

**Implementation Plan for a
Carbon Neutral King County Government**
Prepared in accordance with
2016 King County Comprehensive Plan Workplan Action 9

February 28, 2019



King County

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Executive Summary

Climate change is having profound impacts on public health, economy, and environment and the scientific consensus is that society collectively needs to do more, faster, to reduce greenhouse gas (GHG) emissions. The most recent report from the Intergovernmental Panel on Climate Change documented that global emissions need to be on the steep decline within the next decade to avoid the worst impacts of climate change.

King County has a long track record of innovation and leadership to reduce GHG emissions and prepare for climate change impacts. King County's 2015 Strategic Climate Action Plan (SCAP) established ambitious goals, targets, and priority action commitments for both county operations and at the community scale. Still, the County can and must move faster and more aggressively to reduce GHG emissions.

This *Implementation Plan for a Carbon Neutral King County Government* ("Plan"), provides a comprehensive analysis and recommendations for policies and investments necessary to achieve carbon neutrality across all King County government operations and services, consistent with the 2016 King County Comprehensive Plan carbon neutral policies and Workplan Action 9.

There is no universally accepted definition of carbon neutrality. In principle, an organization is carbon neutral when the net balance of emission sources and removals is zero. Strategies to achieve a carbon neutral goal can vary depending on how the goal is defined, particularly with respect to the treatment of direct and indirect emissions reductions and use of carbon offsets to meet goals. ***The analysis and the recommendations of this Plan focus on more ambitious targets and actions that will drive real reductions in the County's direct GHG emissions.*** This approach maximizes climate benefits, increases accountability, encourages cost savings, improves health, and demonstrates leadership.

Based on the analysis completed for this Plan, the Executive recommends that King County build on existing strategies and establish new, stronger targets to reduce operational GHG emissions by 25 percent by 2020, 50 percent by 2025, and 80 percent by 2030. Meeting these accelerated goals will require ***additional investment*** in actions like fleet electrification and sometimes ***controversial policy choices***. Given that County operational emissions are a small percentage of overall emissions in King County, it is essential that the County also analyze actions in the context of ***community scale emissions*** and focus County efforts and investments where they will have the most impact. The County will complete a 5-year update to the 2015 SCAP by June 2020, and will use this update to refine, prioritize, and formalize stronger goals and actions to reduce GHG emissions from county operations and in the community as a whole.

This Plan:

- Builds on and strengthens the County's existing 2015 SCAP and 2016 Comprehensive Plan commitment to reduce operational emissions by recommending a new target for 2025 and strengthening the 2030 target from a 50 percent to 80 percent reduction
- Defines strong GHG reduction goals as King County's near-term carbon neutral approach
- Includes all direct emissions sources and carbon sinks from operations (fuel, energy, methane, land use and electricity) in the goal, an expansion of previous accounting
- Prioritizes direct emission reductions and excludes all purchased carbon offsets
- Aligns with science-based guidance on GHG reductions and climate leadership best practices

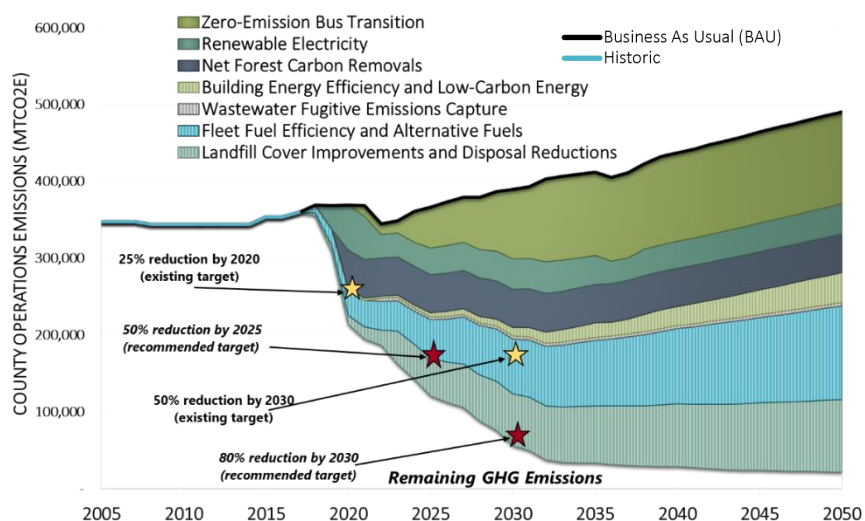
To assess the feasibility of stronger targets, the analysis supporting this Plan modeled the potential GHG reductions of planned and potential additional strategies in seven categories: zero emission bus transition, renewable electricity, forest carbon, wastewater fugitive emissions capture, building energy efficiency and low-carbon energy, fleet fuel efficiency and alternative fuels, and landfill cover improvements and waste disposal reductions. Key findings include that implementation of currently planned actions will put the county on track to meet its existing 2020 target for reducing energy and fuel related operational GHG emissions, and that with additional actions, it is technically feasible to broaden, strengthen and accelerate the County’s GHG reduction targets. Preliminary assessment of health and equity and social justice benefits and impacts suggest that these strategies also offer significant co-benefits.

Recommendations in this Plan are based on preliminary information regarding the feasibility of modelled strategies. The Plan includes an assessment of the requirements of the County (in terms of staff, budget resources, strategic planning) as well as external factors (e.g. market for new technology) that would be needed to implement the identified strategies. For example, County Council action will be needed to: enter into purchase contracts for renewable electricity, approve policies that maximize recycling by customers, adopt supportive policies in the 2020 SCAP, adopt budgets with investments required to continue the transition to battery buses, and implement efficiency projects. Several market and external factors will also need to continue to advance to meet the operational and service needs of King County. For example, technologies will need to advance to ensure availability of electric medium and heavy-duty vehicles, while federal and state incentives and markets will be important to advance efficiency initiatives.

Strategies presented in this Plan serve to illustrate the level of effort required will be refined further during the 2020 SCAP update. The update will take a comprehensive approach to compare the relative GHG benefits and tradeoffs of investments in operations vs. service (i.e. fleet electrification vs. increase transit service). If necessary, the overall targets could also be further updated. Once the targets and strategies are formally adopted by County Council in the 2020 SCAP, they will serve as the comprehensive blueprint for achieving carbon neutrality.

GHG Emissions from King County Operations: Total Emissions and Modeled Reductions.

This Figure shows potential reductions of 2015 SCAP strategies and strategies developed as part of this Plan, showing that it is feasible to achieve the stronger targets recommended.



Key Definitions.

The following definitions, consistent with *The Greenhouse Gas Protocol*¹, are used throughout this Plan.

- **Emissions** refer to the release of GHG into the atmosphere.
- **Reductions** refer to actions that decrease the production of GHG emissions, such as through increased use of renewable energy or commute mode shifts.
- **Removals** refer to actions that take existing GHG out of the atmosphere, such as through avoided deforestation or forest growth.
- **Offsets** refer to credits issued for verified GHG projects that occur at sources not covered by the program, often to achieve a net zero increase in emissions.
- **Operational emissions** refer to the facilities, fleets, and other services that are owned and operated by King County.
- **Communitywide emissions** refer to the emissions released by the community at large
- **Direct emissions** refer to GHG emissions from sources that are owned or controlled by the organization
- **Indirect emissions** refer to GHG emissions that are the consequence of the activities of the organization, but occur at sources owned or controlled by another entity.
- **Scope 1** refers to direct GHG emissions and removals from operations, controlled by the entity (i.e. fuel combustion from King County owned vehicles; natural gas used at King County facilities; landfill gas at Cedar Hill Regional landfill; land use change including carbon sequestered by forest growth on King County owned lands).
- **Scope 2** refers to GHG emissions from the generation of electricity consumed by King County (i.e. emissions from generation of electricity by Puget Sound Energy).
- **Scope 3** refers to all indirect emissions that occur in the value chain of the organization both upstream (e.g. production of goods consumed) and downstream (e.g. avoided transportation emissions from transit service provided).

¹ World Resources Institute and World Business Council for Sustainable Development, 2005. *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*. Available at: <http://www.ghgprotocol.org/>

Introduction

Climate change is having profound impacts on public health, the economy, and the environment. King County has a long track record of innovation and taking action to respond to the challenges of climate change by reducing greenhouse gas (GHG) emissions and preparing for local climate change impacts, and to do so in ways that promote equity and social justice, are cost effective, and have other benefits to the environment, economy, and health. The county was one of the first local governments in Washington State to integrate climate change considerations, goals, and policies into its Comprehensive Plan, and the 2015 Strategic Climate Action Plan (SCAP) established ambitious goals, targets, and priority action commitments for both county operations and at the community scale.

This report, *Implementation Plan for a Carbon Neutral King County Government* (“Plan”), recommends that King County achieve more ambitious targets to reduce King County’s operational Scope 1 and 2 GHG emissions by 80 percent by 2030 compared to 2007 levels. This is an acceleration from the existing goal of 50 percent by 2030. The scientific consensus is that society collectively needs to do more, faster, to reduce GHG emissions. As climate change impacts continue to worsen globally and locally, the Intergovernmental Panel on Climate Change has documented that global emissions need to be on the steep decline within the next decade to avoid the worst impacts. This report outlines policies and investments that build on the work already in progress under the direction of the 2015 SCAP. Reductions at this scale are ambitious but achievable so long as King County takes action as outlined in this report and assuming external market forces continue to evolve to meet service and operational needs.

This Plan recommends this near-term target, with the understanding that specific strategies for implementing the targets will be further refined and formally updated as part of the 2020 SCAP update, which the Executive will transmit in June 2020.

Workplan Direction for Carbon Neutral King County Plan

The 2016 King County Comprehensive Plan is the long-range guiding policy document for all land use and development regulations in unincorporated King County, and for regional services throughout the County including transit, sewers, parks, trails and open space. To make implementation of the Comprehensive Plan more transparent, the 2016 Comprehensive Plan included a Workplan section in the Plan rather than including it in the adopting Ordinance. Workplan Actions are intended to work in conjunction with the other tools such as regulations, incentive programs, and other core regional planning and implementation activities. Workplan Action 9 reads as follows:

Action 9: Carbon Neutral King County Plan. The 2016 Comprehensive Plan includes a new policy F-215b which directs the County to “strive to provide services and build and operate public buildings and infrastructure that are carbon neutral.” To support implementation of this policy, Executive will develop an Implementation Plan for making King County government carbon neutral. The Implementation Plan shall address existing and new County buildings, as well as all County operations and services, and shall identify the actions, costs and schedule for achieving carbon neutral status. This Implementation Plan will help inform the 2020 update of

the SCAP, through which existing county targets for carbon neutrality and GHG emissions reduction will be updated consistent with the F-215b and the Implementation Plan.

- *Timeline:* A Carbon Neutral King County Implementation Plan and a motion adopting the Implementation Plan shall be transmitted to the Council for consideration by February 28, 2019. A Progress Report on development of the Implementation Plan shall be transmitted to the Council by December 31, 2017.
- *Outcomes:* The Executive shall file with the Council for review and potential approval the Carbon Neutral King County Implementation Plan and a motion adopting the Implementation Plan.

Relationship with the 2020 Strategic Climate Action Plan

This Plan and its recommendations lay the foundational technical analysis and recommendations for further development in the 2020 SCAP. The 2020 SCAP will include updates for existing county targets for carbon neutrality and GHG emissions reduction as outlined in Comprehensive Plan Workplan Action #9.

Based on these recommendations, and the final Plan as adopted by the County Council, the Executive will further develop the targets, strategies and actions identified in this Plan for inclusion in the 2020 SCAP. Modeled strategies presented in this Plan serve to illustrate the level of effort required to achieve ambitious operational emission reductions and are likely to evolve as they are further developed in the SCAP.

This Plan, per Comprehensive Plan Workplan direction, evaluates options for setting a carbon neutral goal for King County government operational emissions (i.e. new and existing buildings, facilities, fleet and other services owned and operated by King County government). Communitywide emissions, from residents within the geographic boundary of King County, are considered in the County's SCAP. The 2020 SCAP development will take a comprehensive approach to comparing the relative GHG benefits and tradeoffs of investments in operations vs. service (i.e. vehicle electrification vs. increase transit service). If necessary, the overall emissions reduction targets could be further updated.

Once adopted, the 2020 SCAP will serve as both the comprehensive blueprint for communitywide County climate action and also the roadmap for achieving operational carbon neutrality.

Relationship of this Plan to other King County Commitments

This Plan builds on and integrates a history of related analyses and Executive and Council action and commitments. Key existing commitments, Council direction, and previous research and findings include:

2015 Strategic Climate Action Plan

In 2015, the King County Executive recommended and the King County Council unanimously approved the SCAP. The 2015 SCAP is a five-year blueprint for County action to confront climate change, integrating climate change into all areas of County operations and its work in the

community. The 2015 SCAP guides County work to achieve ambitious GHG emissions reduction targets, prepare for the impacts of a changing climate, and ensure that King County continues to lead on climate action. An important part of development of this Plan is to better quantify the GHG benefits of 2015 SCAP commitments and priority actions. The 2015 SCAP includes GHG reduction targets at two scales: countywide and operations. Specifically, the existing targets are:

- To reduce countywide sources of GHG emissions, compared to a 2007 emissions baseline, by 25 percent by 2020, 50 percent by 2030, and 80 percent by 2050.
- To reduce total GHG emissions from government operations, compared to a 2007 emissions baseline, by at least 15 percent by 2015, 25 percent by 2020, and 50 percent by 2030.
- That the Department of Natural Resources and Parks (DNRP) achieve net carbon neutrality by 2017 and that the Wastewater Treatment Division (WTD) and Solid Waste Division (SWD) each independently achieve carbon-neutral operations by 2025.

This Plan builds from the existing 2015 SCAP targets as a starting point for the analysis and development of recommendations, and further develops a carbon neutral approach for GHG emissions across all government operations and agencies.

King County Ordinance 17971 and Agency Carbon Neutrality Commitments

Ordinance 17971 required DNRP to achieve carbon neutrality by 2017 and that the WTD and SWD each achieve carbon neutrality by 2025. It also required third party review of DNRP, SWD, and WTD GHG accounting methodologies. These targets were also adopted in the 2015 SCAP.

DNRP, WTD, and SWD currently use a net carbon neutral accounting approach. This approach includes an expanded boundary of what is counted as GHG emissions sources, for example it includes an estimate of the lifecycle GHG emissions associated with department-purchased goods and services. It also includes GHG removals from DNRP actions such as tree planting, Loop Biosolids, recycling at transfer stations and a portion of DNRP's renewable energy production. This accounting approach is different than what is proposed in this Plan for all of government operations. Staff recommend continuing to use both approaches for different purposes. For DNRP, the net carbon neutral accounting approach provides benefits by supporting efforts to better quantify and reduce purchasing related emissions and also supports investments in strategies that increase investments in actions that provide GHG removal benefits.

Ordinance 17971 also required that Metro Transit report to the Council on potential options for creation of a Transit Carbon Offset Program. Building on this direction, Metro reported to the Council through May 2015 "Feasibility Evaluation of the Sale of Metro Transit Carbon Offsets" and December 2015 "Monetizing Transit Environmental Attributes" reports. In September 2016, the Council authorized Metro to sell the environmental attributes of powering electric vehicles with renewable energy with Renewable Identification Numbers (RINs) credits, and Metro entered into a contract to purchase renewable fuel for all its electric fleet and sell RINS. Metro's ability to sell RINs continues to await rulemaking by the U.S. Environmental Protection Agency. Following a public comment period in February, 2017, the EPA has not acted on this policy as of January, 2019.

Feasibility of Achieving a Carbon-Neutral or Zero-Emission Bus Fleet

In April 2016, the King County Council approved Motion 14633, which requested that the Executive transmit a report addressing the feasibility of achieving a carbon-neutral or zero-emission

bus fleet. The Council requested that the report provide an analysis and recommendation on whether Metro should adopt a carbon-neutral or a zero-emission fleet goal, provide a range of possible target dates for achieving that goal, identify any changes needed in Metro’s strategic plan or long-range plan to attain the goal, and engage a group of stakeholders to provide input on the plan. In April 2017, the King County Executive recommended and the King County Council adopted the *Feasibility of Achieving a Carbon-Neutral or Zero-Emission Fleet* report, which recommends that no later than 2040 Metro transition to a zero-emission bus fleet powered by renewable energy, and focus early deployment of zero-emission buses in the communities that are most vulnerable to air pollution.

2016 Comprehensive Plan

King County was one of the first local governments to integrate climate change considerations, goals, and policies into its Comprehensive Plan. The 2016 Comprehensive Plan update affirmed and updated King County’s commitment to climate change action. Development of this Plan also relates to and supports several additional Comprehensive Plan policies and commitments, including the following:

- **E-205:** King County shall reduce greenhouse gas emissions from all facets of its operations and actions associated with construction and management of county-owned facilities, infrastructure development, transportation, and environmental protection programs to achieve the emissions reductions targets set in E-206 and to work towards the carbon neutral goal in F-215b.
- **E-206:** King County shall reduce total greenhouse gas emissions from government operations, compared to a 2007 baseline by at least 25 percent by 2020 and 50 percent by 2030.
- **E-206a:** King County’s Department of Natural Resources and Parks, including the Wastewater Treatment Division, Solid Waste Division, Parks and Recreation Division, and Water and Land Resource Division, shall achieve net carbon neutrality for its operations by 2017.
- **E-206b:** King County’s Wastewater Treatment Division and Solid Waste Division shall each independently achieve carbon-neutral operations by 2025.

Future Comprehensive Plan Updates

Once recommended targets and associated strategies are further developed and incorporated into 2020 SCAP, Comprehensive Plan policies will need to be updated to align with the 2020 SCAP.

Approach for Plan Development

All County departments have a role to play in carrying out King County’s climate change priorities. Some departments that have physical plan operations, like DNRP, Metro Transit, and Executive Services, are responsible for leading implementation of many priority actions in the SCAP.

Other departments, such as Public Health - Seattle & King County, the Office of Emergency Management, and the Water and Land Resources Division of DNRP are directly engaged in preparing for climate change-related health impacts and changing weather patterns. All county agencies are building climate change considerations into their community engagement, research, public health, disaster preparedness, and community resilience work.

All of these agencies are represented in the cross-department Climate Leadership Team, which supports implementation of the SCAP, monitors progress, and coordinates across agencies to deliver on SCAP goals and priorities. The Climate Leadership Team designated staff leads from Metro Transit and DNRP to convene an internal workgroup with staff from the Executive Office, DNRP, Facilities Management Division, Fleet Services, Metro Transit, Wastewater Treatment Division, Solid Waste Division, and Performance Strategy and Budget to ensure it reflected input across many King County departments. As needed, staff sought out subject matter expertise from additional staff (e.g. fleet managers). Staff work was supported by consultant support in two phases. A team of University of Washington Evans School² graduate students evaluated carbon neutral policy options and conducted a review of examples of policies from other organizations. External consultants from Cascadia Consulting updated the 2017 King County Operational GHG Inventory and modeled existing and new strategies to reduce emissions.

Importance of Carbon Neutrality

A Renewed Call to Action on Climate Change

Since King County's existing operational GHG emissions reduction targets were set, evidence that climate change presents a significant threat globally and regionally continues to grow. Twenty of the warmest years on record globally have occurred in the last 22 years, with the warmest four occurring since 2015. According to the University of Washington Climate Impacts Group's Washington Climate Change Impacts Assessment³, across the region average annual temperature in the Puget Sound region is rising (+1.5°F since 1900), sea level is rising (+9 inches since 1899), heavy precipitation events are becoming more intense, and the Washington Cascades are experiencing a long-term decline in snow and ice.

These and other changes are expected to accelerate in the coming decades, impacting King County operations and our communities' health, economy, and environment. If warming continues at its current rate, by mid-century, average annual temperature in Washington will be warmer than any year in the 20th century. Snowpack loss and lower summer stream flows will increase competition for already limited summer water supplies, more intense winter precipitation will increase the risk of flooding, warmer and drier summer conditions will increase the potential for wildfire, and the potential for up to five feet of sea level rise by 2100 will put more coastal infrastructure at risk of flooding and erosion.

As the threat of climate change accelerates, the need to set and achieve more ambitious targets to reduce GHG emissions is also becoming clearer. According to the Intergovernmental Panel on Climate Change⁴, a global consortium of scientists, limiting warming to 1.5°C (2.7°F) will require

² Burrows, Z, I. Gordon. N. Schippers. [Defining an Operational Carbon Neutral Goal for King County](#). A capstone project submitted in partial fulfillment of the requirements for the degree of Master of Public Administration. Evans School of Public Policy and Governance. University of Washington.

³ Climate Impacts Group. 2009. The Washington Climate Change Impacts Assessment. M. McGuire Elsner, J. Littell, and L. Whitely Binder (eds). Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, Seattle, Washington.

⁴ IPCC, 2018: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global GHG emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O.

reducing global GHG emissions by at least 45 percent by 2030 and reaching net zero by 2050 (compared to 2010).⁵ Global temperature has already increased 1°C (1.8°F) since 1850 and could reach 1.5°C as soon as 2030 if warming continues at its current rate.

The scientific consensus to avoid the worst impacts of climate change – as well as best practices of corporate and public leaders - indicates that King County should at minimum reduce emissions by 80 percent by 2050. In developing this Plan, staff reviewed best practices from around the globe and found that:

- As shown by the “Science Based Targets” initiative, there has been a surge in private companies adopting emissions reduction targets in line with climate science and Intergovernmental Panel on Climate Change guidance, including setting minimum GHG reduction targets of at least 50 percent by 2050 (compared to 2010).
- The Carbon Neutral Cities Alliance is a collaboration of leading global cities working to cut community scale GHG emissions by 80-100 percent by 2050 or sooner. The CNCA is considered the standard in setting the most aggressive GHG reduction targets undertaken and is focusing on setting and achieving strong reductions in direct emissions.

To lead on climate action and demonstrate that success in the near term is possible, this Plan explores how quickly King County could achieve an 80 percent emissions reduction. The modeling documented in this Plan details how a more aggressive timeline was developed for an 80 percent reduction target.

Reasons for Pursuing Carbon Neutrality and Strong GHG Reduction Targets

In addition to addressing climate change, there are multiple reasons that organizations are pursuing carbon neutrality and setting strong GHG reduction goals. Key rationales for setting ambitious goals identified in researching best practices include:

- *Accountability*: Setting clearly defined goals and measuring progress is critical for making progress
- *Innovation*: Investing in a clean energy future that promotes innovation, supports economic development, and fosters creativity in solutions
- *Cost Savings*: Conserving resources and reducing emissions saves money now and in the future
- *Health*: Reducing emissions and other types of air pollution has benefits for public health and safety
- *Leadership*: Setting ambitious goals can demonstrate success and inspire action by employees, other governments, and businesses

Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)). In Press.

⁵ That Paris Agreement signed by 145 nations in December 2015 reaffirmed the call for limiting global warming to well below 2°C (3.6°F) above pre-industrial levels while also urging governments to work more aggressively to limit warming to 1.5°C (2.7°F). While significant impacts are expected with 1.5°C of warming, the warming that occurs above the 2°C threshold is considered dangerous. The ability to adapt to the more severe impacts associated with higher amounts of warming also becomes more difficult.

Defining a King County Carbon Neutral Goal

An important part of this Plan is to recommend a GHG accounting approach and boundaries for use in defining carbon neutrality. In setting a carbon neutral goal, King County must define what is included and what is excluded from the boundary.

There is no universally accepted definition of carbon neutrality. In simplest terms it means that the net balance of GHG emission sources (e.g. combustion of fossil fuel) and emission removals (e.g. carbon stored in forests) is zero. Approaches to achieving this goal depend significantly on the GHG emissions boundary (e.g. what is included/excluded) and whether a goal prioritizes direct vs. indirect emission reduction strategies. To develop the Plan, the Executive branch evaluated a set of options for setting a carbon neutral goal for King County government operational emissions. The Executive also reviewed examples and best practice from local governments, business and universities. Based on this research, three options for achieving a King County Carbon Neutral were developed and then analyzed:

- **Option 1: Achieve carbon net neutral using an expanded GHG accounting approach,** whereby net balance is zero by including indirect emission reductions from goods and services King County provides in boundary.
- **Option 2: Achieve carbon net neutral through purchase of external carbon offsets,** whereby net balance of emissions is zero by ton for ton purchase from external providers.
- **Option 3: Achieve strong, science-based GHG reduction targets**

To compare the three options, four priorities were established to guide the County's evaluation of policy options. These four priorities were generated from a literature review, case studies of climate policies of several organizations, external interviews, and interviews with King County staff to ensure alignment with King County policy priorities.

- **Climate Benefit:** A primary objective of setting a carbon neutral goal is to provide a framework for meaningful climate action. The goal should lead to action that further reduces King County's emissions. Specifically County staff considered the degree to which each option will reduce emissions, support transformative change to low carbon infrastructure less reliant on fossil fuels over the long-term, and inspire and engage County employees to shift practices that reduce emissions.
- **Feasibility:** In addition to being ambitious, a goal must be achievable. Specifically we explored the degree to which King County has control over the emission source, cost effectiveness, implementation feasibility, flexibility for continuous improvement, and department-specific capacity.
- **Alignment with King County Priorities:** This Plan must be in alignment with the County's climate change, strategic plan, and equity priorities. The King County SCAP directs the county to focus climate mitigation efforts on actions that directly reduce GHG emissions. The King County Equity and Social Justice Strategic Plan directs the County to invest upstream where needs are greatest to reduce inequities by improving air quality and public health outcomes in low-income, limited English speaking and communities of color. The King County Strategic Plan directs the county to improve the health and well-being of people in King County, foster a healthy environment and address climate change.

- **Leadership and Partnership Opportunity:** Setting an operational carbon neutral goal is an opportunity to demonstrate leadership and serve as a model to encourage action by businesses, local jurisdictions, and organizations within King County and beyond.

The three options are as follows:

Option 1: Achieve carbon net neutral using an expanded GHG accounting approach

A net neutral accounting approach includes additional GHG emissions sources, reductions and removals, such as emissions reduced by King County residents as result of services, such providing transit ridership and community recycling. Under this approach, King County would achieve a carbon net neutral goal when the net balance of direct emissions and indirect emissions reductions activities is zero.

King County's Scope 1 and 2 King County government operational emissions are detailed in the modeling sections of this Plan. In 2017, total Scope 1 and 2 emissions were approximately 360,000 MTCO₂e from buildings and facilities, fleet (including Metro bus fleet), and landfill and wastewater fugitive methane emissions. Adding Scope 3 GHG emissions from King County purchases within the boundary of a carbon neutral approach would increase the County's footprint by an estimated 270,000 MTCO₂e (2009 estimate). Other Scope 3 emissions from government operations such as employee commute emissions have not been comprehensively quantified, but are estimated to be much smaller than purchasing emissions.

In 2017, it was estimated that Metro Transit reduced regional GHG emissions by approximately 600,000 MTCO₂e, primarily as a result of promoting more compact land use development, as well as by reducing traffic congestion and replacing private vehicle trips. For 2017, as part of its net carbon neutral accounting approach, DNRP estimated department GHG reductions and removals of approximately 315,000 MTCO₂e associated with tree planting, Loop Biosolids reuse, and recycling at King County owned transfer stations. Overall, these estimates suggest that following a "net" accounting approach, King County could already be considered net carbon neutral (i.e. 915,000 MTCO₂e reductions and removals > 630,000 MTCO₂e operational GHG emissions).

If a net carbon neutral approach was used for all government operations, on its own, this option would likely not provide any additional climate benefit if King County government was already considered carbon net neutral through accounting and no additional actions were pursued. No new action or effort to reduce direct emissions from government operations would be required or incentivized by this option. This option would not align with the County's commitment in the 2015 SCAP to prioritize directly reducing GHG emissions from operations nor would it help set us on a long-term path of low carbon infrastructure. In conflict with the County's Strategic Plan and Equity and Social Justice Strategic Plan it would not reduce local air pollution nor address public health inequities from the burning of fossil fuels.

This option could focus on communicating that the benefits of the services we provide outweigh the negative impacts of operations, but could be perceived as not truly reducing emissions from operations. Details of evaluation of this option against the four priorities for this Plan are provided in Table 1.

Option 2: Achieve carbon net neutral through purchase of external carbon offsets

After taking steps to reduce emissions directly, King County could purchase indirect reductions, such as carbon offsets from emission reducing projects that reduce GHGs from sources outside of operations. This option would limit the boundary of King County emissions to those under direct control of the county, and authorize the County to achieve carbon neutrality by purchasing carbon offsets from projects outside of the direct control of County government to make up the difference and reach zero emissions.

The great majority of private sector, university, and public sector entities that have made carbon neutral commitments have adopted this approach. This includes Seattle City Light (SCL); City of Austin, TX; Metro Vancouver, British Columbia; Microsoft; Google; Lyft; and many universities including the University of Washington. Carbon offsets can run anywhere from \$5 to \$15 per metric ton depending on the project type and location. For example, each year SCL purchases between 100,000 and 300,000 MTCO_{2e} of carbon offsets to compensate for fossil fuel emissions. City Light purchases offsets registered through the Climate Action Reserve, including projects such as biodiesel for Seattle area ferries and garbage trucks, shore power for cruise ships at the Port of Seattle, and methane recapture at dairy farms. The City of Austin expects to need to purchase between 40,000 to 60,000 metric tons of carbon offsets at a cost ranging from \$200,000 to \$900,000 in order to meet its 2020 carbon neutral commitment.⁶

If King County were to adopt this strategy there would be the cost of purchasing the offsets, as well as an administrative cost to ensure offsets purchased met quality standards. High quality offset projects that are additional, legally attributable, measurable, permanent, unique and independently verified do exist, nevertheless ensuring that a given carbon offset project meets these standards is a challenge.⁷ King County Scope 1 and 2 operational emissions are approximately 360,000 metric tons per year (Figure 1). If no further steps were taken to reduce emissions, then given an estimated cost of \$5-\$15 per ton the annual cost to purchase offsets could range from \$1.8 to \$5.4 million per year. To maintain carbon neutral status, and without investment in efforts to reduce emissions directly, carbon offsets would have to continue to be purchased year after year. Over a ten year period from 2020 through 2030 the total cost of offsets could range from \$180 to \$540 million dollars. There is an inherent tradeoff with using County funds for carbon offsets versus investments in infrastructure to set the County on a long-term path to directly reduce its own emissions and reduce its dependence on fossil fuels.

This trade-off became a significant political liability in British Columbia and offers valuable lessons learned. Offsets have been a critical component to achieving the 2010 carbon neutral goal for British Columbia governmental entities. In 2013, an audit determined that two projects that accounted for 70 percent of the offset government agencies purchased were non-additional, (i.e. could not prove that they would not have happened anyway without revenue from offset sale) and the private sector companies receiving the funds would have implemented the projects without government funding. This finding and the cost burden resulted in a public outcry, specifically

⁶ City of Austin. 2018. Greenhouse Gas Reduction Progress Report. Memorandum to the Mayor and City Council from the Office of Sustainability. Available at:

http://austintexas.gov/sites/default/files/files/Sustainability/030118_FINAL_Memo_from_OOS_to_MC_RE_Greenhouse_Gas_Emissions_Reduction_Progress_Report.pdf

⁷ “The CarbonNeutral Protocol: The Global Standard for Carbon Neutral Programmes.” Natural Capital Partners, January 2017. <https://assets.naturalcapitalpartners.com/downloads/The-CarbonNeutral-Protocol-Jan2017.pdf>.

related to public school funding. In the end, British Columbia was forced to close the original carbon offset fund and initiated a replacement program that used funds to implement energy efficiency programs in public schools.

Purchase of carbon offsets or other indirect emission reduction could be used to meet the County's goal. Depending on the due diligence and quality of offsets purchased, the projects could achieve a climate benefit. However, this option would not lead to transformational change of County infrastructure nor support the 2015 SCAP objective to directly reduce GHGs. Diverting funds from direct emission reductions would result in a large volume of offsets being purchased year after year. Unless offsets were restricted to locally based projects they would be unlikely to contribute to improving local air quality and reducing health inequities in the County, a priority of the County's Equity and Social Justice Strategic Plan.

Option 3: Achieve strong, science-based GHG reduction targets

King County can directly reduce Scope 1 and Scope 2 emissions to achieve a GHG reduction goal of 80 percent. An 80 percent reduction goal is aligned with science-based targets and global efforts, such as the Carbon Neutral Cities Alliance to reduce emissions by 80 percent by 2050 as a transformative path to a zero-carbon future. The goal of the Carbon Neutral Cities Alliance is to instigate transformative change by redesigning core city infrastructure (e.g. electricity, transportation, buildings and waste management) so that it operates with few to no carbon emissions.⁸

A stronger GHG reduction goal builds on 2015 SCAP goals and objectives to focus investments and actions on direct emission reductions. Focusing investments on direct emissions helps transform King County infrastructure on a low carbon path for the long-term. Reducing emissions locally supports King County equity and social justice goals to deliver health benefits of improved air pollution locally and economic development.

⁸ "CNCA: Framework for Long-Term Deep Carbon Reduction Planning." Copenhagen: Innovation Network for Communities, June 2014. www.usdn.org/uploads/cms/documents/cnca-framework-12-2-15.pdf?source=http%3a%2f%2fusdn.org%2fuploads%2fcms%2fdocuments%2fcnca-framework-12-2-15.pdf.

Table 1. Comparison of Options for Achieving a Carbon Neutral King County Government

Option	Climate Benefit	Feasibility	Alignment with King County Priorities	Leadership
Option 1: Carbon neutral through GHG accounting approach	None: achieving this option would be based on adopting a comprehensive GHG accounting approach but would not accrue additional GHG reduction benefits beyond current practices.	Feasible dependent on policy decisions about the County’s GHG accounting methodology and framework.	Conflicts with objectives of 2015 SCAP to focus on direct emission reductions. Does not further ESJ goals to reduce health inequities from air pollution.	Communicates the GHG benefit of the services we provide outweighs the emissions generated.
Option 2: Carbon neutral through purchase of external carbon offsets	Indirect GHG emission reductions. Would not contribute to transforming County to low carbon infrastructure. Unlikely to have local air pollutant reduction or other benefits.	Est. cost of \$1.8 – \$5.4 million annual costs, not including program costs. Would likely reduce funding available for direct emission reductions.	Conflicts with objectives of 2015 SCAP to focus on direct emission reductions. Not likely to further ESJ goals to reduce health inequities from air pollution.	Limited. Diverts responsibility from reducing King County direct emissions. Potential liability of using County funds to implement carbon offset projects.
Option 3: Strong GHG reduction targets for direct emissions	Aggressively reduces near-term GHG emissions. Sets county on long-term path to transform infrastructure to zero-carbon	Ambitious but achievable. Further assessment of funding requirements needed. See details in modeling section of this Plan.	Aligned with 2015 SCAP and ESJ goals.	Aligned with best practice Carbon Neutral Cities Alliance. Strong leadership statement in support of science-based targets.

Recommendation for Carbon Neutral Government Operations Approach

The review of best practices, evaluation of King County priorities, and GHG emissions modeling (in following section) concluded that **Option 3: achieving a strong, science-based GHG reduction** goal offers benefits not achieved by alternatives:

- **Maximizes the climate benefit** by aggressively reducing near-term GHG emissions and setting the County on a long-term path to transform to low-carbon infrastructure.
- **Aligned with King County priorities** to directly reduce GHG emissions (per 2015 SCAP) and reduce local air pollution to reduce inequities for King County residents (per ESJ Strategic Plan).
- **Demonstrates leadership** by setting a science-based target aligned with best practices of the Carbon Neutral Cities Alliance and has the potential to catalyze broader climate action by other governments and businesses.

The next section of this report further describes the evaluation done to create the Plan, and describes the technical feasibility of option 3 using a modeling of ongoing and new strategies to reduce operational GHG emissions.

Modeling King County Operational GHG Emissions

Introduction to the Modeling

The scientific consensus indicates that to avoid the worst impacts of climate change society must drastically reduce GHG emissions over the next decade. Reducing GHG emissions and other pollution also helps achieve health, economic development, and other environmental priorities. Furthermore, a comparison of different options for achieving a carbon neutral goal led us to a recommendation focused on achieving stronger GHG reductions from direct King County government emissions, with existing programs/policies/investments and new initiatives, to maximize the climate benefit and be best aligned with King County priorities. A review of best practices of business and public leaders showed that King County should consider a stretch target to reduce GHG emissions by 80 percent. However, to lead on climate action and demonstrate that success in the near term is possible, this Plan still had to determine by what date King County could achieve stronger GHG reduction targets.

This section provides an overview of the modeling exercise undertaken to inform what GHG emissions reduction targets would be ambitious but achievable for King County. The exercise started by modeling potential emission reductions given full implementation of existing 2015 SCAP strategies as well as implementation of additional emissions reduction strategies in seven different categories.

The new emissions reduction strategies modeled are technically feasible and based on assessment of subject matter experts, but still require additional analysis to develop the costs, assess tradeoffs, and further develop implementation feasibility and timeframes. Implementing these new strategies would require additional actions by the King County Council, leadership, staff and external partners.

Based on these strategies, the County will further develop the targets, strategies and actions identified in this Plan for inclusion in the 2020 SCAP. Modeled strategies presented in this Plan serve to illustrate the level of effort required to achieve ambitious operational emission reductions and are likely to evolve as they are further developed.

Operational Greenhouse Gas Emissions and Accounting Approach

To track progress towards GHG emissions reduction targets, local governments calculate annual inventories of their emissions-related activities. Operational emissions can be categorized into three ‘scopes’:

- **Scope 1 emissions** include direct emissions that occur as a part of government operations, such as those that result from property owned or managed by the County. For King County, Scope 1 includes fuel combusted by County-owned vehicles, equipment, and buildings; net carbon change or uptake on County-owned forest land; and fugitive emissions from County-owned wastewater treatment facilities and landfills.
- **Scope 2 emissions** include indirect emissions associated with the consumption of purchased electricity, steam, heating, and cooling.

- **Scope 3 emissions** include all other indirect sources of GHG emissions, such as King County employee business travel and commuting or the lifecycle GHG emissions associated with the production, use and disposal of purchased materials and services. Purchasing is the County’s source of Scope 3 emissions. These emissions are associated with everything from the purchase of office supplies to the emissions from construction projects done on behalf of the County that are contracted out to independent businesses.

Scope 3 emissions for one entity are often also Scope 1 emissions for another entity. For example, emissions associated with King County purchases would also be Scope 1 emissions for the businesses that provide the goods or services King County purchases.

For this Plan, King County includes all Scope 1 and 2 emissions, consistent with adopted protocols and best practices. This is an expansion of past County operational GHG target tracking which focused on GHG emissions from energy and fuel usage (e.g., 2018 SCAP Biennial Report). Scope 3 emissions are not considered within the scope of this Plan, but have previously been quantified and King County will continue work to better quantify and reduce Scope 3 emissions, for example, by addressing employee commute related emissions through the County’s Commute Trip Reduction (CTR) program and by addressing purchasing related emissions through the County’s 2018 Sustainable Purchasing Policy. Additionally, some Scope 3 emissions will continue to be considered as part of existing agency level carbon neutrality commitments by the DNRP, WTD, and SWD.

King County uses The Climate Registry’s widely accepted *Local Government Operations Protocol*⁹ as a guide for completing its inventory. The gases included in the inventory are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and refrigerants (HFC-134, HFC-134a, and R-407C). Emissions of these gases are reported in terms of metric tons of carbon dioxide equivalent (MTCO₂e), the standard unit for GHG inventories. The majority of emissions estimates are calculated by multiplying fuel and electricity use data by a documented emissions factor—a ratio of emissions to an alternative measurement, such as gallons of gasoline (see example calculation below). In select instances, particularly in the case of fugitive—or leaked—emissions, a mix of physical measurement and calculated estimates was employed. Emissions factors were obtained from published sources or, in the case of purchased electricity, were calculated based on supplier specific information. For transportation fuels where well documented life cycle emissions factors have been quantified for the State of California’s Low Carbon Fuel Standard (LCFS), these factors were utilized.

An example GHG emissions calculation is as follows:

$$\text{gallons of gasoline} \times \frac{\text{MTCO}_2\text{e}}{\text{gallon of gasoline}} = \text{MTCO}_2\text{e from gasoline use}$$

⁹ The Climate Registry. Local Government Operations Protocol. Available at: <https://www.theclimateregistry.org/tools-resources/reporting-protocols/local-government-operations-protocol/>

Consistent with 2016 Comprehensive Plan policy F-215b to “strive to provide services and build and operate public buildings and infrastructure that are carbon neutral” the King County operations inventories from 2007 to 2017 include GHG emissions associated with the following activities:

- Electricity, natural gas, steam, propane, and heating oil use in King County buildings, facilities, boilers, furnaces, and generators.
- Diesel, gasoline, propane, electricity, biodiesel, natural gas, jet fuel, and refrigerant use in King County fleets (including Metro buses) and off-road vehicles.
- Methane and nitrous oxide releases at King County operated landfills (open and closed) and wastewater treatment facilities.

Operational Emissions Trends

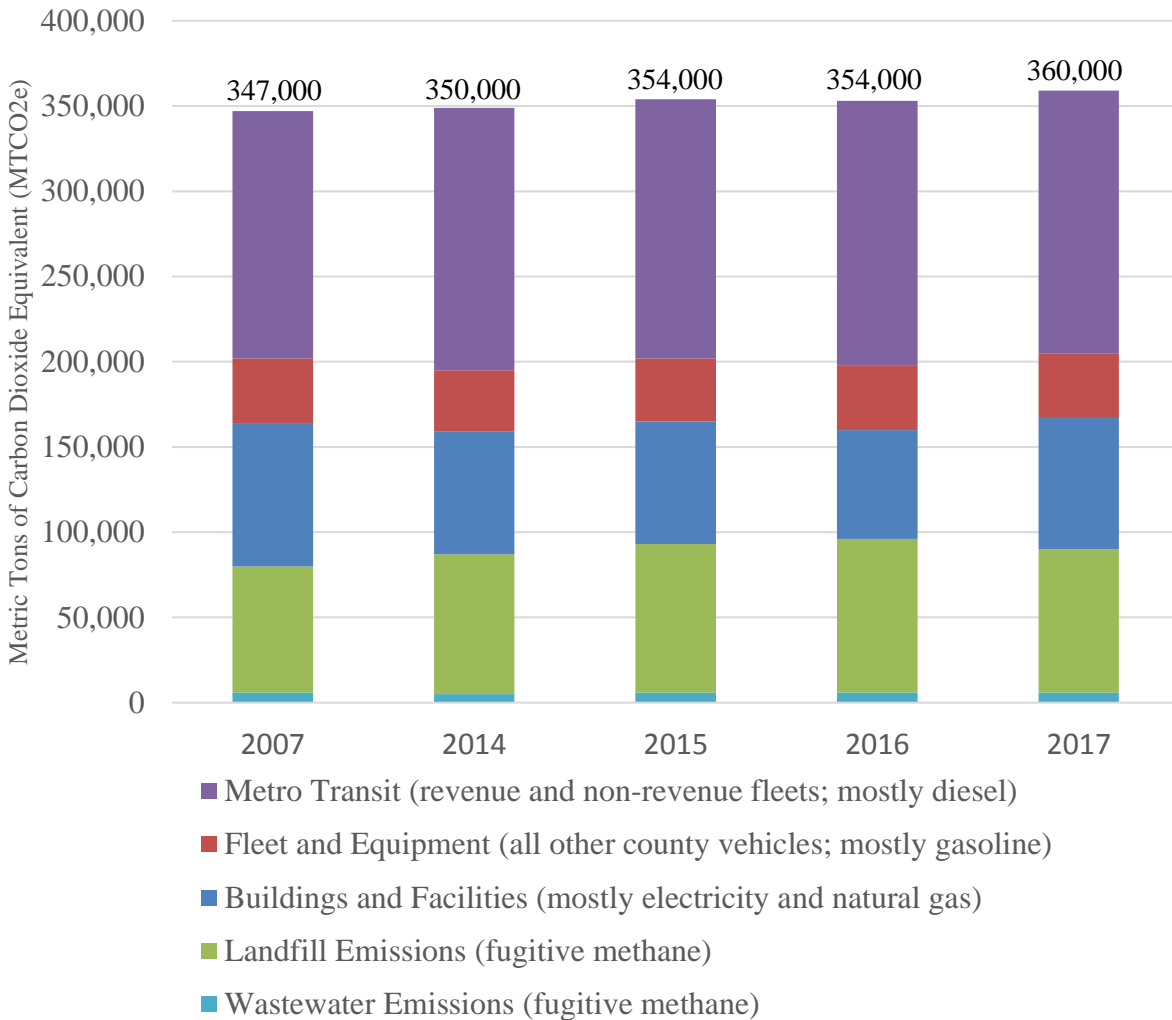
King County’s existing operational GHG emissions target is based on reductions compared to a 2007 baseline year, with targets of a 15 percent reduction by 2015 and a 25 percent reduction by 2020. A summary of operational emissions for 2007 through 2017 is detailed in Figure 1.

Between 2007 and 2017, total population increased by 16 percent and total employment increased by 15 percent. King County services have grown to match increased demand. For example transit ridership increased by 11 percent and total vanpool and vanship ridership increased by 39 percent. Despite these large increases, King County’s total Scope 1 and Scope 2 operations GHG emissions increased by a more modest 4 percent compared to the 2007 baseline.¹⁰ Important trends in operational emissions that contributed to the annual variations shown in Figure 1 include: a decline in building and facilities GHG emissions due to decreased steam and Puget Sound Energy electricity usage; an increase in transit fuel usage; and year to year variability in the acreage of intermediate and final landfill cover systems at the Cedar Hills Regional Landfill. Commitments already in place such as to purchase renewable electricity and electrify buses will help reduce emissions from buildings and facilities and Metro Transit over the coming years.

An analysis completed as part of this Plan assessed what 2017 emissions may have been if no early GHG reduction actions had been taken by the County. Results suggest that King County’s operational emissions may have been 30,500 MTCO_{2e}—approximately 8 percent—higher in 2017 compared to 2007 if King County had not taken early steps to reduce GHG emissions. This analysis estimated what King County’s operational emissions would have been if they had increased more consistent with population growth over the 2007-2017 time frame.

¹⁰ In the updated operational GHG inventory compiled for this Plan, when considering GHG emissions from fuel and energy usage only (excluding fugitive methane emissions), the total increase in emissions is 0.9 percent between 2007 and 2017. This is similar to the 0.6 percent increase reported for these sources for this time frame in the 2017 SCAP Biennial Report.

Figure 1: King County Operations GHG Emissions by Sector. Total Scope 1 and 2 emissions increased by 4 percent between 2007 and 2017, despite countywide population growth of 16 percent. An analysis completed as part of this Plan estimated that 2017 emissions might have been 8 percent higher (391,000 MTCO₂e total) if early actions to reduce emissions had not been taken.



Business-As-Usual Forecast

The modeling exercise began with an examination of historical King County operations data for the GHG inventory baseline year (2007) and years 2014 through 2017. These data provided a baseline from which to build a business-as-usual (BAU) scenario. The BAU scenario offers a window into what operations emissions would be in future years (2018-2050) if King County did nothing additional to reduce emissions. The BAU scenario begins in 2018 and projects GHG emissions for subsequent years based on expected changes to population size, planned updates to King County service provisions (e.g., Metro service changes), anticipated energy market fluctuations, and historical trends. The forecast results in an average increase in MTCO₂e of approximately 1 percent each year, which equates to a 41 percent overall increase in emissions from 2007 levels in 2050. Figures 1, 2 and 3 all include the BAU forecasted increase in emissions over time along with the historic trend in County emissions.

Analysis of Existing 2015 SCAP Strategies

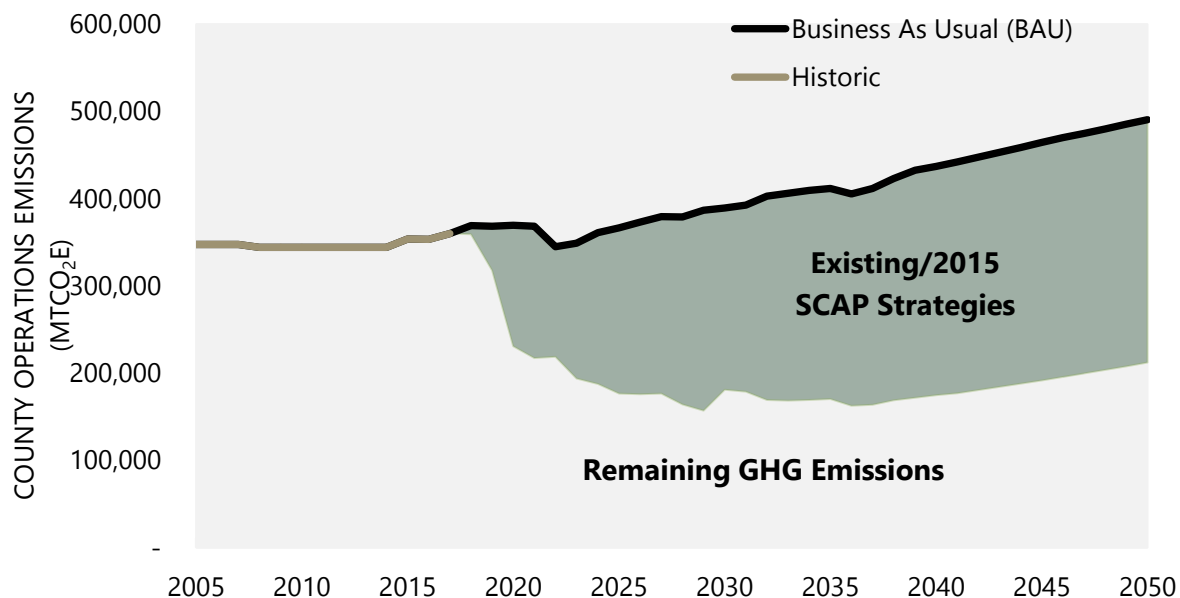
To estimate future County operations emissions given commitments of the 2015 SCAP, the model quantified emission reductions from each SCAP strategy and subtracted those strategy emissions from the BAU scenario. The model directly calculates emissions reductions using documented source data whenever possible or in certain cases emissions reduction estimates based on consultant and King County staff subject matter expertise.

To account for interactions among strategies, the model subtracts reductions in a sequential manner. While this calculation methodology accurately estimates total emissions reductions of all strategies taken together, ascribing emissions reductions to individual strategies can be complicated due to the interdependent nature of reduction activities. For example, consider two strategies: 1) installation of efficient equipment in buildings and 2) purchase of renewable energy. If the energy efficiency strategy is calculated first, then this strategy would get “credit” for emissions reductions associated with changes in energy usage. However, if the renewable energy strategy is considered first and results in a zero-emissions energy supply, then subsequent changes in energy usage would appear to have no impact on GHG emissions. Essentially, in this second calculation scenario, the renewable energy strategy receives all of the “credit” for reducing emissions. However, this does not necessarily reflect how reduction strategies are implemented in the real world. In reality, these strategies would work in concert with one another, with one strategy lowering total energy demand thereby making it easier for utilities and the County to meet regional energy needs with renewable options, and the other strategy increasing the amount of renewable energy options in the region.

Evaluating emissions reductions can be complicated by uncertainty in underlying variables and assumptions. To minimize this uncertainty, all assumptions and variables used in the model were vetted for relevance and accuracy by an interdisciplinary group of King County staff.

Figure 2 below summarizes outcomes of the SCAP strategy analysis. The black line at the top of the chart represents projected emissions in the BAU scenario. The green wedge represents the modeled annual emissions reductions from implementing current SCAP strategies. The bottom border of this reduction wedge represents remaining emissions from King County operations. The size of the wedge reveals that additional reduction strategies will be needed to meet an 80 percent emissions reduction goal. The largest reduction is estimated for year 2029, where emissions are anticipated to be 55 percent below 2007 levels. However, without additional reduction activities beyond those in the current SCAP, emissions will slowly rise again as strategy effectiveness plateaus and BAU trends push emissions up.

Figure 2: Potential Emissions Reductions from Existing 2015 SCAP Strategies



Analysis of New Strategies to Achieve a Stronger GHG Reduction Target

As part of this planning exercise, to evaluate potential reductions associated with additional reduction activities beyond those already in development related to the 2015 SCAP, King County staff developed a set of technically feasible, yet uncommitted, additional strategies. For example, staff who manage the County’s fleets were asked to – based on their professional expertise – estimate when and over what time frame the County might reasonably transition its fleets to electric vehicles. Their professional judgement on when cost effective options might become available and a likely timeframe of vehicle replacements was then built into a forward looking model of potential carbon reductions the County could achieve.

Emissions reductions strategies under seven categories were developed and quantified to determine how they might contribute to reaching an 80 percent operational emissions reduction goal in future years. Details of existing and new strategies modeled are provided in Table 2.

Assessment of What it Would Take to Achieve Modeled Strategies

In addition to outlining the GHG impact of modeled strategies, this Plan provides a preliminary assessment of requirements of the County (in terms of staff, budget resources, strategic planning) as well as external factors (e.g. market for new technology) that would be needed to implement identified strategies. King County will need to invest additional staff and budget resources to support achievement of a stronger GHG reduction goal. Several market and external factors will need to continue to advance to meet the operational and service needs of King County. Pending Council adoption of this Plan, the strategies considered will be further developed for inclusion in the 2020 SCAP update. Table 2 outlines information about key requirements and actions that would be needed by King County government and external partners to achieve the modeled strategies. This information is provided to demonstrate the level of effort and investment that would be needed to achieve identified strategies.

Preliminary Feasibility Information of Modeled Strategies

Emissions reduction strategies modeled are technically feasible and based on assessment of subject matter experts, but will require additional analysis to develop the costs, assess tradeoffs, and further develop implementation feasibility and timeframes. Additionally, implementing these new strategies would require additional actions by the King County Council, leadership, staff and external partners to achieve the proposed reduction targets. These strategies will be further developed for inclusion in the 2020 SCAP, pending council adoption of this Plan.

In developing potential new strategies, staff also assessed information about the status, cost, key considerations, and potential additional benefits and impacts of the strategies related to King County priorities of level of service; ESJ; public health; economic development; and partnerships. This information is also summarized in Table 2 below.

Table 2 provides a summary of existing or 2015 SCAP strategies and new strategies developed in this planning exercise. Each description outlines what was considered an “existing” or 2015 SCAP strategy compared to “new” strategies developed as part of this Plan. To provide a common timeframe across different strategies, the status of each strategy is described for the year 2030, although several new strategies modeled extend beyond this date. The Table documents key requirements of King County government and external factors that would be needed to implement identified strategies. This Table also includes preliminary information about the status, cost, key considerations, and potential additional benefits and impacts of the strategies related to King County priorities of level of service; equity and social justice; public health; economic development; and partnerships.

Table 2: Strategy Details, Implementation Requirements, and Preliminary Feasibility Information of Modeled Strategies.

Strategy Detail	Implementation Requirements	Preliminary Feasibility Information
ZERO-EMISSION BUS TRANSITION		
<p><i>Transition transit fixed route fleet vehicles to zero-emission battery buses.</i></p> <p>Existing: By 2030, 56% of the bus fleet are zero-emissions (100% by 2040). New: By 2030, 65% of the bus fleet are zero-emissions (100% by 2038).</p>	<p>By King County Government:</p> <ul style="list-style-type: none"> Develop additional bus charging either en-route or add infrastructure to existing bus bases prior to 2030. Installation of charging infrastructure at the Interim, South Annex, and South King County bases alone prior to 2030 will be insufficient to support a 100% transition to battery electric buses by 2040. <p>By others:</p> <ul style="list-style-type: none"> Technology for bus fleet, charging, integrated dispatching and energy management will need to continue to develop to meet Metro Transit needs. 	<ul style="list-style-type: none"> Status: 2017 commitment, aligned with 2- and 10-yr CIP. Cost: Life-cycle costs estimate 6 percent higher for battery-electric vs. Diesel-hybrids buses; 2 percent higher when societal costs are included. Costs of battery-electric buses are expected to decline as technology and the market matures. Key Considerations: Standardized charging, battery performance, charging and operations at scale in base operations, workforce development for using new technologies. Additional Benefits and Impacts: Public health benefit from reduced air pollution and noise pollution; ESJ benefit of deploying zero-emission fleet first to communities most vulnerable to air pollution in South King County; partnerships with Seattle City Light (SCL) and Puget Sound Energy (PSE) utilities; catalytic benefit of helping develop and spur the broader market for battery-bus technologies.
RENEWABLE ELECTRICITY		
<p><i>Continue current and pursue future power supply agreements for the consumption of renewable electricity by County government.</i></p> <p>Existing: Green Direct renewable electricity contract with Puget Sound Energy from 2019-2029. New: Develop a new agreement to continue to use renewable electricity beyond 2029.</p>	<p>By King County Government:</p> <ul style="list-style-type: none"> Consensus with PSE and approval by Council to extend the renewable electricity contract from 10 years to a longer time frame. An extended contract would also require agencies to identify suitability of sites and accounts. <p>By others:</p> <ul style="list-style-type: none"> Availability of renewable energy and contract offering with PSE/third party developer. 	<ul style="list-style-type: none"> Status: In March 2017, the Executive recommended and the Council approved a 10-year contract with PSE that commits the county to purchase renewable electricity for the period 2019-2029. Cost: Financial analysis showed that under most scenarios the 10-year contract will save money compared to paying normal utility rates; an estimated \$5 million in savings over the contract lifetime. Key Considerations: A future renewable electricity option beyond the existing 10-year agreement is not confirmed. Additional Benefits and Impacts: Projects will provide health benefits from reduced air pollution. The Skookumchuk Wind Energy project is estimated to create 300 construction and 5 operating jobs and tax revenue in Lewis County. The Draft Environmental Impact Statement identified potential negative benefits to bird species and also measures to reduce impacts. Expected cost savings with the project will reduce operating costs.

Strategy Detail	Implementation Requirements	Preliminary Feasibility Information
NET FOREST CARBON REMOVALS		
<p><i>Maintain carbon sequestration from management and ownership of County-owned lands.</i></p> <p>Existing: Includes an estimated 50,000 MTCO₂e in carbon sequestration per year across all King County owned lands.</p>	<p>By King County Government:</p> <ul style="list-style-type: none"> • Continue to own and steward its forests. • Finalize the accounting methodology so that all King County owned lands are included in the County’s Scope 1 GHG accounting. • Do not sell the carbon sequestered by these forestlands to external parties. 	<ul style="list-style-type: none"> • Status: This strategy is an estimate of direct Scope 1 GHG removals occurring on King County owned lands as a result of forest growth. • Cost: King County owns a variety of lands providing these benefits and maintains them as protected sites for a variety of purposes. Carbon removal from these lands is largely a co-benefit of land protection. • Key Considerations: According to GHG accounting protocols, to account for carbon removals from King County lands as a Scope 1 GHG removal, emissions and sequestration from all King County owned lands need to be quantified. King County is developing a forest carbon offset program for lands acquired since 2015 and the GHG benefit of those lands is not included in this estimate. • Additional Benefits and Impacts: Forests provide a wide variety of environmental, health, recreation, and other benefits.
WASTEWATER FUGITIVE EMISSIONS CAPTURE		
<p><i>Upgrade existing biogas scrubber system at South Plant, through which fugitive methane associated with the wastewater treatment process will be reduced.</i></p> <p>New: Upgrade the existing biogas scrubber system at the South Plant by 2030</p>	<p>By King County Government:</p> <ul style="list-style-type: none"> • Capital funding availability, project management resource availability, prioritization of this project. <p>By others:</p> <ul style="list-style-type: none"> • Ensuring vendor/manufacturer can supply specified equipment. • Could be competing priorities if additional future regulatory requirements (such as nutrient removal) take large amounts of capital or project management resources. 	<ul style="list-style-type: none"> • Status: A project is being developed to upgrade the South Plant’s existing biogas scrubbing system, but the project scope and schedule have not yet been determined. There is a medium probability that a project resulting in the estimated emissions reductions could be implemented by 2030. • Cost: Project scope is not finalized, and budget has not yet been developed. • Key Considerations: This project may be able to be tied to the end of the functional life of the existing biogas scrubber system to minimize potential costs. • Additional Benefits: There would be a modest public health benefit of reduced localized air emissions resulting from lower natural gas consumption.

BUILDING ENERGY EFFICIENCY AND LOW-CARBON ENERGY

Strategy Detail	Implementation Requirements	Preliminary Feasibility Information
<p><i>Continue to implement and ramp up energy efficiency projects in existing county-owned buildings and facilities, through strategies such as lighting retrofits, behavior change programs, and capital investments.</i></p> <p>Existing: By 2030, 11% reduction in electricity and a 9% reduction in fossil fuel through a variety of energy efficiency strategies.</p> <p>New: By 2030, a total of a 20% reduction in fossil fuel use in buildings and facilities through transitioning to electricity and energy efficiency measures.</p>	<p>By King County Government: Across All Agencies</p> <ul style="list-style-type: none"> Formal commitment to no new fossil fuel use in new facilities for heating, ventilation and air conditioning or for water heating. Staff training; management and resource support of energy initiatives. <p>Metro Transit</p> <ul style="list-style-type: none"> By 2028, capital projects to replace heating, ventilation, and air conditioning systems at base facilities achieve efficiency improvements of 20 percent or greater. South King County Base achieves Net Zero Energy status and new South Annex Base achieves aggressive efficiency. <p>Department of Natural Resources and Parks</p> <ul style="list-style-type: none"> Oversight and requirements over maintenance investments to ensure energy reducing equipment is installed during replacement. <p>Facilities Management Division</p> <ul style="list-style-type: none"> Analysis of Major Maintenance and Capital Improvement programs, Master Planning, Facility Condition Assessments, and Energy Audits needed to understand type and timing of opportunities for system upgrades and resource (funding, staffing, etc.) requirements to implement upgrades. Leadership recognition that there is a potential impact to operating budgets and that deep green upgrades may not be cost effective. <p>By others:</p> <ul style="list-style-type: none"> State and federal incentives and/or carbon pricing to help make efficiency and fossil fuel conversion projects cost effective. Continued existence of federal renewable fuels requirements and markets, which through sale of King County renewable energy provide additional revenue to help fund projects. 	<ul style="list-style-type: none"> Status: This category combines incremental efficiency improvements that we are making excellent progress on with long term more uncertain strategies to greatly reduce fossil fuel energy use in buildings. Cost: Many individual projects can be life cycle cost effective, especially with supporting utility or state funding sources. We have not budgeted or made plans for the capital replacement of equipment in buildings at sites including the Courthouse, Administration Building, and Jail which represent our biggest opportunities to reduce fossil fuel use. Key Considerations: Cost effectiveness will be a key consideration, particularly at larger facilities that burn natural gas such as those mentioned above. However, as technology advances and costs are reduced, future projects can be proposed and budgeted. Additional Benefits and Impacts: Efficiency strategies can provide cost effective solutions by reducing operating costs. Economic development activity will result from equipment retrofit activities. Staff and visitor improvements could also result from improved comfort.

LANDFILL COVER IMPROVEMENTS AND WASTE DISPOSAL REDUCTIONS

Strategy Detail	Implementation Requirements	Preliminary Feasibility Information
<p><i>Use deeper cover materials to meet Environmental Protection Agency (EPA) advanced landfill cover system requirements and reduce waste disposal over the long term to reduce landfill methane generation.</i></p> <p>New: (1) Expand and maintain the Cedar Hills Regional Landfill cover system for the majority of the active disposal area to use deeper cover materials (soil or compost) such that it meets EPA requirements for advanced landfill cover improvements. (2) Increased recycling and reduce waste disposal at Cedar Hills Regional Landfill. By 2030, increase recycling from 52% to 70% and reduce waste disposal from 15lbs. per capita per week to 5.1lbs.</p>	<p>By King County Government:</p> <ul style="list-style-type: none"> • Support from management and operations staff to change daily cover material from soil to compost or wood waste. • Maximize self-haul recycling at King County transfer stations through robust staff customer engagement, efficient placement of bins, resource recovery of high value bulky materials and increased services for mattresses and tires. • Maximize recycling from single family unincorporated curbside customers through changes in collection services and policies. This requires support of the KC Council. <p>By others:</p> <ul style="list-style-type: none"> • Approval from the Health Department to use compost or wood waste as daily cover. • Strengthened organics recycling infrastructure and market for application of compost, including additional processing capacity and enhanced market demand including in public sector projects. This will take wide-ranging partnership amongst King County agencies. • Maximize recycling from single family, multi-family and commercial customers county-wide (cities and unincorporated areas), especially food waste and soiled paper. This requires action from all cities, with support of haulers and processors/compost facilities. • Support from cities in widespread use and application of compost. • Support from private sector in additional organics processing capacity. 	<ul style="list-style-type: none"> • Status: The landfill cover improvement strategy was developed as part of this modeling exercise. The waste reduction and recycling strategy is an important component of the SWD'S long-term vision and is presented as articulated in the 2019 Comprehensive Solid Waste Management Plan. • Cost: The landfill cover strategy is technically feasible but additional planning and budgeting would be necessary. The waste reduction strategy has multiple strategies and is a long-term vision of the agency. • Key Considerations: There is some uncertainty about total reductions that would occur from the landfill cover system improvements. Achieving the community waste reduction strategies will require deep collaboration with cities and others. • Additional Benefits and Impacts: Reaching a 70 percent recycling rate and reducing waste amounts county-wide would have broad benefits. For example, less waste generated by the landfill means reduced environmental impacts and also conserves landfill space and would extend the landfill's operating life.

FLEET FUEL EFFICIENCY AND ALTERNATIVE FUELS

Strategy Detail	Implementation Requirements	Preliminary Feasibility Information
<p><i>Transition fleet and transit (non-fixed route) vehicles to electric vehicles (EVs) and other alternative fuels and improving fuel efficiency.</i></p> <p>Existing/2015 SCAP Strategy: This category includes transitioning 20 gasoline cars to electric vehicles by Fleet Administration Division (Fleet) by 2020, converting 10% of Fleet diesel use to biodiesel by 2025; transitioning 89% of Transit Rideshare vehicles to electric vehicles by 2034; and expansion of alternative fuel fleet of propane ACCESS minibuses. The GHG reductions of several additional smaller strategies were also included.</p> <p>New: Transit ACCESS: By 2030, 67% zero-emission EVs. Transit Rideshare: By 2030, 100% zero-emission EVs. Transit Non-Revenue Vehicles: By 2030, 51% of diesel and 95% of gasoline are zero-emission EVs. Fleet Administration Vehicles: Transition 10% of light, medium and heavy-duty vehicles to EVs each year on varying schedules, beginning with light duty vehicles in 2020, medium-duty vehicles in 2023, and then an eventual transition of heavy duty vehicles beginning in 2033.</p>	<p>By King County Government:</p> <ul style="list-style-type: none"> • ACCESS Vehicles: Secure property ownership to investment in charging. In 2020-21, study of fleet range and endurance required to meet service and operational needs. Following the current contract, in 2022 explore opportunities to incorporate fleet changes into contractor service agreement revision. • Rideshare Vehicles: Consider County code revision to exempt EVs from revenue neutral requirement. Continue to test and pilot EV technology. In 2019, Metro will pilot 10 Pacifica plug-in hybrid. Explore pilot of new 2019 Mercedes EV van. • Transit NRV: Light-duty technology is currently available to meet needs. Expansion of charging infrastructure at Metro facilities will be needed to support transition. Continue to pilot and test medium and heavy duty fleet. Explore options to share fleets across County agencies. • Fleet: Funding to cover incremental cost of EVs. Operating costs may decline over time. Funding for charging infrastructure and collaboration with the FMD to ensure adequate charging and parking and in leased spaces. <p>By others:</p> <ul style="list-style-type: none"> • Availability of affordable technology in the timeframes identified. 	<ul style="list-style-type: none"> • Status: This category combines incremental efficiency and alternative fuel strategies that we are making progress on with long term more uncertain strategies that would electrify most fleet vehicles on various schedules. • Cost: The 2015 SCAP Cost Effectiveness Analysis quantified that for types of vehicles with available battery electric technologies, conversions can be life-cycle cost effective. However, some types of vehicles (such as SWD hauling trucks) do not yet have cost effective electric options so implementation is not modeled for these types of vehicles. • Key Considerations: Implementation timeline is dependent on the availability of suitable technology and incremental costs, and in the case of ACCESS land acquisition. Equipment and heavy-duty vehicles must have range to perform necessary county functions. Fast charging is required in order to respond to weather and emergencies with 24/7 operations. • Additional Benefits and Impacts: Partnerships with PSE and SCL for charging infrastructure. Benefits of reduced pollution in the unincorporated areas, particularly in the vicinity of the pit sites and shops.

Results of Modeling

Figure 3 is a simplified visualization of the modeling results. The wedges represent the potential emissions reductions from implementing existing 2015 SCAP strategies and additional, new strategies developed as part of this Plan. The bottom border of the reduction wedge represents the remaining emissions from King County operations. This graphic helps illustrate the impact of the new strategies developed as part of this Plan.

Figure 3: GHG Emissions from King County Government Operations: Total Emissions and Potential Reductions from Existing and New Strategies

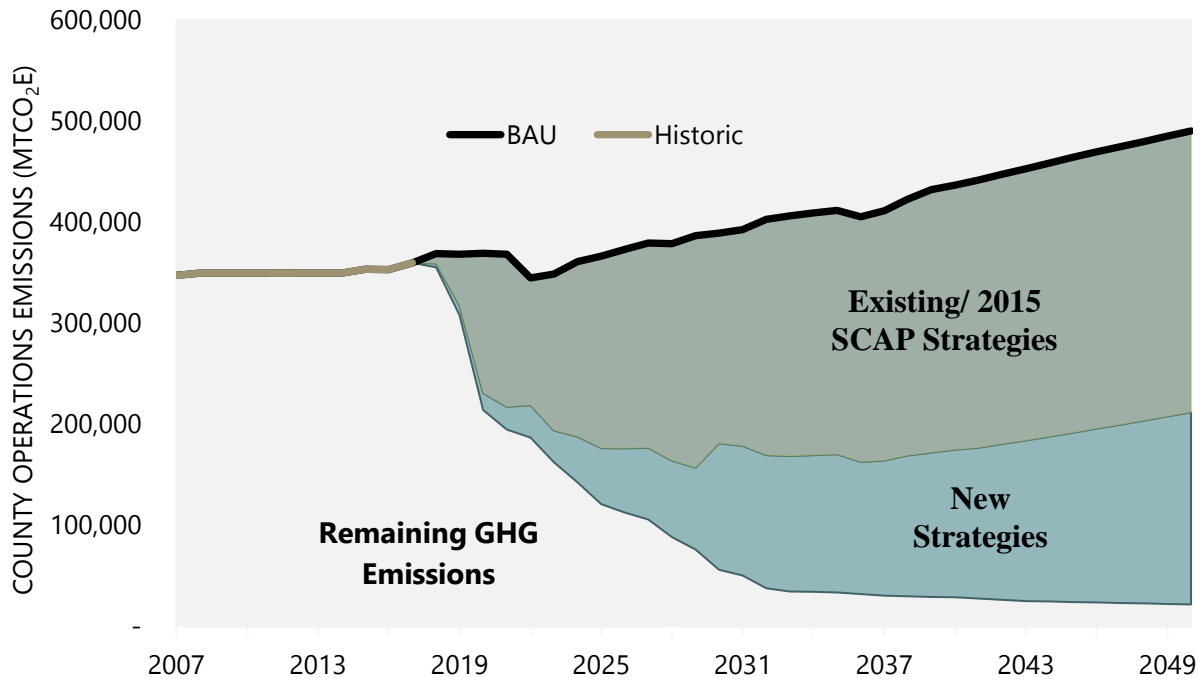
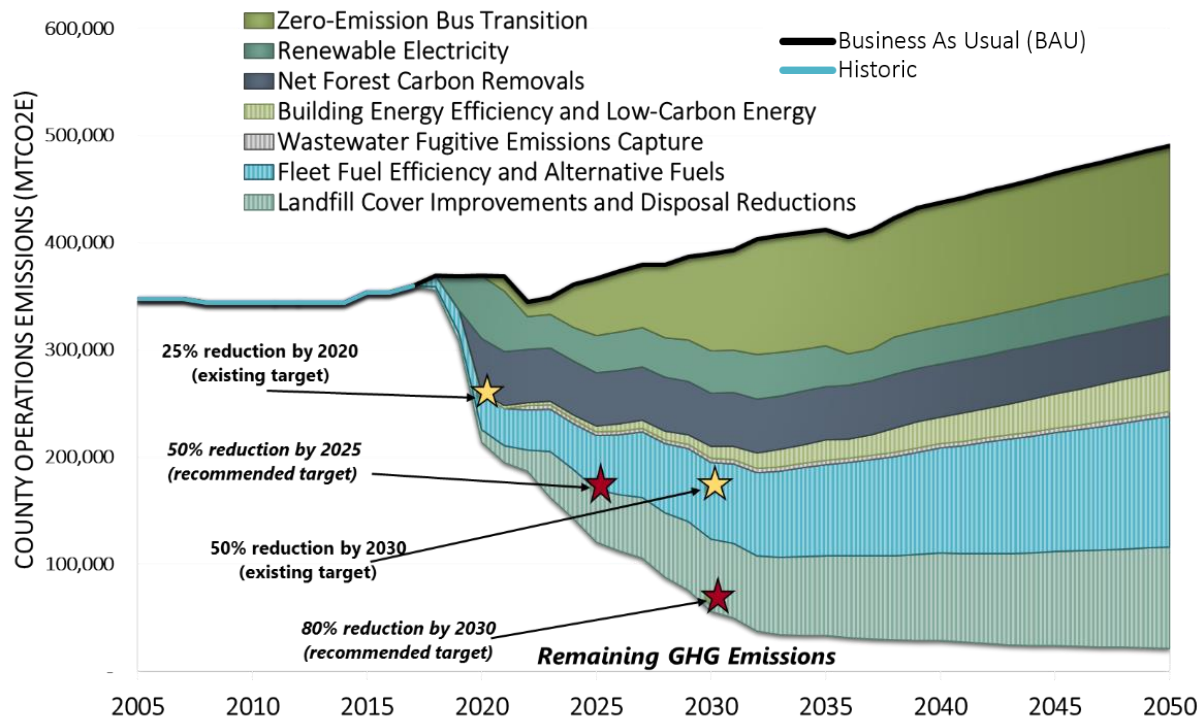


Figure 4 is a more detailed visualization of the combined emissions reduction benefits of existing 2015 SCAP strategies and the new strategies developed as part of this planning exercise. Specific numerical conclusions of the visualization should be interpreted with caution, however, as ascribing emissions reductions to each strategy can be complicated due to their interdependencies. However, the graphic shows that the Zero-Emission Bus Transition and the Fleet Fuel Efficiency and Alternative Fuels strategies likely have the greatest potential emissions mitigation impact.

These visual helps show that, with implementation of the existing 2015 SCAP strategies and the modeled additional strategies, it is technically feasible for King County to reduce operational emissions 80 percent by 2030. In this modeling exercise, by 2050 the combined strategies are estimated to reduce emissions 94 percent below 2007 levels.

Figure 4: GHG Emissions from King County Operations: Total Emissions and Modeled Reductions.



Conclusions from Modeling and Feasibility Assessments

This modeling exercise was undertaken to inform what GHG emissions reduction targets would be ambitious but achievable for King County. The exercise started by modeling potential emission reductions given full implementation of 2015 SCAP strategies as well as implementation of additional emissions reduction strategies developed in seven different categories.

New emissions reduction strategies modeled are technically feasible, following current business practices (e.g. current fleet replacement cycles) and assumes timelines for availability of cost competitive new technology (e.g. electric fleet) informed by subject matter experts. Additional analysis to develop the costs, assess tradeoffs, and further develop implementation feasibility and timeframes will be required. Implementing these new strategies would require additional actions by King County Council, leadership, staff and external partners to achieve.

The modeling showed that existing 2015 SCAP strategies will help the County achieve significant GHG reductions through 2030, consistent with currently adopted targets. Analysis of new strategies developed as part of this planning exercise showed that it is technically feasible to achieve significantly more ambitious targets of a 50 percent reduction by 2025 and 80 percent reduction by 2030.

Summary of Recommendations

Building on the 2015 SCAP, this Plan recommends that King County adopt stronger GHG reduction targets to reduce operational GHG emissions by 50 percent by 2025 and 80 percent by 2030. The recommendations in this Plan are based on:

- Increasing scientific consensus that society collectively needs to do more, faster to reduce GHG emissions to avoid the worst impacts of climate change
- Development and analysis of existing and new strategies – such as fleet electrification, renewable energy, and fugitive methane reductions - that when modeled show that it is technically possible to achieve stronger GHG emissions reduction targets
- Preliminary assessment of feasibility of implementing identified strategies, including cost, health, and equity and social justice benefits and impacts

Development of the Plan included an assessment of how countywide carbon neutrality fits in with existing County commitments; options and recommendations for defining carbon neutrality; rationale for why carbon neutrality is important; best practices reviewed by other organizations; and details of strategies developed and technical modeling that occurred to support the overall Plan.

Recommendations in this Plan are based on preliminary information regarding the feasibility of modeled strategies. The Plan includes an assessment of the requirements of the County (in terms of staff, budget resources, strategic planning) as well as external factors (e.g. market for new technology) that would be needed to implement the identified strategies. For example, Council action will be needed to: enter into purchase contracts for renewable electricity; approve policies that maximize recycling by customers; adopt supportive policies in the 2020 SCAP; adopt budgets with investments required to transition to battery buses; and implement efficiency projects. Several market and external factors will also need to continue to advance to meet the operational and service needs of King County. For example, technologies will need to continue to advance to ensure availability of electric medium and heavy-duty vehicles, while federal and state incentives and markets will be important to advance energy efficiency initiatives.

Modeled strategies presented in this Plan serve to illustrate the level of effort required and are likely to evolve. Based on these strategies, and the final Plan as adopted by the County Council, the Executive will further develop the strategies and actions identified for inclusion in the 2020 SCAP. The 2020 SCAP will take a comprehensive approach to compare the relative GHG benefits and tradeoffs of investments in operations vs. service (i.e. fleet electrification vs. increase transit service). If necessary, the overall emissions reduction targets could also be further updated. Once the targets and supporting strategies are adopted by Council in the 2020 SCAP, they will serve as the comprehensive blueprint for achieving carbon neutrality.