

A Summary of Local Air Quality



bulkley valley - lakes district
airshed management society

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What is this?

In May of 2021 Judi Krzyzanowski BSc, MSc, PhD prepared a report titled: Updated Micro Emissions Inventory for the Bulkley Valley Lakes District of BC, May 19, 2021. This report is for the years 2015 and 2016. This guide is a summary of that report. Find the full report at:

<https://cleanairplan.ca/micro-emissions-inventory-report/>

For this document go to: <https://cleanairplan.ca/plain>
Blue bold lettering is an on line link.

The 2015/2016 Micro Emissions Inventory

Our micro emission inventory identifies the size and source of airborne particles in our area. It is 'micro' because the particles are small. The inventory is also an attempt to understand how and why our air quality varies. The particles of most concern in our airshed are known as Particulate Matter (PM). We know that high levels of particulate are dangerous to our health.

The **Bulkley Valley Lakes District Airshed Management Society (BVLD AMS)** has supported this report. They are a non profit group trying to improve air quality. Refer to a full list of acknowledgements on page 51 of the report.



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Management
Society
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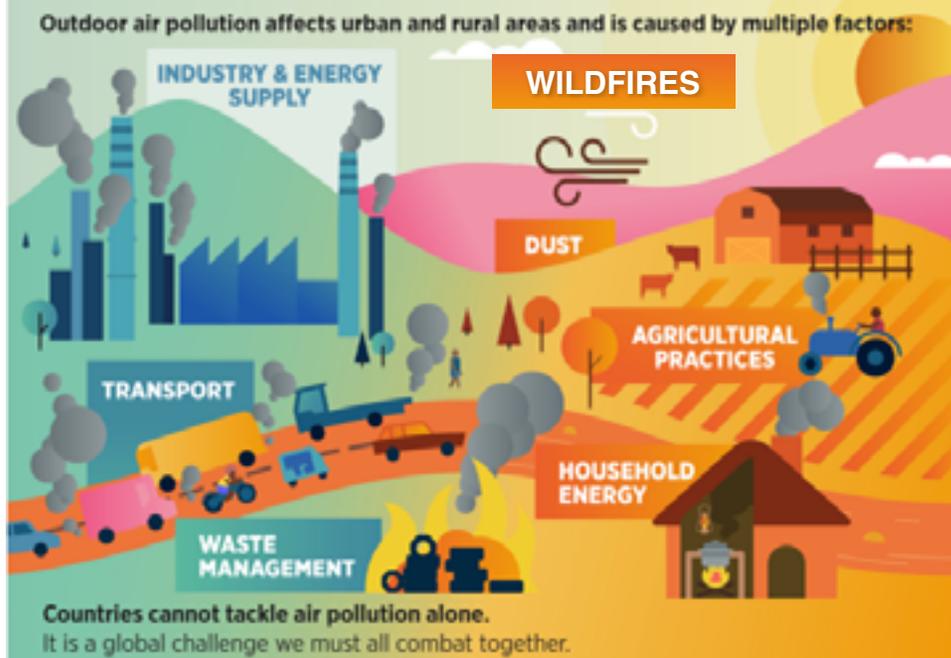
Why do a Micro Emission Inventory?

- See the big picture! What contributes to our air quality?
- Highlight gaps in knowledge and data.
- Inform policy and future projects.
- Identify new sources of emissions.
- Inform ourselves on the effects of living with poor air quality.

What is particulate matter - PM ?

Particulate matter, also called PM, is a mixture of tiny solid or liquid droplets floating in the air. The smoke and soot particles are mostly carbon, but other particles like dirt and dust can contain other chemicals. These particles come from various sources like factories or an event like a bonfire.

COMMON SOURCES OF PARTICULATE MATTER



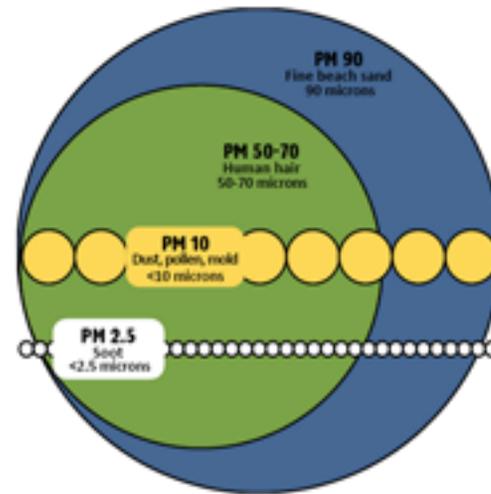
CLEAN AIR FOR HEALTH

#AirPollution



There are 2 sizes of particles of concern in our area. The length of particle is measured in micrometers, also called microns. The symbol for this is μm .

If this green circle were the size of a human hair, then ...



PM 10 is smaller.
PM10 = 10 millionths of a meter across
When referring to this size particle we refer to everything this size and smaller.

PM 2.5 is even smaller.
PM2.5 = 2.5 millionths of a meter across
This is the size of soot, pollen, ash, smoke and more.

Pic: <https://ecology.wa.gov/Air-Climate/Air-quality/Air-quality-targets/Air-quality-standards/Particle-pollution#gallery>

Health Effects

PM2.5 particles are of most concern to our health. Since they are small enough to get into our lungs they also get absorbed into the body. As they break down, they can become carcinogenic. A single large dose of PM2.5 may not have immediate effect but many low doses will cause inflammation. **Studies** have shown links between air quality and the increased severity of certain illnesses.

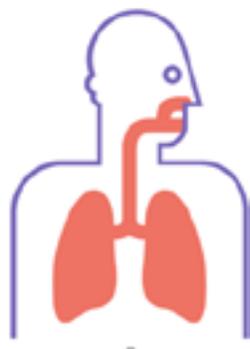
Exposure to high levels of PM creates weakness. It can trigger pregnancy problems, cancers, lung problems and diabetes. A study in Prince George, BC from 2008 - 2015

found there was a relationship between heart attacks and PM2.5 levels, especially in the winter.

Inhaling PM2.5 also leaves us susceptible to more severe illness and respiratory problems like **Covid 19**. Deaths from **Covid 19** have been attributed to high levels of PM2.5.

Increasing health risks and health costs related to poor air quality mean that people are learning to take into account air quality levels when planning activities.

PM2.5



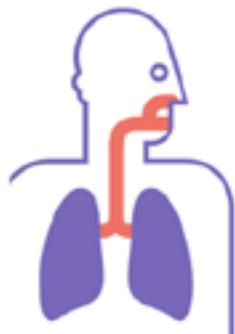
gets deep into lungs

enters our bloodstream

chronic exposure causes respiratory, cardio and/or circulation problems

increased risk of ailments like COVID 19, heart attack, diabetes, birth outcomes and asthma

PM10



causes coughing and wheezing

contributes to asthma and bronchitis

can increase risk of other illnesses

Pic: <https://help.atmotube.com/faq/3-pms/>

The measurement of Particulate Matter

Particulate matter in the province is measured and monitored by the **Ministry of the Environment**. The province of BC has air quality objectives and targets that are based on PM's potential negative health effects.

Smithers, Houston and Burns Lake each have 1 Provincial air quality monitor. These sensors measure the amount of PM in our **outdoor** or ambient air. The annual Provincial air quality objective for PM2.5 is $8\mu\text{g}/\text{m}^3$. PM concentrations are expressed as micrograms per cubic metre or with the symbol $\mu\text{g}/\text{m}^3$.

When you see a measurement of PM10, this includes PM2.5.



High PM

a measure of 50 would mean many particles in our air

Low PM

a measure of 0 would mean none

The amount of PM in the Bulkley Valley and Lakes District is generally quite high. The BC Lung Association rated 43 locations in BC in 2016 and Houston had the highest PM2.5. In 2015, Telkwa had the second highest PM2.5.

Smithers and Burns Lake **ranked** roughly in the middle of the group. Globally there are huge differences across the world. In Central and Southern Asia levels rose more than anywhere else in the world between 2010 and 2016, they were levels roughly 4 times higher than ours.

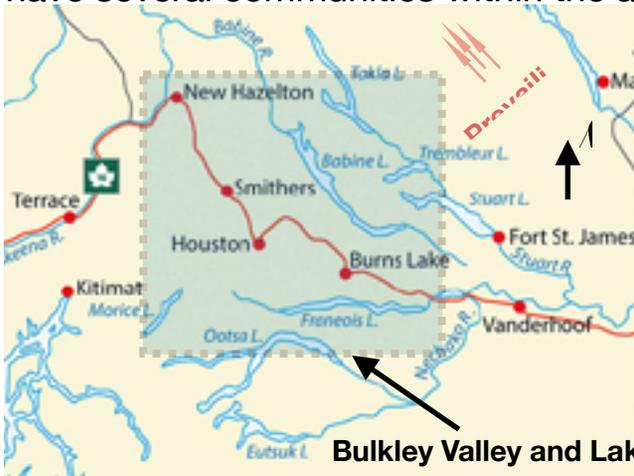
Standards

The **World Health Organization**, the **Federal** government, the **Provincial** government, some municipal governments and the **Bulkley Valley Lakes District Airshed Management Society** all have different standards for acceptable limits on particulate concentrations.

Concentrations loosely indicate risk tolerances for air quality. In the MEI we use the Provincial Standard as our objective for levels. The years 2015 and 2016 have the most recent and complete air quality data available in our airshed.

Our Study Area

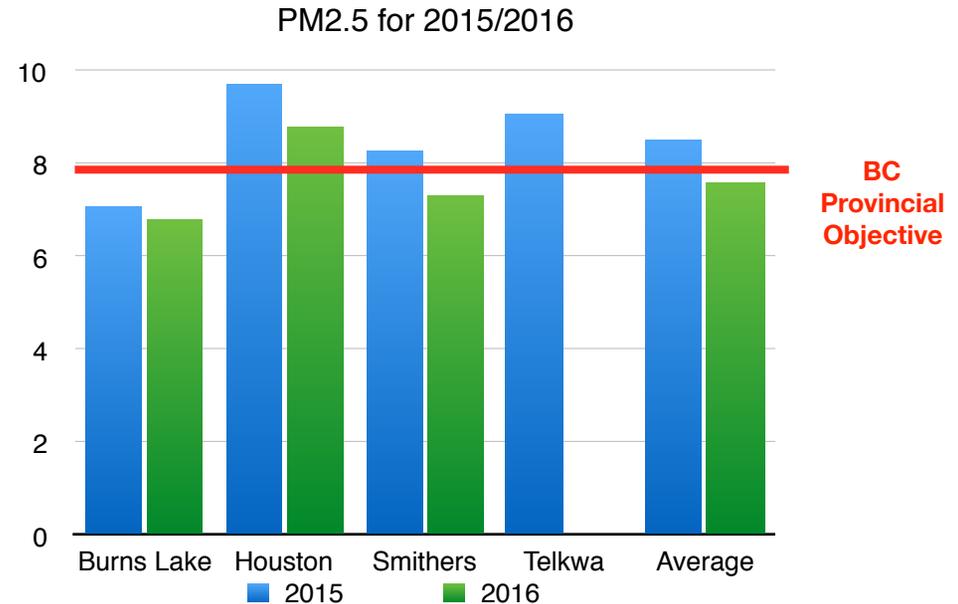
We acknowledge that our study is within the traditional and unceded territories of the **Gitxsan**, **Wet'suwet'en**, **Lake Babine** and **Stellat'en** First Nations. These Nations have several communities within the airshed. A more



Bulkley Valley and Lakes District Airshed

Map: <https://princegeorgecommercialrealestate.com/>

What was our Air Quality like in 2015/2016?

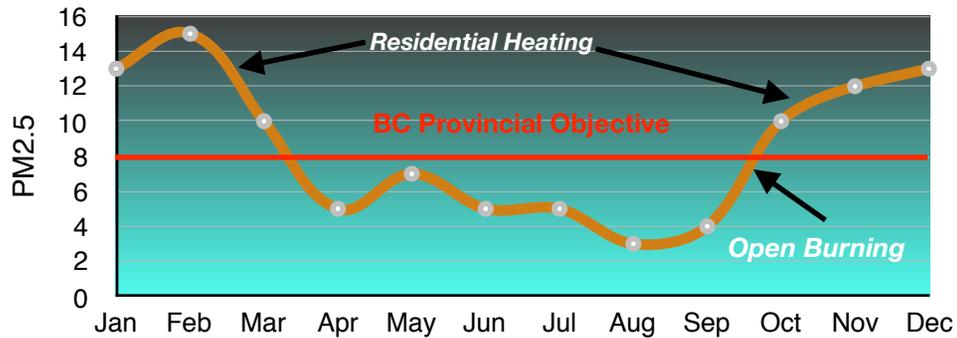


This chart shows a yearly average of PM 2.5 levels for towns in the airshed. This means some days in the year had worse air quality levels than the objective and some days were better.

For 2015
Houston, Smithers and Telkwa showed air quality worse than the Provincial objective.

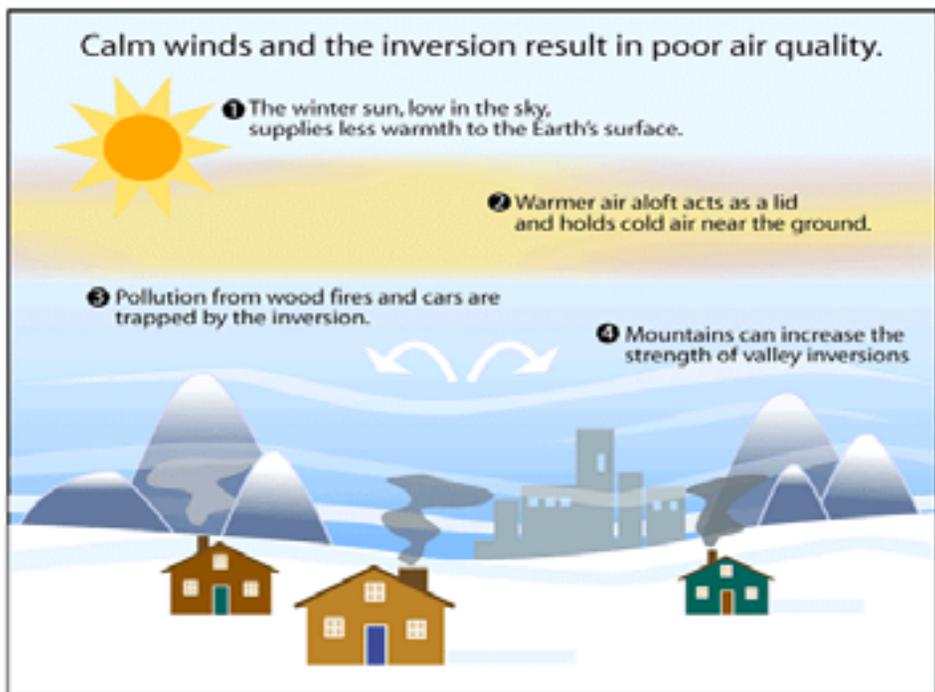
For 2016
All the towns had improved overall air quality for the year. Houston was the only town that did not meet objectives. Telkwa no longer has a Provincial monitor.

How Particulate levels vary seasonally in our airshed



Typical for 2015 and 2016.

Worse air quality occurs in winter.



Graphic: <https://wallacefarmproducts.com/mecklenburg/resources/temperature-inversion/>

Mountains, valleys, lakes and the South Easterly prevailing wind affect where particulate matter gathers.



Town of Smithers, 2016

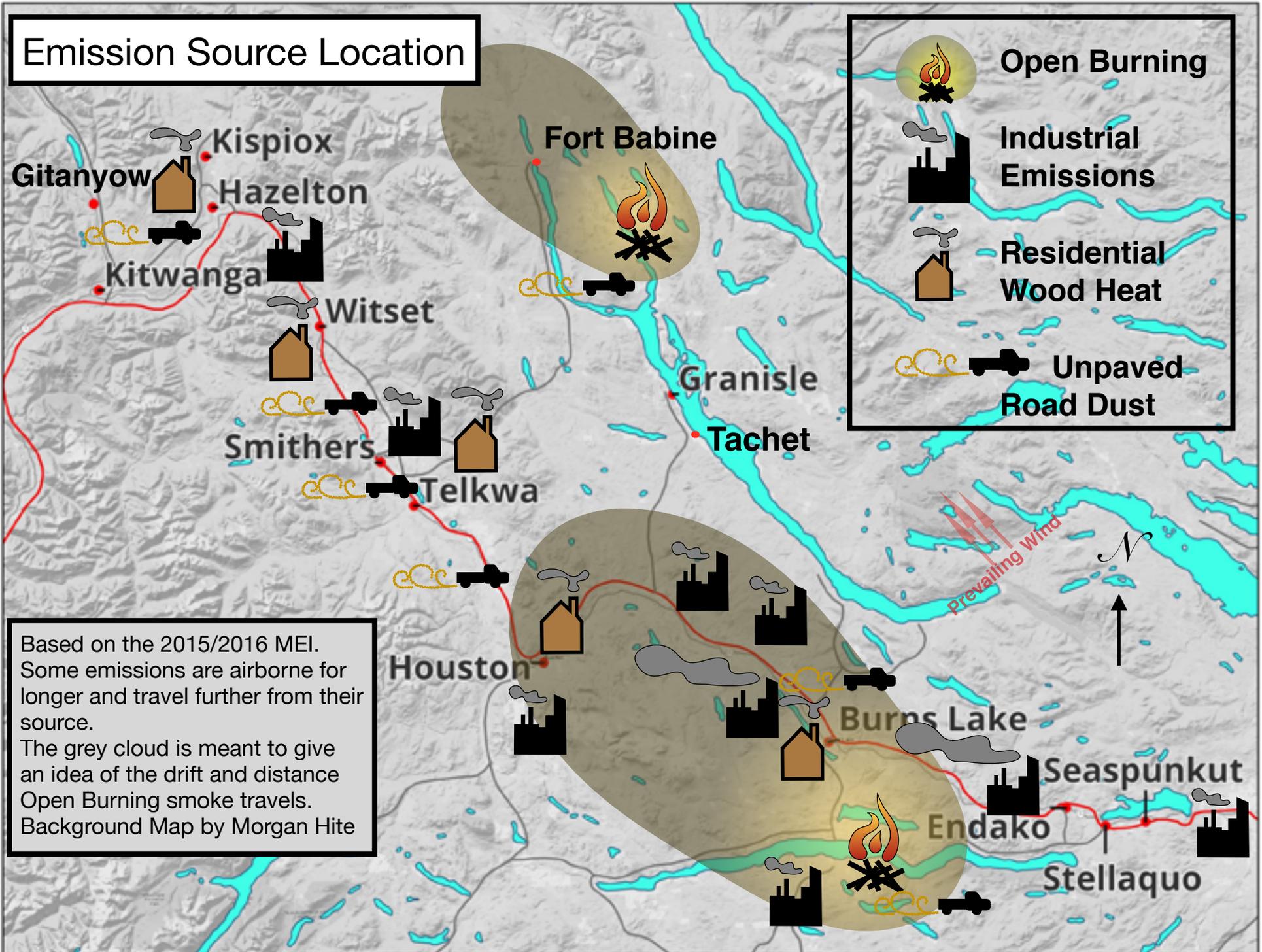
Inversions are more common at night and can go on for days in winter. Good venting occurs when the mixing of cold and warm air layers allows the particulate to move up higher into the air and away. This happens in mid morning, after the air warms.

What our Study Found

The following 4 sources make up the bulk of the PM in our airshed. PM emissions estimates for these sources use industry data and / or complex calculations and assumptions. Source types are described as points, linear, stationary, mobile or natural.

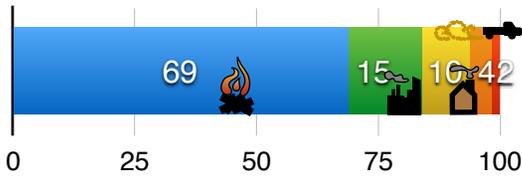
Icon	Title	Industry	What
	Open Burning	Forestry	soot, carbons, ash, minerals
	Commercial and Industrial Facilities	Forestry, Mining	carbon/soot, mineral or fuel dust, yard dust, fuel and
	Residential Wood Heat	Residential appliances	fuel waste, soot, carbons, ash and
	Unpaved Road Dust	Industry and Public	road salt, traction materials, carbons
	The rest	Industry and Public	other burning, exhaust, rail dust, ash, fuel and oil

Emission Source Location

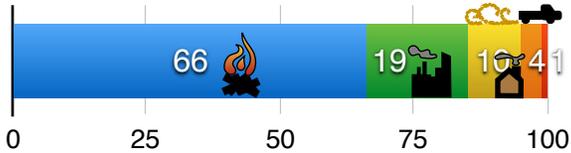


The Weight of Particulate by Source

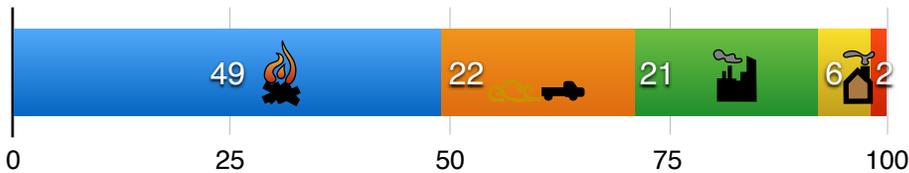
2015 PM 2.5, 3003 tonnes/year →



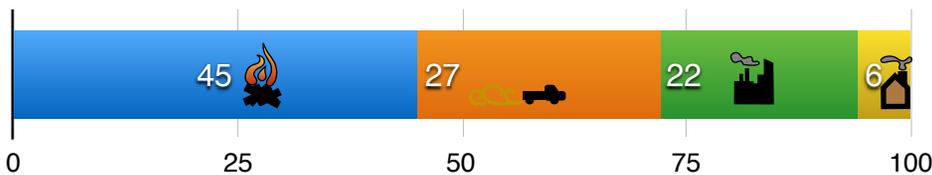
2016 PM 2.5, 2992 tonnes/year →



2015 PM 10, 4888 tonnes/year →



2016 PM 10, 5023 tonnes/year →



The PM10 bars are always longer because they include PM2.5.

- the previous MEI for this airshed was for the years 2001 and 2002
- the total particulate estimated in 2001 was nearly 1.5x as high as 2016 - PM2.5 emissions have remained the same since 2001
- PM10 is down compared to 2001 data probably because beehive burners have been eliminated as an emission source
- residential wood heat emissions are down more than 40% since 2001

Open Burning



Photo: Servaas Mes

How was this estimated?

- estimates are based on the previous 2001 - 2002 MEI and the US Forest Service model called Consume

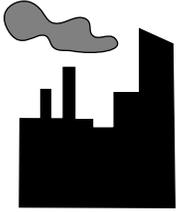
Highlights:

- Open Burning particulate is nearly all PM2.5, the size that is the greatest risk to health
- although debris piles are burned in remote areas PM2.5 can travel a long distance, often affecting communities that are not in the immediate area of the burn

What actions can be taken to reduce PM levels caused by Open Burning?

- lobby operators and regulators to stop burning
- bring back regulated smoke management planning (SMP)
- tighten up Ministerial responsibility for monitoring and compliance ie. what are actual piles burned versus those estimated by the industry?
- process on the stump and use other techniques to reduce solid fuel waste

Industrial Emissions



Canfor, Houston Sept. 2021

- there is no data to tell us whether the suspension of the Huckleberry mine meant less or more PM after operations

What actions can be taken to reduce PM levels caused by Industry?

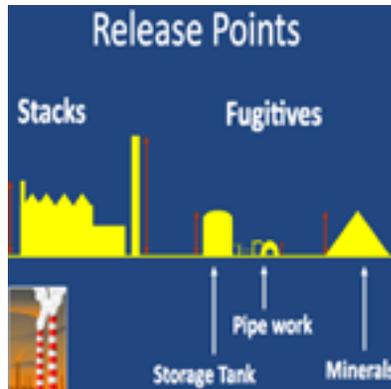
- are emission rates reliable? allow public review
- renew permits based on actual emissions
- lobby for industry to pay for waste reuse and diversion from landfill or burning costs

How was this estimated?

- estimates are based on the [National Pollutant Release Inventory](#), produced by the federal government once a year
- in some cases calculations are based on Environmental Management Act permits issued by the Province of BC. Permits allow a maximum amount of emissions and permit fees are based on periodic measurement and calculation.

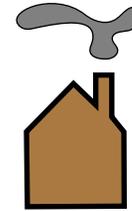
Highlights:

- particulate from Industrial sources is split evenly between PM10 and PM2.5 particle size
- large point source emissions come from various **release points**
- not all release points are added up
- open burning by large facilities is included in industrial totals
- 1 mine near Endako has PM10 made up of mercury and metallic compounds
- the mine was not operational for most of the 2 years and yet accounts for more than all the other industry emissions combined
- these emissions are thought to be from tailings facilities



Graphic: Carrie Schroeder

Residential Wood Heat



ASSESS YOUR EXPOSURE TO POOR AIR

Assess your health, home and safety. Address your household energy use and need. Try a monitor to understand pollution levels. Check out your library for an air pollution kit.

coordinator@cleanairplan.ca
cleanairplan.ca

bulldog valley - lakes district
 airshed management society

How was this estimated?

- estimates are based in part on the Community Energy and Emissions Inventory produced by the Province of BC (CEEI), US-EPA factors, adjustments and local knowledge

Highlights:

- it's uncertain whether the emissions have dropped since 2001 due to errors in math and assumptions or the public's operation of wood stoves
- wood heat particulate is nearly all PM2.5

What actions can be taken to reduce PM levels caused by wood heat?

- bylaw education, monitoring and enforcement
- encourage building for heat retention and future generations
- review building codes
- update wood burning appliances, operate your stove right
- season your wood before burning

Unpaved Road Dust



How was this estimated?

- estimates are based on a federal road dust calculator and adjustments

Highlights:

- omission of paved roads has meant the spring road dust season is not counted and this source can't be compared to 2001
- rain and weather can impact road dust a lot
- our study area has 97% unpaved roads, 1.25% in towns and villages, 12.5% in other communities
- there are more drivers on dirt roads in Fraser Lake, Stellaquo and Seaspunkut than average and PM 10 emissions are higher as a result

What actions can be taken to reduce PM levels caused by road dust?

- lots of municipal street sweeping
- next time include the paved road dust estimations and calculations

Not included in this MEI

- volatile organic compounds (O3, NO2, SO2), greenhouse gases
- wildfires (not many in 2015, 2016)
- pollen
- sources from other provinces or countries
- transportation exhaust fumes, traction materials laid in winter
- agricultural exhaust and sprays
- recreational activities that include generator or rec. vehicle exhaust, backyard burning, campfires, smoke or vapours
- public use of fuel based tools and equipment
- government operations and release points, land fill operations
- business operations like roasters, restaurants and more

Smoke and Air Quality Management

Our community deserves recognition for improvements in air quality. Here is what has been achieved:

- no more use of beehive burners
- burn operators practicing the generally accepted best way to burn **piles**; for those that don't, call: **RAPP**
- considerate operation of residential wood burning **appliances**
- the availability and use of **venting** predictions
- air quality **advisory** and **subscription** services
- a wood stove **exchange** program
- the usage and maintenance of **monitoring** equipment
- research and work monitoring, tabling and estimating **emissions**

SOLUTIONS



Modified WHO infographic.

Next Steps

In order to estimate the impact on health, the data in the MEI can be combined with data based on where people gather and other factors. Further modelling would help people plan and do activities around periods of risk of exposure. We also need to keep our inventory current. Doing it every 2 years would inform industry, health officials and regulators.

It is hoped the MEI and this document will raise awareness of what affects air quality in our airshed and in turn help to keep the skies blue.

Report Prepared by Sue and Ben Brookes, 2021

Acknowledgments



solutions for better air
cleanairplan.ca,
coordinator@cleanairplan.ca
mail: BAG 5000, 3726 Alfred Ave.
Smithers, BC V0J 2N0



glasswaters
foundation



The Bulkley Valley

Town of
Smithers

Find the full report at:

<https://cleanairplan.ca/micro-emissions-inventory-report/>

For this document and online links go to:

<https://cleanairplan.ca/plain>



Helpful Links

Donate to the BVLD AMS: coordinator@cleanairplan.ca

Pollution maps: <https://cleanairplan.ca/pollution-maps/>
Wood stove exchange program: <https://cleanairplan.ca/blog/2021/08/25/wood-stove-exchange-program/>
Draft 2001 and 2002 MEI: <https://cleanairplan.ca/wp-content/uploads/2017/06/MicroEmissionsInventory.pdf>



Graphic: Nick Youngson

Air quality guides, tips and vids:

<https://www.pgairquality.com/Programs/burn-it-clean>
<https://cleanairplan.ca/docs/woodguide.pdf>
<https://cleanairplan.ca/resource-library/>

Contact MLA: Hon. Nathan Cullen, Phone: (250) 387-3655,
nathan.cullen.MLA@leg.bc.ca

Report All Poachers and Polluters (RAPP) 1-877-952-7277 (RAPP) or #7277
<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resource-law-enforcement/conservation-officer-service/cos-rapp>

The Air Quality Health Index for health messages:
<http://www.env.gov.bc.ca/epd/bcairquality/data/aqhi-table.html>

For hourly readings, advisory notices, smoky skies bulletins, regulations and expected venting conditions by the Province of BC Phone (Enquiry BC):1 800 663 7867 or
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-quality/air-advisories> or
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/air>

To subscribe to receive free receive notifications of Air Quality Advisories and Smoky Skies Bulletins for your area use your mobile number or email address at:
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-quality/air-advisories/air-quality-subscription-service>

For a paper referenced in the MEI by the British Columbia Ministry of the Environment and Climate Change Strategy. Ambient Air Quality Criteria for Particulate Matter.
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-quality-management/regulatory-framework/objectives-standards/pm2-5>

Health Organizations:

NHA, Woodsmoke
https://www.northernhealth.ca/sites/northern_health/files/services/environmental-health/documents/wood-smoke%20-poster.pdf
BC Lung Association
<https://bc.lung.ca/how-we-can-help/wood-smoke-and-lung-health/wood-stove-exchange-program>
First Nations Health Authority
<https://www.fnha.ca/what-we-do/environmental-health>

“One must be weary of the infinite nature of something that could become so detailed you get stuck drowning in those details.”

“The best inventory finds a balance between the details (e.g. household) and the big picture (e.g. airshed) and is used to make decisions that protect air quality from degradation.”

Dr. Judy Krzyzanowski BSc, MSc, PhD

Krzyzanowski Consulting

Canada