

**2019 ... cruise ship impacts:  
emissions, garbage and transportation**



**Marg Gardiner**  
B.Sc., M.B.A.(Public Mgt)

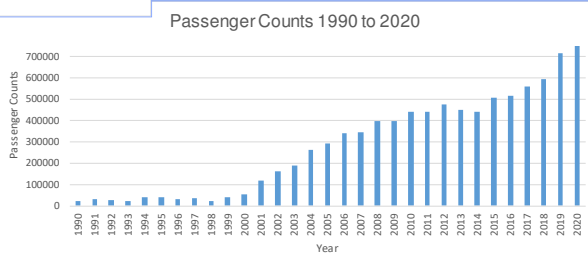
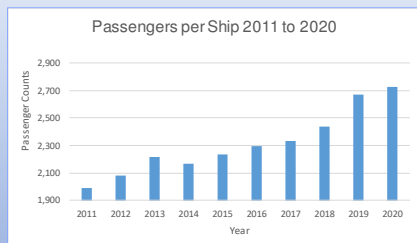
**Bob Vander Steen**  
M.A.(Engineering)

**2019 ... cruise ship impacts: emissions,  
garbage and transportation**

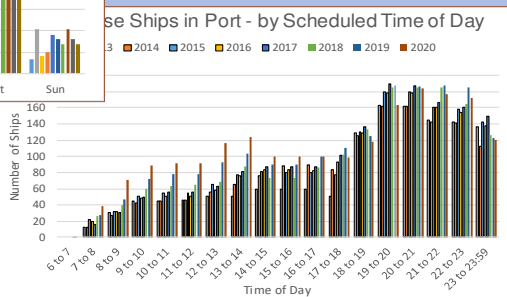
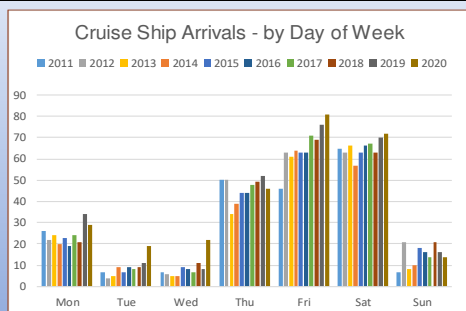
- **Industry Growth**
- **Emissions**
  - *SO<sub>2</sub>, NO<sub>x</sub>, VOCs & PM<sub>x</sub>*
  - *Responsibilities*
- **Shore Power**
  - *Necessary conditions*
- **Land Transportation**
  - *Mitigation*
- **Cruise-ship waste**
  - *CoV/CRD priorities*
- **Winners & Losers**
- **CoV Climate Leadership Plan**



## *growth 1990-2020* *larger ships, more ships, and more people*

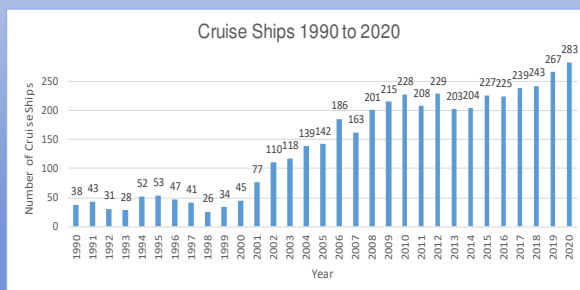


## *growth 1990-2012* *more ships and more days in port*



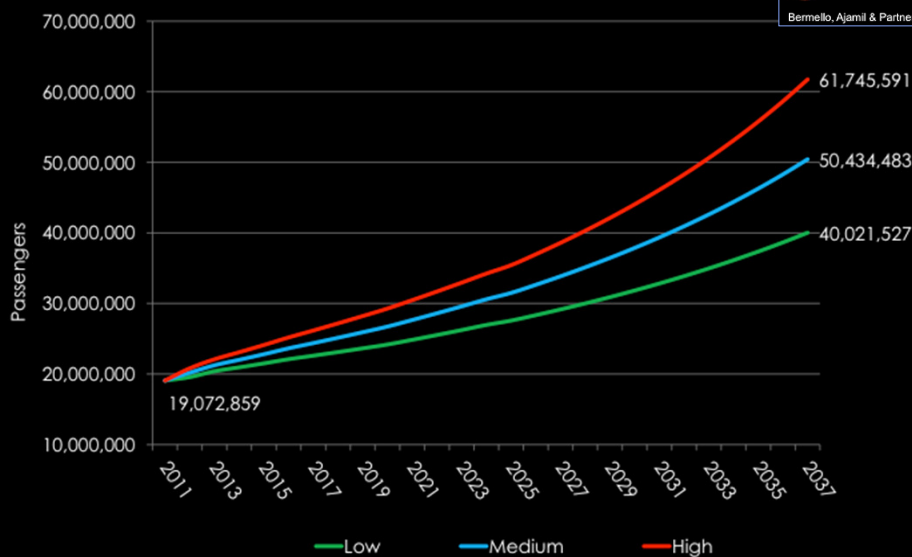
*growth 1990-2012*  
*more ships, more people, and fewer hours/pax in port*

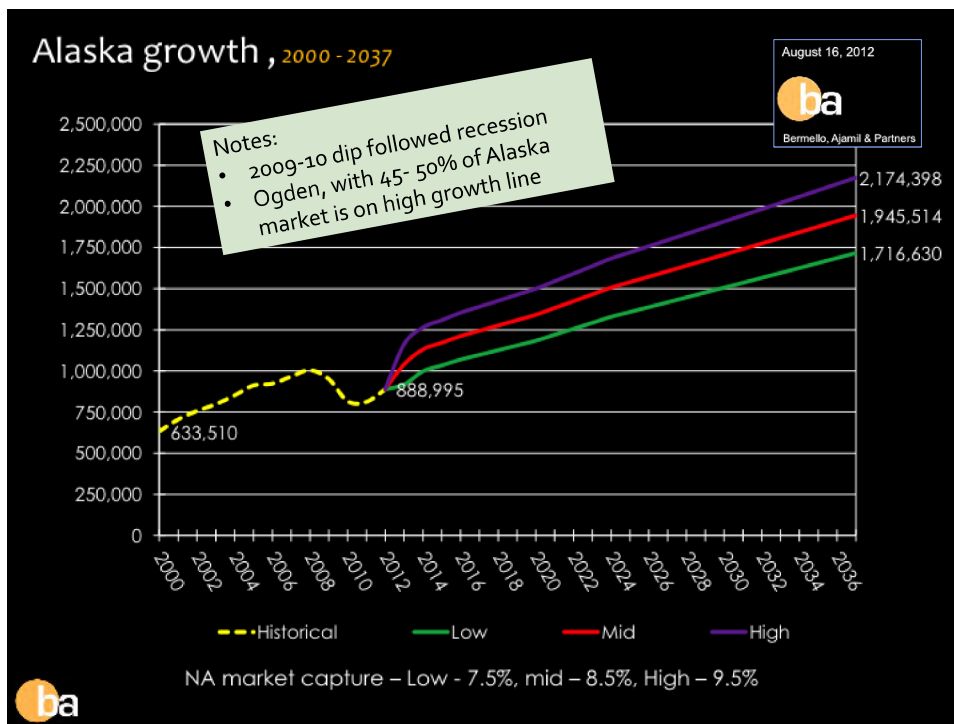
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ships (docked)	208	229	203	204	227	225	239	243	267	283
Passengers (per schedule)	414,388	476,916	449,668	442,044	507,842	516,660	557,798	592,166	713,894	772,621
Avg. Passengers/Ship	1,992	2,083	2,215	2,167	2,237	2,296	2,334	2,437	2,674	2,730
Days in Port	104	108	96	102	112	113	116	119	125	139
Hours in Port	1,502	1,488	1,377	1,475	1,624	1,609	1,687	1,716	1,877	1,946
Avg. Passenger time in port	6.8	6.3	6.5	7.0	6.8	6.9	6.8	6.7	6.7	6.7
Passenger % increase						+2%	+8%	+6%	+21%	+8%



World cruise growth, 2011-2037

August 16, 2012





**Emissions:** "On a few lines, on a few ships, there have been way too many emissions . . . Big clouds of black smoke billowing over the legislature buildings . . . What is the story . . . about our city, and what is it that residents have to breathe"

Combustion of diesel fuels creates GHG and other compounds: NOx, COx, SOx & PMx (and VOCs)



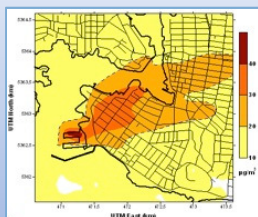
**Climate Impacts: GHG**  
tonnes of GHG

Photo: June 2019

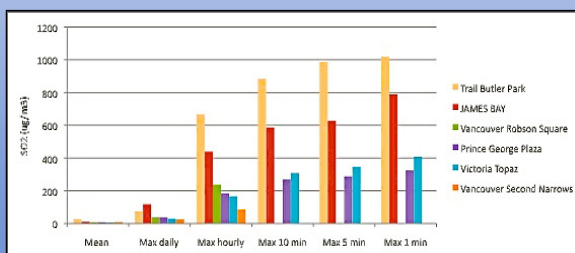
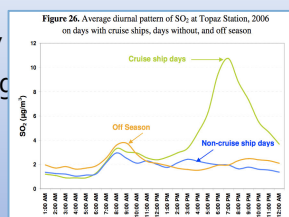
**Resident Impacts: NOx and PMx pollution the clouds:**

- NOx - released during combustion of fossil fuels
- NOx gases produce **orange or brown haze**
- NOx mainly impacts on respiratory conditions
- NOx also contributes to the formation of fine particles (PM)
- PM10 reduced with scrubbers
- PM2.5 increased with scrubbers (respiratory)

## James Bay Air Quality Study (JBAQS) and MAML: *dispersion studies and real measures*



- 2006 JB Air Quality Study
- 2007 Ph 1 Field Monitoring
- 2008 December
- Dispersion maps



*MAML (2009)  
"between the  
smelter and  
pulp mill"*

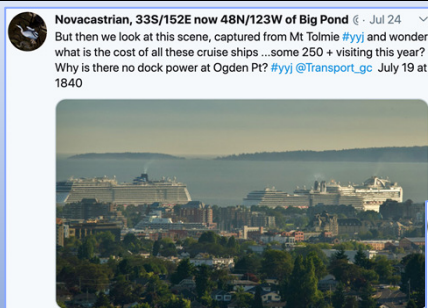
## *emissions: SO<sub>2</sub> resolved in 2013-2014 "what is measured, is managed"*

- 2011 Erie St SO<sub>2</sub> monitor in place
- 2011 cruise-ship behaviours
  - SO<sub>2</sub> reduced by about 50%
- 2012 ECA – August 1, 2012
- 2014, May 15<sup>th</sup>, Greg Wirtz, (CLIA) stated the May 9<sup>th</sup> SO<sub>2</sub> spike was unacceptable . . . Ogdén berths uniquely *"adjacent to residential neighbourhood. SO<sub>2</sub> levels are too high for residential areas. Prevailing winds take emissions inland from the port into urban areas."* CLIA cautioned against 4 ships in 1 day. Shore Power not a solution for Victoria

Norwegian Jewel May 18'12

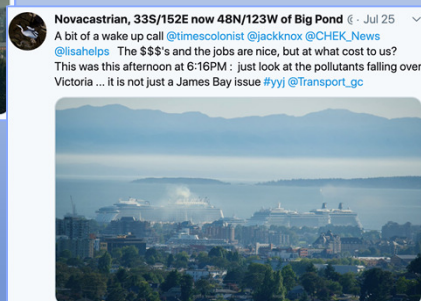


*"the clouds of black smoke billowing over the legislature buildings": NO<sub>x</sub> & PM<sub>x</sub>*



*Cruise-ships overpower skyline & community 18 deck (storey) floating resorts*

Combustion of diesel fuels creates GHG and other compounds:  
NO<sub>x</sub>, CO<sub>x</sub>, SO<sub>x</sub> & PM<sub>x</sub> (and VOCs)



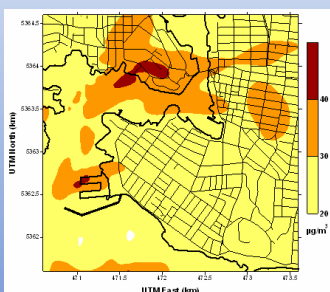
*cruise-ship emissions 2008*

*CALPUFF modeling ...*

*PM<sub>2.5</sub> dispersion*

predicted dispersion

1-hour PM<sub>2.5</sub>



24-hr PM<sub>2.5</sub>

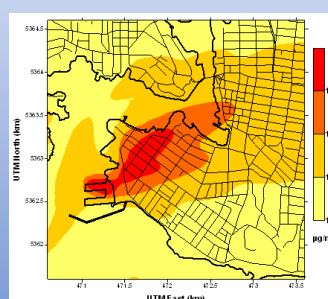
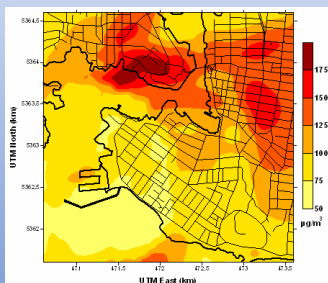


Figure 26. Maximum predicted 1-hr PM<sub>2.5</sub> concentrations (µg/m<sup>3</sup>)

*cruise-ship emissions 2008*  
*CALPUFF modeling ... NO<sub>2</sub> dispersion*

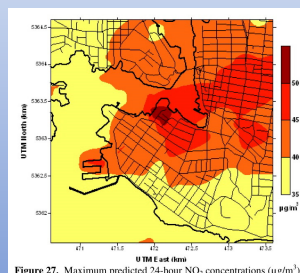
predicted dispersion

1-hour NO<sub>2</sub>



**Figure 26.** Maximum predicted 1-hour NO<sub>2</sub> concentrations (µg/m<sup>3</sup>)

24-hr NO<sub>2</sub>



**Figure 27.** Maximum predicted 24-hour NO<sub>2</sub> concentrations (µg/m<sup>3</sup>)

*Alaskan Port Violations*  
*ships using Victoria as a port-of-call*

Of the 243 cruise ship visits to Victoria in 2018, 100 (41%) were by ships which violated Alaskan air or water environmental regulations. . .

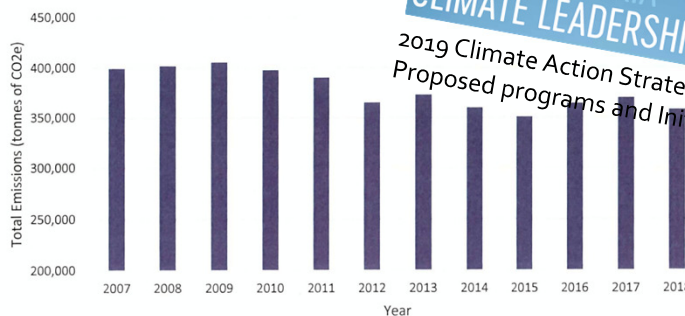
An additional three pending settlements were cited and a \$US37,500 fine paid by Norwegian Cruise Lines . . .

*"increase in public complaints coincides with an increase in the number of ships operating . . . (Scrubbers). Complaints show a weekly trend with certain vessels reporting excess smoke, smell of exhaust and a blue haze settling over downtown Juneau"*

Ship Name	Air Violation	Water Violation	# of Victoria Visits
Amsterdam	x		18
Emerald Princess	x	x	20
Eurodam	x	x	22
Golden Princess	x	x	1
Nieuw Amsterdam	x	x	1
Regatta		x	9
Ruby Princess		x	23
Seven Seas Mariner		x	4
Star Princess		x	1
Westerdam	x	x	1
Total			100

### CoV GHG emissions estimates:

Table 1 Community GHG Emissions Trends

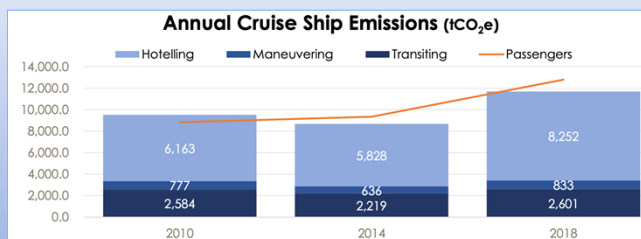


**CITY OF VICTORIA**  
**CLIMATE LEADERSHIP PLAN**  
 2019 Climate Action Strategy  
 Proposed programs and Initiatives

Table 2 Community GHG Emissions Summary

	2007 GHG Emissions (tCO <sub>2</sub> e)	2017 GHG Emissions (tCO <sub>2</sub> e)	2018 GHG Emissions (tCO <sub>2</sub> e)	Change Between 2017 / 2018	Change From Baseline
<b>Total</b>	<b>399,186</b>	<b>367,778</b>	<b>357,519</b>	<b>-2.8%</b>	<b>-10.4%</b>

### GVHA and CoV emissions estimates:



Synergy report (p.3) speaks of "cruise and other tenant emissions" And "tenants" hoteling

#### 2018 emissions:

Cruise-ships ~ 12,000 tCO<sub>2</sub>e  
 increase 34% since 2014  
 "hoteling" ~ 8,252 tCO<sub>2</sub>e  
 vs  
 CoV Community 358,000 tCO<sub>2</sub>e





Ogden Point Deep-Water Terminal



Emissions Inventory

2010, 2014 & 2018

Completed By	Hekki Granthier
Email	hekki@victoriaport.ca
Completed	10/15/2019




## GHG- Synergy emissions Inventory

**Emissions report**

- at 3 points on time
- data NOT based on local measurements or ship logs
- data provided by industry

**Assumptions:**

- ships used low sulphur fuel (but most burn high sulphur fuels and use scrubbers)
- scrubbers never malfunctioned, and
- cruise companies behave ethically

## cold ironing or shore-power is it a red herring - a PR game ?

**Shore power**

Since 2009, shore power installations for cruise ships at the Port of Vancouver have eliminated 582 tonnes of air pollutants and 20,757 tonnes of greenhouse gases. Shore power, cold ironing or alternative marine power, is a clean technology that enables ships fitted with the necessary technical apparatus to shut down auxiliary engines and connect to hydroelectric power while at berth, thereby virtually eliminating related air emissions and engine noise.

Port of Vancouver annual cruise ship shore power results

Results	2018	2017	2016	2015	2014	2013	2012	2011	2010
<b>Successful connections</b>	63	54	54	77	76	82	60	35	44
<b>Shore-power-capable ships</b>	91	68	70	92	98	106	74	58	58
<b>Fuel savings (tonnes)</b>	792	671	689	885	841	978	725	424	476
<b>Net greenhouse gas emission reductions (tCO2e)</b>	2516	2,126	2,185	2,811	2,656	3,092	2,266	1,318	1,521
<b>Criteria air contaminants reduced (tonnes)</b>	59	50	51	66	78	91	80	47	54

## *cold ironing – shore power necessary conditions to make it real*

### Shore power

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Vancouver:

2018 - 243 visits  
91 capable (37%)  
62 connected  
70% capable connected  
**26% visits connected**

2015  
84% capable connected

2013  
77% capable connected

### Conditions:

- 6-10 hour or longer stays
- max 2 ships to facilitate hook-up
- stagger arrivals/departures to facilitate hook-ups
- industry pay/install
- industry use
- BC Hydro grid
- GVHA/City/VIHA studies say 'no'

## *emissions: the air we breathe and polluters think local : act local*

Responsibility for marine emissions including cruise ships:

- GVHA - landlord owning Ogden Point waterlots
- CoV - land use zoning and bylaws (emissions)
- CRD - regional monitoring
- BC MoE - airshed
- Canadian Gov't - airshed and navigable waters (**not** Ogden waterlots)
  - from enquiries and TC statements in 2012 we know
    - Transport Canada does not board or otherwise directly monitor cruise ships in Strait of Juan de Fuca – checks logs as ships are usually in Vancouver

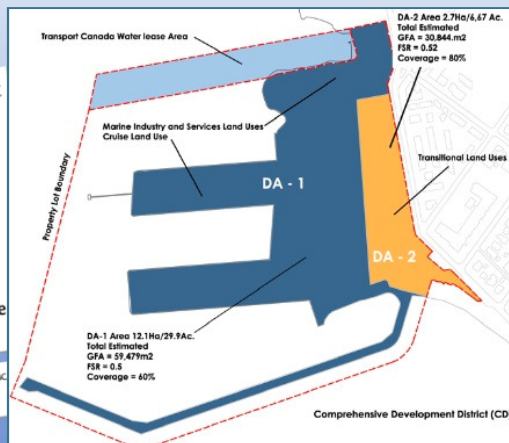
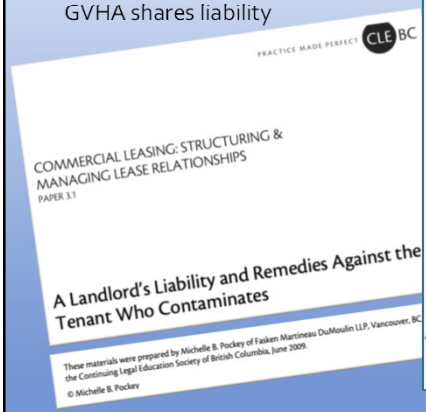
Significant emitters (GHG, VOCs & other chemical compounds): Cruise-ship  
Major GHG emitter: cruise ships ~ 12,000 tCO<sub>2</sub>e/year

## GVHA landlord of Ogden Point waterlots ships leave federal water when turn into waterlots

"cruise-lines as tenants"

"ships hoteling"

GVHA shares liability



## M-2 light industrial district Ogden Point zoning

Performance Zoning:  
"Uses permitted provided they are not noxious or offensive to the immediate neighbourhood . . . by reason of emitting odours, dust, smoke, gas, noise, effluent or hazard . . ."

Noxious: harmful or injurious to health or physical well-being:  
e.g. noxious fumes.

- 1 The following uses are permitted, provided they are not noxious or offensive to the immediate neighbourhood or the general public by reason of emitting odours, dust, smoke, gas, noise, effluent or hazard:
- (a) assaying gold and silver;
  - (b) bakeries;
  - (c) banks;
  - (d) carpet cleaning;
  - (e) churches;
  - (f) clubs;
  - (g) docks, wharves and piers;
  - (h) drycleaners;
  - (i) dye works;
  - (j) forging, electric only;
  - (k) funeral undertaking;
  - (l) gas and petroleum tank farms and storage of flammable liquids or gases having a total storage capacity of less than 135,000 litres;
  - (m) garages;
  - (n) light industry, including manufacturing, processing, assembly, testing, servicing and repairing;
  - (o) mail order businesses;
  - (p) milk processing and distribution;
  - (q) printing and publishing;
  - (r) quick freeze lockers;
  - (s) residence for watchman as ancillary use on lot;
  - (t) restaurants;

## *industry landlord GVHA responsibilities*

*GVHA and its tenants/clients are jointly and separately responsible for cruise-ship emissions from activities on GVHA water and land lots*

- City of Victoria zoning
  - M-2 Light Industrial District. Sec 1 & 1 (g) state: *1. The following uses are permitted, provided they are not noxious or offensive to the immediate neighbourhood or the general public by reason of emitting odours, dust, smoke, gas, noise, effluent or hazard: (g) docks, wharves and piers*
- Corporate responsibility (**contract power trumps regulatory**)
  - Nuisance
    - repeated events
    - GVHA aware of pollution
    - GVHA has right of control as landlord
  - Environmental due diligence
    - Monitoring and contractual controls



10.18  
 "Give consideration, where warranted, to public health and ecological health implications, including air quality and noise . . ."

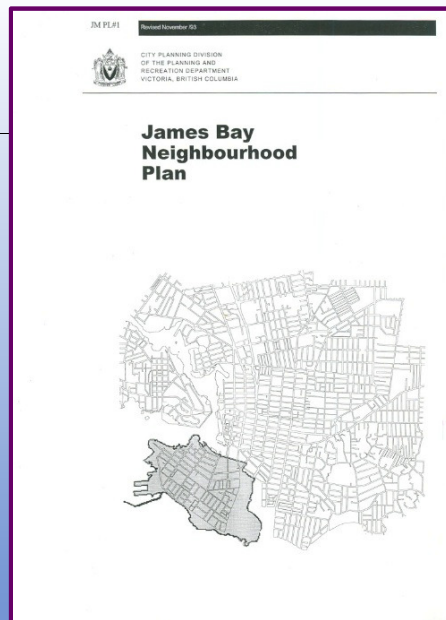
## Official Community Plan

JULY 2012  
 Updated: April 13, 2017



## James Bay Neighbourhood Plan

*"It is important that industries whether new or established be compatible with the neighbourhood"*

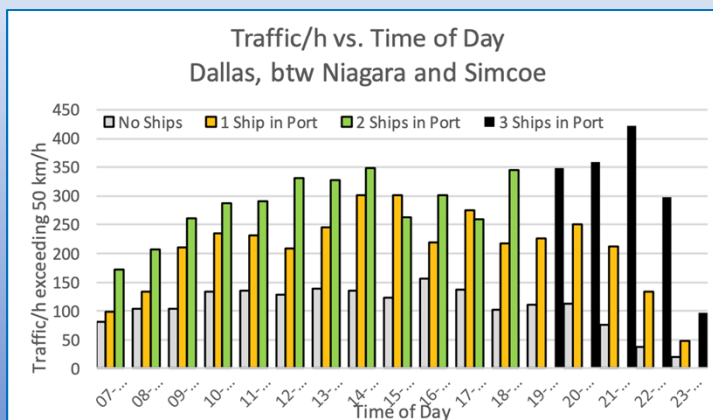


## ground transportation: measures – 2007, 2011, 2012, . . . 2019

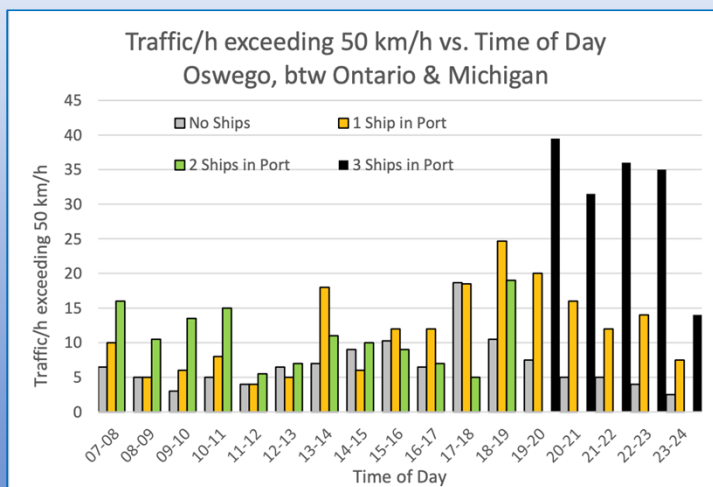
2019  
traffic  
monitor  
locations



*ground transportation:  
2019 highest % increase in traffic volume on Dallas*



*ground transportation:  
2019 highest % increase of traffic exceeding 50 km/hr*



*JBNA request of GVHA to contain transportation impacts  
 . . . not attempt to pass off all responsibility to City*

**GVHA**

- respect need for “quiet-hours”
- optimize ship scheduling
  - ship arrivals 1-2 hrs apart
  - 1-2 ships in port at a time
  - all ships leave by 10-11 pm
- provide alternatives to Shore-Ex
  - walking – promote on site
  - GVHA pathway  
(Ogden to Camel)
  - mobility assists

**Ground Transportation**

- eliminate highway buses
- demand GPS control of taxis
- permit only green quiet shuttles
- dedicate staff to manage PAX



*. . . those who could make change - quickly*

- City of Victoria (*zoning and licensing body and responsible for usage of streets/traffic*)
- GVHA (access permits)
- Butchart Gardens (*est >50% pax = \$7-10million/yr?*)
- Cruise lines (*\$billions/yr*)
- Bus Operators
- Taxi companies (*GPS control*)





Amsterdam – new cruise passenger tax €8 port-of-call  
 Venice €10  
 Catalano €0.65

Dubrovnik "From 2019 a maximum of 2 cruise ships/day No more than 5000 pax in one day. The rescheduling of cruise ship arrivals helped with overcrowding.



Amsterdam's New Tourist Tax Applies to Cruise Passengers

by Adam Leposa | Dec 19, 2018 11:18am



**Bergen Puts Cap on Daily Calls and Passengers**  
 October 11, 2017

Limits set:  
 4 ships/day and/or 9,000 pax/day

...calls per day to four ships and/or 9,000

*changes in US west coast ports:*

JB N'bourhood Assoc. Retweeted

**IntegrityBC @INTEGRITYBC · 6h**

"California will soon raise the percentage of container ships, refrigerated vessels and cruise ships required to be plugged in to land-based power from 70 to 80. Vessels that don't plug in to the shore power can be fined by the state."

---

JB N'bourhood Assoc. Retweeted

**IntegrityBC @INTEGRITYBC · 6h**

On the West Coast, ports that already have shore power available, include: Juneau, Seattle, Vancouver, San Francisco, San Diego and Los Angeles.

That's six alone and the GVHA claims 16 out of 1,000 worldwide.

Princess Ships Clear the Air with Shore Power Connections  
[princess.com](http://princess.com)



## waste management

### City of Victoria: the waste centre for cruise industry

#### Issues:

- Victoria/CRD assuming GHG and other environmental responsibility/costs for a foreign-based \$50 billion foreign-based industry (Seattle and Florida head offices)
- Community bearing traffic/noise impacts (costs) of large vehicles servicing the cruise-industry as
- Hartland receives 150 tonnes/month (10% of waste)
- 90% recycled - heavy trucks through community
- Not compatible activity for residential community



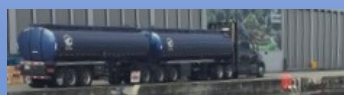
#### Seattle based cruise-industry:

- US based industry (Seattle and Miami)



#### Told:

- Convenient for industry as facilitates turn-around in Seattle



## Climate initiatives: Reuse, recycle, reduce . . City & CRD "ask" of residents, targets & principles

#### "Targets"

- 50% reduction of community GHGs (by 2007 levels) by 2030
- 80% reduction of community-wide GHGs by 2050
- transition to 100% renewable energy by 2050

#### "Ask"

- **Reduce, Reuse and Recycle**
- net Zero approach
- lower carbon footprint of through lifestyle choice



#### "Principles"

- Polluter-Pay-Principle and user-pay approach
- extend the life of Hartland
- lower carbon footprint of energy in buildings, transport and waste

## Victoria as a Port-of-Call



### Value to foreign cruise industry

- Cruise Industry: \$50 billion industry - \$billions annual profit
- base-value of Victoria as port-of-call
  - PVSA fine @ **\$US778/pax X 700,000pax** = **\$US545million = \$Can720 million**
- other value = revenue from shore excursions
- Federal and municipal subsidy through grants to GVHA, and forgone infrastructure costs
- Wastes (unloading)

### Costs to community and the environment

- Air Quality, vibration, noise and street congestion Impacts
- Green House Gases
- Plastics, grey water and hazardous wastes

## THE NEXT CHAPTER: EMBODIED EMISSIONS



CLP The Next Chapter: *"It calls for a fuller understanding of the GHG impacts — including emissions generated beyond city limits to make and deliver the materials, products and services that we consume."*

Can't pretend that ships don't matter – the single major industrial/commercial GHG contributor within city boundaries

The "hotelling" of the cruise-ships is a commercial activity  
Ships at Ogden "Hotelling" are within city boundaries (DVBA hotel tax?)

Going forward with "Embodied Emissions" need to consider the GHG emitted while ships travel in the Strait of Juan de Fuca, , the gray water, and other impacts relating to the environment and wildlife.



*"What is the story . . . about our city?  
What is it that residents have to breathe?"*

Surely the goal of net zero waste for residents is not to be to make way for cruise-industry waste; for residents to reduce while the foreign-based multi-billion \$ industry consumes our flexibility in achieving goals in our climate initiatives.

Industry has had a free ride on impacts on our community for 15 years – and impacts on the broader environment.

The industry will adapt, will change, but only when it must

**The City needs to be bold, to lead.**



July 2017

## *James Bay and tourism JB welcomes hundreds of thousands each year*

*tourism accommodation  
(3,471 visitor capacity)*

- ~ 36% of hotels within DVBA
- ~ 900 rooms
- ~ B&B 100+ rooms
- ~ 10 hotels weekly/monthly 566 rooms

*Residents welcome tourism, share the community, interact with visitors, give direction and volunteer for events.*

*Good tourism interacts with community;  
Bad tourism impacts on community.*





Jennifer Wieland,  
Principal, Nelson Nygaard  
CoV Sustainable Mobility Strategy  
presentation November 14, 2019

Speaking of the important role of government:

*"You get to set the rules, you get to tell the folks how you want them to innovate, how you want them to operate in your city and in your region . . . You also have the most valuable assets to control . . . You have the right of way, you have lands, and you have the ability to shape what the city looks like."*

noise, emissions, GHG: City has the power  
access streets . . . ability to shape the city . . .

## Season's Greetings from the JBNA Board

