

**Chairperson and Committee Members**

ENVIRONMENT AND COMMUNITY DEVELOPMENT COMMITTEE

11 OCTOBER 2012

Meeting Status: **Public**

Purpose of Report: For Decision

**FRAMEWORK FOR A CARBON AND ENERGY MANAGEMENT PLAN**

**PURPOSE OF REPORT**

- 1 This report provides details of the Council's carbon footprint for the 2009-10 and 2010-11 financial years. These have been independently audited and verified. Provisional figures for the 2011-12 carbon footprint have also been provided.
- 2 The report then seeks endorsement of a framework (targets and major focus areas) as the basis for finalising a Council Carbon and Energy Management Plan which will guide an ensuing work programme.

**SIGNIFICANCE OF DECISION**

- 3 This report does not trigger the Council's Significance Policy.

**BACKGROUND**

- 4 The Council has been active in the areas of energy conservation and carbon emissions reduction for close to a decade. It demonstrated this commitment by becoming an EECA<sup>1</sup> 'Energywise Council' in 2003 and by joining the International Cities for Climate Protection (CCP) Programme scheme in 2004. Both these voluntary schemes committed the Council to measuring and managing energy use and emissions, and both have now ended due to withdrawal of external support and funding.
- 5 Following the end of these programmes, it was identified that Council would benefit from moving towards a recognised standard of greenhouse gas (GHG)<sup>2</sup> emissions measurement and reporting. It would lead to a better understanding of Council's liabilities and demonstrate leadership on climate change. The carbonZero programme, a wholly owned subsidiary of Landcare Research, offered a method by which the Council could do this, called CEMARS (Carbon Emissions Measurement and Reduction Scheme).
- 6 Many other organisations in New Zealand and abroad have successfully obtained CEMARS status, including Toyota NZ, Meridian Energy and University of Canterbury. Dunedin City Council is reportedly also in the final stages of obtaining CEMARS status.
- 7 The Council joined the programme in September 2011 and work began towards obtaining CEMARS status. This involves calculating the Council's corporate carbon footprint to the international recognised ISO 14064 standard and adopting an emissions management and reduction plan for the organisation.

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<sup>1</sup> EECA – Energy Efficiency and Conservation Authority

<sup>2</sup> Expressed as 'CO<sub>2</sub> equivalent' or CO<sub>2</sub>e

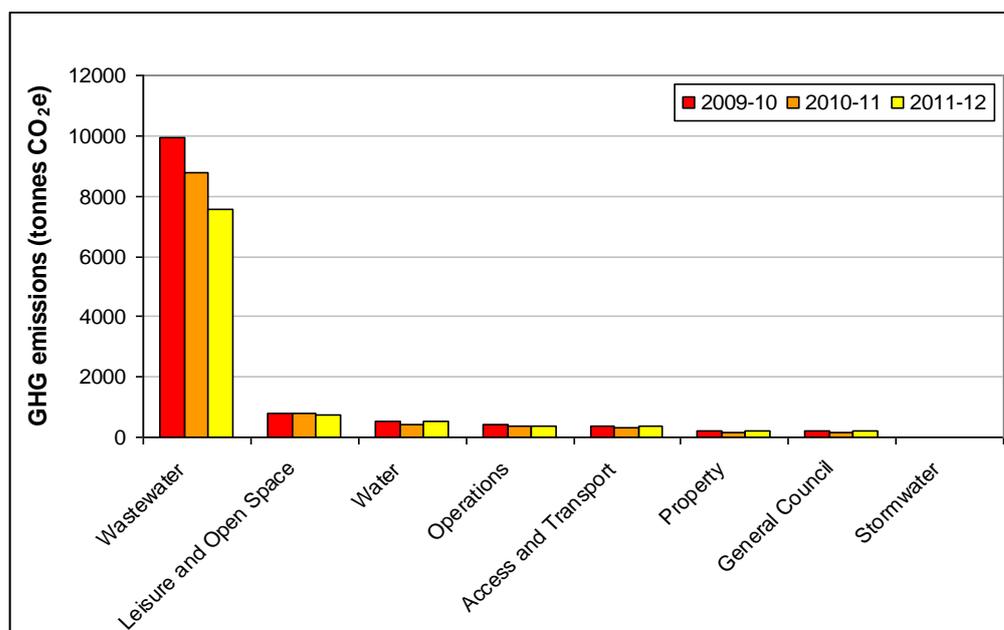
- 8 Council’s carbon footprints for 2009-10 and 2010-11 have now been verified. The 2009-10 financial year was set as the baseline for setting reduction targets and measuring progress towards them. A decision was made to develop an internal corporate Carbon and Energy Management Plan to guide asset management planning and other related processes.
- 9 The intention is to have an organisation plan which sets out a programme for analysis and further work, to guide management in the setting of work and asset management priorities. Councillors were briefed on this work at its outset in November 2011, and provisions were made in the 2012 Long Term Plan to support it. Preparation of a draft plan involves investigating various carbon dioxide (CO<sub>2</sub>) or other greenhouse gas abatement options and developing business cases for those that were most promising in terms of impact, cost effectiveness and co-benefits. Detailed proposals would be brought back through normal asset plan, Annual Plan and Long Term Plan decision processes.

## CONSIDERATIONS

### Council Corporate Carbon Footprint

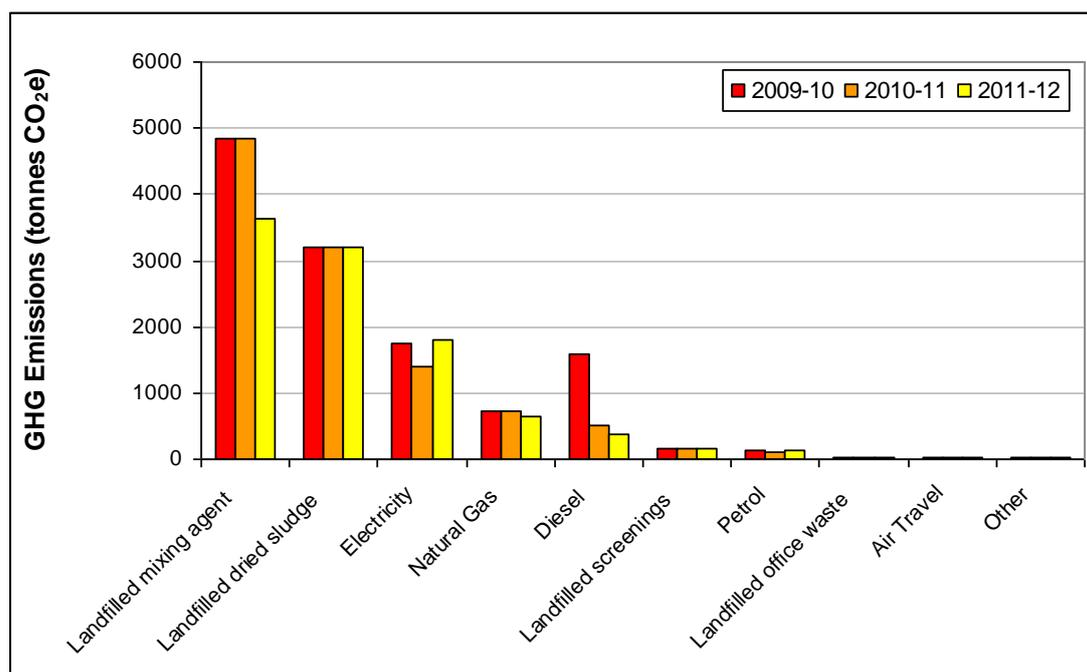
- 10 Council’s GHG emissions reduced by 11.7% between the 2009-10 and 2010-11 financial years. Total operational emissions for Council were 11,007 tonnes of CO<sub>2</sub>e for the 2010-11 whilst there were 12,466 tonnes of CO<sub>2</sub>e in 2009-10. This is a decrease of 1,459 tonnes. Provisional figures for 2011-12 financial year show an approximate footprint of 10,000 tonnes, a 20% reduction compared to the 2009-10 baseline year.<sup>3</sup> This is a significant reduction. A breakdown of the annual results is shown in Figures 1 and 2.

**Figure 1 – Council operational GHG emissions by reporting unit**



<sup>3</sup> Note the 2011-12 figures are not audited and require refinement in some areas, so will be subject to revision.

Figure 2 – Council operational GHG emissions by source



- 11 The most significant decrease between the first two periods occurred in the Wastewater Activity area as result of the conversion of sewage drying from diesel to wood pellet fuel. This occurred in August 2010, near the start of the reporting period. Substantial reductions in emissions between these periods can also be attributed to it being a ‘wet year’ with a larger share of grid electricity coming from hydro power stations.
- 12 The provisional results for 2011-12 show an increase in emissions from electricity use due to both an overall increase in consumption, mainly in the Wastewater area, and a high emissions factor for grid electricity – i.e. a ‘dry year’ for hydro generators. This demonstrates the impact of the government goal of ‘90% renewable electricity by 2025’ would have on local authorities’ GHG emissions.
- 13 The main driver of the observed emissions reduction in 2011-12 is the cessation of the practice of mixing green waste with sewage sludge before it is buried in landfill. When the emissions impact of this came to light during the carbon footprint calculation process, the contractor was immediately instructed to stop.
- 14 These results only include emission sources directly controlled by Council, and exclude the absorption and emissions of carbon dioxide by council-owned forest (these are separately reported). Some sources such as emissions from domestic waste collection and disposal, Council-owned pensioner housing and materials freight have been excluded from the corporate footprint under scheme guidelines for being either outside direct Council control or being too small to warrant the effort of calculating.

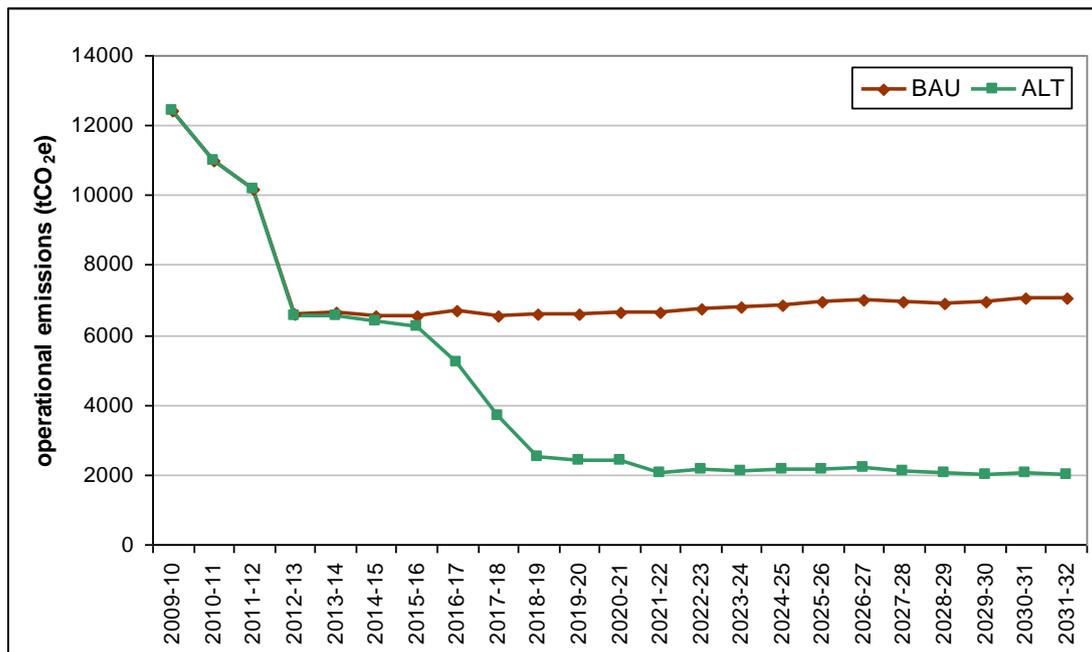
### Projected footprint, energy use and costs

- 15 The Council’s energy use, costs and GHG emissions were projected for 20 years as part of planning for the 2012 Long Term Plan. This projection was based on existing energy usage, known upcoming changes to council assets and operations, district growth forecasts and energy cost inflation figures and formed the

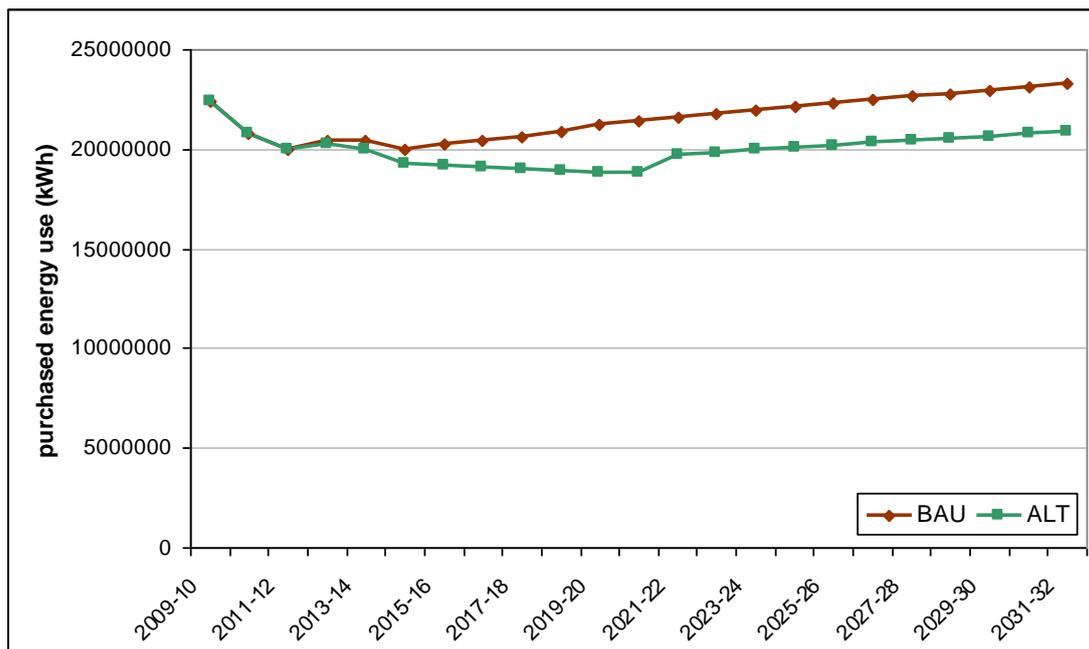
‘business as usual’ (BAU) scenario. A conservative Emissions Trading Scheme (ETS) emissions cost of \$25/tonne and consequently a low percentage of renewable electricity has been assumed, aligning with Ministry of Business and Innovation forecasts.

- 16 As part of preparing a corporate Carbon and Energy Management Plan (‘the Plan’), the impact of proposed reduction measures have been estimated and used to create an alternate emissions and energy path (the ‘ALT’ scenario). This has been used to calculate potential emissions abatement targets for 2014-15 and 2021-22. The emissions, energy use, and selected operating costs in the ALT and BAU scenarios are shown in Figures 3, 4 and 5. An outline implementation programme on which the graphs are based is set out in Table 1.
- 17 Emissions in 2021-22 in the BAU scenario are estimated to be 6,644 tonnes CO<sub>2</sub>e, 47% lower than the 2009-10 emissions baseline year. Relevant operational costs (energy, ETS and streetlight maintenance) would be \$4.5M, 72% higher than in 2011-12.
- 18 In the ALT scenario, emissions are projected to fall to 2,062 tonnes CO<sub>2</sub>e by 2021-22, 83% lower than the base year, and operational costs would be \$3.2M, 22% higher than 2011-12.

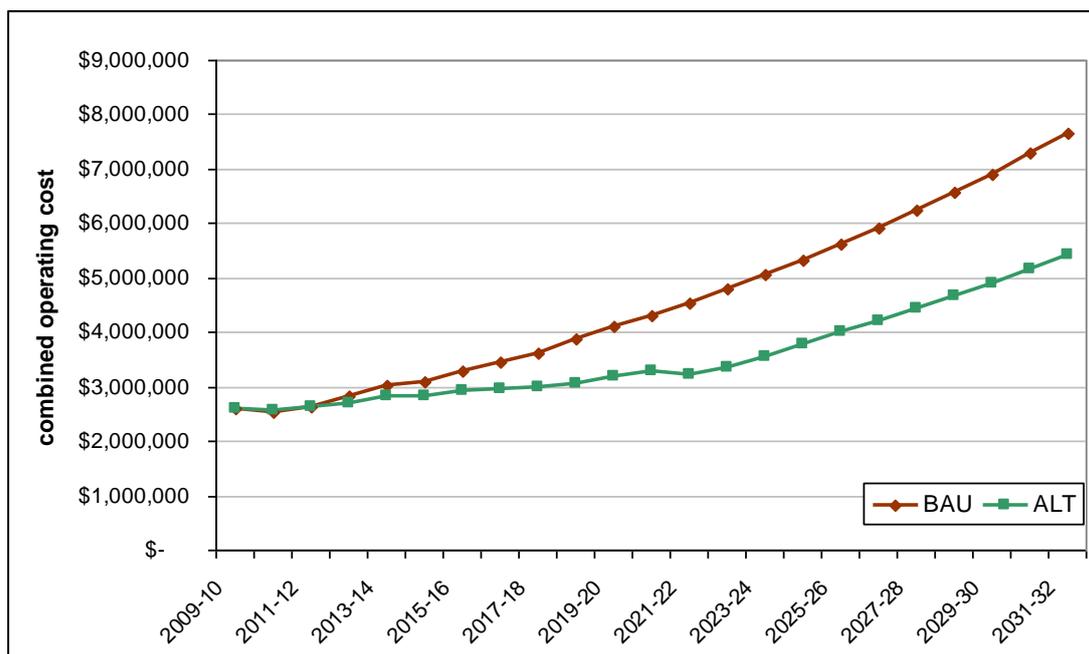
**Figure 3 – Council carbon footprint projections to 2031-32**



**Figure 4 – Council purchased energy use (i.e. excluding own generation) projections to 2031-32**



**Figure 5 – Combined energy cost, ETS cost (@\$25/tonne) and streetlight maintenance cost projections to 2031-32**



- 19 The cumulative operational savings that could be achieved by following the ALT path rather than BAU are shown as the area between the BAU and ALT lines in Figure 5. The cumulative operational saving in 2021-22 is \$6.2M. This saving increases to \$24.0M by 2031-32 due to the continuing effect of the measures proposed to be undertaken, even though the ALT scenario includes no additional interventions after 2021-22.
- 20 Table 1 below outlines the estimated investment and return of the measures in the Plan. The potential investment programme is funded from existing budgets.

**Table 1 – Investment, operational savings (including energy costs, ETS costs @\$25/tonne and streetlight maintenance), and GHG reductions in the ALT scenario**

<i>Measure</i>	<i>Proposed implementation period</i>	<i>GHG reduction in 2021-22 (CO<sub>2</sub>e tonnes/year)</i>	<i>Cumulative operational saving to 2021-22</i>	<i>Cumulative operational saving to 2031-32</i>	<i>Additional investment required compared to BAU</i>
Elimination of GHG emissions related to sewage sludge (biosolids) disposal	2016-19	3,623	\$0.5 M	\$1.4 M	Unknown at this time. Possibly nil
Converting pools from natural gas to wood fuel <sup>4</sup>	2022 onwards	455	\$0.4 M	\$3.8 M	\$1.0 – 1.2 M
The proactive conversion of streetlights to LED (light emitting diode) lamps and advanced controls	2013-22	267	\$2.9 M	\$11.2 M	\$2.8 – 3.2 M
Conversion to wood chip fuel at Paraparaumu Wastewater Treatment Plant	2013-14	Nil	\$1.3 M	\$2.9 M	Nil
All other measures combined	2012-22	237	\$1.1 M	\$4.7 M	\$1.7 -2.1 M
<b>Total</b>		<b>4,582</b>	<b>\$6.2 M</b>	<b>\$24.0 M</b>	<b>\$5.5 – 6.5 M</b>

<sup>4</sup> Note that the timing of this work will go beyond 2022 depending on the replacement life of the gas boilers.

## Impact of Carbon Pricing/Emissions Trading Scheme

- 21 While a \$25/tonne emissions price has been used for the BAU and ALT cost projections, it is not possible to anticipate what future carbon costs might be with any confidence, as they are strongly subject to political influence. Emissions cost projections at different prices have been separately shown in for illustrative purposes in Table 2.

**Table 2 – ETS cost impacts for 2021-22 in the BAU scenario (6,644 tonnes CO<sub>2</sub>e/year)<sup>5</sup> for different emissions unit prices.**

ETS emissions unit price	Biosolids emissions cost	Energy emissions cost	Other emissions cost	Total emissions cost	Total emissions cost as % of BAU operating costs	Energy emissions cost as % of BAU energy costs
\$4/tCO <sub>2</sub> e	\$14,000	\$11,000	\$1,000	\$27,000	0.6%	0.3%
\$25/tCO <sub>2</sub> e	\$91,000	\$70,000	\$6,000	\$166,000	3.7%	1.7%
\$100/tCO <sub>2</sub> e	\$362,000	\$279,000	\$23,000	\$664,000	13.2%	6.2%

- 22 It can be seen at the current very low price of \$3-4/tonne, the cost impact of the ETS on the Council is minor. \$25/tonne is used in the Government's own forecasting: this equates to a total annual ETS emissions cost to Council of \$166,000 under BAU, a sum dwarfed by overall energy costs.
- 23 At \$100/tonne, the ETS would be a powerful driver for eliminating emissions from biosolids disposal, but only if the option that currently allows the Council to use a lower default greenhouse gas emissions factor is removed from regulations. The percentage of energy costs ETS represents (i.e. excluding biosolids) is still relatively low at 6.2%.
- 24 A strong global drive to emissions abatement commensurate with the true scale of the climate change threat could see emissions costs rise much higher than \$100/tonne. Therefore implementing the Plan helps mitigate this risk.

<sup>5</sup> Note these ETS costs exclude those associated with the council permanently removing council-owned forest planted before pre-1990.

## Framework for a Carbon and Energy Management Plan

- 25 The proposed corporate Carbon and Energy Management Plan is intended to provide a framework in terms of prioritising projects to guide management in assessing and presenting projects to Council for decision. The objectives would be to:
- measure, manage and reduce emissions;
  - improve energy efficiency;
  - increase the use of renewable energy ;
  - improve the resilience of operations to energy shocks;
  - aid the development of clean technology businesses that can help council with these objectives and assist the transition of the district to a low-carbon economy.
- 26 The intent would be to achieve continuous reduction in operational GHG emissions by Council. Maintaining this reduction trend on a five-year rolling average is a requirement of continuing to hold CEMARS certified status.
- 27 The measures set out in Table 1 are those that have been identified as having the best balance of impact on emissions and/or operating costs while being likely to be achievable within existing budgets, with any borrowing costs met from the operational savings. On the assumption that they are implemented over an approximate ten year period it is possible to establish a realistic target for that period.
- 28 The emissions reduction targets proposed assume most of these measures being implemented and their potential savings being realised. If some smaller measures do not eventuate, it is likely that others will be identified to replace them. However, the major measures identified are more critical.
- 29 The Committee could decide to adopt more conservative targets if it did not want to advance all the areas of work (particularly the ‘major’ measures), or to allow for a situation where all the savings associated with them are not achieved. However, as each project will be considered for decision by Council on a project by project basis, it will be possible to monitor and modify targets, or target dates. Conversely, the Committee may wish staff to seek greater levels of abatement by setting a higher ‘stretch’ target.
- 30 The ALT path is very close to the BAU path for the first few years. The major abatement activities are essentially locked-in now, meaning that Council operations are already on track to achieve the forecast reduction of 47% in 2014-15 (five years following the baseline year of 2009-10). The projection already factors in having a ‘dry year’ for hydro generation. A conservative reduction target of 45% by 2014-15 is proposed.
- 31 The ALT path is 83% below BAU at the 2021-22 mark. To allow for unforeseen circumstances an 80% reduction target is proposed. This would still require the major measures, particularly elimination of biosolids emissions, to be achieved, or a significant alternative method to have been utilised. If the Government

achieves its 90% renewable electricity target for 2025, it would lead to reductions additional to those forecasted.

- 32 Although the projections go further into the future (to 2031-32), the programme of measures considered does not, hence longer term (e.g. 20 year) targets are not being proposed at this time. Formal Committee endorsement of the targets is sought.

### **Major focus areas**

- 33 While there are a wide range of measures available to support energy conservation and GHG reduction, reduce costs and improve management and reporting, a small number of measures in major focus areas contribute most directly to the reduction targets being achieved.
- 34 The major measures and their impact on emissions are described in Table 1 and are discussed below. If endorsed by Council, measures included in the plan will not automatically go ahead. The business case for each would be developed further before final approval was sought to implement them. Council's overall endorsement for continuing to explore these areas is sought at this time.

#### *Biosolids disposal*

- 35 Disposal of dried sewage sludge in Otaihanga landfill is the single largest emissions source within Council operations. The emissions arise as the buried sludge degrades in the absence of oxygen, meaning methane, a powerful greenhouse gas, is produced. In larger landfills, capture and flaring of this some of this gas is possible, but this is not viable at Otaihanga.
- 36 If the sludge degrades aerobically, or the methane is burnt, CO<sub>2</sub> is produced. This CO<sub>2</sub>, unlike that which comes from burning fossil fuels, is 'neutral' with respect to climate change as it would have only recently been drawn from the atmosphere as the original biomass it is made from (plants and animals) grew. Therefore it is possible to completely eliminate harmful GHG emissions from biosolids disposal.
- 37 A review of the Council's biosolids management strategy is underway. It is proposed that the goal of eliminating emissions from sewage sludge is incorporated as a major objective into the work on the biosolids strategy, but not to the exclusion of other considerations, such as cost and practicality.
- 38 The screenings from the waste water treatment plant are another significant waste stream and small but significant emissions source. This material has co-mingled organic and inorganic (e.g. plastic) components. As it is a relatively small volume, sending it to a landfill with gas capture is likely to be the best way to reduce these emissions. Costs associated with this will be assessed.

#### *Wood fuel at swimming pools*

- 39 Wood fuel is a carbon neutral fuel with the potential to eliminate most of Council's natural gas use if used at swimming pools, where the majority of natural gas use occurs. The major constraint on the use of wood fuel is its cost relative to natural gas. Wood chip needs to be sufficiently cheaper per unit of energy for the significant capital expenditure in a wood boiler to be justified, i.e.

so the overall life-cycle costs are less than if a natural gas boiler and fuel was used.

- 40 Wood pellet (used at the Paraparaumu Wastewater Treatment Plant) is around the same price per unit of energy as natural gas. Wood chip is likely to be significantly cheaper than pellet, but the lack of an existing wood-chip supply market in the area is holding this option back. These constraints are why the Council has not moved sooner to put wood boilers in at its pools, including the new aquatic centre.
- 41 Establishing a local wood chip supply for the wood boiler at the Paraparaumu Waste Water Treatment Plant should be achievable, and is the focus of staff efforts at present as it is expected this will bring significant operational cost savings. This would go some way towards building confidence in the security and costs of wood chip fuel supply for swimming pools.
- 42 As natural gas prices are likely to rise, it is reasonable to expect that wood-chip boilers may be viable at pools in the future. It is proposed that the area is kept under review while the Council concentrates on securing a new contract for the wood fuel supply to its existing wood boiler, and that specific proposals are advanced in future years when the economic case for wood chip heating at pools becomes more viable, and when the existing gas-fired boilers are nearing the end of their design life.

### *LED streetlight conversion*

- 43 Modern LED streetlights are capable of delivering the same or greater amount of light to the road corridor of a higher quality, using approximately half the amount of electricity compared to conventional lamps and fixtures. Light pollution is reduced by the more accurate light placement possible with LEDs. They are reported to have more than 100,000 hrs operating life, reducing maintenance requirements. The white light of LEDs, which allows objects to be more easily recognised, offers improved safety to residents, as well as improved amenity.
- 44 Dimming LED lamps achieves a reduction in energy consumption roughly equal to the reduction in light output, meaning further savings can be achieved compared to conventional technology, provided a reduction in light levels at certain times (e.g. midnight to 4am) are acceptable to stakeholders. Internet connected controls offer a way to control the lights, measure their energy use and check their status remotely, bringing further operational savings.
- 45 A business case has been developed based on existing knowledge of new streetlight technology, which indicates replacing all old lamps and fixtures with LEDs over a 9-year period would be financially viable. The cost for refitting Council's stock approximately of 5,000 streetlights has been estimated at \$3.0M, a sum that would have been repaid from operational savings within a year of implementation being completed.
- 46 Council is undertaking two pilot installations of LED streetlights with Internet connected controls at present to better understand the technology, the costs and practicalities of implementation.

- 47 It is proposed that officers refine the details of the business case with a decision on implementing a conversion programme being brought to Council as part of the 2013-14 Annual Plan process.

### Other emissions reduction measures

- 48 Other emission reduction measures include existing projects such as the electric rubbish truck, expanding use of emulsion diesel, a vehicle fleet review and reducing office waste.
- 49 Grid-connected solar photovoltaic (PV) systems, such as the demonstration system on Ōtaki Library and Memorial Hall, have good potential especially as their price continues to drop and electricity prices are rising. Many council properties, such as libraries, offices and the Emergency Operations Centre are suitable for this technology. The focus here would be on reviewing the potential for developing solar photovoltaic projects at these sites. There is an opportunity to develop links with the Clean Technology Trust and the Clean Technology Centre in this area.
- 50 There is further potential for improved energy efficiency within Council-operated assets, although the overall impact is likely to be limited as the major energy using activities of water and waste water have been independently investigated and found to already be very efficient. Hence the Plan only includes a modest amount of emissions savings from energy efficiency improvement.

### Measurement, monitoring and reporting

- 51 The framework would also include supporting measures, such as improving the accuracy of and timeliness of emissions reporting in certain areas and setting up additional monitoring to help identify waste. It is proposed that new facilities such as the Aquatic Centre and Civic Building will be singled out for special scrutiny to help ensure they live up to their promised potential.
- 52 A cross-department team would maintain an overview of energy costs, emissions and the implementation of the Plan. Quarterly energy reports, results of annual carbon footprint audits, and proposed updates to the Plan would be presented to the Corporate Business Committee.

### Local native forest offsets

- 53 It is proposed that the concept of increasing local native forest plantings to offset residual operational emissions (around 2,000 tonnes CO<sub>2</sub>e/yr in ALT) and 'embodied carbon' in capital projects be included in the Plan for further exploration. It is not proposed at this stage to include this as a major focus project, until further work has been done on options.
- 54 This approach could eventually make the Council net-zero carbon by closing the gap between what can be achieved via Council's assets and operations (80%) and a 100% reduction in emissions. It could also deliver considerable side benefits such as land stabilisation, improving water quality, biodiversity and providing more natural spaces for recreation and tourism. Native plantings also are likely to be as 'permanent' as it is possible to achieve: an important test for it having any long-term climate change benefit.

- 55 There is potential to work with private landowners and community groups to develop a strategy for this offset work. Such initiatives do not have to rely on Council land ownership but would require permanent retention of the planted areas.
- 56 The amount of offsetting needed would change depending on the success of other measures. It would also depend on the emergence of other options to reduce emissions that the Council might choose to adopt further down the track (e.g. greater use of electric vehicles). Further investigation of the practical and financial feasibility of implementing native forest plantings on the necessary scale is also required.
- 57 The impact of additional native planting or any other form of any offsetting has not been included in the proposed targets or emissions forecasts at present.

### Financial Considerations

- 58 Approval of the framework targets and major focus areas for further work does not commit the Council to any spending beyond that already budgeted in the Annual Plan and 2012 Long Term Plan. Normal Council processes would apply to all measures, and final approval would be sought for individual measures at the appropriate time.
- 59 Funding for advancing any of the major focus areas would draw on savings from the wood fired boiler, which is enabled by the Council Energy Policy, EECA Crown Loans and grants, and the cost savings projects themselves – i.e. energy and maintenance budgets.
- 60 The primary test for inclusion of measures and areas of focus in the framework has been the likelihood of initiatives being able to be carried out in ‘rates-neutral’ way – that is the investment required, including borrowing costs, can be met from existing budgets.

### Legal Considerations

- 61 There are no legal considerations.

### Delegation

- 62 The Environment and Community Development Committee has the delegated authority to consider this matter under the following clause of the 2010-13 Governance Structure and Delegations.

*7. Without limiting the generality of this delegation, the committee has the following functions, duties and powers:*

*7.1 Authority to develop (within any wider existing strategic framework) policies and work programmes that support the social, economic, environmental and cultural wellbeing of the community.*

### Consultation

- 63 No external consultation has taken place as the carbon footprint and proposed framework are principally a corporate matter for Council.

Policy Implications

64 There are no policy implications.

Tāngata Whenua Considerations

65 There are no Tāngata Whenua considerations.

Publicity Considerations

66 CEMARS status (once obtained on completion of the draft plan) would be promoted to both internal and external audiences. The Council’s carbon footprint reports, audit report, and corporate Carbon and Energy Management Plan and its appendices will be published on the Council’s website.

67 The Council can communicate its leadership on climate change matters through this work, and set an example to others. A media plan will be prepared.

**RECOMMENDATIONS**

68 That the Environment and Community Development Committee notes the results of the ISO 14064 (carbon footprint) audit of Council conducted by the carboNZero programme.

69 That the Environment and Community Development Committee approves continuing work on the major focus areas in the Carbon and Energy Management Plan and notes that specific projects will be presented on a case by case basis to Council for decision, via usual project, Annual Plan and Long Term Plan decision processes.

70 That the Environment and Community Development Committee approves the proposed corporate greenhouse gas reduction (GHG) targets of a 45% reduction in operational GHG emissions in 2014-15, and an 80% reduction in 2021-22, compared to the baseline year of 2009-10.

71 That the Environment and Community Development Committee approves further exploration of options for offset planting as a mechanism to achieve 100% reduction targets.

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