Appendix A:

Kelowna

GHG Emissions Modelling Study

May 2022

Executive Summary

A lot has changed since Kelowna's 2018 Community Climate Action Plan was endorsed. Since the Plan's development, new Intergovernmental Panel on Climate Change (IPCC) research stresses the urgent need for immediate action to reduce greenhouse gases (GHGs). The IPCC asserts that a global GHG reduction of 40 to 45 per cent below 2010 levels by 2030 and reaching net-zero by 2050 is needed to limit global heating below 1.5 degrees Celsius to avoid catastrophic impacts. In response, federal and provincial climate change directives have been updated, adopting more aggressive emissions reduction targets and timelines. Federally, the Canadian Net-Zero Emissions Accountability Act (2021) targets a 40-45 per cent reduction in emissions below 2005 levels by 2030 and attaining net-zero emissions by 2050. Provincially, GHG reduction targets of 40, 60, and 80 per cent reductions below 2007 levels by 2030, 2040, and 2050 respectively have been legislated. Last fall, the Province released its CleanBC Roadmap to 2030, an aggressive plan to put BC on the path toward net-zero emissions by 2050.

As the City prepares to develop its next climate plan to 2030, a better understanding of how the community could reduce its GHG emissions to align with these climate targets is required. The *GHG Emissions Modelling Study* determined Kelowna's GHG emissions inventories for 2007 and 2016, and modelled the local potential emission reductions of senior government initiatives. Understanding that even greater ambition is required to reach the current targets, the study also modelled the reduction potential of additional low-carbon actions that could be taken locally to help the community align with national and international climate targets.

Kelowna's GHG Emissions

Emissions inventories were completed for 2007 and 2016. 2007 serves as the base year to align with Provincial GHG emissions reduction targets. The scenario modelling was based on the 2016 inventory as more robust and current data is available for that year.

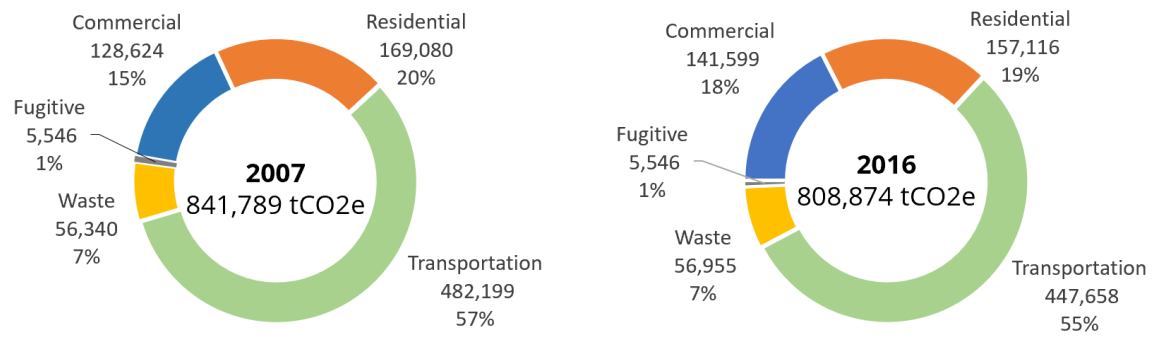


Figure A. Kelowna's 2007 and 2016 GHG emissions inventories.

It should be noted that while 2016 demonstrates a 3.9 per cent decrease in GHG emissions this may not be indicative of a consistent trend, as GHG emissions can vary widely year-over-year due to external factors such as weather. This is illustrated in the 2018 inventory which has a 3.7 per cent increase in GHG emissions over 2007 levels (provided in Appendix 5).

Modelling Scenarios

Kelowna's GHG Emissions Modelling Study assessed four community emissions scenarios to determine the local emission reduction potential of senior government policies announced to date, as well as the potential of additional local policies needed to achieve reductions aligned with the IPCC 1.5 degrees Celsius pathway. Each scenario builds on the results of the previous.

1. **Business as usual (BAU)** – Includes the emissions impacts of Kelowna's increasing population, housing, commercial spaces, and vehicles, and assumes land use, transportation habits, and average dwelling size maintain current trajectories.
2. **CleanBC Actions** – Includes emissions reductions possible through the implementation of the provincial CleanBC and CleanBC Roadmap plans, such as the Energy Step Code and net zero-emissions electricity grid. Some federal mandates, such as 100 per cent zero-emission light-duty vehicle sales by 2035 are also included.
3. **City Plans** – Includes emissions reductions resulting from the recently adopted 2040 Official Community Plan (OCP), 2040 Transportation Master Plan (TMP), and the corporate Green Fleet Strategy.
4. **Low-carbon Scenario (LCS)** – Includes additional local actions that could be taken to achieve emissions reductions aligned with senior government and internationally accepted targets.

While the report focuses on energy and emissions outlooks in the near term to 2030, outlooks to 2050 were also modelled (Appendix 6).

Modelling Results

As illustrated in Figure B, the BAU scenario projects a slight decline in emissions between now and 2030. Over a longer time horizon, however, BAU emissions increase with the growing population. The biggest reduction potential by 2030 is from the transportation sector, due to cleaner fuel (required by BC's Renewable & Low Carbon Fuel Requirements Regulation) and the uptake of electric vehicles. Other major reductions are achieved through BC's requirements for net-zero emissions in the electricity grid by 2030. New and existing buildings are also a major sector for reductions to 2030 through efficiency improvements and converting to low-carbon fuel sources. Through implementing a combination of senior government and local actions, the low carbon scenario modelling demonstrates that the community could achieve GHG emission reduction targets beyond provincial or federal targets. These include major low-carbon shifts in all sectors.

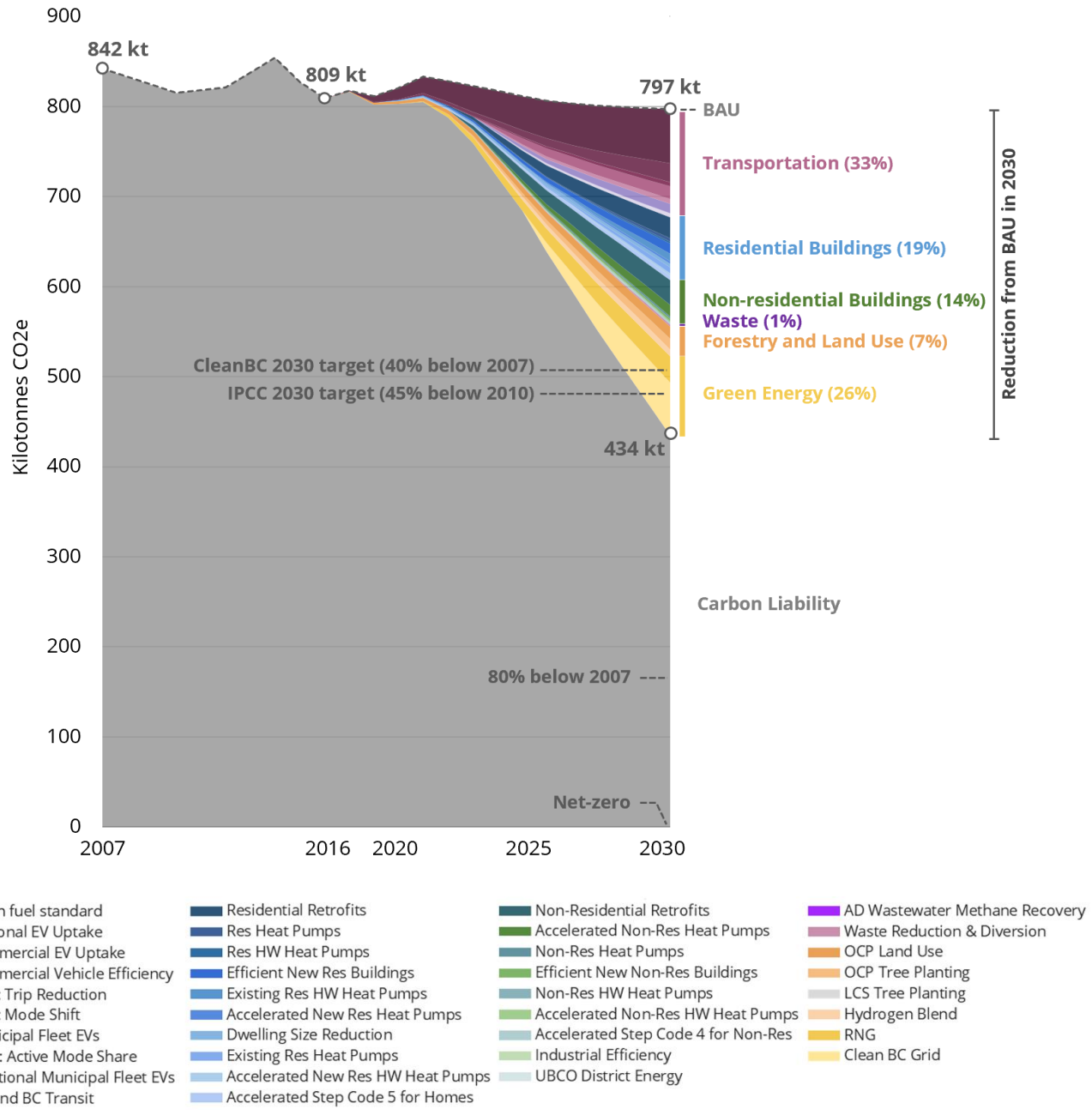


Figure B: Potential emissions reductions to 2030, by sector.

Figure C demonstrates the significance of supporting the local implementation of the CleanBC climate plan. This, in combination with the community reaching its own growth and transportation targets, will result in a 26 per cent emission reduction below 2007 levels. (It should be noted that early implementation of City plans provides long-term reduction benefits). To align with senior government targets, the modelling shows that additional ambitious low-carbon actions are required. Those modelled could achieve a 48 per cent reduction below 2007 levels by 2030.

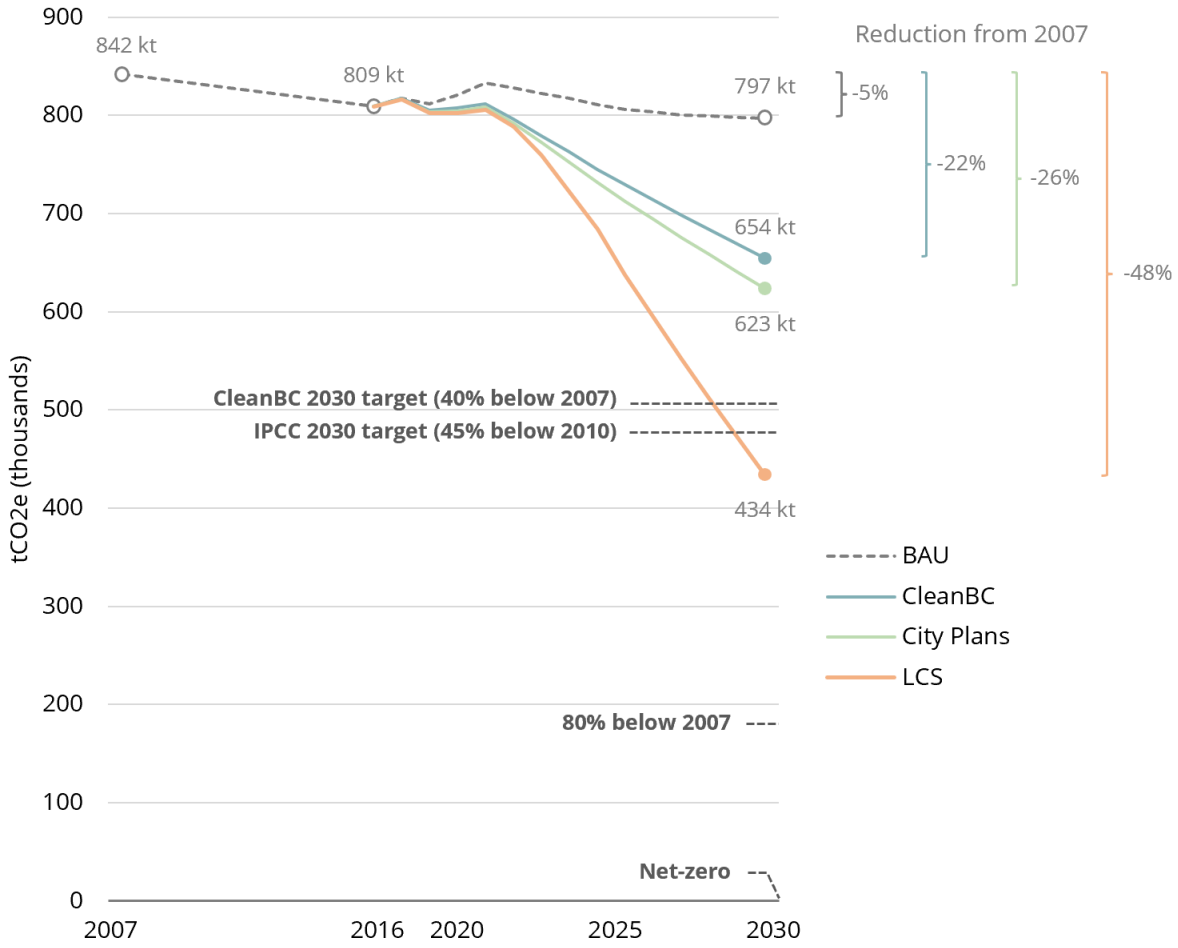
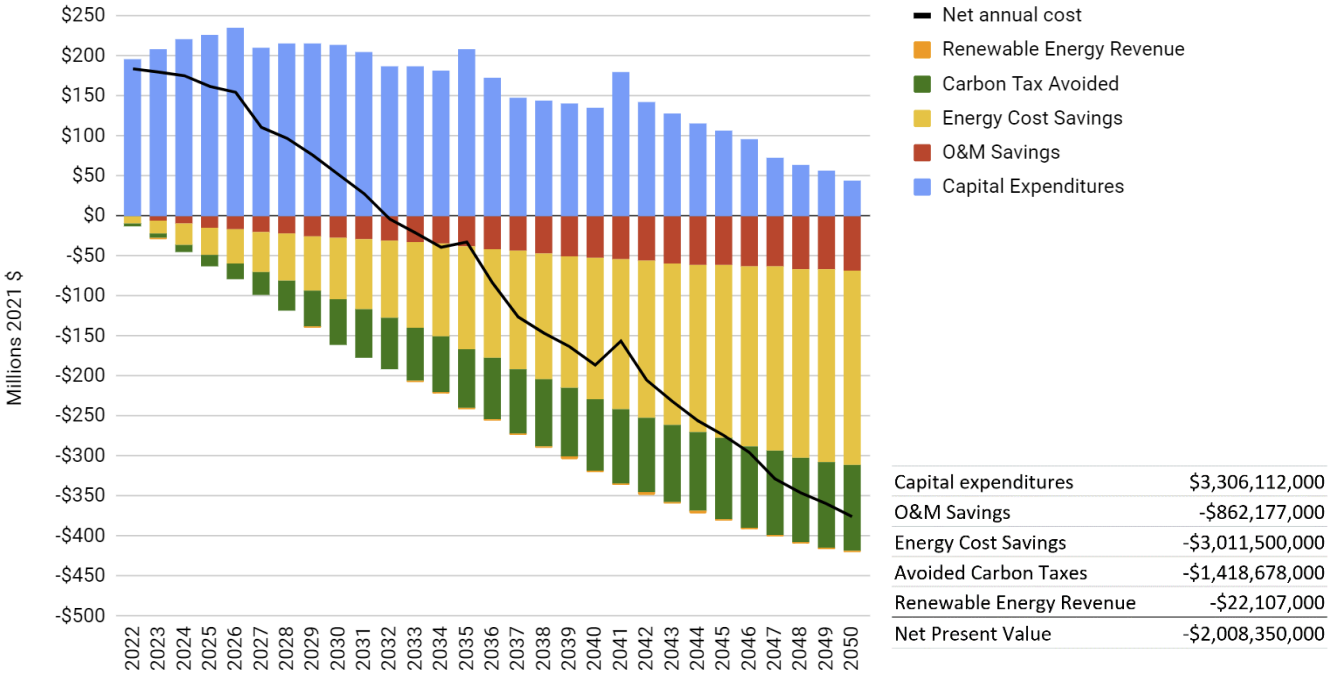


Figure C: Modelled emissions trajectories of four scenarios. The low-carbon scenario (LCS) includes emissions reductions from greening the BC grid by 2030.

Financing the Low-Carbon Transition

To understand the financial implications of reducing GHG emissions, the costs and potential savings for implementing the full suite of low-carbon scenario actions were modelled to 2050. These costs and savings represent those incurred by municipal, private, and public sectors and are additional to those that would occur in the BAU scenario. The black trendline shown in Figure D represents net annual costs and indicates that the break-even point across all action investments could be 2032, at which point energy efficiency, energy systems that require less maintenance and have longer lifespans, revenues from renewable energy sales, and avoided carbon taxes (from reduced fossil fuel purchases) provide ongoing savings, achieving almost two billion dollars in cumulative savings by 2050.



Capital expenditures	$3,306,112,000
O&M Savings	-$862,177,000
Energy Cost Savings	-$3,011,500,000
Avoided Carbon Taxes	-$1,418,678,000
Renewable Energy Revenue	-$22,107,000
Net Present Value	-$2,008,350,000

Figure D: Modelled year-over-year expenditures and savings of low-carbon scenario actions implementation, over and above those that would be incurred in the BAU scenario.

In Closing

To reduce the severity of expected climate change impacts locally and across the globe, GHG emissions must be reduced across all sectors. From the international to local stage, action is needed by governments, businesses, industries, and the public. This modelling analysis demonstrates that relying solely on federal and provincial policies and mandates will be insufficient for Kelowna to achieve the IPCC 1.5 degrees Celsius pathway and 2030 senior government emissions reduction targets. With further local low-carbon actions, the community could surpass these targets and achieve a 48 per cent reduction below 2007 levels by 2030. Achieving this will require substantial investment and coordination between governments, citizens, businesses, and other entities, but over the long term the financial savings, as well as other economic, social, and environmental benefits provided by emissions reduction actions, will far outweigh the investment.