

2

BUS ANTI-IDLING PROGRAM

The Transportation Services Committee recommends:

1. **Adoption of the recommendation contained in the following report dated October 15, 2012, from the Commissioner of Transportation and Community Planning, and the following additional recommendation:**
2. **The Regional Clerk circulate this report to the Clerks of the local municipalities.**

1. RECOMMENDATION

It is recommended that this report be received for information.

2. PURPOSE

This report provides Council with information related to York Region Transit's recently-implemented Anti-Idling program for bus contractors to follow during layover and recovery times.

3. BACKGROUND

York Region Transit (YRT)/Viva has adopted and implemented a number of programs, plans and initiatives that aim to improve air quality and are in line with the goals and objectives of the Region's environmental framework

YRT/Viva is a sustainable mode of transportation that makes a measurable positive impact on air quality by displacing emissions from personal automobile use. Beyond this, YRT/Viva demonstrates its commitment to reducing its environmental impact on local communities through a variety of initiatives:

Informal Anti-idling Practice: An informal practice existed where bus engines were required to shut down after 15 minutes of idling. The new program replaces this.

Five-Year Service Plan (2012 -2016): The Five-Year Service Plan identifies multiple strategies to increase the efficiency and effectiveness of service. For example, multiple route types using various equipment types efficiently provide the appropriate amount of

capacity to service demand. This reduces unnecessary fuel consumption and, ultimately, emissions.

Clean Air Promotions and Marketing: Annual clean air campaigns are launched and designed to encourage people to try transit, thereby displacing personal automobile emissions.

Bio-diesel Program: YRT/Viva's use of B5 and B20 bio-diesel fuel for its Viva buses results in a reduction in carbon monoxide, hydrocarbons and particulate matter that enter the atmosphere through exhaust emissions.

Ultra Low-Sulphur Diesel Fuel: YRT/Viva uses this fuel type for all of its YRT conventional buses. Ultra low-sulphur diesel fuel was introduced in 2006 to achieve better local air quality and to reduce diesel tailpipe pollutions. Along with updated engine technology, ultra low-sulphur diesel fuel significantly improves emissions rates from 500 parts per million using the low-sulphur diesel to 15 parts per million using the Ultra.

YRT/Viva's environmental initiatives support the Region's existing programs, plans and initiatives such as: York Region Official Plan, Vision 2051, York Region Air Quality Strategy, York Region Transportation Master Plan, Regional Pedestrian and Cycling Master Plan, and the Smart Commute Initiative.

Since 2010, the bus manufacturing industry has made changes to bus technology to significantly reduce the emission from public transit buses. YRT/Viva staff are undertaking a study to review bus propulsion technology that provides an overall benefit on reducing fuel consumption with consideration to capital and operating costs. Upon completion of the study, YRT/Viva staff will report the information to Council.

YRT/Viva demonstrates its continued commitment to reducing its environmental impact by implementing a formal anti-idling program

The Region does not have an anti-idling by-law, however, three municipalities within the Region do. The cities of Markham and Vaughan and the Town of Newmarket have anti-idling by-laws. Each of these by-laws provides a number of exemptions to public transit vehicles and is not enforced. Prior to the implementation of the new anti-idling program, YRT/Viva had an operating practice in place that limited bus idling to 15 minutes with a number of exceptions related to operating requirements and weather.

An anti-idling program has a number of benefits such as: reduced emissions, fuel consumption, maintenance cost and reduced noise. See Table 1 below for further details on the benefits of an Anti-Idling Program.

4. ANALYSIS AND OPTIONS

YRT/Viva assessed the volume of emissions from its buses based on existing conditions and compared the information to the potential benefits that may be realized from the implementation of an anti-idling program

In 2011, YRT/Viva staff, with the assistance of HDR Corporation, completed a review of YRT/Viva's current bus environmental performance, using scheduled bus layover and recovery time, and identified an anti-idling program to be implemented. The results of the review accompany this report as *Attachment 1*.

YRT/Viva evaluated three idling restriction options: five minutes, three minutes and one minute, and determined the potential benefits from the implementation of each

For the purpose of developing an anti-idling program, three options were examined: five minutes, three minutes and one minute. These were selected as the times most commonly used amongst transit systems across Canada.

Table 1 below illustrates the benefits associated with each of the three options, not yet taking into consideration the objective of the program and possible exemptions.

Table 1
Annual Anti-idling Program Benefits

Benefits	Five-minute Anti-idling Program	Three-minute Anti-idling Program	One-minute Anti-idling Program
Emissions reduction	289,400 kg of CO ₂ e*	659,748 kg of CO ₂ e*	1,145,175 kg of CO ₂ e*
Emissions savings equivalents	Removing 55 SUVs from the road	Removing 125 SUVs from the road	Removing 217 SUVs from the road
Fuel Reduction	107,182 L of diesel	244,348 L of diesel	424,136 L of diesel
Cost Savings**	\$107,182	\$244,348	\$424,136

Note: Reductions/savings do not include the factor of exemptions (See Table 3)

*Carbon Dioxide Equivalents – an international measure of greenhouse gas emissions

**Cost savings from fuel reduction are calculated using \$1.00 per litre

Additional benefits of an anti-idling program include the reduction of noise and maintenance costs

An anti-idling program for stationary buses is a cost-effective way to mitigate the noise impact on neighbouring sensitive land uses based on the low-idle noise levels which are greater than the minimum criteria set by the Ministry of the Environment (MOE).

Based on an exterior noise test performed by Altoona Bus Research and Testing Centre, noise from a bus (bus types used by YRT/Viva) ranges from 57.7 to 65.6 decibels, with the MOE criteria being set at 55 decibels. See *Attachment 1* for more details.

With respect to maintenance, idling does more damage to the engine than starting and stopping. Running an engine at low speed (idling) causes twice the wear on internal parts compared to driving at regular speeds, which can increase maintenance costs and shorten engine life.

The benefits of the three program options were evaluated based on the percentage of the bus layover times that would be affected

YRT/Viva's average scheduled bus layovers range on average from 0 minutes to 34.8 minutes, and vary from route to route. In total, YRT/Viva's 122 routes collectively have 5,107 layovers on an average weekday. Table 2 below shows the percentage of YRT/Viva layovers that would be affected and unaffected by the program.

Table 2
Number and Percentage of Weekday Layovers Affected

Layovers	Five-minute Anti-idling Program	Three-minute Anti-Idling Program	One-minute Anti-Idling Program
	Layovers: # and %	Layovers: # and %	Layovers: # and %
Affected	2,780 (54%)	4,273 (84%)	4,826 (94%)
Unaffected	2,327 (46%)	834 (16%)	281 (6%)
Total	5,107 (100%)	5,107 (100%)	5,107 (100%)

YRT/Viva has implemented a three-minute idling program which is subject to exemptions for extreme weather conditions, safety considerations and proper vehicle function

Based on the results of the review, a one-minute program does not offer significantly greater coverage than a three-minute program. On the other end of the spectrum, a five-minute program is deemed ineffective and difficult to justify as it covers only half of the service. For this reason, a three-minute program was implemented.

North American transit agencies include exemptions to their anti-idling programs for a variety of reasons. The factors that dictate which exemptions are included depend on the scope of the anti-idling program.

Exemptions to the program focus on areas of:

1. Safety

Vehicles are permitted to idle before 5 a.m. and after 9 p.m. to ensure operator and passenger safety. Interior lights will remain on.

2. Temperature

Vehicles are permitted to idle when the outdoor temperature is greater than 27 degrees Celsius and less than -5 degrees Celsius to allow heaters and air conditioners to operate, to address passenger comfort.

3. Passenger Boarding/Alighting

Vehicles are permitted to idle when passengers are boarding and alighting. This will allow doors to function properly and ensure passenger comfort.

4. Bus Air Pressure

Vehicles are permitted to idle when air pressure is lower than 100 psi. This will ensure proper air to brakes and doors.

The impact of exemptions on cost savings

The safety exemptions reduce the impact of the program by approximately 10 per cent. Meanwhile, the temperature exemption, which allows for idling when the outdoor temperature is – 5 degrees Celsius or above 27 degrees Celsius, reduces the impacts another 20 per cent. This is based on historical weather data obtained from Environment Canada which demonstrates that the temperature was below or above these temperatures 20 per cent of the time between 5 a.m. and 9 p.m. in 2010.

Implementing an anti-idling program requires operational oversight, communications with the operating contractors and the bus operators and an operating training program

There are two approaches to enforcing an anti-idling program. They are:

Technology: an automatic engine shutdown system can be installed to ensure 100 per cent program compliance.

People and Processes: people can be given the responsibility to implement processes and enforce them.

The benefit of the technology approach is that there is a 100 per cent guarantee that the program will be followed. The benefit of the 'people and processes' approach is that it is flexible and supports operations.

Given the two approaches, YRT/Viva staff will enforce the program with 'people and processes' with future consideration to the technology approach.

Under the 'people and processes' approach, anti-idling program evaluation and reporting is based on compliance; the percentage of operators that comply with the program. YRT/Viva staff will monitor the program adherence and report compliance by noting the transit operator, location, date, time, temperature and reason for the violation. There is an opportunity to include the anti-idling program adherence information in future YRT/Viva performance-based contracts.

Link to Key Council-approved Plans

Vision 2051

- Interconnected Systems for Mobility
 - A system that prioritizes people and reduces the need for travel
 - Prioritizes alternative modes of travel for active transportation
 - A variety of transit choices

2012-2016 Five-Year Service Plan

- Efficiency and effectiveness Strategies
 - Matching bus capacity to demand
 - Schedule adjustments to meet right travel, layover and recovery time

York Region Air Quality Strategy

- YRT/Viva anti-idling program supports the basic principles of the Corporate Air Quality Strategy

5. FINANCIAL IMPLICATIONS

The three-minute anti-idling program provides an opportunity to reduce vehicle emissions, fuel consumption and operating costs by an estimated \$176,000 annually

The implementation of an anti-idling program will result in reductions in emissions, fuel, cost and noise. Table 3 below illustrates the potential reduction in emissions, fuel and cost. The dollar savings below take into consideration the exemptions for temperature, safety, boarding/alighting and air pressure as noted in this report.

Table 3
Post-Program Emissions, Fuel and Cost Reductions

Item	Post Program Implementation Reductions*	Annual Equivalent of
Emissions	475,019 kg of CO ₂ e	90 SUVs off the road
Fuel	175,931 L of diesel	N/A
Cost Savings	\$175,931	1,832 hours of transit service

*Taking exemptions to the anti-idling program into consideration

6. LOCAL MUNICIPAL IMPACT

Local municipalities will benefit from the anti-idling program with the reduction of noise and emissions of pollutants from public transit vehicles.

7. CONCLUSION

YRT/Viva has implemented a bus anti-idling program that restricts buses to a maximum idling time of three minutes with the exemptions noted in this report that address temperature, safety, boarding and alighting, and specific mechanical variables.

This program will reduce emissions, fuel, noise and costs associated with operating YRT/Viva services.

For more information on this report, please contact Ann-Marie Carroll, Director, Transit Operations at Ext. 5677.

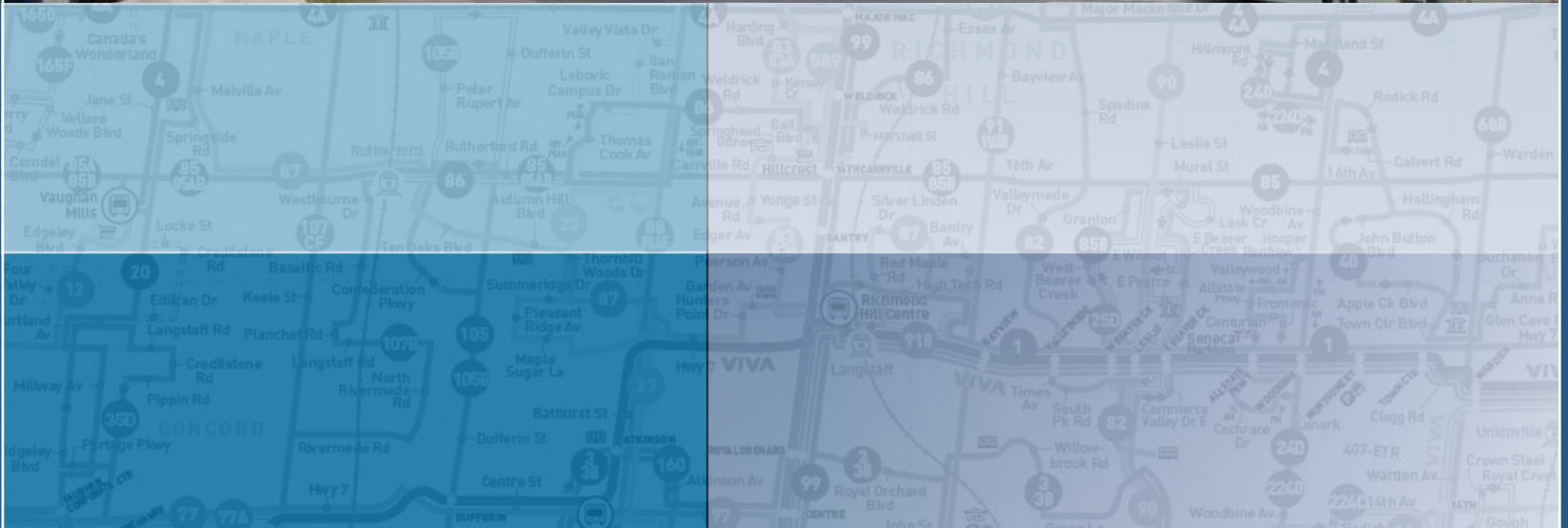
The Senior Management Group has reviewed this report.

(The attachment referred to in this clause is attached to this report.)



YORK
REGION
TRANSIT

Anti-Idling Program



YRT / Viva Project Team

Project Manager

Ann-Marie Carroll

HDR Project Team

Principal

John Hubbell

Project Manager

Mark Mis

EXECUTIVE SUMMARY

York Region Transit / Viva (YRT / Viva) operates a family of public transit services that collectively and significantly contribute to sustainability in the Regional Municipality of York (York Region). In addition, YRT / Viva is committed to implementing environmentally conscious business practices such as the use of biodiesel fuel and the installation of bike racks on buses. The objective of this report is to develop an anti-idling program that maximizes environmental and financial benefits in a practical manner that does not compromise business operations.

Based on an alternatives assessment and consultations with operations staff, it is recommended that YRT / Viva enact a Regional transit anti-idling by-law of 3 minutes with exemptions for temperature, safety, boarding / alighting and air pressure. It is important to note that the anti-idling by-law developed only applies to transit vehicles during layover / recovery time¹. It does not apply to transit vehicles that are operating and in service.

The proposed Regional transit anti-idling by-law reads as such:

1. No transit operator shall cause or permit a bus to idle more than three (3) minutes during layovers.
2. Exemptions to (1) include:
 - a. When the temperature outside is:
 - i. More than twenty-seven degrees Celsius (27°C)
 - ii. Less than minus five degrees Celsius (-5°C)
 - b. When the time is:
 - i. Before five hundred hours (5:00)
 - ii. After twenty-one hundred hours (21:00)
 - c. While passengers are boarding and alighting
 - d. If the bus' air pressure is below 100 psi.

The benefits (savings) of implementing the anti-program include reductions in emissions, fuel, cost and noise as seen in **Table E-1**.

Table E-1: Anti-Idling Program Benefits (Savings)

Benefits	Net Reductions	Equivalent of
Emissions	475,019 kg of CO ₂ e	90 SUVs off the road per year
Fuel	175,931 L of diesel	N/A
Cost	\$175,931.00	1,832 hours of transit service per year

The implementation of the anti-idling program includes assigning program accountability to the Manager of Operations, developing the training program, and ultimately, advancing the anti-idling by-law toward Regional Council adoption.

¹ A stopping point at the end or along a transit route used by transit operators to adjust to publicized service schedules.

TABLE OF CONTENTS

Executive Summary	i
1. Introduction	1
2. Program Development	1
2.1 Complementary Programs, Plans and Initiatives	1
2.1.1 York Region	1
2.1.2 YRT / Viva	2
2.2 Anti-Idling By-laws and Policies within York Region and Across the GTA.....	2
2.2.1 York Region	2
2.2.2 Greater Toronto Area	3
2.3 Recommended Regional Anti-Idling By-law	6
2.3.1 Alternatives Assessment	6
2.3.2 Benefits	7
2.3.3 By-law Language	7
2.4 Implementation, Enforcement and Evaluation Strategy	8
2.4.1 Implementation Strategy	8
2.4.2 Enforcement and Evaluation Strategy	8
3. Summary	9

Tables

Table 1: Anti-Idling By-laws within York Region	3
Table 2: Anti-Idling By-laws and Policies within the Greater Toronto Area	4
Table 3: Anti-Idling By-law Benefits	7

Appendices

- A. CUTA Survey of Transit System Idling Programs
- B. Alternatives Assessment
- C. Heavy-Duty Transit Vehicle Noise at Idle and MOE Policies and Protocols

1. INTRODUCTION

York Region Transit / Viva (YRT / Viva) operates a family of public transit services that collectively and significantly contribute to sustainability in the Regional Municipality of York (York Region). In addition, YRT / Viva is committed to implementing environmentally conscious business practices such as the use of biodiesel fuel and the installation of bike racks on buses. The objective of this report is to develop an anti-idling program that maximizes environmental and financial benefits in a practical manner that does not compromise business operations.

2. PROGRAM DEVELOPMENT

This section focuses on the development of an anti-idling program and includes the following sub-sections that:

- Identify complementary programs, plans and initiatives
- Examine idling control by-laws and policies within York Region and neighbouring municipalities
- Develop an anti-idling by-law
- Define an implementation, enforcement and evaluation strategy.

2.1 Complementary Programs, Plans and Initiatives

This section demonstrates that an anti-idling program complements numerous programs, plans and initiatives that York Region and YRT / Viva have adopted.

2.1.1 York Region

York Region is committed to the preservation of the Region's land, water and air. With respect to air quality, an anti-idling program complements the following programs, plans and initiatives:

- **York Region Official Plan:** The Official Plan provides the framework for “a sustainable natural environment, economic vitality, and healthy communities.”
- **Vision 2026:** Vision 2026 is the Region's strategic plan that provides guidance to decision makers. The “enhancement of the environment, heritage and culture” is identified as one of the Plan's eight goals.
- **York Region Air Quality Strategy:** The Strategy provides a list of principles that will help to ensure that clean air actions are implemented, monitored and measured.
- **York Region Transportation Master Plan:** The Transportation Master Plan (TMP) identifies strategies that integrate land-use and transportation. This will decrease in-vehicle use through reduced car trip distances and increased alternative transportation and ultimately result in avoided emissions. The Transportation Master Plan also identifies the need to “limit emissions and waste, minimize consumption of non-renewable resources and minimize noise pollution.”
- **Regional Pedestrian and Cycling Master Plan:** The Plan provides programs to encourage and promote cycling within the Region, standards and guidelines on pedestrian / cycling path design, and networks of cycle paths. This plan supports the displacement of emissions.

- **Smart Commute Initiative:** This transportation demand management (TDM) project promotes and provides alternative modes of transportation to the single occupancy vehicle and is directly geared towards reducing GHG emissions.

The preceding demonstrates that an anti-idling program complements existing Regional programs, plans and initiatives.

2.1.2 YRT / Viva

Public transit is an environmentally friendly mode of transportation that makes a positive impact on air quality by displacing emissions from personal automobiles. Beyond this, YRT / Viva exhibits its commitment to reducing its environmental impacts through the following programs, plans and initiatives:

- **Five-Year Service Plan (2012-2016):** The Five-Year Plan identifies multiple strategies to increase the efficiency and effectiveness of service. For example, multiple route types using varying equipment efficiently provide the appropriate amount of capacity to service demand. This reduces unnecessary fuel consumption and ultimately emissions.
- **Clean Air Promotions and Marketing:** Annual clean air campaigns are launched and designed to encourage people to try transit thereby displacing personal automobile emissions.
- **Biodiesel Program:** YRT / Viva consume B5 and B20 fuels. The use of biodiesel fuel results in a reduction in carbon monoxide, hydrocarbons and particulate matter from exhaust emissions.
- **Bike Racks:** Bike racks on buses encourage links with active transportation.

The aforementioned programs, plans and initiatives suggest that an anti-idling program is in line with current YRT / Viva environmental business practices.

2.2 Anti-Idling By-laws and Policies within York Region and Across the GTA

This section reviews existing anti-idling by-laws in York Region and identifies anti-idling by-laws and policies in neighbouring jurisdictions within the Greater Toronto Area.

2.2.1 York Region

Currently, York Region does not have a regional anti-idling by-law in place, however, three (3) municipalities within York Region do: Markham, Newmarket and Vaughan as noted in **Table 1**.

Table 1: Anti-Idling By-laws within York Region

Municipality	By-Law #	Maximum Idle Time	Transit Exemptions
Markham	2005-192	3 minutes	1. Vehicles parked while passengers are embarking or disembarking.
Newmarket	2005-157	2 minutes	1. Public transit vehicles and private transit vehicles while passengers are embarking or disembarking en route or in terminals 2. Public transit vehicles while at a layover or stopover except where idling is substantially for the convenience of the operator of the vehicle.
Vaughan	170-2004	5 minutes	1. Transit and passenger vehicles while passengers are embarking or disembarking en route or at terminals 2. Transit vehicles while at a layover or stopover location, except where idling is substantially for the convenience of the operator of the vehicle.

As noted in **Table 1**, the maximum idle time ranges from 2 to 5 minutes. This variation complicates YRT / Viva's transit operating procedures. For example, a transit operator is permitted to idle up to 5 minutes at Vaughan Mills terminal in Vaughan but only up to 2 minutes at Newmarket GO Bus Terminal in Newmarket. A Regional anti-idling by-law provides a consistent and simplified approach to transit operations. It also allows YRT / Viva to develop an anti-idling program that meets transit operations and driver/passenger safety needs.

2.2.2 Greater Toronto Area

As seen in **Table 2**, in the Greater Toronto Area² (GTA) jurisdictions address idling control similarly with comparable maximum idle times and like transit exemptions.

² In the GTA, municipalities that have enacted an idling control by-law do not make provisions to exempt neighbouring transit vehicles that operate within their jurisdiction. For example, YRT / Viva buses that enter the City of Toronto are required to comply with Toronto's 1 minute anti-idling by-law.

Table 2: Anti-Idling By-laws and Policies within the Greater Toronto Area

Municipality / Region (Agency)	Regulation Type	Maximum Idle Time	Transit Exemptions
Brampton (Brampton Transit)	Municipal By-Law (133-2011)	3 min.	1. While passengers are embarking or disembarking en route or at terminals. 2. While at stopover locations. 3. Where the temperature outside a transit vehicle is more than 27 degrees Celsius or less than 5 degrees Celsius.
Burlington (Burlington Transit)	Municipal By-Law (27-2009)	1 min.	1. Transit vehicles while at a layover. When there are no passengers/operator on board, the engine will be turned off.
Durham Region ³ (Durham Region Transit)	Agency Policy (Based on Municipal By-Laws)	3 min.	1. In severe conditions where idling is required to maintain a comfortable environment for passengers.
GO Transit ⁴	Agency Policy (Based on Municipal By-Laws)	3 min.	1. Allowed to idle in extreme hot / cold weather at the operator's discretion 2. Daylight hours (do not turn off engine when lighting is required for visibility and safety and heating and cooling is required).
Hamilton (Hamilton Street Railway)	Municipal By-Law (07-160)	3 min.	1. Transit vehicles while passengers are embarking or disembarking en route or in terminals. 2. Transit vehicles while at a layover or stopover location (15 min. maximum) except where idling is substantially for the convenience of the operator of the vehicle or in situations where engine shutdown will result in restart

³ The Regional Municipality of Durham By-Law No. 66-2011 indicates that each of the municipalities under the region should have its own ability to enact an anti-idling By-Law. For example, the Town of Ajax By-Law No. 14-2011 states that 'no person shall cause or permit a vehicle to idle for more than 2 consecutive minutes' with the exception of 'transit vehicles while at a layover or stopover location, except where the idling is substantially for the convenience of the operator of the vehicle'; where as, the Town of Whitby By-Law No. 6489-11 states that 'no person shall cause or permit the Idling of a vehicle for more than five (5) minutes in any sixty (60) minute period' with the exception of 'transit vehicles while at a layover or stopover location'.

⁴ As per CUTA Survey of Transit System Idling Programs and Exemptions - April 15, 2008.

Municipality / Region (Agency)	Regulation Type	Maximum Idle Time	Transit Exemptions
			complications.
Mississauga (Mississauga Transit)	Municipal By-Law (194-09)	3 min.	1. Transit vehicles while passengers are embarking or disembarking en route or at transit terminals. 2. Transit vehicles while at a stopover location (5 min. maximum). 3. Transit vehicles where the ambient temperature outside a transit vehicle is more than 27 degrees Celsius (27 degrees Celsius) or less than 5 degrees Celsius (5 degrees Celsius).
Oakville (Oakville Transit)	Municipal By-Law (2002-153)	5 min.	1. Transit and passenger vehicles while passengers are embarking or disembarking en route or at terminals. 2. Transit vehicles while at a layover or stopover location (15 min. Maximum), except where the idling is substantially for the convenience of the operator of the vehicle.
Toronto ⁵ (Toronto Transit Commission)	Municipal By-Law (775-2010)	1 min.	1. Transit vehicles while passengers are embarking or disembarking.

It is important to note that the by-laws noted in **Table 2** apply to both private and public vehicles; transit along with fire, police and emergency medical services are addressed through exemptions.

As seen in **Table 2**, jurisdictions within the GTA have chosen to enact idling control by-laws or policies that set maximum idle times from 1 minute to 5 minutes with the majority of jurisdictions applying a 3 minute time limit. Common exemptions for transit include:

- While passengers are boarding (embarking) and alighting (disembarking) transit vehicles
- While at a layover or stopover location
- When the temperature outside a transit vehicle is uncomfortably too hot or too cold.

⁵ The Toronto Transit Commission has a 3 minute anti-idling policy in place.

Durham Region Transit (DRT) and GO Transit are special cases; both agencies operate a considerable portion of their service in multiple municipalities⁶, like YRT / Viva. As such, they are subject to the idling control by-laws of each municipality within which they operate. Both DRT and GO have implemented an idling control policy of 3 minutes which largely adheres to the municipal by-laws within each agency's service area. However, through a policy both DRT and GO are still exposed to the risk of operating in municipalities where the municipal by-law is less than 3 minutes (e.g. DRT – Ajax and Toronto. GO – Ajax, Burlington and Toronto).⁷ For this reason, it is recommended that YRT / Viva enact a Regional transit by-law and not develop a policy to address anti-idling.

For more information about anti-idling by-laws and policies across Canada, please see **Appendix A** which provides the results of survey conducted by the Canadian Urban Transit Association in 2008.

2.3 Recommended Regional Anti-Idling By-law

The following section outlines the results of an alternatives assessment, the benefits of implementing an anti-idling by-law and recommends specific by-law language.

It is important to note that the anti-idling by-law developed only applies to transit vehicles during layover / recovery time⁸. It does not apply to transit vehicles that are operating and in service.

2.3.1 Alternatives Assessment

As documented in **Appendix B**, an assessment was conducted to determine the appropriate maximum idle time and by-law exemptions. With respect to maximum idle time, three (3) alternatives were assessed: 1 minute, 3 minutes and 5 minutes. Based on consultations with YRT / Viva transit operations, potential environmental and financial impacts and best practices across the GTA, a 3 minute maximum idle time was selected. Exemptions to the 3 minute maximum idle time include:

- **Temperature:** Vehicle permitted to idle when the temperature is greater than 27°C and less than -5°C to allow heaters and air-conditioners to operate
- **Safety:** Vehicle permitted to idle before 05:00 hours (5:00 AM) and after 21:00 hours (9:00 PM) to ensure operator and passenger safety
- **Boardings / Alightings:** Vehicle permitted to idle when passengers are boarding and alighting
- **Air Pressure:** Vehicle permitted to idle when air pressure is lower than 100 psi to ensure the transit vehicle is operable.

⁶ It should also be noted that idling reduction by-laws in the GTA do not make exemptions for any neighbouring transit vehicles. For example, YRT / Viva buses that enter the City of Toronto are required to comply with Toronto's 1 minute anti-idling by-law.

⁷ Discussions with transit agencies suggest that transit vehicles are rarely fined for anti-idling violations.

⁸ A stopping point at the end or along a transit route used by transit operators to adjust to publicized service schedules.

2.3.2 Benefits

Enacting an anti-idling by-law will result in reductions in emissions, fuel, cost and noise⁹.

Table 3 shows the potential benefits (savings) of implementing an anti-idling by-law with a maximum idle time of 3 minutes and exemptions for temperature, safety, boarding / alighting and air pressure as noted in section 2.3.1.

Table 3: Anti-Idling By-law Benefits (Savings)

Benefits	Net Reductions	Equivalent of
Emissions	475,000 kg of CO ₂ e	90 SUVs off the road per year
Fuel	176,000 L of diesel	N/A
Cost	\$176,000	1,832 hours of transit service

As seen in **Table 3**, an anti-idling by-law could result in annual emission savings of approximately 475,000 kg of CO₂e which is equivalent to taking 90 SUVs off the road. It may also result in an annual cost savings of approximately \$176,000 which is equivalent to providing an additional 1,832 hours of transit service. The benefits shown in **Table 3** are intended to illustrate the potential reductions in emissions, fuel and cost. Actual savings depends upon a number of factors from anti-idling program adherence to transit scheduling practices.

2.3.3 By-law Language

Based on the preceding assessment, it is recommended that YRT / Viva consider the following anti-idling by-law language.

1. No transit operator employed or contracted by YRT / Viva shall cause or permit a bus to idle more than three (3) minutes during layovers.
2. Exemptions to (1) include:
 - a. When the temperature outside is:
 - i. More than twenty-seven degrees Celsius (27°C.)
 - ii. Less than minus five degrees Celsius (-5°C.)
 - b. When the time is:
 - i. Before five hundred hours (5:00)
 - ii. After twenty-one hundred hours (21:00)
 - c. While passengers are boarding and alighting
 - d. If the bus' air pressure is below 100 psi.

⁹ An anti-idling by-law is a cost effective way to mitigate the noise impact stationery buses have on neighbouring sensitive land uses as shown in **Appendix C**.

2.4 Implementation, Enforcement and Evaluation Strategy

The following section outlines an implementation, enforcement and evaluation strategy.

2.4.1 Implementation Strategy

Implementing an anti-idling program consists of:

- **Assigning Accountability:** Manager of Operations responsible for anti-idling program oversight.
- **Developing a Training Program:** Prepare training material and program information including booklets, presentations, and posters. Train and educate transit supervisors, contractors and operators of the program's benefits and how it will be enforced.
- **Adopting Anti-Idling By-Law:** Approve anti-idling program at the senior management level and advance anti-idling by-law towards Regional Council adoption.

2.4.2 Enforcement and Evaluation Strategy

2.4.2.1 Enforcement

There are two alternative approaches to enforcing an anti-idling program. They are:

- **Technology:** An automatic engine shutdown system can be installed to ensure 100% program compliance.¹⁰
- **People and Processes:** People can be given the responsibility to implement processes and enforce them.

The benefit of the technology approach is that there is 100% guarantee that the program will be followed.¹¹ The benefit of the people and process approach is that it flexible and supports operations.

Given the two approaches, it is recommended that YRT / Viva enforce its anti-idling program with people and processes with future consideration to the technology strategy:

- **People:** Manager of Operations is responsible for the program's success and it is enforced by Operations Inspectors. The Manager of Operations can initiate program changes if required.
- **Process:** During early implementation, a grace period could be in place where transit operators violating the program may be reminded of the program and its benefits. Once the grace period ends, if violations continue, transit operators can be fined at an amount yet to be determined and addressed with progressive disciplinary measures.

2.4.2.2 Evaluation

Under the people and processes approach, anti-idling program evaluation and reporting is based on compliance; the percent of operators that comply with the program. It is encouraged the

¹⁰ YRT/Viva's fleet is equipped with this technology.

¹¹ A manual override for exemptions will be required (fast idle)

Operations Inspectors monitor the program adherence and report non-compliance. By noting the transit operator, location, date, time, temperature and reason for the violation. There is an opportunity to include the anti-idling program adherence information in future YRT / Viva performance based contracts.

3. SUMMARY

YRT / Viva operates a family of public transit services that collectively and significantly contribute to sustainability in York Region. In addition, YRT / Viva is committed to implementing environmentally conscious business practices such as the use of biodiesel fuel and the installation of bike racks. Anti-idling is another program that furthers YRT / Viva's commitment to the environment and complements Regional and current YRT / Viva programs, plans and initiatives.

Based on an alternatives assessment and consultations with operations staff, it is recommended that YRT / Viva enact a Regional transit anti-idling by-law of 3 minutes with exemptions for temperature, safety, boarding / alighting and air pressure. It is important to note that the anti-idling by-law developed only applies to transit vehicles during layover / recovery time. It does not apply to transit vehicles that are operating and in service. As noted, the benefits of implementing the program are vast and include reductions in emissions, fuel, cost and noise.

The implementation of the anti-idling program includes assigning program accountability to the Manager of Operations, developing the training program, and ultimately, advancing the anti-idling by-law toward Regional Council adoption.

Appendix A

CUTA Survey Transit System Idling Programs

Table C-1: CUTA Survey of Transit System Idling Programs and Exemptions - April 15, 2008

Transit System	Maximum Idle Time	Max. or Min. Temp. (°C)	Time of Day (i.e. Daylight Only)	Location Specific	Regulation Type	Dates of the Year	Other Information (factors relating to the bus' engine)
Brampton	3 min.				Municipal By-Law		
Burlington	3 min.				Municipal By-Law		Up to 3 minutes of idle time allowed for transit vehicles on layover or stopover; non transit vehicles have 1 minute of idle time
Calgary	5 min.	- 10 °C or colder			Agency Policy		
Coast Mountain (South Coast BC Transit Authority/ TransLink)	3 min.			Switch off engine when vehicle unattended and unlocked	Municipal By-Law		On arriving at a terminus or layover, engines on a diesel bus are to be shut off when layover is longer than 3 minutes. All headlights, interior and clearance lights, heaters, fans, etc. are to be switched off, except those necessary for the safety of the operator, customers, and vehicle.
Durham Region	3 min.				Municipal By-Law & Agency Policy		
Edmonton	5 min.	> 10 °C	Daylight hours		Agency Policy	May 23 – September 30	Air reservoir pressure greater than 80 psi; Comfort and safety of the passengers is not compromised
GO Transit	3 min.	Allowed to idle in extreme hot / cold weather at the operator's discretion	Daylight hours (do not turn off engine when lighting is required for visibility and safety and heating and cooling is required).	All locations	Agency Policy	No set dates	In regards to factors pertaining to bus engine – fast idle is used when bus is in revenue service i.e. when loading / unloading customers or when required to power auxiliary equipment i.e. heating, air conditioning, lighting, etc.
Guelph	-	- 20 °C			Agency Policy		All operators are required to shut off their buses while waiting at a transfer point, while on a layover or while waiting at the end of their route for their scheduled departure time. Operators are required to shut off their buses when returning to the garage.

Transit System	Maximum Idle Time	Max. or Min. Temp. (°C)	Time of Day (i.e. Daylight Only)	Location Specific	Regulation Type	Dates of the Year	Other Information (factors relating to the bus' engine)
Hamilton	15 min.				Municipal By-Law		Up to 15 minutes of idle time allowed for transit vehicles on layover or stopover; non transit vehicles have 3 minutes of idle time
Mississauga	5 min.	Allowed to idle in extreme hot / cold weather at the operator's discretion	Daylight hours (do not turn off engine when lighting is required for visibility and safety).	Do not turn off engine if: the vehicle is assisting in an emergency activity as authorized by a Route Supervisor; vehicle is stopped in traffic or at a stoplight	Municipal By-Law		Do not turn off engine if: air pressure gauge indicates a reading of less than 120 psi. Operators should not let vehicles idle unnecessarily in the storage areas or maintenance shops.
Oakville	5 min.				Municipal By-Law		
Ottawa	1 min.	25 °C > x > -5 °C		Applies on lay-by or in the garage	Municipal By-Law	April 15 – October 15	Do not idle if a bus is in revenue service and passengers are onboard or if the engine is required to immediately power auxiliary equipment (roof lights etc.)
Saskatoon	3 min.	27 °C > x > -5 °C			Agency Policy		When Idling is required as part of repair process or to prepare for servicing. Also fast or high idle is not to be used beyond the recommended high idle point required for warm up.
St. Albert	5 min.			Min. ahead of scheduled departure time; also applies to buses returning to the garage in the evening if there are in	Municipal By-Law	Between April and October	Buses parked in lot after a.m. servicing, breaks on training runs and chapters and when the handibuses have gaps in the schedule
Thunder Bay	-				Agency Policy		Turn the engine off when the operator leaves the vehicle.

Transit System	Maximum Idle Time	Max. or Min. Temp. (°C)	Time of Day (i.e. Daylight Only)	Location Specific	Regulation Type	Dates of the Year	Other Information (factors relating to the bus' engine)
Toronto ¹²	3 min.	27 °C > x > -5 °C	Daylight hours (do not turn off engine when lighting is required for visibility and safety).	Bus is stationary, or expected to be stationary, in excess of three minutes; Bus is left unattended for any reason; Bus is returned to the garage or operating facility	Municipal By-Law		Bus may be kept running to defog the windows.
Waterloo (Grand River Transit)	10 seconds	Exempt during extreme cold or heat			Municipality Policy for Municipality-Owned Vehicles		Vehicles assisting in an emergency activity; engaged in a parade or race or any other event authorized by the municipality; while passengers are embarking or disembarking en route or in terminals; while at a layover or stopover location (with passengers on the bus); transporting a person where a doctor certifies that the temperature must be controlled with use of power from the engine; should shut off engine to compromise safety; should not switch off engine in traffic or at a stoplight
Windsor	5 min. (15 min. for a scheduled stop over)	27 °C > x > -5 °C			Municipal By-Law		
Winnipeg	5 min.	Colder than 0 °C			Agency Policy	April 15 – October 15	Only Low Floors (because of no restart problems with older high floors)

¹² In July 2010, the City of Toronto implemented a 1 minute idling control bylaw which includes the TTC. The only exemption is when passengers are embarking and disembarking a vehicle.

Appendix B

Alternatives Assessment

B. ALTERNATIVES ASSESSMENT

The following section defines existing conditions and assesses program.

B.1 Existing Conditions

The following section defines the existing impact of transit vehicles idling during recovery/layover.

As seen in **Table B-1**, in 2010 it is estimated that YRT / Viva revenue vehicles produced 1.4 million kilograms of carbon dioxide equivalents (kg of CO₂e), consumed, 522,000 litres (L) of fuel and expended \$522,000 from idling during layover/recovery. To put this impact into perspective, this is equivalent to the emissions produced by 266 SUVs over a year.

Table B-1: 2010 Baseline Emissions, Fuel and Cost

Impact	Quantity
Emissions Produced	= 1,408,968 kg of CO ₂ e
Fuel Consumed	= 521,840 L of diesel and blends
Cost Expended	= \$521,840

These figures represent the total maximum potential savings an anti-idling program would realize assuming 0 minutes maximum idle time. Recognizing that idling, to some extent, is required as a normal business activity, the proceeding section will identify options that can save a portion of this potential maximum.

The calculation methodology is provided in section **B.4**.

B.2 Program Options and Exemptions

An anti-idling program provides an opportunity to realize emission, fuel and cost savings. This section identifies the benefits of varying program options and defines exemptions.

B.2.1 Program Options

Across Canada, transit agencies restrict idling anywhere between 1 minute and 15 minutes. The specific time selected is program driven. For the purpose of this program, three (3) program options are examined: 1 minute, 3 minutes, 5 minutes.

B.2.1.1 Benefits

As identified, the benefits of an anti-idling program include emission, fuel and cost savings.¹³

Table B-2 quantifies these benefits under each of the three anti-idling program options.

Table B-2: Benefits of Anti-Idling Program Options (without Exemptions)

Impact	5-minute Anti-Idling Program	3-minute Anti-Idling Program	1-minute Anti-Idling Program
Emissions	289,400 kg of CO ₂ e	659,748 kg of CO ₂ e	1,145,175 kg of CO ₂ e
Fuel	107,182L of diesel	244,348L of diesel	424,136L of diesel
Cost	\$107,182.00	\$244,348.00	\$424,136.00

Table B-2 illustrates the benefits under each of the options.¹⁴ Intuitively, the less time a bus' engine idles, the greater the environmental and financial impact. The annual benefits are equivalent to:

- **Emission Savings**¹⁵
 - 5 minute: Taking 55 SUVs off the road per year
 - 3 minute: Taking 125 SUVs off the road per year
 - 1 minute: Taking 217 SUVs off the road per year
- **Cost Savings**
 - 5 minutes: Adding 1,116 hours of transit service per year
 - 3 minutes: Adding 2,545 hours of transit service per year
 - 1 minute: Adding 4,418 hours of transit service per year.

Two other direct benefits of anti-idling is the elimination of noise and reduced light maintenance costs. With respect to noise, buses idle at levels greater than recommended by the Ministry of Environment. As seen in **Appendix C**, the implementation of an anti-idling program resolves this issue.

With respect to maintenance, idling does more damage to the engine than starting and stopping. Running an engine at low speed (idling) causes twice the wear on internal parts compared to driving at regular speeds, which can increase maintenance costs and shorten the life of the engine. This is why engine manufacturer Cummins states that “excessive idle should be avoided when possible (as it) results in reduced fuel economy and increased engine wear.”¹⁶ However, it should be noted that fuel consumption during engine start-up is equivalent to about 10-30 seconds of engine idling.

¹³ The savings identified in this section are estimates based on rates and best available information as presented in section **B.4**. The actual savings could be less due to YRT/Viva's fleet composition.

¹⁴ The benefits do not include exemptions presented in the following section. These exemptions will reduce the savings.

¹⁵ Canadian Vehicle Survey 2009 (average distance by motorists = 16,249 km per year). Emission and Fuel efficiency statistics from Transport Canada's Urban Transportation Emission Calculator.

¹⁶ Ziring, Emily *Mitigating Excessive Idling of Transit Buses* (Urban Transportation Center, Chicago, IL; 2010)

B.2.1.2 Program Coverage

Program coverage refers to the extent the anti-idling program applies to YRT / Viva's total number of layovers. It is important to note as it is assumed that the more "reach" a program has the more effective it is.

YRT / Viva's average scheduled layovers range on average anywhere from 0 minutes to 34.8 minutes and varies from route to route. In total, YRT / Viva's 125 routes collectively have 5,107 layovers on an average weekday. **Table B-3** shows the % of YRT / Viva's layovers that would be affected / unaffected by the program, where: defined as:

- **Affected Layovers:** Layovers that have a duration greater than the program
- **Unaffected Layovers:** Layovers that have a duration less than the program.

Another way to think about affected and unaffected is that reductions in emissions, fuel, cost and noise can be captured from affected layovers because the transit operator will have to comply to the anti-idling program.

For further clarity, an example of this is a 3 minute layover is unaffected by a 5 minute anti-idling program because the layover's duration is less than the program. However, the same 3 minute layover would be affected by a 1 minute program.

Table B-3: Number and % of Weekday Layovers Affected by Program Options

Layovers	5-minute Anti-Idling Program	3-minute Anti-Idling Program	1-minute Anti-Idling Program
	Layovers: # and %	Layovers: # and %	Layovers: # and %
Affected	2,780 (54%)	4,273 (84%)	4,826 (94%)
Unaffected	2,327 (46%)	834 (16%)	281 (6%)
Total	5,107 (100%)	5,107 (100%)	5,107 (100%)

As seen in **Table B-3**, the lower the anti-idling program, the more layovers that are affected. The following summarizes the findings and conclusions drawn for the three program options:

- **5 minute program:** Approximately 54% of YRT/Viva's routes are affected.
- **3 minute program:** Yields a significant increase where 84% of the trips are now affected.
- **1 minute program:** Yields less of an impact increasing the number of trips affected to 94%.

Based on the preceding, a 1 minute program does not offer significantly greater coverage than a 3 minute program. On the other end of the spectrum, a 5 minute program is deemed ineffective and difficult to justify as it covers only half of the service. For this reason a 3 minute program is recommended.¹⁷

¹⁷ Note: Engine start-up consumes 30 seconds worth of fuel. New England EPA

B.2.2 Exemptions

North American transit agencies include exemptions to their anti-idling programs for a variety of reasons. The factors that dictate which exemptions are included depend on the scope of the anti-idling program. Some transit agencies impose a system-wide anti-idling program where exemptions include:

- **Revenue Service:** Buses are permitted to idle while in revenue service
- **Traffic:** Buses are permitted to idle while on change-offs or deadheads during traffic
- **Maintenance:** Buses are permitted to idle when maintenance staff are conducting work on them
- **Emergencies:** Buses are permitted to idle during emergencies
- **Events:** Buses are permitted to idle during parades and other events.

The aforementioned exemptions do not apply to the scope of the YRT / Viva anti-idling program which targets layover/recovery time.

North American transit agencies include exemptions in their anti-idling programs for layover / recovery that are designed to maintain operational efficiencies, protect vehicle equipment and to ensure passenger and operator safety is not compromised. Based on current YRT / Viva programs and peer system practices, the following exemptions are recommended:

- **Temperature**
 - Description: Vehicle permitted to idle when the temperature is greater than 27°C and less than -5°C to allow heaters and air-conditioners to operate
 - Justification: Based on practices in the GTA (GO Transit), Calgary, Guelph, Mississauga, Saskatoon, Toronto, Ottawa, Waterloo, Windsor. The specific temperature is based on the preceding systems and recommended in the *2005 Situational Analysis: The Status of Anti-idling By-laws in Canada*.
- **Safety**
 - Description: Vehicle permitted to idle before 05:00 hours (5:00am) and after 21:00 hours (9:00pm) to ensure operator and passenger safety
 - Justification: Based on YRT / Viva request stop service and best practices.
- **Boardings / Alightings**
 - Description: Vehicle permitted to idle when passengers are boarding and alighting
 - Justification: To allow doors to function properly and for passenger comfort.
- **Air Pressure**
 - Description: Vehicle permitted to idle when air pressure is lower than 100 psi
 - Justification: To ensure proper air to brakes and doors.

The effects of safety exemption which allows idling before 05:00 hours (5:00am) and after 21:00 hours (9:00pm), reduces the impacts of the program by approximately 10%, since roughly 10% of YRT's revenue hours occur during this time period. Meanwhile the temperature exemption allowing for idling when the temperature is below -5°C or above 27°C reduces the impacts another 20%. This is based on historical weather data obtained from Environment Canada which demonstrated that the temperature was below -5°C or above 27°C during 20% of the time between 05:00 hours (5:00 am) and 21:00 hours (9:00pm) in the year 2010. The newly calculated benefits that account for reductions due to the above exemptions are shown in **Table B-4**.

Table B-4: Re-calculated Benefits due to Exemptions (with Exemptions)

Impact	3-minute Anti-Idling Program	Equivalent of
Emissions	475,019 kg of CO ₂ e	90 SUVs off the road per year
Fuel	175,931 L of diesel	N/A
Cost	\$175,931.00	1,832 hours of transit service

B.3 Carbon Dioxide Equivalents (CO₂e)

The United Nations' Intergovernmental Panel on Climate Change recognize carbon dioxide equivalent (CO₂e) as an international measure of greenhouse emissions and it is the primary currency of international emissions trading. There are many types of greenhouse gases. Six such gases are controlled by the Kyoto protocol. These include:

1. Carbon Dioxide (CO₂)
2. Methane (CH₄)
3. Nitrous Oxide (N₂O)
4. Perfluorocarbons (PFC)
5. Hydrofluorocarbons (HFC)
6. Sulphur Hexafluoride (SF₆).

Each of these gases has a different capacity to heat the atmosphere. This is referred to as their global warming potential (GWP). CO₂ is the standard bearer for GWP – it has been assigned a GWP = 1. Other GWPs include¹⁸:

- Methane GWP = 21
- Nitrous Oxide GWP = 310
- Perfluorocarbons GWP = 6,000 – 9,000
- Hydrofluorocarbons GWP = 1,000 – 10,000
- Sulphur Hexafluoride GWP = 23,900.

CO₂ is not a potent greenhouse gas compared to the others. However, because CO₂ is produced in such huge quantities, its effect dwarfs all the other greenhouse gasses combined. For the sake of ease, when an organization calculates its greenhouse emissions, these are reported as though they were equivalent to a given volume of CO₂. This is CO₂e. For example, greenhouse emissions from a landfill of 100 tonnes of methane are recorded as 2,100 tonnes of CO₂e. Using CO₂e as a standard measure of greenhouse emissions allows for comparing the greenhouse impact of a variety of greenhouse emissions sources.¹⁹

¹⁸ Intergovernmental Panel on Climate Change

¹⁹ Townsville State of Environment Report (<http://www.soe-townsville.org/index.html>)

B.4 Emissions, Fuel and Cost Calculations

The following section describes the calculation methodology used to quantify emission, fuel and cost benefits. The required sources of data include:

- Time: approximate total number of hours at idle
 - Based on November board period (130,460 hours per annum)²⁰
 - Based on assumption that idling occurs during the entire scheduled recovery / layover time²¹
 - Source: York Region Transit/Viva (2010)
- Fuel Consumption Rate: approximate number of litres of fuel consumed per hour at idle
 - 4 litres of diesel per hour for heavy-duty transit vehicles
 - Source: Natural Resources Canada²²
- Emission Rate: carbon equivalents emitted per litre
 - 2.7 kg per litre (2691 g per litre)
 - Source: Transport Canada, Urban Transportation Emission Calculator (2011, bus, diesel, carbon equivalents)²³
- Cost of Fuel: cost per litre of fuel
 - \$1.00
 - Source: York Region Transit / Viva (2010).

It is worth noting that the preceding is based on available information and not specifically YRT / Viva's fleet. YRT / Viva's fleet was not tested for emission and fuel consumption as it the cost to obtain the information would mitigate the savings gained from the program.

Also worth noting is that future calculations of the baseline may require changes to the preceding at the following intervals:

- Time: Annually
- Fuel Consumption Rate: Unchanged until other data becomes available
- Emission Rate: 2016 as per UTEC or until other more reliable data becomes available
- Cost of Fuel: Annually.

To assess the impacts of each timing option and the associated savings from baseline conditions, each YRT transit route was considered as provided from the November board period statistics.

Exhibit B-1 demonstrates the calculation method used to calculate the annualized idling time for all vehicles with a timing option.

It shall be noted that if the recovery / layover time for each trip is less than the maximum allowable idling time, fuel, emission or cost savings will not be realized.

²⁰ Based on 442 scheduled hours of recovery per weekday (260 weekdays per annum), 188 scheduled hours of recovery per Saturday (52 Saturdays per annum) and 110 scheduled hours of recovery per Sunday (52 Sundays per annum).

²¹ Currently, a 15 minute informal anti-idling program is in place. This is not captured in the calculation.

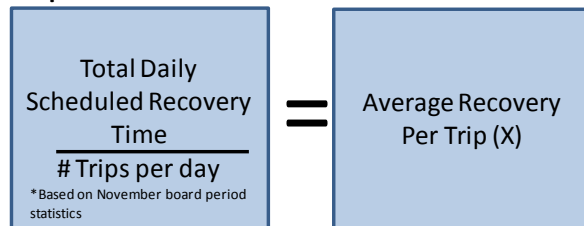
²² Discussion with Linda Harvey (Manager, Sustainable Transportation, Natural Resources) on September 30, 2010 and www.internationaltransportforum.org/Proceedings/ecodriving/2-03Canada.pdf

²³ <http://www.wapps.tc.gc.ca/Prog/2/UTEC-CETU/GhgEmissionFactors.aspx?lang=eng>

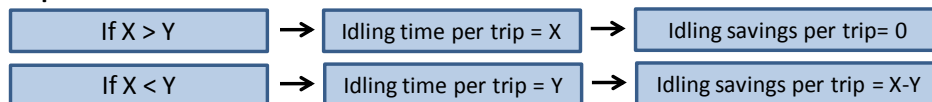
From the newly calculated annual idling time, fuel consumption, emission production and cost expenditure are calculated for each timing option. Fuel, emission and cost savings under the new timing option is assumed to be the difference in these impacts from baseline conditions (i.e. Baseline Impacts (**Exhibit B-2**) – Timing Option Impacts = Savings **Exhibit B-3**).

Exhibit B-1: Conceptual Calculation Method for Multiple Program Options

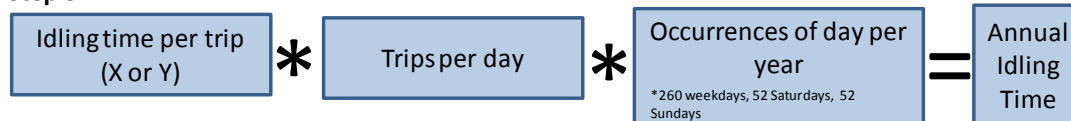
Step 1



Step 2



Step 3



Where Y = timing option (i.e. new idling time)
X = average recovery per trip

Exhibit B-2: Baseline Calculations

Impact	Quantity
Emissions Produced	= 521,840L * 2.7 kg/L = 1,408,968 kg of CO ₂ e
Fuel Consumed	= 130,460 hrs * 4 L/hr = 521,840 L of diesel and blends
Cost Expended	= 521,840L * \$1.00/L = \$521,840

Exhibit B-3: Savings Calculations

Impact		5-minute Anti-Idling Program	3-minute Anti-Idling Program	1-minute Anti-Idling Program
Emissions	Produced	= 414,658L * 2.7 kg/L = 1,119,577 kg of CO ₂ e	= 277,492 * 2.7 kg/L = 749,228 kg of CO ₂ e	= 97,704L * 2.7 kg/L = 263,801 kg of CO ₂ e
	Saved	= 1,408,976 kg – 1,119,577 kg = 289,400 kg of CO ₂ e	= 1,408,976 kg – 749,228 kg = 659,748 kg of CO ₂ e	= 1,408,976 kg – 263,801kg = 1,145,175 kg of CO ₂ e
Fuel	Consumed	= 103,664 hrs * 4L = 414,658L of diesel	= 69,373hrs * 4L = 277,492L of diesel	= 24,426 hrs * 4L = 97,704L of diesel
	Saved	= 521,840L - 414,658L = 107,182L of diesel	= 521,840L - 277,492L = 244,348L of diesel	= 521,840L - 97,704L = 424,136L of diesel
Cost	Expended	= 414,658 L * \$1.00/L = \$414,658.00	= 277,492 L * \$1.00/L = \$277,492.00	= 97,704L * \$1.00/L = \$97,704.00
	Saved	= \$521,840 – \$414,658 = \$107,182.00	= \$521,840 – \$277,492 = \$244,348.00	= \$521,840 – \$97,704 = \$424,136.00

Appendix C

Heavy-Duty Transit Vehicle Noise at Idle and MOE Policies and Protocols

Memorandum

To: Mark Mis
From: Andrew Evans
Date: December 21, 2010
Re: **Heavy-Duty Transit Vehicle Noise at Idle and MOE Policies and Protocols**

This memo intends to identify the extent of bus idling noise levels (dBA) in support of an anti-idling program for York Region Transit / Viva.

Bus Idle Noise Levels

An internet search was conducted to find noise levels of a typical public transit bus under low idle (stationary) conditions. A report undertaken in the United States for the 2007 Noise Convention by Mr. Jason Ross and Mr. Michael Staiano called ***A Comparison of Green and Conventional Diesel Bus Noise Levels*** identifies an average noise level of 65 dBA under low idle conditions for a conventional diesel bus (with air conditioning off).

The Altoona Bus Research and Testing Center provides a bus database with the results from a series of stringent tests on new model buses prior to purchasing with federal funds as stipulated by the Federal Transit Administration in the Surface Transportation and Uniform Relocation Assistance Act of 1987. One of the tests performed is an exterior noise test while stationary. The following table outlines the results of the tests for specific buses within the YRT / Viva fleet based on stationary low idle conditions.

Table C-1: Existing Noise Levels

Bus	Air Conditioning ON		Air Conditioning Off	
	Curb Side	Street Side	Curb Side	Street Side
Eldorado National EZ Rider II	--	--	63.5 dBA	65.6 dBA
Thomas-Dennis SLF ²⁴	64.7 dBA	63.4 dBA	63.2 dBA	62.0 dBA
New Flyer D40LF	57.7 dBA	57.1 dBA	59.7 dBA	57.2 dBA

²⁴ The Thomas-Dennis SLF will be retired in the near future.

Ministry of Environment Position

The Ministry of Environment (MOE) has published a report that outlines the position of the MOE on noise level criteria in land use planning. The report was published in support of the Provincial Policy Statement under the Planning Act and is intended for use in planning of land uses adjacent to facilities such as but not limited to airports, road and rail transportation corridors and infrastructure, industrial facilities, aggregate facilities, major commercial facilities, sewage treatment facilities, and waste sites.

The MOE has set minimum criteria for selected outdoor and indoor living areas during day and night time periods. The specified sound level criteria are minimum requirements and set for a required time length. For outdoor living areas, the MOE has set a sound level criterion of 55 dBA between the hours of 7:00 AM and 11:00 PM. For indoor living areas, the MOE has set the sound level criteria of 45 dBA during the day (7:00 AM to 11:00 PM) and 40 dBA during the night (11:00 PM to 7:00 AM).

Summary

An anti-idling program for stationary buses is a cost effective way to mitigate the noise impact on neighbouring sensitive land uses based on the low idle noise levels which are greater than the minimum criteria set by the MOE. An idling bus can therefore become an annoyance and a source of complaint. The MOE has allowed for migration of the noise source through the modification of design or operation of the noise source to reduce the noise impact. However, this can result in significant costs and not be beneficial to the operator.



An

HDR Corporation
100 York Boulevard, Suite 300
Richmond Hill, ON L4B 1J8

