12,000
	Honoraria - Stakeholders		30,467	66,578
	Insurance		4,000	4,800
	Meeting Expenses		9,940	13,180
	Office Supplies		2,916	4,365
	Print & Reproduction Services			
		Annual Report	0	5,000
		General	973	2,822
	Repairs & Maintenance		0	500
	Records Storage		1,198	1,689
	Subscriptions		767	3,600
	Telecommunications		4,705	6,415
	Travel			
		Consultants	1,687	0
		Stakeholders	13,970	28,847
		Staff	5,337	28,440
	Supplies & Services - Other		560	0
Total Supplies & Services			**106,006**	**219,256**
Professional Fees				
	Legal Fees		972	3,000
	Audit		9,200	9,200
	Consulting Expense		34,395	0
	NGO Sector Coordination		8,750	21,000
	Accounting Fees		4,375	34,500
Total Professional Fees			**57,692**	**67,700**
Human Resources				
	Salaries & Wages		308,553	451,682
	Employer Contributions		14,106	20,827
	Group Benefits		33,973	46,953
	Group Retirement Savings Plan		22,542	31,386
	Performance Pay		0	0
	Employee Recognition		465	1,200
	Staff Development			
		Membership Fees	0	475
		Training	238	5,000
	Temporary Staff & Contract Labour		1,027	5,000
	Recruitment		0	1,000
Total Human Resources			**380,904**	**563,523**
Uncategorized expense				
Total Expenses			**544,602**	**850,479**

DECISION SHEET

Item 1.4	**Approve Proposed 2018 CASA Core Operating (Internal) Budget**
Issue:	Review and approve the proposed 2018 CASA Core Operating (Internal) Budget.
Background:	The CASA operates within a fiscal year ending on December 31. CASA is funded by an annual grant from Alberta Environment and Parks, which operates within a fiscal year and granting cycle ending on March 31. Therefore this proposed 2018 CASA Core Operating (Internal) Budget will inform our next operating grant. The board needs to review and approve the 2018 CASA Core Operating (Internal) Budget.
Status:	The executive committee has reviewed the budget and is recommending the board approve it.
Attachment:	CASA 2018 Budget (2nd Draft)
Decision:	Approve the proposed 2018 CASA Core Operating (Internal) Budget.

CASA 2018 Budget (2nd Draft)

CASA	2018 Budget
Human Resources:	
Gross Salaries*	340,000
Employee Benefits*	50,000
CPP*	10,200
EI*	4,800
WCB*	1,000
Training & Conferences*	8,000
Staff Travel Expenses*	10,000
Sub Total	424,000
Office Administration:	
Printing & Design	5,000
Total Office Operations*	25,000
Insurance *	4,000
IT Support*	16,000
Service Fees (Bank)*	1,000
Repairs*	1,000
Sub Total	52,000
Professional Fees:	
Legal	1,000
Auditor	9,200
Sub Total	10,200
Consultants (Core Business):	
Project Management	5,000
Communications and Outreach	15,000
Accounting and Admin.*	37,500
Strategic Planning/Other	10,000
Sub Total	67,500
Project Costs:	
Honoraria (Teams)	53,000
Travel/Accomm. Expenses	20,000
Sector Co-ordination	21,000
Hosting	5,500
Recognition (Teams/Members)	3,000
Sub Total	102,500
Board Costs:	
Honoraria (Directors)	10,000
Travel/Accomm. Expenses	14,000
Hosting	20,000
Indigenous Relations*	50,000
Sub Total	94,000
TOTAL	**750,200**

DECISION SHEET

Item 1.5 **Scheduling 2018 Board Meetings**

Issue: Select format, schedule and locations for 2018 meetings

Background: CASA's bylaws require that the board meet at least three times a year, and that the annual general meeting (AGM) be held before the end of December.

CASA's 2018 budget is expected to decrease a further $100,000. In light of a reduced budget and expressed preferences from some directors to ensure agendas are filled with substantive content, the executive committee is proposing that CASA schedule three meetings in 2018 rather than four.

A key benefit of fewer board meetings is significant savings in productivity and costs for members, their organizations, support staff, and CASA. As well, there will be more time between meetings for teams to do more work and have more substantive updates at the meetings.

It is important to ensure that meeting slightly less frequently does not negatively affect CASA's ability to provide deliverables on required timelines. CASA has an established process to call a meeting on short notice to address any critical issues should the need arise, and the executive committee would not hesitate to call an unscheduled meeting if needed.

Staff are also investigating the possibility of hosting video-conference meetings that are simultaneously held in Edmonton and Calgary at GoA facilities to reduce costs and encourage participation.

For 2018, the executive committee is recommending the AGM be held in April, and that a one or one-and-a-half-day strategic planning workshop be added to the September meeting.

Further, CASA could hold a reception and recognition dinner the evening prior to the last board meeting of the calendar year. It is a relatively inexpensive way to facilitate informal board member interaction and help build relationships. It also provides an opportunity to recognize directors who have stepped down during the past year for their efforts to this worthy organization. The Minister of Environment and Parks could be invited to attend and address the group.

Status: The executive committee is proposing that:

- the board schedule three meetings in 2018, continuing to alternate between Calgary and Edmonton, on the following dates that align with the President's availability; and
- the AGM immediately precede the April meeting, and
- a one or one-and-a-half day workshop to inform strategic planning be added to the fall meeting, and
- CASA hold a recognition event the evening prior to the December board meeting.

Decision: Approve the following CASA meetings for 2018:

Meeting	**CASA** **Date and location**
AGM and Board	April 12 (Edmonton)
Strategic Planning Workshop	September 27 (Calgary)
Strategic Planning Workshop + Board Meeting	September 28 (Calgary)
Recognition dinner	December 12 (Edmonton) 5:00 pm – 8:30 pm
Board	December 13 (Edmonton)

DECISION SHEET

Item 1.6: **Changes to Signing Authority**

Issue: To conduct the business of the CASA, contractual agreements must be negotiated, and authority is required to make payments.

Background: CASA's bylaws require that new signing officers be approved by the CASA board. CASA's current signing authorities include Andre Asselin, Cara McInnis, Rick Blackwood, Peter Noble and Bill Calder.

CASA's requirements for signing authority on payments are:

- For cheques **under** $10,000, any two approved signing authorities (staff or directors) are required.
- For cheques **over** $10,000, one approved staff and one approved director are required.

A significant component of the amalgamation with AWC has been the modernization of CASA's financial administration. CASA has embraced online banking and this approach is much more efficient; however it can be further improved by granting Financial Administrator Sunny Yeung signing authority to set up the payments in online banking that the ED then approves and releases. This process has been used by AWC for several years, is auditor approved, makes it simple to audit, and has had four clean audits since using this process. It is also prudent to have a third staff signing authority in the office.

CASA's contribution to the payroll with a full staff under the amalgamated structure in 2018 will exceed $10,000 and will exceed $15,000 if nominal increases are provided to staff within two years. The executive director requested that the limits be increased to $25,000. This is the same amount the AWC approved and would make it simpler to administer.

Status: The Executive Committee is recommending that the board approve adding the Financial Administrator Sunny Yeung as signing authority and increasing the signing limits above from $10,000 to $25,000

Decisions:

1. Approve Financial Administrator Sunny Yeung be granted signing authority.
2. Approve increasing the limits of the signing authorities to $25,000.

INFORMATION SHEET

Item 2.0: **Government of Alberta Update**

Issue: Hear an update on recent developments within the Government of Alberta and provide an opportunity for discussion on relevant topics of interest.

Background: This is an opportunity for the Government of Alberta to update and engage the Board.

DECISION SHEET

Item 3.0: **Coal to Gas**

Issue: The Coal to Gas Project Team is still working on its report which will be distributed as a supplementary package no later than December 6th.

DECISION SHEET

Item 4.0 **Ambient Air Quality Objectives**

Issue: Approve the Team's Project Charter and receive an update on their progress.

Background: At the December 2016 Board meeting, the CASA Board of Directors approved a Statement of Opportunity from Alberta Environment and Parks (AEP) for the formation of a CASA Ambient Air Quality Objectives (AAQO) Project Team. The priorities are in response to the development of Canadian Ambient Air Quality Standards for $PM_{2.5}$, O_3, NO_2 and SO_2 and the carry forward of two substances from the previous Alberta Ambient Air Quality Objectives Stakeholder Advisory Committee work plan, total reduced sulphur (TRS) and H_2S. These priority substances are the focus of AEP's work plan on ambient air quality objective development and review.

The team has laid out staggered timelines to address all six substances. Sub-groups that report to the team were established to take on the bulk of the work for each substance.

Prior to Board approval of the AAQO Team's terms of reference, a concern was raised that the proposed process used to transmit the AAQOs to the client (AEP) was outside of CASA's normal process. Initially, the team proposed to approve the AAQOs and forward them to AEP without the Board's approval. The concern was that the product would be considered a CASA product but the board would not have the opportunity to approve the findings prior to a report going out with the CASA brand.

The team was directed to follow the typical CASA process and draft a project charter that clearly addresses this gap for review and approval by the board.

The team's subgroups have made significant progress on developing draft AAQOs for $PM_{2.5}$ and H_2S.

Status: The team is presenting its project charter for approval as well as an update on their work

Attachment: Draft project charter

Decision: Approve the project charter

Clean Air Strategic Alliance
Ambient Air Quality Objectives Project Team
Project Charter

20 November 2017

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Introduction

Ambient air quality objectives are an important part of Alberta's air quality management system as they help protect the health of Albertan's and the environment. Alberta Environment and Parks (AEP) sets ambient air quality objectives for the province under section 14(1) of the *Environmental Protection and Enhancement Act* (EPEA). It is important that the objectives be reviewed on a regular basis and new objectives be developed when there is a need.

Background

Since 2001, AEP has worked with a multi-stakeholder committee, the Alberta Ambient Air Quality Objective Stakeholder Advisory Committee (AAAQOSAC) to develop and review ambient air quality objectives. The committee successfully developed or reviewed thirty objectives in that time. The committee was sunsetted in December 2015.

At their December 2016 Board Meeting, the CASA Board of Directors approved a Statement of Opportunity from AEP for the formation of a CASA Ambient Air Quality Objectives Project Team (AAQO Project Team). The priorities are in response to the development of Canadian Ambient Air Quality Standards (CAAQS) for $PM_{2.5}$, O_3, NO_2 and SO_2 and the carry forward of two substances from the previous AAAQOSAC work plan, TRS and H_2S. CAAQS have been developed for long-term air zone management and are reported on annually. AAQOs are used in a number of ways, including to assess compliance near major industrial air emission sources and to report on the state of Alberta's atmospheric environment. These values are also applied in various assessments used to model and predict the impact on air quality and human and environmental health (e.g., Environmental Impact Assessments, Human Health Risk Assessments etc.). AAQOs cover averaging periods ranging from 1 hour to 1 year (annual). Alberta is reviewing their current AAQOs in light of recent CAAQS changes.

These priority substances are the focus of Alberta Environment and Park's work plan on ambient air quality objective development and review. One of the following approaches is used for the substances under consideration:

- Objective development is undertaken when no Alberta objective exists; and,
- Objective review occurs when an Alberta objective is already in place.

Clean Air Strategic Alliance's Key Role

CASA's diverse membership makes it well positioned to bring stakeholders together to discuss air management issues. While it is preferred that the AAQO Project Team develop consensus recommendations, CASA recognizes that there may be different opinions around the table on what the objective should be. The intent for this team is to provide AEP with the range of perspectives from those CASA members participating on the Project Team while concurrently striving to reach consensus. If non-consensus recommendations are brought forward it is the responsibility of the project team to document the views, rationale, and present it to the board. The board will formally approve the team's reports and submit to AEP for consideration in the setting of the AAQO.

Alignment with CASA Core Business

The vision of CASA is "the air will have no adverse odour, taste or visual impact and have no measurable short- or long-term adverse effects on people, animals or the environment." The development of ambient air quality objectives is in line with achieving this vision and the use of a collaborative multi-stakeholder consensus approach is consistent with CASA's mission. It is also in line with CASA's goals: to protect the environment by preventing short and long-term adverse effects on people, animals and the ecosystem, to optimize economic efficiency and to promote pollution prevention and continuous improvement.

Scope

The AAQO Project Team is to recommend ambient air quality objectives for $PM_{2.5}$, O_3, SO_2, NO_2, H_2S and TRS based on careful review and consideration of:

- scientific information, adverse health and ecosystem effects specific to the substance; and
- technological and economic factors.

The Team will strive to reach consensus recommendations where possible. The reports will be sent to the board for approval. Once approved, the reports will be submitted to AEP for consideration.

Project Goal

The Ambient Air Quality Objectives Project Team, will develop:

1. Reports with substance specific AAQO recommendations according to the project schedule.

2. A final report that will summarize the substance specific reports and provide additional process context including a summary introduction and conclusion.

The substance specific reports and the final summary report will also provide a rationale for proposed ambient air quality objectives that considers the current science as well as technological and economic factors. A recommendation on a new, revised or reconfirmed PM2.5, O3, SO2, NO2, H2S and TRS ambient air quality objective.

Project Objectives

1. Recommend a new, revised or reconfirmed AAQO for $PM_{2.5}$ by March 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.

2. Recommend a new, revised or reconfirmed AAQO for O_3 by September 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.

3. Recommend a new, revised or reconfirmed AAQO for H_2S and TRS by December 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.

4. Recommend a new, revised or reconfirmed AAQO for NO_2 by September 2019. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.

5. Recommend a new, revised or reconfirmed AAQO for SO_2 by December 2019. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.

6. Provide a final summary report on the team's process and success by March 2020.

Project Deliverables

The AAQO Project Team will provide the CASA Board with a report for each of Project Objectives 1-5 for approval. The Team will also provide a final summary report for Objective 6. The AAQO Project Team will recommend that the CASA Board approve each of these reports and forward them to AEP. Each of the substance reports will include:

1. A recommendation for a new, revised or reconfirmed AAQO.
2. An overview of the scientific, technological and economic information and factors that were reviewed and considered by the team.
3. If there are non-consensus views on a proposed recommendation, those stakeholders with the dissenting views will provide detailed description of those views, including why they don't agree with the proposed recommendation. They will also detail their preferred recommendation with a rationale.

In addition to the deliverables described above, the AAQO Project Team will keep the CASA Board apprised of their progress through frequent written and verbal updates. CASA acknowledges that this is high priority work for Alberta Environment and Parks, and is striving to complete the work in a timely manner.

Unique Nature of the AAQO Project Team's Work

The nature of this team's work means it is possible to have non-consensus on proposed objectives. Some non-consensus recommendations are a possibility and should not be seen as a failure. The AAQO Project Team will strive for consensus, however, if they do not achieve consensus the report will outline non-consensus positions including a rationale for each position. This detailed documentation of positions will act as information and context to assist AEP in its decision on the ambient objective in question. It is also recognized that AEP has a subsequent public review process for proposed AAQOs, and a consensus recommendation from CASA could in some circumstances not be adopted by AEP. Whether or not the team achieves consensus, the CASA Board will be asked to approve the team's report before it goes to AEP to

ensure that process is adhered to and the report reflects the idea of CASA's vision, as opposed to a review of the technical content and recommendation.

Roles and Responsibilities

Team members should establish effective communication with the decision makers in the organizations/groups they represent, so that information and feedback can be solicited. It is each team member's responsibility to bring their constituency along and ensure that they can demonstrate to other team members that they are endeavoring to do this.

Team members also need be aware and accept that differences of opinion and perspective are natural and expected and that the tension between differing perspectives can be used positively to help generate solutions. In addition, all team members need to actively participate and display a commitment and responsibility for the well-being of the team and the success of the process, including keeping the team on task and on track.

The expectations of AAQO Team Members are consistent with those roles and responsibilities described in CASA's *Managing Collaborative Processes Guide*.

Reporting Structure

Figure 1 represents the reporting structure of the AAQO Project Team. Further process details can be found in CASA's *Comprehensive Air Quality Management System (CAMS)* document.

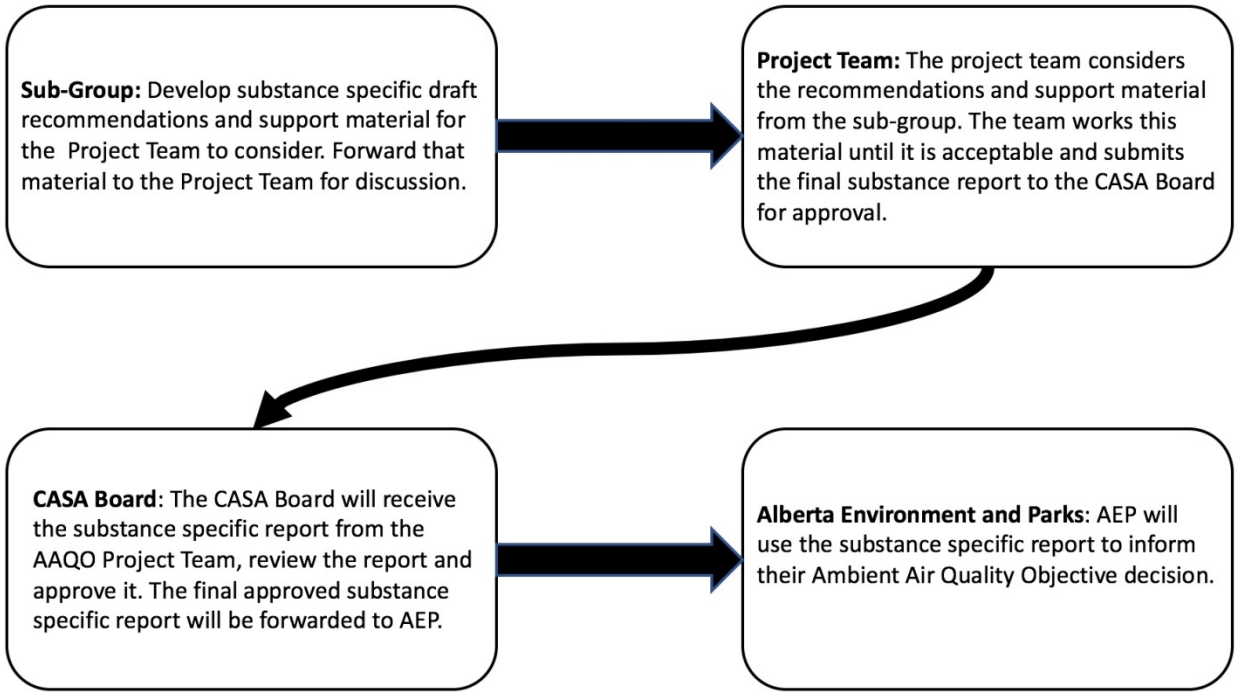

Figure 1: AAQO Project Team Reporting Structure

Project Quorum

The AAQO process will require quorum for all substantive decisions involving recommendations, but not on process decisions. In lieu of the team, the co-chairs are empowered to make process decisions between meetings. The team will meet 4 times per year with the expectation that the substantive work will occur at the sub-groups. Additional meetings can be called under exceptional circumstances, by co-chairs.

Quorum is defined as:

Organization	**Number of stakeholders to achieve quorum**
Alberta Airshed Council	1
Alberta Environment and Parks	1
Alberta Health	1
Alberta Health Services	1
Environmental Non-Governmental Organizations	1
Industry	1

Stakeholder Engagement Plan

Key stakeholders will be engaged on an as-needed basis to address the specific concerns that their industry might have with the development of objectives. The following categories of stakeholders may also be involved:

Project Team: Stakeholders who are required at the table to reach consensus agreement.

Corresponding Members: Stakeholders who receive all correspondence, but are not required at the table to reach consensus agreement.

Sub-groups or Technical Experts: Stakeholders who have a specific interest or expertise and can be engaged in a more focused way at a Sub-group level.

Project Schedule

The work of the AAQO Project Team is sequential, and will follow the schedule as outline in Figure 2.

2017			2018				2019				2020
June	Sept	Dec	March	June	Sept	Dec	March	June	Sept	Dec	March
$PM_{2.5}$											
		O_3									
				NO_2							
							SO_2				
H_2STRS											
										Final Report	

Figure 2: AAQO Project Schedule

Projected Resources and Costs

Given the current level of knowledge within the AAQO Project Team and with CASA's report writing support, it is anticipated that no additional external resources will be required for this project. It is the intent to use sub-groups to conduct the detailed background work associated with developing recommendation for each of the parameters being reviewed.

If Team Members determine that additional expertise is required (consultants, modelling of parameters, etc.) they are required to: (1) develop a detailed Terms of Reference for the work, and (2) fundraise. Given the current level of knowledge within the AAQO Project Team and with CASA's report writing support, it is anticipated that no additional resources will be required. It is the intent to use sub-groups to conduct the detailed background work associated with developing recommendation for each of the parameters being reviewed.

DECISION SHEET

Item 5.0: **Non-Point Source (NPS) Project Team**

Issue: Approve the final report and recommendations.

Background: The NPS Project Team was launched in November 2015 to help address non-point source air emissions contributing to non-achievement in the orange or red management levels of the Canadian Ambient Air Quality Standards (CAAQS) for ambient $PM_{2.5}$ and O_3 in Alberta. This work supports the Government of Alberta's (GoA) *Clean Air Strategy (2012).*

The team compiled and reviewed information on non-point source air emissions in Alberta. The team selected eight non-point source topic areas for recommended management actions and identified those that could be undertaken by CASA. The team also identified opportunities to reduce non-point source emissions which were not selected for recommendation development.

The methodology used by the team to choose the recommendation areas and detailed information on the recommendations themselves are included in the final report.

Status: The team is seeking approval of its draft final report and recommendations. The report details the work of the project team and contains 19 recommendations for reducing non-point source air emissions in Alberta. Recommendations are presented in the following areas:

- Transportation (on-road light-duty and on-road heavy-duty vehicles)
- Construction operations and road dust
- Commercial and residential heating (residential wood burning)
- Industrial non-point sources (fuel terminals)
- Open-air burning
- Land-use planning
- Non-point source knowledge gaps and uncertainties
- Climate change initiatives and air quality co-benefits

Attachments:

1. Draft Non-Point Source Project Team report
2. Summary of recommendations

Decisions:

1. Approve the project team's report: *Recommendations for Non-Point Air Emission Sources in Alberta*
2. Disband the Non-Point Source Project Team

Recommendations for Non-Point Air Emission Sources in Alberta

Final Report by the CASA Non-Point Source Project Team

24/11/2017

Acknowledgements

The Non-Point Source Project Team would like to thank its member organizations and the Technical Task Group for their assistance in completing this work. The project team also thanks the many people and organizations who provided content feedback as the report was developed, including Energy Efficiency Alberta, the Motor Dealers Association of Alberta, the Calgary Region Airshed Zone Particulate Matter and Ozone Committee, the Alberta Motor Transport Association, the Capital Region Air Quality Oversight Advisory Committee, and the Red Deer Particulate Matter Response Advisory Committee.

Several people greatly assisted project team members in gaining a common understanding of non-point sources. In particular, the team thanks Frauke Spurrell, Maxwell Mazur, Phoenix Le, and Yayne-abeba Aklilu of Alberta Environment and Parks, and Sanjay Prasad of the Wood Buffalo Environmental Association. The team also thanks John Englert of Alberta Transportation for his contributions to the Transportation Subgroup, and David Dodge of Energy Efficiency Alberta for helping the team gain a better understanding of his organization's work.

The team appreciates the corresponding members for staying abreast of the project, the administrative and other support provided by the CASA Secretariat, and the work of Nancy Mackenzie of Bronze Horse Communications for transforming the Technical Task Group's raw drafts into a coherent report.

Members of the Non-Point Source Project Team:

Name	Stakeholder Group
Atta Atia	Alberta Agriculture and Forestry
Nadine Blaney	Fort Air Partnership and the Alberta Airsheds Council
Jill Bloor	Calgary Region Airshed Zone and the Alberta Airsheds Council
Tasha Blumenthal	Alberta Association of Municipal Districts and Counties
Bill Calder	Prairie Acid Rain Coalition and the Alberta Environmental Network
Rhonda Lee Curran	Alberta Environment and Parks
Mandeep Dhaliwal	Calgary Region Airshed Zone and the Alberta Airsheds Council
Jim Hackett	ATCO Power Canada Ltd.
Nancy Hackett	City of Red Deer
Rob Hoffman	Canadian Fuels Association
Carolyn Kolebaba	Alberta Association of Municipal Districts and Counties
Lauren Maris	City of Red Deer
Steve Marshman	Alberta Canola Producers
Alison Miller	Imperial Oil Ltd. (representing the Canadian Association of Petroleum Producers and the Chemistry Industry Association of Canada)
Corinna Mulyk	Alberta Transportation
Rupesh Patel	Alberta Transportation
Andrew Read	Pembina Institute and the Alberta Environmental Network
Tanya Sakamoto	City of Calgary
Bob Scotten	West Central Airshed Society and the Alberta Airsheds Council
David Spink	Prairie Acid Rain Coalition and the Alberta Environmental Network
Chandra Tomaras	City of Edmonton
Martin Van Olst	Environment and Climate Change Canada
Scott Wilson	Alberta Motor Association
Ruth Yanor	Mewassin Community Council and the Alberta Environmental Network

Members of the Technical Task Group:

Name	Stakeholder Group
Patrick Andersen	West Central Airshed Society and the Alberta Airsheds Council
Randy Angle	Alberta Environmental Network
Rhonda Lee Curran	Alberta Environment and Parks
Mandeep Dhaliwal	Calgary Region Airshed Zone and the Alberta Airsheds Council
Ike Edeogu	Alberta Agriculture and Forestry
Richard Melick	Alberta Environment and Parks
Bob Myrick	Alberta Environment and Parks
Koray Onder	Canadian Association of Petroleum Producers
Victoria Pianarosa	Parkland Fuel Corporation
David Spink	Prairie Acid Rain Coalition and the Alberta Environmental Network
Frauke Spurrell	Alberta Environment and Parks
Martin Van Olst	Environment and Climate Change Canada

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APPENDICES:

1. Alberta Air Zone Report 2011-2013
2. Final Technical Report: A Knowledge Synthesis of Non-Point Source Air Emissions and their Potential Contribution to Air Quality in Alberta
3. Non-Point Source Project Charter
4. CASA Non-Point Source Team Communications Plan
5. CASA Non-Point Source Project: Project and Communications Plan Backgrounder
6. Non-Point Source Project Message Map
7. Agricultural Practices

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Recommendations

For the electronic version only, each recommendation in the following list is hyperlinked to the associated text in the body of the report.

Executive Summary

The Alberta: Air Zones Report 2011-2013 (Government of Alberta, 2015) indicates five of the six air zones in Alberta are either approaching or not achieving the Canadian Ambient Air Quality Standards (CAAQS) for fine particulate matter ($PM_{2.5}$) and the North Saskatchewan Air Zone is approaching the CAAQS for ozone (ozone).

Air quality can be affected by both natural and human sources. When substances from natural and anthropogenic (i.e., human) sources accumulate in the atmosphere, air quality can degrade and affect human and ecosystem health.

Alberta's 2012 Clean Air Strategy highlighted the importance of addressing both point and non-point sources to sustain good air quality. Non-point source emissions are dispersed, which makes them difficult to quantify and challenging to manage. Additional management tools and/or approaches are required, which led to the Clean Air Strategic Alliance (CASA) being tasked with this project.

The CASA Non-Point Source Project focused on non-point source emissions contributing to ambient $PM_{2.5}$ and ozone in Alberta where air quality is approaching or not achieving the CAAQS. Since November 2015, project team members have been working to understand non-point sources in the province and to develop recommendations to better manage them. Project stakeholders came from government, non-government organizations, Airshed Organizations, and industry. The project had four objectives:

1. Compile and review information and agree on a common understanding of non-point source air emissions in Alberta.
2. Identify non-point source air emissions reduction opportunities in Alberta, where CASA's multi-stakeholder approach could add the most value.
3. Identify and recommend management actions, which could include recommending policy change, to address the highest value non-point source air emissions reduction opportunities in Alberta (from Objective 2).
4. Develop and implement a strategy and action plan for communicating with and engaging stakeholders and the public on the work of the project.

Non-Point Sources of Focus in this Project

It is recognized that there are limitations in the current understanding of the relative significance of different anthropogenic non-point source air emission sources and their impact. The complexity of air quality issues is such that there will always be some level of additional knowledge and data detail that is desirable; however, lack of full information should not prevent actions based on best available information. Furthermore, efforts need to be made to address critical gaps and uncertainties that notably influence the ability to understand and effectively manage air quality issues in an air zone or provincially.

A Technical Task Group (TTG) addressed much of Objective 1, producing in 2016 the Final Technical Report: A Knowledge Synthesis of Non-Point Source Air Emissions and their Potential Contribution to Air Quality in Alberta. The TTG reviewed and synthesized best available information from ambient air quality monitoring, emissions inventories, air quality simulation models, and receptor models to estimate the possible contributions of non-point source emissions to ambient air quality levels. The TTG ultimately provided a refined list of non-point sources for the project team's consideration, understanding that supporting information was limited. The team subsequently reviewed and further refined the TTG's list of non-point sources based on additional criteria as part of its work on Objective 2.

Through Objectives 2 and 3, the team agreed on non-point source air emission reduction opportunities and recommended actions, summarized below, for mobile sources (transportation), construction operations and road

dust, open-air burning, commercial and residential heating, industrial non-point sources, land-use planning, addressing non-point source knowledge gaps and uncertainties, and considering air quality co-benefits with climate change initiatives. The project team did not recommend actions for non-point source categories on the TTG list if management actions were already in place or planned. Timeline and capacity constraints prevented the team from making recommendations, or limited the number of recommendations developed, for some other sources on the TTG list.

The relative impact of various sources in the sub-regions in the orange or red CAAQS management level was also considered. In the absence of full information, the team used its best judgement on the sources that were most important in sub-regions where red or orange CAAQS monitoring results were obtained.

Potential co-benefits for NO_x reduction were also a factor. A new nitrogen dioxide (NO_2) CAAQS has been approved by Canada's environment ministers and will have an impact on Alberta's future air quality management.

Summary of Recommendations

Transportation

1. That Alberta Environment and Parks and Alberta Transportation collaborate with municipalities, Airshed Organizations, and other appropriate stakeholders to develop and implement a strategy to:
    i. increase the public's understanding of emissions resulting from vehicle use and their impact on air quality
    ii. increase the public's awareness of the practical actions they can take to reduce emissions from vehicle use
    iii. encourage individuals to reduce emissions from vehicle use

2. That Alberta Environment and Parks, Alberta Transportation, municipalities, motor dealers, and related organizations collaborate to develop and implement a strategy to accelerate and support increasing the percentage of all substantially lower emitting vehicles in Alberta, with the following goals:
    i. to increase the available charging or fueling infrastructure where required for these vehicles
    ii. to increase the purchase of these vehicles

3. That Alberta Transportation prohibit vehicle emission control system tampering of future model year vehicles and engines through revisions to applicable provincial legislation and associated vehicle inspection criteria

4. That Alberta Transportation amend the *Commercial Vehicle Safety Regulation* and associated Commercial Vehicle Inspection Manual to require inspection of commercial vehicle emission controls in accordance with the Canadian Council of Motor Transport Administrators 2014 National Safety Code Standard 11, Part B (NSC 11B) of future model year vehicles

5. That Alberta Transportation:
    i. work with partners to expand the availability of infrastructure for zero and lower emission vehicles (e.g., charging/fueling infrastructure) for long-haul heavy-duty vehicles
    ii. in coordination with municipalities, support and develop programs to remove barriers and expand the purchase and use of zero and lower emission vehicles for municipal services (transit, municipal fleets, etc.)

6. That Alberta Environment and Parks and Alberta Transportation work with appropriate stakeholders to:
    i. provide education and promotion of commercial freight membership in the SmartWay Transport Partnership

ii. encourage, through the SmartWay Transport Partnership, increasing fleet fuel efficiencies through education and promotion of the use of fuel efficiency technologies, such as aerodynamic devices, idle reduction devices, or low rolling resistance tires
iii. encourage SmartWay participation as a consideration for procurement

7. That Alberta Transportation and municipalities, in collaboration with appropriate stakeholders, support the development of urban and long-haul freight strategies for the movement of goods in Alberta

8. That Alberta Environment and Parks and Alberta Transportation, in collaboration with appropriate stakeholders, undertake an innovative on-road emission testing study

9. That Energy Efficiency Alberta (EEA) consider the transportation sector as an area for future EEA programs that provide greenhouse gas and air emission reduction co-benefits

Construction Operations and Road Dust

10. That Alberta Environment and Parks and Alberta Transportation work with municipalities, construction companies, and other stakeholders to develop and disseminate a best practices guide to address dust from construction and roads that:
    i. identifies why this issue is important and what can be done to address it
    ii. provides templates for environmental policies and plans
    iii. prepares for potential requirements in the future

Open-Air Burning

11. That Alberta Environment and Parks with involvement from Alberta Agriculture and Forestry, the Alberta Urban Municipalities Association, and the Alberta Association of Municipal Districts and Counties:
    i. review provincial and municipal open-air burning requirements and management practices
    ii. initiate reasonable measures to help ensure that in the future the potential air quality impacts of open-air burning are appropriately considered, recognizing that prescribed burning is a necessary tool to protect communities, human life, infrastructure, and natural resources, and can be an important agricultural or ecosystem management tool

Commercial and Residential Heating

12. That Alberta Environment and Parks:
    i. evaluate and identify the barriers to fuel-switching from biomass to a cleaner alternative or retrofitting old wood burning space-heating equipment to meet the Canadian Standards Association Standard for Performance Testing of Solid-Fuel-Burning Heating Appliances, edition B415.1-10 (CSA B415.1-10) or Environmental Protection Agency Title 40 Code of Federal Regulations (EPA 40 CFR) standards
    ii. develop strategies and programs as needed to motivate fuel-switching, replacement, or retrofitting

13. That Alberta Environment and Parks, municipalities, and Airshed Organizations:
    i. develop a coordinated notification process to discourage indoor and outdoor wood burning during periods when air quality is, or is forecasted by the air monitoring network to be, degraded
    ii. provide general education and awareness on the air emissions associated with wood burning

Industrial Non-Point Sources—Gasoline Distribution

14 That Alberta Environment and Parks consider the benefits of requiring Stage 1 vapour recovery units for fuel terminals, but only in the context of other potential actions that could be taken by industry to reduce ambient $PM_{2.5}$ and ozone

Land-Use Planning

15A That municipalities and their neighbouring communities work together and with relevant stakeholders to:

i. identify and promote opportunities to design urban form and infrastructure to reduce environmental impacts and improve air quality
ii. educate the public and others about the importance of these opportunities
iii. work to implement environmentally responsible land-use planning by updating bylaws, statutory plans, and policies

15B That the Government of Alberta support collaboration among municipalities and other stakeholders on environmentally responsible urban development and land-use planning through financial mechanisms, education, and engagement

Gaps and Uncertainties – Knowledge of Non-Point Sources

16. That Alberta Environment and Parks address, as a priority in its future air quality work, gaps and uncertainties in ambient air quality monitoring (e.g. $PM_{2.5}$ and ozone), emission inventory, source characterization, modelling, and atmospheric chemistry as identified by the Non-Point Source Project Team's Technical Task Group

Climate Change and Air Quality

17A That the Alberta Climate Change Office and Energy Efficiency Alberta consider the air quality impacts of any proposed new policy, program, or action they consider adopting related to non-point sources and place value on those measures with substantial air quality and co-benefits

17B That the Alberta Climate Change Office and Energy Efficiency Alberta, as resources permit, also consider the air quality impacts of their existing policies, programs, and actions related to non-point sources and make adjustments to increase air quality co-benefits where warranted

The project team considers this project as a starting point for continued, coordinated effort to manage non-point source emissions to improve air quality for the benefit of Albertans.

1 Background

1.1 About CASA

The Clean Air Strategic Alliance (CASA) was established in March 1994 as a new way to manage air quality in Alberta. CASA is a multi-stakeholder partnership composed of representatives selected by industry, government, and non-government organizations. Every partner is committed to a comprehensive air quality management system for Alberta.

CASA's mandate is to:

1. implement the comprehensive Air Quality Management System for Alberta
2. conduct strategic air quality planning for Alberta through shared responsibility and use of a consensus-building, collaborative approach
3. prioritize concerns about air quality in Alberta, and develop specific actions or action plans and activities to resolve those concerns

Effective management of Alberta's air quality requires a broad range of stakeholders to work together to ensure that policy meets societal needs. Economic prosperity, a clean environment, and thriving communities must all be furthered in an integrated way to provide the kind of sustainable future Albertans expect.

CASA has a long and successful history of building collaborative solutions to important air quality issues and developing policy recommendations for the Government of Alberta's consideration. It provides a forum for its members to explore each other's interests, propose regulatory and other options, test and evaluate new approaches, and jointly commit to implementation. Most importantly, agreement is reached through consensus.

A collaborative and structured decision-making process is used to help multi-stakeholder teams:

- strengthen cross-sector stakeholder relationships and networks
- ensure that decisions fit stakeholder interests
- increase innovation and creativity in decision making
- improve project deliverables, including developing sustainable solutions for air quality

This approach recognizes that stakeholders are better able to identify and agree upon an optimal solution when the task is accepted as a mutual problem.

CASA has a history of working with stakeholders to develop an understanding of non-point source emissions in Alberta (see Appendices 1 and 3 for background information and the project charter). The work of CASA's Non-Point Source Project Team was informed by the following definition provided by the Government of Alberta[1] for point and non-point source emissions:

> Point source pollution is a term used to describe emissions from a single discharge source that can be easily identified. Non-point source pollution originates from many different and diffuse sources (aggregated sources of emissions), which collectively can have a significant impact on air quality. This aggregation is done because the emission sources are either too small and numerous, too geographically dispersed, or too geographically large to be estimated or represented by a single point. There are four types of non-point sources (Table 1).

[1] Clean Air Strategic Alliance. 2013.

Table 1: Four Types of Non-Point Sources

Area	Area sources are spatially diffuse and/or numerous sources that can only be measured or estimated using the accumulation of numerous point sources or as estimation of an entire area (e.g., forest fires, tailings ponds).
Volume	A volume source is a three-dimensional source of air emissions. Essentially, it is an area source with a third dimension. Examples include particulate emissions from the wind erosion of uncovered piles of materials, and fugitive gaseous emissions from various sources within industrial facilities.
Line	A line source is a source of air pollution that emanates from a linear (one-dimensional) geometric shape, usually a line. Examples include dust from roadways, and emissions from aircraft along flight paths. There can be several different segments in a line source (e.g., road network).
Mobile	Mobile sources are broad area sources that are the accumulation of non-stationary operations. These include transportation sources such as cars, trucks, boats, and non-stationary construction equipment. Mobile sources can include both on-road and off-road sources. On-road sources refer to emissions from on-road engines and on-road vehicles. Examples include cars, trucks, and motorcycles. Off-road sources refer to emissions from off-road engines and off-road vehicles. Examples include mine fleets, farm and construction equipment, and gasoline-powered lawn and garden equipment.

This CASA Non-Point Source Project is a unique attempt in Alberta to address non-point sources of fine particulate matter ($PM_{2.5}$) and ozone directly and holistically. The provincial government's regulatory system, which has been effective for point sources, is not suited to the wide variety of non-point source emissions, so non-traditional mechanisms may be needed. To successfully and cost-effectively address air quality, both point and non-point source emissions must be reduced.

1.2 The CASA Non-Point Source Project

The Canadian Ambient Air Quality Standards (CAAQS) were established to protect human health and the environment and are the driver for air quality management across the country. They establish ambient air quality levels and outline associated management actions for harmful air pollutants, including $PM_{2.5}$ and ozone, in air zones. These standards are intended to drive continuous improvement in air quality across Canada and are not "pollute up to levels." They are designed to become increasingly stringent over time and to be periodically reviewed to ensure continuous improvement in protecting the health of Canadians and the environment. The CAAQS are a key part of both the national and Alberta Air Quality Management Systems.

Alberta Environment and Parks (AEP) completed a province-wide assessment against the CAAQS (see Appendix 1) for $PM_{2.5}$ and ozone for 2011-2013, and determined the CAAQS management level for each ambient air monitoring station and associated air zone. Individual air zones in Alberta have been assigned different management levels, requiring actions to address identified and emerging air quality issues within the specified air zone. Necessary actions include reducing emissions from the various types of anthropogenic sources, recognizing that naturally-occurring and anthropogenic point and non-point sources all contribute to cumulative effects on air quality.

The 2011-2013 assessment[2] showed that four of Alberta's six air zones (Lower Athabasca, North Saskatchewan, South Saskatchewan, and Upper Athabasca) were in the orange management level (requiring actions for preventing CAAQS non-achievement) for the annual $PM_{2.5}$ CAAQS. The Red Deer Air Zone was in the red management level (requiring actions for achieving CAAQS) for both the annual and 24-hour CAAQS for $PM_{2.5}$. The North Saskatchewan Air Zone was in the orange management level for ozone. Non-point sources are large contributors of air emissions and it is recognized that meaningful reductions in emissions from non-point sources will be required to reduce ambient $PM_{2.5}$ and ozone levels.

The Non-Point Source Project Team began work in November 2015 with the goal of recommending management actions to reduce air emissions from non-point sources in Alberta, focusing on areas approaching or not achieving

[2] Government of Alberta, 2015.

the CAAQS. The scope of the Non-Point Source Project Team was non-point source emissions of primary $PM_{2.5}$ and precursors of secondary $PM_{2.5}$ and ozone (i.e., sulphur oxides [SO_x], nitrogen oxides [NO_x], volatile organic compounds [VOCs], and ammonia [NH_3]). The work to reduce these substances is expected to have the co-benefit of reducing other emissions.

The project objectives were to:

1. compile and review information and agree on a common understanding of non-points sources in Alberta
2. identify non-point source opportunities in Alberta where CASA's multi-stakeholder approach could add the most value
3. identify and recommend management actions, which could include recommending policy change, to address the highest value non-point source air emissions opportunities in Alberta
4. develop and implement a strategy and action plan for communicating the work of the Non-Point Source Project Team and engaging stakeholders and the public

1.3 Work of Project Team Support Groups

1.3.1 Technical Task Group Report Overview

The Technical Task Group (TTG), a sub-committee of the Non-Point Source Project Team, was struck in March 2016 to compile and review information and reach a common understanding of non-point sources in Alberta (Objective 1). The TTG representatives were largely external to the project team. Relying on in-kind contributions from members, the TTG recommended eight non-point sources of focus for the project team. Having a group devoted to gathering and synthesizing technical information and adding value by offering assessments and a path forward enabled the Non-Point Source Project Team to focus on the other objectives of its mandate.

The TTG's Final Technical Report: A Knowledge Synthesis of Non-Point Source Air Emissions and their Potential Contribution to Air Quality in Alberta (TTG report) presents what was known about non-point source emissions and their relative contribution to air quality at the time of the report, particularly for the Alberta air zones in the red or orange management levels under the CAAQS Framework (see Appendix 2 for the TTG report).

The TTG report synthesized four major sources of information:

1. point and non-point source emission inventories, retrospective trends in emissions for 2000-2014, and emissions forecasting
2. ambient monitoring data and information for ozone, $PM_{2.5}$, VOCs, total hydrocarbons (THC)/non-methane hydrocarbons (NMHC), sulphur dioxide (SO_2), NO_x, and NH_3 (as available) and trends in ambient levels
3. air quality modelling studies of ozone and/or $PM_{2.5}$ and ozone, and $PM_{2.5}$ precursors with a focus on modelling that includes non-point sources, and any relevant studies from similar jurisdictions in the United States
4. available receptor modelling studies to identify potential sources contributing to $PM_{2.5}$ and ozone concentrations in the air zones at the red and orange CAAQS management levels

The TTG approached its examination of point and non-point sources that potentially contribute to and influence air quality in Alberta through ambient air monitoring information, emissions inventories, and modelling studies for the air zones. TTG members discussed a number of issues surrounding the use of these resources, including interpretation of ambient air monitoring data, the uncertainties in emissions inventories, and the shortage of receptor modelling and air quality simulation modelling studies for the air zones. The TTG report discusses some of these limitations, identifies the gaps and uncertainties encountered, and provides overall conclusions. Appendices to the TTG report include air zone specific reports that summarize: 1) assessments against the CAAQS, 2) air emissions inventory data, and 3) air modelling and receptor modelling studies carried out for each region.

The TTG report focuses on both non-point sources directly emitting $PM_{2.5}$ and on sources emitting the precursor substances that contribute to the formation of $PM_{2.5}$ and ozone in the atmosphere, including NO_X, SO_2, VOCs, and NH_3. The ten largest non-point sources in Alberta as a whole are identified for emissions of primary $PM_{2.5}$, NO_x, VOCs, NH_3, and SO_2 along with the important non-point sources in the individual air zones. Unfortunately, information on the relative significance of various non-point sources in sub-regions within air zones where red or orange management levels have been reached is limited. General emissions trends since 2000 were considered, both retrospective and forecasted.

The air zone summaries contained in the TTG report and the complete reports for each air zone appended to the TTG's report present findings and conclusions for supporting improved air quality in each of Alberta's air zones. The CAAQS management levels and the identified non-point sources for each air zone are summarized in Table 2 (below and on the next page); the non-point sources are listed based on their emissions inventory category rather than by the four broad non-point source types (area, volume, line, and mobile) to focus recommendations on specific sectors. The orange CAAQS management level requires actions to prevent a CAAQS exceedance, the yellow level requires actions to prevent air quality deterioration, the red level requires actions to achieve the CAAQS, and the green level requires actions to keep clean areas clean.

Table 2: Air Zone CAAQS Management Levels and Non-Point Sources Identified by the TTG for the Project Team's Consideration

Air Zone	$PM_{2.5}$ CAAQS Management Level	Ozone CAAQS Management Level	Identified Non-Point Sources*
Lower Athabasca	Orange Management Level (Actions for Preventing CAAQS Exceedance)	Yellow Management Level (Actions for Preventing Air Quality Deterioration)	• Oil Sands Specific (NO_X from mine fleets, VOCs from tailings ponds and mines, $PM_{2.5}$ from mining and tailings operations) • Industrial non-point sources (VOCs) • Construction ($PM_{2.5}$) • Road dust ($PM_{2.5}$) • Transportation (NO_X, VOCs) • Prescribed burning for oil sands land development ($PM_{2.5}$)
Upper Athabasca	Orange Management Level (Actions for Preventing CAAQS Exceedance)	Yellow Management Level (Actions for Preventing Air Quality Deterioration)	• Industrial non-point sources (VOCs) • Road dust ($PM_{2.5}$) • Agriculture (VOCs, $PM_{2.5}$, NH_3) • Transportation (NO_X, VOCs) • Construction ($PM_{2.5}$)
North Saskatchewan	Orange Management Level (Actions for Preventing CAAQS Exceedance)	Orange Management Level (Actions for Preventing CAAQS Exceedance)	• Transportation (NO_X, $PM_{2.5}$) • Agriculture (NH_3) • Commercial and residential heating ($PM_{2.5}$) • Road dust ($PM_{2.5}$) • Construction ($PM_{2.5}$) • Industrial non-point sources (VOCs)

Air Zone	$PM_{2.5}$ CAAQS Management Level	Ozone CAAQS Management Level	Identified Non-Point Sources*
South Saskatchewan	Orange Management Level (Actions for Preventing CAAQS Exceedance)	Yellow Management Level (Actions for Preventing Air Quality Deterioration)	• Road dust ($PM_{2.5}$) • Construction ($PM_{2.5}$) • Transportation (NO_X, VOCs) • Industrial non-point sources (VOCs) • Agriculture (NH_3, VOCs, $PM_{2.5}$)
Red Deer	Red Management Level (Actions for Achieving CAAQS)	Yellow Management Level (Actions for Preventing Air Quality Deterioration)	• Road dust ($PM_{2.5}$) • Construction ($PM_{2.5}$) • Agriculture ($PM_{2.5}$, NH_3, VOCs) • Transportation (NO_X, VOCs) • Industrial non-point sources (VOCs)
Peace	Yellow Management Level (Actions for Preventing Air Quality Deterioration)	Green Management Level (Actions for Keeping Clean Areas Clean)	• Agriculture ($PM_{2.5}$, NH_3) • Construction ($PM_{2.5}$) • Industrial non-point sources (NO_X, VOCs, NH_3) • Road Dust ($PM_{2.5}$) • Transportation (NO_X, VOCs)

*The parameters associated with the source type that were considered particularly relevant in the context of CAAQS management in that air zone are also identified; e.g., for the agriculture category only NH_3 emissions are considered of high relevance in the North Saskatchewan Air Zone whereas in the South Saskatchewan Air Zone, $PM_{2.5}$, NH_3, and VOCs from this category are considered relevant. Details on the information and assessments conducted to identify priority emission categories and associated priority pollutants can be found in the individual air zone reports appended to the TTG report.

The TTG report identified eight categories of non-point sources that the project team could consider (Table 3 below and on the next page).

Table 3: Non-Point Sources Identified by the TTG for the Project Team's Consideration

Non-Point Source Category	Description of Non-Point Source	Air Zone Where Non-Point Sources Identified as Relevant[5]	Emissions Identified as Relevant
Transportation	Emissions from on- and off-road, rail, air, and marine vehicles and equipment	All Zones	NO_x, VOCs
Construction Operations[1]	Fugitive particulate matter emissions resulting from disturbances on construction sites	All Zones	$PM_{2.5}$
Road Dust	Re-suspension of particulate matter by vehicles travelling on paved and unpaved roads	All Zones	$PM_{2.5}$
Prescribed Burning	Emissions from controlled fires used for land management treatments, specifically land clearing for industrial development in the Lower Athabasca Air Zone	Lower Athabasca	$PM_{2.5}$, VOCs, NO_x
Agriculture[2]	Emissions from agricultural activities, including: manure handling, tilling and wind erosion, fertilizer application, crop harvesting, and crop drying	All Zones except Lower Athabasca	NH_3, VOCs, $PM_{2.5}$
Commercial and Residential Heating	Emissions from combustion sources used for space or water heating in residential and	North Saskatchewan	NO_x

Non-Point Source Category	Description of Non-Point Source	Air Zone Where Non-Point Sources Identified as Relevant[5]	Emissions Identified as Relevant
	commercial establishments, health and educational institutions, and government/public administration facilities		
Industrial non-point sources[3]	Emissions from non-point sources at industrial operations from various sectors (e.g., oil and gas, chemical, cement, petroleum refining, hydrocarbon storage, transportation), including: plant fugitive leaks, materials storage and handling, non-stationary equipment, space heating, and storage tanks	All Zones	NO_x, VOCs
Oil Sands Specific[4]	Emissions from non-point sources specific to oil sands mining operations, including: tailings ponds, mine fleets, mine faces, and mining disturbances	Lower Athabasca	NO_x, VOCs, $PM_{2.5}$,

1 Emissions from construction equipment fuel combustion are captured under the off-road transportation categories.
2 Emissions from agricultural equipment fuel combustion are captured under the off-road transportation categories.
3 Plant fugitive emissions from oil sands mining operations are captured under the Industrial non-point sources category.
4 Emissions from road dust at industrial operations are captured under the road dust category, oil sands specific non-point sources (emissions from tailings ponds, mine faces, mine fleets and mining disturbances) are captured under the Oil Sands Specific category.
5 All the non-point source categories are present and influence air quality in all the air zones but the Technical Task Group identified these air zones as the ones in which the noted source category may be relevant in the context of current CAAQS management issues within that zone.

The TTG report also identified information gaps and uncertainties as well as several areas for potential future work to help improve the overall understanding of the contribution of non-point sources to air quality in the province. Gaps and uncertainties identified for future work are:

- the need for more $PM_{2.5}$ speciation data with adequate supporting information
- emissions inventories with clear source categories
- the need for resources and capacity to do region-specific and province-wide modelling to account for transport from one air zone to another
- improving the use and reliability of receptor modelling to better identify the sources of primary pollutants contributing to ambient $PM_{2.5}$ and ozone concentrations
- improving confidence in receptor modelling for secondary pollutants
- the need for more atmospheric profiling (e.g., wind and temperature) and better information on plume behaviour and atmospheric transformations occurring in the atmospheric boundary layer near ambient monitoring stations experiencing elevated $PM_{2.5}$ and ozone concentrations
- a better understanding of fugitive emissions, which are a large source of VOCs and primary $PM_{2.5}$ emissions from many industrial operations in Alberta

Finally, the TTG report noted that to improve overall understanding of the atmospheric chemistry underlying the formation of secondary $PM_{2.5}$ and ozone, there is a need to better understand specific air quality events where data are available from individual monitoring stations. Some questions that could be considered during future work are described in recommendation 16 (Section 2.8).

1.3.2 Transportation (Mobile Sources) Subgroups

To help fulfill Objectives 2 and 3, the project team established a Transportation Subgroup for comprehensive discussions outside of regular project team meetings on the wide variety of transportation-related (mobile) sources and potential management actions to address them. The Transportation Subgroup included

representatives from the project team and additional support from Alberta Transportation. The purpose of the subgroup was to identify potential management actions where CASA's multi-stakeholder approach could add the most value, and present the findings to the project team.

The subgroup reviewed potential management actions, both regulatory and voluntary, using several criteria including what is already being done in Alberta, gaps between what is being done in Alberta and in other jurisdictions, potential cross-cutting impact across multiple regions, feasibility, time needed for implementation, and anticipated success of implementation based on available information. The potential management actions resulting from the screening process were then fleshed out and discussed with the project team.

The team established three subgroups to further review and refine the potential management actions. Based on transportation categories (on-road light-duty vehicles, on-road heavy-duty vehicles, and off-road equipment [both vehicles and engines]), the subgroups determined potential priority management actions or next steps for consideration by the project team. At the team's direction, the subgroups then developed recommendations based on the agreed upon priorities for on-road light-duty and on-road heavy-duty vehicles.

1.3.3 Communications Subgroup

Communicating the work of the project team to CASA stakeholders and the public was acknowledged early in the process as an important objective throughout the project and a Communications Subgroup was formed from a subset of the project team to assist with Objective 4.

The Communications Subgroup developed a strategy to develop and distribute communications materials during and following completion of the project. The Communications Plan (see Appendix 4) had three objectives:

- raise awareness of CASA, the CASA process, and the Non-Point Source Project Team as a foundation for the future dissemination of information
- communicate the impact of non-point source emissions on the state of air quality in Alberta
- communicate the findings and recommendations of the project to address non-point source emissions in Alberta

The subgroup prepared a background document and a non-point source message map (see Appendices 5 and 6). It also held a workshop on April 12, 2017 during which organizations involved in communications and outreach on air quality and non-point source emissions shared information on their programs and discussed complementary future directions. The workshop identified organizations and programs that could share messaging from the project team and who could potentially help carry the project results to a wider audience.

1.4 Refining the Project Focus

1.4.1 Rationale for Selecting Non-Point Sources for Potential Recommendations

The project team considered the non-point sources identified by the TTG as well as three additional non-point source categories in the context of the project scope to determine which non-point sources would be the focus of the final recommendations of this project (Table 4). Other factors were also considered in determining which sources identified by the TTG the team would address in its final report.

The project team did not recommend actions for non-point categories on the TTG list if management actions were already in place or planned. Timeline and capacity constraints prevented the team from making recommendations, or limited the number of recommendations developed, for some other sources on the TTG list.

The relative impact of various sources in the sub-regions in the orange or red CAAQS management levels was also considered. In the absence of full information, the team used its best judgement on the sources that were most important in sub-regions where red or orange CAAQS monitoring results were obtained.

Potential co-benefits for NO_x reduction were also a factor. A new nitrogen dioxide (NO_2) CAAQS has been approved by Canada's environment ministers and will have an impact on Alberta's future air quality management.

As noted in Table 4, some aspects of transportation, agriculture, commercial and residential heating, industrial non-point sources, and oil sands specific sources already have existing or planned management actions and the team did not make specific recommendations for further management action. These categories are discussed in Section 3. Furthermore, the project team added three non-point source topic areas that relate to the identified NPS categories.

Table 4: Refined List of Non-Point Source Topic Areas for Potential Recommendations

Non-Point Source Topic Area	Description of Non-Point Source Topic Area	Recommendations
Transportation	Emissions from on-road and off-road, rail, air, and marine vehicles and equipment	Recommendations for selected sources See Section 2.2 and Recommendations 1-9
Construction Operations[1] and Road Dust	Fugitive particulate matter emissions resulting from disturbances on construction sites Re-suspension of particulate matter by vehicles travelling on paved and unpaved roads	Recommendations for selected sources See Section 2.3 and Recommendation 10
Prescribed Burning	Emissions from open-air burning activities such as controlled fires used for forestry, agricultural land, and biomass management with specific reference to land clearing for industrial development in the Lower Athabasca Air Zone	See Section 2.4 and Recommendation 11
Agriculture[2]	Emissions from agricultural activities including manure handling, tilling and wind erosion, fertilizer application, crop harvesting, and crop drying	No recommendation at this time See Section 3.2
Commercial and Residential Heating	Emissions from combustion sources used for space or water heating in residential and commercial establishments, health and educational institutions, and government/public administration facilities	Recommendations for selected sources See Section 2.5 and Recommendations 12-13
Industrial non-point sources[3]	Emissions from non-point sources at industrial operations from various sectors (e.g., oil and gas, chemical, cement, petroleum refining, hydrocarbon storage and transportation), including plant fugitive leaks, materials storage and handling, non-stationary equipment, space heating, and storage tanks	Recommendation for selected sources See Section 2.6 and Recommendation 14
Oil Sands Specific[4]	Emissions from non-point sources specific to oil sands mining operations, including tailings ponds, mine fleets, mine faces, and mining disturbances	No recommendation at this time See Section 3.6
Land-Use Planning	Emissions from transportation modes and distances, as well as building and housing types	See Section 2.7 and Recommendations 15A and 15B
Gaps and Uncertainties	Information and data to define the amount that each non-point source category contributes to pollution concentrations	See Section 2.8 and Recommendation 16
Climate Change	Greenhouse gas sources addressed by Climate Change Office and Energy Efficiency Alberta policy, programs and actions	See Section 2.9 and Recommendations 17A and 17B

1 Emissions from construction equipment fuel combustion are captured under the off-road transportation categories.
2 Emissions from agricultural equipment fuel combustion are captured under the off-road transportation categories.
3 Plant fugitive emissions from oil sands mining operations are captured under the Industrial non-point sources category.
4 Emissions from road dust at industrial operations are captured under the road dust category, oil sands specific non-point sources (emissions from tailings ponds, mine faces, mine fleets and mining disturbances) are captured under the Oil Sands Specific category.

2 Recommendations

2.1 Introduction

AEP has led work over several years directly focused on managing and reducing ambient $PM_{2.5}$ and ozone in regions where these substances are a concern. This CASA Non-Point Source Project has aimed to complement and add value to this region-specific work by recommending cross-cutting action on non-point sources that provides benefits to more than one region. Several recommendations also propose processes that may result in policy changes or other action that would be difficult to develop or support in one region alone.

New CAAQS for NO_2 that were published in Fall 2017 may pose their own challenges for Alberta's air quality management. Given this, the team kept the possibility of co-benefits for NO_2 reduction in mind when determining what sources to focus on and in crafting recommendations.

Consistent with the CASA consensus approach, extensive stakeholder review influenced the final content of the recommendations presented in this report.

This project and its report should be considered as an important first step to effectively managing the contribution of non-point source emissions to Alberta's air quality. Managing Alberta's non-point source emissions, like the broader effort to ensure good air quality, will be an ongoing effort. Many air quality management initiatives are underway and planned in Alberta and these informed project team decisions about which recommendations to make. Decisions were based on the assumption that these ongoing initiatives will continue and that planned initiatives will be implemented. If this does not happen, those sources or areas will need to be revisited and may require additional action.

This report presents recommendations related to mobile sources (transportation), construction operations and road dust, open-air burning, commercial and residential heating, industrial non-point sources, land-use planning, addressing non-point source knowledge gaps and uncertainties, and considering air quality co-benefits with climate change initiatives.

Some non-point sources do not have associated recommendations and the rationale is provided in Section 3.

The recommendations are directed, to the best of the project team's knowledge, to the anticipated implementers at the time the project was completed. Several recommendations also call on one party or another to "support" various actions and initiatives. This "support" may, but need not necessarily, include financial support or contributions.

2.2 Transportation

Transportation is a major non-point source in Alberta and is a large emission source in the air zones that are approaching or not achieving the CAAQS, and in urban sub-regions. For the purpose of this project, transportation includes on- and off-road, rail, air, and marine vehicles and equipment. These recommendations focus on on-road light-duty and on-road heavy-duty vehicles. The other transportation sources are included in Section 3. In 2014, on-road light-duty gasoline cars and trucks (e.g., personal vehicles) were responsible for 26.1 kilotonnes and 3.8% of the total anthropogenic NO_x emissions in Alberta. On-road heavy-duty diesel vehicles were responsible for 51 kilotonnes and 7.4% of the total anthropogenic NO_x emissions, as well as 2.2 kilotonnes and 0.3% of the anthropogenic $PM_{2.5}$ emissions in Alberta. Light-duty gasoline cars and trucks were responsible for 22.7 kilotonnes and 3% of VOCs emissions in Alberta. Reducing tailpipe emissions also helps reduce potential exposure to vehicle exhaust.

Recommendations 1-9 reflect the importance of transportation emission sources in Alberta and detailed rationale is provided for each recommendation.

2.2.1 Mobile Sources: On-Road Light-Duty and Heavy-Duty Vehicles

RECOMMENDATION 1: REDUCE EMISSIONS FROM IN-USE ON-ROAD LIGHT-DUTY VEHICLES

That Alberta Environment and Parks and Alberta Transportation collaborate with municipalities, Airshed Organizations, and other appropriate stakeholders to develop and implement a strategy to:

i. increase the public's understanding of emissions resulting from vehicle use and their impact on air quality
ii. increase the public's awareness of the practical actions they can take to reduce emissions from vehicle use
iii. encourage individuals to reduce emissions from vehicle use

PERFORMANCE MEASURES

i. Creation of a charter or memorandum of understanding (MOU) formalizing the collaboration by January 2020
ii. Development of an appropriate strategy satisfying the recommendation by December 2021
iii. Implementation of the strategy satisfying the recommendations by December 2022

PERFORMANCE INDICATORS

i. Number of Albertans subscribed, number of trips taken, and total hours driven in sharing economy vehicles
ii. Number of people entering downtown by sustainable transportation (transit, pedestrians, and cyclists) compared to vehicles
iii. Ridership on public transit

RATIONALE AND BACKGROUND

Increasing understanding of emissions from transportation and their impacts on air quality provides a foundation for increasing public awareness of the need to reduce emissions. Empowering and encouraging the public to use viable, lower emitting transportation options may lead to increases in carpooling, use of public transit, purchases of more fuel-efficient vehicles, and active transportation (e.g., walking, bicycling). Individuals could also benefit from multi-mode transportation trip planning tools to increase their use of lower emitting transportation options.

Environmental and Health Value

The use of high occupancy vehicles (carpooling, public transit), active transportation choices, and the use of lower emitting vehicles will reduce vehicle emissions, which is particularly important in areas in the orange or red CAAQS management levels.

Compatibility with Existing Initiatives

This recommendation aligns with many national, provincial, and municipal initiatives aimed at reducing emissions via increased carpooling, active transportation, fuel efficient driver education, purchase of fuel efficient vehicles, active transportation, and others. Examples are provided below.

National:

- Buying a Fuel-Efficient Vehicle (Natural Resources Canada – Office of Energy Efficiency)
- Eco Driving, Fuel-Efficient Driving Techniques (Natural Resources Canada – Office of Energy Efficiency)
- Mobile Sources Working Group under the national Air Quality Management System (Canadian Council of Ministers of the Environment [CCME])
- Pan-Canadian Framework on Clean Growth and Climate Change
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)
- Climate Leadership Plan (Government of Alberta)
- Green Transit Incentives Program (GreenTRIP)(Alberta Transportation)
- Draft Provincial Public Transportation Strategy (Alberta Transportation)

Municipal:

- 2016 Edmonton Metropolitan Growth Plan
- Calgary Parking Authority Carpool Parking Program (City of Calgary)
- Calgary Transportation Plan (City of Calgary)
- Edmonton Community Energy Transition Strategy (City of Edmonton)
- Pedestrian Strategy (City of Calgary)
- The Way We Green (City of Edmonton)
- The Way We Move, City of Edmonton Transportation Master Plan (City of Edmonton)
- Various vehicle idling reduction bylaws and initiatives; e.g., Be Idle Be Free (City of Edmonton), Idle Free (City of Red Deer)

Other:

- Carpool.ca (Trans-Canada Carpool.ca)
- Commuter Challenge (annual event), https://commuterchallenge.ca/
- Smart Drive Challenge (Scout Environmental, Government of Ontario, Canadian Fuels Association, Natural Resources Canada)
- Smart Fuelling (Canadian Fuels Association, Canadian Independent Petroleum Marketers Association, Canadian Convenience Stores Association, Canadian Automobile Association)

Potential Stakeholders

- Academics working on public health and air quality
- Alberta Association of Municipal Districts and Counties
- Alberta Motor Association

- Alberta School Boards
- Alberta Urban Municipalities Association
- Energy Efficiency Alberta
- Government of Alberta (Alberta Health, Alberta Culture and Tourism)
- Private sector (e.g., energy companies, ride-sharing companies, car manufacturers and dealerships)
- Transportation-related non-profit organizations (e.g., Electric Vehicle Association of Alberta, Paths for People, Edmonton Bicycle Commuters)

ADVICE TO IMPLEMENTERS

This recommendation focuses on education and awareness, and implementers may be able to leverage, link to, or partner with existing programs and organizations. Examples of existing initiatives include driver education (eco-driving), reducing unnecessary idling, carpooling, public transit, active transportation, purchase of low emission and/or right-sized vehicles, and highlighting efforts of companies with innovative programs that provide carpooling for staff or use lower emission vehicle fleets. Alignment with AEP's Environmental Education Framework would be appropriate.

An initial step may be to conduct an inventory of existing programs and initiatives to identify opportunities for stakeholders to leverage and amplify their impact. Many relevant initiatives in other jurisdictions could be adapted for use in Alberta.

As an innovative example, the Smart Drive Challenge[3] is an eco-driving program that uses actual participant driving data collected through a smartphone app. Drivers establish a three-week baseline of their typical driving patterns and then complete an online training course, after which they are challenged to implement their new knowledge with the goal of improving their efficiency by 5% and reducing their driving by 10%. Drivers are given access to an online dashboard where they can review their progress. Participants are entered into a draw for financial incentives awarded at the end of the challenge period. Smart Drive Challenge is a partnership involving Scout Environmental, the Canadian Fuels Association, and the governments of Ontario and Canada and is working to actively expand the regions in which it operates.[4]

The Government of Alberta may wish to consider this recommendation as an area of future work for CASA.

[3] Smart Drive Challenge. 2017.

[4] Personal conversation with Mike Driedger, Program Director, Scout Environmental. April 28, 2017.

RECOMMENDATION 2: INCREASE THE PERCENTAGE OF ZERO AND LOWER EMISSION ON-ROAD LIGHT-DUTY VEHICLES

That Alberta Environment and Parks, Alberta Transportation, municipalities, motor dealers, and related organizations collaborate to develop and implement a strategy to accelerate and support increasing the percentage of all substantially lower emitting vehicles in Alberta, with the following goals:

i. to increase the available charging or fueling infrastructure where required for those vehicles
ii. to increase the purchase of these vehicles

PERFORMANCE MEASURES

i. Creation of a team charter or MOU formalizing the collaboration by January 2020
ii. Implementation of a strategy to increase the percentage of zero and low emission vehicles by December 2021

PERFORMANCE INDICATORS

i. Percentage of zero and low emission vehicles available and sold by car dealerships
ii. Percentage of plug-in hybrid and electric vehicles registered for use in Alberta
iii. Number of level 2 and level 3 electric vehicle charging stations installed and active in Alberta

RATIONALE AND BACKGROUND

Incentives that reduce the purchase price premium for some of these vehicles and availability of the necessary charging infrastructure have been key factors in other jurisdictions. The effect of the price premium for electric vehicles is noticeable, in that 96% of recent electric vehicle sales in Canada occurred in Ontario, Quebec, and British Columbia, all of which offer financial incentives.[5]

Evidence and experience from Norway, the Netherlands, and California indicate that strong supportive policy in the form of incentives, infrastructure, and vehicle availability can increase the percentage of zero and low emission vehicles.[6] However, analysis by the Montreal Economic Institute[7] indicates that financial incentives for the purchase of electric vehicles are not the most efficient policy mechanism to reduce greenhouse gas emissions on a cost per tonne basis. It also concludes that policies providing incentives do have a positive impact on electric vehicle sales and uptake.

Incentives may be applied at the time of purchase or based on the maintenance and operation of the vehicle. Non-financial incentives such as designated parking places for low emitting vehicles and preferred registration rates may also be options. Expanding the availability of zero and low emission vehicles in combination with purchase and use incentives and an expanded network of charging infrastructure could encourage broader consumer uptake and use, eventually leading to a reduction of emissions from light-duty vehicles.

Internal combustion engine (ICE) gasoline and diesel-powered vehicles will continue to be viable options and, likely the preference, for many Albertans for years to come. Progressively stringent federal regulations, advances in technology, and reductions in weight, have increased efficiency and will continue to reduce emissions from ICE vehicles.

[5] Marcon. 2016.
[6] Axsen, J., Goldberg, S., and Melton, N. 2016.
[7] Belzile, G. and Milke, M. 2017.

Environmental and Health Value

An increase in use of substantially lower emission personal vehicles and a corresponding decrease in the use of, or emissions from, gasoline or diesel personal vehicles will help to reduce $PM_{2.5}$ and ozone levels in urban areas that are approaching or not achieving the CAAQS.

A recent University of Calgary study that examined the impact of electric vehicles suggests that they would substantially reduce emissions. The report states, "Even in Alberta, with its high-carbon electricity, there are greenhouse gas benefits associated with fuel production and use in shifting from gasoline to electric-powered personal vehicles. For a typical personal-use vehicle driven 15,000 km/year, the benefit is 1 to 1.5 t CO_2e (tonnes of carbon dioxide equivalent) per vehicle per year. For new vehicles in 2015, that represents approximately 33% reduction in emissions, but by 2040, the reduction is estimated to be 50%."[8]

Compatibility with Existing Initiatives

This recommendation aligns with several national, provincial, and municipal initiatives aimed at emissions reductions via increased use of alternatively fueled vehicles. Examples are provided below.

National:

- Mobile Sources Working Group under the national Air Quality Management System (CCME)
- Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada)
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)
- Climate Leadership Plan (Government of Alberta)
- Truck Stop Electrification Feasibility Study (Alberta Transportation)
- Zero Emission Vehicle Impact Study (Alberta Transportation)

Municipal:

- Electric Vehicle Strategy (City of Calgary, under development)
- Electric Vehicle Strategy (City of Edmonton, under development)

Potential Stakeholders

- Alberta Association of Municipal Districts and Counties
- Alberta Motor Dealers Association
- Alberta Motor Vehicle Industry Council
- Alberta Urban Municipalities Association
- Canadian Natural Gas Vehicle Alliance
- Car share programs
- Electric Vehicle Association of Alberta
- Energy Efficiency Alberta
- Government of Alberta (Economic Development and Trade)

[8] Layzell, D. B. and Straatman, B. 2016, p.3.

ADVICE TO IMPLEMENTERS

Incentives

An electric vehicle incentive program[9] was introduced in Ontario in 2010, with new parameters developed and implemented in 2016. The results of this program provide information on cost and environmental and health benefits. Similar financial incentive programs exist in British Columbia, Prince Edward Island, and Quebec (which also provides incentives for hybrid electric vehicles and used electric vehicles[10]).[11] British Columbia's program is funded by the province's Innovative Clean Energy fund and administered by the New Car Dealers Association of BC.[12]

British Columbians also benefit from the BC Scrap-It program, a supportive initiative operated by a not-for-profit organization. This program relies on funding from government and program partners so that it can offer incentives to individuals choosing to scrap a vehicle so they can purchase a low or lower emitting option, including hybrid electric vehicles, plug-in hybrid electric vehicles, electric vehicles, ICE vehicles, bicycles, Car2Go and car share credits, transit passes, and others.[13]

The intent of financial incentives is to equalize the cost premium between low emitting vehicles and conventional vehicles which, depending on the vehicle, can be substantial. For vehicle replacements, the vehicles to be replaced should emit less than those intended for purchase, and should be scrapped if certain criteria are not met.

Increasing Zero and Low Emission Vehicle Sales

Provincial registered motor vehicle statistics indicate that zero and low emission vehicles comprise a very small proportion of registered motor vehicles overall and have been increasing at a very slow rate. The vehicle registry figures classify vehicles by fuel type not by their emission categories; therefore, separate statistics exist for electric and hybrid vehicles. Low emission ICE vehicles, however, are not included as a category in the vehicle registry data. As of March 31, 2017, 377 electric vehicles and 16,678 hybrid vehicles were registered for use in Alberta.[14] Taken together, electric and hybrid vehicles represented less than one-half of one percent of all registered motor vehicles in the province. Increasing the percentage of zero and low emission vehicles in use needs to be accompanied by efforts to increase public awareness regarding real-world expectations of such vehicles as well as the availability of charging infrastructure. Urban fleet vehicle users such as car-sharing companies should also be encouraged to examine the broader use of zero and low emission vehicles in their fleets.

In Ontario, a non-profit organization called Plug 'n Drive,[15] which is sponsored by the provincial government, utilities, the auto industry, charging industry, and others, works to increase the adoption of electric vehicles in that province. A key component of its education and outreach strategy is the Electric Vehicle Discovery Centre. Visitors to the Centre learn how electric vehicles help reduce emissions, get accurate information regarding their environmental and economic benefits, and test drive electric vehicles from a variety of auto manufacturers. Plug 'n Drive also maintains a comprehensive website featuring electric vehicles and related topics, including charging. Some jurisdictions increase the percentage of zero and low emission vehicles through regulation. An example is California, which uses the Zero Emission Vehicle (ZEV) regulation to help achieve its long-term emission reduction goals by requiring manufacturers to offer specific numbers of the cleanest cars available for sale. ZEV program technologies include battery electric, fuel cell, and plug-in hybrid electric vehicles. The regulation was adopted in

[9] Bronson Consulting. 2013.
[10] Used Vehicles Pilot Project. Government of Quebec [vehiculeselectriques.gouv.qc.ca].
[11] Bronson Consulting. 2013.
[12] Clean Energy Vehicles for British Columbia [www.cevforbc.ca/clean-energy-vehicle-program].
[13] BC Scrap-It Program [scrapit.ca].
[14] Alberta Transportation. 2016.
[15] Plug 'n Drive Canada. 2017.

1990 and several decades of data are available to assess the program's costs and benefits. Nine other states have since adopted the California regulation (Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont),[16] and Quebec has implemented a zero-emission standard as well. A similar approach involving a regulation to require minimum numbers of zero and lower emission vehicles to be sold in Alberta was considered by the project team; draft recommendations to achieve this were developed and tested with select stakeholders but were not adopted because of stakeholder concerns.

The Government of Canada recently announced that, under the Pan-Canadian Framework on Clean Growth and Climate Change, it would collaborate with provincial and territorial governments, industry, and stakeholders to develop a national ZEV strategy by 2018.[17] The framework will enhance existing initiatives including light-duty vehicle regulations and provincial ZEV programs. A national advisory group was struck to help inform the strategy by identifying options to address barriers to ZEV adoption, looking at vehicle supply, costs and benefits of ownership, infrastructure readiness and requirements, and public awareness.

Infrastructure

Initiatives to expand charging infrastructure at the federal, municipal, and regional levels are underway. Coordination helps to ensure alignment, leverage expertise, and prevent duplication of efforts. The document prepared for the CCME Mobile Sources Working Group provides valuable background and context for expanding electric vehicle charging infrastructure.[18] With various stakeholders focused on this task, it is important to work towards a relatively seamless experience for users. To increase acceptance and use of electric vehicles for long distance travel, it will also be important to expand charging infrastructure along key travel routes such as the Trans-Canada Highway and similar corridors.

Greening the Vehicle Fleet

Implementers may wish to consider an approach that focuses on greening the vehicle fleet overall with appropriate emphasis on encouraging consumers to replace older, higher-emitting vehicles with newer, lower-emitting ones. Alberta could realize the benefits of leveraging financial and other incentives such as vehicle scrappage programs.

Increasing consumer awareness, knowledge, and understanding of zero and low emission vehicles and their benefits is crucial to improving uptake. Stakeholders may wish to partner or collaborate on the development of an initiative like Ontario's Plug 'n Drive to provide Alberta consumers with a provincial source of information and opportunities to test such vehicles in real-world conditions.

Dealership salespeople have an important role to play in informing consumers about electric vehicles and the availability of charging stations as well as addressing range anxiety. They must also be familiar with the types of incentives, financial and otherwise, available to eligible purchasers.

[16] Alliance of Automobile Manufacturers. 2017

[17] Transport Canada. May 26, 2017.

[18] Marcon. 2016.

RECOMMENDATION 3: ANTI-TAMPERING REQUIREMENTS FOR LIGHT-DUTY AND HEAVY-DUTY VEHICLES

That Alberta Transportation prohibit vehicle emission control system tampering of future model year vehicles and engines through revisions to applicable provincial legislation and associated vehicle inspection criteria

PERFORMANCE MEASURES

i. Existing vehicle equipment legislation (e.g., *Vehicle Equipment Regulation*) is modified by January 2022 to prohibit emission control system tampering of future model year vehicles registered in Alberta
ii. Existing vehicle inspection manuals (e.g., Automotive and Light Truck Inspection Manual) are modified to include vehicle emission control criteria and associated inspections (e.g., out-of-province inspections) commencing by January 2023

RATIONALE AND BACKGROUND

Emission control systems or devices are standard design requirements for new vehicles and engines to ensure that stringent national emission standards are met. Tampering with emission control systems or devices circumvents the objectives of federal regulations. Tampering-related activities include altering mechanical or computer systems, advertising tampering services, and selling or operating a tampered vehicle or engine.

The scope and environmental impact of tampering in Alberta is not known, but limited Alberta-specific information from a past CASA program is available. The Breathe Easy program was a CASA-sponsored pilot project conducted in Calgary in 2003 that focused on scrapping pre-1988 vehicles. Scrapped vehicles were inspected to determine whether emission control systems had been subject to tampering. About one in five (21%) showed evidence of emission control system tampering.[19]

ENVIRONMENTAL AND HEALTH VALUE

Modifying existing legislation to include anti-tampering requirements will provide direction for acceptable practices for mechanics and send a signal to the public that such activity is unlawful. Currently there is nothing in place to prevent mechanics or the public from removing emission controls in Alberta, although most other Canadian provinces and territories have anti-tampering legislation. Including anti-tampering information in the Automotive and Light Truck Inspection Manual would increase general awareness and apply to inspection criteria for vehicles entering the province from elsewhere.

COMPATIBILITY WITH EXISTING INITIATIVES

Implementation of anti-tampering legislation aligns with several existing national and provincial initiatives designed to reduce emissions. Examples are provided below.

National:

- Mobile Sources Working Group under the national Air Quality Management System (CCME)
- Legislation for in-use vehicles would complement federal requirements for emission controls on new and imported vehicles to help ensure proper maintenance after sale.
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)

[19] Clean Air Strategic Alliance, Vehicle Emissions Team. 2003.

POTENTIAL STAKEHOLDERS

- Alberta Motor Association
- Alberta Motor Transport Association
- Canadian Trucking Alliance
- Government of Alberta (Alberta Environment and Parks)
- Private sector (automotive repair industry, mechanics, training schools, etc.)

ADVICE TO IMPLEMENTERS

Implementing anti-tampering requirements for future model years would provide notice to Alberta stakeholders including owners, operators, and mechanics that tampering is unacceptable; requirements would not apply retroactively. These requirements should also be considered for any vehicle coming into the province to be registered; i.e., those undergoing out-of-province inspections as of a specific implementation date. Exemptions may need to be considered in unique circumstances; e.g., antique vehicles.

Anti-tampering legislation in other Canadian jurisdictions can be used to gauge the impacts of implementing a similar program in Alberta; for example:

- Drive Clean Program (Government of Ontario)
- Heavy Vehicle Inspection and Maintenance Program (PIEVAL[20] – Government of Quebec) – roadside emission inspections of heavy-duty vehicles
- Anti-Tampering Legislation (Governments of British Columbia, Ontario, Quebec, Manitoba, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, Northwest Territories, Yukon)[21]

Alberta's *Vehicle Equipment Regulation* and *Commercial Vehicle Safety Regulation* may be the appropriate legislation to revise to prohibit emission control system tampering. The Automotive and Light Truck Inspection Manual and Commercial Vehicle Inspection Manual should reflect such changes. See Recommendation 4 for additional benefits that could accrue from amendments to this regulation.

[20] Societé de l'assurance automobile Quebec. 2017.

[21] Bronson Consulting. 2013.

RECOMMENDATION 4: INSPECT COMMERCIAL (ON-ROAD HEAVY-DUTY) VEHICLE EMISSION CONTROLS

That Alberta Transportation amend the *Commercial Vehicle Safety Regulation* and associated Commercial Vehicle Inspection Manual to require inspection of commercial vehicle emission controls in accordance with the Canadian Council of Motor Transport Administrators 2014 National Safety Code Standard 11, Part B (NSC 11B) of future model year vehicles

PERFORMANCE MEASURES

i. Modifications are made to the *Commercial Vehicle Safety Regulation* and the associated Commercial Vehicle Inspection Manual by January 2022 to require inspection of emissions controls for future model year vehicles
ii. Vehicle emissions controls are included in commercial vehicle inspections by January 2023

PERFORMANCE INDICATOR

i. Number of non-compliant vehicles, beginning in January 2023

RATIONALE AND BACKGROUND

Emission control systems or devices are standard design requirements for new vehicles and engines to ensure that stringent national emission standards are met. Tampering with emission control systems or devices circumvents the objectives of federal regulations. Tampering-related activities include altering mechanical or computer systems, advertising tampering services, and selling or operating a tampered vehicle or engine.

In Alberta, commercial trucks and buses that exceed the applicable weight threshold must pass the Periodic Motor Vehicle Inspection annually and semi-annually, respectively. They must also be inspected using the NSC 11B criteria, excluding Emission Controls (sections B, C, D, and E of NSC 11B) and Exterior Sun Visor (section A and Figures 1 – 4) until such time as the *Commercial Vehicle Safety Regulation* is amended to support their inclusion.

The New West Partnership was established to create an economic partnership to advance shared provincial interests in strengthening the regional economy. It was recognized that achieving the full potential of the Partnership would require removal of unnecessary barriers to trade, investment, and labour mobility. Work is underway through this forum to harmonize trucking regulations and remove irritants and impediments to commercial transportation within the region.

ENVIRONMENTAL AND HEALTH VALUE

Aligning the inspection criteria with the up-to-date National Safety Code will help identify poorly maintained vehicles and require them to be repaired or prohibit their use. Reducing commercial vehicle emissions would help reduce ambient levels of $PM_{2.5}$ and ozone and would also improve overall air quality.

COMPATIBILITY WITH EXISTING INITIATIVES

This recommendation aligns with several national and provincial initiatives. Examples are provided below.

National:

- Mobile Sources Working Group under the national Air Quality Management System (CCME)
- National Safety Code criteria
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)

POTENTIAL STAKEHOLDERS

- Government of Alberta (Alberta Environment and Parks)
- Alberta Motor Vehicle Industry Council
- Trucking industry and relevant association
- Mechanic associations and training schools

ADVICE TO IMPLEMENTERS

Implementing commercial vehicle emission control inspection criteria for future model years would provide notice to Alberta stakeholders including owners, operators, and mechanics and would be consistent with the complementary recommendation to prohibit emissions control system tampering of future model year vehicles and engines (Recommendation 3). These inspection criteria would not apply retroactively for compliance purposes but could be applied for other purposes, such as gathering data to help inform adjustments to emission inventories.

Commercial vehicle inspections are already required under Section 19 of the *Vehicle Inspection Regulation*. Implementing emission control criteria for commercial vehicle inspections would require revisions to existing legislation and the associated inspection manual.

NSB 11B provides minimum criteria for visual inspections of emission controls; additional criteria such as on-board diagnostics testing or tailpipe emissions testing could also be considered as part of commercial vehicle inspections.

RECOMMENDATION 5: INCREASE THE PERCENTAGE OF ZERO AND LOWER EMISSION ON-ROAD HEAVY-DUTY VEHICLES

That Alberta Transportation:

i. work with partners to expand the availability of infrastructure for zero and lower emission vehicles (e.g., charging/fueling infrastructure) for long-haul heavy-duty vehicles

ii. in coordination with municipalities, support and develop programs to remove barriers and expand the purchase and use of zero and lower emission vehicles for municipal services (transit, municipal fleets, etc.)

PERFORMANCE MEASURES

i. Percentage of zero and lower emission buses in municipal transit fleets
ii. Percentage of zero and lower emission heavy-duty vehicles in service in Alberta
iii. Number of electrified truck stops installed on major freight corridors

PERFORMANCE INDICATORS

i. Number of freight vehicles that used electrified truck stops

RATIONALE AND BACKGROUND

One method of reducing emissions is to encourage the uptake of alternatively fueled vehicles for heavy-duty on-road use. Generally, electric vehicles provide the largest reduction, completely eliminating direct emissions. Other fuel sources such as compressed natural gas (CNG) or hydrogen fuel cells also lower air emissions. Although CNG reduces emissions compared to standard diesel fuel, tailpipe emissions are still generated. Hydrogen fuel cell technologies can reduce emissions but require further demonstration of commercialization.

Feasibility studies have identified the cost effectiveness of electric transit buses compared to standard fossil-fueled vehicles based on available technology (see Table 5). Generally, the uptake of electric buses has been inhibited by the higher initial capital costs and lack of fueling and maintenance infrastructure rather than by technical issues.

Table 5: Comparative Lifecycle Cost of Diesel and E-bus Technologies (2016 Dollars)

Cost elements for a fleet of 40 buses	Diesel buses	Trickle-charged e-buses	En-route charged e-buses
Capital Investment Costs			
Bus acquisition & rebuild (40 units)	$28 075 180	$45 865 569	$57 281 973
Building and Infrastructure cost	None required	$750 000	$1 154 992
Charging stations cost	None required	Included with bus	$6 767 923
Other soft, non-recurring costs	None required	$119 843	$126 822
Capital expenses total	**$28 075 180**	**$46 861 434**	**$65 331 710**
Operating Costs			
Maintenance and service costs	$26 201 313	$18 260 531	$18 064 388
Charging/fueling equipment maintenance	Negligible	$66 899	$1 131 926
Fuel and electricity cost	$14 015 707	$4 831 981	$5 310 479
Carbon levy	$1 303 976	$21 496	$21 496
Operating expenses total	**$41 520 996**	**$23 159 937**	**$24 528 289**
Total NPV Lifecycle Cost	**$69 596 176**	**$69 916 319**	**$89 859 999**
% difference with diesel buses	**-**	**+0.46%**	**+29.12%**

Source: City of Edmonton Transportation Committee. 2016.

Electric long-haul heavy-duty vehicles are being commercialized, and expanding the necessary charging and fueling infrastructure would help reduce a major barrier to their future uptake. In addition, providing truck stop

electrification infrastructure, increased education, and uptake of anti-idling devices (such as auxiliary power units and shore power options) as part of a suite of measures can reduce idling from current long-haul heavy-duty fleets by allowing for the use of electric truck cab heaters during downtime instead of heat provided by the engine. This recommendation speaks to the need to work with industry to reduce idling from current long-haul heavy-duty fleets and increase the uptake of alternative fuel and electric auxiliary units to power necessary onboard systems.

Environmental and Health Value

Diesel is the dominant fuel used for bus services. An increase in use of substantially lower emission vehicles for municipal services and a corresponding decrease in the use of, or emissions from, gasoline or diesel vehicles will help to reduce $PM_{2.5}$ and ozone, which is especially important in the areas that are in the orange or red management levels for CAAQS.

Compatibility with Existing Initiatives

This recommendation aligns with national, provincial, and municipal initiatives aimed at supporting emissions reductions via increased usage of alternatively fueled vehicles. Examples are provided below.

National:

- Mobile Sources Working Group under the national Air Quality Management System (CCME)
- Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada)
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)
- Climate Leadership Plan (Government of Alberta)
- Truck Stop Feasibility Study (Alberta Transportation)
- GreenTRIP (Alberta Transportation)

Municipal:

- Calgary has focused on CNG buses, but has been trialing other vehicle technologies.
- Construction on Calgary's Stoney CNG Bus Storage and Transit Facility started in 2017. This facility will provide storage and maintenance space for Calgary Transit's new fleet of CNG buses, as well as on-site compressed natural gas fueling infrastructure.
- The Edmonton Goods Movement Strategy has an objective to mitigate community, environmental, and safety impacts which includes advocating for fuel efficiency and emissions testing on heavy vehicles
- Edmonton undertook a feasibility study of electric buses, endorsed their inclusion in the fleet, and is procuring multiple units.[22]
- Grande Prairie is considering purchasing electric buses based on an August 2016 report on viability. It is also considering the feasibility of using a solar energy storage system for charging stations
- Medicine Hat has incorporated eight CNG buses in its fleet.
- Red Deer has eight CNG buses and has plans to convert its entire fleet to CNG in the next five years.
- Under GreenTRIP (Alberta Transportation), St. Albert tested electric buses and has subsequently purchased multiple units and is investigating full electrification

Potential Stakeholders

- Alberta Motor Dealers Association
- Alberta Motor Vehicle Industry Council

[22] City of Edmonton Transportation Committee. 2016.

- Cities of Calgary, Edmonton, Leduc, Lethbridge, Medicine Hat, Red Deer
- Energy Efficiency Alberta
- Government of Alberta (Alberta Environment and Parks, Alberta Municipal Affairs)
- Strathcona County
- Trucking Associations

ADVICE FOR IMPLEMENTERS

The availability of zero and low emission vehicles as well as the necessary fueling and maintenance infrastructure are the primary barriers to expanding the use of such vehicles. Developing the correct infrastructure in the best locations will require significant coordination between industry and provincial and municipal governments.

Numerous feasibility studies have been undertaken for use of electric or CNG buses, and successful deployment has occurred. These feasibility studies have indicated similar financial viability of zero and low emission vehicles compared to standard fossil fuel based equipment (see Table 5). However, zero and low emission vehicles generally have a larger up-front cost compared to standard fossil fuel vehicles, but with lower fuel and maintenance costs over the life of the vehicle. Any support provided should focus on infrastructure costs and developing the business case to help expand their use.

There may be an added up-front cost for purchasing zero or low emission vehicles. While reduced fuel and maintenance costs for zero/low emission vehicles make their use financially viable, the higher initial cost may remain a barrier, so there could be a role for financial incentives or special debt services to encourage their uptake. These may be applied at the time of purchase or be based on the maintenance and operation of the vehicle (i.e., preferred vehicle registration rates, less frequent inspection requirements).

This recommendation must build on the work already undertaken by municipalities and target expansion of the most beneficial technologies. This requires coordination among municipalities, with a clear role for Alberta Transportation in providing overall strategic direction.

Partners for Climate Protection has developed a resource guide to help reduce emissions from municipal heavy-duty vehicles, which can help guide municipal strategy development.[23]

Substantial research has been undertaken to evaluate the current status of alternate fueling modes for on-road heavy-duty vehicles. The Electric Power Research Institute summarized this in 2017.

The Electric Power Research Institute has also investigated additional benefits to electric vehicle use as a grid-tied resource. This facilitates the collection and sharing of revenue from grid services and electric vehicles connected to the grid.

Support for the uptake of lower/zero emission vehicles requires developing the necessary infrastructure to facilitate their use, specifically new fueling and maintenance infrastructure for electric and CNG-fueled vehicles. Targeted support to municipalities to develop this infrastructure would help reduce the barriers to expanding the use of these fuels for on-road heavy-duty vehicles.

[23] Partners for Climate Protection. 2010.

RECOMMENDATION 6: INCREASE ON-ROAD HEAVY-DUTY FLEET FUEL EFFICIENCIES

That Alberta Environment and Parks and Alberta Transportation work with appropriate stakeholders to:

i. provide education and promotion of commercial freight membership in the SmartWay Transport Partnership
ii. encourage, through the SmartWay Transport Partnership, increasing fleet fuel efficiencies through education and promotion of the use of fuel efficiency technologies, such as aerodynamic devices, idle reduction devices, or low rolling resistance tires
iii. encourage SmartWay participation as a consideration for procurement

PERFORMANCE MEASURES

i. Alberta Environment and Parks and Alberta Transportation have established promotion of SmartWay by January 2019
ii. Number of SmartWay partners and affiliates (membership number)

PERFORMANCE INDICATOR

i. Average diesel consumption per kilometre travelled among all Alberta carriers in the program

RATIONALE AND BACKGROUND

One method of reducing emissions is to improve the data and knowledge available on fleet fuel efficiencies and promote the use of fuel-efficient equipment and retrofits. Improving the data and knowledge of the current state of fleet fuel efficiencies will assist the transport sector in identifying opportunities to improve fuel consumption and associated emissions. Purchasing strategies can be developed to guide improvements in fleet fuel efficiencies based on each fleet's unique situation.

SmartWay program summary:

- The SmartWay Transport Partnership, a program delivered in Canada by Natural Resources Canada under a license agreement with the United States Environmental Protection Agency (EPA), is a collaboration among freight shippers, carriers, and logistics companies to voluntarily improve fuel efficiency and reduce emissions from freight transport.
- Shippers and carriers can participate as SmartWay partners, while others such as governments and non-government organizations may participate as affiliate members to help promote the program.
- The key program message is "Save Fuel, Save Money, Reduce Emissions."
- To mitigate the environmental impact of the movement of their goods, shippers are increasingly turning to their supply chain to become more efficient.
- The concept that "you can't manage what you don't measure" is key for companies trying to manage their operations and fuel use, and that is what SmartWay offers them.
- The program includes:
    - free standardized reporting tools and resources to help freight transport carriers become more fuel efficient
    - benchmarking and data reports that allow carriers to measure their progress against their industry peers
    - carrier data that freight shippers can use to accurately report their carbon footprint
    - environmental performance recognition for carriers to help market their business
- SmartWay provides access to real data allowing companies to make informed business decisions.

- When the data are used, carriers gain insight into how to improve their performance (e.g., whether they should buy new tractors, trailers, or aerodynamic add-ons; undergo training; or develop anti-idling programs).
- SmartWay helps shippers identify which carriers to work with and how they can alter their transportation practices, such as co-loading, to improve performance.

Environmental and Health Value

Improving fleet fuel efficiency and associated emissions can help reduce $PM_{2.5}$ and ozone levels. Heavy-duty diesel vehicles are a major source of NO_x, and a source of NH_3 and $PM_{2.5}$ emissions in Alberta.

Compatibility with Existing Initiatives

This recommendation aligns with several national, provincial, and municipal initiatives aimed at supporting emissions reductions via improved fleet fuel efficiency. Examples are provided below.

National:

- Mobile Sources Working Group under the national Air Quality Management System (CCME)
- Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada)
- SmartWay (Natural Resources Canada)
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)
- Climate Leadership Plan (Government of Alberta)
- Truck Stop Electrification Feasibility Study (Alberta Transportation)

Municipal:

- The Edmonton Goods Movement Strategy has an objective to mitigate community, environmental, and safety impacts which includes advocating for fuel efficiency and emissions testing on heavy vehicles

Potential Stakeholders

- Energy Efficiency Alberta
- Government of Alberta (Service Alberta)
- Natural Resources Canada
- Private industry requiring procurement for transportation of goods
- Trucking industry and relevant associations, including the Alberta Motor Transport Association
- NGOs

Advice to Implementers

SmartWay is an established program with free tools and free training and information sessions. The SmartWay program in Canada is fully aligned with the US program. The SmartWay online membership database contains all members, which is convenient for those who transport across the Canada-US border.

Natural Resources Canada already actively supports and promotes the use of SmartWay. Alberta could further expand SmartWay's use by coordinating engagement with Canadian carriers.

More directed promotion could take the form of reduced registration fees for SmartWay carriers, reduced inspection obligations, and procurement requirements including preferential selection of SmartWay carriers.

In 2010 the "Trucks of Tomorrow" pilot incentive program[24] was launched by Climate Change Central to address barriers preventing the trucking industry from adopting fuel efficiency technologies. Results from this pilot could be reviewed and applied as appropriate. A longer-term financial commitment to an incentive program may help planning by trucking companies, but participation in SmartWay is expected to pay for itself through fuel savings.

The trucking industry, including the Alberta Motor Transport Association, has been investigating technology upgrades that reduce fuel use and emissions, such as aerodynamic devices, idle reduction devices or low rolling resistance tires. Promotion of SmartWay may support the industry in implementing these upgrades more broadly.

If any direct financial support is considered under this recommendation or other strategies for on-road heavy-duty vehicles, participation in the SmartWay Transport Partnership should be considered as a requirement for receiving assistance.

[24] Climate Change Central. 2012.

2.2.2 Freight Strategies

RECOMMENDATION 7: SUPPORT AND DEVELOP FREIGHT STRATEGIES

That Alberta Transportation and municipalities, in collaboration with appropriate stakeholders, support the development of urban and long-haul freight strategies for the movement of goods in Alberta

PERFORMANCE MEASURE

i. Establishment or expansion of goods movement strategies within and between urban centres by January 2020

PERFORMANCE INDICATORS

i. Proportion of tonnes of goods moved by rail in Alberta
ii. On-road time measured through electronic logging devices

RATIONALE AND BACKGROUND

Some methods of decreasing emissions include adjusting delivery scheduling away from peak congestion times, developing local delivery strategies for coordination, and using real-time traffic data to optimize urban delivery systems to reduce idle times and optimize fuel use. Similar strategies can be developed for province-wide transportation routes and corridors to optimize the overall movement of goods throughout Alberta. The main focus of this recommendation is to help reduce congestion within urban areas as there are existing initiatives for goods movement on a broader scale.

ENVIRONMENTAL AND HEALTH VALUE

Reducing congestion in urban centres increases the efficiency of vehicle traffic movement overall, thereby reducing idling. This lowers emissions through reduced fuel use.

Streamlining and increasing coordination for long-haul goods transportation similarly helps improve overall fleet efficiencies and ultimately reduces fuel use and associated air pollution.

COMPATIBILITY WITH EXISTING INITIATIVES

This recommendation aligns with several national, provincial, and municipal initiatives. Examples are provided below.

National:

- Mobile Sources Working Group under the national Air Quality Management System (CCME)
- Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada)
- The Canadian Council of Motor Transport Administrators Electronic Logging Device Mandate (to take effect December 2017)
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)
- Climate Leadership Plan (Government of Alberta)

Municipal:

- Calgary Goods Movement Strategy (City of Calgary; to be completed in 2018)
- Edmonton Goods Movement Strategy (City of Edmonton)

POTENTIAL STAKEHOLDERS

- Delivery and logistics companies
- Government of Alberta (Alberta Climate Change Office, Alberta Economic Development and Trade)
- Northern Alberta Development Council
- Rail and air industry and associations
- Trucking industry and association (Canadian Trucking Alliance, Alberta Motor Transport Association)

ADVICE TO IMPLEMENTERS

Various institutes and agencies are researching the status of goods movement in Alberta and other jurisdictions, including the Pacific Gateway Alliance, the Van Horne Institute, the Regional Plan Association, Volvo Research and Educational Foundations, and the Pembina Institute. This research can help identify activities to be evaluated as part of developing an Alberta-specific goods movement strategy.

Recognizing the benefits from reduced congestion, some urban centres have already established goods movement strategies.

Alberta's rail system capacity has been reduced in recent years with some lines being removed rather than maintained. Better integration of the rail system into commercial shipping can create efficiencies and reduce or remove the need for on-road heavy-duty vehicle transportation. Key corridors for rail transportation should be identified, preserved, and incorporated into freight strategies. A cost-benefit analysis of rail versus on-road freight would help demonstrate the best mode to use for specific transportation needs.

Heavy-duty vehicle use restrictions could be implemented for certain times and areas but would not be considered as effective and efficient as implementing a comprehensive strategy.

2.2.3 On-Road Emission Testing Study

RECOMMENDATION 8: CONDUCT AN ON-ROAD EMISSION TESTING STUDY

That Alberta Environment and Parks and Alberta Transportation, in collaboration with appropriate stakeholders, undertake an innovative on-road emission testing study

PERFORMANCE MEASURE

i. The study is complete by January 2020 and provides $PM_{2.5}$ and NO_x emissions data, at minimum, for a variety of vehicles and model years used in Alberta

RATIONALE AND BACKGROUND

On-road heavy-duty vehicles were identified as a source of primary $PM_{2.5}$, NO_x, NH_3, and VOCs. An innovative on-road emission testing study could help:

- characterize emissions from in-use vehicles (e.g., determine which ages and classes of vehicles have highest and lowest emissions, and whether emissions reality matches perception) in a particular area such as the Edmonton to Calgary corridor
- identify potential impacts of program and policy options (e.g., design the study to target highest emitters)
- test the feasibility of integrating emission testing into program options (e.g., for identifying gross-emitters)

A similar, short-term study was conducted in British Columbia in 2012,[25] in which emissions data were collected for a variety of diesel vehicles and model years through the use of a remote sensing device and a heavy-duty emissions tunnel. These newer technologies provide data beyond the snap acceleration smoke test that has limitations for measuring PM and does not measure NO_x.

ENVIRONMENTAL AND HEALTH VALUE

Heavy-duty diesel vehicles are known to be an important source of NO_x, NH_3 and $PM_{2.5}$ emissions in Alberta. An innovative emissions testing study would increase understanding of actual emissions from heavy-duty vehicles and inform targeted management actions for these non-point sources for highest benefit.

COMPATIBILITY WITH EXISTING INITIATIVES

This recommendation aligns with national and provincial initiatives. Examples are provided below.

National:

- Mobile Sources Working Group under the national Air Quality Management System (CCME)
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)

Municipal:

- Greater Vancouver Regional District Remote Sensing Device Trial for Monitoring Heavy-duty Vehicle Emissions (City of Vancouver)

[25] Envirotest Canada. 2013.

POTENTIAL STAKEHOLDERS

- Airshed Organizations
- Municipalities
- Trucking industry and associations

ADVICE TO IMPLEMENTERS

An innovative emission testing study could gather valuable information on emissions and potential management actions in Alberta and for public awareness and education. This study can include both heavy-duty and light-duty vehicles, and its results could be compared with previous and any future studies (e.g., to gauge improvements). The short-term study conducted in British Columbia in 2012 could help inform the remote sensing device study design, as a limitation of the BC study was the option for drivers to avoid the test site. The historical CASA Vehicle Emissions Team projects included studies titled ROVER I and ROVER II (Roadside Optical Vehicle Emissions Reporter). This study would link with Recommendation 16, Knowledge of Non-Point Sources.

CASA could potentially lead such a project through its multi-stakeholder process, which has a demonstrated track record of success. In 1998, the ROVER project assessed actual in-use vehicle emissions using a remote sensing van equipped to measure exhaust emissions from more than 66,000 light-duty vehicles in four municipalities. In 2006, the project was repeated as ROVER II, testing more than 50,000 vehicles in Edmonton, Calgary, Red Deer, and Canmore. ROVER II found emissions per kilometre were falling, but vehicle use had increased. It is important to recognize that the lower emission rates per vehicle are partly offset by the increased number of vehicles.[26]

Undertaking the project through CASA would allow lessons learned from previous studies to be applied, thus leveraging opportunities for awareness and education, consideration of future studies to gauge effectiveness of implemented management actions, and engagement with all stakeholders, particularly willing participants in the trucking industry. Additional benefits can be derived from this research by considering both air contaminants and greenhouse gases.

This study would be a mechanism to ground-truth actual emissions from vehicles in Alberta and help focus potential management actions on the highest polluters. With the more stringent CAAQS for NO_2, additional NO_x reduction actions will likely be required from large sources such as heavy-duty vehicles.

[26] ESP and McClintock, P.M. 2007.

2.2.4 Energy Efficiency Alberta and the Transportation Sector

RECOMMENDATION 9: ENERGY EFFICIENCY ALBERTA AND THE TRANSPORTATION SECTOR
That Energy Efficiency Alberta (EEA) consider the transportation sector as an area for future EEA programs that provide greenhouse gas and air emission reduction co-benefits

PERFORMANCE MEASURES

i. EEA to inform CASA of the result of its consideration of action on transportation by January 2019
ii. If warranted by the review, the number of EEA transportation programs in place by January 2020

RATIONALE AND BACKGROUND

EEA is a new provincial agency that is delivering programs and services to help Albertans save both energy and money and reduce emissions. Alberta's Climate Leadership Plan includes a commitment to reinvest all revenue from the carbon levy into Alberta's economy, including $645-million to EEA over five years. EEA was launched in October 2016 and began rolling out programs in 2017, including:

- Direct Install Residential Program offering direct, no-charge installation of low-cost energy efficiency products to residences, such as lighting, water, and heating components
- Residential Consumer Products Program offering point of sale rebates to residential consumers at retail outlets with products such as lighting, insulation, and appliances
- Business, Non-Profit, and Institutional Rebate Program offering incentives for high-efficiency products and the installation of electric and gas-based products such as lighting, heating and cooling systems, and hot water systems

EEA evaluates potential programs and decides which to implement based on where incentives are most cost-effective at reducing energy use.

ENVIRONMENTAL AND HEALTH VALUE

Increasing the use of high occupancy vehicles (carpooling, public transit), individuals choosing active transportation (e.g., walking, bicycling), and the use of more fuel-efficient vehicles will reduce vehicle emissions, which is of particular concern in areas in the orange or red CAAQS management levels.

EEA programs in the transportation sector could reduce emissions through, for example, incentives for the purchase or use of lower emitting vehicles or for increased use of alternative modes of transportation (e.g., active transportation, sharing economy vehicles, and public transit).

COMPATIBILITY WITH EXISTING INITIATIVES

This recommendation potentially aligns with several national, provincial, and municipal initiatives aimed at emissions reductions in the transportation sector. Examples are provided below.

National:

- Mobile Sources Working Group under the national Air Quality Management System (CCME)
- Buying a Fuel Efficient Vehicle (Natural Resources Canada – Office of Energy Efficiency)
- Eco Driving, Fuel-Efficient Driving Techniques (Natural Resources Canada – Office of Energy Efficiency)
- Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada)
- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)
- Climate Leadership Plan (Government of Alberta)
- Green Transit Incentive Program (GreenTRIP) (Alberta Transportation)

Municipal:

- Electric Vehicle Strategy (City of Calgary, under development)
- Electric Vehicle Strategy (City of Edmonton, under development)
- Various vehicle idling reduction bylaws and initiatives (e.g., Be Idle Free [City of Edmonton], Idle Free [City of Red Deer])

Others:

- Smart Drive Challenge (Scout Environmental, Government of Ontario, Canadian Fuels Association, Natural Resources Canada)
- Smart Fuelling (Canadian Fuels Association, Canadian Independent Petroleum Marketers Association, Canadian Convenience Stores Association, Canadian Automobile Association)

Potential Stakeholders

- Alberta Motor Dealers Association
- Alberta Motor Vehicle Industry Council
- Canadian Natural Gas Vehicle Alliance
- Carpool programs
- Electric Vehicle Association of Alberta
- Government of Alberta (Alberta Transportation, Alberta Environment and Parks, Alberta Economic Development and Trade)
- Municipalities

Advice to Implementers

EEA could expand into the transportation sector using a variety of approaches, such as promoting methods to drive less or drive more efficiently, incenting the use of public and alternative transit options, incenting the purchase or use of lower emission vehicles, and assisting individuals in assessing transportation costs and emissions associated with where they choose to live.

Efficiency Vermont[27] is an example of an energy efficiency agency which has incorporated transportation efficiency into its programming with the aim of helping people drive less and drive more efficiently to lower energy costs and protect the environment.

[27] https://www.efficiencyvermont.com/

2.3 Construction Operations and Road Dust

RECOMMENDATION 10: BEST PRACTICES GUIDE FOR CONSTRUCTION OPERATIONS AND ROAD DUST

That Alberta Environment and Parks and Alberta Transportation work with municipalities, construction companies, and other stakeholders to develop and disseminate a best practices guide to address dust from construction and roads that:

i. identifies why this issue is important and what can be done to address it
ii. provides templates for environmental policies and plans
iii. prepares for potential requirements in the future

PERFORMANCE MEASURE

i. The best practices guide is complete, disseminated, and in use by January 2021

PERFORMANCE INDICATORS

i. From January 2021, number or percentage of municipalities with construction and road dust plans
ii. From January 2021, where complaints are tracked, the number of complaints related to construction and road dust
iii. From January 2021, the number of times the guide has been downloaded

RATIONALE AND BACKGROUND

Construction dust is defined as fugitive particulate matter resulting from disturbances on construction sites; this dust is the main source of primary $PM_{2.5}$. Over the past few years, $PM_{2.5}$ emissions from construction sources have been increasing and are projected to increase further in the future.[28] Furthermore, construction dust is a relevant source of $PM_{2.5}$ in all air zones.

Municipalities typically manage dust issues reactively through Community Standards bylaws. The Government of Alberta requires the potential impacts of dust emissions, including emissions during project construction, to be addressed in environmental impact assessments and also requires details on the applied emission control technologies or what is being presented as the best available technology; however, there are no provincial guidance documents on what constitutes best available dust control technology or strategies. Municipalities indicated that templates for environmental policies and plans would be helpful.

ENVIRONMENTAL AND HEALTH VALUE

Reducing particulate matter from construction and road operations can reduce impact of dust on residents, and improve visibility and therefore improve safety. It also improves air quality conditions for workers, residents, and others nearby; better protects soils and vegetation in the vicinity of dust sources; and reduces erosion and sediment issues from materials tracked from a site or entering watercourses.

[28] Government of Alberta. 2016c.

Compatibility with Existing Initiatives

This recommendation aligns with several provincial initiatives. Examples are provided below.

Provincial:

- Clean Air Strategy (Government of Alberta)
- Environmental Construction Operation (ECO) plans are required for work done on behalf of Alberta Transportation
- New project construction related dust emission assessments and management plans are required as part of project environmental impact assessments

Potential Stakeholders

- Alberta Association of Municipal Districts and Counties
- Alberta Chamber of Commerce
- Alberta Roadbuilders and Heavy Construction Association
- Alberta Urban Municipalities Association
- Industrial associations (to represent industry project proponents and who hire contractors)

Advice to Implementers

Calgary, Edmonton and Alberta Transportation have addressed this issue by requiring ECO plans for contractors performing work on their behalf. However, ECO plans have a much broader mandate than construction dust and include other environmental impacts such as riparian disturbances, prevention of sediment reaching watercourses, and tree protection. The ECO Plan Framework does not provide specific guidance on dust mitigation measures. Contractors who do work for any of these three organizations will be familiar with ECO plans, so this process is not new to a portion of industry. The ECO Plan Framework is in place[29] and an ECO Plan template is being tested.

The City of Calgary has dedicated full-time resources to reviewing ECO plans and conducting construction site inspections. These individuals have knowledge and expertise in environmental best practices for construction sites. A similar resource commitment may not be feasible for smaller municipalities.

The best practices guide may be relevant for all types of construction operations and roads (residential, commercial, institutional, highway, coal mine, oil sands mine, other industrial, etc.). The guide may feature a section that includes commonalities for all sectors, as well as separate sections for any unique issues for specific sectors. The guide should also include multi-media considerations for a holistic approach; that is, address not only air emissions but also consider water conservation and impacts to surrounding soils and vegetation.

The Government of Alberta may wish to consider this recommendation as an area of future work for CASA.

[29] Alberta Transportation, City of Calgary, and City of Edmonton. 2017.

2.4 Open-Air Burning

RECOMMENDATION 11: REVIEW OPEN-AIR BURNING REQUIREMENTS

That Alberta Environment and Parks with the involvement of Alberta Agriculture and Forestry, the Alberta Urban Municipalities Association, and the Alberta Association of Municipal Districts and Counties:

- **i.** review provincial and municipal open-air burning requirements and management practices
- **ii.** initiate reasonable measures to help ensure that in the future the potential air quality impacts of open-air burning are appropriately considered, recognizing that prescribed burning is a necessary tool to protect communities, human life, infrastructure, and natural resources, and can be an important agricultural or ecosystem management tool

PERFORMANCE MEASURES

i. By January 2020, Alberta Environment and Parks, in conjunction with relevant stakeholders, has completed a review of open-air burning practices and requirements in the province in relation to air quality management

ii. By January 2021, Alberta Environment and Parks has informed CASA on the findings from the review, and if applicable, identified opportunities for improvements and related possible implementation strategies

RATIONALE AND BACKGROUND

Existing open-air burning requirements and restrictions in Alberta focus on hazard and safety management. Open-air burning, if not managed and conducted appropriately, can have substantial and adverse effects on health, safety, and the environment, including influencing the CAAQS management level that applies to an air zone.

All levels of government and different government departments have an interest in, and some legislative authority over, open-air burning and need to work together in implementing this recommendation. While the recommendation is directed to the Government of Alberta and municipalities, open-air burning in national parks can affect provincial air quality so possible engagement of the federal government in implementation should be considered. The 2016 CCME Guidance Document for Canadian Jurisdictions on Open-Air Burning and the Parkland Airshed Management Zone Municipal Burning Bylaw Survey Report represent starting points for the recommended review in terms of regulatory and non-regulatory management options, best practices, public education, and addressing the air quality issues associated with open-air burning. These documents recognize that open-air burning is necessary for certain forestry and agricultural management practices.

The CCME[30] defines open-air burning as:

> *Any fire or burning practice conducted outside a building and includes but is not limited to, small confined fires and large confined fires, fires in burn barrels, in air curtain incinerators, outdoor recreational fireplaces, prescribed burning, and construction site and demolition site fires.*

Localized burning activities can contribute to elevated $PM_{2.5}$ readings, which over time can lead to an air zone being assigned to the orange or red CAAQS management level.

[30] CCME. 2016a, p.35.

Environmental and Health Value

The 2016 CCME Guidance Document for Canadian Jurisdictions on Open-Air Burning[31] outlines some of the potential health effects, most notably impacts on young children and older adults especially those whose respiratory and cardiovascular systems are already compromised. Long-term exposure to elevated levels of airborne PM can reduce lung function and contribute to asthma and chronic bronchitis, heart problems and premature mortality. Even short-term exposure has been associated with acute respiratory reactions and increased susceptibility to respiratory infections. The CAAQS for $PM_{2.5}$ are intended to reduce these types of health impacts. The management of open-air burning should consider possible air quality and health effects.

Compatibility with Existing Initiatives

The project team sought to review enough information to obtain a general overview of the type and nature of open-air burning requirements in Alberta. The Parkland Airshed Management Zone (PAMZ) conducted a detailed open-air burning review for Central Alberta in 2012[32] resulting in a *Municipal Burning Bylaw Survey Report.* Together, the PAMZ review and a review conducted as part of the CASA Non-Point Source Project, indicate that open-air burning is a well-recognized non-point source with potential to impact air quality. A number of Alberta urban and rural municipalities have bylaws to address open-air burning.

Prescribed burning is also covered by provincial legislation[33] and is defined as:[34]

> *The knowledgeable and controlled applications of fires on a specific land area to accomplish planned and well-defined resource management objectives.*

Alberta's prescribed fire program is a proactive approach to wildfire and forest management. The intent is to remove fuels that may contribute to wildfires that could threaten communities and human life, infrastructure, wildlife, and natural resources. They are managed to minimize emission of smoke, and Government of Alberta staff work with communities and stakeholders to ensure that prescribed fires are handled in a safe and efficient manner.

Existing controls focus on addressing the fire hazard and safety issues associated with open-air burning with restrictions on what can be burned and the details of where, when, and how the burning is conducted. In certain cases, permits are required. The Government of Alberta provides requirements and guidance about what can and cannot be open-air burned and possible approval requirements that may apply,[35] and provides guidance on specific options, including open-air burning, that can be used to manage certain materials.[36]

Potential nuisance issues associated with open-air burning are also often considered, but apart from a bylaw in the Regional Municipality of Wood Buffalo (RMWB), impacts on air quality are not.[37]

This recommendation is compatible with existing provincial and municipal initiatives to manage open-air burning activities and would provide additional guidance on open-air burning practices and management in terms of air quality considerations and controls.

[31] CCME. 2016a.
[32] Parkland Airshed Management Zone. 2012.
[33] Government of Alberta. 2017b.
[34] Alberta Agriculture and Forestry. 2017a.
[35] Alberta Environment and Parks. 2015.
[36] Alberta Agriculture and Forestry. 2017b.
[37] Regional Municipality of Wood Buffalo. 2001.

POTENTIAL STAKEHOLDERS

- Agricultural sector
- Airshed Organizations
- Forestry sector
- Municipalities
- Parks Canada

ADVICE TO IMPLEMENTERS

The CCME and PAMZ documents noted previously identify a number of regulatory tools and management options for reducing air quality impacts associated with open burning. These include:

- Municipal bylaws: These bylaws can include requirements that address air quality impacts associated with open-air burning.
- Provincial regulations: Regulations could specifically prohibit open-air burning practices that result in certain air quality impacts, like those in the RMWB bylaw. The material allowed to be open-air burned could be reviewed.
- Burn restrictions and air quality advisories: These can be used at the municipal and provincial level as a community or air zone air quality management tool along with the CAAQS and/or Alberta Ambient Air Quality Objectives as reference points to identify burn restrictions and notifications.
- Requirement for burn permits and/or burn plans: These generally already apply to agricultural, forestry, and large-scale vegetative burning, but options for ambient air quality monitoring could be added as modelling and monitoring technology improves.
- Enhanced public education: The province and municipalities should emphasize public education activities to build awareness about existing fire bylaws and regulations, the impacts of open-air burning, and alternatives to avoid burning.

The CCME guidance document provides examples of educational material that could assist jurisdictions wanting to establish or expand regulations, bylaws, or programs for managing open-air burning. In discussing this issue, the project team recognized the need for open-air burns in certain circumstances such as land clearing and agriculture (e.g., removing un-harvestable crops), and ecosystem management. The management of open-air burning should recognize these needs but activities should be conducted in a manner that considers and, to the extent practicable, manages the air impacts of the burning.

The Government of Alberta may wish to consider this recommendation as an area of future work for CASA.

2.5 Commercial and Residential Heating

The TTG identified commercial and residential heating in terms of NO_x emissions. Gas and oil-fired commercial and residential heating and carbon pricing are included in Sections 3.3 and 3.4. Home heating with wood fuel is not a large contributor to air quality issues generally in Alberta, but in large urban centres, these emissions can combine with emissions from other local and regional sources to elevate ambient levels. Residential wood burning was a focus of the project team as it was in the top 10 highest emitters of $PM_{2.5}$ and VOCs. In 2014, residential fuel wood combustion was responsible for 6.6 kilotonnes and 1% of anthropogenic $PM_{2.5}$ emissions, and 8.7 kilotonnes and 1.2% of anthropogenic VOC emissions in Alberta.

2.5.1 Residential Wood Burning

RECOMMENDATION 12: REVIEW RESIDENTIAL WOOD BURNING PRACTICES

That Alberta Environment and Parks:

i. evaluate and identify the barriers to fuel-switching from biomass to a cleaner alternative or retrofitting old wood burning space-heating equipment to meet the Canadian Standards Association Standard for Performance Testing for Solid-Fuel-Burning Heating Appliances, edition B415.1-10 (CSA B415.1-10) or Environmental Protection Agency Title 40 Code of Federal Regulations (EPA 40 CFR) standards
ii. develop strategies and programs as needed to motivate fuel-switching, replacement, or retrofitting

PERFORMANCE MEASURE

i. By March 2019, Alberta Environment and Parks has completed the evaluation and identification of barriers to fuel-switching from biomass to a cleaner alternative or retrofitting old equipment and has informed CASA on the findings of the review

RATIONALE AND BACKGROUND

The use of wood for home heating or to supplement other fuels for home heating, produces more emissions than natural gas. Recent years have seen advancements in residential wood burning equipment, and the EPA and CSA have established high efficiency standards. Ensuring adherence to these standards in all new construction and incenting the retrofit of older equipment would reduce the contribution from wood burning. In general, the use of wood for heating should be minimized and wood burning equipment that conforms to CSA or EPA efficiency and emissions standards (CSA B415.1-10; EPA 40 CFR, Part 60, Subpart AAA)[38] should be used.

As of 2011, natural gas met approximately 91% of primary home heating needs in Alberta, with most of the remaining 9% met by electric furnaces.[39] The use of wood and wood pellets, oil, propane, and other fuels together accounted for less than 1% of total primary heating in Alberta. As many wood-burning fireplaces are used occasionally for secondary heating and personal enjoyment, the percentage of overall fireplace use might be greater than the "less than 1%" figure, and it is difficult to determine the precise contribution of fireplaces to overall residential heating-related emissions.

[38] CSA B415.1-10: Canadian Standards Association developed the *Performance Testing of Solid Fuel Burning Heating Appliances* (B415.1) by basing the standards on the US Environmental Protection Agency *Standards of Performance for New Residential Wood Heaters, Section 60-532 of the 1988 Clean Air Act, subpart AAA*, which is under the US Code of Federal Regulations (Title 40 CFR).

[39] Statistics Canada. 2015.

Table 6 provides information about the amount of wood burned by different types of appliances in Alberta in 2005.

Table 6: Wood Burned by Different Wood-burning Equipment in Alberta

Category	Annual Wood Burned in Alberta (tonnes)	Proportion of Total Wood Burning Emissions by %
Conventional Fireplaces - Without Glass Doors	66,273	25
Conventional Fireplaces - With Glass Doors	59,896	22
Fireplaces with an Insert - Conventional	6,658	2
Fireplaces with an Insert - Advanced Technology	11,344	4
Fireplaces Advanced Technology	6,211	2
Wood Stoves - Conventional Not Air Tight	40,107	15
Wood Stoves - Conventional Air-Tight	45,893	17
Wood Stoves - Advanced Technology	19,228	7
Central Furnaces/Boilers	5,804	2
Others (including pellet stoves)	5,323	2
Total	**266,737**	

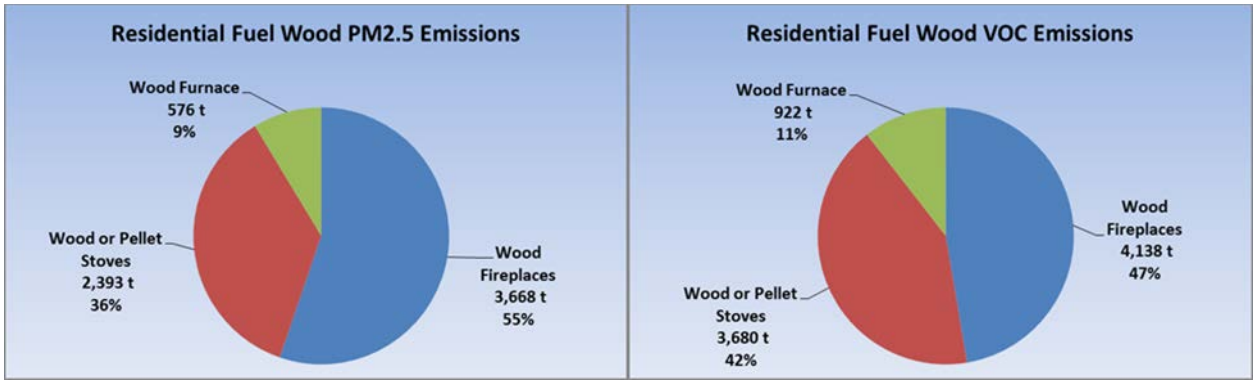
Data Source: Environment Canada. 2005b.

Fireplaces burn the most wood, followed by wood stoves, furnaces and boilers. Although the number of people and dwellings in Alberta has increased greatly since 2005, the number of wood burning appliances (particularly fireplaces) might not have increased as quickly. Over the last 10-15 years, the norm for new homes seems to be natural gas fireplaces rather than wood fireplaces. It is now a requirement that new installations of wood burning equipment must meet CSA B415.1-10 or EPA 40 CFR standards under Alberta Building Code 2014 energy efficiency section 9.36.3.10 (effective November 1, 2016).

Environmental and Health Value

Incenting the retrofit of old equipment would reduce particulate matter and VOCs from existing sources, and promote reductions from the inventory baseline. Figure 1 shows the breakdown of $PM_{2.5}$ and VOC emissions in 2014 in Alberta by type of wood burning appliance. Wood burning fireplaces were the leading source of both $PM_{2.5}$ and VOC emissions.

Figure 1: 2014 Alberta $PM_{2.5}$ and VOC Emissions by Type of Appliance



Data Source: *Environment and Climate Change Canada, 2014 emissions from the 1990-2015 Air Pollutant Emissions Inventory*

Table 7 shows the emission factors of different wood burning equipment in Canada, and highlights the improved performance from advanced technology.

Table 7: The Emission Rates of Different Wood Burning Equipment in Canada

Wood combustion appliances	Estimated number of appliances ('000)	Emission factors			
		$PM_{2.5}$ g/kg	CO g/kg	VOCs g/kg	PAHs g/kg
Wood burning fireplaces					
Fireplaces					
Without glass doors	846	18.4	77.7	6.5	0.0375
With glass doors	897	12.9	98.6	21	0.0375
Fireplaces with an insert					
Conventional	129	13.6	115.4	21.3	0.215
Advanced technology (catalytic)	22	4.8	70.4	7	0.064
Fireplaces advanced technology (any)	57	4.8	70.4	7	0.064
Wood burning stoves					
Conventional stoves					
Not air-tight	445	23.2	100	35.5	0.215
Air-tight	777	13.6	115.4	21.3	0.276
Advanced technology stoves	142	4.8	70.4	7	0.064
Central furnaces/boilers	278	13.3	68.5	21.3	0.288
Other wood burning equipment	41	13.6	115.4	21.3	0.215
Pellet stoves	13	1.1	8.8	1.5	0.0015

Data Source: Environment Canada. 2005a.

Compatibility with Existing Initiatives

This recommendation aligns with several national, provincial, and municipal initiatives. Examples are provided below.

National:

- Code of Practice for Residential Wood Burning Equipment (CCME)
- Model municipal bylaw for regulating wood-burning appliances (Environment Canada)
- CSA B-365 code for Solid-Fuel-Burning Appliances and Equipment specifies requirements for the installation, alteration, and maintenance of solid fuel-burning appliances and equipment installed indoors or outdoors, and equipment requirements for solid fuel-burning appliances
- Strategy on Short-Lived Cliamte Pollutants – 2017 (ECCC)

Provincial:

- Clean Air Strategy (Government of Alberta)
- Wood burning factsheet (Government of Alberta)
- Requirements to meet the CSA B-365 code for installation, operation, and equipment requirements for solid fuel burning appliances (Alberta Building Code)

Municipal:

- Woodstove Changeout Rebate Program to provide incentive to retrofit old wood burning equipment (City of Nanaimo)

Potential Stakeholders

- Government of Alberta (Alberta Climate Change Office)
- Municipal Planning Departments

Advice to Implementers

For new construction and retrofits of factory-built wood burning appliances for space heating, the Alberta Building Code now requires that the CSA B-365 installation Code for Solid-Fuel-Burning Appliances and Equipment requirements for solid fuel burning appliances be met. Municipal building permits, including information on standards approvals for factory-built units, are needed to install new wood burning equipment in some major centres.

Some assessment of the typical cost of converting from wood fuel to natural gas would be useful to assess the likelihood of residential fuel switching as a potential cost avoidance measure with respect to the carbon levy.

With greater emphasis on reducing greenhouse gas emissions, there is potential to see an increase in the use of biomass (mainly wood) as a home heating alternative. Biomass, when sustainably harvested, is considered carbon-neutral due to the carbon sequestered during plant growth. However, biomass combustion releases a larger proportional amount of emissions than natural gas, so the increased use of biomass could exacerbate air quality concerns. This implication is not broadly recognized and general public education could help.

This recommendation should be considered in conjunction with Recommendation 13.

RECOMMENDATION 13: DISCOURAGE WOOD BURNING PRACTICES DURING PERIODS OF DEGRADED AIR QUALITY

That Alberta Environment and Parks, municipalities, and Airshed Organizations:

- **i.** develop a coordinated notification process to discourage indoor and outdoor wood burning during periods when air quality is, or is forecasted by the air monitoring network to be, degraded
- **ii.** provide general education and awareness on the air emissions associated with wood burning

PERFORMANCE MEASURE

i. By January 2019, a coordinated notification process has been established and implemented

PERFORMANCE INDICATORS

i. Enactment and total number of wood burning advisories or bans linked to poor air quality events
ii. Where information is available, number of bylaw complaints about wood burning during poor air quality events

RATIONALE AND BACKGROUND

During periods of stable weather conditions (e.g., low winds, inversions), particularly in the wintertime, burning wood can have a greater impact on air quality. With a lack of dispersion, emissions from wood burning can become trapped near the ground and, combined with emissions from the many other sources in urban environments, contribute to elevated ambient air pollution. Thus, wood burning should be minimized when atmospheric conditions do not provide sufficient dispersion.

ENVIRONMENTAL AND HEALTH VALUE

Stable atmospheric conditions are already a challenge in terms of ambient air quality management. During these periods, particulate matter and NO_x levels (as with most air pollutants) typically increase and often lead to air quality issues. Discouraging wood burning during stable weather conditions can help reduce peak levels of ambient air emissions and reduce the public's exposure to harmful substances.

Active notification for the public about these conditions helps raise the profile of ambient air quality so people can take measures to reduce their exposure and contribution to unsafe ambient levels.

COMPATIBILITY WITH EXISTING INITIATIVES

This recommendation aligns with several provincial and national initiatives. Examples are provided below.

National:

- Strategy on Short-Lived Climate Pollutants – 2017 (ECCC)

Provincial:

- Air Quality Health Index (AQHI) related messaging (Government of Alberta)
- Clean Air Strategy (Government of Alberta)
- Wood Smoke Factsheet (Government of Alberta)

POTENTIAL STAKEHOLDERS

- Environment and Climate Change Canada (AQHI system)
- Alberta Health Services (AHS)
- Municipal Bylaw Departments
- Municipal or Regional Fire Chiefs and fire departments

ADVICE TO IMPLEMENTERS

Implementation of a fire advisory or restriction is straightforward and this authority may already be included in municipal bylaws. However, enforcement of municipal bylaws typically focuses first on education and is complaint-driven, potentially requiring some time for full implementation of a change and for outcomes to be realized. Despite enforcement challenges, these advisories or restrictions will advance broader public education on air quality. The first focus should be on public education, both proactively and during poor air quality events.

Establishing or enhancing a public notification system that builds on the AQHI notification system (Alberta AQHI app, Tweets) when stable weather conditions are present would require further development, cooperation, and coordination with AHS, Airshed Organizations, and municipalities to define roles and responsibilities.

AEP has established a social media notification system via Twitter that could be used to notify the public of poor air quality events. Given its role in ambient air monitoring, leveraging the department's notification system would reduce duplication.

The Government of Alberta published a wood burning fact sheet[40] that should accompany any public messaging. For other education initiatives, alignment with AEP's Environmental Education Framework would be appropriate.

[40] Alberta Environment and Parks. 2014b.

2.6 Industrial Non-Point Sources

2.6.1 Gasoline Distribution

RECOMMENDATION 14: CONSIDER THE BENEFITS OF STAGE 1 VAPOUR RECOVERY UNITS FOR FUEL TERMINALS

That Alberta Environment and Parks consider the benefits of requiring Stage 1 vapour recovery units for fuel terminals, but only in the context of other potential actions that could be taken by industry to reduce ambient $PM_{2.5}$ and ozone

PERFORMANCE MEASURE

i. By June 2019, a review is completed by AEP that considers the value of Stage 1 vapour recovery units (VRUs) for fuel terminals

RATIONALE AND BACKGROUND

Stage 1 controls are the integrated equipment systems used to recover gasoline vapours when 1) tank trucks are loaded with gasoline at fuel terminals, and 2) tank truck deliveries of gasoline are made to service stations. Stage 1 controls at the terminal consist of VRUs and these controls are not currently regulated in Alberta. Certain jurisdictions in Canada (i.e., Lower Mainland BC, the Windsor to Quebec City corridor, and Newfoundland) regulate Stage 1 controls. Stage 1 controls have been demonstrated to recover more than 95% of the VOCs associated with loading and off-loading gasoline.

Table 8 shows the 2014 VOC emissions to air as reported to the National Pollutant Release Inventory (NPRI) by the larger fuel distribution terminals in Alberta. This reporting is required by industrial facilities that exceed designated release reporting volume thresholds under the *Canadian Environmental Protection Act, 1999* (CEPA). The VOC emissions for all facilities shown in the table are attributable to the individual facility (combination of point and non-point sources) indicated.

VOC emissions from tank truck deliveries to individual service stations are not reportable under NPRI as service stations do not meet the minimum reporting threshold.

Table 8: 2014 VOC Emissions at Canadian Fuels Member Fuel Terminals in Alberta

Facility	City	Releases to Air (tonnes)
Imperial Oil – Edmonton Terminal	Edmonton	1,310
Suncor Energy Products Partnership – Edmonton Terminal	Edmonton	846
Imperial Oil – Calgary Terminal	Calgary	713
Shell Canada Products – Sherwood Marketing Terminal	Edmonton	636
Shell Canada Energy Ltd. – Calgary Terminal	Calgary	294

Source: NPRI 2014: VOC Emissions to Air

VOCs are well controlled for the thousands of daily motor vehicle refueling transactions at service stations. Recent technical advancements in automotive systems have led to the development of Onboard Refueling Vapour Recovery (ORVR). This technology has been installed in fuel tanks in all light-duty cars and trucks in North America,[41] beginning in 1998 for cars and 2001 for trucks. As a result, nearly all of the on-road fleet of gasoline powered vehicles in Canada and the US are equipped with ORVR. According to the US EPA, extensive testing of ORVR systems in the on-road fleet has demonstrated approximately 98% vapour capture for ORVR.

[41] Helsel, Z. R. and Grubinger, V. 2012.

Environmental and Health Value

VOCs that combine with NO_x in the atmosphere on warm sunny days may contribute to the formation of ozone and $PM_{2.5}$. Gasoline vapours contain a number of VOCs including butane, pentane, benzene, toluene, and xylenes, as well as other compounds that are considered toxic. The 1991 CCME Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks indicates that implementing gasoline vapour recovery in distribution networks could reduce total anthropogenic VOC emissions in Canada by 2-3%.

Compatibility with Existing Initiatives

This recommendation aligns with several national and provincial initiatives. Examples are provided below.

National:

- Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks (CCME)

Provincial:

- Clean Air Strategy (Government of Alberta)
- Recovery of Gasoline Vapour in Bulk Transfers (Government of Ontario)
- Gasoline Distribution Emission Regulation Bylaw No. 1085 (Greater Vancouver Regional District)
- Gasoline Vapour Control Regulation (Government of British Columbia)
- Air Pollution Control Regulations (Government of Newfoundland and Labrador)

Potential Stakeholders

- Government of Alberta (Alberta Transportation)
- Municipalities
- Oil and gas industry
- Trucking companies and associations

Advice to Implementers

Either reducing NO_x at a refinery or reducing VOC emissions from fuel terminals would help reduce ambient $PM_{2.5}$. However, it is important that AEP consider potential reductions resulting from implementing Stage 1 VRUs in the broader context of actions that could be taken to reduce a facility's contribution to ambient $PM_{2.5}$, ozone, and NO_x, given the size of the potential investments.

The potential benefits of emissions controls on gasoline distribution from fuel terminals could be considered along with the information collected as part of the Industrial Air Emissions Management Program, which is currently focused on NO_x.

VRUs at fuel terminals require substantial capital investment, estimated at $10-15-million for each fuel terminal.[42] There is an economic return on VRU investments at terminals, as vapours that would otherwise have been lost to the atmosphere are captured and returned to storage. Actual realized economic return at each facility will depend on many highly variable factors including size of investment, facility volume, and product margins. For the trucking industry, tank trucks would also need to be equipped or retrofitted at an estimated cost of between $5,000 and $10,000 per unit;[43] for the retail gasoline sector, service stations must be equipped with tank fittings to enable vapour recovery connections. Most underground tank systems constructed in the last 20 years already include such fittings. Based on the experience of the Canadian Fuels Association, most tanker trucks in Alberta would require retrofitting. Because of the investment in the trucking industry, it is recommended that if the Government of Alberta decides to pursue VRUs it should be a regulatory requirement for the whole province.

[42] Rob Hoffman. 2017. Personal communication.

[43] Rob Hoffman. 2017. Personal communication.

2.7 Land-Use Planning

RECOMMENDATION 15A: DEVELOP LAND-USE PLANNING PROTOCOLS TO SUPPORT AIR QUALITY OUTCOMES

That municipalities and their neighbouring municipalities work together and with relevant stakeholders to:

i. identify and promote opportunities to design urban form and infrastructure to reduce environmental impacts and improve air quality
ii. educate the public and others about the importance of those opportunities
iii. work to implement environmentally responsible land-use planning by updating bylaws, statutory plans, and policies

PERFORMANCE MEASURES

i. By January 2019, municipalities have tools to incent brownfield development
ii. Number of municipal bylaws, statutory plans, and policies such as municipal development plans, transportation plans, and growth plans, identifying air quality as an issue to address through complete and compact communities

RECOMMENDATION 15B: SUPPORT COLLABORATION ON LAND-USE PLANNING

That the Government of Alberta support collaboration among municipalities and other stakeholders on environmentally responsible urban development and land-use planning through financial mechanisms, education, and engagement

PERFORMANCE MEASURE

i. By January 2020, the Government of Alberta to inform CASA on the support provided for collaboration among municipalities and other stakeholders

RATIONALE AND BACKGROUND

Urban form is the physical characteristics that define built-up areas, including the shape, size, density, and configuration of settlements. It can be considered at different scales – from regional, to urban, neighbourhood, block, and street.[44]

Urban development patterns greatly influence personal choices and options related to transportation modes and distances, as well as building and housing types. Non-point source air emissions may directly result from these choices. Once built, the urban form lasts for many decades and retrofits can be costly and difficult. If cities continue to develop as they have in the past, emissions can be expected to increase.

The Government of Alberta's *Climate Leadership Report to Minister* states that:

> *The design of cities and neighbourhoods matters profoundly, because urban form, once set, is hard to change, and has consequences for future energy use well beyond this century. … Attracting development to mixed-use and transit/active mobility-oriented neighbourhoods in already-developed urban areas is a key strategy in reducing*

[44] UK Government Office for Science/Foresight. 2014.

emissions across the long-term, and a critical focus for empowering the role for Alberta's municipal governments. (p.73)

The environmental impacts of development are not restricted to urban areas. For example, a lack of coordination in land-use planning across and between regions can result in increased transportation distances. Overall, land-use planning practices can be improved to consider and address the environmental impacts of development.

Transportation is a substantial source of NO_x emissions, and also contributes VOCs and $PM_{2.5}$. In addition, residential and commercial heating contribute to NO_x and $PM_{2.5}$ emissions, and these emissions are related to building types and efficiencies (e.g., single detached homes compared to apartments, or individual boilers compared to district heating).

For various reasons, stakeholders may want to preserve the status quo of existing low density neighbourhoods or maintain a preference for greenfield suburban expansion and single-family homes. Complete communities require that a range of choices for transportation, housing, and other activities, such as employment, shopping, and recreation be incorporated into the design, planning, and implementation phases. It is important to address how communities are built to provide the best possible environmental and health outcomes, including a reduction in non-point source emissions.

Environmental and Health Value

Reducing transportation distances and the need for single occupant vehicles, as well as improving the efficiency of commercial and residential heating systems through land-use planning may help to reduce NO_x, VOCs, and $PM_{2.5}$ in urban areas, which is particularly important for areas that are in the orange or red management levels for CAAQS.

Building complete, compact communities with a variety of housing and transportation options has other co-benefits:

- reduced greenhouse gas emissions
- reduced costs for residents resulting from lower transportation and heating fuel consumption
- improved health through active modes of transportation and access to local recreation and amenities
- reduced infrastructure operation and maintenance costs for the municipality especially for streets, transit, and water and wastewater systems

AHS is creating a Healthy Community by Design guidance document to help municipalities and other stakeholders plan and build communities with consideration given to air quality and other health indicators. Already, a healthy public policy information sheet by AHS states that motor vehicles make a significant contribution to air pollution, and that exposure is increasing. Further, "Improved air quality and healthier neighbourhoods overall could be achieved by emphasizing public transit and infrastructure that supports active transportation over the building of more roads, and promoting transportation demand management as well as other strategies that reduce automobile dependence."[45]

Compatibility with Existing Initiatives

This recommendation aligns with several provincial and municipal initiatives. Examples are provided below.

Provincial:

- Capital Region Fine Particulate Matter Response (Government of Alberta)
- Clean Air Strategy (Government of Alberta)
- Climate Leadership Report to Minister (Government of Alberta)

[45] Alberta Health Services. 2008.

- Healthy Community by Design Guidance Document (in development, AHS)
- Modernized Municipal Government Act (Government of Alberta)
- Red Deer Fine Particulate Matter Response (Government of Alberta)
- Regional Plans under the *Alberta Land Stewardship Act*, including the South Saskatchewan Regional Plan (Government of Alberta)

Municipal:

- Municipal Development Plans, transportation plans and associated targets

The benefits of complete, compact communities with active and public transportation options are recognized by a wide variety of stakeholders, including but not limited to:

- AHS, who supports healthy initiatives put forward by government, municipalities, and all other stakeholders that recognize the importance of community design, natural environments, and active public transportation. AHS believes these options improve health by providing simple alternatives for physical and social activity, in addition to reducing air pollution exposure and generation. AHS receives support for these initiatives through staff interactions with provincial and local agencies including the establishment of a Healthy Communities by Design cross-professional sub-committee.
- Canadian Institute of Planners' Healthy Communities Practice Guide[46] which states, "Achieving health oriented goals of the Community Plan may require communities to re-align their land development regulations," and that, "Car-dependent communities created by extensive single-use, low-density land use have important implications for health: people are less active because they walk less, vehicle exhaust degrades air quality, motor vehicle injuries increase, and mental health and social capital are adversely affected."
- Federation of Canadian Municipalities Standing Committee on Environmental Issues and Sustainable Development policy statement that recommends the Government of Canada, "Develop, with municipal governments, initiatives to assist municipalities in reducing vehicle use through improved public and active transportation and sustainable urban-planning practices."[47]
- The Government of Alberta's Efficient Use of Land Implementation Tools Compendium (2014) sets out a series of tools and best practices that can be used by land-use planners, land users, and decision makers to help implement efficient land-use strategies and reduce the footprint of human activities on Alberta's landscape.

Given the agreement on the importance of development patterns and land-use planning on the health of communities, barriers to implementation need to be identified and mitigated.

An example of a program to support collaboration is British Columbia's Plan H, which supports local government engagement and partnerships across sectors to create healthier communities. This program has a toolkit to help governments link planning principles to a variety of health outcomes.[48]

[46] Canadian Institute of Planners. 2017, p. 34.
[47] Federation of Canadian Municipalities. 2017, p. 10.
[48] Government of British Columbia. 2017.

POTENTIAL STAKEHOLDERS

- Airshed Organizations
- Alberta Airsheds Council
- Alberta Association of Municipal Districts and Counties
- Alberta Professional Planners Institute
- Alberta Urban Municipalities Association
- Building Industry and Land Development Alberta
- Government of Alberta (Alberta Climate Change Office and Alberta Municipal Affairs)

ADVICE TO IMPLEMENTERS

Land-use planning is under the direct control of municipalities, through their authority under the *Municipal Government Act*. However, as has been noted, developers, builders, existing and new home owners, and municipalities themselves may be motivated to preserve the status quo of existing low density neighbourhoods or maintain a preference for greenfield suburban expansion and single family homes. There can also be an imbalance in which greenfield development faces fewer time delays or financial costs than infill, brownfield, or denser forms of urban development. If there are perceived to be undesirable constraints on development, there is potential for developers and prospective home owners to choose to build in outlying municipalities, exacerbating transportation and related emission issues.

These factors make a collaborative approach to regional growth management important to avoid shifting environmental problems to other jurisdictions. For example, to manage non-point source transportation emissions, municipalities may need to work together on regional transportation strategies at the same time they are considering improvements to development patterns within their boundaries. This is a sensitive issue with many components but a solution has many co-benefits. It is not as simple as just increasing density. It is about building vibrant, complete communities with choices for transportation, housing, and services. It is also about facilitating regional collaboration and coordination of land-use planning.

Potential areas for the Government of Alberta to support collaboration on environmentally responsible urban development and land-use planning are:

- considering improved land-use form and environmental protection when making transportation and infrastructure funding allocations to municipalities and school boards
- providing more funding and planning support for developing and coordinating regional, public, and active transportation systems
- supporting education of the public and specific stakeholder groups about the impact of land-use planning on the environment to influence behavioural change. To assist this, municipalities could identify opportunities to align their public communication and education with AEP's Environmental Education Framework
- providing forums for municipalities to share ideas and experiences and learn from each other
- engaging the Alberta Professional Planners Institute to integrate air quality into their professional outcomes
- empowering municipal governments to attract mixed-use and transit or active mobility-oriented neighbourhoods in already developed urban areas

To encourage remediation and redevelopment of brownfield sites, under the *Modernized Municipal Government Act,* municipalities would be allowed to establish a tax exemption framework for brownfield properties that cancels, defers, or reduces the municipal portion of the property taxes owing on a brownfield property for a number of years. By bylaw, a municipality must outline the special tax treatment conditions and factors for qualifying properties (e.g., number of years a site must sit vacant).

There may be an opportunity for municipalities to use Growth Management Boards (for Calgary and Edmonton regions) under the *Modernized Municipal Government Act,* to advance stakeholder discussion and collaboration on urban development patterns and land-use planning in general. These groups will implement mandatory regional planning mechanisms for land-use planning and require municipalities to work together on service delivery and cost-sharing matters.

The Alberta Airsheds Council and regional Airshed Organizations could be key stakeholders in facilitating the discussion about the impact of regional growth and development on air quality, potential options for improvement, and for multi-stakeholder engagement. A suggested starting point for collaboration is the spillover effect of urban development decisions on the regional transportation network.

Greensburg, Kansas, provides an interesting case study of a city that has rebuilt after a natural disaster, with a focus on sustainable urban form and infrastructure.[49]

Urban development and land-use planning are complex and sensitive issues. As such, this issue requires more investigation, collaboration, and consensus, including:

- education of planners about the connection of development patterns to air quality and non-point source emissions
- education of the development community about changing what they offer. The public can only buy, or not buy, what is on the market, and developers design communities they think the public wants
- education of municipal leaders on the effects of development patterns on air pollution and the relative benefits of complete, compact communities with transportation options
- incentives to develop complete, compact communities; for example, when Edmonton wanted developers to preserve heritage buildings incentives were offered to support this and cover some of the financial risk
- consideration of regional growth management in conjunction with changes to the development patterns within a municipality's boundaries

[49] Billman, L. 2009.

2.8 Gaps and Uncertainties

2.8.1 Knowledge of Non-Point Sources

RECOMMENDATION 16: ADDRESS GAPS AND UNCERTAINTIES IN KNOWLEDGE OF NON-POINT SOURCES

That Alberta Environment and Parks address, as a priority in its future air quality work, gaps and uncertainties in ambient air quality monitoring (e.g., $PM_{2.5}$ and ozone), emission inventory, source characterization, modelling, and atmospheric chemistry as identified by the Non-Point Source Technical Task Group

PERFORMANCE MEASURES

The following measures are to advance the understanding of a) the sources contributing to, and b) the dominant factors affecting the formation of secondary contaminants at CAAQS monitoring stations measuring elevated ambient concentrations through focused improvements to current gaps and uncertainties.

i. Beginning in 2019, AEP to communicate to CASA biennially the status of progress in reducing these gaps and uncertainties.
ii. By January 2020, AEP in conjunction with partners as appropriate, will have:
    a. Implemented a process for identifying and publicly communicating areas that are approaching or not achieving the CAAQS
    b. Developed, and publicly communicated, a monitoring plan with clear scientific questions and hypotheses for focused studies
    c. Initiated focused studies in priority areas (which may include monitoring, modeling, emissions inventories, source characterization, and atmospheric chemistry work) with subsequent data analysis that inform the next steps and help address gaps and uncertainties

PERFORMANCE INDICATOR

i. By January 2019, AEP will communicate to the CASA Board of directors the monitoring plans or strategies for air zones assigned to the red or orange management levels for the 2014-2016 CAAQS assessment period.

RATIONALE AND BACKGROUND

The Non-Point Source Project has identified some specific uncertainties and gaps under each of the air quality activities and categories noted in Recommendation 16 that should be given priority. The project team also recognizes that there are many other agencies and organizations such as Environment and Climate Change Canada (ECCC), Alberta Agriculture and Forestry (AAF), Airshed Organizations, and others that are involved in work related to some or all of the knowledge gaps and uncertainties identified in the TTG report. They can play an important role in addressing many of these gaps and uncertainties.

It is also hoped that all of the gaps and uncertainties identified in the TTG report will be further considered as a priority when planning air quality related programs.

As outlined in Section 1, the project team established the TTG to help address the two identified potential outcomes and deliverables under Objective 1 from the project Terms of Reference. In general, these were to:

- prepare a technical document, using available information from emission inventories, ambient monitoring, air quality modelling, and receptor modelling to synthesize what is known about non-point source air emissions and their potential contribution to air quality in Alberta, and to identify any information and data-related knowledge gaps encountered

- based on this compilation, with emphasis on areas in the orange or red CAAQS management levels in Alberta, provide a refined list of non-point sources for the project team's consideration in focusing the project work

In its report to the project team, the TTG identified a number of gaps and uncertainties that greatly limited its ability to specify and understand the direct linkages between non-point sources and their impacts on air quality. These gaps and uncertainties included:

- a lack of certain air quality monitoring data
- emission inventory uncertainties
- limited air quality modelling and related source apportionment assessments
- limitations in understanding of how certain atmospheric processes are affecting secondary $PM_{2.5}$ and ozone formation in specific areas

These gaps and uncertainties led the TTG to conclude that overall, there is insufficient information and data to confidently define the amount that each non-point source category contributes to ambient concentrations at the specific monitoring stations seeing elevated $PM_{2.5}$ or ozone levels. However, the available resources did help narrow the number of potentially relevant non-point sources to a more manageable number for further consideration by the project team as well as helping to identify priority information needs.

Environmental and Health Value

Effectively managing air quality and addressing CAAQS management level issues requires a good understanding of the factors affecting air quality in an air zone. The complexity of air quality issues is such that additional knowledge and data detail will always be desirable, but efforts need to be made to address critical gaps and uncertainties that influence the ability to understand, and therefore effectively manage, air quality issues in an air zone or provincially. The project team believes that addressing the gaps and uncertainties identified below would greatly advance the objectives of the general and CAAQS-related air quality management in the province.

Compatibility with Existing Initiatives

This recommendation aligns with several national and provincial initiatives. Examples are provided below.

National:

- National Air Quality Management System (CCME)

Provincial:

- Clean Air Strategy (Government of Alberta)

Potential Stakeholders

- Airshed Organizations
- Environment and Climate Change Canada

Advice to Implementers

Gaps and Uncertainties Identified for Monitoring, Inventory, Modelling, and Science

Based on the work of the TTG, the project team identified the following knowledge gaps and uncertainties as priorities for consideration when developing future air quality monitoring and assessment plans. These priorities are grouped according to the nature of the issue to assist in determining the party (or parties) that might be involved in filling the noted gaps and reducing the identified uncertainties. Each category is individually important, but it is the combination of information and understanding from each category that provides the comprehensive insight required to improve understanding and inform effective air quality management.

- ***Monitoring***: Comprehensive ambient air quality and meteorological data are essential if the emission sources and other factors influencing air quality at a particular location or in a region are to be understood. A lack of $PM_{2.5}$ speciation and gas mixture composition data limit the ability to conduct source apportionment receptor modelling while the lack of vertical atmospheric wind and temperature profiles limit the ability to evaluate and validate source apportionment air quality simulation modelling outputs. These limitations affect the ability to understand and address CAAQS-related air quality issues. Filling these monitoring gaps at certain critical air monitoring sites and locations needs to be considered when developing and implementing air zone monitoring and management plans, with priority given to $PM_{2.5}$ speciation. Furthermore, analysis of the monitoring data should be leveraged in cases where data are already collected. The Canadian National Air Pollution Surveillance $PM_{2.5}$ speciation program is an example of the type of program that can provide the detailed PM composition data necessary to conduct source apportionment studies. The vertical atmospheric profiling and gas mixture composition monitoring being conducted by the Wood Buffalo Environmental Association and ECCC as part of air zone and oil sands monitoring programs are examples of the type of detailed air quality and meteorological data collection programs that need to be strategically applied in areas where CAAQS management actions are or may in the future be triggered. These enhanced monitoring activities could be campaigned based, periodic, or permanent depending on the location and circumstances.

- ***Emission inventories***: Assessing the relevance of different emission sources and different emission source types on air quality locally, regionally, or provincially requires information on the quantities and characteristics of all significant emission sources, including point sources, non-point sources, natural sources, and anthropogenic sources. While Alberta has, in general, good emission inventory data, there are specific gaps and uncertainties which, if addressed, would significantly improve the ability to understand where and how different emission sources and source types are influencing air quality. All the non-point source emission categories should be reviewed in terms of the method(s) being used to estimate emissions for that category, what if any validation of these methods has been undertaken, the uncertainties associated with the current estimation method and options to improve and validate the current emission estimates, and implementation of a non-point source emission estimate validation program for those non-point sources by categories and parameters identified as a priority (Table 2).

- ***Source characterization:*** Similarly, characterization of certain non-point source emissions should be undertaken with an emphasis on non-point sources in the areas requiring CAAQS air quality management and where that non-point source is considered to be a potential contributor to elevated $PM_{2.5}$ and/or ozone level (the individual air zone reports appended to the TTG report provide information on what these non-point sources are or may be). Better quantification and the development of chemical characterizations (“fingerprints”) of various types of emission sources, particularly fugitive VOCs and NH_3 emissions from certain industries (upstream oil and gas, refineries and fuel handling/transfer operations and oil sands operations), certain agricultural operations and practices (intensive livestock operations and crop fertilization practices), $PM_{2.5}$ (dust) emissions from agricultural activities, construction operations, roads, and certain industrial activities (oil sands mines, quarries, and sand and gravel operations) are considered a priority for reducing the uncertainty with current emission datasets and assisting in CAAQS-related air quality management.

- ***Modelling***: Models can be valuable air quality assessment and management tools. A need to expand the use and reliability of air quality simulation and receptor modelling, at both the air zone and provincial scales, has been identified. To date, modelling use has been limited and a large gap exists in the available

resources and capacity to do region-specific and province-wide modelling to account for transport from one air zone to another. Finally, model validation has been limited in part due to the monitoring and emission gaps identified above and gaps in understanding of the underlying atmospheric processes affecting ozone and secondary PM formation. Enhancements in the ability to conduct both of these types of modelling and validation of the models used would greatly facilitate understanding and the ability to address existing and possible future CAAQS exceedances and other air quality issues.

- ***Atmospheric Chemistry (e.g., PM and ozone formation):*** Atmospheric processes play a major role in determining where, how, and how much $PM_{2.5}$ and ozone are formed, making it essential to understand these processes when developing air quality improvement plans. Several questions arise in an Alberta context:
    - What are the physical and/or chemical mechanisms involved in the formation of ozone and secondary $PM_{2.5}$ near specific individual monitoring stations, for specific air quality incidents?
    - What sources and pollutants are contributing to secondary $PM_{2.5}$ and ozone formation near specific individual monitoring stations, for specific air quality events?
    - What changes are occurring as an air parcel passes over different sources and land uses near specific individual monitoring stations, for specific air quality events?
    - What is the relative importance of natural versus anthropogenic VOCs in ozone formation?
    - What is the relative importance of NO_x versus VOCs in ozone formation in different local and regional areas?

Work that advances understanding in these areas would contribute to the development of better models and most importantly improve our ability to develop effective $PM_{2.5}$ and ozone management plans. It is suggested that all relevant parties work together in a coordinated and co-operative manner to address this recommendation.

2.9 Climate Change and Air Quality

2.9.1 Energy Efficiency Air Quality Co-Benefits

RECOMMENDATION 17A: CONSIDER AIR QUALITY AND HEALTH IMPACTS OF PROPOSED NEW CLIMATE CHANGE AND ENERGY EFFICIENCY INITIATIVES

That the Alberta Climate Change Office and Energy Efficiency Alberta consider the air quality impacts of any proposed new policy, program, or action related to non-point sources they consider adopting and place value on those measures with substantial air quality co-benefits

PERFORMANCE MEASURE

i. By January 2019, the adoption of a policy or process by the Climate Change Office and Energy Efficiency Alberta to systematically consider the air quality impacts of any new policies, programs, and actions related to non-point sources they consider adopting and give value to those with higher air quality co-benefits. Information to be shared with CASA on the policy or process by March 2019

RECOMMENDATION 17B: CONSIDER AND UPDATE AIR QUALITY AND HEALTH IMPACTS OF EXISTING CLIMATE CHANGE AND ENERGY EFFICIENCY INITIATIVES

That the Alberta Climate Change Office and Energy Efficiency Alberta, as resources permit, also consider the air quality impacts of their existing policies, programs, and actions related to non-point sources and make adjustments to increase air quality co-benefits where warranted

PERFORMANCE MEASURE

i. By January 2019, the adoption of a policy or process by the Climate Change Office and Energy Efficiency Alberta to consider the air quality impacts of their existing policies, programs, and actions and make adjustments to increase co-benefits where warranted. Information to be shared with CASA on the policy or process by March 2019

RATIONALE AND BACKGROUND

Alberta has committed extensive effort and substantial funding within an overall Climate Leadership Plan and energy efficiency agenda to reduce greenhouse gases in the province. Lower greenhouse gas emissions are often accompanied by reductions of other substances that affect air quality. Intentionally considering the air quality implications, both positive and inadvertently negative, of proposed actions, programs, and strategies will ensure alignment between the Climate Leadership Plan and the Air Quality Management System.

Governments and stakeholders are working to manage levels of ambient $PM_{2.5}$ and ozone through existing and planned initiatives and through the recommendations of this project. Focusing on the important efforts to reduce greenhouse gas emissions, then evaluating and selecting those strategies that reduce both greenhouse gases and other emissions could provide greater benefits for the investment made.

Within the Government of Alberta, different organizational units manage climate change and air quality. This recommendation would help ensure a stronger linkage where it could add the most value. In the end, the air is a

single environmental medium and the cumulative effects of differing actions on that single medium need to be considered fully.

Generally, greenhouse gas emissions and air pollution are often confused because they are closely related. While climate change action helps address a world-scale problem, air pollution typically has more local or regional impacts, affecting people directly and immediately. Providing a better understanding of air quality and environmental benefits of climate change actions and energy efficiency programs would highlight the full benefits provided by these programs.

While Alberta's climate and energy efficiency programs focus on saving energy and reducing greenhouse gas emissions, improved community well-being is considered within the overall outcomes of the Climate Leadership Plan, thus linking with air quality and health. The evaluation of Climate Leadership Plan funding proposals also involves many considerations, including air quality. As a result, this project's recommendations are a logical next step from the current climate and energy efficiency frameworks and programs.

Environmental and Health Value

$PM_{2.5}$ has significant negative acute and chronic health effects, and also negatively affects the environment. The current CAAQS for $PM_{2.5}$ has not been achieved in one of Alberta's air zones and is close to not being achieved in several others. Greenhouse gas and energy efficiency actions that intentionally benefit both air quality and greenhouse gas levels would contribute more systematically to health and environmental benefits.

Compatibility with Existing Initiatives

This recommendation aligns with several national and provincial initiatives. Examples are provided below.

National:

- National Air Quality Management System (CCME)

Provincial:

- Alberta Climate Leadership Plan (Government of Alberta)
- Clean Air Strategy (Government of Alberta)

Potential Stakeholders

- Government of Alberta (Alberta Environment and Parks)
- Municipalities
- Home Builder Associations

Advice to Implementers

The scope of these recommendations is limited to non-point sources because of the terms of reference of this project, but considering the air quality and health impacts of all climate change and energy efficiency initiatives would be beneficial. Alberta Health is encouraged to strengthen its capability to assess the health impacts of these initiatives.

Of particular concern for some stakeholders is the impact on air quality from the increased use of biomass for heat and energy. While biomass burning is considered carbon neutral, the combustion of biomass releases numerous emissions that can create air quality problems under certain conditions. With the introduction of carbon pricing in Alberta (see section 3.4 for more information), there may be a shift towards greater use of biomass, possibly compounding air quality challenges.

Many considerations are part of developing and selecting climate change policies or strategies and energy efficiency programs. It is not intended that air quality become the focus of these programs, but consideration of the air quality benefits could provide additional useful information that might lead to the selection of one strategy or program over another based on its benefit to both the Alberta Climate Leadership Plan and the Air Quality Management System. Consideration of the air quality impacts of proposed policies, strategies, programs, and actions can be accomplished with the expertise available within AEP.

An appropriate and knowledgeable stakeholder organization could provide feedback on the programs selected by Energy Efficiency Alberta for delivery. The feedback would facilitate the adaptation of the programing to meet the needs of specific stakeholders and Albertans more broadly. This organization could also evaluate air quality components of the energy efficiency programming and offer feedback on potential future programs to achieve both greenhouse gas and air quality benefits.

3 Information from Refining the Project Focus

The recommendations in the previous sections do not address all non-point source categories or their subcategories, based on the project refinement process described in Section 1. One consideration was existing management actions already addressing a non-point source. This section provides an overview of some of the key existing management actions that were taken into account.

3.1 Transportation

The management of transportation-related emissions involves the complementary roles of federal, provincial, local governments, and other stakeholders.

The federal government sets emission standards for new and imported on-road and off-road vehicles and engines in Canada, as listed in Sections 3.1.1 and 3.1.2; these regulations align with those of the US EPA and are updated from time to time. For transportation fuels, there are accompanying federal[50] and provincial[51] standards.

Potential provincial and municipal level actions were considered within the scope of this project and discussed by the Transportation Subgroups and the project team (see Section 1.3.2). The regulation of in-use vehicles and engines falls under provincial government jurisdiction. Local governments contribute to provincial efforts through land-use planning and local bylaws (e.g., anti-idling).

Various initiatives are underway to help reduce emissions from in-use vehicles and engines in various jurisdictions, as described below and in the transportation-related recommendations. Some key reference documents to help inform potential management actions in Alberta through this project and future opportunities include the International Review of Non-Attainment Area Air Quality Management Tools and Techniques (2016) by Ramboll Environ for the Government of Alberta and those available through the CCME Mobile Sources Working Group.

3.1.1 Existing Management Actions and Future Opportunities for On-Road Transportation

The on-road sector includes light-duty vehicles (e.g., passenger cars), light-duty trucks (e.g., vans, pickup trucks, sport utility vehicles), heavy-duty vehicles (e.g., trucks and buses), heavy-duty engines and motorcycles.

Federal regulations include *On-Road Vehicles and Engine Emission Regulations, Passenger Automobile and Light Truck Greenhouse Gas Emissions Regulations,* and *Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations.*

The project team acknowledges existing efforts in Alberta through governments, industry, non-governmental organizations, and Airshed Organizations, including:

- Encouraging use of carpooling, public transit, and active transportation
- Public awareness campaigns
- Driver education (eco-driving)
- Reducing unnecessary idling, purchase of low emission and/or right-sized vehicles
- Carpooling for staff or use of low emission vehicle fleets

The team supports the goals of these initiatives and their positive contribution to air quality management in Alberta, and indicated there may be benefits from increased coordination among similar initiatives.

During initial discussions, the project team considered including mandatory emissions testing for light-duty in-use vehicles as a possible management action to reduce non-point source emissions. The group chose not to recommend mandatory emissions testing for several reasons:

[50] Environment and Climate Change Canada. 2017d.
[51] Alberta Environment and Parks. 2016.

- The potential for Albertans driving older vehicles who are unable to afford newer vehicles being disproportionally affected by mandatory emissions testing and associated costs
- The discontinuation of similar programs for light-duty vehicles such as AirCare in British Columbia because of reduced failure rates and decreasing emissions due to improved vehicle emission control system technologies[52]
- The anticipated costs to government to establish and operate a provincial mandatory emissions testing mechanism in the current fiscal environment
- The anticipated negative reception by some Alberta drivers to additional costs associated with mandatory emissions testing and repairs, if required. This might also be viewed as "piling on" given the reaction by some members of the public to the carbon levy, which also impacts vehicle operation costs
- The continued improvement in vehicle emission control system technology and the rate of Alberta vehicle fleet renewal and replacement

3.1.2 Existing Management Actions and Future Opportunities for Off-Road Transportation

The off-road sector includes a broad range of vehicle and engine applications ranging from small engines that power lawn and garden equipment to much larger engines used to power mining, construction, agricultural, and forestry equipment. This sector also includes engines used to power recreational equipment such as snowmobiles and personal watercraft.

Federal regulations include *Off-Road Compression-Ignition Engine Emission Regulations*, *Off-Road Small Spark-Ignition Engine Emission Regulations*, and *Marine Spark-Ignition Engine, Vessel and Off-Road Recreational Vehicle Emission Regulations*.[53]

Excluding rail and aviation equipment that remain under federal jurisdiction, once off-road vehicles and equipment are sold, any management actions for these sources would fall under provincial or municipal jurisdiction. The project team reviewed off-road mobile equipment data for gasoline and diesel fueled equipment from the 2014 Air Pollutant Emissions Inventory.[54] Based on provincial totals, the highest off-road emitters of NO_x included agricultural equipment and construction and mining equipment (excluding oil sands mine fleets, which are included in the oilsands-specific category), and the highest off-road emitters of VOCs were recreational equipment followed by construction and mining equipment (excluding oil sands mine fleets) and lawn and garden equipment. Some sources are largely in urban areas and others are more localized or dispersed in rural areas.

While existing off-road vehicles and equipment will be replaced with newer, lower emitting versions over time, management actions could include using existing equipment in a more fuel-efficient manner or accelerating fleet turnover through replacement or retrofit, for example. Selected off-road mobile emissions sources are discussed below.

Construction Equipment

Examples of construction equipment include excavators, tractors, dozers, loaders, backhoes, graders, and cranes. The Government of Alberta and the Alberta Roadbuilders and Heavy Construction Association have an MOU to support increasing energy efficiency and reducing greenhouse gas emissions in Alberta, and to develop A Guide to Energy Efficient Best Practices for Alberta's Road Building and Heavy Construction Industry.[55] With the current MOU expiring in 2017, there is an opportunity to reinvigorate the conversation to reduce both greenhouse gas and

[52] Government of British Columbia. 2014.
[53] Environment and Climate Change Canada. 2013b.
[54] Environment and Climate Change Canada. 2017b.
[55] Alberta Roadbuilders and Heavy Construction Association. 2013.

air emissions from construction equipment. Alberta Transportation has initiated this discussion with stakeholders and a draft updated MOU is in progress.

Agricultural Equipment

Examples of agricultural equipment include tractors, combines, swathers, irrigation sets, sprayers, balers, tillers, and agricultural mowers. A number of management practices aimed at improving agricultural equipment fuel efficiency may reduce air emissions as a co-benefit and have been adopted by most Alberta farmers. These practices, some of which are described below, can reduce fuel consumption and improve fuel efficiency.

- Direct Drilling and Minimum Tillage: Switching to direct drilling and minimum tillage can reduce fuel use by more than 80%. In Alberta, the Reduced Tillage LINKAGES program, which ended in 2009, helped increase the adoption rate of no-till practices in Alberta.[56]
- Precision Agriculture: With this practice, producers use global positioning systems, geographic information systems, equipment guidance (autosteer), yield monitoring, site specific nutrient mapping and precision crop input application to farming. This approach tailors the use of site-specific practices of agricultural technology that reduce fuel consumption, increase fuel efficiency of agricultural machinery, increase yield, and reduce or mitigate environmental damage.[57] For example, a soil test defines the precise amounts of fertilizer the crops require and identifies the best plant variety for each crop.
- Controlled Traffic Farming: "Controlled traffic farming is a crop production system in which the crop zone and traffic lanes are distinctly and permanently separated."[58] This practice saves energy in tillage operations.
- Machine Maintenance: Regular preventative maintenance of tractors and heavy equipment, such as replacing tractor air and fuel filters, and maintaining and repairing planters, tillage, and harvest equipment, helps improve fuel efficiency and reduce emissions from agricultural machinery.
- Matching Tractor Size with Implement Size:[59] This practice involves selecting the right tractor size for the right implement load (avoiding use of large tractors for light load implements).
- Ballasting Tractors for Fuel Efficiency:[60] [61] [62] Tractor fuel efficiency can be adversely affected by using too much ballast or too little ballast. Too much ballast can cause excessive rolling resistance while too little ballast can cause excessive tractor wheel slip. Using the right ballast is key for tractor fuel efficiency.

Recreational and Lawn-and-Garden Equipment

Examples of recreational equipment include snowmobiles, ATVs, off-road motorcycles, and recreational marine. Examples of lawn-and-garden equipment include lawn and garden tractors, lawn mowers, chain saws, turf equipment, leaf blowers and vacuums, and trimmers, edgers, and brush cutters, many of which have both residential and commercial applications. Management actions have included programs by Scout Environmental (formerly Summerhill Impact) in Ontario called Mow Down Pollution, Clean Wake Engine Take-back, and Fuel Can Flip, where the accelerated turnover of older equipment was incented for emissions reductions.[63] The project team did not have consensus on initiating similar programs in Alberta at this time, but there may be future opportunities in this area, such as for education and awareness initiatives that highlight what individuals can do to improve air quality or where individual businesses could support Clean Air Day.

[56] Alberta Agriculture and Forestry. 2016
[57] Biggs, L. and Giles, D. 2012
[58] Controlled Traffic Farming Alberta. 2014
[59] Gellings, C. W. 2008.
[60] Helsel, Z. R. and Grubinger, V. 2012
[61] NSW Farmers. 2013
[62] Hanna, H. Mark; Harmon, Jay D.; and Petersen, Dana. 2010.
[63] Scout Environmental. 2017.

Mining Equipment

For mine fleets, which relate to the off-road sector and oil sands specific categories, facility *Environmental Protection and Enhancement Act* approvals include requirements for new and replacement mining vehicles, typically requiring those that meet the most up-to-date federal standards. Furthermore, the pending oil sands Base Level Industrial Emission Requirements (BLIERs) discussions have included in-use mine fleets within their scope to date. Regardless of the outcome of the BLIERs discussions, the fleet will reduce emissions as lifecycle turnover occurs. While the newest federal standards (Tier IV) are still being implemented, during the next federal review of vehicle emissions standards, the importance of increasingly stringent federal standards for diesel engines greater than 750 horsepower in size should be highlighted as they are a large emitter of NO_x in Alberta. Oil sands mine fleet emissions are particularly relevant to the Lower Athabasca Zone, as described in the TTG report. Available information[64,65] suggests that further emission reductions are possible. See also Section 3.6: Oil Sands Specific.

3.2 Agriculture

As there are numerous existing actions to help manage emissions from agricultural sources (Appendix 7), and their effectiveness in improving air quality is unclear, there was not consensus to develop recommendations for this source. Primary agricultural production is categorized as a non-point source of emissions. These emissions are complex and vary from season to season and from location to location. Agricultural air emissions of interest include, in no particular order, ammonia, odours, VOCs, hydrogen sulphide (H_2S), and particulate matter.

Agriculture contributes 92% of total ammonia emissions in Alberta. Ammonia is a valuable crop nutrient so minimizing emissions provides both economic and environmental benefits. In the agriculture sector, ammonia emissions occur primarily from livestock buildings, open feedlots, fertilizer use, manure storage facilities, and during manure handling, treatment, and application to land. The *Agricultural Operation Practices Act* (AOPA) and its associated regulations apply to all agricultural operations in Alberta. Part one of the Act defines how nuisance issues such as odour, dust, noise, and smoke resulting from agricultural activities are addressed. Part two of the Act sets the permitting process for the construction or expansion of confined feeding operations, the compliance process, and offences related to, and penalties for, contravening the Act. The Natural Resources Conservation Board is responsible for delivering AOPA, permitting of confined feeding operations, and addressing complaints regarding the management of manure on agricultural operations in Alberta.

Agriculture in Alberta also produces emissions of $PM_{2.5}$ and VOCs. While AAF recognizes the importance of these substances, its current prioritized focus is on ammonia emissions.

Mobile agricultural equipment fall under the transportation category (section 3.1.2).

3.2.1 Management Actions

Monitoring and characterizing air emissions, particularly VOCs from agricultural operations, is expensive and technically challenging. AAF and agricultural commodity groups and organizations have invested considerable human, material, and financial resources to provide guidance and support to the agricultural industry to:

- manage odour and other air emissions
- develop beneficial management practices (BMPs) for producers to manage agricultural air emissions and minimize their impacts on air quality
- develop a strategic approach to manage potential air quality impacts associated with agricultural production in Alberta

[64] USEPA. 2004.

[65] Environment Canada. 2008.

As described in Section 3.1.2, agricultural practices have shifted toward more precise methods that may help improve air quality management. Data in the Canadian Field Print Initiative[66] indicates that energy used in the production of spring wheat decreased by 6% between 1891 and 2011 on a per hectare basis. During that same period, energy use per tonne was reduced by 39% and the yield of spring wheat increased by 59%. As more recent data become available, it will be shown if these promising trends are continuing.

Since 1998, AAF has engaged in more than 22 different air quality research projects, often in collaboration with stakeholders. Current projects include:

- Air Quality (Ammonia) Management
- Managing Greenhouse Gases and Ammonia
- Reducing NH_3 emissions
- Targeting Nitrous Oxide (N_2O) Emissions

From 2012 to 2017, AAF's Environmental Stewardship Branch implemented an Odour and Air Quality Strategy that facilitated the management of odour and other agricultural industry air emissions. Associated accomplishments following the implementation of the strategy are described in Appendix 7. These include the strategic plan released in 2008 by the CASA Confined Feeding Operations (CFO) Project Team. This plan focused on managing six emissions of concern (NH_3, H_2S, particulate matter, pathogens and bio-aerosols, VOCs, and odour). Based on the recommendations, AAF implemented the following initiatives and provided support to others:

- development of a new emission inventory for NH_3 and particulate matter
- monitoring for NH_3, H_2S, particulate matter, and VOCs
- prioritization of research into BMPs to reduce emissions of NH_3 from CFOs

In 2012, AAF developed the CFO Air Quality BMP Extension Plan. Related products include factsheets and workbooks, workshops, online source emission calculators and web links on the AAF website, and manuals for managing CFO air quality. Every two years, AAF conducts the Environmentally Sustainable Agricultural Tracking Survey (ESATS) to measure producers' awareness and adoption of key BMPs. AAF uses the survey results to investigate the effectiveness and barriers to adoption of BMPs. ESATS 2014 survey results indicated that there is a low adoption rates of some of BMPs. AAF will continue to investigate the effectiveness and barriers to adoption of these BMPs (see Figure 1 in Appendix 7).

3.3 Gas and Oil-Fired Commercial and Residential Heating

As there are existing, planned, or anticipated actions to help reduce emissions from natural gas and oil-fired heating equipment, the project team did not develop recommendations to address this source of emissions from the commercial and residential heating sector. (Recommendations were developed for wood-burning equipment, Section 2.5.)

Natural Resources Canada *Energy Efficiency Regulations* contain increasingly stringent energy efficiency standards for products and equipment across Canada, including requirements for new gas furnaces and boilers, oil-fired furnaces and boilers, and gas-fired unit heaters. For energy efficiency as a system, the National Energy Code of Canada for Buildings 2011, and Section 9.36 "Energy Efficiency" of the Alberta Building Code 2014, set out technical requirements for the energy efficient design and construction of new buildings. The Alberta Building Code now incorporates these requirements, including requirements for the building envelope, lighting, service water heating, and heating, ventilation, and air-conditioning (HVAC).[67]

[66] Canadian Field Print Initiative. 2017.

[67] Natural Resources Canada. 2017b.

EEA also delivers programs targeting commercial and residential heating to allow consumers to save energy and money and reduce emissions. The next programs are to be determined.

3.4 Linkages with the Alberta Carbon Levy and Carbon Pricing

As of January 1, 2017, the Government of Alberta began charging a carbon levy on all transportation and heating fuels that emit greenhouse gases when combusted, at a rate of $20/tonne in 2017 and $30/tonne in 2018. The rate is based on the amount of carbon released by the combusted fuel, not on the mass of fuel itself, and includes diesel, gasoline, natural gas, and propane. Thus, the levy is applied to the transportation, heating and industrial non-point source categories discussed in this report. The levy does not apply to electricity.

Under the Climate Leadership Plan, the carbon levy is the first economy-wide pricing of carbon in Alberta. The principle of carbon pricing is that a levy on carbon intensive activities makes them more expensive for consumers to reflect the full social cost and incent reduction and innovation. The increased cost is intended to change behaviour and encourage less-carbon-intensive activities. Consequently, individuals and businesses that rely to a greater degree on carbon emitting activities such as driving will pay a greater share of the carbon levy and may be motivated to improve or implement efficiencies. Some exemptions to the levy are in place, including exemptions for biofuels and for marked fuels used for on-farm agricultural purposes.

In March 2016, the Government of Canada and most of Canada's premiers committed to putting Canada on the path to meet or exceed the national target of reducing greenhouse gas emissions by 30% below 2005 levels by 2030. To support these efforts, the Government of Canada released the Pan-Canadian Framework on Clean Growth and Climate Change, which includes a benchmark for carbon pricing throughout Canada. Due to take effect in 2018, the emission reduction requirements will become more stringent over time to reduce Canada's greenhouse gas emissions at lowest cost to business and consumers, and to support innovation and clean growth. Since Alberta has already implemented a greenhouse gas reduction framework and carbon pricing, this provides the opportunity for Alberta to pursue an equivalency agreement that would meet the intent of the federal policy and ensure that the carbon pricing in Alberta is unique to its emissions profile and to the industries and natural resources that operate in the province.

3.5 Industrial Non-Point Sources

Current provincial and federal government action is expected to reduce non-point source emissions of VOCs from the oil and gas sector. Under the *Canadian Environmental Protection Act*, ECCC has an ongoing review process through the Chemical Management Plan to reduce risk of exposure to VOCs. As a result, additional measures to reduce fugitive emissions of VOCs from the petroleum industry are being developed. ECCC has released draft regulations (Canada Gazette Part I, May 27, 2017) targeting refining (including upgraders) and integrated petrochemical industries to reduce petroleum refining gases. This will result in reductions of VOCs more broadly from the petrochemical industry. ECCC has also released draft regulations (Canada Gazette Part I, May 27, 2017) targeting the upstream oil and gas sector to reduce VOCs and methane by 40 to 45% by 2025. Similarly, the Alberta Government's parallel initiative to reduce methane by 45% from the oil and gas industry by 2025 will have a co-benefit of also reducing VOCs from these sources.

Industry non-point sources of NO_x include non-stationary equipment (mobile sources) and space heating. Mobile sources including on-road and off-road vehicles at industrial sites are included in the transportation category. The carbon levy also applies to transportation and heating fuels at industrial sites.

3.6 Oil-Sands Specific

Minimization of VOC Emissions from the Petroleum Industry

Canada's Oil Sands Innovation Alliance (COSIA) is an alliance of oil sands producers focused on accelerating the pace of improvement in environmental performance in Canada's oil sands through collaborative action and innovation. Several initiatives are underway related to VOC emissions. For example, COSIA and the Canada-Alberta Oil Sands Monitoring Program are working to better quantify both methane and VOC emissions from tailing ponds and mine faces. As the price on carbon increases (see section 3.4), the incentive to reduce methane emissions will increase. In the oil and gas industry, methane emissions are associated with VOC emissions, so reducing methane will also reduce VOC emissions. See also Section 3.1.2 for reference to mine fleets.

4 Summary and Next Steps

The goal of the CASA Non-Point Source Project was to recommend actions, which could include policy changes, to help address non-point source air emissions contributing to ambient $PM_{2.5}$ and ozone levels in Alberta, focusing on areas where the orange or red management levels have been assigned under the CAAQS framework.

The TTG assisted the project team in narrowing the list of non-point sources for the project focus by synthesizing the best available information from existing emission inventories, ambient monitoring, air quality modelling, and receptor modelling on non-point source air emissions and their potential contribution to air quality in Alberta. The project team further narrowed the focus by limiting management actions to those within provincial or municipal jurisdiction, considering efficiencies of management actions that may be cross-cutting and aligned with actions in leading jurisdictions, and seeking to not duplicate work that is already underway or planned.

The project team made recommendations in eight areas: mobile sources (transportation), construction operations and road dust, open-air burning, commercial and residential heating, industrial non-point sources, land-use planning, addressing non-point source knowledge gaps and uncertainties, and considering air quality co-benefits with climate change initiatives.

Recommendations for other sources including agricultural sources were not included in this project, but some opportunities are identified for consideration. Furthermore, where the project team assumed that a source would be addressed through another initiative, future verification will be needed to determine whether the initiative was implemented or further action is needed.

The nature of non-point source air emissions management is such that there is typically not one simple solution and the mechanisms for management may be unclear. Also, some categories of non-point emission sources involve many different individual emitters. For this reason, many of the recommendations are multi-faceted with actions that include elements of policy and regulation, public education and awareness, and planning. There is an important role to play for a variety of stakeholders, including different levels and departments of government. In addition, while some sources are cross-cutting, not all regions of the province have the same challenges. As a result, some recommendations may lead to greater benefits in some regions than others.

A communications network of stakeholders was initiated as part of the project to facilitate coordinated messaging on air quality in education and public communication work, including communication on the recommendations of this project. It will be beneficial to sustain this network beyond completion of the project.

The CASA Non-Point Source Project Team is pleased to have been able to undertake this work and advises that this project be seen as only a first important step in what needs to be an ongoing, coordinated effort to manage Alberta's non-point source emissions.

5 Bibliography

Alberta Agriculture and Forestry. 2016. *Environmentally Sustainable Agriculture Tracking Survey Report.* Retrieved from http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/aesa15117

_____. 2017a. *Prescribed Fire.* Edmonton, AB: Government of Alberta. Retrieved from www.wildfire.alberta.ca/prevention/prescribed-fire/default.aspx.

_____. 2017b. *Un-harvested Crops? Know your Options.* Edmonton, AB: Government of Alberta. Retrieved from http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/All/com16303.

Alberta Building Code. 2014. Retrieved from *http://www.chbaalberta.ca/alberta-building-code-2014?mid=1228*

Alberta Capital Airshed. 2015. Municipal Idle-Free Toolkit. Online at http://capitalairshed.ca/idle-free-toolkit.

Alberta Environment and Parks. 2014a. Capital Region Fine Particulate Matter Response. Edmonton, AB: Government of Alberta.

_____. 2014b. *Wood Burning Smoke Factsheet.* Edmonton, AB: Government of Alberta.

_____. 2015. *Prohibited Debris: Before you Burn… Learn!* Edmonton, AB: Government of Alberta.

_____. 2016. *Renewable Fuels Standard Regulation.* Retrieved from http://aep.alberta.ca/climate-change/guidelines-legislation/renewable-fuels-standard-regulation.aspx.

_____. 2016a. Red Deer Fine Particulate Matter Response. Edmonton, AB: Government of Alberta.

_____. n.d. *Environmental Education Framework.*

Alberta Health Services. 2008. *Healthy Public Policy Information Sheet: Land Use Planning and Health.* Edmonton, AB: Government of Alberta.

_____. 2016. *Environmental Public Health Week September 26-30, 2016.* Edmonton, AB: Government of Alberta. Retrieved from www.albertahealthservices.ca/news/Page13405.aspx.

Alberta Municipal Affairs. 2016. *Information on Energy Codes.* Edmonton, AB: Government of Alberta. Retrieved from www.municipalaffairs.alberta.ca/CP_Energy_Codes_Information.

Alberta Roadbuilders and Heavy Construction Association. 2012. *A Guide to Energy Efficient Best Practices for Alberta's Road Building and Heavy Construction Industry.* Edmonton, AB: Alberta Roadbuilders and Heavy Construction Association.

_____. 2013. *Alberta Roadbuilders and Heavy Construction Association – Memorandum of Understanding (MOU) with Alberta Environment and Sustainable Resource Development and Alberta Transportation.* Edmonton, AB: Alberta Transportation. Retrieved from www.transportation.alberta.ca/4058.htm.

Alberta Transportation, City of Calgary, and City of Edmonton. 2017. *Environmental Construction Operations (ECO) Plan Framework Instructions for Preparing ECO Plans for Alberta Transportation, City of Calgary, and City of Edmonton Construction Projects.* Calgary, AB: Environmental and Safety Management, City of Calgary.

Alberta Transportation. 2016. Alberta Vehicle Statistics: Number of Registered Motorized Vehicles by Fuel Type.

_____. 2016. *Climate Change and Emissions – Policy and Program Options Report*. Internal document for discussion purposes only.

_____. 2017. Green Transit Incentives Program (GreenTRIP). Retrieved from http://www.transportation.alberta.ca/5409.htm.

Alliance of Automobile Manufacturers. 2017. ZEV Mandate States. Retrieved from autoalliance.org/energy-environment/state-electric-vehicle-mandate/.

Axsen, J., Goldberg, S., and Melton, N. 2016. *Canada's Electric Vehicle Policy Report Card*. Vancouver, BC: Simon Fraser University, Sustainable Transportation Action Research Team.

Becker, J. M. and Hastings-Simon, S. 2017. *Kick-Starting Energy Efficiency in Alberta – Best Practices in the use of Efficiency as an Energy Resource.* Calgary, AB: The Pembina Foundation.

Belzile, G. and Milke, M. 2017. *Are Electric Vehicle Subsidies Efficient?* Montreal, QC: Montreal Economic Institute.

Biggs, L. and Giles, D. 2012. *Current and Future Agricultural Practices and Technologies which affect Fuel Efficiency*. Brussels, Belgium: Intelligent Energy Europe.

Billman, L. 2009. *Rebuilding Greensburg, Kansas, as a Model Green Community: A Case Study.* Golden, Colorado: National Renewable Energy Laboratory.

Bronson Consulting. 2013. *Clearing the Air: 2012 Canadian Vehicle Emissions-Reduction Program Inventory*. Canadian Council of Ministers of the Environment (CCME).

Cairns, S. and Arros, P. 2014. *Policy Bundles for Reducing Transportation Emissions in Large Cities.* Ottawa: Sustainable Prosperity Institute.

Calgary Parking Authority. 2017. Carpool Parking Program. Retrieved from https://www.calgaryparking.com/findparking/carpool

Canadian Council of Ministers of the Environment (CCME). 1991. *Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks.* Winnipeg, MB: Canadian Council of Ministers of the Environment.

_____. 2012a. *Code of Practice for Residential Wood Burning Appliances.* Winnipeg, MB: Canadian Council of Ministers of the Environment.

_____. 2012b. *Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone.* Winnipeg, MB: Canadian Council of Ministers of the Environment.

_____. 2014. *Advanced Vehicle Technologies – Federal and Provincial Incentive Programs*. CCME Mobile Sources Working Group internal document. Winnipeg, MB: Canadian Council of Ministers of the Environment.

_____. 2016a. *Guidance Document for Canadian Jurisdictions on Open-Air Burning.* Winnipeg, MB: Canadian Council of Ministers of the Environment.

_____. 2016b. *Vehicle and Engine Tampering: Description and Examples of Acceptable Practices*. Winnipeg, MB: Canadian Council of Ministers of the Environment. Online at http://www.ccme.ca/files/Resources/air/mobile_sources/Tampering%20Description_EN.pdf.

Canadian Field Print Initiative. 2017. Retrieved from http://fieldprint.ca/.

Canadian Fuels Association. 2017. Smart Fuelling Tips to Save on Fuel, and Save the Planet. Retrieved from http://www.canadianfuels.ca/Blog/April-2016/Smart-Fuelling-tips-to-save-on-fuel,-and-save-the-planet/.

Canadian Institute of Planners. 2017. *Healthy Communities Practice Guide.* Ottawa: Canadian Institute of Planners. Retrieved from www.cip-icu.ca/Issues/Healthy-Communities.

City of Edmonton. 2015. Edmonton's Community Energy Transition Strategy. Online at https://www.edmonton.ca/city_government/documents/EnergyTransitionStrategy.pdf.

_____. 2017. *The Way We Move*. Retrieved from https://www.edmonton.ca/city_government/city_vision_and_strategic_plan/the-way-we-move.aspx.

_____. 2017. *Walk Edmonton*. Retrieved from https://www.edmonton.ca/transportation/walk-edmonton.aspx.

City of Edmonton Transportation Committee. 2016. *Electric Bus Feasibility Study*. Edmonton, AB: City of Edmonton.

City of Nanaimo. 2017. "Rebates." Nanaimo: Property and Development, City of Nanaimo. www.nanaimo.ca/property-development/rebates.

Clean Air Strategic Alliance (CASA) Non-Point Source Technical Task Group. 2017. *Final Technical Report: A Knowledge Synthesis of Non-Point Source Air Emissions and their Potential Contribution to Air Quality in Alberta*. Edmonton, AB: Clean Air Strategic Alliance.

Clean Air Strategic Alliance, Vehicle Emissions Team. 1999. *The Alberta ROVER Project Summary Report.* Online at http://www.casahome.org/uploads/source/Alberta%20ROVER%20Project%20(March%201999).pdf.

_____. 2003. *Breathe Easy Vehicle Scrappage Program Report.*

_____. 2010. Final Report to the CASA board. Online at http://www.casahome.org/uploads/source/PDF/VET%20Final%20Report.pdf.

_____. 2013. *NPS Workshop, October 23, 2013*. Background Information. Prepared by: Government of Alberta.

Climate Change Central. 2012. *Trucks of Tomorrow Final Report.*

Controlled Traffic Farming Alberta. 2014. *Controlled Traffic Farming Alberta*. Edmonton, AB: Controlled Traffic Farming Alberta. Retrieved from www.controlledtrafficfarming.org.

CSA Group. 2017. CSA B365-10 (R2015): Installation Code for Solid-Fuel-Burning Appliances and Equipment. Retrieved from http://shop.csa.ca/en/canada/fuels-and-appliances/b365-10-r2015/invt/27013182010.

Electric Power Research Institute (EPRI). 2017. Initial Data for Non-Light-Duty Electric Transportation Options. Palo Alto, CA: EPRI.

Energy Efficiency Alberta. 2017. *Energy Efficiency Alberta.* Edmonton, AB: Government of Alberta. Retrieved from www.efficiencyalberta.ca.

Environment and Climate Change Canada. 2013a. *Canadian Ambient Air Quality Standards*. Environment and Climate Change Canada. www.ec.gc.ca/default.asp?lang=En&n=56D4043B-1&news=A4B2C28A-2DFB-4BF4-8777-ADF29B4360BD.

_____. 2013b. *Vehicle and Engine Regulations.* Gatineau, QC: Environment and Climate Change Canada. Retrieved from www.ec.gc.ca/air/default.asp?lang=En&n=AE4ECEC1-1.

_____. 2017a. Canadian Ambient Air Quality Standards. Retrieved from http://www.ec.gc.ca/default.asp?lang=En&n=56D4043B-1&news=A4B2C28A-2DFB-4BF4-8777-ADF29B4360BD.

_____. 2017b. *Air Pollutant Emissions Inventory*. Retrieved from https://ec.gc.ca/pollution/default.asp?lang=En&n=E96450C4-1.

_____. 2017c. *ECCC Strategy on Short-Lived Climate Pollutants.* Gatineau, QC: Environment and Climate Change Canada.

_____. 2017d. *Fuel Regulations*. Retrieved from https://www.ec.gc.ca/energie-energy/default.asp?lang=En&n=EE068DA8-1.

_____. 2017e. *Strategy on Short-Lived Climate Pollutants – 2017.* Retrieved from https://ec.gc.ca/GES-GHG/FF677357-F627-463A-A7C4-9068CEF3C3D9/5003-SLCP%20Strategy%202017_EN.pdf.

_____. 2017f. *The Pan-Canadian Framework on Clean Growth and Climate Change: Canada's Plan to Address Climate Change and Grow the Economy.* Ottawa, ON: Government of Canada

Environment Canada. 2005a. Impact of Residential Wood Stove Replacement on Air Emissions in Canada. Montreal, QC: Government of Canada.

_____. 2005b. Provincial distribution of wood burned by each category of appliances in Canada. Montreal, QC: Government of Canada.

_____. 2006. *Model Municipal By-law for Regulating Woodburning Appliances.* Ottawa: Government of Canada.

_____. 2008. Evaluation of Vehicle Emissions Reduction Options For the Oil Sands Mining Fleet. Prepared by M. J. Bradley and Associated. March 2008.

Envirotest Canada. 2013. *Greater Vancouver Regional District Remote Sensing Device Trial for Monitoring Heavy-duty Vehicle Emissions*. Burnaby, BC: Envirotest Canada.

ESP and McClintock, P.M. 2007. *The Alberta Rover II On-road Vehicle Emissions Survey: Prepared for the Clean Air Strategic Alliance*. Tuscon, AZ: ESP.

Federation of Canadian Municipalities. 2017. *Environmental Issues and Sustainable Development Policy Statement.*

Frank, L., Kavage, S., and Litman, T. 2006. *Promoting Public Health through Smart Growth: Building Healthier Communities through Transportation and Land Use Policies and Practices.* Vancouver, BC: Smart Growth BC.

Gellings, C. W. 2008. "Energy Efficiency in Agricultural Equipment." Efficient Use and Conservation of Energy, vol. 2.

Germain, A. 2005. *Impact of Residential Wood Stove Replacement on Air Emissions in Canada.* Environmental Protection Branch, Environment Canada.

Government of Alberta. 2009. *Automotive and Light Truck Vehicle Inspection Manual*. Online at http://www.transportation.alberta.ca/content/doctype41/production/amltmanualdec2009.pdf.

_____. 2012*. Clearing the Air: Alberta's Renewed Clean Air Strategy*. Edmonton, AB: Government of Alberta.

_____. 2013a. *Alberta Land Stewardship Act.* Edmonton, AB: Alberta Queen's Printer.

_____. 2013b. *Issue: Application and Use of the National Base-Level Industrial Emissions Requirements (BLIERs) Within the Alberta Regulatory Policy System.* Edmonton, AB: retrieved from https://open.alberta.ca/dataset/2024a1f6-801c-432d-bdc8-aec090854b45/resource/1dce8704-6adc-44c5-bb7c-a05a1692e278/download/2013-BaseLevelIndustrialEmissions-Jun18-2013.pdf.

_____. 2014. *Efficient Use of Land Implementation Tools Compendium.* Edmonton, AB: Government of Alberta.

_____. 2015. *Alberta: Air Zones Report 2011-2013.* Air and Climate Change Policy Branch, Alberta Environment and Parks.

_____. 2016a. *Commercial Vehicle Inspection Manual.*

_____. 2016b. *Energy Efficiency Alberta Helps Save People Money.* Edmonton, AB: Government of Alberta. Retrieved from www.alberta.ca/release.cfm?xID=4370646a37239-e955-7d4e-646cb8636d0063b3.

_____. 2016c. *Summary Report on Major Non-Point Source Air Emission Sources in Alberta.* Edmonton, AB: Air Policy Section, Government of Alberta.

_____. 2017a. *Climate Leadership Plan.* Retrieved from https://www.alberta.ca/climate-leadership-plan.aspx#toc-0

_____. 2017b. *Forest and Prairie Protection Act*. *Forest and Prairie Protection Regulation*. Edmonton, AB: Alberta Queen's Printer.

_____. 2017c. *South Saskatchewan Regional Plan 2014 – 2024*. Edmonton, AB: Government of Alberta.

_____. *Energy Efficiency Advisory Panel.* Edmonton, AB: Government of Alberta. Retrieved from www.alberta.ca/energy-efficiency.aspx.

Government of British Columbia. 2014. Aircare Program Comes to an End. News Release. Retrieved from https://news.gov.bc.ca/stories/aircare-program-comes-to-an-end.

_____. 2017. *Plan H.* Retrieved from http://planh.ca.

Government of Canada. 1999. *Canadian Environmental Protection Act* (CEPA). Ottawa, ON: Queen's Printer for Canada.

Hanna, H. Mark; Harmon, Jay D.; and Petersen, Dana. 2010. "Farm Energy: Ballasting tractors for fuel efficiency." Agriculture and Environment Extension Publications. 29. http://lib.dr.iastate.edu/extension_ag_pubs/29

Helsel, Z. R. and Grubinger, V. 2012. *Introduction to Energy-Efficient Tractor and Field Operations*. Extension.org. Retrieved from http://articles.extension.org/pages/29604/introduction-to-energy-efficient-tractor-and-field-operations#top.

IBI Group.2009. *The Implications of Alternative Growth Patterns on Infrastructure Costs.* Calgary, AB: City of Calgary.

Layzell, D. B. and Straatman, B. 2016. "The Potential Impact of Electric Vehicles on Alberta's Energy Systems" in *CESAR Scenarios*. Vol. 1, No. 2.

Leach, A, Adams, A., Cairns, S., Coady, L., and Lambert, G. 2015. *Climate Leadership Report to Minister.* Edmonton, AB: Alberta Environment and Parks

Lees + Associates. 2014. *Healthy Built Environment Linkages: A Toolkit for Design, Planning, Health*. Vancouver, BC: Provincial Health Services Authority.

Marcon. 2016. *Business Case for Investing in Electric Vehicle Direct Current Fast Charge Station Infrastructure*. Prepared for the Mobile Sources Working Group, Canadian Council of Ministers of the Environment. Online at http://www.ccme.ca/files/Resources/air/mobile_sources/Final%20DCFC%20Report.pdf.

Natural Resources Canada. 2016. ecoDriving, Fuel-Efficient Driving Techniques. Retrieved from http://www.nrcan.gc.ca/energy/efficiency/transportation/cars-light-trucks/fuel-efficient-driving-techniques/7507.

_____. 2017a. *Buying a Fuel-Efficient Vehicle* (Natural Resources Canada. Retrieved from http://www.nrcan.gc.ca/energy/efficiency/transportation/cars-light-trucks/buying/7477.

_____. 2017b. *Canada's Energy Efficiency Regulations.* Ottawa, ON: Government of Canada. Retrieved from www.nrcan.gc.ca/energy/regulations-codes/standards-6845.

NSW Farmers. 2013. *Monitoring Wheel Slip to Achieve Fuel Efficiency*. Australia: NSW Farmers Association.

Ontario Ministry of Transportation. 2011. Sustainability Implementation Plan. Retrieved from http://www.mto.gov.on.ca/english/sustainability/MTO-SIP-English-rnd8-forprint.pdf

Parkland Airshed Management Zone. 2012. *Parkland Airshed Management Zone (PAMZ) Municipal Burning Bylaw Survey Report.* Sundre, AB: PAMZ.

Partners for Climate Protection. 2010. Enviro-fleets: Reducing Emission from Municipal Heavy-duty Vehicles: A Guide to Helpful Resources. Ottawa, ON: Federation of Canadian Municipalities.

Plug 'n Drive Canada. 2017. Retrieved from https://plugndrive.ca/.

Ramboll Environ. 2016. *International Review of Non-Attainment Area Air Quality Management Tools and Techniques.* Edmonton, AB: Government of Alberta, Environment and Parks Department. Retrieved from http://aep.alberta.ca/air/reports-data/documents/ReviewNonAttainmentAirQuality-Jul29-2016.pdf.

Regional Municipality of Wood Buffalo. 2001. *Regional Municipality of Wood Buffalo Bylaw No. 01/084 Open Air Fire Bylaw.* Fort McMurray, AB: Regional Municipality of Wood Buffalo.

RWDI. 2016. *Emissions, Air Quality and Health Impacts of Widespread Electric Vehicle Use: Literature Review and Relevance to the Canadian Situation.* Prepared for Health Canada.

Scout Environmental. 2017. *Our Programs.* Toronto, ON: Scout Environmental. Retrieved from scoutenvironmental.com/site/programs.

Smart Drive Challenge. 2017. smartdrivechallenge.ca.

Societé de l'assurance automobile Quebec. 2017. Mechanical Inspection and Maintenance of Heavy Vehicles. Quebec: Retrieved from https://saaq.gouv.qc.ca/en/transportation-goods/heavy-vehicles/mechanical-inspection-and-maintenance/ [mddelcc.gouv.qc.ca/air/pieval/] [this is the French version]

Statistics Canada. 2015. *Households and the Environment: Energy Use.* Ottawa, ON: Environment Accounts and Statistics Division, Statistics Canada, Catalogue no. 11-526-S, Table 2, 2015.

Trans Canada Carpool.ca. 2017. Carpool.ca. Retrieved from https://www.carpool.ca/.

Transport Canada. May 26, 2017. *Government of Canada to Develop a National Zero-Emissions Vehicle Strategy by 2018*. News release. Retrieved from https://www.canada.ca/en/transport-canada/news/2017/05/government_of_canadatodevelopanationalzero-emissionsvehiclestrat.html.

UK Government Office for Science/Foresight. 2014. *Urban Form and Infrastructure: A Morphological Review.* Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/324161/14-808-urban-form-and-infrastructure-1.pdf.

USEPA. 2004. Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel. Federal Register. Vol. 69, No. 124, Tuesday, June 29, 2004, Rules and Regulations. Retrieved from https://www.gpo.gov/fdsys/pkg/FR-2004-06-29/pdf/04-11293.pdf

World Health Statistics 2016: Monitoring Health for the SDGs, Sustainable Development Goals. 2016. Geneva, Switzerland: World Health Organization. http://www.who.int/gho/publications/world_health_statistics/2016/en/.

6 Acronyms

AAC	Alberta Airsheds Council
AAF	Alberta Agriculture and Forestry
AEP	Alberta Environment and Parks
AHS	Alberta Health Services
AOPA	Agricultural Operation Practices Act
AQHI	Air Quality Health Index
BLIERS	Base-level Industrial Emission Requirements
BMPs	Beneficial (or Best) Management Practices
CAAQS	Canadian Ambient Air Quality Standards
CASA	Clean Air Strategic Alliance
CCME	Canadian Council of Ministers of the Environment
CEPA	Canadian Environmental Protection Act
CFOs	Confined feeding operations
CNG	Compressed natural gas
CO	Carbon monoxide
COSIA	Canada's Oil Sands Innovation Alliance
CRAZ	Calgary Region Airshed Zone
CSA	Canadian Standards Association
ECCC	Environment and Climate Change Canada
ECO (plan)	Environmental Construction Operation
EEA	Energy Efficiency Alberta
(US) EPA	(US) Environmental Protection Agency
ESATS	Environmentally Sustainable Agricultural Tracking Survey
GHG	Greenhouse Gases
ICE	Internal combustion engine
MOU	Memorandum of Understanding
NH_3	Ammonia
NMHC	Non-methane hydrocarbons
NO_2	Nitrogen dioxide

NO_x	Nitrogen oxides
NPRI	National Pollutant Release Inventory
NPS	Non-point source
ORVR	Onboard Refueling Vapour Recovery
PAHs	Polycyclic aromatic hydrocarbons
PAMZ	Parkland Airshed Management Zone
$PM_{2.5}$	Fine particulate matter (2.5 microns or less in diameter)
RMWB	Regional Municipality of Wood Buffalo
SO_2	Sulphur dioxide
SO_x	Sulphur oxides
THC	Total hydrocarbons
TTG	Technical Task Group (of the NPS Project Team)
VOCs	Volatile Organic Compounds
VRU	Vapour Recovery Unit
ZEV	Zero Emission Vehicle

7 Appendices

1. Alberta Air Zone Report 2011-2013
2. Final Technical Report: A Knowledge Synthesis of Non-Point Source Air Emissions and their Potential Contribution to Air Quality in Alberta
3. Non-Point Source Project Charter
4. CASA Non-Point Source Team Communications Plan
5. CASA Non-Point Source Project: Project & Communications Plan Backgrounder
6. Non-Point Source Message Map
7. Agricultural Practices

Overview of Recommendations & Performance Measures

#	Topic Area	Recommendation	Performance Measure(s)
1	Transportation (Mobile Sources) – On-Road Light-Duty	That Alberta Environment and Parks and Alberta Transportation collaborate with municipalities, Airshed Organizations, and other appropriate stakeholders to develop and implement a strategy to: i. Increase the public's understanding of emissions resulting from vehicle use and their impact on air quality ii. Increase the public's awareness of the practical actions they can take to reduce emissions from vehicle use iii. Encourage individuals to reduce emissions from vehicle use	i. Creation of a charter or MOU formalizing the collaboration by January 2020 ii. Development of an appropriate strategy satisfying the recommendation by December 2021 iii. Implementation of the strategy satisfying the recommendation by December 2022
2	Transportation (Mobile Sources) – On-Road Light-Duty	That Alberta Environment and Parks, Alberta Transportation, municipalities, motor dealers, and related organizations collaborate to develop and implement a strategy to accelerate and support increasing the percentage of all substantially lower emitting vehicles in Alberta, with the following goals: i. To increase the available charging or fueling infrastructure where required for those vehicles ii. To increase the purchase of these vehicles	i. Creation of a team charter or MOU formalizing the collaboration by January 2020 ii. Implementation of a strategy to increase the percentage of zero and low emission vehicles by December 2021
3	Transportation (Mobile Sources) – On-Road Light-Duty and On-Road Heavy-Duty	That Alberta Transportation prohibit vehicle emission control system tampering of future model year vehicles and engines through revisions to applicable provincial legislation and associated vehicle inspection criteria	i. Existing vehicle equipment legislation (e.g. *Vehicle Equipment Regulation*) is modified by January 2022 to prohibit emission control system tampering of future model year vehicles registered in Alberta ii. Existing vehicle inspection manuals (e.g., Automotive and Light Truck Inspection Manual) are modified to include vehicle emission control criteria and associated inspections (e.g., out-of-province inspections) commencing by January 2023
4	Transportation (Mobile Sources) – On-Road Heavy-Duty	That Alberta Transportation amend the *Commercial Vehicle Safety Regulation* and associated Commercial Vehicle Inspection Manual to require inspection of commercial vehicle emission controls in accordance with the Canadian Council of Motor Transport	i. Modifications are made to the *Commercial Vehicle Safety Regulation* and the associated Commercial Vehicle Inspection Manual by January 2022 to

		Administrators 2014 National Safety Code Standard 11, Part B (NSC 11B) of future model year vehicles	require inspection of emissions controls for future model year vehicles ii. Vehicle emissions controls are included in commercial vehicle inspections by January 2023
5	Transportation (Mobile Sources) – On-Road Heavy-Duty	That Alberta Transportation: i. Work with partners to expand the availability of infrastructure for zero and lower emission vehicles (e.g., charging/fueling infrastructure) for long-haul heavy-duty vehicles ii. In coordination with municipalities, support and develop programs to remove barriers and expand the purchase and use of zero and lower emission vehicles for municipal services (transit, municipal fleets, etc.)	i. Percentage of zero and lower emission buses in municipal transit fleets ii. Percentage of zero and lower emission heavy-duty vehicles in service in Alberta iii. Number of electrified truck stops installed on major freight corridors
6	Transportation (Mobile Sources) – On-Road Heavy-Duty	That Alberta Environment and Parks and Alberta Transportation work with appropriate stakeholders to: i. Provide education and promotion of commercial freight membership in the SmartWay Transport Partnership ii. Encourage, through the SmartWay Transport Partnership, increasing fleet fuel efficiencies through education and promotion of the use of fuel efficiency technologies, such as aerodynamic devices, idle reduction devices, or low rolling resistance tires iii. Encourage SmartWay participation as a consideration for procurement	i. Alberta Environment and Parks and Alberta Transportation have established promotion of SmartWay by January 2019 ii. Number of SmartWay partners and affiliates (membership number)
7	Transportation (Mobile Sources) – On-Road Heavy-Duty	That Alberta Transportation and municipalities, in collaboration with appropriate stakeholders, support the development of urban and long-haul freight strategies for the movement of goods in Alberta	i. Establishment or expansion of goods movement strategies within and between urban centres by January 2020
8	Transportation (Mobile Sources) – On-Road Light-Duty and On-Road Heavy-Duty	That Alberta Environment and Parks and Alberta Transportation, in collaboration with appropriate stakeholders, undertake an innovative on-road emission testing study	i. The study is complete by January 2020 and provides $PM_{2.5}$ and NO_x emissions data, at minimum, for a variety of vehicles and model years used in Alberta

9	Transportation (Mobile Sources) – On-Road Light-Duty	That Energy Efficiency Alberta (EEA) consider the transportation sector as an area for future EEA programs that provide greenhouse gas and air emission reduction co-benefits	i. EEA to inform CASA of the result of its consideration of action on transportation by January 2019 ii. If warranted by the review, the number of EEA transportation programs in place by January 2020
10	Construction and Road Dust	That Alberta Environment and Parks and Alberta Transportation work with municipalities, construction companies, and other stakeholders to develop and disseminate a best practices guide to address dust from construction and roads that: i. Identifies why this issue is important and what can be done to address it ii. Provides templates for environmental policies and plans iii. Prepares for potential requirements in the future	i. The best practices guide is complete, disseminated, and in use by January 2021
11	Open-Air (Prescribed) Burning	That Alberta Environment and Parks with the involvement of Alberta Agriculture and Forestry, the Alberta Urban Municipalities Association, and the Alberta Association of Municipal Districts and Counties: i. Review provincial and municipal open-air burning requirements and management practices ii. Initiate reasonable measures to help ensure that in the future the potential air quality impacts of open-air burning are appropriately considered, recognizing that prescribed burning is a necessary tool to protect communities, human life, infrastructure, and natural resources, and can be an important agricultural or ecosystem management tool	i. By January 2020, Alberta Environment and Parks, in conjunction with relevant stakeholders, has completed a review of open-air burning practices and requirements in the province in relation to air quality management ii. By January 2021 Alberta Environment and Parks has informed CASA on the findings from the review, and if applicable, identified opportunities for improvements and related possible implementation strategies
12	Commercial and Residential Heating – Residential Wood Burning	That Alberta Environment and Parks: i. Evaluate and identify the barriers to fuel-switching from biomass to a cleaner alternative or retrofitting old wood burning space-heating equipment to meet the Canadian Standards Association Standard for Performance Testing for Solid-Fuel-Burning Heating Appliances, edition B415.1-10 (CSA B415.1-10) or Environmental Protection Agency Title	i. By March 2019, Alberta Environment and Parks has completed the evaluation and identification of barriers to fuel-switching from biomass to a cleaner alternative or retrofitting old equipment and has informed CASA on the findings of the review

		40 Code of Federal Regulations (EPA 40CFR) standards ii. Develop strategies and programs as needed to motivate fuel-switching, replacement, or retrofitting	
13	Commercial and Residential Heating – Residential Wood Burning	That Alberta Environment and Parks, municipalities, and Airshed Organizations: i. Develop a coordinated notification process to discourage indoor and outdoor wood burning during periods when air quality is, or is forecasted by the air monitoring network to be, degraded ii. Provide general education and awareness on the air emissions associated with wood burning	i. By January 2019, a coordinated notification process has been established and implemented
14	Industrial Non-Point Sources – Fuel Terminals	That Alberta Environment and Parks consider the benefits of requiring Stage 1 vapour recovery units for fuel terminals, but only in the context of other potential actions that could be taken by industry to reduce ambient $PM_{2.5}$ and O_3	i. By June 2019, a review is completed by Alberta Environment and Parks that considers the value of Stage 1 vapour recovery units for fuel terminals
15A	Land-Use Planning	That municipalities and their neighbouring municipalities work together and with relevant stakeholders to: i. Identify and promote opportunities to design urban form and infrastructure to reduce environmental impacts and improve air quality ii. Educate the public and others about the importance of these opportunities iii. Work to implement environmentally responsible land-use planning by updating bylaws, statutory plans, and policies	i. By January 2019, municipalities have tools to incent brownfield development ii. Number of municipal bylaws, statutory plans, and policies such as municipal development plans, transportation plans, and growth plans, identifying air quality as an issue to address through complete and compact communities
15B	Land-Use Planning	That the Government of Alberta support collaboration among the municipalities and other stakeholders on environmentally responsible urban development and land-use planning through financial mechanisms, education, and engagement	i. By January 2020, the Government of Alberta to inform CASA on the support provided for collaboration among municipalities and other stakeholders
16	Non-Point Source Knowledge Gaps and Uncertainties	That Alberta Environment and Parks address, as a priority in its future air quality work, gaps and uncertainties in ambient air quality monitoring (e.g. $PM_{2.5}$ and O_3), emission inventory, source	i. Beginning in 2019, Alberta Environment and Parks to communicate to CASA biennially the status of progress in reducing these gaps and uncertainties

		characterization, modelling, and atmospheric chemistry as identified by the Non-Point Source Technical Task Group	ii. By January 2020, AEP in conjunction with partners as appropriate, will have: a. Implemented a process for identifying and publicly communicating areas that are approaching or not achieving the CAAQS b. Developed, and publicly communicated, a monitoring plan with clear scientific questions and hypotheses for focused studies c. Initiated focused studies in priority areas (which may include monitoring, modeling, emissions inventories, source characterization, and atmospheric chemistry work) with subsequent data analysis that inform the next steps and help address gaps and uncertainties
17A	Climate Change Initiatives and Air Quality Co-benefits	That the Alberta Climate Change Office and Energy Efficiency Alberta consider the air quality impacts of any proposed new policy, program, or action related to non-point sources they consider adopting and place value on those measures with substantial air quality co-benefits	i. By January 2019, the adoption of a policy or process by the Climate Change Office and Energy Efficiency Alberta to systematically consider the air quality impacts of any new policies, programs, and actions related to non-point sources they consider adopting and give value to those with higher air quality co-benefits. Information to be shared with CASA on the policy or process by March 2019
17B	Climate Change Initiatives and Air Quality Co-benefits	That the Alberta Climate Change Office and Energy Efficiency Alberta, as resources permit, also consider the air quality impacts of their existing policies, programs, and actions related to non-point sources and make adjustments to increase air quality co-benefits where warranted	i. By January 2019, the adoption of a policy or process by the climate Change Office and Energy Efficiency Alberta to consider the air quality impacts of their existing policies, programs, and actions and make adjustments to increase co-benefits where warranted. Information to be shared with CASA on the policy or process by March 2019

INFORMATION SHEET

Item 6.0: **Information Presentation from Mike Fernandez, Alberta Climate Change Office**

Issue: Climate Leadership Plan Implementation

Background: In 2015, the Government of Alberta announced the Climate Leadership Plan, detailing a suite of new policy objectives to reduce greenhouse emissions in the province while supporting Alberta's prosperity.

The Alberta Climate Change Office has been working with Ministry partners, agencies, and various stakeholders, to implement these and other aspects of the Plan.

The presentation will provide an update on implementation of the Plan generally and aspects that may be particularly relevant to CASA's mandate, including:

- The shift from the Specified Gas Emitters Regulation to an output-based allocation approach for large emitters, and
- The commitment to reduce methane emissions from oil and gas operations by 45% by 2025.

Status Report

Item 7.0:	Roadside Optic Vehicle Emissions Recorder (ROVER) III Working Group Status Report
Task:	This working group will develop a project charter that will direct a project team to undertake the tasks outlined in the Statement of Opportunity brought forward at the September 2017 CASA board meeting. This is the third ROVER project to be undertaken by CASA.
Status:	The working group members have been identified and the first meeting was held on November 23rd, 2017. The working group is expected to bring a project charter to the board for approval at the spring board meeting.
Working Group Members:	Randy Angle, Prairie Acid Rain Coalition Andrew Barnes, Alberta Motor Transport Association Ann Baron, Southern Alberta Group for the Environment Rhonda Lee Curran, Alberta Environment and Parks Rob Hoffman, Canadian Fuels Association Rahul Shrivastava, Alberta Transportation
Project Manager:	Katie Duffett kduffett@casahome.org 780-644-5312

9915 108 St, 1400
EDMONTON AB T5K 2G8
CANADA

Meeting: CASA Board Meeting
Date of meeting: December 13, 2017
Meeting place: McDougall Centre
Rosebud Room
455 6 St SW Calgary, AB T2P 4A2

1. Were the objectives as listed in the agenda accomplished? Yes
   No

2. The objectives we did not accomplish are:

3. How can future meetings be improved?

4. Did the board book (decision sheets, attachments, reports) provide you with the information needed to make informed decisions? Yes
   No

5. Do you have any other feedback you would like the Executive Committee to consider?

6. How do you feel about the value of this meeting for the time you spent here?

Name (optional): _____

Clean Air Strategic Alliance
List of Stakeholder Groups and Representatives

Stakeholder Group	*Sector*	*Member*	*CASA Board Representative*	
			Director, Association/Affiliation	*Alternate Director, Association/Affiliation*
Industry	Petroleum Products	Canadian Fuels Association (formerly CPPI)	**Peter Noble –** Senior Regulatory Affairs Manager Imperial Oil	**Brian Ahearn**, Vice President – Western Division Canadian Fuels Association
NGO	NGO Health	The Lung Association - Alberta & NWT	**Leigh Allard**, President & CEO The Lung Association - Alberta & NWT	**Vacant**
NGO	NGO Rural	Southern Alberta Group for the Environment	**Ann Baran** Southern Alberta Group for the Environment	**Wayne Ungstad** Notinto Sipiy Conservation Authority
Industry	Mining	Alberta Chamber of Resources	**Rob Beleutz**, Environmental, Health and Safety Manager Graymont Western Canada Inc.	**Dan Thillman**, Plant Manager Lehigh Cement
Government	Federal	Environment Canada	**Cheryl Baraniecki**, Associate Regional Director General, West & North Environment Canada	**Martin Van Olst**, Senior Analyst Environment Canada
Government	Provincial Government – Energy	Alberta Energy	**Stacey Schorr** Assistant Deputy Minister Resource Development Policy Division Alberta Energy	**Wade Clark**, Executive Director Resource Land Access Alberta Energy
Industry	Oil & Gas – Large Producers	Canadian Association of Petroleum Producers	**Claude Chamberland,** Canadian Association of Petroleum Producers	**Koray Onder,** Canadian Association of Petroleum Producers
Industry	Forestry	Alberta Forest Products Association	**Keith Murray**, Director Industry/Government Relations Alberta Forest Products Association	**Vacant**
Government	Local Government - Rural	Alberta Association of Municipal Districts & Counties	**Vacant**	**Vacant**
Industry	Alternate Energy		**David Lawlor**, Director of Development NextEra Energy Canada	**Vacant**
Aboriginal Government	First Nations	Samson Cree Nation	**Holly Johnson Rattlesnake** Samson Cree Nation	**Vacant**
Industry	Chemical Manufacturers	Chemistry Industry Association of Canada (CIAC)	**Terry Rowat,** Manager Methanex Corporation	**Greg Moffatt**, Director Government Stakeholder Relations – Western Canada Chemistry Industry Association of Canada

Clean Air Strategic Alliance
List of Stakeholder Groups and Representatives

Government	Provincial Government – Health	Alberta Health	**Vacant**	**Chris Shandro**, Executive Director Health Protection - Public Health & Compliance Division Alberta Health
Aboriginal Government	Métis	Métis Settlements General Council	**Mary Onukem**, Environmental Coordinator Métis Settlements General Council	**Vacant**
NGO	NGO Industrial	Pembina Institute	**Ruth Yanor** Mewassin Community Council	**Andrew Read** Pembina Institute
NGO	NGO Urban	Prairie Acid Rain Coalition	**Bill Calder** Prairie Acid Rain Coalition	**David Spink** Prairie Acid Rain Coalition
Industry	Agriculture	Alberta Beef Producers	**Rich Smith**, Executive Director Alberta Beef Producers	**Humphrey Banack** Alberta Federation of Agriculture
NGO	Consumer Transportation	Alberta Motor Association	**Scott Wilson**, Senior Policy Analyst Alberta Motor Association	**Vacant**
Government	Provincial Government – Environment	Alberta Environment Sustainable Resource Development	**Andre Corbould**, Deputy Minister Alberta Environment and Parks	**Rick Blackwood**, Assistant Deputy Minister Alberta Environment and Parks
Industry	Utilities	TransAlta Corporation	**Jim Hackett**, Director, Health, Safety, Security & Environment ATCO Power	**Ahmed Idriss,** Senior Advisor, Environment Policy Capital Power Corporation
Government	Local Government – Urban	Alberta Urban Municipalities Association	**Vacant**	**Vacant**
Industry	Oil & Gas – Small Producers	Vacant	**Vacant**	**Vacant**

CASA Project Team & Committee Membership

November 27, 2017

Non Point Source Project Team			
First Name	**Last Name**	**Organization Name**	**Title**
Allison	Miller	Imperial Oil Ltd. (CAPP/CIAC)	Member/Co-Chair
Andrew	Read	Pembina Institute	Member
Atta	Atia	Alberta Agriculture and Forestry	Member
Bill	Calder	Prairie Acid Rain Coalition	Member/Co-Chair
Brian	Ahearn	Canadian Fuels Association	Corresponding Member
Chandra	Tomaras	City of Edmonton	Member
Corinna	Mulyk	Alberta Transportation	Member
David	Spink	Prairie Acid Rain Coalition	Member
Jill	Bloor	AAC - Calgary Region Airshed Zone	Alternate
Jim	Hackett	ATCO	Member
Karen	Raven	Alberta Agriculture and Forestry	Alternate
Katie	Duffett	Clean Air Strategic Alliance	Project Manager
Lauren	Maris	City of Red Deer	Member
Mandeep	Dhaliwal	AAC - Calgary Region Airshed Zone	Alternate
Martin	Van Olst	Environment and Climate Change Canada	Member
Nadine	Blaney	Fort Air Partnership	Member
Nancy	Hackett	City of Red Deer	Alternate
Rhonda Lee	Curran	Alberta Environment and Parks	Member/Co-Chair
Rich	Smith	Alberta Beef Producers	Alternate
Rob	Hoffman	Canadian Fuels Association	Member
Rupesh	Patel	Alberta Transportation	Alternate
Ruth	Yanor	Mewassin Community Council	Member
Scott	Wilson	Alberta Motor Association	Member
Steve	Marshman	Alberta Canola Producers	Member
Susan	Valentine	Alberta Association of Municipal Districts and Counties	Corresponding Member
Tanya	Sakamoto	City of Calgary	Member
Tasha	Blumenthal	Alberta Association of Municipal Districts and Counties	Member

Non Point Source Communications Subgroup			
First Name	**Last Name**	**Organization Name**	**Title**
Andrew	Read	Pembina Institute	Member
Jim	Hackett	ATCO	Member
Karla	Reesor	Alberta Airsheds Council	Member
Katie	Duffett	Clean Air Strategic Alliance	Project Manager
Ruth	Yanor	Mewassin Community Council	Member
Tasha	Blumenthal	Alberta Association of Municipal Districts and Counties	Member

Non Pount Source Municipal Caucus			
First Name	**Last Name**	**Organization Name**	**Title**
Chandra	Tomaras	City of Edmonton	Member
Katie	Duffett	Clean Air Strategic Alliance	Project Manager
Lauren	Maris	City of Red Deer	Member
Nancy	Hackett	City of Red Deer	Alternate
Rhonda Lee	Curran	Alberta Environment and Parks	Member
Tanya	Sakamoto	City of Calgary	Member
Tasha	Blumenthal	Alberta Association of Municipal Dsitrcits and Counties	Member

Performance Measures Committee			
First Name	**Last Name**	**Organization Name**	**Title**
Ruth	Yanor	Mewassin Community Council	Member

Communications Committee			
First Name	**Last Name**	**Organization Name**	**Title**
Ann	Baran	South Alberta Group For The Environment	Member
Cara	McInnis	Clean Air Strategic Alliance	Coordinator
Erin	Brophy	Canadian Fuels Association	Member
Ruth	Yanor	Meweassin Community Council	Member
Sarah	Dunn	Alberta Environment and Parks	Member

Ambient Air Quality Objectives Committee			
First Name	**Last Name**	**Organization Name**	**Title**
Alison	Miller	Imperial Oil Ltd. (CAPP/CIAC)	Member/Co-Chair
Andrew	Read	Pembina Institute	Member
Anne	Vigneau	ATCO Power	Member
Atta	Atia	Alberta Agriculture and Forestry	Member
Bob	Myrick	Alberta Environment and Parks	Corresponding Memebr
Chad	Beegan	Alberta Health Services	Corresponding Memebr
Darcy	Walberg	North West Refinery	Member
David	Spink	Prairie Acid Rain Coalition	Member
Debra	Hopkins	Alberta Environment and Parks	Corresponding Memebr
Kevin	Warren	Alberta Airsheds Council	Member
Laura	Blair	Alberta Enviornment and Parks	Member/Co-Chair
Laurie	Cheperdak	Alberta Enviornment and Parks	Member
Liz	Stengl	Nova Chemical (CIAC)	Member
Long	Fu	Alberta Enviornment and Parks	Corresponding Member
Lynn	Que	Alberta Health Services	Member
Matt	Dance	Clean Air Strategic Alliance	Project Manager
Nina	Wang	Alberta Health	Member
Opel	Vuzi	Health Canada	Member
Randy	Angle	Prairie Acid Rain Coalition	Member/Co-Chair
Rich	Smith	Alberta Beef Producers	Member
Rob	Hoffman	Clanadian Fuels Association	Member
Sanjay	Prasad	Alberta Airsheds Council	Member
Sheila	Lucas	Alberta Environment and Parks	Member
Shelley	Morris	Alberta Health	Member

H2S / TRS Subgroup			
First Name	**Last Name**	**Organization Name**	**Title**
Alison	Miller	Imperial Oil Ltd. (CAPP/CIAC)	Member
Atta	Atia	Alberta Agriculture and Forestry	Member
Bob	Myrick	Alberta Environment and Parks	Corresponding Member
Chad	Beegan	Alberta Health Services	Corresponding Member
David	Spink	Prairie Acid Rain Coalition	Member

Debra	Hopkins	Alberta Environment and Parks	Corresponding Member
Joan	Tingley	ATCO	Corresponding Member
Laura	Blair	Alberta Environment and Parks	Member
Laurie	Cheperdak	Alberta Environment and Parks	Member
Long	Fu	Alberta Environment and Parks	Corresponding Member
Lynn	Que	Alberta Health Servies	Member
Matt	Dance	Clean Air Strategic Alliance	Project Mananger
Nina	Wang	Alberta Health	Member
Rich	Smith	Alberta Beef Producers	Member
Sanjay	Pradsad	Alberta Airsheds Council	Member
Sheila	Lucas	Alberta Environment and Parks	Member
Shelley	Morris	Alberta Health	Member

PMO3 Subgroup			
First Name	**Last Name**	**Organization Name**	**Title**
Alison	Miller	Imperial Oil Ltd. (CAPP/CIAC)	Member
Andrew	Read	Pembina Institute	Member
Atta	Atia	Alberta Agriculture and Forestry	Member
Bob	Myrick	Alberta Environment and Parks	Corresponding Member
Chad	Beegan	Alberta Health Services	Corresponding Member
David	Spink	Prairie Acid Rain Coalition	Member
Debra	Hopkins	Alberta Environment and Parks	Corresponding Member
Kevin	Warren	Alberta Airsheds Council	Member
Laura	Blair	Alberta Enviornment and Parks	Member
Laurie	Cheperdak	Alberta Enviornment and Parks	Member
Liz	Stengl	Nova Chemical (CIAC)	Member
Long	Fu	Alberta Environment and Parks	Corresponding Member
Lynn	Que	Alberta Health Services	Member
Matt	Dance	Clean Air Strategic Alliance	Project Manager
Nina	Wang	Alberta Health Services	Member
Randy	Angle	Prairie Acid Rain Coalition	Member
Rob	Hoffman	Canadian Fuels	Member
Sheila	Lucas	Alberta Environment and Parks	Member

NO2/SO2 Subgroup			
First Name	**Last Name**	**Organization Name**	**Title**
Darcy	Walberg	North West Refinery	Member
Laura	Blair	Alberta Envrionment and Parks	Member
Matt	Dance	Clean Air Strategic Alliance	Project Manager
Nina	Wang	Alberta Health	Member
Opel	Vuzi	Health Canada	Member
Randy	Angle	Prairie Acid Rain Coalition	Member

ROVER III Working Group			
First Name	**Last Name**	**Organization Name**	**Title**
Andrew	Barnes	Alberta Motor Transport Association	Member
Ann	Baran	Southern Alberta Group For The Environment	Member
Katie	Duffett	Clean Air Strategic Alliance	Project Manager
Rahul	Shivastava	Alberta Transportation	Member
Randy	Angle	Prairie Acid Rain Coalition	Member
Rhonda Lee	Curran	Alberta Envrionment and Parks	Member
Rob	Hoffman	Canadian Fuels Association	Member

Coal to Gas Project Team			
First Name	**Last Name**	**Organization Name**	**Title**
Ahmed	Idriss	Capital Power	Member
Ana	Radu	Trans Canada	Member
Andrew	Read	Pembina Institute	Member
Brian	Baudais	TransAlta	Member
Candice	Johnston	Alberta Energy	Member
Celeste	Dempster	Alberta Environment and Parks	Member
Daniel	Lai	Alberta Energy	Member
David	Spink	Prairie Acid Rain Coalition	Member
Holly	Johnson-Rattlesnake	Samson Cree Nation	Member
Jim	Hackett	ATCO	Member
Kelly	Scott	ATCO	Member
Laura	Arnold	TransAlta	Member

Mark	McGillivray	ENMAX	Member
Matt	Dance	Clean Air Strategic Alliance	Project Manager
Randy	Dobko	Alberta Environment and Parks	Member
Riley	Georgsen	TransAlta	Member
Ruth	Yanor	Meweassin Community Council	Member
Sharon	Willianen	Alberta Environment and Parks	Corresponding Member
Shaun	McNamara	Maxim Power Corp	Member
Sushmitha	Gollapudi	Alberta Environment and Parks	Member
Tom	Marr-Laing	Innstor	Member