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Used Oil Policies to Protect the Environment: An Overview of Canadian Experiences

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Abstract

We examine some consequences of dumping used oil in the environment and review some policies to foster used oil recycling. We then contrast policies adopted in the Canadian Prairie Provinces for managing used oil, used oil filters, and containers, with those put in place in the rest of Canada. Our analysis proposes that public-private partnerships relying on economic instruments and public education can be more effective for recycling used oil than public agencies relying mostly on regulations.

Introduction

Each year, Canadians purchase approximately 1 billion liters of motor and lubricating oil (Statistics Canada, 2001). In 1999, 356 million liters of used oil were recycled but a similar volume ended up in landfills, in sewers, or directly in the environment where it contributed to non-point source pollution, spoiling freshwater resources and degrading ecosystems. In fact, used oil is the “single largest environmentally hazardous recyclable material”(MARRC, 2001), and a spill of used oil as small as one liter can potentially contaminate a million liters of freshwater. Pollution can also result from used oil filters and containers. This problem has been overlooked in the transportation and economic literatures where the emphasis of studies linking transportation to pollution has been on air quality or noise impacts, with little consideration for water quality.

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It should be emphasized that only a fraction of the lubricating oil sold is recyclable, because some of it is consumed during use; we adopt here a recycling potential of 70% following recommendations from the American Petroleum Institute (API). In addition, used oil, used oil filters, and containers have recycling value: used oil can be refined again (at one third the energy cost), used for producing asphalt, or burned for energy; metal in used oil filters can be re-used to manufacture metal products such as rebars, nails, and wire; finally, used plastic containers can be processed to produce a variety of plastic products (pipes, posts, etc.).

The purpose of this paper is to see what can be learned from policies put in place in Canada to deal with used oil, used oil filters, and containers. We first review some potential consequences from discharging used oil in the environment. We then consider some policies that can foster used oil recycling, with a focus on economic instruments. Third, we analyze policies adopted in Canada to tackle this problem based on recent phone and e-mail surveys. The last section summarizes our conclusions. This paper should be of interest both in developed countries, where there are increasing concerns for the environmental impacts of transportation, and in developing countries, where the development of motor vehicle transportation threatens an already fragile environment.

Environmental Impacts

To properly motivate the problem, let us start with an overview of potential environmental impacts of used oil. First, used oil is rarely pure: it is often contaminated by chemicals added to motor oil to improve engine performance, by physical and chemical changes during use, or by the combination with other waste during disposal. Common oil contaminants include trace metals and chlorinated solvents; gasoline and products of incomplete combustion; polynuclear aromatic hydrocarbons; and glycols, water and PCBs (Environment Canada, 2001b).

Refined products such as motor oil and gasoline are more toxic than crude oils because they are soluble in water (and difficult to remove once mixed with water), they disperse more readily into water, and they are more easily absorbed by soft tissues (USCG, 2001). As a result, used oil spills can have multiple consequences for humans and ecosystems. Oil concentrations as small as 1 part per million (ppm) can contaminate drinking water supplies. For mammals and birds, harmful impacts may include toxic contamination, destruction of food resources and habitats, and reproductive problems (EPA, n.d.). In addition, oil vapors are toxic to some species and may damage their central nervous system, liver and lungs. Ingesting oil can also impact the ability of animals to digest food and damage their intestinal tract. Moreover, oil reduces the insulating capacity of fur and the water-repellency of feathers, which places some animals at risk of freezing to death or drowning. Oil contamination can also cause reproductive

problems, particularly for birds. It can coat eggs, thus inhibiting gas exchange by sealing pores, which smothers embryos or causes abnormal embryo development (EPA, n.d.).

The severity of these impacts depends on a number of factors including weather, water temperature, geographic features, and specific characteristics of the oil itself. Whereas wave action can disperse an oil spill fairly quickly in open water environments, oil contamination in calm waters can remain in the environment over long periods of time, sometimes for years, thus considerably prolonging its negative impacts (EPA, n.d.). Natural recovery times (through weathering, evaporation, oxidation, biodegradation, and emulsification) can vary considerably, from a few days to more than a decade, particularly if groundwater is impacted.

Groundwater contamination should be a serious concern in Canada since it is the sole source of freshwater for almost 25% of Canadians (Environment Canada, 2001a); most of the Maritime Provinces obtain more than 50% of their freshwater from groundwater sources. However, groundwater contamination is often detected only after the fact. Recent disasters such as chemical seepage from the Hagersville tire fire in Ontario and the deaths resulting from E. Coli-contaminated groundwater in Walkerton, Ontario, have started to focus the public's attention on groundwater pollution.

Used Oil Management Alternatives

In a world with perfect information, a tax (a fine) could be placed on illegal dumping of used oil in order to internalize the resulting negative externalities on freshwater resources and ecosystems. In reality, it is very difficult to quantify these damages and to find the right tax level. There are also two categories of used oil generators: large ones such as industry and service stations, and small ones, such as do-it-yourself oil-changers and rural users. While the former are relatively easy to monitor and regulate, it is not the case for the latter, which are the main source of used oil pollution. Used oil dumping has a moral hazard dimension: an oil user can either dispose of used oil in a recycling facility and incur individual costs, or dump it illegally ("midnight dumping") thereby creating costs for society. Unfortunately, an enforcement scheme with high fines to discourage illegal dumping is likely to be costly and quite unpopular, and thus politically difficult to implement.

Currently, the most common approach is to impose a tax on used oil but this approach encourages illegal dumping: oil changers face not only their time costs but also a tax. In addition, a tax is typically far too low to cover any environmental clean-ups that may be considered. As for many other environmental problems, pollution prevention is much cheaper than pollution clean-up. Subsidies to "virtuous" oil users could be considered, but a pure subsidy

approach is likely to receive a low priority in a context of tight budgets and pressing social needs. It thus makes sense to consider a system combining a tax to generate revenues, and a subsidy to promote recycling and pay for potential damages caused by improper disposal. This approach is more politically acceptable as it rewards socially responsible behavior without imposing high monitoring and enforcement costs on society. An example of such a scheme is a deposit-refund system but variations (see below) are possible. Deposit-refund systems are now common for beverage container recycling, and they have also been successfully implemented for used tires, lead-acid batteries and, in some Scandinavian countries, to prevent the improper disposal of junk cars.

Economic instruments cannot do the job by themselves, however, especially in the context of environmental quality. Education programs are essential to inform the public about potential environmental damages from improper disposal practices and about new economic incentives. Let us now analyze the Canadian used oil management experience.

An Overview of Canadian Regulations and Programs

In Canada, provinces have jurisdiction over used oil management. There are no federal regulations that specifically address the fate of used oil, although several federal laws indirectly deal with used oil pollution.³ To gain an understanding of current provincial legislation for used oil, used oil filters, and oil containers, we surveyed environmental ministries by e-mail and by phone. We found that Canadian provinces can be partitioned in two groups: the Prairie Provinces (Alberta, Saskatchewan and Manitoba) and the rest.

Prairie Provinces. The Prairie Provinces have recently implemented market-based incentives through Environmental Handling Charges (EHC) and Return Incentives (RI): fees are collected on oil sales at the wholesale level and the money collected is used to subsidize returns of used oil, used oil filters, and containers; it is thus a variation on deposit/refund systems. These programs offer an interesting example of partnership between the public and private sectors; they are fully managed and operated through not-for-profit private corporations at minimal costs to the provincial governments.⁴

³ They include the Transportation of Dangerous Goods Act, the Fisheries Act, the Migratory Birds Convention Act, and the Ocean Dumping Control Act.

⁴ This institutional arrangement was retained because there was significant public concern for environmental quality but little support for new government-based programs. According to public opinion polls, 75-80% of Manitoba citizens supported dedicated pre-disposal fees, but the provincial government's fiscal structure does not permit such dedicated fund programs. The province thus opted for a non-profit organization (Personal communication with the Waste Reduction Officer for the Government of Manitoba, 06/07/01).

Saskatchewan was the first province to act when the Saskatchewan Association for Resource Recovery Corporation (SARRC) was established by the provincial government in February 1996. SARRC is a non-profit, industry-run program funded by EHCs on the sale of oil, oil filters, and oil containers. Consumable oils such as 2-cycle or chain oils are exempt and so are oil containers over 30 liters. Return incentives (see Table 1) are paid to registered collectors, who pick up used oil, filters, and containers from large farms and businesses, industry, and institutions.⁵ For do-it-yourselfers, small farms and small businesses, SARRC supports EcoCenters throughout the province.

Prior to the establishment of SARRC, the used oil recovery rate hovered around 23%; today, that figure has grown to 58%. The impact on oil filter recycling was even more spectacular, rising from a pre-program rate of approximately 5% to 79% in 2000. Much remains to be done for used oil containers, however, as the 2000 recycling rate was just 16%, up from 1% prior to SARRC. Details of potentially recyclable amounts and recycling rates are shown in Tables 2 and 3.

Following Saskatchewan, both Alberta and Manitoba adopted similar programs. In April 1997, the Lubricating Oil Material Recycling and Management Regulation created the Alberta Used Oil Management Association (AUOMA), a non-profit organization composed of wholesale lubricating oil suppliers. Similarly, Manitoba authorized in 1997 the incorporation of the Manitoba Association for Resource Recovery Corp. (MARRC) as a non-profit corporation. Both AUOMA and MARRC derive most of their revenues from EHCs on the sale of lubricating products at the wholesale level. They finance collection facilities, return and processing incentives, and public education materials.

As shown in Table 3, recycling rates for used oil and used oil containers have markedly increased since the creation of AUOMA and MARRC. These good results are noteworthy given the low population densities in most of the Prairie Provinces. The recycling of used oil containers is still lagging, however, with Alberta leading the way.

To boost their recycling effort, the Prairie Provinces engage in a variety of public education programs with approximate 2000 budgets of \$62,000 for Saskatchewan, \$114,000 for Manitoba, and \$180,000 for Alberta. They have developed information brochures and web sites. They have also created a mascot ("Mr. Oil Drop") to promote oil recycling, and frequently attend trade shows. Finally, they offer a toll-free number and regularly use media information campaigns.

Other Provinces. Other provinces have either relied mostly on government agencies or have not done much.

⁵ In this paper, all \$ amounts are in Canadian dollars.

In 1992, British Columbia (BC) enacted the Return of Used Lubricating Oil Regulation. This regulation classifies waste oil as a “special waste” and requires oil sellers to contract with a return facility within 4 km to accept used oil at no charge. Of approximately 80.5 million liters that could be recycled yearly, 45.7 million liters were recovered (~57%) in 1999, a very respectable result in comparison to the Prairie Provinces. BC is currently considering new regulations, including “eco fees,” to start recycling oil filters and containers.

The two most populous provinces of Canada, Ontario and Quebec, do not currently have specific policies for managing used oil, oil filters, or oil containers. Ontario’s Environmental Protection Act requires all hazardous and liquid wastes to be registered with the province, but used oil is not considered a hazardous material unless it contains PCBs in concentrations greater than 50 ppm. In Quebec, a proposed new law on used lubricating oil products drafted in June 2000 had not been finalized as of the summer of 2001. It relies mostly on regulations: it requires sellers to provide a recycling service within 5 km in urban areas and regional county municipalities south of the 51st parallel.

Maritime Provinces do not yet have extensive used oil management programs, and they do not collect recycling data. Prince Edward Island (PEI) established a used oil recovery program similar to BC’s in 1992. Nova Scotia passed used oil regulations in 1995, but they only apply to spills greater than 100 liters (5 liters if contaminated); oil filters can still be disposed of in solid waste landfills, although new regulations similar to PEI’s are currently under review. Newfoundland does not have specific policies for managing used oil, but draft regulations are anticipated by the end of 2001; they are based on a voluntary “return to retail” program and/or a wholesale tax.⁶ Finally, New Brunswick does not yet have used oil policies.

Unlike the Prairie Provinces, the rest of Canada does not do much for educating the public on used oil recycling.⁷ British Columbia seems to be the most active: it has a recycling hotline and provides copies of regulations upon request; unfortunately, public education efforts there have been hampered by recent budget cuts.⁸

⁶ Phone conversation with Eric Maddox from the Newfoundland Department of Environment on 4/20/01.

⁷ Ontario, Prince Edward Island, New Brunswick, and Newfoundland did not provide us with any information on public education programs. Quebec is expecting to create public education programs in partnership with industry in the future.

⁸ E-mail from Tina Neale, information services Director, BC Recycling Council, 06/29/01.

Summary and Conclusions

Based on our survey and discussions with environmental officials, there are a number of reasons for which a well-structured, privately run, non-profit organization (PRNPO) is more effective than a government agency to manage taxable, recyclable materials such as used oil. A PRNPO has a more focused mission, with a guaranteed stream of revenues; it can thus reap gains from specialization under private sector discipline, and its performance is easier to evaluate if appropriate disclosure requirements are in place. By contrast, a government agency typically has a multitude of missions, which makes it difficult to assess its performance and track its use of resources. Indeed, government agencies were unable to estimate the number of staff hours spent on used oil programs, whereas this information is readily available in the Prairie Provinces. Moreover, a government agency is subject to shifting political priorities and to budget cuts (e.g., BC) which may hamper the achievement of long-term goals. Even British Columbia, which obtains respectable results with its regulatory program, is now considering the adoption of the PRNPO model. Although this analysis should provide a useful point of departure for other countries, the performance of the Prairie PRNPOs should be monitored to see how it withstands the test of time.

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Province	Used Oil (\$/liter)	Used Oil Containers (\$/kg)	Used Oil Filters (\$/205 liter drum)
Alberta	\$0.08-\$0.17	\$0.87-\$1.10	\$80.00-\$140.00
Manitoba	\$0.08-\$0.17	\$0.95-\$1.35	\$80.00-\$170.00
Saskatchewan	\$0.08-\$0.14	\$1.00-\$1.35	\$100.00-\$160.00

Table 1. Ranges of Return Incentive for the Prairie Provinces

Province	Used Oil (10 ⁶ liters)	Used Oil Containers (metric tons)	Used Oil Filters (10 ⁶ units)
Alberta	98	2590	6.7
Manitoba	19.6	950	1.9
Saskatchewan	25.9	1000	2.2
British Columbia	80.5	N.A.	N.A.

Table 2. Potentially recyclable used oil, oil containers, and oil filters.

Province	Used Oil	Used Oil Containers	Used Oil Filters
Alberta			
Before	41%	7%	17%
After	62%	36%	81%
Manitoba			
Before	33%	N.A.	N.A.
After	56%	13%	75%
Saskatchewan			
Before	23%	1%	5%
After	58%	16%	79%
British Columbia	57%	N.A.	N.A.
Rest of Canada	47%	N.A.	N.A.

Table 3. Recycling rates for used oil, oil containers, and oil filters.

Notes. We assume a 70% recycling potential following recommendations from the American Petroleum Institute. “Before” volumes of recycled used oil are 40, 6.5, and 6 million liters for Alberta, Manitoba, and Saskatchewan respectively. “Before” refers to recycling rates prior to the instauration of EHC and RI programs. “After” are recycling rates for 2000. “N.A.” means non-available. The “Rest of Canada” is all the provinces but Alberta, Manitoba, Saskatchewan, and British Columbia.

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