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Technical Memo #6

Waste Generator Source Separation



**Comox Strathcona
Waste Management**

TO: Regional Solid Waste Advisory
Committee (RSWAC)

TO May 2, 2024
RSWAC:

FROM: Larry Gardner, ASCT

TO To be presented at a future
BOARD: CSWM Board Meeting (Month
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Strategy Description

Improving Convenience

This Technical Memo discusses the concept of mandating that waste generators have separate waste bins for each stream of waste: organics, recycling and garbage. The objective is to improve convenience in recycling and consequently increase diversion.

Applicable Guiding Principles

- ✓ *Maximize beneficial and best use of waste materials and manage residuals appropriately.*
- ✓ *Prevent organics and recyclables from going into the garbage.*
- ✓ *Build and support collaborative partnerships to achieve regional targets.*

Typically, communities with residential curbside single-stream collection (i.e. garbage only) will have recycling depots within their community. Rarely will there be an option for managing organics, particularly food waste, other than through home composting. Where these communities have transitioned residential collection to multi-stream curbside collection of garbage, recyclables and organics, they have provided customers both opportunity and convenience in diversion. This type of service change typically will increase participation with recycling and consequently diversion rates increase. The same premise holds true for every other sector of waste generator, such as multi-family or commercial businesses; namely providing opportunity and increased convenience will lead to higher levels of participation in waste diversion.

Academic studies conducted worldwide on the subject typically draw the same conclusion, that diversion increases with convenience. A recent study by DiGiacomo¹ in Vancouver showed convenience improved composting and recycling rates in high-density residential buildings; increased recycling rates ranged from 70 per cent to 147 per cent in the study.

- A recent study by Damien Wei Xiang Soo² in Singapore found that people are more likely to recycle when recycling is more convenient.
- McDonald, S. and Oke, A.³, in considering recycling behaviour between home and work, stated “opportunities (with regard to options and facilities) to perform recycling are fundamental and often shape a consumer’s decision-making process in whether to engage in recycling.”

The findings above are not likely to be a surprise to most people, and the sentiment is well captured in a quote from Ruben Anderson, Behavior Change Consultant:

From a behavioral perspective, it is impossible to increase recycling behavior if there is no recycling bin. And yet this is exactly the strategy that has been pursued for decades. “Educate” people about the importance of recycling... and then what? Are they supposed to take recyclables home from the office in their purse?

Value of Source Separated Materials

The concept of having bins available to all generators for source separation should not just consider increasing convenience, but also weigh the quality of the diverted materials. Similarly, cost is always a consideration and is relative to costs of achieving the same diversion by another means.

In considering costs, there are really only two options for diverting waste after reduce/reuse have been exhausted which are 1) source separation from waste, or 2) post-collection sorting from waste.

¹ DiGiacomo, A., Wu, D. W. L., Lenkic, P., Fraser, B., Zhao, J., & Kingstone, A. (2018). Convenience improves composting and recycling rates in high-density residential buildings. *Journal of Environmental Planning and Management*, 61(2), 309–331.

<https://doi.org/10.1080/09640568.2017.1305332>

² Damien Wei Xiang Soon, Promoting recycling behaviours through convenience: Focus on the relatives, not the absolute, *Cleaner Waste Systems*, Volume 7, 2024, 100135, ISSN 27729125,

<https://doi.org/10.1016/j.clwas.2024.100135> (<https://www.sciencedirect.com/science/article/pii/S2772912524000071>)

³ MCDONALD, S. and OKE, A. 2018. Recycling at home and work: an exploratory comparison. *Social business [online]*, 8(2), pages 145-165. Available from: <https://doi.org/10.1362/204440818X15208755610874>

It is beyond the scope of this paper to provide a cost accounting of the two options, but in simple terms, source separation system costs are an order of magnitude lower as compared to post-collection sorting of mixed waste (mixed waste is when organics, recycling and garbage are all put into one bin). This is largely because the majority of the “work” of sorting is borne by the waste generator (business or resident). Mixed recyclable collection (e.g. paper, plastics, metal in the same bin) still requires further sorting down stream of collection, but is far more efficient and cost effective than pulling recyclables out of a mix of the mixed waste stream (with organics and garbage). Post-collection sorting of mixed waste streams has very high operational costs and high capital cost to construct a facility.

As for the quality of materials, source separation consistently results in higher value and more marketable materials because they do not have the same contamination challenges of post-collection sorted material. Incidentally, most mixed waste post-collection sorting is geared towards energy production where much of the material is used as a fuel for energy production.

Strategy Examples

Based on improving convenience, promoting diversion of high value recyclables and low system costs, two regional districts in the province have developed regulatory programs to incent source separation by waste generators:

- Fraser Valley Regional District – FVRD adopted Bylaw 1495 in 2018 which requires recyclables, organic waste and refuse to be taken to a facility or facilities that manage the separated waste stream of recyclables, organic waste and refuse. The bylaw infers that separated waste containers are required to comply with requirements. Enforcement is through the courts and on summary conviction fines will be levied of not less than \$5,000 and not more than \$10,000. The bylaw is cumbersome and costly if it is to be enforced as evidence must be gathered on the waste source and destination to support a conviction. Also, the legality of the bylaw provisions is yet to be tested in court. FVRD has been using the bylaw as a tool to encourage voluntary compliance. To date, they have not assessed the efficacy of the bylaw with respect to increasing diversion. FVRD has indicated that, antidotally, there is some improvement with multi-family diversion as a consequence of the bylaw.
- Regional District of Nanaimo – The RDN has created a draft bylaw, Bylaw 1812, that requires all commercial, institutional and multi-family buildings to have bins allowing for waste source separation. A generator can have three separate containers, or a partitioned container or containers, that are clearly labeled and identifiable as separate storage for each of garbage, recycling and organic material. Alternately, the regulated party may contract with a waste collector to pick-up and haul the material to a sorting

facility. Fines for non-compliance range from \$300 to \$500. Note that the RDN bylaw does not go as far as compelling the waste generator to use the bins. The RDN is awaiting a decision from the Minister of Environment and Climate Change Strategy on approval of their Waste Hauler Licensing Bylaw before adopting Bylaw 1812 as they plan to initiate the two programs concurrently.

There are other means by which a regional district could make compulsory the provision for waste generators to have source separation such as:

Compulsory Waste Collection Service – This is akin to the compulsory residential curbside collection service provided in a number of communities within CSWM. However, the service would be expanded to all waste generators including multi-family, institutional and commercial locations. Essentially every business and residence would automatically be included in a CSWM waste collection system which could include the requirement for placing different materials in separate bins or bags. Such a system could be provided by local government staff, or contracted out to a private hauler or haulers. The overall intent is to improve collection delivery efficiency, reducing overall system costs through increased scale of economy. It is recognized that over time, this could potentially lead to a reduction in competition, and the potential for rate increases without alternative service providers. However, this could be counter balanced by procurement with more than one hauler to maintain the physical presence of multiple service providers in the region.

Waste Hauler Licensing — Waste haulers could be licensed, and a condition of license could require that only source separated material be collected, or that the collection of mixed waste be subsequently sorted. Given that source separated material typically has more value (lower contamination) than post-collection separated material, and source separation has lower sorting costs than post-collection sorting, invariably most customers are likely to chose the lower cost option - source separated bins.

The advantage of Waste Hauler Licensing over a Compulsory Waste Collection Service is that it retains private sector competition. To establish Waste Hauler Licensing, additional authorities must be accessed by the regional district through approval of the Solid Waste Management Plan. The concept outlined here is to set up hauler licensing with the primary objective of having haulers only collect source separated material.

A separate Technical Memorandum, Waste Hauler Licensing, presents a strategy that proposes to use licensing to introduce an economic model that makes disposal of recyclable material in mixed waste more expensive, and waste diversion more profitable.

Flow Management — Flow management is the ability to direct the hauling of waste, or the hauling of recyclables, within or through the area covered by the Solid Waste Management Plan. To establish flow management regulation, additional authorities provided by the SWMP are required. Metro Vancouver proposed to introduce Flow Management but was denied by the province. The province cited concerns that the bylaw would create a monopoly on waste management and destabilize the private hauling industry and might increase illegal dumping. As this concept has already been turned down by the province, it is not discussed further here. However, if CWSM wanted to pursue the concept further details on the Metro Vancouver model could be investigated.

Reinforcement of the Strategy Through Landfill Restrictions

In all cases, the activity of source separation can be enhanced by restrictions on materials at CSWM landfills by way of bans and surcharges. Bans and surcharges directly impact waste haulers bringing divertible material to the landfill. Where restrictions are in place, haulers are likely to encourage their customers not to place unacceptable material in waste containers destined for the landfill. It is common for waste haulers to also apply charges to their customers where they have placed unacceptable or divertible materials (e.g. large quantities of cardboard) in their waste collection bins.

CSWM Background

CSWM's 2012 Solid Waste Management Plan proposed the concept of mandatory recycling by the Industrial Commercial Institutional (ICI) sector in areas where recycling services are readily available. Examples presented were to:

1. Require all ICI buildings to implement a recycling collection service by a defined date (this closely resembles the Fraser Valley Bylaw example), or
2. Provide recycling collection services to ICI buildings as a local government service (described above as the Compulsory Waste Collection Service).

Since that time no major initiatives have been undertaken by the CSWM to regulate the ICI sector waste. It is worthy of note that in 2021 there was a consideration for expanding curbside collection to single-family rural residents in the Comox Valley Regional District, based on an initiative from the CVRD Electoral Area Services Committee. Through an Alternative Approval Process, it was deemed there was not community support for establishing a Compulsory Waste Collection Service for these residents.

The City of Courtenay also recently (Nov. 2022) removed multi-family and ICI generators from their contracted collection service (provided by Emterra), and now provide service to single-family dwellings only (with some exceptions). The private sector has filled in the gaps, and multiple companies were offering to provide quotes for buildings and businesses. There was no

requirement for recycling to be provided as part of this replacement service. Removal from the compulsory service was due to demand for more control over service delivery by individual businesses and buildings, as well as financial challenges of fairly distributing costs among users.

Multi-family dwellings in Courtenay were previously included as part of the Recycle BC program, and the city received revenue from Recycle BC for each dwelling unit to offset the cost of providing recycling to buildings. The funding from Recycle BC was in the realm of \$19 per household per year, plus the \$3 top up for education and service delivery. After the exit of the consolidated service delivery by the City of Courtenay, Recycle BC approached the private haulers operating in the area to sign up with them, in order to be able to offer subsidized recycling collection to multi-family dwellings and to cover the cost of processing. The private haulers declined to participate citing cost efficiencies in combining ICI and MF on their routes, and high contamination standards in the contract.

Waste Available for Diversion

Table 1 below is an extract from the 2017 Comox Strathcona Waste Management Waste Composition Study (Table 3.16) and is useful in estimating the amount of material that could possibly be diverted from the waste stream.

Table 1: Top 5 Divertible Items by Generator, 2017 CSWM Waste Audit

Sample Type	Ranking	Material Category	Tonnage (kg/yr)	MT/yr	% of Sample Type
Self Haul (Cash Drop)	1	Yard Waste	201,760	201.76	5.99%
	2	Food Waste	151,918	151.92	4.51%
	3	Clean Wood	109,051	109.05	3.24%
	4	Other Steel (non-packaging)	49,510	49.51	1.47%
	5	Hazardous Products & Electronics	28,515	28.51	0.85%
		Total Top 5 Self Haul (Cash Drop)	540,754	540.75	16.06%
		Total All Self Haul (Cash Drop) Material	3,366,899	3,366.90	100.00%
Small ICI/Multi-Family	1	Food Waste	4,605,649	4,605.65	19.97%
	2	Paper Tissue/Towelling	1,295,801	1,295.80	5.62%
	3	Yard Waste	1,153,252	1,153.25	5.00%
	4	Hazardous Products & Electronics	943,945	943.95	4.09%
	5	Other Printed Paper (Obligated)	831,809	831.81	3.61%
		Total Top 5 Small ICI/Multi-Family	8,830,456	8,830.46	38.29%
		Total All Small ICI/Multi-Family Material	23,063,475	23,063.48	100.00%
Large ICI	1	Food Waste	962,906	962.91	24.72%
	2	Yard Waste	329,781	329.78	8.46%
	3	Old Corrugated Cardboard	244,875	244.87	6.29%
	4	Newsprint Flyers and Inserts	203,893	203.89	5.23%
	5	Hazardous Products & Electronics	141,554	141.55	3.63%
		Total Top 5 Large ICI	1,883,009	1,883.01	48.33%
		Total All Large ICI Material	3,895,998	3,896.00	100.00%
CND	1	Clean Wood	240,336	240.34	2.28%
	2	Other Steel (non-packaging)	153,350	153.35	1.45%
	3	Yard Waste	101,988	101.99	0.97%
	4	Old Corrugated Cardboard	99,105	99.10	0.94%
	5	Drywall/Gypsum	83,546	83.55	0.79%
		Total Top 5 CND	678,324	678.32	6.42%
		Total All CND Material	10,557,919	10,557.92	100.00%
Curbside (Single Family Residential)	1	Food Waste	6,525,415	6,525.42	32.52%
	2	Paper Tissue/Towelling	1,121,959	1,121.96	5.59%
	3	Yard Waste	1,055,984	1,055.98	5.26%
	4	Flexible Film Plastic – LDPE & HDPE (packaging)	444,678	444.68	2.22%
	5	Clear and Coloured Glass containers	369,209	369.21	1.84%
		Total Top 5 Curbside (Single-Family Residential)	9,517,245	9,517.24	47.43%
		Total All Curbside (Single-Family Residential) Material	20,063,830	20,063.83	100.00%

Table 2, below, applies the data from the 2017 audit to determine the possible diversion potential from all sectors excluding municipally serviced single family residential curbside collection. Municipal curbside collection is excluded as there is already multi-stream collection and it is not impacted by this strategy. Although there has been changes in waste quantities since 2017, the relative percentages of divertible materials are not expected to have changed significantly since that time since expansion of food scrap diversion just began in 2023. As can be seen, with a moderate uptake in waste generator participation in recycling due to having source separation bins, it is reasonable to expect an amount in the range of 20 per cent of the

material being diverted and a 3.9 per cent reduction of the total waste stream. In the absence of any other motivation to use the source separation bins, this is likely to be the upward diversion limit. It may be possible to enforce the use of the source separation bins but relying on oversight has not been effective where it has been attempted (e.g. San Francisco 2008 claimed to be the first USA mandatory recycling law) as communities have not ultimately supported the cost nor the enforcement regime. Other models, such as licensing waste haulers have the potential to motivate haulers so that they encourage their customers to source separate.

Table 2: Aggregate Diversion Potential for All Sectors (Excluding Single Family Residential)

2017 CSWM Waste Audit Data, Total Waste Stream 61,500 tonnes*			
Percent of Available Material in the Waste Stream Removed	Available Divertible Material Metric Tonnes (MT)	Divertible Material Removed (MT)	% of Diversion Impact to Total Waste Stream
100 % Removed	12,000	12,000	19.5 %
70 % Removed	12,000	9,000	14.6 %
50 % Removed	12,000	6,000	9.8 %
20% Removed	12,000	2,400	3.9 %
10% Removed	12,000	1,200	2.0 %

*values rounded to nearest 1000 tonnes

Options for Implementation

Strategy 1 – Introduce a Bylaw Requiring Source Separated Materials to be Taken to Recycle Facilities

This strategy would mirror the Fraser Valley Regional District approach, where FVRD adopted a bylaw that requires recyclables, organic waste and refuse to be taken to a facility or facilities that manage the separated waste stream of recyclables, organic waste and refuse. Legal advice should be obtained on the enforceability of such a bylaw.

Operational and Staffing Impacts Anticipated

If FVRD's bylaw is used as a template, there are minimal set up costs. Resource demands will be highly dependant on how the bylaw is enforced. In the case of FVRD, the bylaw is primarily an education tool in responding to complaints mostly from multi-family residents that don't have source separation bins. The level of effort placed on administering the bylaw is minimal. However, if proactive inspections and enforcement was to be carried out, it would take at least one full time staff member.

Estimate of Diversion Impact

FVRD reports that, antidotally, they believe there has been some minor increase with diversion in the multi-family sector. A reasonable estimate for diversion impact would be less than 1 per cent of the total waste stream. With a moderate level of active enforcement, this strategy could achieve recovery of 20 per cent recovery of materials resulting 3.9 per cent diversion increase to the total waste stream.

Financial Implications

Using the bylaw as primarily an education tool in responding to complaints is expected to have a minor impact to staff workload equivalent to \$5,000 annually. With a moderate level of enforcement, it is estimated that one full time position would be necessary and combined with legal costs would be \$170,000 annually. Enforcement costs may be reduced over time if successful prosecutions are achieved, as other parties will see that the consequence of non-compliance is real. However, the complexity in gathering evidence and the court process for a conviction result in a significant time delay from infraction to penalty and may not have the same deterrent effect as a more expedient enforcement model.

Regulatory Authority Required

FVRD relied on the authorities in the *Local Government Act* that authorizes local government to require owners or occupiers of property to use a waste disposal or recycling service or require waste to be taken to a specified place. Such authority can be adopted through a bylaw directly by local government. Note that the activity of administering the bylaw also needs to be within the “waste management service” which is detailed in CSWM’s establishing bylaw.

Strategy 2 – Require the IC&I and All Residences to Have Source Separated Bins

This strategy would mirror the Regional District of Nanaimo approach – the RDN has been granted exclusive authority by the BC Legislature to require persons to have source separation bins. The authority is not readily available to other regional districts. However, as regulation has been passed granting the RDN this authority, there is a good chance that similar petitions from other regional districts will also meet with success. The RDN has crafted a draft bylaw that they plan to enact that will require all business and residences to have separated bins for recycling or to contract with a hauler that carries out post-collection sorting. More information on their initiative including consultation can be found on their [webpage](#).

Operational and Staffing Impacts Anticipated

If the RDN’s draft bylaw is used as a template, there are minimal set up costs. The RDN’s primary consultation on this strategy was done in conjunction with the overall Solid Waste Management Plan review and included print, television, radio, social media, advertising, surveys and meetings. Through the review process, the RDN estimated that there were in the

order of 500,000 notifications, of which 4,000 were in-person conversations⁴. Additional education on the bylaw will take place when the bylaw is introduced with a cost in the order of \$40,000.

The bylaw as written proposes to carry out enforcement on a largely complaint driven process. Given the ease of enforcement (i.e. determine if separate bins available) and moderate fines for non-compliance, it is anticipated that only a few enforcement actions will have a large deterrent impact and influence overall community behaviour to comply. The consequence is that haulers are more likely to “sell” a multiple bin service to their customers which lessens the role of enforcement over time. This contrasts with the FVRD bylaw that is complicated to enforce because the contravention is for the action of “not taking the recyclables to a recycling facility.”

Estimate of Diversion Impact

With a minor level of active enforcement, this strategy could achieve recovery of 20 per cent of divertible materials resulting in an estimated 3.9 per cent (2,400 tonne) diversion increase to the total waste stream. This is probably the upward limit of impacting diversion rates unless there is some other motivation to use the separated bins. The RDN is targeting a 10 per cent diversion of their total waste stream through a combination of their source separation bylaw, and their intention to introduce Waste Hauler Licensing; Waste Hauler Licensing is expected to motivate the use of separate waste containers and is discussed in a separate Technical Memorandum.

Financial Implications

To ensure that initial communication on the bylaw is broad reaching, and if undertaken with other CSWM communication, communication costs would be in the order of \$40,000. If three months of intense enforcement activity was to be carried out over the first year of bylaw introduction, the cost would be about \$30,000. Cost should fall after initial introduction and be under \$10,000 annually.

Regulatory Authority Required

Local government does not have the authority to regulate municipal solid waste or recyclable material at the site at which it originates other than requiring the use of a collection service or the removal of material to a specified place. However, such authority can be provided by the BC Legislative Assembly and, on May 8, 2023, the Legislative Assembly amended the *Nanaimo Regional District Regulation* to include:

⁴ Appendix H -RDN Stage 3 Public Consultation; https://www.rdn.bc.ca/sites/default/files/inline-files/Appendix%20H_0.pdf

“The Nanaimo Regional District is granted the additional power to, by bylaw, require owners or occupiers of real property to have separate containers for different types of solid waste and recyclable material.”

If CSWM is to pursue this strategy, it will be necessary to demonstrate community support. The SWMP renewal provides the means to gauge community support for the strategy. If the strategy does ultimately get included in the Solid Waste Management Plan, the plan provides the justification to support a petition to the B.C. Legislature for regulation providing the authority.

Strategy 3 – Compulsory Waste Collection Service

This strategy would involve the local government operating a collection service for all waste generators in the CSWM. The work could be done directly by CSWM, municipal partners or by contracted haulers. It is essentially an expansion of the municipally run curbside collection programs that are currently in place in the region. Albeit different equipment and frequencies of collection would be used for collecting the ICI and Multi-family sectors. Typical municipal operated residential curbside services do not provide an option to “opt out” and everyone pays for the service through a utility fee or taxation. The same concept of everyone participating would apply to a compulsory collection service.

A compulsory service does not mean everyone receives the same service or pays the same rate. Areas with low population densities would need a different service or, perhaps, more practical to exclude from the service entirely. Further exploration of the concept for application in rural areas is required along with other strategies that might be more practical in the circumstance.

Operational and Staffing Impacts Anticipated

Operational and staffing needs would be significant to support a service for all ICI, multi-family and residential generators. Based on high level costs for delivery of a service to all waste generators by the City of Courtenay in 2022, extrapolated to the entire CSWM population, conceptually annual operating costs for such an undertaking would likely been in excess of \$26 million. This estimate assumes to include all current municipal delivered collection services; these could continue to be delivered by municipal governments and overall program costs would decrease accordingly. An increase in staffing of 1.5 full-time positions are required based on the experience of other jurisdictions.

Estimate of Diversion Impact

Diversion would be similar to the other options presented (e.g. 3.9 per cent range). Diversion could be increased by more rigorous enforcement in using the separate material bins. But like

all the other options presented, a bigger regulatory hammer substantially increases cost, has diminishing returns, and is more likely to alienate the community.

The RDN estimated the combination of requiring the IC&I and residential sectors to have source separation bins in combination with Waste Hauler Licensing could potentially lead to 70 per cent recovery of the available divertible waste; 70 per cent recovery of this waste in the CSWM would have a diversion improvement of 14.6 per cent. This concept is discussed in the Technical Memorandum on Waste Hauler Licensing.

Financial Implications

Financial implications would by far exceed any other strategy presented here. Costs could be expected to exceed \$26 million annually if the service delivery was comprehensive, and reduced if municipalities continued to deliver their service to local residents.

Regulatory Authority Required

Although regional districts have the authority to set up compulsory collection service the service itself must be set first set out in a “service establishment bylaw.” If CSWM’s existing establishing bylaw requires revision, it likely needs to be approved by the Inspector of Municipalities. Strategies adopted in the Solid Waste Management Plan would provide the justification for such changes in service. Other than the CSWM internal bylaw approval process, additional costs would be for legal advice in the order of \$10,000.