ACTION

SEATTLE CLIMATE ACTION PLAN

April 2013

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April 22, 2013

Although there had been years of mounting evidence, 2012 felt like a watershed moment for climate change awareness in the United States. The level and severity of climate disruption we saw across the country confirmed that now is the time to take bold action to reduce our climate pollution and to prepare for the impacts of climate change. As a progressive city with a commitment to environmental stewardship and a culture of innovation, I believe there is no city better equipped to lead the way on climate solutions than Seattle.

The thoughtful, creative and ambitious actions that make up the Climate Action Plan provide a clear vision for Seattle's climate leadership. But the Plan does more than provide a vision for climate leadership; it also provides a vision for a city that is vibrant, economically prosperous, and socially just. Taking climate action is not about austerity, wool sweaters, or sitting in the dark. It is about creating great places to live, work and play that preserve the environment.

In developing the Climate Action Plan we engaged grassroots sustainability groups, environmental leaders, technical experts, businesses and community members to provide the City with creative ideas and recommendations. Thank you to the Green Ribbon Commission, the Technical Advisory Committees, City staff, and the hundreds of Seattleites who provided comments for the hard work and long hours that went into developing Seattle's Climate Action Plan.

The time to act is now. The Climate Action Plan cannot be a vision that sits on a shelf. The City is committed to getting to work immediately on the actions in this Plan and to lead the way for other cities. I hope that Seattle's residents and businesses will join us in taking action to ensure Seattle remains a great city for future generations.

Sincerely,

Mike O'Brien
Chair, Energy and Environment Committee
Seattle City Council

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Table of Contents

01 Background

Introduction

Role of Cities in Climate Action

Seattle's History of Climate Protection

Process

The 2013 Climate Action Plan

CAP's Connection to Other City Plans

Emissions Reduction Potential of Actions

CAP Monitoring

02 Reducing Emissions

Transportation + Land Use

Building Energy

Waste

03 Preparing for Climate Change

04 What You Can Do

Product Lifecycles & the Global Context

In Your Home

Getting Around

Eating

Buying Stuff

Participate

05 Appendices

Freight

Air

Industry

BACKGROUND

"Visualizing Climate-Friendly Neighborhoods" – OSE community outreach
(Image: Studio 216 with GGLO)

01 Background

Introduction

Climate change is a challenge of sobering magnitude and urgency, which will require us to draw on our extraordinary capacity for resilience and innovation. Across the nation in 2012, we saw record heat, record drought, and super storms that took significant economic and human tolls. What's more, the science of climate change indicates we should expect more of what we saw in 2012 in the years ahead. We can rise to the challenge by tapping into the creativity and entrepreneurial spirit of Seattle. As decades-long leaders in environmental sustainability, we have the opportunity to again lead the way with climate actions that are bold, innovative, and just.

Role of Cities in Climate Action

With more than 80% of Americans living in urban areas, cities play a powerful role in addressing climate change. The design of cities—how we use our land, how we design our buildings, how we get around—significantly impacts the amount of energy we use and greenhouse gas (GHG) emissions we produce. In the next 20 years, we expect another one and a half billion residents in the world's cities, many of them in the developing world. Therefore, it is critical that cities like Seattle demonstrate that it is possible to dramatically reduce GHG emissions, while creating more vibrant and prosperous places to live and do business.

Seattle's History of Climate Protection

Seattle has been a world leader in climate action for many years. For example, in 2000 Seattle became the first city in the nation to adopt a green building goal for all new municipal facilities, and in 2001 the City created a LEED incentive program for private projects. In 2005, after decades of investment in conservation and renewable energy, Seattle City Light was the nation's first large electric utility to become carbon neutral. That same year, Mayor Nickels, concerned about federal inaction on climate change, launched the Mayor's Climate Protection Initiative and challenged U.S. mayors to do what the federal government would not: meet the GHG emission reduction targets of the Kyoto Protocol—7% below 1990 levels by 2012. More than 1,000 mayors representing nearly 89 million Americans joined Seattle in making the pledge to take climate action.

In 2006, Seattle was one of the first cities in the nation to adopt a Climate Action Plan (CAP). The 2006 CAP laid out a strategy to meet the Kyoto target and identified short-terms actions the City should take to achieve that goal. To date, fifteen of the eighteen areas of action identified in the 2006 CAP have been implemented or are in the process of implementation. (In late 2013, the Seattle Office of Sustainability & Environment expects to release the 2012 GHG Emissions Inventory for the Community of Seattle, which will tell us whether Seattle met the Kyoto goal in 2012.)

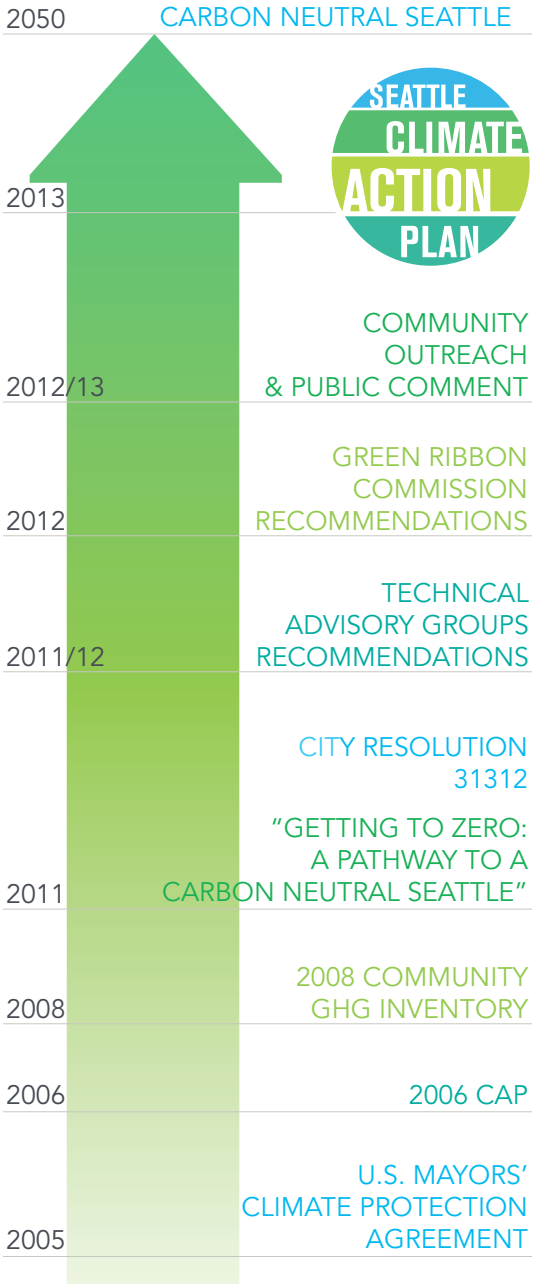
Process

In 2011, recognizing that the Kyoto Protocol goal is just the first step forward in reducing climate pollution, the Mayor and City Council adopted an ambitious and long-term climate protection vision for our community (through *Resolution 31312*):

- Reach Zero Net GHG Emissions by 2050
- Prepare for the likely impacts of climate change

The 2013 CAP details a strategy for realizing this vision. In an effort to create a strategy that reflects broad community goals and commitment, the CAP was developed through a process that engaged Seattle's residents and businesses, subject matter experts, and community leaders:

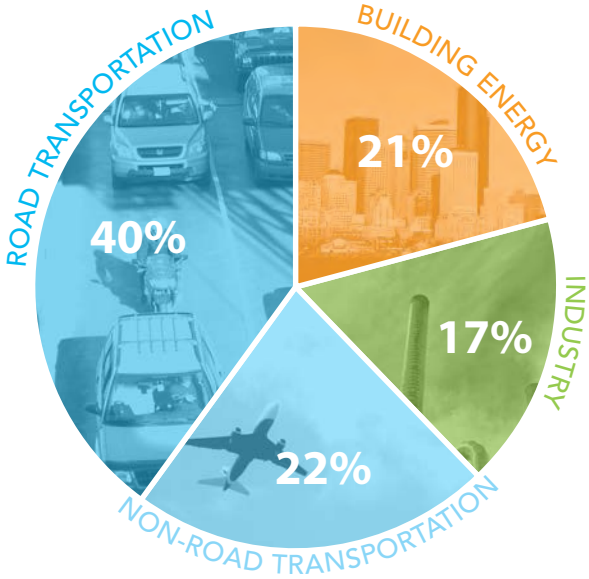
- Carbon neutral community groups, convened by City Council, identified actions that the City could take in the short term to move forward on the carbon neutral goal.
- A *proof of concept analysis* outlined a potential pathway to carbon neutrality, which confirmed deep emission reductions were technically possible with sufficient funding and community support.
- *Technical Advisory Groups* (TAGs), which included a cross section of sector experts, identified a range of actions in the transportation, land use, building energy, and waste sectors that would cost-effectively reduce emissions, and contribute to achieving other community goals.
- A *Green Ribbon Commission* (GRC) of community, environmental, and business leaders considered the TAG recommendations and added their own ideas and perspectives to develop recommendations in the sectors considered by the TAGs and for preparing for the impacts of climate change.
- The public provided input throughout the process through *website comments* and community meetings, including targeted outreach to nine underserved communities where meetings were held in residents' native languages and neighborhoods.



01 Background

The 2013 Climate Action Plan (CAP)

With the ambitious goal of carbon neutrality as its guide, the 2013 CAP takes a broad and long term view. Climate change is not a stand-alone issue separate from the other issues cities face. It is rooted in land use, transportation, and building energy patterns that have evolved over generations. Similarly, the solutions to climate change are not stand-alone, and are part of Seattle's work to reorient land use patterns, transportation infrastructure, and building energy systems to build vibrant communities. Therefore, the 2013 CAP provides a coordinated strategy and long-term vision for action that cuts across City functions. The strategy focuses on City actions that reduce GHG emissions while also supporting other community goals, including building vibrant neighborhoods, fostering economic prosperity, and enhancing social equity. In addition, the 2013 CAP includes actions that will help us prepare for the likely impacts of climate change.



Seattle Citywide Greenhouse Gas Emissions by Sector
(Source: 2008 Seattle Community GHG Inventory)

GHG emissions can be found in virtually every sector of our community and economy. The City actions in the 2013 CAP focus on those sources of emissions where City action and local community action will have the greatest impact: road transportation, building energy, and waste, which comprise the majority of local emissions (see Chapter 3), and actions to increase local resilience to the unavoidable impacts of climate change (see Chapter 4). The CAP also includes information on actions we as individuals can take to reduce our climate impact through purchasing decisions (see Chapter 5). Community actions to reduce emissions from freight, air, and industry are discussed in the appendices.

Actions are categorized as follows:

Actions to Implement by 2015

Short-term actions that should begin in the next three years to pilot new ideas, test new approaches, and lay the foundation for longer term action.

Actions to Implement by 2030

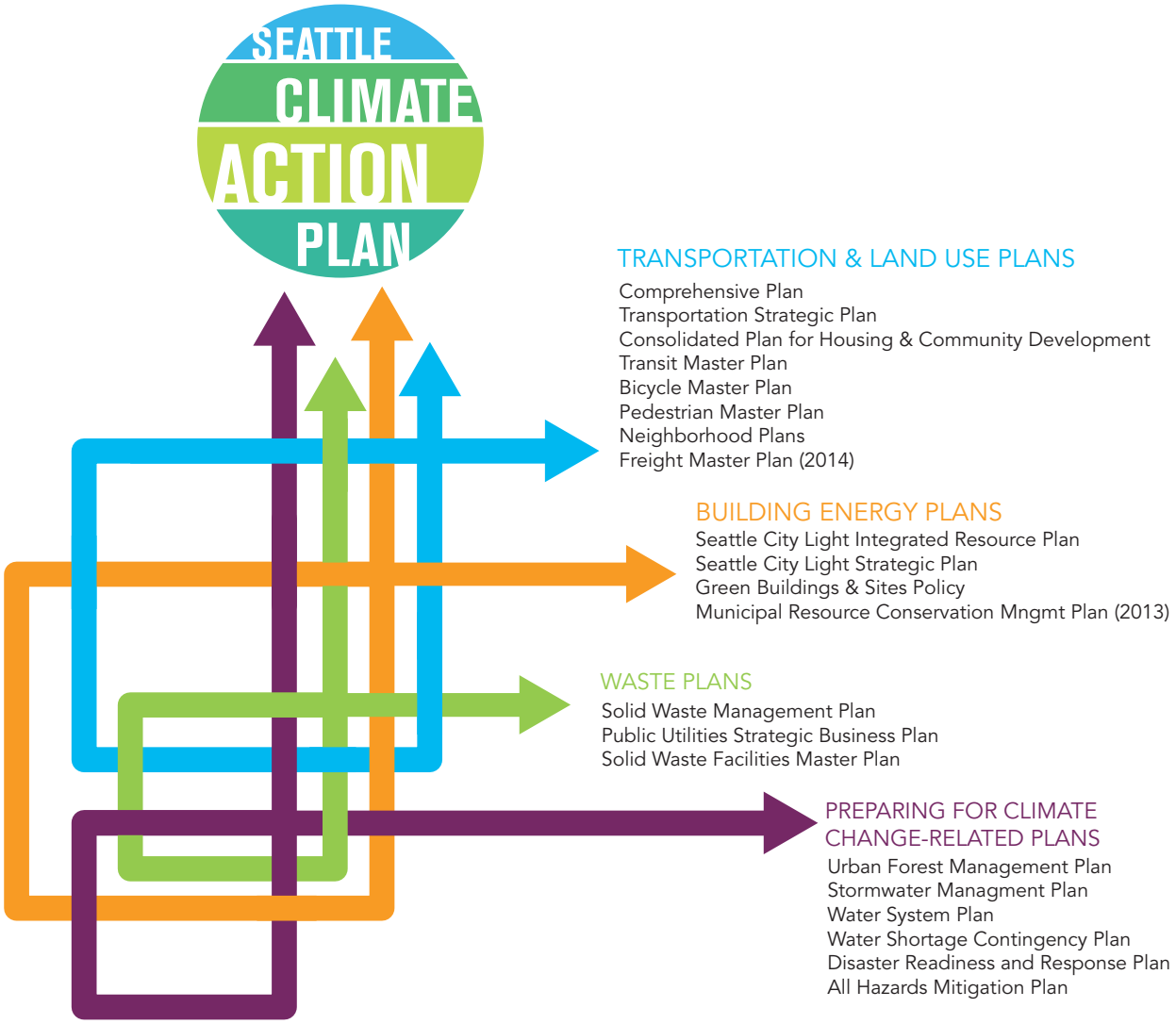
Long-term actions will take time to implement but are essential for meeting Seattle's climate protection goals.

Climate Action Plan's Connection to Other City Plans

The City has many plans for improving the economic, social, and environmental well-being of the community. The Climate Action Plan is implemented through related plans that are developed and executed across multiple City departments. The Climate Action Plan works with and through these plans by:

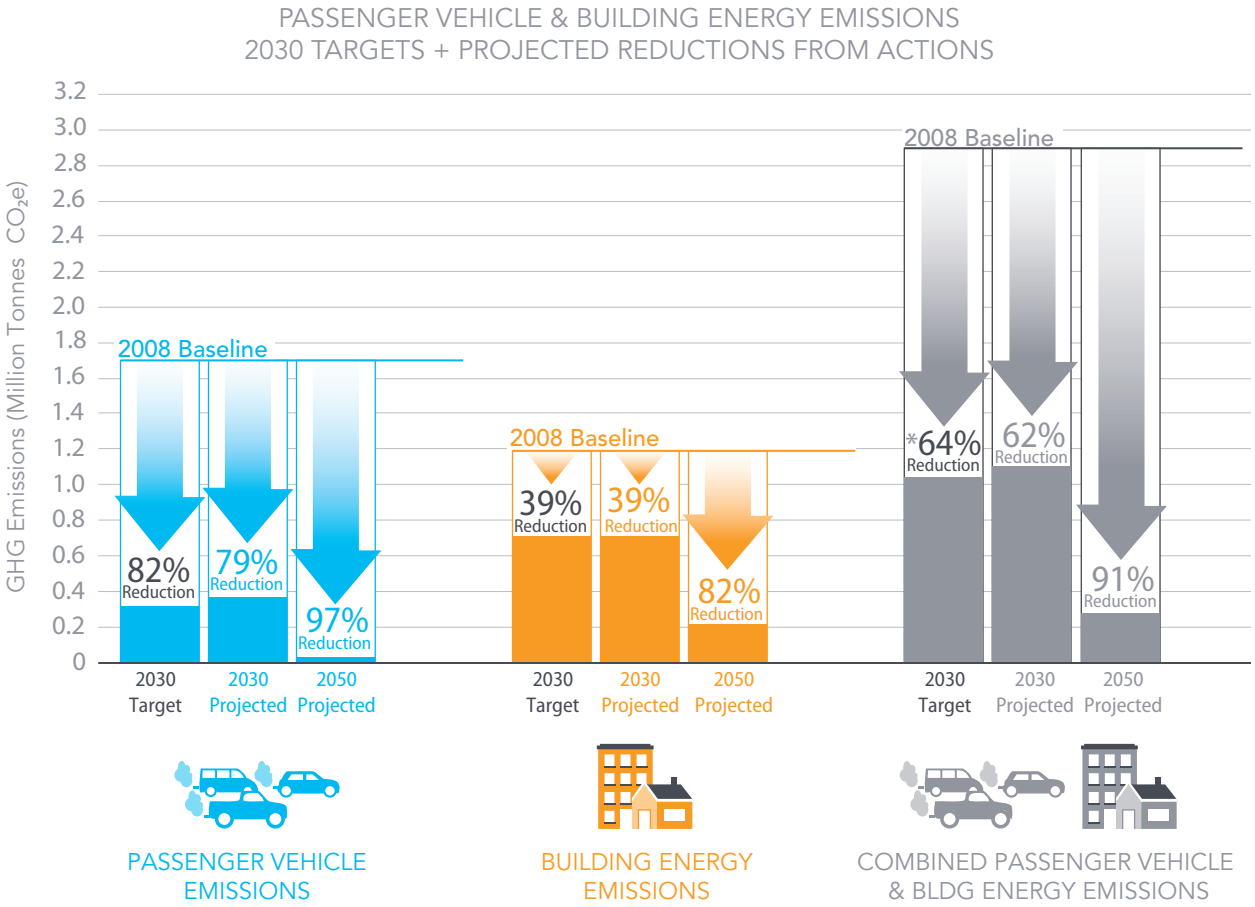
- Providing a planning and monitoring framework for achieving climate change goals.
- Highlighting critical actions for reducing emissions and fostering resilience to climate impacts.
- Guiding consideration of emissions reduction potential across the range of City plans.

The principle plans through which the Climate Action Plan is implemented are identified in the figure below. In order to achieve our climate goals, these plans must be fully funded and implemented.



Emissions Reduction Potential of Actions

Based on a high-level analysis, the package of actions detailed in this Plan has the potential to reduce GHG emissions in the passenger transportation and building energy sectors by 62% by 2030 and puts the city well on the path to meeting the goal of carbon neutrality by 2050.



*This reduction target is equivalent to the Council Target of a 58% reduction of Total Emissions from the Transportation and Building Energy Sectors when accounting for the exclusion of Freight emissions reductions. | Note: This chart focuses on emissions reductions from the emissions sources the City can most directly influence—Passenger Transportation emissions and Building Energy emissions. Freight emissions are excluded from the graph, but are discussed in the Appendices. Emissions from the Waste sector are also not included in this chart because avoided emissions (from waste buried in the landfill) offset the direct emissions from waste disposal (from waste transportation and some landfill emissions leakage). As a result, GHGs from the waste disposal process are near zero. However, there is still substantial indirect emissions benefit from reducing waste when recyclable materials are diverted from the landfill and used in place of raw materials in manufacturing processes.

Achieving the emissions reductions detailed for the transportation, building energy, and waste sectors requires that the recommended actions are implemented in a timely, coordinated, sustained way. Partial or poorly coordinated implementation will reduce the emissions reduction potential of the Climate Action Plan. Additionally, many of these strategies, most notably in the transportation sector, will require several orders of magnitude more public resources than are currently available. Realizing the full GHG emissions reduction potential of these strategies will only be possible with new and sustained funding sources at the local, regional, and state levels.

Climate Action Plan Monitoring

The Office of Sustainability & Environment will be responsible for monitoring and reporting on the progress of the 2013 CAP's targets and actions on the following schedule:

- *Implementation of 2015 Actions & 2030 Actions*: Annually. (The following pages summarize actions to implement by 2015 and identify the lead implementing agency for each action.)
- *Climate Action Outcome Indicators*: Every other year, or as data is available. See table of indicators below. *Note*: There are several challenging gaps in data. Specifically, the lack of a City of Seattle Transportation model to provide city-specific travel data is a significant barrier to accessing transportation related Climate Action Outcome indicators and GHG information.
- *Local Community GHG Emissions*: Every three years, including inventories for 2012 & 2015. 2012's inventory is currently under way.

This 2013 Climate Action Plan is intended to evolve over time. Informed by Seattle's progress to date, the best available science, emerging climate strategies, and input from the community, the City will update the Climate Action Plan with new short-term actions and will revisit the suite of 2030 actions in 2016.

Table: Climate Action Outcome Indicators

SECTOR		INDICATOR	TARGET
TRANSPORTATION	Passenger	Passenger Vehicle Emissions (Million Tonnes CO_2e)	82% Reduction
		Vehicle Miles Travelled (VMTs)	20% Reduction by 2030*
		GHG Emissions Intensity of Travel (GHG Emissions per mile of Seattle Vehicles)	75% Reduction by 2030*
	Mode Share	Center City Commute Trip	Trend away from single occupant vehicles
		All Trips in Seattle	Trend away from single occupant vehicles
	Transit	Ridership	Increase in transit mode share and ridership
		Service	Increase in transit service hours and service levels on Seattle's Frequent Transit Service network
	Bicycling	Ridership	Triple the amount of bicycling from 2007 levels by 2017
	Safety	Crash Data	Eliminate serious injuries and fatalities on Seattle streets by 2030

Indicator Table is continued on the next page.

Climate Action Outcome Indicators

SECTOR		INDICATOR	TARGET
LAND USE	Housing	Households (in Urban Centers/Villages)	45% of households
		Affordable Housing Units	Increase in households with incomes up to 80% of the Area Median Income (AMI) paying less than 30% of their income on rent/mortgage
	Jobs	Jobs (in Urban Centers/Villages)	85% of jobs
	Livability Components	Services within a Walk (WalkScore)	Meet a minimum WalkScore in all Urban Centers/Villages
		Open Space	Increased number of Urban Villages meeting open space goals
BUILDING ENERGY	Commercial Bldgs	Commercial Building Emissions (Million Tonnes CO_2e)	45% Reduction by 2030
		Energy Use (Trillion BTU)	10% Reduction in Energy Use by 2030*
	Residential Bldgs	Residential Building Emissions (Million Tonnes CO_2e)	32% Reduction by 2030
		Energy Use (Trillion BTU)	20% Reduction in Energy Use by 2030*
	Commercial & Residential (Combined)	Building Energy Emissions (Million Tonnes CO2e)	39% Reduction by 2030
		GHG Intensity of Building Energy Use (Emissions/BTU)	25% Reduction by 2030*
	Multifamily Residential & Commercial Bldgs	Energy Use Intensity (EUI) of Existing Bldgs	Average EUI (kBtu/SF/year) for buildings greater than 20,000 sq ft: Decrease in average EUI Develop EUI target by 2020
		New Buildings, and Major Renovations, Meeting Green/Sustainability Standards	50% of permitted new construction projects achieve one of the following green building standards by 2025: Living Building Challenge, Built Green, LEED, Evergreen Sustainable Development Standard, or Passive House
WASTE	Recycling & Composting	Waste diverted from landfill to recycling and composting	70% Diversion Rate by 2022
	Collection, Processing, & Disposal	Methane emissions from landfill	50% Reduction in methane emissions by 2020
TOTAL GHG EMISSIONS		Community Greenhouse Gas Inventory	58% Reduction by 2030*

*Target included in the Comprehensive Plan

Actions to Implement by 2015

TRANSPORTATION + LAND USE	LEAD AGENCY
Renew and extend the time frame of the Bridging the Gap levy and prioritize investments in transit, pedestrian, and cycling improvements and system maintenance.	Transportation
Secure local or transit agency authority to levy a motor vehicle excise tax (MVET) at the City or County level.	Transportation
Work with regional and state partners to adopt a funding strategy to meet current and future transportation needs.	Transportation
Begin construction of 23rd Avenue priority bus corridor.	Transportation
Complete the preliminary engineering and environmental analysis for the Center City Transit Connector.	Transportation
Develop a Freight Master Plan that includes goals to make freight movement more efficient and reduce its impact on greenhouse gas emissions.	Transportation
Build bicycle lanes that are physically separated from traffic in the Center City.	Transportation
Expand on-street bicycle racks and facilitate provision of off-street bicycle parking and bike sharing.	Transportation
Implement bicycle intersection safety improvements on heavily traveled bicycle corridors.	Transportation
Improve sidewalks and crossings on arterial streets to connect Urban Centers and Villages.	Transportation
Improve wayfinding and bus passenger facilities by adding electronic real-time bus schedule information and off-board payment options.	Transportation
Implement Safe Routes projects to improve pedestrian connections to schools, transit and neighborhood business districts.	Transportation
Participate in multi-agency efforts working to support bike sharing, vehicle sharing and ride sharing.	Transportation
Work with Transportation Management Associations, property managers, employers, homeowners associations, and community groups to develop and market transit passes, car sharing and other programs that support travel options.	Transportation
Support private adoption of electric vehicles (EVs) by making it easier to get permits and by planning for access to charging stations and impacts on energy demand.	Planning & Development
Develop a Green Fleets Plan for the City of Seattle fleet that encourages market adoption of next generation vehicles and fuels.	Fleets & Facilities
Expand the City's municipal electric vehicle (EV) fleet.	Fleets & Facilities
Develop a citywide transit communities strategy that integrates neighborhoods with high capacity transit.	Planning & Development
Develop equitable development policies to support growth and development near existing and planned high capacity transit without displacement as part of the 2015 Comprehensive Plan major review.	Planning & Development
Continue to implement local area plans and urban design frameworks in Capitol Hill, Broadview/Bitter Lake/Haller Lake, Rainier Beach, Othello, Mount Baker, Beacon Hill, Northgate, and the University District.	Planning & Development

Actions to Implement by 2015

TRANSPORTATION + LAND USE	LEAD AGENCY
Implement the Challenge Grant strategies in the Rainier Valley to prevent displacement and retain affordable housing near transit.	Housing
Develop a tool to foster consistent consideration of greenhouse gas emissions impacts and opportunities to reduce them when updating and implementing transportation and land use plans.	Sustainability & Environment
Develop a placemaking strategy to use our public spaces to make streets and neighborhoods more vibrant and promote economic activity. Implement a project reallocating a portion of the public right-of-way to a public/pedestrian space such as a plaza or parklet.	Transportation
Develop and begin implementation of a coordinated land use and transportation plan in a high-priority transit and bicycle corridor with a goal of shifting more trips to travel modes that generate fewer or no greenhouse gas emissions.	Transportation and Planning & Development
Include health, safety, and equity outcomes in transportation and land use planning building on the Healthy Living Assessment project.	Transportation and Planning & Development
Implement strategies to provide residents' daily needs within a convenient walk and create nodes well served by transit and non-motorized transportation options.	Transportation and Planning & Development
Research the benefits of pricing policies on climate protection, transportation and community goals (e.g. reduced congestion, improved air quality, revenue generation) and their potential social equity impacts and solutions by examining the experience of other communities.	Transportation
Create a grant program that supports walking, biking, and transit projects in business districts with paid parking.	Economic Development
Work with neighborhood districts to develop on-street parking management and other access strategies.	Fleets & Facilities
Expand the E-Park program in the Center City to reduce the need to drive around to find parking.	Sustainability & Environment

Actions to Implement by 2015

BUILDING ENERGY	LEAD AGENCY
Begin implementing a plan to deploy smart meters that provide real-time energy use information to all Seattle City Light customers.	City Light
Develop and test a program for rating home energy performance when a house is listed for sale.	Sustainability & Environment
Make the energy benchmarking scores of the City's municipal buildings publicly available.	Sustainability & Environment
Develop a Resource Conservation Management Plan to guide efficiency investments in City facilities, including developing a strategy for routinely conducting "tune ups" of City facility energy systems (known as retro-commissioning).	Sustainability & Environment
Require building energy audits for the largest and least efficient commercial and multifamily buildings to help identify cost effective improvements.	Sustainability & Environment
Transition the Community Power Works - Home pilot program to an established program that assists homeowners with home energy efficiency upgrades.	Sustainability & Environment
Pilot a retro-commissioning incentive program to provide financial and technical assistance to tune up energy systems in existing commercial buildings.	City Light
Maintain the City's commitment to low-income weatherization through the HomeWise program.	Housing
Pass state legislation to authorize a property tax exemption for rental housing owners who undertake significant upgrades to increase energy efficiency.	Sustainability & Environment
Partner with property owners and managers to identify the most compelling financing tools for energy efficiency upgrades in commercial buildings and outline a plan to help bring the tools to market.	Sustainability & Environment
Pilot a utility incentive program that would pay for actual energy savings over time instead of providing an up-front payment for projected savings.	City Light
Continue improving permitting processes to promote the most sustainable buildings, such as the Living Building and Deep Green Pilot Program.	Planning & Development
Partner with Seattle Public Schools to identify opportunities to build Living Building Challenge or Deep Green schools.	Sustainability & Environment
Continue increasing energy efficiency standards in the Seattle Energy Code over time.	Planning & Development
Evaluate opportunities for the energy code to focus on total energy performance instead of prescriptive requirements.	Planning & Development
Require the energy performance of buildings undergoing major renovation or change of use (known as "substantial alteration" in code) to come close to the energy performance requirements for new buildings.	Planning & Development
Expand district energy systems on First Hill and into the South Lake Union and Denny Triangle neighborhoods.	Sustainability & Environment
Develop an alternative energy master plan that focuses on low-carbon energy solutions, such as district energy, solar energy, and geothermal energy in the public right-of-way.	Sustainability & Environment
Maintain Seattle City Light's commitment to conservation and renewables, as well as to providing carbon neutral electricity.	City Light
Continue Seattle City Light support for solar energy through net metering, which offers payments to customers with excess electricity.	City Light

Actions to Implement by 2015

WASTE	LEAD AGENCY
Support and collaborate on ongoing state, regional, and national programs and policies to encourage product stewardship of electronics and other materials.	Public Utilities is the lead agency for all actions to implement by 2015.
Pursue local product stewardship programs, such as take-back requirements for select products that are not included in state or regional programs and reducing product packaging.	
Launch programs to support edible food donation, help commercial kitchens find efficiencies and reduce waste, and help households and businesses reduce food waste through better planning, purchasing, storage and preparation.	
Continue to support opt-out programs for junk mail.	
Implement new recycling and composting programs for residential and business waste, including programs that target waste hauled by residents to transfer stations.	
Increase enforcement of residential and business recycling and composting requirements.	
Ban the following materials from residential and business garbage to increase recycling: asphalt paving, concrete, bricks, asphalt shingles, plastic film, clean wood, residential food, and compostable paper.	
Phase-in bans on the following construction and demolition waste from job sites and private transfer stations: recyclable metal, cardboard, plastic film, carpet, clean gypsum, clean wood, and asphalt shingles.	
Expand investment in existing residential and business programs for reuse and organics management to reach more residents and businesses.	
Continue to support and expand material exchanges and reuse programs, and promote building with salvaged and reclaimed materials.	
Make reuse and recycling drop-off more convenient at transfer facilities.	
Enhance outreach and education about recycling and composting to residents and businesses.	
Pilot and consider changing to every-other-week garbage collection from single-family homes.	
Focus grants on schools to establish system-wide collection for food and yard waste.	
Seattle Public Utilities achieves carbon neutrality through operational emission reductions, local emissions reductions projects, and GHG offsets.	

Actions to Implement by 2015

PREPARING FOR CLIMATE CHANGE	LEAD AGENCY
Conduct a citywide assessment of the impacts of temperature, precipitation, and sea level rise on City infrastructure, operations, facilities, and services, including human health with special attention to vulnerable communities.	Sustainability & Environment
Develop a comprehensive adaptation strategy that integrates the City's planning efforts across all relevant departments and considers both the cost of implementing actions to improve our ability to adapt and the potential cost of inaction. Engage residents in developing the strategy.	Sustainability & Environment
Apply the planning methodology detailed in the City of Seattle Sea Level Rise Planning Guidance for Capital Projects to projects projected to be impacted by sea level rise.	Sustainability & Environment
Use thermal imaging to identify areas that are likely to be most impacted by heat events to inform development of urban forest and tree planting priorities and programs.	Sustainability & Environment
Maintain efforts to restore all 2500 acres of forested parkland by 2025 through the Green Seattle Partnership.	Parks & Recreation
Implement the Urban Forest Stewardship Plan.	Sustainability & Environment
Implement projects in several urban creeks that connect floodplains, increase stormwater storage capacity, and improve culverts to minimize flooding and improve habitat.	Public Utilities
Evaluate climate change impacts on electricity resources and future energy demands using applied research and modeling beyond the 20-year planning horizon currently used in the Integrated Resource Plan.	City Light
Collaborate with external partners to research the impacts of climate change on hydroelectric projects, including impacts on generating facilities and salmon survival.	City Light
Maximize conservation programs to help meet future electricity needs, reduce the need for new energy sources as Seattle grows, reduce energy costs to residents and businesses, and help meet obligations for natural resource stewardship.	City Light
Implement Advanced Metering to begin the transition to a "smart grid" to help meet customer demand, detect system overloads that could be caused by heat events or other issues, and reroute power to improve system reliability.	City Light
Work with federal and academic research groups to downscale climate data for the watersheds supplying the city's water. Use this information to update the water supply assessment and explore impacts on the intensity of forest fires, turbidity, the timing of fall rains, and precipitation in the city.	Public Utilities
Continue to invest in water conservation programs reducing per capita water use to help meet future needs and to build adaptive capacity.	Public Utilities
Continue to evaluate the impacts of climate change on the drainage system and identify strategies for enhancing resilience.	Public Utilities
Adopt a Green Stormwater Infrastructure (GSI) Policy and implementation plan affirming GSI as the preferred stormwater management strategy, and facilitate multi-agency implementation, including expanded asset management, operations and maintenance programs, and funding.	Sustainability & Environment
Expand precipitation monitoring and evaluation capabilities to mitigate future urban flooding risk and enhance understanding of neighborhood-scale climate impacts.	Public Utilities

Actions to Implement by 2015

PREPARING FOR CLIMATE CHANGE	LEAD AGENCY
Evaluate the impacts of sea level rise on flood prone areas and shoreline development and habitat, and consider implications for land use management strategies.	Planning & Development
Collaborate with the State, County, neighboring cities, and impacted residents and businesses to create a coordinated approach to shoreline management that enhances preparedness and increases the cost effectiveness of preparing for sea level rise. Prepare a worst case scenario response strategy.	Sustainability & Environment
Evaluate climate impacts to transportation infrastructure and operations, including critical needs for emergency response, goods and services movement, and community access. Identify and prioritize strategies for enhancing resilience.	Transportation
Consider future climate conditions when designing buildings and identify current or future opportunities to include elements such as on-site stormwater management, distributed power generation, and passive solar.	Planning & Development
Pilot an advanced green building standard, such as the Living Building Challenge, on a City facility to assess its appropriateness for resilient design and to promote similar levels of green building in the private market.	Sustainability & Environment
Review development codes and incentives, and identify barriers and potential opportunities, to encourage private development to become more resilient (e.g. increasing on-site stormwater retention).	Planning & Development
Assess and plan for the impacts of climate change on public health, including the disproportionate impacts on lower income, recent immigrant, older, and very young residents, who are at greater risk of health impacts from climate change.	Public Health - Seattle & King County
Continue to factor climate change projections into emergency preparedness and recovery planning, including future updates to the Seattle Disaster Readiness and Response Plan and the Disaster Recovery Plan.	Emergency Management
Strengthen the local and regional food system by implementing the Seattle Food Action Plan and consider the impacts of climate change on access to healthy, affordable food in future Plan updates.	Sustainability & Environment
Expand community gardening and urban agriculture opportunities at P-patches, schools, and on rooftops and inventory vacant land that could be made available for farming.	Neighborhoods
Continue efforts to preserve farmland near the city through land use and TDR policies.	Planning & Development

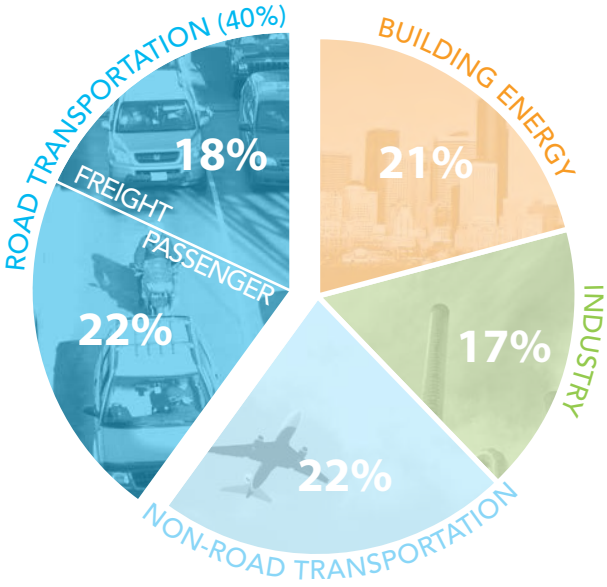
REDUCING EMISSIONS

"Visualizing Climate-Friendly Neighborhoods" – OSE community outreach
(Image: Studio 216 with GGLO)

TRANSPORTATION + LAND USE

Why are road transportation and land use actions important to reducing greenhouse gas (GHG) emissions?

Road transportation is Seattle's largest source of GHG emissions, comprising approximately 40% of 2008 community emissions. The emissions come from fossil fuels burned by cars, trucks, transit, and freight vehicles as they travel through the City moving people and goods. Improving the efficiency of that movement —by reducing the number and length of vehicle trips, increasing the number of people moved per vehicle, or increasing the number of clean vehicles on the streets—will significantly reduce the climate impact of Seattle's transportation system. Coordinated transportation and land use actions are required to achieve emissions reductions in a way that enables us to live, work, and play in vibrant communities.



"Road" Transportation Sector emissions.
(Source: 2008 Seattle Community GHG Inventory)

Seattle is expected to receive more than 100,000 new residents and 100,000 new jobs over the next 20 years. If Seattle met this new growth with car-dominated land use and transportation strategies, not only would GHG emissions increase we wouldn't have enough space for housing and jobs. New growth, if managed well, can support Seattle's efforts to create pedestrian-friendly urban centers and neighborhoods, places with a diversity of housing, employment opportunities, services, recreational opportunities, and convenient transit. Seattle has already seen the climate benefits of transportation and land use strategies that concentrate jobs and housing in complete communities. From 1990 to 2008, Seattle's population grew by 16%, yet per capita GHG emissions from road transportation dropped by 4%.

While reducing GHG emissions is the primary purpose of this plan, it is important to note that these strategies provide a number of other community benefits. Residents who can meet many of their daily needs by walking, bicycling, or riding transit also benefit from lower overall household costs, improved health, thriving local business districts, and increased opportunities for housing and jobs. The city's economy also benefits from reduced fossil fuel use in the transportation system. In 2011, Washington's petroleum consumption drained nearly $15 billion out of the state economy, more than $2,000 per person. Money spent on cars and gasoline creates less than half as many local jobs as money spent on other goods and services.

How will we reduce road transportation emissions?

The transportation and land use actions are focused on passenger transportation, which represents over a third of all road emissions and is the transportation source where the City action can have the greatest impact. These actions reduce emissions by:

- Expanding transit, walking, and bicycling infrastructure and services to provide effective choices for getting around (*Transportation Choices*)
- Meeting the growing demand for conveniently located homes and businesses in walkable neighborhoods with a variety of recreation and service opportunities (*Complete Communities*)
- Providing economic signals that better reflect the true cost of driving (*Economic Signals*).

Taken together, the transportation and land use actions reduce climate pollution from transportation by prioritizing transit, bicycling, walking, and freight mobility over passenger vehicles. The actions that provide transportation choices, create complete communities, and send economic signals are highly synergistic, and must be implemented as a system to achieve the intended reduction in emissions.

Emissions from freight transportation, which make up 18% of road transportation GHG emissions as of 2008, are not a primary focus of the Climate Action Plan because the main strategies for reducing freight emissions are related to vehicle fuel and technology improvements, which the City has limited ability to influence. That said, many of the strategies recommended in this section will have some impact on freight emissions, particularly those that reduce congestion and allow goods to move more efficiently through our City. In addition, the Climate Action Plan does include an overview of efforts to reduce GHG emissions from freight transportation in the Appendices.

Transportation Choices & Complete Communities

Transportation systems and land use patterns are inextricably connected. Investments in transportation choices such as increased transit service attract development. At the same time, new housing and commercial development creates the demand necessary to support transit. By locating housing and jobs closer together, promoting development near high capacity transit, and expanding transit service to support urban centers and villages, we can meet the needs of a growing population in vibrant communities and reduce passenger vehicle trips.

Transportation + Land Use

If transportation and land use planning are not well coordinated, the ability to get around and the opportunity to create vibrant communities are compromised. For example, without convenient transit, walking and bicycling options, residents and businesses must rely on auto travel, which requires more space and creates a disincentive to build compact communities. Further, without compact communities that create sufficient demand, it is very costly to serve a neighborhood with frequent transit service.

Economic Signals

Economic signals, such as road and parking pricing, create financial incentives to reduce auto travel, and provide a motive for residents to ride transit, walk or bike. Road pricing also has the potential to generate significant revenue to support development of transportation choices. However, if pricing strategies are implemented without other options for getting around (Transportation Choices) and for living close to work and other daily needs (Complete Communities), there are likely to be significant mobility and social equity impacts. For example, when transportation choices and complete communities are not available, road and parking pricing strategies increase the cost of transportation and the impacts fall hardest on low-income residents.

How can we enhance equity through climate action?

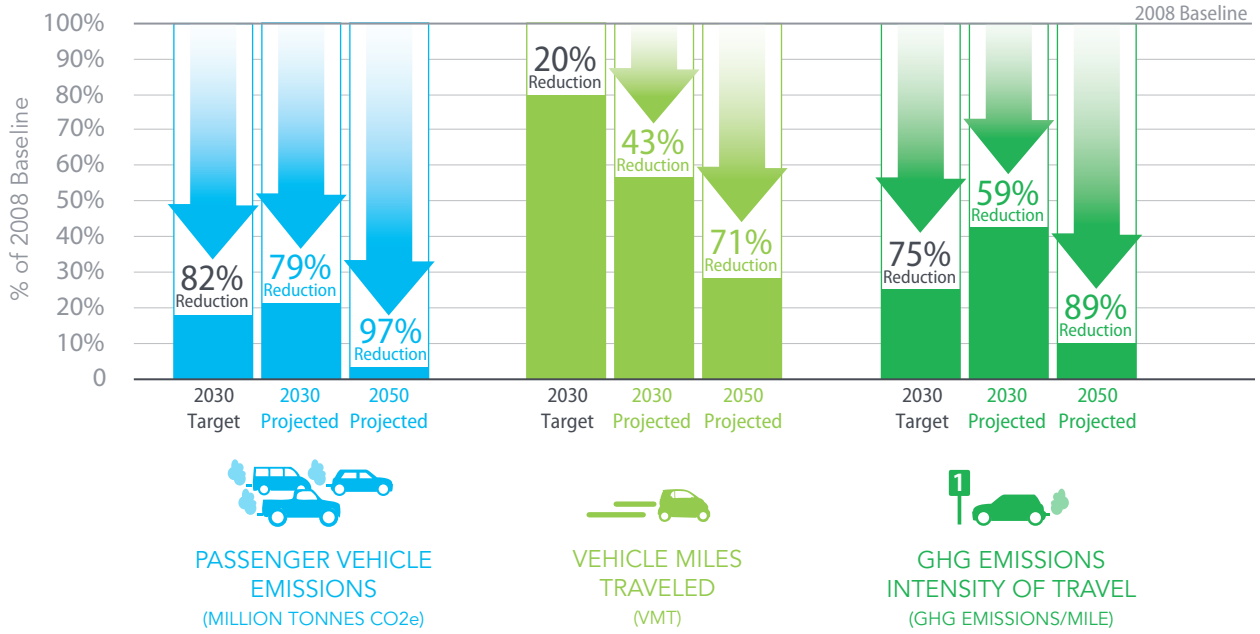
To equitably transition to a low carbon transportation system, we must design and implement transportation and land use actions so that they work for the full range of Seattle residents, which requires designing the actions to:

1. Meet the needs of families, immigrant communities, an aging population, people with disabilities, and lower income residents.
2. Assist existing residents and businesses to remain and thrive in walkable, transit-oriented communities.
3. Expand low-cost transportation options to mitigate the impacts of economic signals that increase the cost of transportation, especially for lower income residents.

How much will these actions reduce GHG emissions?

The City's 2030 goals are to reduce emissions from passenger vehicle transportation by 82%, vehicle miles traveled by 20%, and emissions per mile traveled by 75% from a 2008 baseline. Implemented together, the full package of transportation and land use actions included in this plan would exceed the goals for reductions in vehicle miles traveled and make substantial progress toward the 2030 goals for reducing emissions per mile traveled and passenger vehicle emissions. While the 2030 projected reduction for emissions per mile falls short of the target, the actions would set the city on a path that is expected to result in approximately 89% reductions by 2050. The delay in emission reductions per mile is primarily due to anticipated rates of adoption of alternative fuels and vehicles, and could be accelerated if significant progress is made in that area over the next 15 years. The figure below shows the projected emissions reductions achieved from aggressive implementation of the recommended actions, relative to a 2008 baseline.

PASSENGER VEHICLE EMISSIONS, TRANSPORTATION VMTS, & GHG EMISSIONS PER MILE
2030 TARGETS + PROJECTED REDUCTIONS FROM ACTIONS



It is important to note that while the actions that support transportation choices and complete communities would substantially reduce emissions, economic signals are critical to achieving the emissions reduction goal. Road pricing and parking management actions are estimated to produce a quarter of the emission reductions that could be achieved by 2030. Additionally road pricing is an essential strategy over the long term, because the actions not only reduce emissions, but also represent the single largest potential source of local or regional funding to implement transportation choices.

Transportation + Land Use

How will we monitor our progress?

The City will track implementation of the identified actions, as well as a range of indicators. These indicators, many of which are drawn from Seattle's Comprehensive Plan, Pedestrian Master Plan, and Bicycle Master Plan, are intended to help us evaluate the ongoing implementation and effectiveness of the CAP (see table below). At present, data is not available to track several of the key indicators. Resolving the data gaps will require a Seattle-specific travel demand model and access to WalkScore data specific to urban centers and urban villages.

Table: Climate Action Outcome Indicators

SECTOR		INDICATOR	TARGET
TRANSPORTATION	Passenger	Passenger Vehicle Emissions (Million Tonnes CO_2e)	82% Reduction
		Vehicle Miles Travelled (VMTs)	20% Reduction by 2030*
		GHG Emissions Intensity of Travel (GHG Emissions per mile of Seattle Vehicles)	75% Reduction by 2030*
	Mode Share	Center City Commute Trip	Trend away from single occupant vehicles
		All Trips in Seattle	Trend away from single occupant vehicles
	Transit	Ridership	Increase in transit mode share and ridership
		Service	Increase in transit service hours and service levels on Seattle's Frequent Transit Service network
	Bicycling	Ridership	Triple the amount of bicycling from 2007 levels by 2017
	Safety	Crash Data	Eliminate serious injuries and fatalities on Seattle streets by 2030
LAND USE	Housing	Households (in Urban Centers/Villages)	45% of households
		Affordable Housing Units	Increase in households with incomes up to 80% of the Area Median Income (AMI) paying less than 30% of their income on rent/mortgage
	Jobs	Jobs (in Urban Centers/Villages)	85% of jobs
	Livability Components	Services within a Walk (WalkScore)	Meet a minimum WalkScore in all Urban Centers/Villages
		Open Space	Increased number of Urban Villages meeting open space goals
	*Target included in the Comprehensive Plan		

ACTIONS

The Transportation & Land Use actions are organized as follows:

TRANSPORTATION CHOICES:

Funding
Transportation Infrastructure & Service
Transportation Demand Management
Vehicle Fuels & Technologies

COMPLETE COMMUNITIES:

Policy & Planning

ECONOMIC SIGNALS:

Road Pricing
Parking Management

TRANSPORTATION CHOICES

High quality transit, bike, pedestrian, and freight networks provide the underlying backbone of a low carbon transportation system. By prioritizing accessibility and mobility for people and goods over vehicle capacity, we can meet the needs of a growing population while significantly reducing GHG emissions.

The Seattle Streetcar connects downtown to South Lake Union; expansion plans are in the works. (Photo: Seattle Streetcar)

Pilot Project: Fremont Bridge Bicycle Counter (Photo: SDOT)

TRANSPORTATION CHOICES

Funding

While we have a bold vision of a city connected with an efficient, effective, accessible, and well-maintained transit, bicycling, and pedestrian network and services, our transportation system is facing an unprecedented funding crisis. New funding sources are critical to maintain existing service levels and meet maintenance needs, as well as to implement our transportation vision.

2030 Vision

- Seattle has adequate funding to fully implement the Transit, Bicycle, Pedestrian and Freight Master Plans, and meet maintenance needs.

Actions to Implement by 2015

1. Renew and extend the time frame of the Bridging the Gap levy and prioritize investments in transit, pedestrian, and bicycling improvements and system maintenance.
2. Secure local or transit agency authority to levy a motor vehicle excise tax (MVET) at the City or County level.
3. Work with regional and state partners to adopt a funding strategy to meet current and future transportation needs including mechanisms such as:

   a) A city development authority* that serves as an independent entity of Seattle government, or similar mechanism, forming public private partnerships in order to use district-based funding mechanisms (e.g. tax increment financing*, tax abatement, simplified local improvement districts).

   b) A tax on unpaid off-street parking* in commercial areas, to supplement the current commercial parking tax authority.

   c) A comprehensive system of congestion pricing on all limited access highways in Central Puget Sound and potentially non-highway arterials.

*State legislative action required.

TRANSPORTATION CHOICES

Transportation Infrastructure & Service

Enhancing mobility, access and safety through a range of transportation choices is key to reducing auto dependence. The City has visionary transportation master plans that guide planning and investments to expand transit, pedestrian, and bicycle infrastructure and service, but they need funding to be implemented. Key actions from these plans are highlighted here.

2030 Vision

- Rail lines, dedicated bus lanes (many with Electric Trolley Bus service) and cycle tracks crisscross the City. Walking, bicycling, or transit are the easiest ways to get around.
- Seattle's Frequent Transit Service network is complete, offering frequent transit service on high ridership routes identified within the Transit Master Plan.
- The pedestrian network is completed within ½ mile of all High Capacity Transit and Bus Rapid Transit stations, schools, community centers, health care facilities, and Urban Centers and Urban Villages.
- There is a bike facility within ¼ mile of every home in Seattle. Protected/buffered on-street bicycle lanes and greenways connect Urban Centers and Villages.

Actions to Implement by 2015

1. Begin construction of 23rd Avenue priority bus corridor.
2. Complete the preliminary engineering and environmental analysis for the Center City Transit Connector.
3. Develop a Freight Master Plan that includes goals to make freight movement more efficient and reduce its impact on greenhouse gas emissions.
4. Build bicycle lanes that are physically separated from traffic in the Center City.
5. Expand on-street bicycle racks and facilitate provision of off-street bicycle parking and bike sharing.
6. Implement bicycle intersection safety improvements on heavily traveled bicycle corridors.
7. Improve sidewalks and crossings on arterial streets to connect Urban Centers and Villages.

TRANSPORTATION CHOICES

Transportation Infrastructure & Service

Actions to Implement by 2030

1. Develop a comprehensive, connected network of safe and comfortable bicycle facilities to, from and within the Center City and Urban Villages.
2. Develop a citywide network of neighborhood greenways that prioritize walking and bicycling on residential streets.
3. Implement four high capacity transit corridors as identified in the Seattle Transit Master Plan: Center City Connector, Ballard to Downtown, Madison to Downtown, and University District to Downtown.
4. Add transit service to high demand routes to complete the Frequent Service Network.
5. Enhance sidewalks, crossings, and public places in Urban Centers and Urban Villages.
6. Collaborate with King County Metro to expand the electric trolley bus system to include more routes and more frequent service in areas identified in the Transit Master Plan by funding service, building infrastructure, and coordinating planning.
7. Use green stormwater infrastructure and low carbon materials, when designing and building infrastructure.

Creative crosswalk pilot project.
(Photo: Seattle Dept. of Transportation)

TRANSPORTATION CHOICES

Transportation Demand Management

Transportation demand management strategies affect how, when, and where people travel by facilitating access to travel options.

2030 Vision

- Seattle residents and commuters have easy access to and information about transportation options such as bicycling, walking, transit, carpooling, and car sharing.

Actions to Implement by 2015

1. Improve wayfinding and bus passenger facilities by adding electronic real-time bus schedule information and off-board payment options.
2. Implement Safe Routes projects to improve pedestrian connections to schools, transit, and neighborhood business districts.
3. Participate in multi-agency efforts working to support bike sharing, vehicle sharing, and ride sharing.
4. Work with Transportation Management Associations, property managers, employers, homeowners associations, and community groups to develop and market transit passes, car sharing, and other programs that support travel options.

Actions to Implement by 2030

1. Provide incentives, marketing, and innovative enhancements to make transit, walking, and bicycling more fun and appealing.
2. Expand the existing Commute Trip Reduction (CTR) program beyond large employers to include outreach and services for smaller employers in select locations.

TRANSPORTATION CHOICES

Vehicle Fuels & Technologies

While many of the Plan's actions will reduce the need for auto travel, cars and freight vehicles will remain part of our transportation system. In addition, the number of transit vehicles and trips will grow. Therefore, it is important that we reduce the climate impacts of the remaining cars, buses, and truck through cleaner vehicles and fuels.

2030 Vision

- 15% of passenger cars are electric vehicles, and significant progress has been made in transitioning diesel vehicles to next generation alternative fuels.

Actions to Implement by 2015

1. Support private adoption of electric vehicles (EVs) by making it easier to get permits and by planning for access to charging stations and impacts on energy demand.
2. Develop a Green Fleets Plan for the City of Seattle fleet that encourages market adoption of next generation vehicles and fuels.
3. Expand the City's municipal electric vehicle (EV) fleet.

Actions to Implement by 2030

1. Reduce barriers to electric vehicle use, including evaluating options to provide access to charging infrastructure for households without off-street parking.
2. Pursue grant funding and partners to develop a network of fast charging stations that will allow vehicles to charge in under 30-minutes increasing vehicle range, expanding opportunities for charging, and providing commercial opportunities to business owners.
3. Support programs which help heavy duty truck owners and operators transition to more efficient vehicles and cleaner fuels.
4. Explore ways to use Seattle waste to produce alternative fuels, such as liquid natural gas from anaerobic digesters.

COMPLETE COMMUNITIES

Coordinated transportation and land use planning can facilitate the growth of transit-oriented communities, increase mobility for our growing population, improve access to multiple modes of transportation, and create and support appealing destinations. Together, these results can reduce vehicle miles traveled by shortening travel distances and better connecting the places we live, work, and play.

2030 Vision

- Neighborhoods surrounding every high capacity transit station and frequent bus node have a vibrant and diverse mix of commercial spaces and housing.
- 45% of residents live in Urban Centers and Urban Villages
- 85% of jobs are in Urban Centers and Urban Villages

Complete Communities 2030: A mulitfamily neighborhood streetscape.
(Image: Studio 216 with GGLO and OSE)

http://www.seattle.gov/environment/documents/ClimateFriendlyNeighborhoods.pdf

COMPLETE COMMUNITIES

Policy & Planning

Integrating climate goals into transportation and land use policy and planning that prioritizes transit, walking, and bicycling over auto travel while accommodating freight movement is critical to meet climate goals and the needs of a growing population.

Actions to Implement by 2015

1. Develop a citywide transit communities strategy that integrates neighborhoods with high capacity transit.
2. Develop equitable development policies to support growth and development near existing and planned high capacity transit without displacement as part of the 2015 Comprehensive Plan major review.
3. Continue to implement local area plans and urban design frameworks in Capitol Hill, Broadview/Bitter Lake/Haller Lake, Rainier Beach, Othello, Mount Baker, Beacon Hill, Northgate, and the University District.
4. Implement the Challenge Grant strategies in the Rainier Valley to prevent displacement and retain affordable housing near transit.
5. Develop a tool to foster consistent consideration of greenhouse gas emissions impacts and opportunities to reduce them when updating and implementing transportation and land use plans.
6. Develop a placemaking strategy to use our public spaces to make streets and neighborhoods more vibrant and promote economic activity. Implement a project reallocating a portion of the public right-of-way to a public/pedestrian space such as a plaza or parklet.
7. Develop and begin implementation of a coordinated land use and transportation plan in a high-priority transit and bicycle corridor with a goal of shifting more trips to travel modes that generate fewer or no greenhouse gas emissions.
8. Include health, safety, and equity outcomes in transportation and land use planning building on the Healthy Living Assessment project.
9. Implement strategies to provide residents' daily needs within a convenient walk and create nodes well served by transit and non-motorized transportation options.

COMPLETE COMMUNITIES

Policy & Planning

Actions to Implement by 2030

1. Allow a greater diversity of housing types (e.g. duplex, triplex, cottages etc) in selected single and multi-family areas.
2. Provide for the retention and creation of affordable commercial space and family-sized housing in transit communities (e.g. expanded density and height bonuses, tax exemptions, joint development projects*, or inclusionary zoning*).
3. Continue efforts to preserve Seattle's industrial lands which provide local jobs and have efficient access to a deep water port, rail lines and highways.

*State legislative action required.

Complete Communities 2030: An urban village streetscape.
(Image: Studio 216 with GGLO and OSE)

http://www.seattle.gov/environment/documents/ClimateFriendlyNeighborhoods.pdf

ECONOMIC SIGNALS

Economic signals are high impact strategies for reducing GHG emissions, reducing congestion, increasing the efficiency of the roadway system, and generating revenue to fund transportation choices. But, their implementation must be carefully sequenced with the transportation choices and complete communities actions to support mobility for all residents and businesses in our community.

2030 Vision

- The true cost of driving is internalized and congestion is managed through road and parking pricing thereby reducing passenger trips by car.
- A significant portion of the revenue from pricing strategies funds transportation choices.

Road Pricing

Comprehensive roadway pricing (e.g. tolling) has proven to be an effective way to reduce GHG emissions and traffic congestion, as well as to generate substantial revenue to fund the transportation system.

Actions to Implement by 2015

1. Research the benefits of pricing policies on climate protection, transportation and community goals (e.g. reduced congestion, improved air quality, revenue generation) and their potential social equity impacts and solutions by examining the experience of other communities.

Actions to Implement by 2030

1. Secure authorization to implement a comprehensive system of road pricing* on all limited access highways in Central Puget Sound. Work to ensure the region has the authority* to set transportation planning objectives and rates to meet the objectives. Ensure the region* can dedicate road pricing revenues to multimodal transportation projects.
2. Evaluate road pricing opportunities on non-highway arterials and develop a pilot project to test whether road pricing can help reduce congestion while also reducing emissions and providing funding for transportation choices.

*State legislative action required.

ECONOMIC SIGNALS

Parking Management

By right-sizing and appropriately pricing parking, housing costs can be reduced, transit, walking, and biking encouraged, smart growth facilitated, and vehicle miles traveled reduced.

Actions to Implement by 2015

1. Create a grant program that supports walking, biking, and transit projects in business districts with paid parking.
2. Work with neighborhood districts to develop on-street parking management and other access strategies.
3. Expand the E-Park program in the Center City to reduce the need to drive around to find parking.

Actions to Implement by 2030

1. Expand parking policies to incorporate goals beyond customer access such as allowing spending of new revenue to support improvements in transit, bicycle, and pedestrian infrastructure and services.*

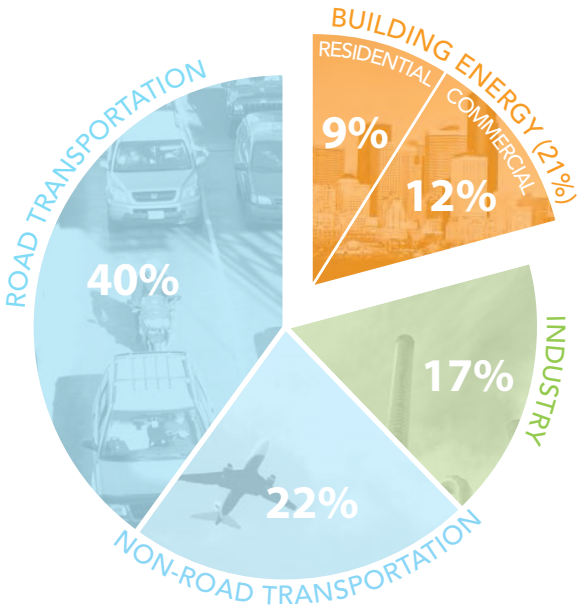
*State legislative action required.

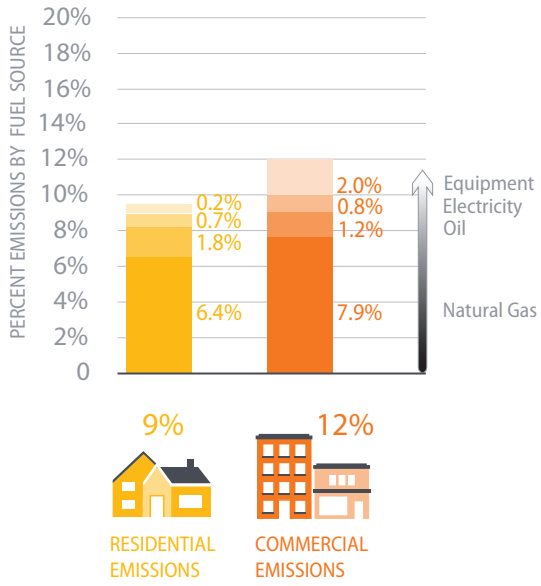
BUILDING ENERGY

Why are building energy actions important to reducing greenhouse gas (GHG) emissions?

From heating to cooling, from cooking to lighting, our buildings perform many energy intensive tasks, so it is no surprise that building energy use accounts for more than 20% of Seattle's GHG emissions. The emissions from our buildings come from the combustion of fossil fuels like oil and natural gas in a furnace or water heater. Making sure our energy comes from clean, low-carbon sources and improving the overall energy efficiency of our buildings are essential to reducing our GHG emissions. In Seattle, we are fortunate to have electricity that is carbon neutral through Seattle City Light, but there are still downstream emissions benefits of efficiency: the more of our clean hydropower we conserve, the more we can sell to other utilities to be used by communities outside Seattle, which reduces their need to use fossil fuels to power their buildings.

In addition to reducing GHG emissions, investments in building energy efficiency and clean energy help improve our communities. By reinvesting in our building stock, we continue to benefit from high quality buildings, support local job growth in the energy efficiency and clean energy sectors, and keep utility bills low.

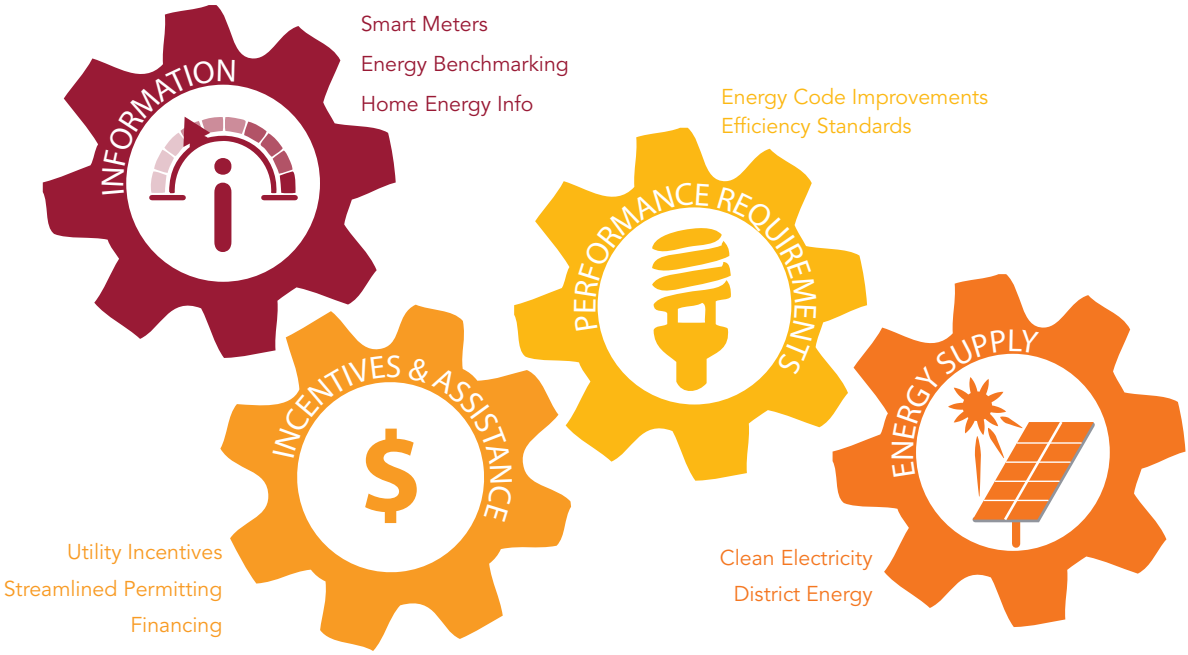




Building Energy emissions account for more than 20% of Seattle's GHG emissions and the majority of building energy emissions are from natural gas. (Source: 2008 Seattle Community GHG Inventory)

How will we reduce emissions from building energy?

The energy efficiency of both existing and new buildings can be significantly increased through a combination of information, incentives, and performance requirements. Measuring and sharing building energy use increases awareness and provides the information needed to make cost-effective energy upgrades. Incentives, like rebates and financing, help offset the upfront cost of those investments. Performance requirements ensure that all buildings meet a certain level of energy performance. These strategies are the key ingredients in a comprehensive strategy that achieves our climate goals. They are most effective when combined, and provide building owners and operators—from large commercial property owners to tenants in low-income apartments—the tools they need to make decisions that are smart for the environment and their budgets. When these actions work together, they build on and increase the overall impact of each individual action. The effectiveness of the individual measures is reduced if implemented alone.



In addition to increasing building energy efficiency, GHG emissions can also be reduced by lowering the carbon-intensity of energy sources. Seattle is fortunate to have a wealth of clean hydroelectricity, as well as an electric utility that has been carbon neutral since 2005 and has an ongoing commitment to conservation and renewable energy. However, many other opportunities exist to increase the diversity of our renewable energy sources. Increasing our options for renewable energy is particularly important as our city grows and energy demands grow with it. By taking advantage of low carbon energy sources like waste heat from industrial processes, we can develop clean, efficient and cost-effective energy systems, allowing some of our green electricity to reduce fossil fuel use elsewhere, including in our transportation system.

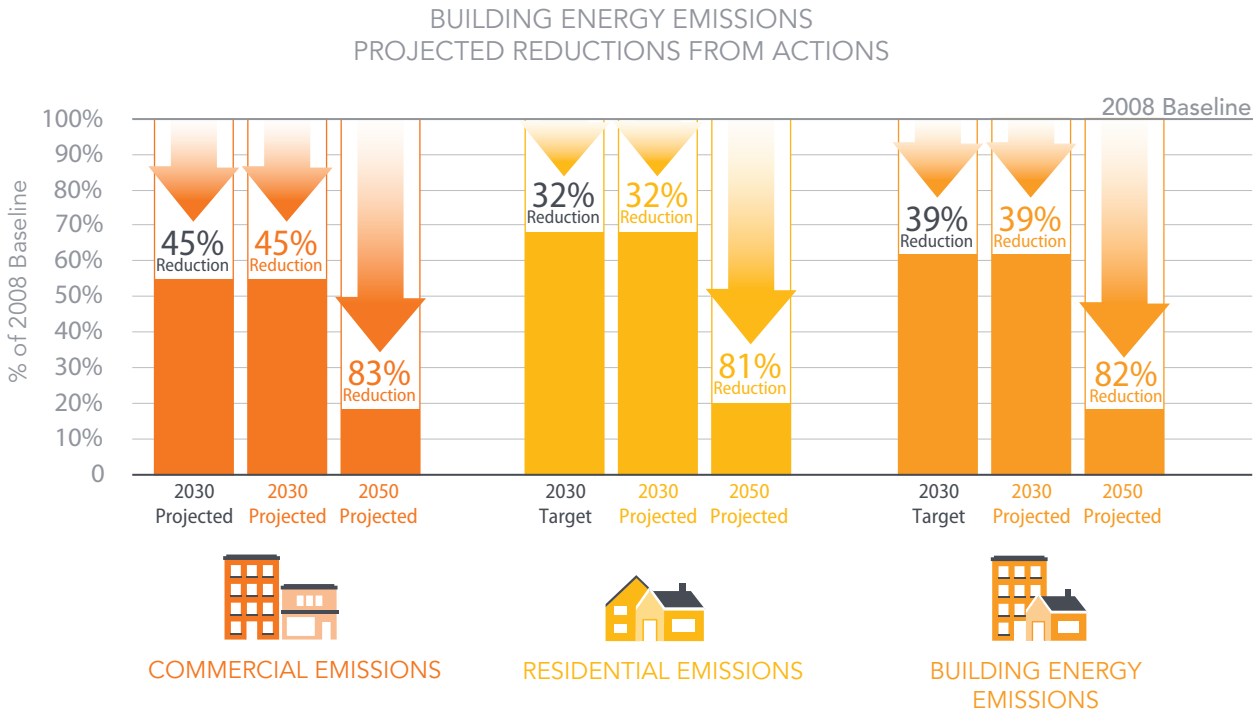
Building Energy

How can we enhance equity through climate action?

To ensure building energy actions promote shared prosperity, race and social equity goals must be considered fundamental to the design and implementation of building energy strategies. There are a lot of opportunities to enhance equity when strategies are designed with equity in mind. At a high level, energy efficiency actions compliment housing affordability goals by reducing energy bills, helping to provide renters equal access to energy efficiency upgrades, and increasing job opportunities for energy upgrade work.

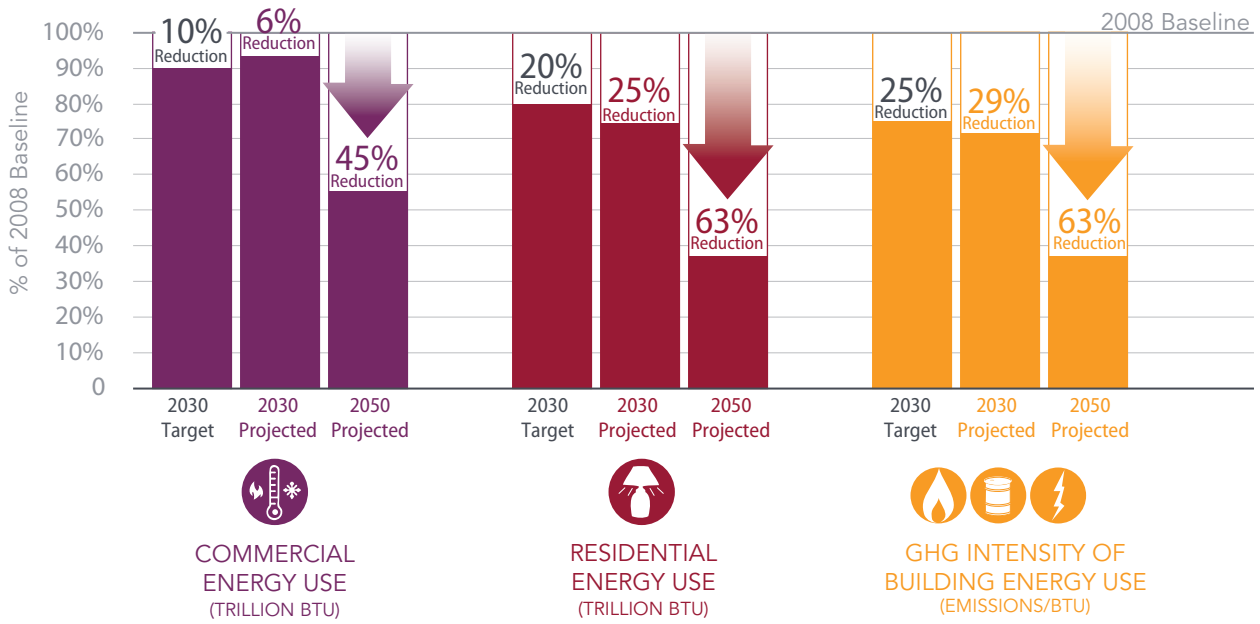
How much will these actions reduce emissions?

The building energy actions focus on reducing energy use and its GHG intensity in residential and commercial buildings. Clean energy sources have a lower carbon content than fossil fuels, so using cleaner fuels is as important as conserving energy. The figure below shows the projected emissions reductions achieved from aggressive implementation of the recommended actions, relative to a 2008 baseline. A key assumption in the analysis is that Seattle City Light will maintain its commitment to conservation and renewables, as well as to being a carbon neutral utility. Therefore, no emissions related to electricity are presented in either the 2008 baseline or forward-looking projections. It is important to note, however, that conserving electricity in our homes and businesses has substantial climate benefits by saving clean electricity for use in place of fossil fuels in other communities and in our transportation system, which will become increasingly electrified in the coming decades. In addition, including electricity conservation in energy upgrade packages can often help make the entire upgrade package more economical for a building owner.



The City's 2030 goals are to reduce energy use in commercial buildings by 10% and residential buildings by 20%, and reduce the GHG intensity of all fuels by 25%. With aggressive implementation, this package of building energy actions will meet our overall 2030 target to reduce total building energy GHG emissions by 39%. While projected reductions in energy use in the commercial sector fall short of the 2030 target, the projected reductions in residential energy use and the GHG intensity of building energy surpass the targets so that the overall emissions reductions goals remain on track.

BUILDING ENERGY USE & GHG INTENSITY
2030 TARGETS + PROJECTED REDUCTIONS FROM ACTIONS



Projected residential energy use reductions exceed the 2030 target because the Plan includes some focused actions on multifamily rental housing, and assumes an ongoing aggressive energy upgrade program for single family homes at a scale only recently achieved through the Community Power Works program. Utility conservation programs have continually provided strong support to the commercial building sector, and as a result the emission reductions realized through the actions in the Plan are building off a base of efficiency achieved through earlier conservation efforts.

Actions reducing emissions in existing buildings were also projected to have a larger impact than those related to new construction because most of the buildings we will see in 2050 have already been built. Reaching these targets requires sustained effort over time, and delays in acting on these strategies will reduce the Plan's achievements. Early action is critical: the overwhelming majority of the projected 2050 emissions reductions stem from a progressive ramp up of the Plan's near-term (by 2015) actions.

Building Energy

How will we monitor our progress?

The City will annually track implementation of the identified actions, as well as a range of indicators. These indicators are outlined in the table below and are intended to help the City evaluate the ongoing effectiveness of the Plan and its progress toward meeting goals.

Table: Climate Action Outcome Indicators

SECTOR		INDICATOR	TARGET
BUILDING ENERGY	Commercial Bldgs	Commercial Building Emissions (Million Tonnes CO_2e)	45% Reduction by 2030
		Energy Use (Trillion BTU)	10% Reduction in Energy Use by 2030*
	Residential Bldgs	Residential Building Emissions (Million Tonnes CO_2e)	32% Reduction by 2030
		Energy Use (Trillion BTU)	20% Reduction in Energy Use by 2030*
	Commercial & Residential (Combined)	Building Energy Emissions (Million Tonnes CO2e)	39% Reduction by 2030
		GHG Intensity of Building Energy Use (Emissions/BTU)	25% Reduction by 2030*
	Multifamily Residential & Commercial Bldgs	Energy Use Intensity (EUI) of Existing Bldgs	Average EUI (kBtu/SF/year) for buildings greater than 20,000 sq ft: Decrease in average EUI Develop EUI target by 2020
		New Buildings, and Major Renovations, Meeting Green/Sustainability Standards	50% of permitted new construction projects achieve one of the following green building standards by 2025: Living Building Challenge, Built Green, LEED, Evergreen Sustainable Development Standard, or Passive House

*Target included in the Comprehensive Plan

ACTIONS

The Building Energy section is organized into the following categories:

INFORMATION

INCENTIVES & ASSISTANCE

PERFORMANCE REQUIREMENTS

ENERGY SUPPLY

The first three sections outline actions to improve the energy efficiency of both existing and new buildings. As described earlier, improving energy efficiency requires an interconnected strategy that provides policies and tools that increase information, offers incentives and other assistance, and requires minimum building energy performance.

The fourth section is focused on actions to expand the options and availability of clean energy sources. Maintaining Seattle City Light's (SCL) commitment to provide carbon-neutral electricity is central to our success. Creating opportunities to use other clean energy fuels, such as waste heat from industry, sewer lines, or data centers, helps complete a transition to clean energy sources.

Implementing these actions will require coordinated action across multiple City departments, including the Department of Planning & Development for development incentives and performance requirements, the Office of Sustainability & Environment for information, incentives, and energy supply actions; and SCL for information, incentives, and clean energy supply. While the City has limited influence over private utilities, the plan includes several SCL pilot programs that if successful have the potential to influence the conservation programs of other utilities in the region.

Building Energy

INFORMATION

Making smart energy choices requires quality information at key decision points. The decision to buy a home or lease a business space should be informed by data about the operating cost of energy use. When trying to reduce energy bills, understanding how much energy is being used and where it is being used are key. Smart meters and energy assessments can provide information to building operators to help them increase efficiency and save money.

2030 Vision

- Individuals making decisions about whether to buy, lease, or finance a building expect to receive information about a building's energy performance.
- Building energy use information is just as available and understandable as a "miles per gallon" rating on a vehicle is today, and energy efficiency has a clear market value.
- Building owners, operators, and occupants have access to real-time feedback about the energy use in their building and options to improve energy performance.

Actions to Implement by 2015

1. Begin implementing a plan to deploy smart meters that provide real-time energy use information to all Seattle City Light customers.
2. Develop and test a program for rating home energy performance when a house is listed for sale.
3. Make the energy benchmarking scores of the City's municipal buildings publicly available.
4. Develop a Resource Conservation Management Plan to guide efficiency investments in City facilities, including developing a strategy for routinely conducting "tune ups" of City facility energy systems (known as retro-commissioning).
5. Require building energy audits for the largest and least efficient commercial and multifamily buildings to help identify cost effective improvements.

Actions to Implement by 2030

1. Make information from the Energy Benchmarking reports publicly accessible.
2. Establish a requirement for disclosing home energy use or a home energy rating at the point of sale for single-family homes.

INCENTIVES & ASSISTANCE

Making energy efficiency improvements financially compelling is an essential step to increasing efficiency on a broad scale. The right package of incentives, financing, and support services can provide attractive payback periods, spurring investments in energy efficiency. These actions build on Seattle's already strong support for energy efficiency through utility conservation incentives, as well as land use and permitting incentives.

2030 Vision

- Energy efficiency incentives, financing options, and support services have catalyzed more than 12,000 homeowners across all fuel types to conduct home energy upgrades.
- Successful energy upgrade programs offering incentives and financing are in place for multifamily housing and a variety of commercial building types. Thirty percent of multifamily and commercial buildings have conducted comprehensive energy upgrades.

Actions to Implement by 2015

1. Transition the Community Power Works - Home pilot program to an established program that assists homeowners with energy efficiency upgrades.
2. Pilot a retro-commissioning incentive program to provide financial and technical assistance to tune up energy systems in existing commercial buildings.
3. Maintain the City's commitment to low-income weatherization services through the HomeWise program.
4. Pass state legislation to authorize a property tax exemption for rental housing owners who undertake significant upgrades to increase energy efficiency.*
5. Partner with property owners and managers to identify the most compelling financing tools for energy efficiency upgrades in commercial buildings and outline a plan to help bring the tools to market.
6. Pilot a utility incentive program that would pay for actual energy savings over time instead of providing an up-front payment for projected savings.
7. Continue improving permitting processes to promote the most sustainable buildings, such as the Living Building and Deep Green Pilot Program.
8. Partner with Seattle Public Schools to identify opportunities to build Living Building Challenge or Deep Green schools.

*State legislative action required.

INCENTIVES & ASSISTANCE

Actions to Implement by 2030

1. Identify the package of pricing, financing, and incentives to make energy efficiency upgrades obvious economic wins for a broad spectrum of building types.
2. If pilot results are successful, establish a utility incentive structure at Seattle City Light that pays for actual energy savings over time instead of providing an up-front payment for projected savings.
3. Ensure broad access to financing with alternative repayment structures that allow repayment over time as efficiency measures reduce energy costs, or where the loan stays with the building so future owners who are realizing the benefits of the investment pay back the loan (e.g. meter-based financing, Property Assessed Clean Energy financing).
4. Identify new sources of funding for incentives to encourage deeper energy retrofits (e.g. property taxes).
5. Establish a City property tax exemption program for existing rental housing undergoing an energy retrofit to provide a financial incentive for building owners to take action and lower utility bills for tenants.*
6. Establish and strengthen existing energy price structures that incentivize conservation and help improve the cost-effectiveness of deeper efficiency improvements (e.g. rate design, commodity costs, and connection pricing for conservation).
7. Incentivize deep energy efficiency in construction through incentives (e.g. density bonuses) for green building practices including energy efficiency.
8. Study how fees for permit review could be structured to incentivize energy efficiency, and work to implement a program if the study suggests a beneficial outcome.
9. Develop incentive programs to capture and utilize waste heat (e.g. from industrial operations, data centers, or sewage lines).
10. Allow public space, including the public right-of-way, to be used for alternative energy infrastructure such as solar panels and ground source heat wells.

*State legislative action required.

PERFORMANCE REQUIREMENTS

Even with a strong economic case for energy efficiency, performance requirements are part of a longer-term strategy to ensure that all buildings operate at a basic level of efficiency. Requirements should focus on the most cost-effective solutions, and follow the availability of incentives and assistance to help building owners meet new requirements. The actions below represent a gradual increase in efficiency standards for existing buildings over time, and also reflect the important role of the Seattle Energy Code in ensuring our new buildings are built as efficiently as possible.

2030 Vision

- All buildings in the city, regardless of age, have achieved a basic level of energy performance.
- Energy efficiency improvements are integrated into all significant building renovations.
- Energy codes have successfully transitioned to an outcome-based approach.

Actions to Implement by 2015

1. Continue increasing energy efficiency standards in the Seattle Energy Code over time.
2. Evaluate opportunities for the energy code to focus on total energy performance instead of prescriptive requirements.
3. Require the energy performance of buildings undergoing major renovation or change of use (known as "substantial alteration" in code) to come close to the energy performance requirements for new buildings.

Building Energy

PERFORMANCE REQUIREMENTS

Actions to Implement by 2030

1. Move toward an energy code focused on total energy performance. Ultimately, the energy code should include a combination of prescriptive elements, performance requirements, and outcome-tracking.
2. Think creatively about how land use policies and building energy strategies can integrate to create highly efficient new construction. For example, land use codes could foster building designs that better capture passive heating and cooling opportunities.
3. Create a minimum energy performance standard to ensure widespread improvement of our entire building stock. A standard should focus on the most cost-effective energy improvements, and can ramp up over time after tools and incentives are available to assist building owners.
4. Require periodic retro-commissioning (building "tune-ups") for the largest and least efficient commercial and multifamily buildings.
5. Require waste heat recovery in new buildings, where appropriate.

Post-occupancy building performance measurements at Broadway Crossing (LEED Silver) have allowed the design team and building owner to fine tune building operations. (Photo: William P. Wright)

ENERGY SUPPLY

Reaching the goal of carbon neutrality requires actions beyond increasing energy efficiency. While Seattle is fortunate to benefit from Seattle City Light's carbon-neutral electricity, there are many buildings that use fossil fuels, such as natural gas and oil, to heat their buildings. On-site renewable energy systems and district energy systems are important strategies to transition away from fossil fuels. District energy systems, heating and cooling shared by multiple buildings, can use waste heat and renewable energy sources, and move these resources around to where and when they are most needed.

2030 Vision

- Seattle buildings are fueled by a portfolio of renewable and low- or no-carbon energy sources. Seattle City Light continues to provide carbon neutral electricity, and multiple neighborhood district energy systems are using renewable and waste heat sources.

Actions to Implement by 2015

1. Expand district energy systems on First Hill and into the South Lake Union and Denny Triangle neighborhoods.
2. Develop an alternative energy master plan that focuses on low-carbon energy solutions, such as district energy, solar energy, and geothermal energy in the public right-of-way.
3. Maintain Seattle City Light's commitment to conservation and renewables, as well as to providing carbon neutral electricity.
4. Continue Seattle City Light support for solar energy through net metering, which offers payments to customers with excess electricity.

Actions to Implement by 2030

1. Establish a diversity of low- to no-carbon energy sources through district energy systems and on-site renewable energy systems to supplement the City's carbon-neutral electricity, create diversity in supply, and contribute to the market growth of renewable energy systems.
2. Integrate land use and infrastructure planning to optimize opportunities for heat exchange between sources that generate excess heat (e.g. data centers or sewer lines) and buildings that require additional heat (e.g. office buildings or apartments).

WASTE

Why is waste important for reducing emissions?

How much waste we create and how we dispose of it have a significant impact on greenhouse gas (GHG) emissions. Emissions are released during the waste disposal process in two ways. First, emissions are released from the vehicles and equipment needed to take garbage from homes and businesses to the landfill (waste transport). Second, emissions are released as the waste materials decompose in the landfills (waste disposal). However, landfills also act as carbon storage; they trap organic material and their associated emissions underground, thereby preventing decomposition and emissions release. In consequence, the net GHG impact of waste transport and disposal is essentially zero: the trapped, or avoided, emissions are roughly equivalent to the emissions from transport and disposal activities. But that is only half of the waste story.

The more significant role waste plays in climate change is in the emissions that can be avoided by waste reduction, sustainable product design, recycling, and composting.

Designing and using products sustainably, recycling products at the end of their useful life, and composting organic material are critical waste management strategies that reduce emissions. For example:

- Harvesting virgin materials and manufacturing new products result in significant GHG emissions and other pollutants that can be avoided when products are manufactured using less material, designed to last longer, and are repaired and reused.
- Using recycled materials rather than raw materials to create new products results in substantially fewer emissions during production. Thus, recycling products at the end of their useful life avoids emissions for the next generation of products.
- Composting organic waste builds healthy soil and plants, which serve as reservoirs for carbon that would otherwise result in GHG emissions in the atmosphere.

2008 WASTE MANAGEMENT

TOTAL WASTE

% OF WASTE DIVERTED

2022 WASTE MANAGEMENT TARGET

Reduce Total Waste & Increase % Share of Recycling/Compost

TOTAL WASTE

% OF WASTE DIVERTED

How will we reduce emissions from waste?

Seattle has long been a national leader in waste reduction, recycling, and composting. The solid waste actions in this Plan build on this legacy and continue to expand the City's focus on reducing the amount of waste generated and increasing the share of waste that is recycled and composted.

How can we enhance equity through climate action?

The benefits from waste reduction strategies should be shared across the range of Seattle residents. To meet this goal, implementation strategies for the waste actions should:

1. Continue to emphasize monitoring all neighborhoods in Seattle for a consistent high level of service and engagement, regardless of ethnic, racial, or income composition.
2. Improve the access of tenants/renters to recycling and composting programs.

How much will these actions reduce emissions?

The net emissions generated from the waste transport and disposal process are near zero because the amount of carbon stored in the landfill is roughly equal to the emissions generated from landfill gas and transportation. However, the upstream emissions benefits of waste reduction and recycling programs are substantial because they reduce the amount of total waste generated and the amount of new materials needed to create products.

The 2012 Solid Waste Plan outlines a pathway to achieve a 70% recycling and composting rate by 2022. By implementing the Solid Waste Plan and taking additional actions, the City can reduce emissions from collection, processing, and disposal and avoid substantial upstream emissions. If the suite of recommendations is fully funded and implemented, the City can maintain net zero GHG emissions from its waste transport and disposal activities and can substantially increase the amount of avoided emissions achieved through waste reduction, product stewardship, recycling, and composting.

Waste

How will we monitor our progress?

The City will track implementation of the identified actions, and monitor a range of indicators. These indicators are outlined in the table below and are intended to help the City evaluate the ongoing effectiveness of the Plan and its progress toward meeting goals.

Table: Climate Action Outcome Indicators

SECTOR	INDICATOR	TARGET
Recycling & Composting	Waste diverted from landfill to recycling and composting	70% diversion rate by 2022
Collection, Processing, & Disposal	Methane emissions from landfill	50% reduction in methane emissions by 2020

ACTIONS

Actions to reduce emissions from waste are organized as follows:

WASTE REDUCTION & PRODUCT STEWARDSHIP

RECYCLING & COMPOSTING

COLLECTION, PROCESSING, & DISPOSAL

2030 Vision

- The City diverts 70% of its waste to recycling and composting.
- New markets for recycled materials are developed.
- Producers of the goods we consume are taking responsibility for the end-of-life management of their products.

WASTE REDUCTION & PRODUCT STEWARDSHIP

Waste reduction includes actions which affect the design, manufacture, or use of materials or products (including packaging) to prevent waste. Product stewardship is an approach where those involved in a product's lifecycle—manufacturers, retailers, users, and disposers—share responsibility for reducing environmental impacts.

Actions to Implement by 2015

1. Support and collaborate on ongoing state, regional, and national programs and policies to encourage product stewardship of electronics and other materials.
2. Pursue local product stewardship programs, such as take-back requirements for select products that are not included in state or regional programs and reducing product packaging.
3. Launch programs to support edible food donation, help commercial kitchens find efficiencies and reduce waste, and help households and businesses reduce food waste through better planning, purchasing, storage and preparation.
4. Continue to support opt-out programs for junk mail.

Actions to Implement by 2030

1. Support new and expanded programs to reduce construction and demolition waste, such as creating grading standards for salvaged structural lumber so that it can be more readily reused.
2. Develop training programs for deconstructing buildings to increase the amount of materials salvaged for reuse as an alternative to traditional demolition techniques.
3. Continue collaborating with local, state, and regional partners to develop a framework for product stewardship, including adopting life cycle emissions as a criterion for prioritizing products.
4. Continue collaborating with state and federal partners to set standards for "eco-labels" and environmental certifications for product and packaging suppliers.
5. Expand source reduction efforts to City construction projects, and incorporate end-of-life management considerations into City procurement guidelines.
6. Encourage and pilot "paperless" City operations for select City processes.

RECYCLING & COMPOSTING

As a nationally recognized leader in recycling and composting, Seattle currently diverts more than 54% of all residential and business waste, and more than 65% of waste from construction and demolition. The City will continue to develop and implement innovative strategies to increase the amount of waste diverted to recycling and composting.

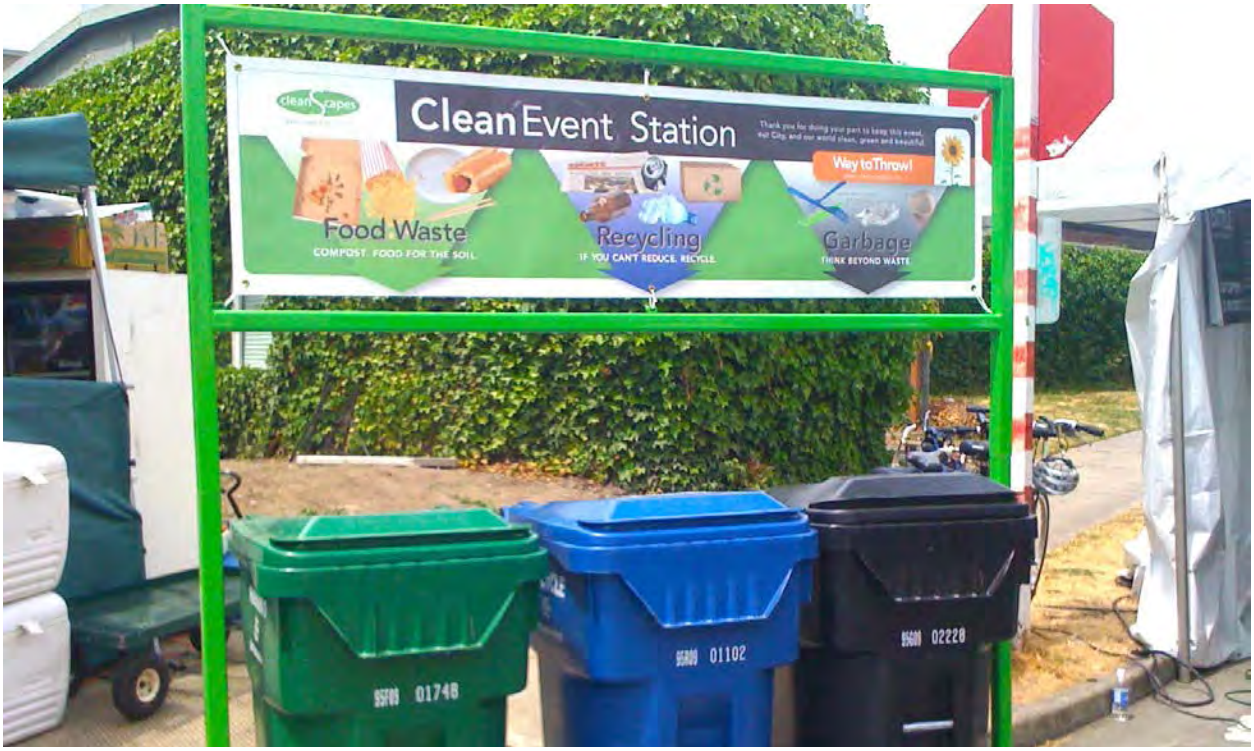
Actions to Implement by 2015

1. Implement new recycling and composting programs for residential and business waste, including programs that target waste hauled by residents to transfer stations.
2. Increase enforcement of residential and business recycling and composting requirements.
3. Ban the following materials from residential and business garbage to increase recycling: asphalt paving, concrete, bricks, asphalt shingles, plastic film, clean wood, residential food, and compostable paper.
4. Phase-in bans on the following construction and demolition waste from job sites and private transfer stations: recyclable metal, cardboard, plastic film, carpet, clean gypsum, clean wood, and asphalt shingles.
5. Expand investment in existing residential and business programs for reuse and organics management to reach more residents and businesses.
6. Continue to support and expand material exchanges and reuse programs, and promote building with salvaged and reclaimed materials.
7. Make reuse and recycling drop-off more convenient at transfer facilities.
8. Enhance outreach and education about recycling and composting to residents and businesses.

RECYCLING & COMPOSTING

Actions to Implement by 2030

1. Develop and promote a certification program for construction and demolition processing facilities in coordination with local industry and other solid waste planning jurisdictions.
2. Increase technical assistance and enforcement related to food packaging requirements so that all take-out food packaging is recyclable or compostable.
3. Support coordination between organics processors, food service product suppliers, and food service retailers to expand the availability of compostable food service products.
4. Build partnerships to analyze and develop a market for a recycled textiles industry, including meeting with stakeholders to determine and overcome barriers, developing standards and specifications, and committing public purchasing contracts to promote the industry. Focus on materials with persistently low recycling rates.



A "Clean Event Station" provides bins for food waste composting, recycling, and garbage at events. (Photo: City of Seattle)

COLLECTION, PROCESSING, & DISPOSAL

Emissions from waste management result from in-city collection, processing, and transfer; long-distance transport, and methane released from the landfill. These emissions can be reduced by creating efficiencies in these processes.

Actions to Implement by 2015

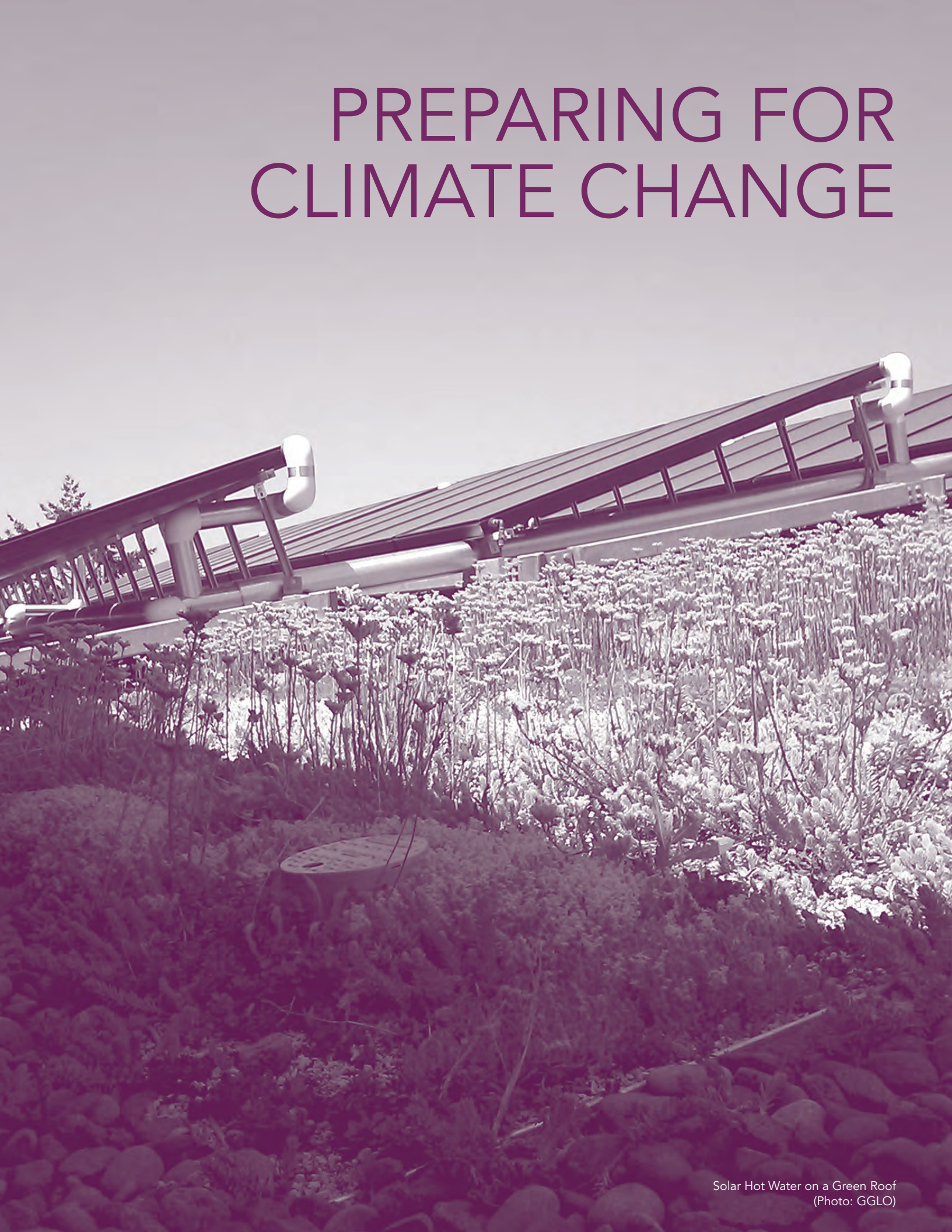
1. Pilot and consider changing to every-other-week garbage collection from single-family homes.
2. Focus grants on schools to establish system-wide collection for food and yard waste.
3. Seattle Public Utilities achieves carbon neutrality through operational emissions reductions, local emissions reduction projects, and GHG offsets.

Actions to Implement by 2030

1. Evaluate alternative approaches to contracting with collection and processing companies to identify opportunities for more efficient waste management.
2. Learn about landfill methane capture and emissions reduction practices at other landfills to inform the landfill contracts. Include a review of landfill methane capture and emissions reduction practices in the contract review process.
3. Support capacity building for composting organics, such as anaerobic digestion.
4. Monitor and adapt programs to incorporate new technologies and recycled material markets as they become available.

(Photo: City of Seattle)

PREPARING FOR CLIMATE CHANGE



Solar Hot Water on a Green Roof
(Photo: GGLO)

Why do we need to prepare for a changing climate?

While we must make concerted efforts to reduce GHG emissions, historic emissions have and will continue to impact the global climate. Additionally, the lack of progress in reducing future emissions means that additional climate change will exacerbate the impacts communities are already experiencing. In 2012, the nation saw a glimpse at the type of extreme weather events expected to increase due to climate change:

- Temperatures in the contiguous United States were the hottest on record.
- The World Bank issued a global hunger warning after severe droughts in the United States and eastern Europe sent food prices to a record high.
- Hurricane Sandy affected 24 states and resulted in more than $75 billion in damages.
- Wildfires consumed more than nine million acres across the United States, including a Washington state fire that burned more than 20,000 acres of national forest, forced more than 400 families to evacuate, and destroyed 60 homes.
- In Seattle, a December storm coupled with an unusually high tide caused the highest water levels ever recorded, leading to flooding of Alki Beach, the promenade and more than 100 beach front homes.

Smoke haze from the Taylor Bridge Fire obscures the sun in Yakima,WA. (Photo: Nate Gilbert)

Alki Beach Promenade Flooding, 2012 (Photo: Patrick Sand, West Seattle Blog)

Flooding, heat waves, and extreme high tides are not new challenges in Seattle, and we have strategies for responding to them. However, climate change will shift the frequency, intensity, and timing of these events, and what we now consider an extreme event will become the new normal. If we are not prepared for these changes, the events will significantly impact our community's economy, infrastructure, and health. Therefore, it is critical that Seattle is prepared for the impacts of a changing climate. Climate scientists anticipate the most significant climatic changes in the Pacific Northwest will be to temperature, precipitation, and sea level, which are summarized in the table below.

	PROJECTED CHANGES	
	NEAR-TERM CHANGES (THRU 2050)	LONG-TERM CHANGES (THRU 2100)
TEMPERATURE	Average annual temperature projected to increase within range of 1.5°F to 5.2°F by 2040s, with summer temperatures increasing as much as 7.9°F. The frequency and duration of extreme heat events (days over 92°F) is projected to increase.	Average annual temperature projected to increase within range of 2.8°F to 9.7°F by 2080s, with average summer temperatures increasing as much as 12.5°F. The frequency and duration of extreme heat events (days over 92°F) is projected to increase.
PRECIPITATION	Average annual change in precipitation likely to be small (+1% to +2%) but wetter winters and drier summers are likely. More precipitation expected to fall as rain rather than snow at mid and low elevations, contributing to a projected statewide reduction in average spring snowpack of about 28% by the 2020s and about 40% by the 2040s. Stream flows likely to be higher in autumn, winter and early spring, and lower in late spring and summer, especially in rivers fed by snow melt.	Projected decrease in average snowpack of about 60% by the 2080s. Projected increase in average annual precipitation of +4%; wetter winters and drier summers are likely. Stream flows likely to be higher in autumn, winter and early spring, and lower in late spring and summer, especially in rivers fed by snow melt. Potential for more extreme precipitation events continues.
SEA LEVEL	Base Sea Level Rise: Estimates for the increase in base sea level range up to 9" by the 2030s and up to 19" by the 2050s. Episodic Sea Level Rise: In addition to base sea level rise, storm surges and high tides will continue to periodically increase sea level. The highest observed water level was 38" above mean higher-high water, or an "everyday" high tide.	Base Sea Level Rise: Estimates for the increase in base sea level range up to 56" by 2100. Episodic Sea Level Rise: Planning estimates for episodic sea level rise factors remain the same in 2100: 38 inches.

What does it mean to prepare for climate change?

Preparing for the impacts of climate change is a complex challenge. Climate science is evolving and is complicated by the uncertainty of future global emissions levels. Therefore, the City's preparedness strategy needs to be an evolving one as well. The systems, plans, and infrastructure put in place to enhance resilience to climate impacts must be grounded in the best available science of the time and frequently re-evaluated as new information becomes available.

As we saw with Superstorm Sandy, proactive planning for impacts can be more cost-effective than a reactive approach of responding to damage after the fact. Proactive planning can help ensure city infrastructure and systems continue to function as climate conditions change. This type of planning may mean designing for projected future conditions now or anticipating the need for later modifications or operational changes. For example, designing bridge expansion joints for projected future temperature extremes may be a cost effective way to prepare now for future temperatures, because retrofitting a bridge is challenging and costly and failure of an expansion joint could result in traffic delays and damage.

In other situations, the lack of certainty about the timing and magnitude of future impacts may mean that it is more cost effective to design a project to allow for future modifications, once potential impacts are more certain. For example, a current roadway stormwater system can be designed to allow future modification to accommodate additional precipitation. To be most effective, climate change preparedness requires project and program-specific decisions that require a broad understanding of the impacts of climate change.

How can we enhance equity by preparing for the impacts of climate change?

Our most vulnerable populations, including lower income, recent immigrant, and older residents, are at greater risk from the impacts of climate change and they often have the fewest resources to respond to changing conditions. Fostering the resilience in these more vulnerable residents and supporting their recovery after extreme events is critical. To enhance equity, climate change preparedness strategies should:

1. Prioritize actions that help vulnerable populations to moderate potential impacts and to cope with the consequences of climate change.
2. Incorporate input and perspectives from members of the vulnerable populations.

ACTIONS

Actions for preparing for a changing climate are organized into the following categories:

ASSESSMENT & PLANNING

NATURAL SYSTEMS

UTILITY SYSTEMS:

Electricity System
Water Supply System
Drainage System

LAND USE & THE BUILT ENVIRONMENT:

Land Use
Transportation
Buildings

COMMUNITY PREPAREDNESS:

Public Health
Emergency Planning
Food Systems

All of the following actions are intended to be implemented by 2015. Planning efforts over the next three years will provide the information and the framework necessary to develop longer-term strategies.

2030 Vision

Seattle is preparing for a changing climate through an adaptive management process that evolves as projections are updated and impacts are seen, including the following:

- City infrastructure and services are planned, built, and managed to maximize function and longevity under future climate conditions.
- Disproportionate impacts of climate change on vulnerable populations are minimized.
- Short-term cost effectiveness and long-term economic vitality are maximized.
- Ecosystem services and ecosystem integrity are protected and enhanced to foster the resilience of natural systems.

ASSESSMENT & PLANNING

The City of Seattle has been planning for the impacts of climate change, but the City does not have a comprehensive adaptation strategy. A citywide strategy is needed that employs an integrated and interdisciplinary approach and maximizes co-benefits such as fostering healthy communities, natural systems, social equity, and prosperity.

Actions to Implement by 2015

1. Conduct a citywide assessment of the impacts of temperature, precipitation, and sea level rise on City infrastructure, operations, facilities, and services, including human health with special attention to vulnerable communities.
2. Develop a comprehensive adaptation strategy that integrates the City's planning efforts across all relevant departments and considers both the cost of implementing actions to improve our ability to adapt and the potential cost of inaction. Engage residents in developing the strategy.
3. Apply the planning methodology detailed in the City of Seattle Sea Level Rise Planning Guidance for Capital Projects to projects projected to be impacted by sea level rise.

NATURAL SYSTEMS

Fish in our urban and rural watersheds are at risk from changes in temperatures and stream flows. Trees and other vegetation are at risk from emerging disease and insect pests, and may be weakened by changes in growing conditions. Our natural systems support wildlife and enhance the livability of the city. They also help reduce the impacts of a changing climate, by keeping our city cooler and reduce stormwater runoff.

Actions to Implement by 2015

1. Use thermal imaging to identify areas that are likely to be most impacted by heat events to inform development of urban forest and tree planting priorities and programs.
2. Maintain efforts to restore all 2500 acres of forested parkland by 2025 through the Green Seattle Partnership.
3. Implement the Urban Forest Stewardship Plan.
4. Implement projects in several urban creeks that connect floodplains, increase stormwater storage capacity, and improve culverts to minimize flooding and improve habitat.

Tree planting party. (Photo: GGLO)
The Green Seattle Partnership is working to restore 2,500 acres of forested parkland by 2025.

A raccoon discovers a chum salmon on the banks of Piper's Creek in Carkeek Park. (Photo: Catherine Anstett, Seattle Public Utilities)

UTILITY SYSTEMS

Seattle's utility systems are highly dependent on the weather, particularly the timing and amount of precipitation. Our water supply and the majority of our electricity supply rely on regional rainfall and snowpack. Our drainage system, which manages storm water runoff, is sensitive to changes in the volume of runoff from precipitation. Seattle Public Utilities and Seattle City Light have been considering the impacts of climate change on our utility systems for a number of years, including impacts on water and electricity supply and the drainage system. The following actions build on their ongoing work.

Electricity System

Actions to Implement by 2015

1. Evaluate climate change impacts on electricity resources and future energy demands using applied research and modeling beyond the 20-year planning horizon currently used in the Integrated Resource Plan.
2. Collaborate with external partners to research the impacts of climate change on hydroelectric projects, including impacts on generating facilities and salmon survival.
3. Maximize conservation programs to help meet future electricity needs, reduce the need for new energy sources as Seattle grows, reduce energy costs to residents and businesses, and help meet obligations for natural resource stewardship.
4. Implement Advanced Metering to begin the transition to a "smart grid" to help meet customer demand, detect system overloads that could be caused by heat events or other issues, and reroute power to improve system reliability.

Water Supply System

Actions to Implement by 2015

1. Work with federal and academic research groups to downscale climate data for the watersheds supplying the city's water. Use this information to update the water supply assessment and explore impacts on the intensity of forest fires, turbidity, the timing of fall rains, and precipitation in the city.
2. Continue to invest in water conservation programs reducing per capita water use to help meet future needs and to build adaptive capacity.

UTILITY SYSTEMS

Drainage System

Actions to Implement by 2015

1. Continue to evaluate the impacts of climate change on the drainage system and identify strategies for enhancing resilience.
1. Adopt a Green Stormwater Infrastructure (GSI) policy and implementation strategy affirming GSI as the preferred stormwater management approach.
2. Expand precipitation monitoring and evaluation capabilities to mitigate future urban flooding risk and enhance understanding of neighborhood-scale climate impacts.

Green Stormwater Infrastructure in Ballard.
(Image: Seattle Public Utilities)

LAND USE & THE BUILT ENVIRONMENT

Land Use

Rising sea levels are anticipated to inundate low-lying areas and increase storm surge resulting in infrastructure and property damage, as well as loss of near shore habitat. Strategies and regulations are in place now to manage development and maximize the habitat value of shorelines; however, projected future conditions require a re-evaluation of these strategies.

Actions to Implement by 2015

1. Evaluate the impacts of sea level rise on flood prone areas and shoreline development and habitat, and consider implications for land use management strategies.
2. Collaborate with Washington state, King County, neighboring cities, and impacted residents and businesses to create a coordinated approach to shoreline management that enhances preparedness and increases the cost effectiveness of preparing for sea level rise. Prepare a worst case scenario response strategy.

Transportation

The transportation system was built to withstand local weather and climate based on past experience. Increased temperatures, storms, and flooding resulting from climate change that are outside the ranges used in designing transportation infrastructure could result in delays, disruptions, and damage to infrastructure.

Actions to Implement by 2015

1. Evaluate climate impacts to transportation infrastructure and operations, including critical needs for emergency response, goods and services movement, and community access. Identify and prioritize strategies for enhancing resilience.

LAND USE & THE BUILT ENVIRONMENT

Buildings

Buildings need to meet not only current conditions, but also perform well over time under a range of future climate conditions. Buildings that use advanced green building standards can be more resilient, relying less on centralized mechanical systems and more on decentralized, passive and self-generated heating, cooling, and water systems.

Actions to Implement by 2015

1. Consider future climate conditions when designing buildings and identify current or future opportunities to include elements such as on-site stormwater management, distributed power generation, and passive solar.
2. Pilot an advanced green building standard, such as the Living Building Challenge, on a City facility to assess its appropriateness for resilient design and to promote similar levels of green building in the private market.
3. Review development codes and incentives, and identify barriers and potential opportunities, to encourage private development to become more resilient (e.g. increasing on-site stormwater retention).

The Bullitt Center aims to be the greenest commercial building in the world. It is designed to achieve the Living Building Challenge. (Image: The Miller Hull Partnership)

The Bertschi School Living Building Science Wing by the Restorative Design Collective is the first certified Living Building Challenge project in Washington state. (Photo: Benjamin Benschneider)

COMMUNITY PREPAREDNESS

Public Health

Climate change is anticipated to increase the frequency and severity of heat stress, respiratory diseases, and vector-borne diseases. Extreme weather, like floods and storms, stress our physical health, our mental health, and our public health system. The existing public health infrastructure – both nationally and locally – is not adequate to meet current needs and will be further stressed under future climate conditions.

Actions to Implement by 2015

1. Assess and plan for the impacts of climate change on public health, including the disproportionate impacts on lower income, recent immigrant, older, and very young residents, who are at greater risk of health impacts from climate change.

Emergency Planning

Projected climate impacts on temperature, flooding, storms, and disease have the potential to exacerbate the impacts of disasters on our community. While the city's Office of Emergency Management has incorporated consideration of the projected impacts of climate change into emergency preparedness and response plans, continued reevaluation as new data becomes available is needed.

Actions to Implement by 2015

1. Continue to factor climate change projections into emergency preparedness and recovery planning, including future updates to the Seattle Disaster Readiness and Response Plan and the Disaster Recovery Plan.

COMMUNITY PREPAREDNESS

Food Systems

The crops, livestock, and fisheries that supply our local food, as well as the global food distribution system, could be significantly affected by changes in temperature and the frequency and intensity of extreme weather including floods and droughts. While the 2012 drought in the United States and Europe was just one year, it provides us with a glimpse of the impacts climate change can have on food supplies. Impacts on food supply can affect global food prices, limiting access to affordable healthy food, particularly for lower income residents.

Actions to Implement by 2015

1. Strengthen the local and regional food system by implementing the Seattle Food Action Plan and consider the impacts of climate change on access to healthy, affordable food in future Plan updates.
2. Expand community gardening and urban agriculture opportunities at P-patches, schools, and on rooftops and inventory vacant land that could be made available for farming.
3. Continue efforts to preserve farmland near the city through land use and Transfer of Development Rights policies.

The Seattle Community Farm, a project of Lettuce Link, a program of Solid Ground, educates, inspires, and increases food security for residents of Southeast Seattle. In September of 2012 the farm had harvested over 6,000 pounds of organic produce, all of which went to the Rainier Valley Food Bank and residents of the Rainier Vista community and wider Rainier Valley neighborhood. (Photo: John Bolivar Photography, used by permission of Solid Ground)

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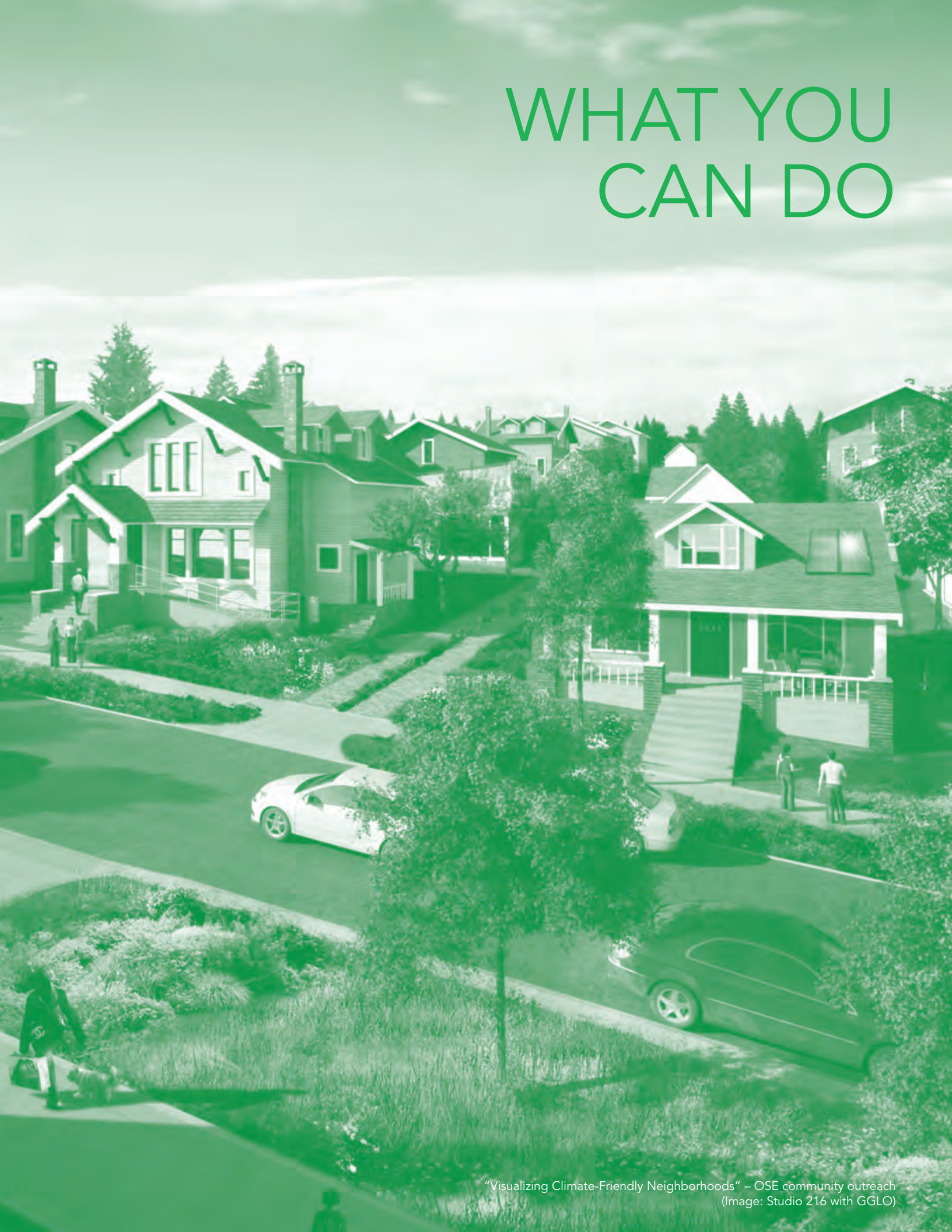
WHAT YOU CAN DO



"Visualizing Climate-Friendly Neighborhoods" – OSE community outreach
(Image: Studio 216 with GGLO)

04 What You Can Do

Introduction

Climate change is a global challenge that requires innovation and ingenuity, common-sense solutions, confident leadership, and individual action. While the consequences of climate change reverberate across the globe, Seattleites will encounter local challenges as well, including changes in precipitation, rising sea levels, and more scorching hot days. Along with local challenges, though, Seattleites have local opportunities to reduce their individual carbon footprints and do their part to mitigate the effects of climate change. The choices Seattle residents make when purchasing goods and services can have a significant influence on greenhouse gas (GHG) emissions in Seattle and around the world.

This Plan focuses primarily on the emissions over which City government has the greatest influence. In previous chapters, action items were presented that will reduce Seattle's emissions between now and 2030 and 2050. This chapter, however, focuses on the actions over which we as consumers have the most control; actions we can start taking now to reduce emissions by 2020, putting us well on the path toward our longer term goals.

The everyday choices we make matter. When we open our pocketbooks or swipe our credit cards to purchase goods, we also purchase the (GHG) emissions associated with what we are buying. The things we buy—from our food and our clothing to our computers and our cars—have emissions attached to them from raw materials, manufacturing, transport, retail sale, use, and disposal. Often, these emissions occur in other parts of the world, so they are not reflected in local GHG emissions inventories.

THE RIGHT ACTIONS ADD UP

YOUR CHOICES + YOUR NEIGHBORS' CHOICES = A **BIG** DIFFERENCE FOR THE CLIMATE

30% REDUCTION
IN GREENHOUSE GAS (GHG) EMISSIONS BY 2020

OUR GOAL IS EQUIVALENT TO:

4.7 MILLION BARRELS OF OIL SAVED OR **$395.7** MILLION SAVED*

*Based on Spot Off Crude 6/19/12 at $83.98

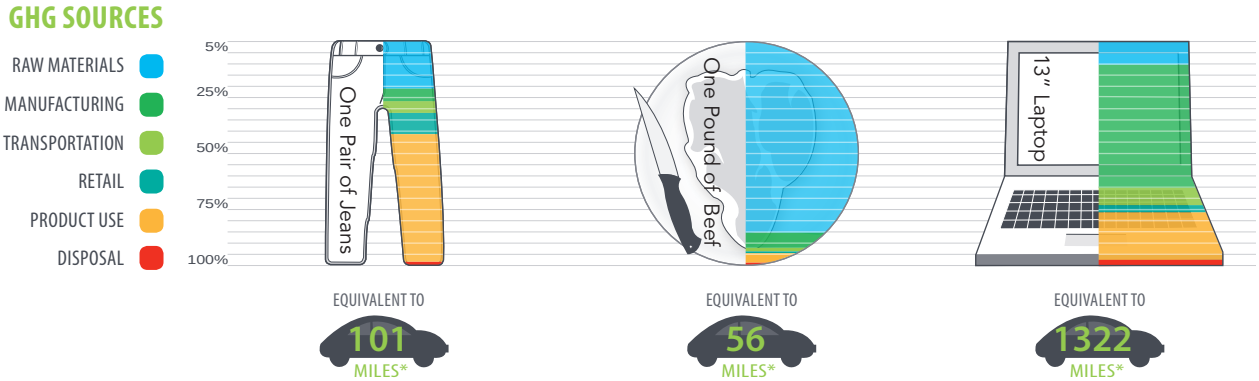
Product Lifecycles & the Global Context

Once we understand the relationships between what we purchase and GHG emissions, Seattleites – from schoolchildren and families to entrepreneurs and policy makers – can pave the way toward more climate-friendly choices. Our city has set a bold goal of becoming carbon neutral by 2050. Our individual choices are key to achieving this goal.

Cities conduct GHG inventories to inform and monitor the effectiveness of GHG reduction strategies. While the standard geographic inventory helps local jurisdictions design actions to reduce emissions sources over which they have significant influence, it doesn't capture many of the emissions associated with the goods and services residents purchase. Therefore, the City of Seattle, King County, and the Puget Sound Clean Air Agency recently commissioned a consumption-based inventory, which looks at emissions from the raw materials, manufacturing, transport, retail sale, use, and disposal over the life of the goods and services we buy, wherever those emissions occur. The recommendations that follow were developed based on this consumption-based inventory and can help us make informed decisions about the things we buy.

GHG EMISSIONS COME FROM MORE THAN JUST YOUR CAR

A lot of GHG emissions are embedded in the things we buy and use everyday - here are some examples:



The largest source of GHG emissions in your jeans comes from cleaning them. Reduce your impact by washing on cold and line drying.

*Mileage calculated using the average lifetime of this product - 2 years with 52 washes per year and a 28MPG vehicle.

The largest source of GHG emissions in beef comes from raising the cows. Reduce your impact by going meat free one day a week.

*Mileage calculated using the consumption of one pound of beef and a 28MPG vehicle.

The largest source of GHG emissions in your laptop comes from its materials and making it. Reduce your impact by using technology tools to make your laptop last longer.

*Mileage calculated using the average lifetime of this product - 4 years of normal office use and a 28MPG vehicle.

Product Lifecycles & the Global Context

GHG emissions occur throughout the full lifecycle of the goods and services we purchase. By understanding which phase in a product's lifecycle results in the largest share of emissions, we can act as informed consumers and reduce our individual carbon footprints. For example, over the lifecycle of a car, the emissions from driving it are the greatest; thus, buying a fuel efficient car is our best opportunity to reduce its lifecycle emissions. In contrast, the production stage in the lifecycle of food is the most emissions-intensive. Therefore, eating more fruits and vegetables and less meat and dairy is a great way for us to reduce our carbon footprints through our food choices.

Cars and food have different lifecycles, so we have different opportunities to make choices that reduce our carbon footprints.

Before a car is purchased, emissions have already been released across the globe – perhaps beginning at a steel maker in China, moving to a parts manufacturer in Japan, arriving at an assembly plant in South Carolina, and being shipped across the nation to arrive at a dealer in Seattle. Emissions associated with driving the car begin after purchase. After racking up too many miles, the car has disposal emissions, which may include transportation to a junk yard and recycling the car in whole or in parts. Because most emissions are emitted during driving, our best opportunity to reduce its lifecycle emissions is by buying a fuel-efficient car.

In contrast, food has much higher emissions from its production than from any other stage of its lifecycle. The production of meat and dairy, for example, is among the largest contributors to the world's growing carbon footprint. The emissions associated with beef come from the pesticides, chemical fertilizers, energy, water, and feed it takes to grow a cow. Cows are ruminant animals that generate methane, a gas 25 times more potent than carbon dioxide. Because most emissions are emitted during production, our best opportunity to reduce our carbon footprint through food choices is by eating more fruits and vegetables and less meat and dairy.

We can reduce emissions in Seattle and across the globe by making informed consumer decisions. Half of Seattle's household GHG emissions are created in our home and by getting around, eating, and buying stuff.

C'MON SEATTLE, WE CAN DO THIS - AND HERE'S HOW!

HALF OF SEATTLE'S HOUSEHOLD GHG EMISSIONS ARE CREATED IN THESE FOUR AREAS

Together we can make a **BIG** difference by making improvements in four areas

IN YOUR HOME

Is your home an energy hog costing you money? Simple changes can save money, increase comfort and reduce your home's GHG impact.

GETTING AROUND

Mix use of bike, walking and transit to save money on gas, reduce your GHG footprint, and live a healthier life!

EATING

Eating a healthy diet rich in fruits and vegetables will improve you and your family's health and reduce your impact on the planet.

BUYING STUFF

When buying new things, consider how long they will last. The things we buy and throwaway carry a big GHG footprint.

In Your Home

In addition to reducing your footprint, investing in energy upgrades can save you money on your energy bill and increase the value of your home. Here's how:

- Reduce energy use through weatherization, insulation, and efficiency upgrades to heating equipment. Seattle City Light and Puget Sound Energy offer home energy audits and rebates to help reduce the upfront cost of many of these items, as well as for new appliances and lighting. Low-interest financing options are also available through local lenders.
- As your appliances and home energy systems need replacing, upgrade to newer, energy saving options.
- When the time comes to purchase or rent, consider how large a home you actually need. You don't want to be stuck heating an extra bedroom and a finished basement you never use.

IN YOUR HOME

UPGRADE YOUR INSULATION

Upgrades to your home energy system such as new insulation will make your home more comfortable, and you'll save money on your energy bill.

	ANNUAL SAVINGS*	
YOU	$170 DOLLARS	2.3 BARRELS
10 OF YOUR FRIENDS	$1,700 DOLLARS	23 BARRELS
10 OF THEIR FRIENDS	$17,000 DOLLARS	230 BARRELS
ALL OF SEATTLE	$104M DOLLARS	1.4M BARRELS

*Based on average energy use and costs in Seattle. Savings assumed that upgrading insulation reduced energy costs by 10%.

What Can We Do?

Getting Around

Emissions from cars and trucks are the largest source of emissions in our region. If you drive solo, these emissions are particularly inefficient. The big choices you make, such as where to live and what kind of car to drive, can either lock in a high- or low-emissions footprint. Here's how:

- When purchasing your next car, make fuel efficiency a top priority.
- Consider your proximity to work, bus lines, entertainment, grocery stores, and other destinations when buying or renting a home.

These decisions are made infrequently, but daily decisions also matter. As the majority of our urban travel is either for commuting to and from work or for short trips to run errands, biking, walking, and taking advantage of transit can significantly reduce emissions. By combining your workout with your errands, you can save money and burn calories.

GETTING AROUND

BIKE OR WALK FOR SHORT TRIPS

40% of our urban travel is two miles or less. Combine your workout with your errands. You'll save money and look great too.

	ANNUAL SAVINGS*		
	DOLLARS	BARRELS	CALORIES
YOU	$116	.6	52,000
10 OF YOUR FRIENDS	$1,160	6.25	520,000
10 OF THEIR FRIENDS	$11,600	62.5	5.2M
ALL OF SEATTLE	$71M	382,562	32.9B

*Based on a person biking and walking four trips a week that were two miles each way (four miles round trip). Savings assumed a 50% biking and walking division.

There are many options for getting around the city in climate-friendly and convenient ways, from busing to bicycling and walking. (Photo: City of Seattle)

Eating

Opportunities to reduce emissions through food choices often coincide with healthier, less expensive options. Here's how:

- Eat less dairy and meat, as these items have particularly high GHG emissions associated with their production. Consider joining the worldwide campaign to go meat free one day each week, and watch your waistline and your carbon footprint shrink.
- Waste less food. Producing food is associated with significant emissions, so better managing your food purchases, so less food spoils and gets tossed, can lead to significant GHG savings.

EATING

GO MEAT FREE ONE DAY A WEEK

Join the world wide campaign Meatless Mondays, and go meat free for an entire day each week and watch the calories and your footprint shrink.

	OIL	
	ANNUAL SAVINGS*	
YOU	.25 BARREL	14,300 CALORIES
10 OF YOUR FRIENDS	2.5 BARRELS	143,000 CALORIES
10 OF THEIR FRIENDS	25 BARRELS	1.4M CALORIES
ALL OF SEATTLE	150,263 BARRELS	8.7B CALORIES

*Based on eating a healthy vegetarian diet for all meals one day a week. Savings calculated by replacing 5.5 ounces of meat with 5.5 cups of vegetables one day a week for 52 weeks.

Buying Stuff

Short-lived stuff—stuff you throw away shortly after buying it—represents throwaway emissions. When making purchases, look for quality and durability. Here's how:

- When buying new items, durability matters. It can be worth spending extra money up front for a high-quality product with a longer life span.
- Consider whether you really need it. Can you borrow it or rent it?
- Purchasing second-hand clothing, recreational equipment, and other goods can reduce the demand for new goods and their associated emissions.

BUYING STUFF

BUY SECOND-HAND CHILDREN'S CLOTHING

Children grow out of clothes so fast. You can reduce your impact and save money by purchasing gently used clothing.

		OIL
	ANNUAL SAVINGS*	
YOU	$300 DOLLARS	.88 BARRELS
10 OF YOUR FRIENDS	$3,000 DOLLARS	9 BARRELS
10 OF THEIR FRIENDS	$30,000 DOLLARS	88 BARRELS
ALL OF SEATTLE	$183.6M DOLLARS	538,648 BARRELS

*Based on purchasing 20 first-hand $30 children's outfits annually. Savings assumed that new clothing has 19kg of CO_2e per outfit and that second-hand clothing is 50% of the cost.

What Can We Do?

Participate

Every day, we are presented with many opportunities to reduce our individual carbon footprints. For our actions to "add up" to big change, however, widespread shifts are required. Through collective action, each of us can participate in and accelerate these shifts. By helping educate our friends and families, participating in local planning meetings and neighborhood groups, and supporting a robust climate policy as described in this plan, Seattle can harness its innovation and ingenuity to combat the consequences of climate change – here and across the globe. To link up with a sustainability group in your neighborhood, visit *http://goscallops.org/*.

Several other resources exist to help consumers make sound purchasing decisions. Among the best are two books by the Union of Concerned Scientists: the classic "Consumer's Guide to Effective Environmental Choices" and "Cooler Smarter," which features an online tool. Learn 20 ways to reduce your emissions by 20% in 20 days at *http://coolersmarter.org/*.

APPENDICES

(Photo: Alicia Daniels Uhlig)

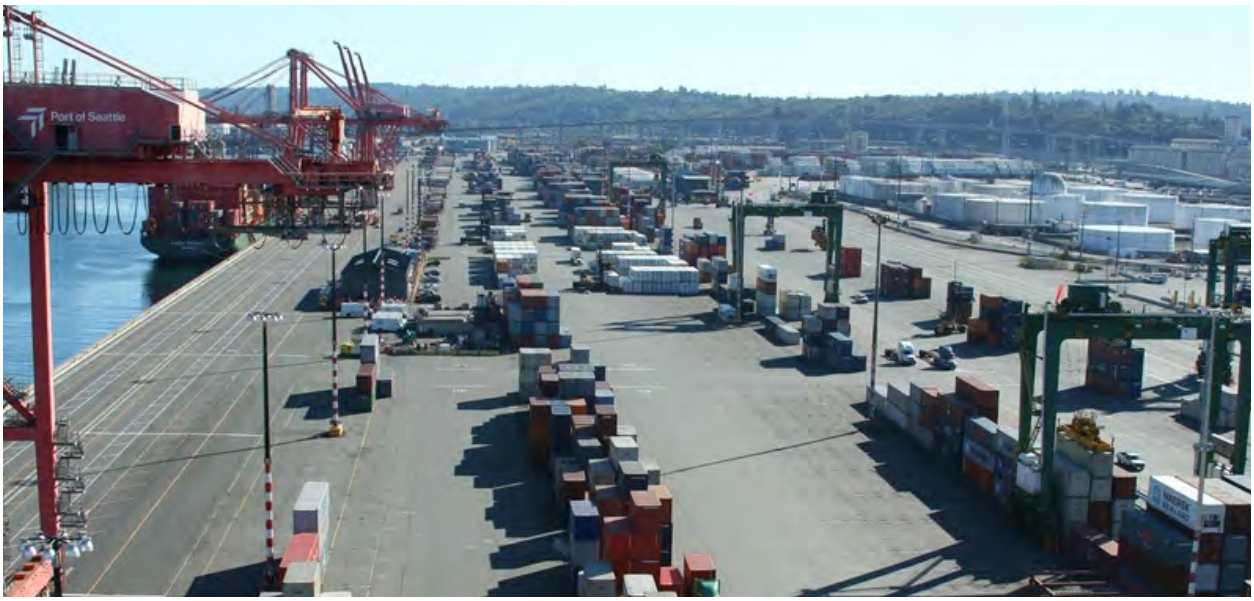
FREIGHT

What is Freight?

Freight includes all goods transported by ship, aircraft, train, van, and truck. Because 40% of jobs in Washington State are tied to trade related activities – and one in four directly tied to imports – and because international trade depends on efficient freight mobility in Seattle, everyone has an interest in freight. The movement of freight reverberates through local community networks and across the international marketplace, and it is difficult to overstate the breadth and depth of freight's reach.

The Washington State Freight Plan identifies three components of Washington's freight system:

- **Global Gateways** includes international and national trade flows through Washington. Washington is a gateway state, primarily connecting Asian trade flows to the United States, Alaska to the lower 48 states, and Canada to the western U.S. Approximately 70% of international goods entering Washington gateways continue on to the larger U.S. market.
- **Made in Washington** includes the regional economies that rely on the freight system. Washington's manufacturers and farmers depend on a robust freight transportation network to ship Washington-made products throughout the nation and worldwide.
- **Delivering Goods to You** includes the retail and wholesale distribution system. The freight distribution system delivers food, clothes, books, spare parts, fuel, and countless other goods.

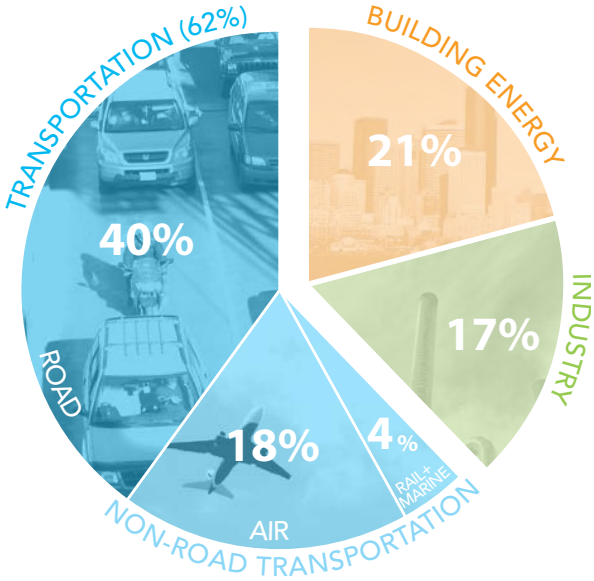


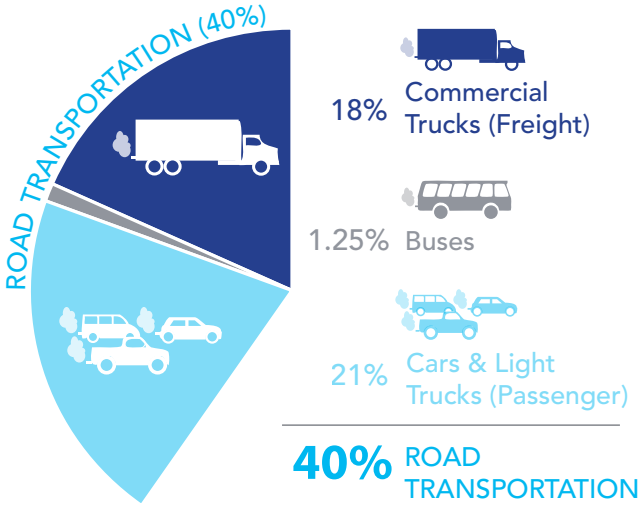
Port of Seattle (Photo: Peter G. Kim)

Why is freight included in Seattle's Climate Action Plan?

While this plan focuses primarily on those emissions sources where local government has the greatest influence – including passenger transportation – freight represents a significant share of Seattle's greenhouse gas (GHG) emissions. Transportation represents the largest source of citywide emissions, 40% of which are from cars and trucks, and nearly half of that comes from heavy- and medium-duty trucks involved in the movement of freight. Reflecting the growth of the region over the last two decades, emissions from heavy- and medium-duty trucks have increased 16% since 1990.

Freight movement is a complex and dynamic system that requires robust local infrastructure to efficiently move goods to their destinations. Freight moves almost exclusively by diesel engines, be it by boat, train, plane, or truck, and these diesel engines release GHG emissions and other air pollutants.





Nearly half of the emissions from road transportation come from heavy- and medium-duty trucks involved in the movement of freight. Freight also contributes to emissions in the air, rail, and marine sectors. (Source: 2008 Seattle Community GHG Inventory)

Freight

From producer to consumer, from long-haul trips on interstates to quick deliveries on local access roads, virtually all commodities are moved by truck at some point. According to the United States Department of Energy (DOE), approximately 69% of all freight tonnage is hauled by heavy-duty trucks, accounting for more than 20% of the fuel consumed in the United States. Supporting all land uses, trucks deliver raw materials to industrial sites, documents and supplies to businesses, stores, and restaurants, and household goods to residents. The more time it takes to deliver these goods, the higher the transportation costs – both fiscally and environmentally. Transportation delays tend to disproportionately increase labor, fuel, and maintenance costs associated with freight movement.

Many in the freight community are poised to support reductions in freight emissions. Thus, Seattle's Climate Action Plan offers recommendations to reduce freight emissions by increasing the efficiency of the roadway, minimizing congestion, decreasing passenger vehicle trips, and supporting programs that promote cleaner trucks. The Plan also recommends developing a comprehensive, multimodal Freight Master Plan, which will engage the freight community in on-going efforts to improve the efficiency and sustainability of freight movement.

What are the strategies to reduce emissions from freight?

Freight is a cost-competitive industry, and lack of upfront capital is often a barrier to truck owners and operators adopting emission-reducing technologies. Small companies and independent contractors are particularly challenged in funding upfront costs for cleaner technologies. While grants and loans can help offset these costs, they are competitive and often require matching funds. Flexible programs, financing mechanisms, and incentives can help truck owners and operators overcome these hurdles. Additionally, though initial costs may be prohibitive, they are usually offset over time as new technologies decrease fuel use.

Many innovative programs aim to reduce freight's environmental footprint through a combination of incentives and regulations. These include:

Northwest Ports Clean Air Strategy
As the sixth busiest U.S. seaport serving 22 international steamship lines and moving 2.1 million 20-foot equivalent unit (TEU) containers each year, the Port of Seattle plays a major role in Seattle's freight community. Committed to reducing freight-related emissions that adversely affect local and regional airsheds, the Ports of Seattle, Tacoma, and Vancouver, B.C., are collaborating under the Northwest Ports Clean Air Strategy. This voluntary collaboration, started in 2007, represents the first and only tri-port and international clean air program. The strategy is a comprehensive air quality program to reduce diesel emissions from heavy- and medium-duty trucks, as well as ocean-going vessels, cargo-handling equipment, trains, and harbor vessels. Program partners also include the U.S. Environmental Protection Agency (EPA), Puget Sound Clean Air Agency (PSCAA), Washington State Department of Ecology), and Environment Canada.

The Northwest Ports Clean Air Strategy established short-term goals focused on the use of cleaner fuels and exhaust controls, and long-term goals focused on fleet upgrades, implementation of new technologies, and supporting national and international regulations. Heavy- and medium-duty trucks achieved the strategy's short-term goals in 2010, when all trucks entering Port container terminals had engines built in 1994 or later (engines built in 1994 or later are 2.5 to 6 times cleaner than engines built before 1994). By the end of 2017, the Port of Seattle will require all trucks to have particulate matter emissions equivalent to a 2007 or newer engine model year. In 2012, the Port of Seattle received $3.8 million in federal Congestion Mitigation and Air Quality Improvement funds to scrap and replace 200 older trucks to comply with 2007 standards.

Puget Sound Clean Air Agency
To incentivize compliance with the Northwest Ports Clean Air Strategy's short- and long-term goals, the PSCAA developed an innovative program called the Seaport Truck Scrappage and Retrofits for Air in Puget Sound (ScRAPS). With funding from the Port of Seattle and Ecology, PSCAA initiated ScRAPS in 2009. Over fifteen months, ScRAPS replaced 280 of the oldest, dirtiest diesel trucks that haul containers to and from major regional ports, and exhaust retrofits were installed on 89 replacement trucks. As a result, the local airshed avoids 5 tons of diesel particulate matter, 80 tons of nitric oxides, and 4 tons of carbon annually. Additionally, PSCAA's Diesel Solutions program works to reduce diesel emissions by retrofitting vehicles with pollution control equipment, encouraging the use of cleaner fuels, and promoting reduced idling.

Port of Seattle Century Agenda
In 2012, the Port of Seattle adopted its Century Agenda to guide sustainable growth. While positioning the Puget Sound as a premier international logistics hub, advancing the region as a leading tourism destination and business gateway, and promoting small business growth and workforce development, the Century Agenda goals aim to ensure the Port of Seattle is the greenest and most energy efficient port in North America. For freight shipped by sea from Asia to major markets in the Midwest and on the East Coast, Seattle already offers the lowest carbon footprint of any other port, making it a Green Gateway for trade. Among its environmental stewardship targets over the next 25 years, the Port of Seattle endeavors to:

- Meet all increased energy needs through conservation and renewable sources.
- Reduce air pollutants and carbon emissions, specifically:
    - o Reduce air pollutant emissions by 50% from 2005 levels.
    - o Reduce carbon emissions from all port operations by 50% compared to 2005 levels, and reduce aircraft-related carbon emissions at Sea-Tac by 25%.
- Anchor Puget Sound urban-industrial land use to prevent sprawl to less developed areas by protecting existing industrial land clustered in Manufacturing and Industrial Centers.

Freight

Federal and State Partnerships

Federal and state agencies partner with the freight community to foster compliance with air quality regulations. In August 2011, EPA and the National Highway Traffic Safety Administration created the Heavy-Duty National Program (HDNP). With broad support from industry and environmental organizations, HDNP adopted complementary fuel efficiency and emissions standards for model year 2014 through 2018 heavy- and medium-duty trucks. Nationwide, the standards are estimated to reduce carbon emissions by approximately 270 million metric tons, save 530 million barrels of oil, and provide $49 billion in net program benefits over the life of these trucks. A second phase of regulations is currently being planned for model years beyond 2018.

In addition, EPA has two innovative efforts to reduce diesel emissions, including:

- **The SmartWay Transport Partnership** helps truckers and railroads adopt technologies that reduce fuel consumption and emissions. SmartWay partnered with local non-profit Cascade Sierra Solutions to make SmartWay Upgrade Kits available to truckers along the I-5 corridor. Kits include a diesel oxidation catalyst, a particulate matter filter, idle reduction devices, and other technologies.
- **The West Coast Collaborative** is a public-private partnership including EPA, equipment manufacturers, fleet owners, state and local governments, and non-profit organizations. The Collaborative leverages federal funds to reduce emissions from the highest polluting engines. With Ecology and privately owned construction companies, the Collaborative recently installed diesel oxidation catalysts on construction equipment and trucks. The project will reduce emissions of fine particulates by 0.65 tons, carbon by 121.4 tons, and hydrocarbon by 29.8 tons annually.

Industry Innovations

Additional innovations are occurring in the heavy- and medium-duty truck industry. DOE's Vehicle Technologies Program initiated a project called the SuperTruck Program in 2010. The five-year program will partner with industry stakeholders to design a heavy-duty truck that demonstrates a 50% improvement in overall freight efficiency through technologies such as improved aerodynamics, reduced engine idling technologies, waste heat recovery, advanced combustion techniques, and powertrain hybridization. Through the program, DOE expects fuel efficiency innovations to save long-haul truckers more than $15,000 per truck per year in fuel costs. According to DOE, all SuperTruck projects are on schedule to meet the 50% freight efficiency goal by 2015.

Non-Road Transportation Emissions

While heavy- and medium-duty trucks are a significant source of freight-related emissions, many in the freight community are also working to address other sources of freight-related emissions, including ocean-going vessels, cargo-handling equipment, trains, and harbor vessels. The Port of Seattle initiated a voluntary public/private partnership working for healthy air and maritime trade. The Puget Sound Maritime Air Forum issued an updated Maritime Air Emissions Inventory in 2012, the most extensive study of its kind completed in the United States and the first to include GHG emissions. Another project to reduce maritime emissions allows Princess Cruises and Holland America Line cruise ships to use electricity to power ships while at berth. Both shore power projects were initiated, funded, and implemented by the cruise lines with the support of the Port, PSCAA, agency partners, EPA, and Seattle City Light. The Port is the first in North America to have the infrastructure to support two ships plugging in simultaneously, and the shore power projects are estimated to reduce annual air emissions equivalent to taking 1,100 cars of the road for a year.

What is the role of the City of Seattle?

While freight is not a central focus of Seattle's Climate Action Plan, the City has an important role in fostering the industry in a way that protects the climate and promotes economic growth. Freight drives much of the region's growth, and the City aims to support the freight community's efforts to ensure growth is sustainable. Reducing congestion and passenger vehicle trips will help freight move more freely through the city, thereby reducing emissions. Additionally, this Plan includes an action for the City to work with the freight community to develop a comprehensive, multimodal Freight Master Plan. The Seattle Freight Master Plan will address citywide freight mobility, including policies, projects, programs, and investment priorities to move goods efficiently. The City will continue to seek opportunities to work with the freight community to achieve goals across the triple bottom line of economic development, environmental stewardship, and social responsibility.

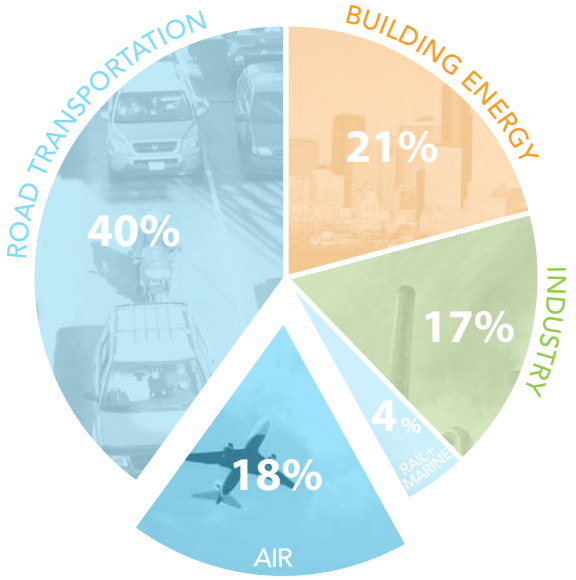
AIR

How does air travel affect the climate?

Air travel is an increasingly essential means of moving people and goods around in the global economy. The Federal Aviation Administration (FAA) predicts that airline passenger travel will double in the next 20 years. With a far-reaching influence on the economy and fueled by diesel engines, air travel is a significant source of greenhouse gas (GHG) emissions, responsible for about 18% of Seattle's emissions.

GHG emissions for flights can be divided into two distinct phases: take off and landing, when fuel consumption is high; and cruising, when consumption is comparatively low. This means that short flights have more GHG emissions per mile traveled than longer flights.

While air freight is a small proportion of overall freight, it produces more emissions per ton than any other mode of freight transport. Some of this is unavoidable. Airplanes are a critical travel mode for highly perishable cargo (i.e., agricultural products) and medical items (i.e., blood, tissue, and organs). Nearly all commercial passenger airline services also carry paid cargo, including fresh seafood, fruits, vegetables, business documents, medical supplies, software, and electronics thereby improving per passenger or per good emissions efficiency.



Air Emissions
(Source: 2008 Seattle Community GHG Inventory)

What are the strategies to reduce emissions from air travel?

Increased Efficiency

The aviation industry has taken a number of steps over the last 30 years to make aircraft engines more fuel efficient, and manufacturers have committed to continued reduction in GHG emissions. However, commercial aircraft typically last for 35-40 years, so efficiency improvements will be slow.

Larger aircraft accommodate more seats and tend to fly farther per departure, which decreases fuel use per passenger. Other efficiency opportunities include:

- Electrifying the airplane's nose wheel so the airplane's engines aren't used for taxying.
- Changing airline timetables, routes, and flight frequencies to keep planes full.
- Limiting the cruise altitude of aircraft to reduce high-altitude contrails, which have a warming effect.
- Using turboprop aircraft for short-range flights. They often burn less fuel than jet engines and fly at lower elevations, where there is less concern about ozone and contrails.

Alternative Fuels

In the Pacific Northwest, stakeholders have been working to make aviation biofuels a cost-effective option. Sustainable Aviation Fuels Northwest (SAFN) was launched in 2010 by Boeing, Alaska Airlines, Port of Seattle, Port of Portland, Spokane International Airport, and Washington State University (WSU). SAFN believes the region can develop a commercially viable aviation biofuels industry. It identified four promising feed stocks: oilseeds, forest residues, municipal solid wastes, and algae. SAFN has advocated for public investment and policy support to help the industry become competitive. The University of Washington (UW) and WSU were recently awarded two separate $40 million grants to use Pacific Northwest woody biomass to expand the biofuels industry into Washington, Oregon, Idaho, western Montana, and northern California. If successful, the UW demonstration project alone will lay the foundation to build five commercial biorefineries and cultivate 400,000 acres of poplars, resulting in 1,500 direct jobs.

Fueling up on biofuel, April 2012
(Photo: The Boeing Company)

Air

Optimizing Air Travel

Reducing unnecessary trips is a key strategy for reducing the impact of air travel on the climate. New communication technologies have the potential to optimize business travel, which is a significant source of air travel emissions. Virtual meeting technology continues to improve, making it easier for businesses to connect with clients and colleagues remotely. A Seattle engineering firm, Ridolfi Inc., included carbon emissions from client trips in the criteria of whether or not to accept a job. Through this and other efforts, the firm reduced annual air mileage by 40% and saved $10,000 in air travel expenses.

Another way to optimize air travel is to implement pricing that better reflects the true cost of air travel by internalizing the cost of GHG emissions. Potential options include a fuel tax, a carbon tax, and passenger facility charges. Beginning in 2012, the European Union (EU) required all flights in and out of Europe to pay for their global-warming emissions. However, airlines and governments in the United States, China, and Italy applied intense pressure on the EU through lawsuits and the threat of trade retaliation. The U.S. Congress passed legislation in late 2012 to shield US airlines from paying the fee. The EU responded by freezing the rule for one year to allow time for international talks on an alternative global plan to address airline emissions.

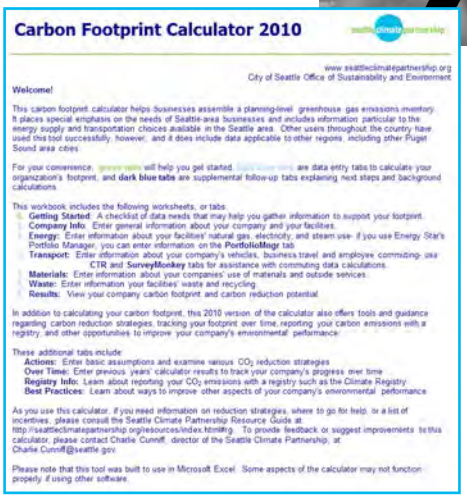
Balancing a Triple Bottom Line at Sea-Tac

While airports have limited control over emissions from air travel, they do have significantly more control over the associated emissions from operating the airport. Seattle-Tacoma International Airport, our region's major airport, is owned and operated by the Port of Seattle. Emission sources controlled by the Port include fleet vehicles, electricity use, and natural gas boilers. In 2009, the DOE awarded Sea-Tac Airport a $5 million grant to jump start the electrification of its fleet of 650 ground support vehicles. Beginning in 2013, Sea-Tac will add electric charging stations for airplane ground support equipment, and replace 200 gas and diesel vehicles with electric vehicles. The project is expected to save more than 400,000 gallons of fuel per year and reduce emissions by more than 4,500 metric tons per year. The Port earned a national Green Fleet award for its environmental practices by using biodiesel and hybrid vehicles, committing to ambitious air quality goals, and instituting aggressive green practices at the Port's maintenance shops. The Port has also contracted with Yellow Cab Company to provide taxi service to and from the airport with a vehicle fleet that uses alternative fuels or achieves a highway rating of at least 45 miles per gallon.

In addition to what is happening on the ground, the FAA and Alaska Airlines are collaborating on the Greener Skies project, which focuses on Required Navigation Performance (RNP). RNP uses satellite-based flight guidance technology to help airplanes descend more efficiently. Using RNP technology and continuous descent, aircraft can descend from cruise altitudes to runways along shorter, more direct flight paths and at lower power. Each year, Greener Skies is estimated to cut fuel consumption by 2.1 million gallons, reduce carbon emissions by 22,000 metric tons (the equivalent of taking 4,100 cars off the road every year), and minimize pollution from overhead air traffic in some communities.

What is the role of the City of Seattle?

Air travel is not a central focus of this Plan. Most of the actions to address aviation's impact on the climate are beyond the reach of any individual city. However, there are actions the City of Seattle can take to protect the climate and promote economic growth by supporting a reduction in GHG emissions from air travel. The City encourages employees to reduce air travel by using technology that makes virtual meetings more effective and affordable. The Office of Economic Development has developed an online tool to help businesses calculate the emissions impact of air travel so they can better manage both emissions and the cost of travel.



Carbon Footprint Calculator 2010

www.seattleclimatepartnership.org
City of Seattle Office of Sustainability and Environment

Welcome!

This carbon footprint calculator helps businesses assemble a planning-level greenhouse gas emissions inventory. It places special emphasis on the needs of Seattle-area businesses and includes information particular to the energy supply and transportation choices available in the Seattle area. Other users throughout the country have used this tool successfully, however, and it does include data applicable to other regions, including other Puget Sound area cities.

For your convenience, green tabs will help you get started. Light blue tabs are data entry tabs to calculate your organization's footprint, and **dark blue tabs** are supplemental follow-up tabs explaining next steps and background calculations.

This workbook includes the following worksheets, or tabs:

- **Getting Started**: A checklist of data needs that may help you gather information to support your footprint.
- **Company Info**: Enter general information about your company and your facilities.
- **Energy**: Enter information about your facilities' natural gas, electricity, and steam use- if you use Energy Star's Portfolio Manager, you can enter information on the **PortfolioMngr** tab.
- **Transport**: Enter information about your company's vehicles, business travel and employee commuting- use **CTR** and **SurveyMonkey** tabs for assistance with commuting data calculations.
- **Materials**: Enter information about your companies' use of materials and outside services.
- **Waste**: Enter information your facilities' waste and recycling.
- **Results**: View your company carbon footprint and carbon reduction potential.

In addition to calculating your carbon footprint, this 2010 version of the calculator also offers tools and guidance regarding carbon reduction strategies, tracking your footprint over time, reporting your carbon emissions with a registry, and other opportunities to improve your company's environmental performance.

These additional tabs include:

- **Actions**: Enter basic assumptions and examine various CO_2 reduction strategies.
- **Over Time**: Enter previous years' calculator results to track your company's progress over time.
- **Registry Info**: Learn about reporting your CO_2 emissions with a registry such as the Climate Registry.
- **Best Practices**: Learn about ways to improve other aspects of your company's environmental performance.

As you use this calculator, if you need information on reduction strategies, where to go for help, or a list of incentives, please consult the Seattle Climate Partnership Resource Guide at http://seattleclimatepartnership.org/resources/index.html#g. To provide feedback or suggest improvements to this calculator, please contact Charlie Cunniff, director of the Seattle Climate Partnership, at Charlie.Cunniff@seattle.gov.

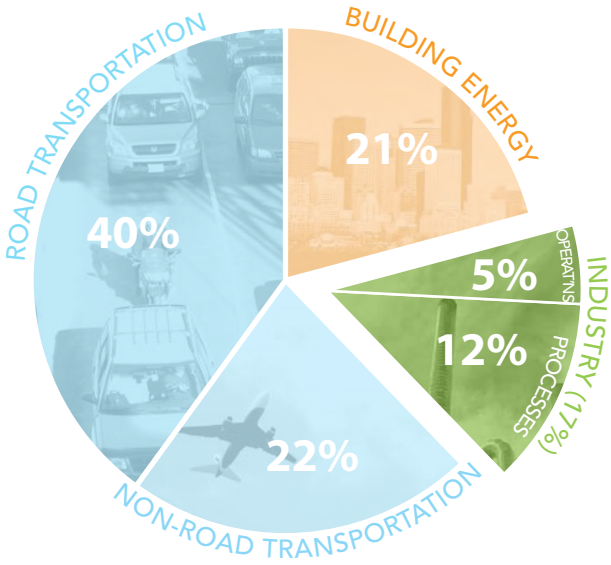
Please note that this tool was built to use in Microsoft Excel. Some aspects of the calculator may not function properly if using other software.

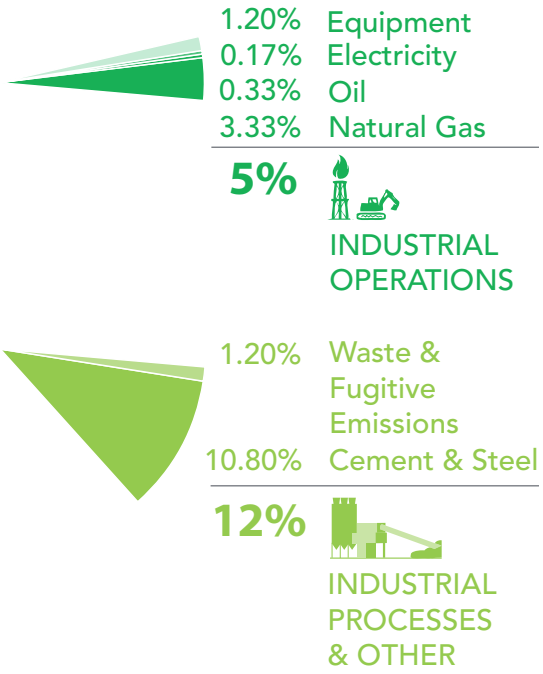
http://www.growseattle.com/green

INDUSTRY

How does Industry affect the climate?

The industrial sector produces the goods (and the raw materials that go into them) that we use every day. The greenhouse gases (GHG) emitted during industrial production are split into two categories: emissions from operations (e.g. machinery, construction equipment, HVAC systems etc) and emissions from production (processes for products such as cement and steel). Industry accounted for about 20% of the total GHG emissions throughout the United States in 2010, roughly the same percentage as industrial emissions in Seattle's 2008 GHG inventory. Seattle's industrial sector includes industrial machinery, fabricated metal, aerospace, stone, clay, glass, and concrete. Cement production, which supplies the entire Puget Sound region, is the most GHG-intensive industry in Seattle, accounting for nearly two-thirds of all industrial emissions in 2008.





Industry emissions and their sources.
(Source: 2008 Seattle Community GHG Inventory)

What are the strategies to reduce emissions from industry?

Industry Innovations

Significant strides have been made in recent years to develop less GHG-intensive cement. For example, many waste by-products from coal burning and steel production do not contribute any carbon into the environment when made into cement-like products. One of the most common waste by-products is fly ash, a fine powder recovered from the gases of burning coal. When mixed with lime and water, fly ash forms a compound with properties similar to cement. Thus, fly ash can be used to replace a portion of cement in concrete. In addition to reducing the amount of energy- and GHG-intensive traditional cement, fly ash provides product quality advantages—the resulting concrete is denser, which results in a tighter, smoother surface.

State-Industry Partnership for Lean Management

Over the past several years, many Washington businesses have partnered with Washington State Department of Ecology and Washington Manufacturing Services to pilot Lean Manufacturing techniques to improve their competitiveness. Lean techniques focus on increasing efficiency and decreasing waste resulting in significant environmental benefits. Aerospace manufacturers, cabinet-builders, hospitals, and shipbuilders are some of the Washington businesses using Lean techniques to lower costs, improve quality, reduce lead times, and integrate environmental practices into their processes.

National Technical Assistance Programs

The United States Environmental Protection Agency (EPA) ENERGY STAR program helps industries implement state of the art energy management programs, learn energy management techniques from a broad network of industrial companies in the partnership, and earn recognition for energy performance achievements. The ENERGY STAR program also offers a tool which scores the energy performance of specific industrial sites against the industry nationally and helps establish production-based energy intensity metrics, set goals, and track performance. Access to this information can help inform strategies to improve efficiency and reduce emissions. Seattle has approximately 100 buildings and plants representing over 32 million square feet that were ENERGY STAR certified. In 2013, Bentall Kennedy, a Seattle-based real estate investment firms, was recognized for its outstanding contribution to reducing GHG emissions as an ENERGY STAR Partner of the Year.

Regulations

EPA is also working to develop common-sense regulatory initiatives to reduce GHG emissions and increase efficiency in the industrial sector. In 2010, EPA set stricter GHG emissions thresholds for new and existing industrial facilities, including for the nation's largest GHG emitters: power plants, refineries, and cement production facilities. In 2012, EPA proposed a rule that would set national limits on the amount of carbon pollution that power plants can emit.

Industry

What is the role of the City of Seattle?

Like freight and air travel, industry is not a central focus of this plan. Many of the actions to address industry's impact on the climate are led by industry organizations or state and national environmental agencies. However, the City has several efforts underway that help reduce industry's GHG emissions while promoting economic growth.

Capital Projects – Fly Ash
The City of Seattle's cement specifications include provisions for substituting fly ash for cement in capital building projects that use concrete. As described above, substitution of fly ash for cement is a sustainable building practice, as it reduces GHG emissions and enhances the performance of concrete. A recent analysis from Seattle Department of Transportation found that by maximizing use of fly ash and other green paving materials, over 2,000 tons of carbon can be reduced each year – equivalent to the carbon dioxide released by 320 passenger cars in one year.

Seattle City Light – Energy Smart Services
Seattle City Light provides financial incentives and technical assistance to industrial customers to help reduce energy use and operating costs through the Energy Smart Services program. The program can subsidize up to 70% of energy efficiency project costs. Seattle City Light recently entered into an energy conservation contract with its largest customer, Nucor Steel. The project will turn Nucor's waste heat from manufacturing processes into energy, resulting in the recovery of 5,000 megawatt-hours of energy—enough to heat 540 Seattle homes for a year.

Seattle Public Utilities – Resource Venture
Seattle Public Utilities' (SPU) Resource Venture program provides outreach, education, and technical assistance to businesses to help them conserve resources, reduce or prevent pollution, and become more sustainable. The program supports SPU's solid waste, water, and stormwater programs, providing general outreach services to all Seattle businesses, as well as customized assistance to large, targeted businesses to achieve resource conservation savings and to eliminate waste. Services are offered in five program areas: recycling; waste prevention; water conservation; stormwater pollution prevention; and green building. In 2007, Resource Venture helped the Port of Seattle expand its recycling programs to include food waste, plant material, untreated wood, oil, gasoline, tires, batteries, fluorescent lamps, scrap metal, paint thinner, and other less common recyclables. Over the last five years, efforts through the program have reduced the amount of garbage generated at the Port by nearly 17%.

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SEATTLE CLIMATE ACTION PLAN