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**From:** Michal Simhon & Malcolm Shield

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**Project:** Corporate Carbon Neutral 2032 Plan

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**Subject:** Progress Update

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## 1 PURPOSE

This Progress Report (the Report) presents the work completed to date as part of the development of the Regional District of Nanaimo's (RDN) *Corporate Carbon Neutral 2032 Plan* (the Plan).

The Report provides the context for developing the Plan, details the scope of the Plan, briefly introduces the scenarios that will be evaluated through a triple-bottom-line plus risk approach (TBL + risk) using a multi-criteria analysis framework, and the rationale for using such an approach. A summary of the two workshops held to date with RDN staff is also presented.

The Report has been developed by Associated Engineering (Associated). Associated was retained to provide consulting services to support the development of the Plan in February 2020, in response to RFP #20-001.

## 2 CONTEXT

### 2.1 Strategic Plan Context

The RDN's 2019-2022 Strategic Plan outlines a number of goals. Of greatest relevance is the Climate Change Goal 1.0 to "Be leaders in climate change adaptation and mitigation, and become net zero by 2032", with Climate Change Action 1.2 "Review and update corporate emissions plan and greenhouse gas (GHG) reduction strategy" pertaining directly to the Plan. The RDN's *Corporate Carbon Neutral 2032 Plan* will complement the *Strategic Plan* and develop the means for the RDN to follow through on the implementation of carbon neutrality measures.

### 2.2 Energy and Emissions Context

The RDN currently reports its emissions to the Province of BC as part of the Climate Action Revenue Incentive Program (CARIP) that provides a rebate for the carbon tax paid by local governments on their fuel and electricity use. This reporting allows the sources of the RDN's emissions to be broken down by fuel type, as shown in *Figure 1*. CARIP reported emissions result from both stationary sources (building/facility space heating, hot water and electricity consumption), and mobile sources (RDN vehicle fleet and small equipment liked that used for landscaping). *Figure 1* includes emissions from contracted services, e.g. waste collection trucks, but excludes emissions from Transit, since transit services are out of scope (and are discussed in *Section 3.1.1*), as they are the jurisdiction of BC Transit.

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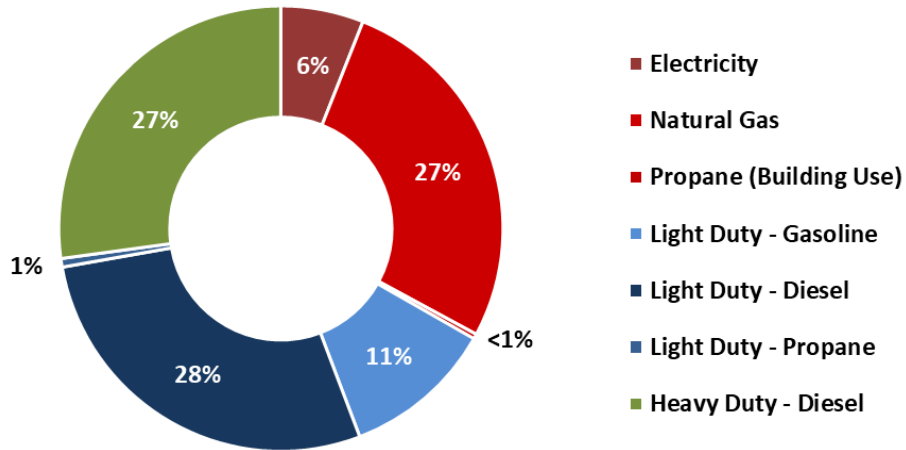


Figure 1: RDN GHG Emissions Distribution by Fuel Type (for 2019)

Diesel use in light-duty vehicles was the largest emission contributor at 28% of total emissions, followed, jointly at 27%, by natural gas use in buildings and facilities and diesel use for heavy-duty vehicles. Gasoline use in light-duty vehicles accounts for 11% of total corporate emissions, with building and facility electricity use accounting for only 6% of the total since electricity in B.C. is almost carbon neutral. Propane use within the RDN's operations is negligible at less than 2% of total emissions.

### 3 PLAN DEVELOPMENT PROCESS

The Plan development process is shown in Figure 2, with completed tasks shown in green, current tasks in red, and future work with no colour (shared shading indicated approximate task completion).

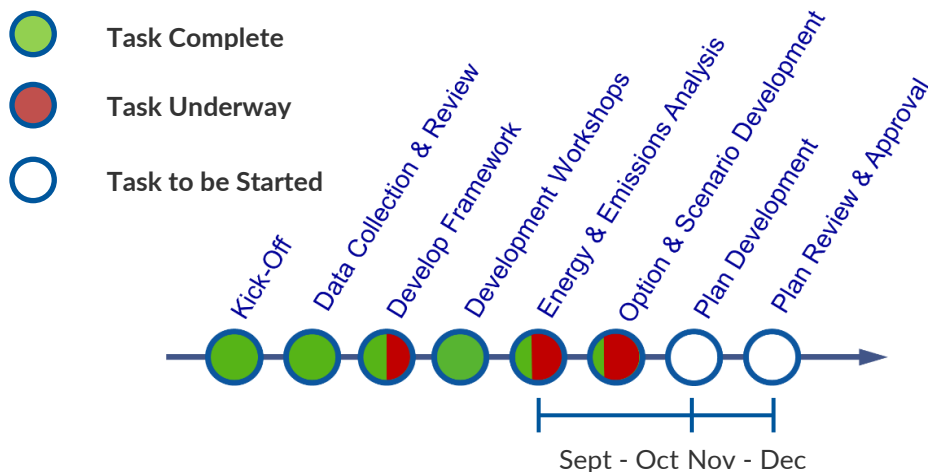


Figure 2: Carbon Neutral Plan Development Process

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The development process is designed to review the current state of emissions reporting and planning to inform the path forward, rather than taking a retrospective view to understand, in detail, past emissions. A draft vision and set of guiding principles are under development, with the intent that they will shape the Framework Development to assess the RDN's carbon neutral options (which are discussed in *Section 3.2*).

The Data Collection and Review, coupled with the Development Workshops, provide the foundation to develop and assess potential emission reduction actions. Those actions may be both technical, i.e. relate to the nature of the technology changes that the RDN should consider in achieving carbon neutrality by 2032, as well as procedural, i.e. action related to the business functions and operations of the RDN and how it discharges its core mandate.

Energy and emissions analyses have been completed for current operations, and work is underway on the Options and Scenarios Development using a bespoke MSEXCEL-based emissions model which is currently under development (discussed in *Section 3.5.1*). The model will allow future emissions, under a range of scenarios, to be estimated between now and 2032- the target year for the Plan. This analytical tool, along with the insights from RDN staff (through the workbooks and development workshops), and Associated's experience with other local governments, will form the basis for the proposed actions that will be co-developed with RDN through September and October 2020. Based on initial feedback of the proposed actions from RDN Staff, the Climate Action Technical Advisory Committee and the Committee of the Whole, final actions will be proposed in the Draft Plan to be presented for the Committee of the Whole's consideration before year-end.

Each stage of the process is discussed in more detail below.

### 3.1 Data Collection and Review

Associated worked together with the RDN to collect information relevant to the development of the Plan. These included past emissions reports, fuel and electricity use data, current corporate strategic plans and policy, as well as various 2019 Annual Reports. Data related to the RDN vehicle fleet was collected through a brief survey circulated to the RDN's various Departments to understand the vehicles currently in use in their fleets.

#### 3.1.1 Scope of the Plan

##### *Facilities and Assets in Scope*

The scope of the plan is consistent with guidance from the Provincial Government, under the Green Communities Committee (GCC) *Carbon Neutral Framework*<sup>1</sup>. The *Framework*, which is a core tenet of the Climate Action Charter to which the RDN is a signatory, ensures that local governments plan to eliminate their emissions from what are termed "traditional services". These include such things as: administration and facility buildings; fleet vehicles, solid waste collection and diversion; road and traffic operations; water management (drinking, storm and waste); fire protection and recreation and cultural services. Outside the scope of the GCC Framework, but consistent with the internationally recognized GHG Protocol's need to manage emissions over which an organization has direct jurisdictional control<sup>2</sup>, the emissions from the disposal of solid waste (i.e. landfill gas emissions) are also considered in scope.

<sup>1</sup> Province of BC, *Becoming Carbon Neutral Guide*, <https://www.toolkit.bc.ca/sites/default/files/BecomingCarbonNeutralGuideV3.pdf>

<sup>2</sup> GHG Protocol, *GHG Protocol for Cities*, <https://ghgprotocol.org/standards>

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Explicitly excluded from the scope are aviation and marine emissions, and emissions associated with the provision of transit services (both fleet and facilities), since, consistent with the GHG Protocol, these are under the control of BC Transit and outside the scope of the *GCC Framework*. In some cases, emissions sources that are known to be, or can be rationally expected to be, very small may also be excluded since they do not materially impact the total emissions of the RDN. Construction related emissions (and other “embodied emissions”) are considered out of scope by the *GCC Framework*.

### ***Technologies in Scope***

When considering which technologies to include in a potential pathway to achieve net-zero emissions, only commercially available technologies will be included in the scenarios. There is likely a role for the RDN to play in undertaking an innovative response to the climate crisis, but this is better positioned to be on the “leading edge” rather than the “bleeding edge” of technology uptake and demonstration.

## **3.2 Develop Framework**

In an iterative process that was based on the results of the data collection and review stage, the Workbooks (see below, *Section 3.3.1*) and the Development Workshops (discussed below in *Sections 3.3.2 & 3.3.3*), a multi-criteria analysis framework is being developed to evaluate technology and management options to achieve carbon neutrality.

A multi-criteria analysis framework allows different technology options to be evaluated based on a set of criteria spanning the economic, environmental and social criteria; such as GHG reduction potential, cost implications (capital and life cycle), resilience, and required operational / cultural change, air quality improvement, job creation, etc. Each criterion will be weighted in-line with the priorities of the RDN, as directed by RDN staff. Additional criteria to assess potential risk will be included for factors such as technology risk, fuel availability risk, and operations and maintenance skills availability. Once the criteria are confirmed, the scenarios will be evaluated against the “business-as-usual” case, to help the RDN understand its options in electing how best to achieve carbon neutrality.

The approach described is a systematic way to apply a “Triple-Bottom-Line+Risk” (TBL+Risk) approach to addressing multiple disparate, but related, considerations. Using such an approach allows effective qualitative comparison between options without the need for extensive detailed analyses and goes beyond the cost-centric view of traditional cost-benefit analyses, which are difficult to administer without detailed insight and data, and do not easily account for the environmental and social benefits of emissions reduction efforts.

## **3.3 Development Workshops**

### **3.3.1 Workbooks**

Ahead of the workshops, RDN staff were asked to complete a Workbook to help them prepare for the workshops and also provide some insights to the consultant team on aspects such as hopes and concerns for the Plan development and outcomes; potential challenges and opportunities; and to better understand guiding principles and values beyond the classic considerations of cost and technology risk.

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### 3.3.2 Development Workshop 1: June 23<sup>rd</sup>, 2020

#### *Summary and Overview*

The first virtual workshop was held with RDN staff from Long Range Planning, Recreational Services, Parks, Arena Services, Aquatic Services, Transportation Services, Water and Wastewater Services, Zero Waste, Purchasing and Engineering Services on June 23<sup>th</sup>, 2020. The purpose of the workshop was to review, collate, and present the group's feedback from the individual workbook responses. The discussion presented barriers and expectations from staff for achieving carbon neutrality by 2032. A proposed Vision Statement and Guiding Principles were also presented to staff and discussed.

The second half of the workshop focussed on the RDN's current emissions status (see *Figure 1*). Staff were then presented with a short-list of technology options under each of the scope categories. In line with *Sections 3.2* and *3.5* the draft scenarios and multi-criteria analysis framework were presented, discussed and feedback sought.

The workshop concluded with an open Q&A session. In general, feedback from the workshop was positive and constructive. The insights gained are currently being used to help inform the Plan development.

### 3.3.3 Development Workshop 2: June 29<sup>th</sup>, 2020

#### *Summary and Overview*

The second virtual development workshop was held with the same RDN Staff on June 29<sup>th</sup>, 2020. The objectives of the workshop were to build on the first and gain a deeper understanding of the barriers, challenges and opportunities of moving towards carbon neutrality.

Attendees were asked what tools and resources would best support them to undertake the carbon neutral mandate in their work. This was built upon through the co-completion of a SWOT (strengths, weaknesses, opportunities and threats) analysis, as well as a review of potential technology option scenarios.

The workshop included two detailed sessions to review how business process is currently used to deliver projects, and what may need to change to successfully deliver projects that support a carbon neutral organization. The insights from the workshop will be used to inform the Plan development. The workshop was well received.

## 3.4 Energy and Emissions Analysis

It is typical to view corporate emissions through an energy "lens", since traditionally energy management and energy efficiency have been the management metrics employed in almost all organizations. With this in mind, *Figure 3* shows the RDN's energy use by Department. Fire & Emergency account for 25% of total energy use, Water and Wastewater at 22% each and Community & Recreation at 20%. There is then a significant drop in the contribution to total energy use from the remaining Departments, with Corporate buildings at 4% of total, and Streetlighting, Park and Waste haulage and facilities each contribute 2% (the balance 1% is for miscellaneous uses).

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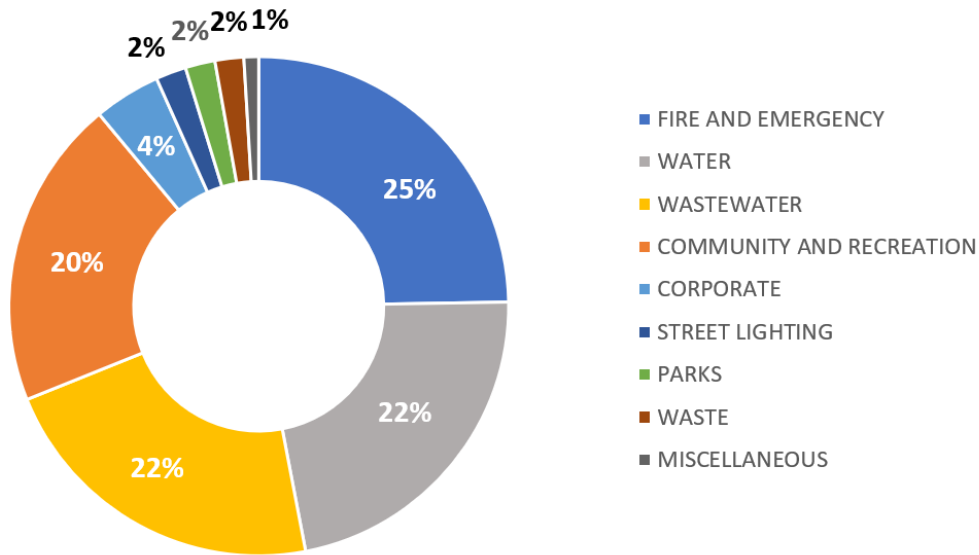


Figure 3: RDN Energy Use by Department (for 2019)

However, the RDN has in place a carbon-neutral target, so it is more instructive to look at greenhouse gas emission rather than energy use. *Figure 4* presents, total emissions from sources within the Plan’s scope, broken down into those from landfill gas emission (arising from the decomposition of solid waste, which produces methane – a significant greenhouse gas), and those from RDN operations (from the use of fuel and electricity). The total in-scope corporate emissions in 2019 were estimated to be approximately 30,460 tonnes of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e)<sup>3</sup> of which landfill gas emissions account for 89% and operations 11%.

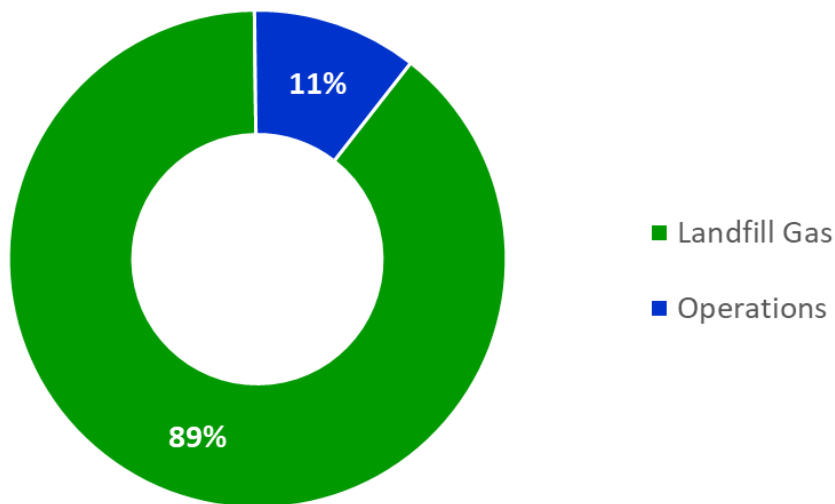


Figure 4: RDN Corporate Emissions Breakdown (for 2019)

<sup>3</sup> Operational emissions estimated from energy use records, landfill gas emissions from 2018 provincial reporting, the latest year for which data is available.

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As shown in Figure 5, fuel and electricity use by Fire & Emergency account for 48% of the RDN’s operating emissions, with Community & Recreation 16%, Water 14%, Wastewater 12%, Corporate facilities 5% and Parks 3%; with the remaining balance (<1%) evenly spread between Streetlighting, Waste haulage, and miscellaneous sources.

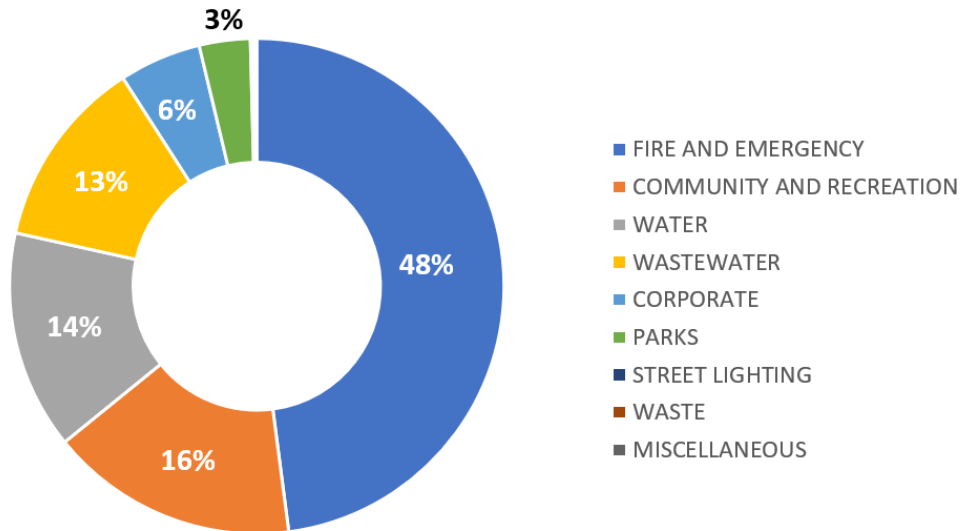


Figure 5: RDN Operating GHG Emissions Breakdown by Department (for 2019)

Transit services, which the RDN has close links to, although are out of scope for the Plan (discussed in Section 3.1.1), produce approximately 250tCO<sub>2</sub>e of emissions a year, equivalent to about 10% of the RDN’s operational emissions (i.e. excluding those related to landfill gas release).

Viewing the need for action through a greenhouse gas lens highlights the need to primarily reduce landfill gas emissions; yet this cannot be at the expense of the operational emissions for which all departments must be responsible if carbon neutrality is to be achieved. The energy lens and greenhouse gas lens provide different perspectives, giving rise to different priorities. However, the RDN has in place a clear carbon neutral target, which necessitates planning that is predominantly GHG focused. The scenario approach outlined below allows the RDN to prioritize its actions to meet its carbon neutral target.

### 3.5 Option and Scenario Development

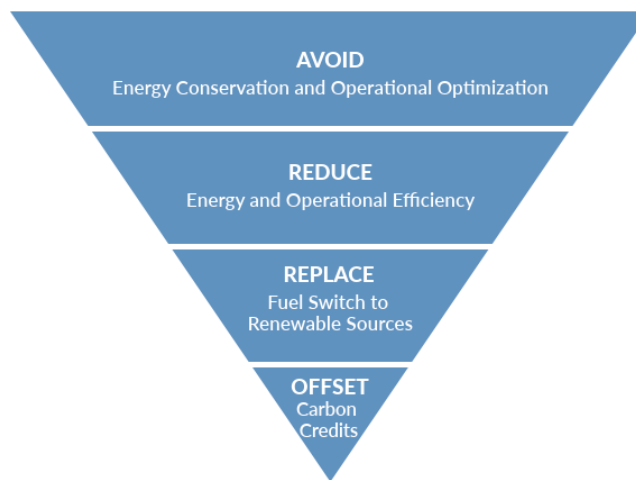
#### 3.5.1 Modelling Approach

The MSEXcel-based emissions modelling tool will take currently available data from the RDN to establish future annual emissions under a “business-as-usual” scenario out to the year 2032. If data isn’t readily available, appropriate proxies will be sourced and used. The model will estimate future emissions under the range of scenarios described above, so that each may clearly have its emissions impact understood, and the “gap” to carbon neutrality be clearly demonstrated. The model will allow the emissions impacts to be understood in aggregate, or by business unit, and by emission source (facility, fleet, etc.).

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### 3.5.2 Using Scenarios to Provide Options

The development process has been designed to generate options in achieving carbon neutrality, the options being articulated through different scenarios. In all scenarios, energy conservation (not wasting energy) is the first step in the “carbon hierarchy” (see *Figure 6*) with energy efficiency (doing more with less) the second. Only after these measures have been optimized should fuel-switching be considered, with emissions offsetting a final resort. Consistent with this hierarchy, the scenarios under consideration for the main emissions sources in the RDN are described below.



**Figure 6: The Carbon Hierarchy**

#### **Facilities**

In the majority of building facilities, energy use is primarily dedicated to the provision of space heat and hot water (where the latter is significantly smaller than the provision of space heat in all but some industrial operations), and the operation of electrical equipment (of all kinds). Given the supply of clean electricity in BC, and the mild climate on Vancouver Island, the facilities scenarios will focus on a move towards electrification to displace fossil-fuel generated heat. The scenarios will provide a range of cases where there is an increasing fraction of total energy that is carbon neutral.

#### **Fleet**

The fleet survey results are being used to inform potential technology options for low-carbon vehicles.

The emergence of plug-in hybrid vehicles (where the vehicle has a large battery that can be used for a significant portion of the vehicle’s operation, in addition to a conventional engine) and battery electric vehicles (where the vehicle has only a battery and motor) is revolutionizing light-duty vehicles. With clean electricity in BC, the light-duty fleet vehicle scenarios will focus on right-sizing (of vehicle and fleet) as well as the balance of plug-in hybrids to battery electric vehicles.

The technology options to move heavy-duty vehicles off diesel and towards carbon neutrality are more numerous, but their markets are less well established. As such, the scenarios for the heavy-duty fleet will focus on which technologies





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provide different scales of emissions reduction, from a modest, approximate 25% carbon reduction to full carbon neutrality.

### ***Water and Wastewater***

The vast majority of energy use in the RDN's water management operations comes from the use of clean electricity in plant processes (mainly pumping and filtration). With this in mind the scenarios will focus, at a high level, on efficiency gains to make marginal emissions improvements.

Similarly, waste water opportunities for emissions reduction will focus on the marginal gains to emissions from efficiency improvements, while the potential opportunity to beneficially use the biogas from wastewater treatment facilities will constitute the most ambitious scenario.

### ***Solid Waste***

The diversion of organic material from the landfill provides the most significant opportunity to reduce landfill gas emissions; while for those emissions that do remain, the collection and destruction through, flaring or injection into the natural gas grid of cleaned landfill gas, presents a range of different scenarios that will be considered. The scenarios will reflect and build upon the RDN's current work in both of these areas.

## **4 CONCLUSION**

The development of the *Corporate Carbon Neutral Plan 2032* is on track and represents an important opportunity to set the long-range direction for the RDN's operations and consider pragmatic technological and operational improvements that can provide significant emissions reductions. A range of scenarios will be brought forward for the Board's consideration as to which is the most appropriate for the RDN.