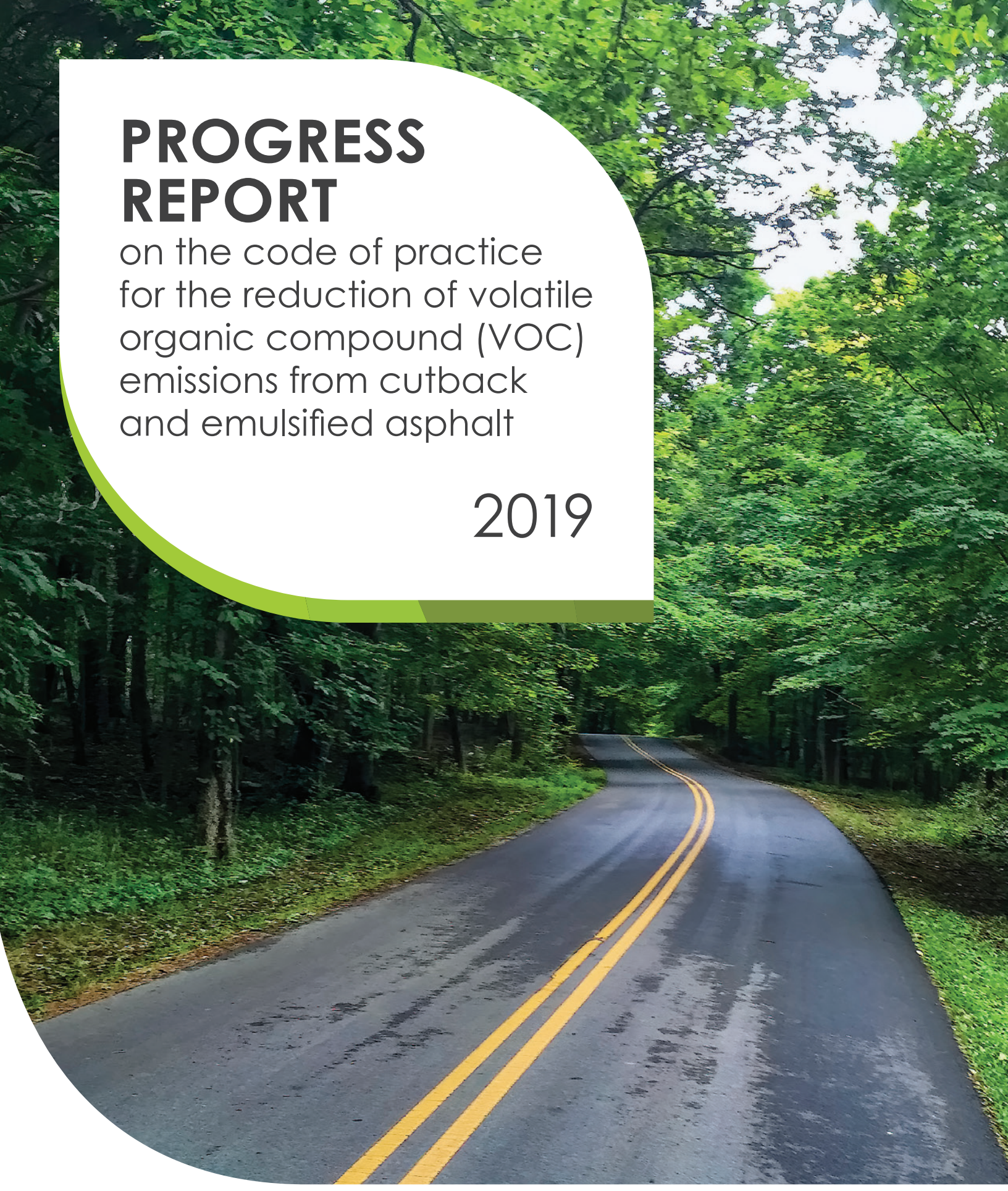
PROGRESS REPORT

on the code of practice for the reduction of volatile organic compound (VOC) emissions from cutback and emulsified asphalt

2019



Environment and Climate Change Canada
Environnement et Changement climatique Canada

Canada

Cat. No.: En14-271/2-2020E-PDF
ISBN: 978-0-660-38285-2
EC8316

Environment and Climate Change Canada
Public Inquiries Centre
12th Floor, Fontaine Building
200 Sacré-Coeur Boulevard
Gatineau QC K1A 0H3
Telephone: 819-938-3860
Toll Free: 1-800-668-6767 (in Canada only)
Email: ec.enviroinfo.ec@canada.ca

Aussi disponible en français

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The objective of this report is to provide a summary of the data submitted by industry in 2020 for the 2019 calendar year as recommended in the Code of Practice for the Reduction of Volatile Organic Compound (VOC) Emissions from Cutback and Emulsified Asphalt (the Code). This is the second progress report following the publication of the Code in 2017. As such, results from the first progress report, covering 2017 activities, are compared to the 2019 data to assess the progress made in meeting the Code's objectives.

VOCs and air pollution

VOCs are volatile organic compounds that participate in the formation of ground-level ozone through complex reactions with nitrogen oxides (NOx), in the presence of sunlight. They also contribute to the formation of particulate matter via complex chemical reactions involving emissions of other smog precursors, including sulphur dioxide (SO_2), NOx and ammonia (NH_3).

Particulate matter and ground-level ozone are the 2 principal components of smog. Smog is an air quality issue that poses serious health and environmental concerns in Canada. Particulate matter and ozone can be transported by prevailing winds over long distances, making them not only a local urban issue but also one that can extend into many smaller communities and rural areas. The 2013 Canadian Smog Science Assessment (co-authored by Environment and Climate Change Canada and Health Canada) concluded that both particulate matter and ground-level ozone need to be treated as having no safe level.

VOCs and asphalt

Cutback asphalt and emulsified asphalt are liquefied asphalt products used in various road construction, maintenance and repair applications, such as plant mix, road mix, surface treatment and maintenance mix. These products are prepared by mixing asphalt cement with a petroleum solvent to produce cutback asphalt, or with emulsifiers and water (and sometimes a small amount of petroleum solvent) to produce emulsified asphalt. During paving operations, the petroleum solvent or the water evaporates after the liquefied asphalt is applied, leaving the asphalt cement behind. This evaporation of petroleum solvent results in the emission of VOCs. The use of cutback asphalt generates more VOC emissions than emulsified asphalt as it contains larger quantities of petroleum solvents.

As of 2016, many jurisdictions in Canada and the United States have adopted practices to reduce VOC emissions from this sector. These practices involve either restrictions on the use of cutback asphalt during the ozone season (typically the summer months), or a prohibition of the use of cutback asphalt throughout the year. In addition, many jurisdictions restrict VOC content in the manufacturing of cutback and emulsified asphalt.

CODE OF PRACTICE OBJECTIVES

On February 25, 2017, a notice of the issuance and publication of the Code of Practice for the Reduction of Volatile Organic Compound Emissions from Cutback and Emulsified Asphalt was published in the Canada Gazette, Part I. The objective of the Code is to protect the environment by reducing VOC emissions from the liquefied asphalt sector by at least 40% over a 6-year period. The Code includes reporting every 2 years for cutback and emulsified asphalt manufacturers in order to measure the emission reduction progress in meeting the objective.

The Code describes recommended practices for cutback and emulsified asphalt, including maximum VOC contents by volume during and outside of the ozone season (table 1). The ground-level ozone season in Canada runs from May 1 through September 30. There are no recommended practices in the Code for emulsified asphalt products used outside of the ozone season.

Table 1: recommended VOC limits

Type of liquefied asphalt	Time of year	VOC content (% by volume) which evaporates at 260 °C or less
Cutback asphalt (CA)	During the ozone season	≤ 0.5
Cutback asphalt (CA)	Outside of the ozone season	≤ 5
Emulsified asphalt (EA)	During the ozone season	≤ 3
Emulsified asphalt (EA)	Outside of the ozone season	N/A

Additionally, the Code recommends manufacturing, importing, selling and using low VOC-emitting alternative products instead of cutback asphalt with petroleum solvent formulations, and promotes the consideration of low VOC-emitting products during contracting discussions. A commitment to follow the Code should also be included in contracts issued for paving or maintenance operations in Canada.

SUMMARY OF RESULTS FOR 2019

The Code includes reporting provisions targeting liquefied asphalt manufacturers. A summary of the information received for the 2019 reporting period is presented below. Due to rounding, numbers presented throughout this document may not add up exactly to the totals provided and percentages may not exactly reflect absolute figures.

It should be noted that 2 manufacturers who missed the 2017 reporting period provided information for 2017 along with that of 2019. We have amended the 2017 data accordingly. The updated data is found in the Annex.

In total, 11 manufacturers provided Environment and Climate Change Canada with a report for the 2019 calendar year. However, 1 of the reporters indicated that they did not manufacture any cutback or emulsified asphalts in 2019 and therefore the data presented in this section is representative of 10 Canadian manufacturers of liquefied asphalt. Not included in this progress report are data submitted by 1 reporter on 4 cutback products whose VOC content are not available and data submitted by another reporter on an alternative product not covered by this code.

There were 262.7 kilotonnes (kt) of liquefied asphalt manufactured in Canada in 2019, generating 5.1 kt of VOCs after application. As shown in table 2, the majority of the production was emulsified asphalt (87%). Although cutback asphalt represented only 13.2% of the liquefied asphalt manufactured, it was responsible for 54.9% (2.8 kt) of the VOC emissions. Most of the cutback asphalt was produced in Ontario, Saskatchewan and Alberta, while emulsified asphalt was mainly produced in Saskatchewan, Ontario, Alberta.

Table 2: quantities of liquefied asphalt sold and resulting VOC emissions

Type of liquefied asphalt and time of year	Quantity sold		Resulting VOC emissions	
	(kt)	(%)	(kt)	(%)
CA during ozone season	23.0	8.7	2.1	41.2
CA outside ozone season	4.5	1.7	1.0	19.6
EA during ozone season	222.4	84.1	1.9	37.2
EA outside ozone season	14.6	5.5	0.1	2.0
Annual total	**264.5**	**100.0**	**5.1**	**100.0**

Reporters provided data for each liquefied asphalt product sold or manufactured in 2019. Of the 248 reported liquefied asphalt products, 41 had a VOC content exceeding the Code's recommended practices, which represents 9.1% (24.0 kt) of the total quantity of liquefied asphalt manufactured and is responsible for 55.6% (2.8 kt) of the total resulting VOC emissions (table 3).

Table 3: 2019 products manufactured exceeding the Code's recommendations and resulting VOC emissions

Type of liquefied asphalt and time of year	Number of products reported		Products manufactured exceeding the Code (kt)	Resulting VOC emissions (kt)
	Respecting the Code	Exceeding the Code		
CA during ozone season	3	21	16.8	1.7
CA outside ozone season	11	14	3.8	1.0
EA during ozone season	121	6	3.4	0.1
EA outside ozone season	72	N/A	N/A	N/A
Annual total	**207**	**41**	**24**	**2.8**

PROGRESS SINCE FIRST REPORTING PERIOD (2017)

In 2019, both the reported quantity of liquefied asphalt manufactured and the resulting VOC emissions were lower than what was reported for 2017. Since more manufacturers reported in 2019 than in 2017, the results of the 2 reporting periods are not directly comparable. As such, emission intensity (EI) expressed in kg per tonne of asphalt is used, rather than total emissions, to evaluate the VOC emission reduction progress since 2017.

In 2019, the overall VOC EI from all liquefied asphalt manufactured was 19.4, which is a slight decrease from 20.7 in 2017 (-6.1%). Manufacturers who reported for both 2017 and 2019, reported a more significant decrease in the EI of their products for both cutback asphalt (-15.9%) and emulsified asphalt (-7.9%).

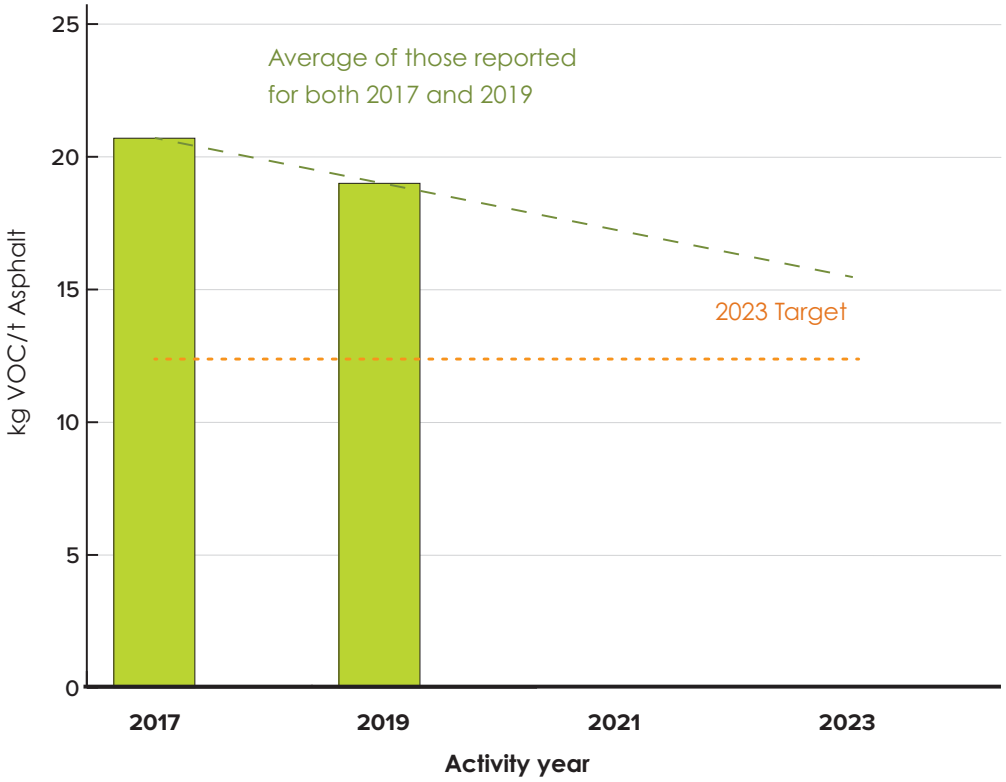
Table 4: changes of VOCs emission intensity for liquefied asphalt products

Type of liquefied asphalt and time of year	VOC emission intensity manufactured: amended 2017 (kg VOC/t product)	VOC emission intensity manufactured: 2019 reporters for both years (kg VOC/t product)	VOC emission intensity manufactured: 2019 all reporters (kg VOC/t product)	Change from amended 2017: reporters for both years (%)	Change from amended 2017: all reporters (%)
CA during ozone season	80.7	63.2	70.9	-21.6	-12.2
CA outside ozone season	118.5	102.4	103.3	-13.6	-12.8
CA average	**89.8**	**75.5**	**80.8**	**-15.9**	**-9.9**
EA during ozone season	11.2	10.3	10.1	-7.9	-9.2
EA outside ozone season	9.8	9.3	9.3	-5.4	-5.1
EA average	**11.1**	**10.2**	**10.1**	**-7.9**	**-9.2**
Average of total asphalt	**20.7**	**19.0**	**19.4**	**-8.3**	**-6.1**

However, the proportion of cutback asphalt in the total liquefied asphalt production remained at the same level (around 12% for both years). This suggests that reduction opportunities still exist by adopting low VOC-emitting alternative products to replace cutback asphalt.

The graph below shows the overall EI of liquefied asphalt products in 2017 and 2019, and the reduction target for 2023 of 40% from the 2017 level. For the purpose of comparison, the EI for 2019 shown in the graph is based on the information provided by the manufacturers who also reported for 2017.

Figure 1: progress towards meeting the 2023 target



CONCLUSION

Based on the information provided by the industry for 2017 and 2019, Environment and Climate Change Canada concluded that the liquefied asphalt sector in Canada is slowly making progress towards reducing VOC emissions from the use of liquefied asphalt. However, to achieve the Code's objective of a 40% VOC emission reduction by 2023 from the 2017 level, there must be an increase in the use of lower emitting products, such as emulsified asphalt.

NEXT STEPS

Environment and Climate Change Canada will continue to design and carry out compliance promotion activities specifically for the Code.

In 2021, efforts are focusing on the promotion of lower VOC-emitting products to help achieve the 40% reduction target by 2023. This includes a campaign to promote the Code's recommended practices to municipalities as well as federal and provincial municipal associations who play a role in paving contract negotiations. Compliance promotion activities will also include reaching out to paving contractors to ensure training is provided to personnel who conduct paving or maintenance operations on how to apply low VOC-emitting alternative products.

Environment and Climate Change Canada will publish a third progress report on the activities of liquefied asphalt manufacturers covering the 2021 calendar year.

Over the longer term, if the Code's objectives are not met, it may be necessary to amend the Code or develop another control instrument to better manage VOC emissions from the liquefied asphalt sector.

CONTACT

If you have any questions regarding this report, please contact the Products Division at 1-888-391-3426 or by email at ec.produits-products.ec@canada.ca.

ANNEX - UPDATED 2017 RESULTS

Table 5: amended 2017 quantities of liquefied asphalt manufactured and resulting VOC emissions

Type of liquefied asphalt and time of year	Quantity of asphalt manufactured (kt)	Proportion in total production (%)	Resulting VOC emissions (kt)	Proportion in total VOC (%)
CA during ozone season	30.0	9.2	2.4	36.1
CA outside ozone season	9.5	2.9	1.1	16.8
EA during ozone season	268.7	82.9	3.0	44.8
EA outside ozone season	16.0	4.9	0.2	2.3
Annual total	**324.3**	**100.0**	**6.7**	**100.0**

Table 6: amended 2017 products manufactured exceeding the Code's recommendations and resulting VOC emissions

Type of liquefied asphalt and time of year	Number of products reported		Products manufactured exceeding the Code (kt)	Resulting VOC emissions (kt)
	Respecting the Code	Exceeding the Code		
CA during ozone season	7	20	20.0	2.4
CA outside ozone season	8	8	3.9	1.0
EA during ozone season	94	6	4.8	0.3
EA outside ozone season	54	N/A	N/A	N/A
Annual total	**163**	**34**	**28.8**	**3.7**