



Climate Action Recommendations for the City of Silverton, Oregon

Winter 2020
Silverton

Deanna Lynn • Yekang Ko, Ph.D.

LA 410/510 Design for Climate Action

Climate Action Recommendations for the City of Silverton, Oregon

Deanna Lynn

Report Writer • Landscape Architecture

Yekang Ko, Ph.D.

Assistant Professor • Landscape Architecture

COLLEGE OF DESIGN

Acknowledgments

The students and report author would like to thank the following individuals for their contributions to this report:

Petra Schuetz, Public Works Director, City of Silverton
Elizabeth Gray, Assistant to City Manager, City of Silverton
Charles Baldwin, Sustainable Silverton
Elyce Hues, Sustainable Silverton
Scott Walker, Sustainable Silverton
Matt McRae, Climate Policy Strategist, Our Children's Trust
Pablo Alvarez, Environmental Justice Community Organizer, Beyond Toxics
Mark Nystrom, Climate Recovery Ordinance Analyst, City of Eugene
Josh Bruce, Director, Oregon Partnership for Disaster Resilience
KJ Lewis, Municipal Relationship Manager, Republic Services
Julie Jackson, Municipal Manager, Republic Services
Annette Mills, Facilitator, Corvallis Sustainability Coalition

This report represents original student work and recommendations prepared by students in the University of Oregon's Sustainable City Year Program for city of Silverton. Text and images contained in this report may not be used without permission from the University of Oregon.

Contents

4	About SCI
4	About SCYP
5	About Silverton, Oregon
6	Course Participants
7	Executive Summary
8	Introduction
9	Land Use and Transportation
16	Buildings and Energy
22	Food and Agriculture
29	Urban Natural Resources
35	Consumption and Waste
41	Adaptation and Community Resilience
42	Conclusion
43	References
46	Appendix A: Implementation Tables

About SCI

The Sustainable Cities Institute (SCI) is an applied think tank focusing on sustainability and cities through applied research, teaching, and community partnerships. We work across disciplines that match the complexity of cities to address sustainability challenges, from regional planning to building design and from enhancing engagement of diverse communities to understanding the impacts on municipal budgets from disruptive technologies and many issues in between.

SCI focuses on sustainability-based research and teaching opportunities through two primary efforts:

1. Our Sustainable City Year Program (SCYP), a massively scaled university-community partnership program that matches the resources of the University with one Oregon community each year to help advance that community's sustainability goals; and

2. Our Urbanism Next Center, which focuses on how autonomous vehicles, e-commerce, and the sharing economy will impact the form and function of cities.

In all cases, we share our expertise and experiences with scholars, policymakers, community leaders, and project partners. We further extend our impact via an annual Expert-in-Residence Program, SCI China visiting scholars program, study abroad course on redesigning cities for people on bicycle, and through our co-leadership of the Educational Partnerships for Innovation in Communities Network (EPIC-N), which is transferring SCYP to universities and communities across the globe. Our work connects student passion, faculty experience, and community needs to produce innovative, tangible solutions for the creation of a sustainable society.

About SCYP

The Sustainable City Year Program (SCYP) is a year-long partnership between SCI and a partner in Oregon, in which students and faculty in courses from across the university collaborate with a public entity on sustainability and livability projects. SCYP faculty and students work in collaboration with staff from the partner agency through a variety of studio projects and service-

learning courses to provide students with real-world projects to investigate. Students bring energy, enthusiasm, and innovative approaches to difficult, persistent problems. SCYP's primary value derives from collaborations that result in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

About Silverton, Oregon

The first settlers came to the banks of Silver Creek, following timber and water power, in the 1800s. Silverton was incorporated in 1885. The young town was a trading and banking center of prominence and ranked among the most progressive towns of western Oregon.

By 1921, Silverton industries were producing exports for other areas and even some foreign countries. The Fischer Flour Mills on South Water Street was among the exporters. Power for the mill was obtained by damming Silver Creek at a point near the present pool, diverting water into a millrace that ran along the creek to the mill and then dumped back into the creek.

The development and opening of the Oregon Garden in the 1990s signify the success of a partnership between the Garden, a private enterprise attracting tourists to botanical displays, and the city of Silverton. The Oregon Garden's

expansive wetlands area has benefited from the City's excess reclaimed water since 2000, while the community benefits from trade the Garden draws to the area. Silverton was recognized for these reuse efforts as a "Community Water Champion" by the National Water Reuse Association in 2018.

Today, approximately 10,380 residents call the city of Silverton home. In addition to the Oregon Garden, the City features a historic downtown, hospital, community pool, and access to nature activities including nearby Silver Falls State Park.

Contributors

MOMOKO ARAI, Anthropology Undergraduate
OPHELIA S. CAVILL, Planning, Public Policy, and Management Undergraduate
MCKENZIE A. DAVIS, Pre-International Studies Undergraduate
CLAIRE A. GILLIES, General Social Sciences Undergraduate
EMI K. HALPERIN, Landscape Architecture Undergraduate
PAIGE M. HARRIS, Landscape Architecture Undergraduate
CHLOE L. KOV, Product Design Undergraduate
MATT E. RAGSDALE, Planning, Public Policy, and Management Undergraduate
COLE A. STAMMER, General Social Sciences Undergraduate
BRENDAN L. WALSH, Environmental Studies Undergraduate
TIMOTHY M. HERRERA, Anthropology Graduate
PAUL T. LORD, Nonprofit Management Graduate
AARON L. WOOLVERTON, Landscape Architecture Graduate
DEANNA LYNN (Student Assistant), Landscape Architecture Graduate
SUBIK K. SHRESTHA (Audit), Architecture Graduate

Executive Summary

This report compiles student work to identify strategies for the city of Silverton to mitigate their climate impact and increase their climate change resiliency. Student recommendations for mitigation and resiliency are grouped based on their topic areas: Land Use and Transportation, Buildings and Energy, Food and Agriculture, Urban Natural Resources, and Consumption and Waste. Each topic area includes specific background information; an action framework with visions, goals, strategies, and actions; a priority strategy for implementation; and a specific design recommendation. Student work on resilience, adaptation and equity is edited into one section: Adaptation and Community Resilience. Students were encouraged to incorporate equity concerns throughout their work. Appendix A includes details about implementation of the strategies for each topic area, including timing, cost, and co-benefits.

The Land Use and Transportation section identifies the top goals for climate change mitigation and resiliency as: decrease single-occupancy vehicle trips, diversify housing types and implement mixed-use zoning, and electrification of city fleet and private vehicles. The priority strategy is to increase use of vanpooling and carpooling. Shifting single-occupancy commuter trips to vanpooling and carpooling can achieve significant reductions in greenhouse gas emissions without a large investment in infrastructure or bus transit. The design recommendations include temporary “tactical urbanism” installations implementing wide multi-modal sidewalks to improve streets for pedestrians and bikes.

The Buildings and Energy section identifies the top goals for climate change mitigation and resiliency as:

increase energy efficiency in existing buildings and reduce community reliance on high-carbon energy from outside sources. Their top priority strategy is to increase energy efficiency within existing buildings in Silverton through outreach and training sessions.

The Food and Agriculture section identifies the top goals for climate change mitigation and resiliency as: support sustainable and local food purchasing, increase awareness of food and climate issues, and improve the local food system with community gardening. The priority strategy is to improve food in schools by serving locally-sourced, low-carbon food. The students’ design recommendation is the design of a community garden near the senior center in Silverton. The garden will have space for community garden plots, a pavilion for community

events, a demonstration garden, and a public food forest.

The Urban Natural Resources section identifies the top goals for climate change mitigation and resiliency as: restore and implement ecological landscapes and protect water resources. The students' priority strategy for implementation is to modify the water utility rate system to encourage water conservation to reduce energy and water use. Their design recommendation is a green infrastructure network of green streets and stormwater filtration interventions.

The Consumption and Waste section identifies the top goals for climate

change mitigation and resiliency as: reduce the amount of consumption, reduce the amount of waste, and increase composting while reducing food waste. Their priority strategy for implementation is to revise the franchise agreement with Republic Services to send waste to the landfill instead of the incinerator, and to collect food waste for composting from businesses. Their design recommendation is to create an annual recycling festival to encourage recycling while building community.

Introduction

Silverton asked the class to provide recommendations that support the creation of a new climate action plan. Silverton's current energy plan is somewhat broad. It lacks specific information on Silverton's priorities and how to implement its goals. Silverton asked students to address both climate mitigation and adaptation.

Students met in person and virtually with city officials and representatives from the community group "Sustainable Silverton" to understand their interests and needs. Throughout the term, students received help and suggestions from those officials and representatives. The class also hosted guest speakers from the city of Eugene and other community action groups

Students were organized into small groups of 2-3 students, each focused

on a topic area determined by the existing energy plan. Throughout the term students worked in these groups to research their topic area; identify Silverton's key needs regarding that topic; and formulate recommendations to mitigate greenhouse gas emissions in that topic area. Students also examined community resiliency, adaptation, and equity.

Land Use and Transportation

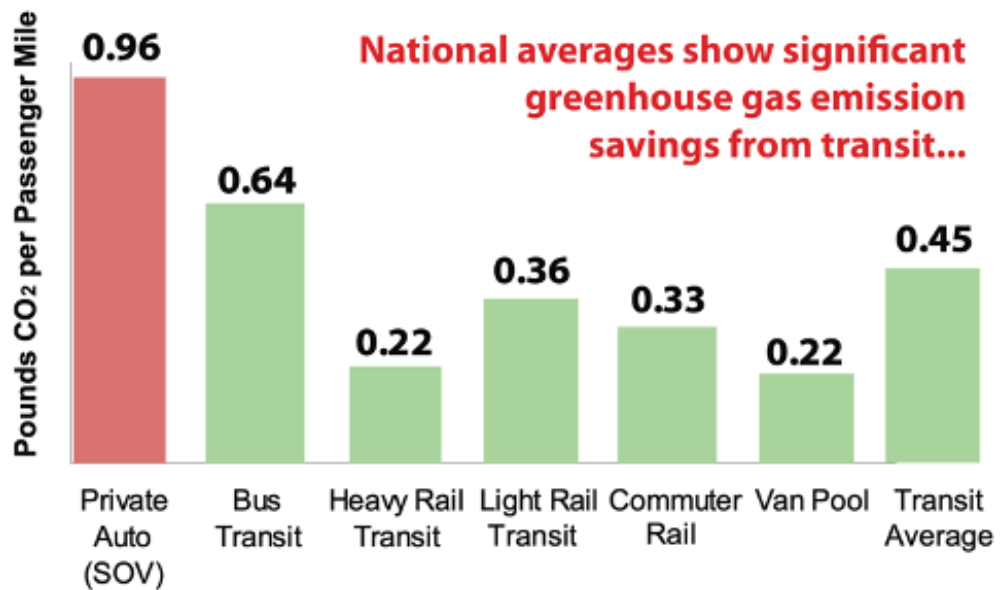
BACKGROUND

Transportation and land use are significant contributors to greenhouse gas emissions. Actions to reduce emissions from transportation and land use have many positive co-benefits for community accessibility and well-being.

In 2017, the transportation sector accounted for 29% of U.S. emissions, the largest contributing sector. Of that 29%, 59% of emissions came from light-duty vehicles such as passenger cars (EPA 2019). The transportation culture in Silverton is largely car-oriented, with 75.4% of Silvertonians driving alone to work, often commuting to Salem (U.S. Census Bureau 2018). This

source of emissions can be significantly mitigated by shifting transportation modes from single-occupancy vehicles to buses or vanpool. Bus transit emits significantly less carbon dioxide than single-occupancy vehicles, and vanpool emits less than half the carbon dioxide of single-occupancy vehicles. Due to the high percentage of Silverton residents who commute alone and the high emissions of single-occupancy vehicle travel, shifting travel modes to less carbon-intensive options such as bus transit, carpool, or vanpool are extremely important for mitigating Silverton's climate impact. Electrifying single-occupancy vehicles will also mitigate greenhouse gas emissions.

FIG. 1
GHG emissions savings from transit use



Transportation should be provided equitably throughout a community. A car-centric built environment is not as equitable as an environment with robust transit and active transportation infrastructure. Many people cannot afford cars. The elderly, minors, and others with physical mobility issues that cannot drive are at a disadvantage when infrastructure for navigating their community without a car is poor. Improving transit and active transportation infrastructure will improve community equity, accessibility, and mobility, while reducing greenhouse gas emissions.

In addition to improving transportation infrastructure, changing land use patterns helps reduce required travel distances. Students recommend revising zoning codes to limit single-family housing and encourage mixed-use development. Supporting increased density through new development will also reduce greenhouse gas emissions by reducing

buildings' energy use. To help Silverton shift their transportation and land use patterns, students recommend tactical urbanism interventions such as painting intersections.

Student recommendations are supported by existing plans and identified community needs. Silverton's Transportation Master Plan (2008) identified infrastructure issues including insufficient sidewalks and minimal or fragmented bicycle facilities. Silverton's Community Survey (2016) highlighted residents' concerns about the lack of pedestrian and bicycle facilities for safety and accessibility reasons. In addition, the Downtown Master Plan (2007) described goals to improve pedestrian facilities as well as develop mixed-use and mixed-density zoning in downtown. One obstacle to addressing these issues is that Silverton's roads are owned by three jurisdictions: Oregon Department of Transportation, Marion County, and the city of Silverton.

ACTION FRAMEWORK

Vision Statement

Silverton is a green city pioneering small city transportation by encouraging active, sustainable transport of people, goods, and services via transit-oriented development.

Goal 1: Decrease single-occupancy vehicle trips through improved transit and active transportation options

Strategy 1: Improve active transportation infrastructure

Transportation accounts for the highest GHG emissions of all sectors. Gas prices will continue to rise as this finite resource diminishes. It is important to begin transitioning to active transportation modes and public transit. Changing transportation attitudes and behaviors takes time. Communities need local government support in taking these steps. Governments can provide safe, comfortable infrastructure for their cities. Current bicycle and pedestrian facilities in Silverton are incomplete outside of the downtown area and should be filled in over the next 10 years.

Actions

- Implement temporary “tactical urbanism” projects to test conversion of road space to pedestrian- or bike-only space.
- Repurpose underutilized space in the downtown area for bike lanes or electric vehicle parking.
- For all future pavement projects, include 12’ multi-modal sidewalks for pedestrian, bike, and micro-vehicle use.

Strategy 2: Increase use of transit and vanpool options

A considerable population of Silvertonians commute to neighboring metropolitan areas for work, causing high GHG output. Changes to daily school and work trips can greatly mitigate climate impacts. Vehicles occupy the same amount of roadway space regardless of their occupancy. Carpooling and vanpooling can greatly reduce climate impact.

Actions

- Encourage Silvertonians to use GetThere App and vanpool/carpool for commutes.
- Improve ease-of-use for Silverton Trolley and promote the service widely.
- Fund an additional bus driver and route.
- Improve bus routes to decrease length of trips for school children.

Goal 2: Diversify housing types and implement mixed-use zoning

Strategy #1: Increase mixed-use zoning parcels

Limiting the amount of commercial and retail land use near or within large single-family zoned areas may put pressure on Silvertonians to drive to these resources. Land use changes that promote mixed-use commercial and retail can limit trips downtown and to commercial centers. Furthermore, including retail and commercial parcels within residential areas can promote walking and biking within a neighborhood. This can help lower GHG emissions and maintain the Urban Growth Boundary’s integrity.

Actions:

- Implement a Mixed-Use Development (MUD) zone surrounding downtown to promote denser development and decrease vehicle trips to commercial and retail resources.
- Incentivize developers with more relaxed zoning restrictions to build mixed-use developments.

Strategy #2: Eliminate single-family zoning

Single-family zoning restricts development of any other housing type, including apartments, courtyard housing, or duplexes. Multifamily housing is more affordable and uses less energy. Silverton could eliminate single-family zoning districts and revise them to include denser, multi-family developments. This does not necessarily mean multi-story apartment buildings; codes can be restricted to

“missing middle” housing such as duplexes, triplexes, and row housing. Permitting non-residential uses in neighborhoods allows small businesses such as corner stores or coffee shops to open, increasing walkability and decreasing trips people need to make out of their neighborhood. State House Bill 2001 requires cities with more than 10,000 people to allow “missing middle housing” such as duplexes and triplexes in all single-family housing zones in an effort to combat the housing crisis. Silverton could revise its zoning to comply with this state bill (Wamsley 2019).

Actions

- Ban single-family zoning. All new development should be zoned to allow housing diversity. This does not have to translate to neighborhood character change and does not necessarily mean large apartment complexes.
- Allow non-residential uses in neighborhoods to permit small businesses. Eliminate other barriers to development such as parking minimums.
- Eliminate zoning code barriers for Accessory Dwelling Units (ADUs).

Goal 3: Electrification of City Fleet and Private Vehicles

Strategy #1: Purchase of Electric Fleet Vehicles

The City could replace public vehicles with electric alternatives. This includes police vehicles (including traffic police) and the public city fleet. Additionally, the City could promote state rebates for electric vehicles (EVs) and offer incentives for residents who purchase new EVs. This strategy could lead to immediate GHG decreases.

Actions

- Apply for the Energy Efficiency and Conservation Block Grant (EECBG) Program to fund electric charging stations and city fleet vehicle purchase.
- Create an incentive program for citizens to buy electric vehicles. This includes offering tax reductions for electric utilities and free or discounted charging at city chargers.

Co-Benefits

Reduction of GHG emissions, clean energy usage, decreased fossil fuel expenditures.

Implementation

This is a capital investment strategy. The lead on this will be the city government finance office, and this is considered a short timing and medium cost strategy.

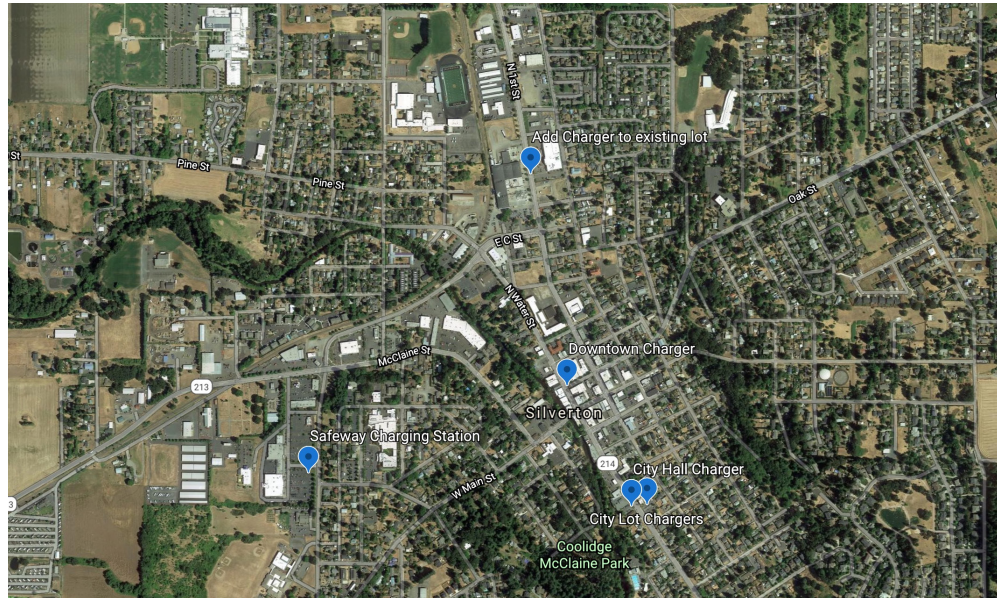
Strategy #2: Build out small charging network in the downtown area

Providing charging infrastructure for EVs in downtown will give residents exclusive park-and-charge opportunities and incentivize increased EV carpooling. Potential impact includes increased diversification of transportation opportunities. There are currently three charging ports in Silverton, one of them being a Tesla Supercharger (only accessible for Tesla-manufactured vehicles).

Actions

- Apply for the Energy Efficiency and Conservation Block Grant (EECBG) Program to fund electric charging stations.
- Contract with Portland General Electric (PGE) to help draft an updated electrical grid to support new chargers. This could also include many charging ports in city parking lots.

FIG. 2
Charging stations
 Proposed additional
 charging station



PRIORITY STRATEGY FOR IMPLEMENTATION

Students' priority strategy is to increase use of vanpooling and carpooling. Silverton is considered a 'Bedroom Community', with many residents living in Silverton but commuting to a nearby metropolitan area for work. Vanpooling and carpooling are especially important to shift commuting traffic to Salem/Woodburn from single-occupancy vehicles. In order to implement this strategy, specific incentives and marketing should be spread to increase enthusiasm. The State of Oregon has seen increased carpooling and vanpooling through an application called Get There. Get There is an ODOT-Sponsored service that individuals can use to coordinate carpools and vanpools. The app also offers contests and prizes to consecutive users. This service should be promoted vastly throughout Silverton. There are incentives for businesses to use the service including tax benefits and subsidies for parking and transportation costs.

SPECIFIC DESIGN RECOMMENDATIONS

Recommendation #1: Tactical Urbanism



FIG. 3

Tactical urbanism project in Fall 2019 installed a low-cost roundabout in Eugene.

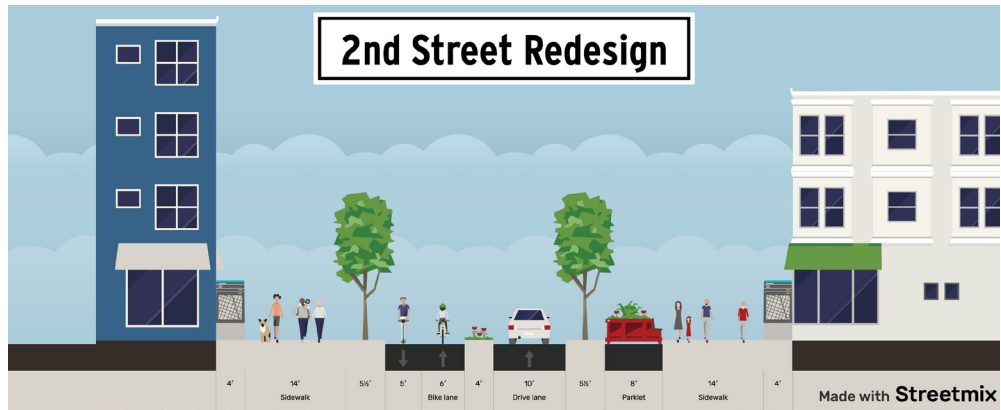
Tactical urbanism is a movement or trend to implement temporary and often playful installations to improve livability in cities. Tactical urbanism projects can provide low-cost, short-term solutions to transportation infrastructure issues. It can gauge feasibility and public reception of new traffic patterns without full implementation. Tactical urbanism can quickly transform a previously unsafe or car-oriented intersection into a navigable space for cyclists and pedestrians. As a result, GHG emissions vehicles could decrease within the project's shorter timeframe rather than the typical 2-5 year capital project timeline. Students suggest implementing a roundabout pilot using

tactical urbanism. These projects can be easily completed with traffic cones, wooden planter boxes, chalk, temporary pavement tape, and other materials, all for a very low price.

Examples of easy-to-implement tactical urbanism projects include roundabouts (made with plastic barriers/bollards or by painting an intersection); protected bike lanes; restriping existing pavement to include bike lanes or crosswalks; visual friction (adding materials in the eyeline of the roadway to encourage driver cautiousness and create a sense of place); and parklets (small parks or gathering areas that repurpose former parking spaces to better serve the community).

Recommendation #2: Reclaiming space for non-motorized vehicles

FIG. 4
Redesign of 2nd street
to reclaim space for
pedestrians and bikes.



Reclaiming space and limiting pavement for cars can incentivize people to walk or bike more frequently. The few bike lanes in Silverton are unprotected three-foot-wide bike lanes. Cyclists typically feel unsafe using these lanes, especially on higher trafficked and higher speed roads. Additionally, fragmented sidewalks are too small for pedestrians and bicyclists to comfortably share space. In Figure 4, sidewalk widths are expanded to

greater than 14' per a recommendation from Scott Walker, who emphasized that many older residents may not be able to use a bike path as often as a wider, safer sidewalk. Wider sidewalks can be used as "multi-use paths", allowing bicyclists and pedestrians to share sidewalk space safely. Expanding sidewalk width and adding protected bike lanes could encourage non-motorized transport and decrease GHG emissions.

Buildings and Energy

BACKGROUND

This section addresses Silverton’s energy sources and building sustainability. Two principle ways to mitigate the GHG emissions associated with energy use and buildings are to shift to carbon-free energy sources and increase energy efficiency.

Silverton receives its electric power from Portland General Electric and its natural gas from Northwest Natural Gas. A large portion of PGE’s energy is sourced from fossil fuels including natural gas. Natural gas has been touted as “green” energy for some time, but methane is a greenhouse gas with a larger climate impact than carbon dioxide. Silverton can reduce reliance on these carbon-intensive sources of energy by increasing solar power and researching other options for electric power. Successful solar initiatives in Pendleton, Oregon offer an exemplary government framework that could be implemented to accelerate a solar transition (Solarize Pendleton).

Residential and commercial buildings are responsible for a combined 39% of the US’s greenhouse gas emissions (EPA 2019). According to a 2013 study, the average household in all types of single-family housing uses roughly twice as much energy as the average household in multi-family housing (Ko 2013). Currently, 80% of Silverton’s housing is single-family detached housing, which is significantly less

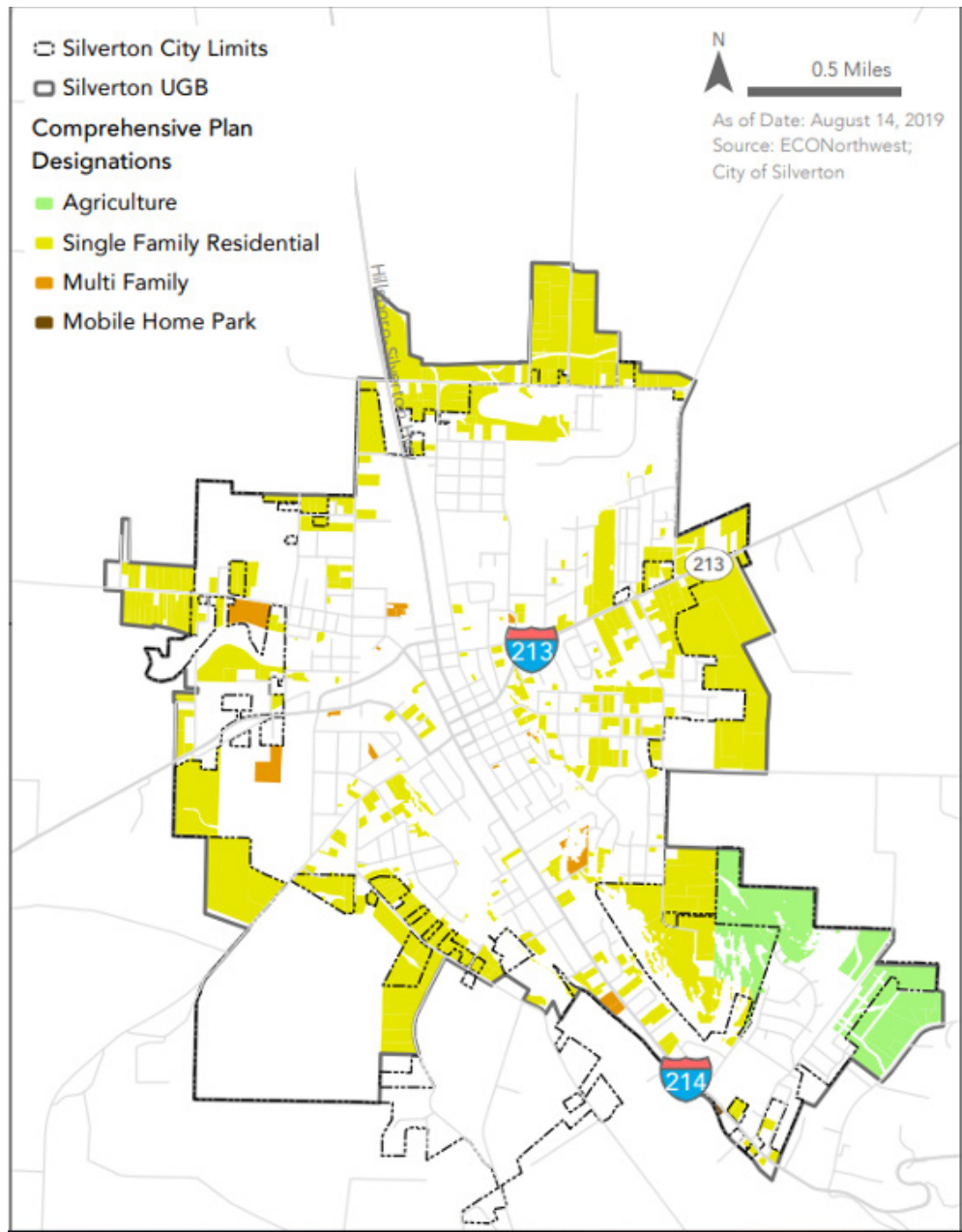
efficient than multi-family or other housing types (ECONorthwest 2020).

65% of planned developments in Silverton are single-family housing projects (ECONorthwest 2020). Silverton could mitigate high potential emissions from these developments by building more multi-family housing, which aligns with predicted demographic changes, and mandating that new housing be energy efficient. Eugene and Corvallis have included in their climate action plans strategies around multi-family housing; Silverton could follow their lead.

While improving Silverton’s planned developments is important to avoid creating more energy inefficient homes, improving the efficiency of existing buildings is essential and can reduce residential energy bills. Seventy-six percent of homes in Silverton were constructed before 1984 and are energy inefficient (Silverton Comprehensive Plan 7-2). Older homes “use 60% more energy per square foot than those built after 2000” (EnergySage 2020). Education and outreach about the economic benefits of increasing home energy efficiency could accelerate the adoption of energy efficiency practices.

Student recommendations aim to delineate practical goals and clear steps needed for successful implementation.

FIG. 5
Single-family housing in
Silverton.
Source: ECONorthwest 2020



ACTION FRAMEWORK

Vision

By 2030, transform Silverton into a community of self-sufficient buildings and energy systems that have net-zero carbon emissions.

Goal 1: Increase energy efficiency in existing buildings

Strategy 1: Households

Significantly reduce energy consumption in residential buildings.

Actions

- Design training modules for homeowners with information such as energy use's environmental impact and cost-benefit analysis of applicable techniques to increase residential energy efficiency.
- Conduct ten active training sessions with Silverton residents, educating participants on the importance of saving energy and helping each resident design an actionable plan to increase their energy efficiency.
- Mandate that all homes built before 1950 undergo a homeowner energy analysis.
- Track utility bills in order to monitor progress.

Strategy 2: Civic

Identify historic buildings in Silverton to be included in grant proposals for energy systems renovations and preservation.

- Assess conditions of historic buildings and apply for grants oriented towards historic building preservation.
- Apply for relevant grants to renovate and preserve the buildings.

Strategy 3: Business

Incentivize local business owners to create and implement energy renovation plans.

Actions

- Design a city program with training modules designed to increase efficiency of current electricity and water use.
- Monitor attendance and installation numbers across Silverton, tracking utility usage after efficient device installation and overall utility savings.

Goal 2: Reduce community reliance on high-carbon energy from outside sources

Goal 2 focuses on energy sources being used, with the hope of making Silverton as self-sufficient as possible. This will allow Silverton to better control its carbon emissions and make energy more affordable for the community.

Strategy 1: Households

- Develop more multi-family housing and “missing middle” housing types instead of single-family housing.
- By the end of 2025, institute a citywide mandate for all new residential constructions to have net-zero energy systems or passive systems.
- Issue a guide for constructing sustainable Accessory Dwelling Units (ADUs). ADUs have potential to use less energy due to their small size.

Strategy 2: Civic

Generate energy from the wastewater treatment plant.

Strategy 3: Civic

Incentivize local business owners to install solar panels as a primary source of energy.

Actions

- Design a city program with training modules modeled on the Solarize Pendleton program in Pendleton, Oregon to help citizens and business owners understand and utilize the program.
- Monitor attendance and installation numbers across Silverton, tracking energy production numbers and overall utility savings from energy produced by solar panels.

PRIORITY STRATEGY FOR IMPLEMENTATION

Our top priority strategy is to increase energy efficiency within existing buildings in Silverton through outreach and training sessions. A series of free-to-attend training and planning sessions could increase community support for energy efficiency and improve active participation in this energy project. Training events for residents will address renovation, upgrades, and improved energy practices in residential areas. These same training and planning modules can be overlapped with sessions for local businesses, which will facilitate similar changes in the commercial areas. Training and planning sessions could also include active planning so that participants are able to construct a feasible plan and budget for upgrading energy systems in their buildings.

At least three different modules should be created targeting various interest groups in Silverton. Potential groups to target could be homeowners, business owners, property managers, and industrial companies. The training sessions topics should cover projected

risks and impacts of climate change, the role of energy production and consumption in contributing to climate change, and demonstrations of how energy efficiency upgrades can be financially beneficial. Next, these modules should support small groups or individuals constructing a renovation plan for their building and illustrate how to include electric vehicle charging stations into their buildings and facilities.

The modules should cover specific information about sealing the building envelope. An airtight building envelope is essential to reducing the energy consumed by its residents. To create more airtight buildings, evaluate potential gaps including door jambs, window jambs, and attic entrances, applying weather stripping or sealant to fill gaps. These kinds of strategies effectively reduce wasted energy from cooling or heating and are affordable for homeowners. After the sessions have been completed, the City could follow up with participants to check in on their progress in renovating their buildings.

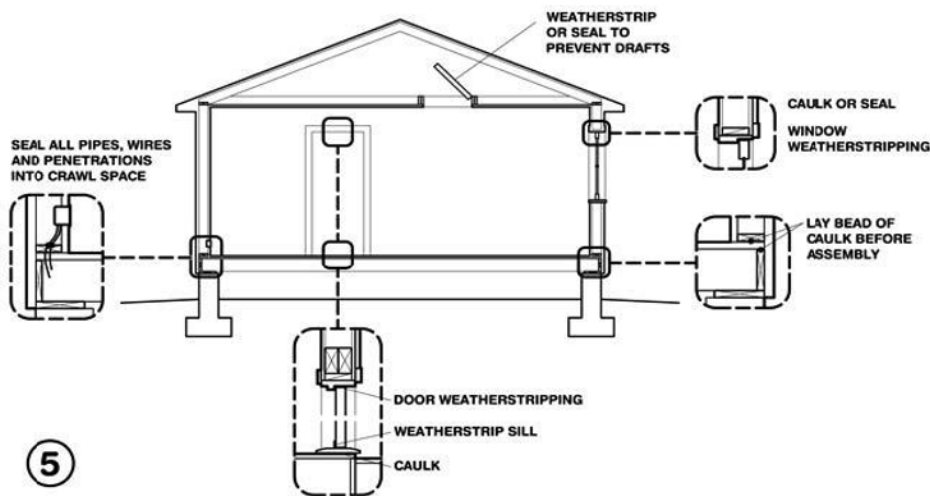


FIG. 6 Example of a building envelope and how to seal it.

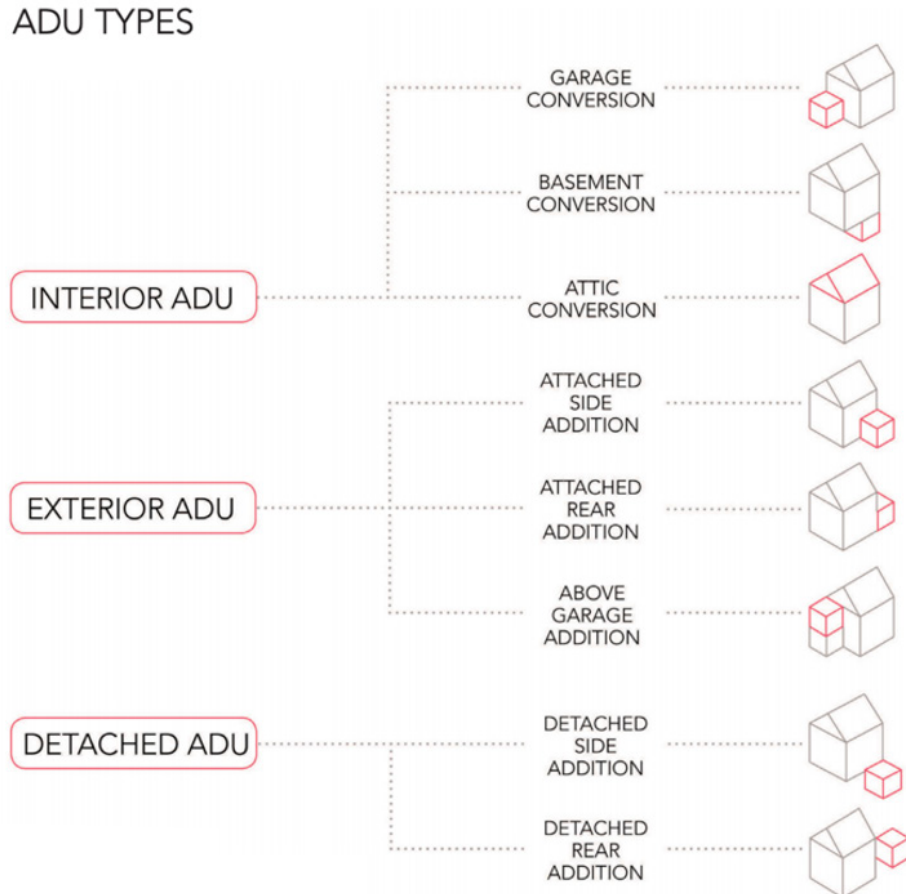
Carefully seal building to minimize infiltration and eliminate drafts, especially in windy sites (house wrap, weather stripping, tight windows)

SPECIFIC DESIGN RECOMMENDATION

Accessory Dwelling Units

One of the biggest objectives for the city of Silverton is to transition to more multi-family housing, which is significantly more efficient for energy consumption and more conducive to the needs of the incoming population. In the short-term, students recommend promoting and implementing Accessory Dwelling Units (ADUs). ADUs involve homeowners building or amending extra space within their property to provide new units for other residents. ADUs offer an opportunity to improve energy efficiency and the accommodation of an increasing population without Silverton compromising its character and charm that drives this growth in the first place (Stagi 2019). ADUs are already being explored as alternative housing practices in other Oregon cities like Eugene and Corvallis, with Portland among the nation’s leaders in ADU implementation (Stagi 2019). ADUs also have additional co-benefits like providing supplemental income for the property owner, providing affordable housing to the community, and being more energy-efficient than larger dwellings.

FIG. 7
Different types of
Accessory Dwelling
Units (created by
Danielle Valdez and
Shelby Stagi).



Food and Agriculture

BACKGROUND

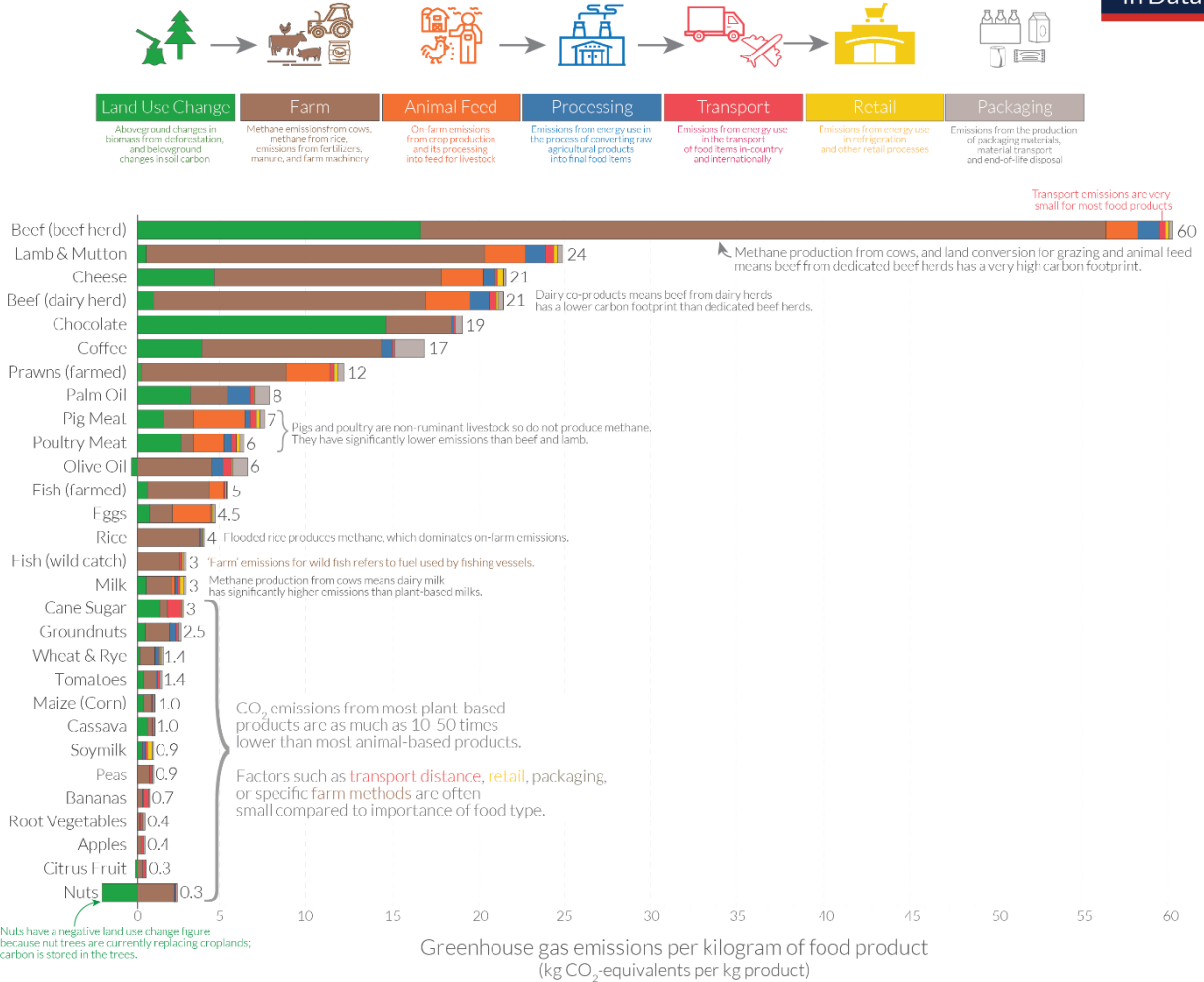
Food and Agriculture includes food production, delivery, and distribution. Food-related emissions come from the way food is grown, how far it is transported, and food waste. Food waste is an enormous contributor to emissions globally (Hawken 2017). Principle ways to decrease food-related emissions for Silverton include shifting consumption to lower-carbon foods, localizing the food system, and expanding community gardening.

Food and agriculture are important to support community resilience in the event that a climate or natural disaster impacts transportation or supply networks. Infrastructure for food distribution should be evaluated for vulnerability to climate or disaster impacts. Community gardens, supermarkets, and food co-ops will need to be evaluated to see if they fall in flood zones, are at risk of a dam breach, or are vulnerable to seismic

activity. Climate change may affect food sourcing and agriculture may need to adapt to changing weather, pests, weeds, and water availability.

The average diet in America is composed of around 57% meat products, which have a very high carbon footprint (Center for Sustainable Systems 2019). Plant-based food is grown using much less energy and has a substantially lower footprint, thus plant-based food is low-carbon food. The production of food makes up about 68% of its footprint, while transportation of the food makes up only about 5% percent (Poore and Nemecek 2013). While eating local food is important for many reasons, it is important to note that how food is produced matters more than where or how far away it is produced. The promotion of low-carbon food at home, restaurants, and school cafeterias can substantially reduce Silverton's GHG emissions.

Food: greenhouse gas emissions across the supply chain



Note: Greenhouse gas emissions are given as global average values based on data across 38,700 commercially viable farms in 119 countries. Data source: Poore and Nemecek (2018). Reducing food's environmental impacts through producers and consumers. *Science*. Images sourced from the Noun Project. OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the author Hannah Ritchie.

FIG. 8
Greenhouse gas emissions of common foods

Food that is grown closer to home produces fewer transportation emissions, saves energy related to storage and refrigeration, and supports local farmers and food processors. Local food distribution networks support low income people and people with restricted mobility. Climate action plans should include strategies around consumption of local low-carbon food and community-based food systems, similar to the city of Portland's climate action plan (City of Portland, 2015).

Regenerative and organic farming practices can reduce food-related

emissions, drawing carbon out of the atmosphere and sequestering it in soil. Regenerative farming practices such as no-till farming, cover crops use, and fertilizing with compost reduce harm to soil life that is critical for soil carbon sequestration. Organic agriculture reduces chemical use including pesticides that also severely harm soil life and pose a risk to human health (Center for Sustainable Systems 2019).

Currently there are not many operating community gardens in Silverton. There are important climate and co-benefits from community

gardens including increased community livability and increased food security for vulnerable community members. The city of Denton's sustainability plan includes strategies to increase their five acres of community gardens to ten acres in five years (Sustainable Denton, 2012). A town in the U.K., Todorden, planted edible food all over the City and saw many

benefits such as increased community well-being, increased income from EcoTourism, and decreased vandalism (Warhurst 2012). Through community gardening and edible landscaping, Silverton could increase visitors to downtown, promote community health and equity, and live up to its name as a "Garden City".

ACTION FRAMEWORK

Vision

The city of Silverton embraces and fulfills its identity as "Oregon's Garden City" by meaningfully connecting and incorporating regional agriculture within the community.

Goal 1: Support sustainable and local food purchasing

Strategy 1: Reform quality and sustainability of school food in the Silver Falls School District

Eugene found that they could not improve school food quality and sourcing while on contract with Sodexo because they were not flexible or open to changes. Transitioning school cafeterias to self-operation will facilitate changing the food served.

Actions

- Ensure free meals for every child.
- Switch to using milk dispensers & reusable utensils at every school to reduce waste.
- Serve low-carbon food options in school district cafeterias.
- Purchase a majority of school food from local producers.
- Participate in the Oregon Farm to School Grant program.
- Cancel the food service contract with Sodexo.

Strategy 2: City government support to local food systems

Actions

- Subsidize the purchase of the permanent location for the food co-op. Providing support through community-supported agriculture programs (CSAs) or a co-op to farmers who utilize organic and regenerative practices can reduce Silverton's food-related emissions. Silverton has an active group of local CSA growers who sponsor a weekly farmers' market. This group is working with other local organizations to establish a permanent co-op grocery in Silverton. Providing support to the local food co-op will make it easier for regional farmers to connect with local institutional food buyers such as the school district, the hospital, restaurants, and grocery stores.

Goal 2: Increase Awareness of Food and Climate Issues

Strategy 1: Perform outreach and provide education to community

Actions

- Make bulletins and pamphlets explaining how GHG emissions are associated with food production and post them at schools, city hall, the farmers' market, and Silverton's social media accounts.
- Conduct community education programs and workshops at community gardens.
- Run food- and climate-oriented education projects at all schools by cooperating with The Oregon Garden.

Goal 3: Improve the Local Food System with Community Gardening

Strategy 1: Develop a public community garden

Actions

- Community members maintain individual garden plots and harvest self-grown food.
- Host sustainable gardening events and workshops by partnering with The Oregon Garden.
- Allow classroom access to teach youth about the importance of eating local.
- Provide demonstration gardens to help address local food insecurity.

Strategy 2: Plant a public food forest

The public food forest can be implemented with the proposed community garden. This space could be surrounded with a large fence to restrict animals but remain unlocked to allow citizens to visit at any time. Having the food forest open for public access could help address local food insecurity by providing healthy and locally grown food to the community.

Actions

- Community volunteers plant edible trees and shrubs.
- Provide educational signage for each plant with food description and proper harvesting times. Each plant and shrub could have a sign explaining what the tree or shrub is, when the harvesting time is, what the food tastes like, and other useful information. This signage could help users avoid allergens and help users understand which foods are edible.
- Public access to food will help address local food insecurity. During various harvest seasons, a harvesting event could occur where community members harvest and donate any leftover food to the local food bank. These donations can support individuals who cannot afford a meal and promote the value that everyone deserves access to healthy and locally grown food.
- Use Beacon Food Forest as precedent to measure success. The Beacon Food Forest in Seattle, Washington is a prime example of what a food forest can look like and can be implemented in its own way within Silverton. A food forest like Beacon could be a valuable and successful asset in Silverton if correctly implemented.

PRIORITY STRATEGY FOR IMPLEMENTATION

Our goal is to increase local food purchasing by implementing policies that addresses school food in the Silver Falls School District. The school district serves about 3,900 students. Improving the district's nutrition program and food supply is an opportunity to make a structural impact in the community. Improving school food can educate students about carbon emissions from food and help convince the community to change eating habits. Student recommendations will help reduce food's climate impact while serving healthier food to kids.

First, school meals should be free for all students. Serving free food for every child promotes an equitable future that prevents malnutrition and hunger. Being hungry has been proven to reduce concentration, lower test score outcomes, and increase negative behavior in children. The Strategic Vision of the Silver Falls School District mentions a discussion to make school meals free for all students at all schools. Companies like Google have had success changing their employee eating habits by serving food for free, limiting the amount of meat served, and serving low-carbon foods (Black, 2020).

Switching to milk dispensers & reusable utensils at every school could help reduce waste. Dairy production is a large source of GHG emissions. Based on observational studies of cafeterias, milk dispensers have helped reduce waste since people usually do not pour more than they intend to drink.

Allowing food carts at the high school could be an opportunity to promote local business and reduce emissions from car travel during lunch time. Food carts on school grounds could improve access for students who do not have cars.

Silverton could purchase a majority of school food from local producers. Shift the type of food served at schools to low-carbon food including vegetarian options. A vegetarian diet greatly reduces an individual's carbon footprint and switching to less carbon intensive meats can have a major impact as well. Focus groups have suggested that the Silver Falls School District should have more farm-to-table practices, especially because of the rich agricultural area the district resides in (Silver Falls School District, 2018). Food grown closer to home produces fewer transportation emissions, saves energy used for storage and refrigeration, and supports local farmers. Farms of all types drive Silverton's economy because of agricultural exports; these farms could also serve as a primary food source for much of the Silverton community.

Silverton should cancel the food service contract with Sodexo and consult with the Kid Food Matters parent group in Eugene. They found that they could not improve school food quality and sourcing while on contract with Sodexo because Sodexo was not flexible or open to changes. They faced significant resistance to phasing out unhealthy food and shifting to more local food sourcing. To solve this issue, Kid Food Matters helped transition the Eugene 4J School District from a Sodexo food contract to a self-operated school district food system. Beginning July 1, 2019, 4J Nutrition Services assumed all management of student meal service after more than 20 years of contracting with a food services management company. Eugene schools now serve many items that come from Oregon farms and two of their schools receive grant funding to serve free fresh fruits and vegetables as snacks. The Kid Food Matters parent group plans on expanding their consultation

work to help other school districts in Oregon transition to self-operation and connect with grants and other funding sources. Silver Falls School District could consult with Kid Food Matters to reform their school food.

Utilize external funding sources to ease the transition costs to self-operation. Sodexo owns all school kitchen equipment, so the largest transition cost will be replacing existing kitchen equipment. A major

way to support local food purchasing is to participate in the Oregon Farm to School Grant Program that was expanded by HB 2579. This food procurement grant is non-competitive and based on the number of meals served. These grant funds can only be used for products produced (grown, raised, or caught) or processed in Oregon, and for meals served as part of USDA's child nutrition programs.

SPECIFIC DESIGN RECOMMENDATION

The community garden could be a space for Silverton residents to learn and practice sustainable gardening techniques. Our design includes garden plots for community members, which will be available to rent for each season at an affordable price. The space will have a pavilion or building to host community events, educational workshops, and a periodic location for the Silverton Farmer’s Market. We also envision a demonstration garden and public food forest on site.

The proposed location for the Community Garden is on public land behind the Silverton Senior Center. Expanding the existing elements and

incorporating a community garden and food forest will allow community members to easily access the Senior Center and harvest food in one central location.

To prevent food and gardening tool theft, the reserved plots will be boarded with a fence that will remain locked at unsupervised times. The fence should be tall and surrounded with native plants that can help deter animals from damaging any plants. The demonstration garden will also have a fence but will remain unlocked to allow public food harvesting. A community garden host could provide general garden maintenance and share gardening knowledge with community garden members.



- 1 - Silverton Senior Center
- 2 - Skate Park
- 3 - Robert Frost School
- 4 - Dog Park
- 5 - Extend Pavement for Access
- 6 - Additional Parking Lot
- 7 - Demo Gardens
- 8 - Community Garden Plots
- 9 - Community Center / Tool Shed
- 10 - Public Food Forest

FIG. 9
Plan for new community garden

Urban Natural Resources

BACKGROUND

Urban natural resources such as parks, trees, and green infrastructure are important for social well-being, ecological health, and civic stewardship (Campbell and Wiesen, 2009).

Additionally, these elements provide resilience to climate change through drawing down carbon, establishing biodiversity, and regulating the local climate (Vargas-Hernández et al., 2018). Fortunately, the city of Silverton has an ecologically-oriented agenda maintaining healthy ecosystems in its master planning documents.

Oregon's snowpack is projected to decline 60% by 2040, which will result in higher peak stream flows earlier in the year and longer drought seasons. Some climate models show a slight increase in precipitation, especially in singular storm events, which could lead to flooding in Silverton (Doppelt, 2009). The damage and extent of the flooding can be reduced by taking action now to maintain riparian vegetation and improve stormwater facilities to reduce erosion and contain increased peak flows. As climate change shifts seasonal wind systems, Silverton will experience longer summer periods without rainfall and drought will be more common. Improving Silverton's overall water

conservation will improve drought resilience (University of Oregon, 2017).

To understand potential GHG mitigation through urban natural resources, we should consider actions and methods other cities have considered for their climate action plans. Portland's Climate Action Plan (2015) prioritizes the health and maintenance of street trees, focuses on ameliorating the Urban Heat Island effect in vulnerable neighborhoods, and adopts a "tree code" to regulate selection of low-maintenance, climate-appropriate trees. The city of Corvallis' Climate Action Plan calls for improved stormwater facilities, pipe daylighting, and stream restoration to reduce the potential for flooding, landslides and destabilizing grounds (City of Corvallis, 2016).

We have identified landscape maintenance, carbon sequestration, urban form, stormwater management, and access to recreation as key climate actions areas for Silverton. In Parks and Recreation documents, Silverton has highlighted existing parks and greenways like Silver Creek as areas to improve ecological function while improving community resilience to changing climatic conditions and uncertainties.

ACTION FRAMEWORK

Vision

We envision a Silverton that has successfully provided access to natural resources while reducing GHG emissions through the mindful management of healthy urban forests systems, ecologies, and green infrastructures.

Goal 1: Restore and Implement Ecological Landscapes

Strategy 1: Utilize the urban forest for climate resiliency and mitigation

Work with the Parks and Recreation Department to evaluate and monitor street trees and vegetation as well as modify species selections as appropriate to address climate change. This includes planting adaptable natives that provide shade.

Revitalizing the urban forest requires establishing relationships with existing management organizations, incentivizing low maintenance landscaping policies, and strengthening ecological resources. Ideally, a healthy urban forest will reduce risks and impacts from heat, drought, and wildfire by preparing for hotter, drier summers with increased incidence of extreme heat days. Over time, the goal is to reduce these stressors while sequestering carbon.

Urban forests can sequester significant amounts of carbon in their biomass, but emissions related to maintenance and disposal of urban trees can cancel out that benefit (Nowak et al., 2002). Lower maintenance landscapes and reuse of wood from urban trees for furniture or biochar can reduce these emissions so that the urban forest is net sequestering carbon (Mcpherson 1999; Dirrenberger et al., 2014).

Actions

- Work with local agencies or universities to evaluate where the urban heat island effect may be affecting vulnerable populations. Analyze where in the City gaps in urban forest canopy coverage overlap with impervious surfaces.
- Create a program to plant trees in those areas that are disproportionately affected by the urban heat island effect.
- Develop new standards for street trees that are more adaptable to Oregon's changing climate. Implement these standards into Silverton's Street Tree permit process.
- Include guidance in the street tree standards around planting more native trees, which perform important ecological functions to support pollinators, birds, and other species.

Strategy 2: Climate-smart landscaping

Create landscaping policies for facilities and residents that consider options for using native vegetation, fire-wise and water-wise landscaping, rain gardens, and electric maintenance tools. Develop a community-led standard and certification process to incentivize the use of native vegetation and water-wise landscaping.

Actions

- Create a purchasing policy specifying electric lawn mowers, chainsaws, leaf blowers, and weed eaters to decrease emissions from gas-powered equipment. The United States emits approximately 26.7 million tons of greenhouse gasses annually through the use of gas-powered lawn equipment. This accounts for 24% to 45% of all off-road gasoline emissions (EPA, 2011-18).
- Encourage planting trees on the west and east sides of houses for energy savings due to shade.
- Incentivize residents to plant rain gardens and micro-wetlands to reduce stormwater runoff and recharge natural water systems.
- Prohibit the use of glyphosate pesticides, and discourage use of other hazardous landscape maintenance chemicals such as pesticides, herbicides, and fungicides. These decimate soil life, undermine carbon sequestration, and pose a threat to human health.
- Encourage low-maintenance landscapes with native and perennial plants that do not require mowing or pruning. Decrease use of hedges that need pruning

and lawn that needs mowing. Maintenance of vegetation types such as lawns releases significant amounts of carbon emissions (Livesley et al. 2010).

- Protect soil health and support carbon sequestration by establishing continuous cover of a diversity of plants in landscapes (Livesley et al. 2010). Healthy soil covered by a diversity of plants also holds on to water and better filters pollution.

Strategy 3: Establish a robust green infrastructure network

Work with local environmental groups, Silverton Parks and Recreation, and the Pudding River Watershed Council to create networks of large and small natural areas with diverse habitats that will buffer the City against increasing heat and floods.

Actions

- Work with local environmental groups and agencies to assess current ecological health of natural areas and develop a plan for conserving these resources.
- Provide adequate recreation facilities to support and accommodate recreation needs. Work with schools to provide joint use of sports facilities.
- Silver Creek Greenway and hillside should be restored as a greenway link for wildlife habitat, beginning with the removal of invasive vegetation and replanting native plants.
- Work with the Pudding River Watershed Council and Parks and Recreation to maintain the health of the Silver Creek Reservoir.
- Develop a plan with The Oregon Garden to maintain the health of Pettit Reservoir.

Goal 2: Protect Water Resources

Promote use of stormwater management to filter urban runoff and accommodate increased peak storm flows. Utilize green infrastructure for additional ecosystem services and buffering against climate effects such as drought and flood. The management of water resources is incredibly important for the livelihood and functioning of our local ecosystems.

Strategy 1

Improve stormwater management resources in key areas to better handle peak flow situations and reduce runoff pollution.

Actions

- Incorporate public stormwater facilities that infiltrate, store, and slow peak stormwater flows at major intersections of stormwater flows.
- Modify existing vegetated medians to accommodate peak stormwater flows.
- Install rain gardens or stormwater facilities to filter stormwater from large parking lots. The stormwater catch basin at the community center should be emulated in other areas such as the swimming pool parking lot.

Strategy 2

Create healthy wetlands, streams, and drainageways throughout Silverton by working with community-led organizations and the Pudding River Watershed Council.

Actions

- Establish habitat restoration plans for the Silver Creek Greenway.
- Stabilize and restore riparian zones streamside slopes throughout the watershed in preparation of greater stormwater events. Restoring native riparian vegetation will help stabilize slopes and buffer buildings from flooding.
- Identify underground streams that could be daylight to better provide ecosystem services (Livesley et al., 2010).
- Modify existing city codes to require designers and contractors to plan all new buildings with green infrastructure.

Strategy 4

Modify the water utility rate system to better serve the community and encourage water conservation. Energy use by drinking water and wastewater facilities accounts for approximately three percent of the United States' energy consumption, which equates to the energy used by 10 million cars annually (EPA).

Actions

- Determine desirable monthly utility costs for residents.
- Eliminate or greatly reduce the base charge and increase use charge to an appropriate level.
- Garner community input to determine new rate changes. This input could take the form of committee of volunteers, an online survey, or door-to-door polling.

PRIORITY STRATEGY FOR IMPLEMENTATION

Our priority strategy for implementation is a new water rate system. Silverton could reach out to its residents for input on the new water rate system. Residents could be notified of an opportunity to give input on a new water rate structure. Various strategies to obtain usable community feedback could be considered. Forming a committee of community members who accurately represent the demographics of Silverton is ideal.

Alternatives include a simple survey distributed via email. A low cost method like sending the survey with residents' water bills could increase response rate. Regardless of methods, the current water utility system and the proposed alternatives must be clearly and concisely explained to residents. Providing a small incentive could increase response rates in survey

or door-to-door methods. A simple deduction from the next water bill is an obvious incentive.

The Finance Department will meet with the city council to determine if community response is accurately representative before moving ahead with new water rate designs. Requiring the survey to have a minimum response rate for all neighborhoods could be a baseline for survey effectiveness. After implementing the new system, the Finance Department and city council must examine trends in resident bills and water use to determine the new system's effectiveness. A check 1, 3, 6, and 12 months after implementation will allow for accurate information assessment and informed decision making in the future. Consider questions like: Do residents' bills better represent their water usage? Has there been a net increase or decrease in water usage? How have high- and low-

income communities been affected? Allowing for the community’s continued feedback on the new system in the form of further surveys or polling is advisable.

**SPECIFIC DESIGN
RECOMMENDATION: GREEN
INFRASTRUCTURE NETWORK**

We developed a series of maps to guide development of a green infrastructure network highlighting prime areas for adaptive measures like stormwater facilities, street tree planting, and potential urban wetlands. Analysis of Silverton’s existing stormwater infrastructure reveals potential problem areas with effects of climate change on water flows. Figure 10 shows existing park locations, drain routes for piped

stormwater, priority streets for green infrastructure, and potential flood spots. Priority assets are important green spaces to preserve and restore. Figure 11 shows a proposed green infrastructure network including existing forest, potential wetlands, potential green streets, and potential urban bioretention gardens. These proposed facilities are strategically placed to remedy problem areas identified in Figure 10. Students intend for these green streets to incorporate stormwater facilities, increased shrub vegetation, and native street tree planting. Altogether, this green infrastructure network should reduce Urban Heat Island effect, stormwater loads on Silver Creek, and provide more aesthetic beauty throughout the City.

FIG. 10
Map of Silverton’s Parks
and Water Resources

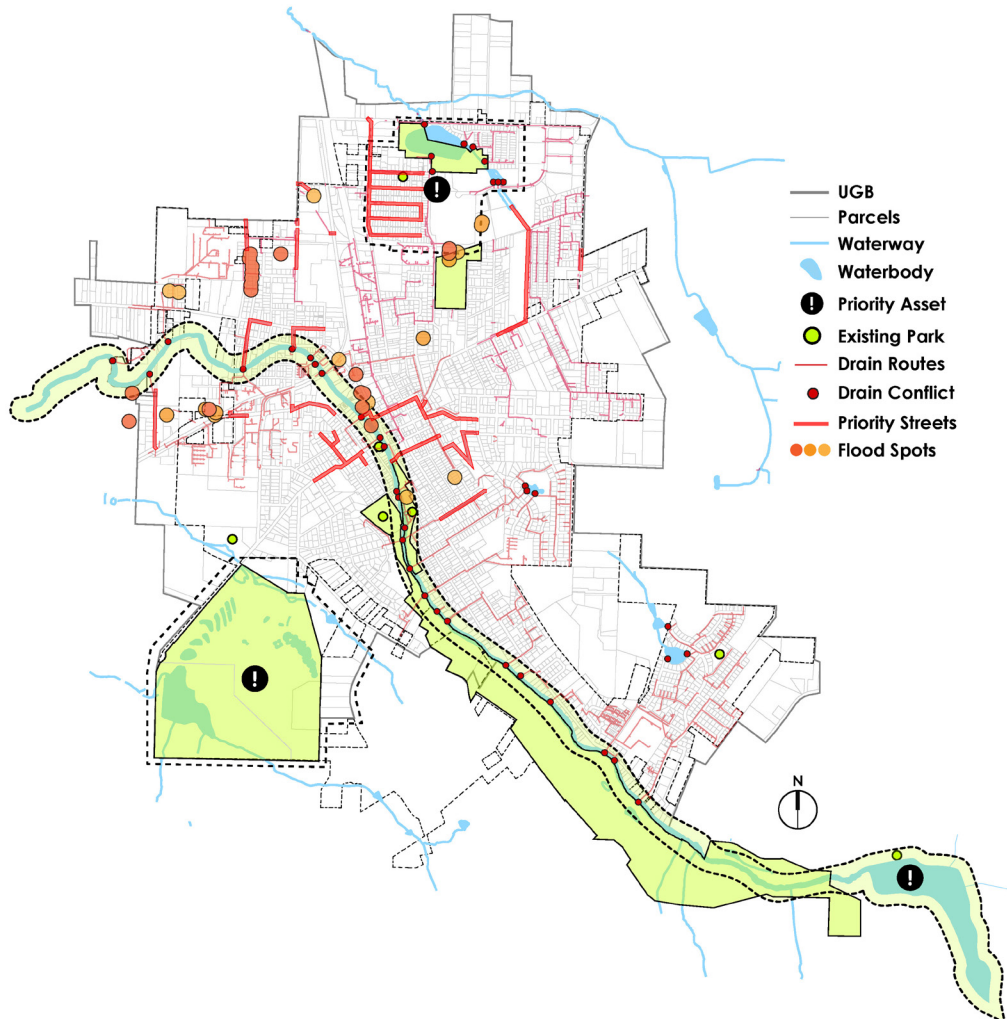




FIG. 11
Map of Proposed green infrastructure network

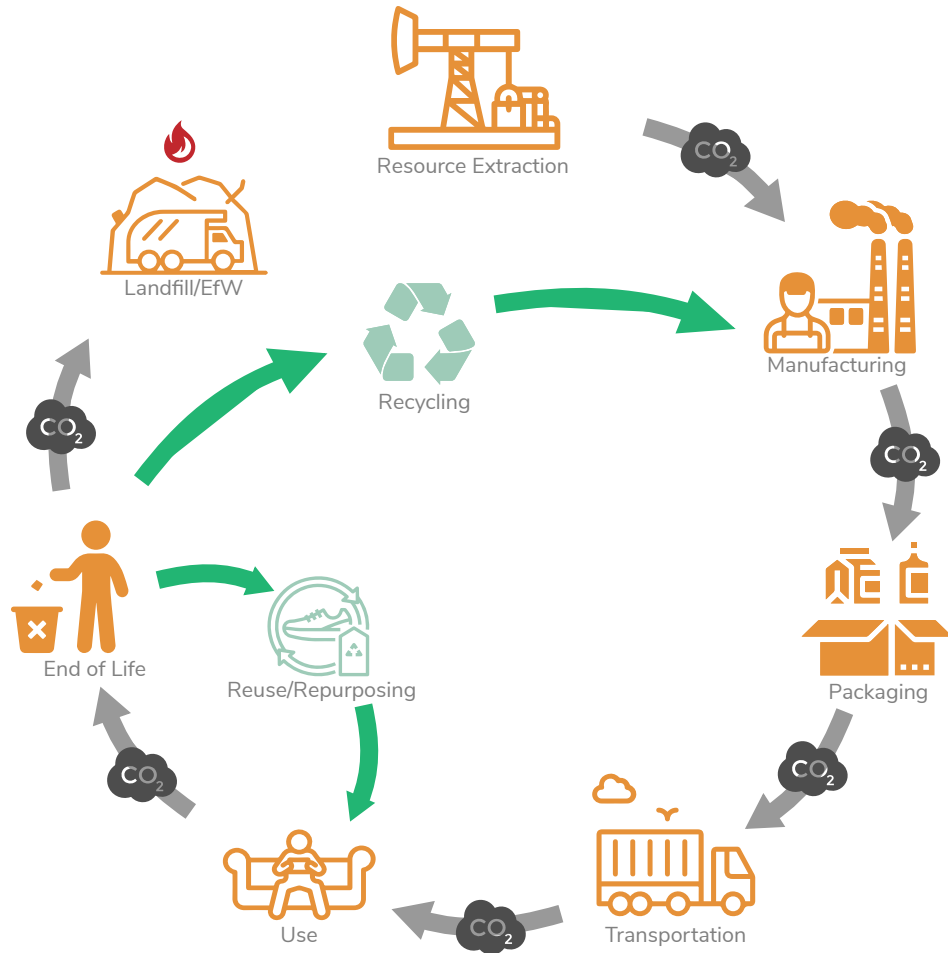
Consumption and Waste

BACKGROUND

Silverton contracts with Republic Services for collection of waste, residential composting, and recycling. The recyclable material is sent to Pioneer Recycling Services in Clackamas for processing. They send wet waste and household hazardous waste to a materials recovery facility in Woodburn. Food waste and yard debris is sent to Pacific Region Compost Facility for composting. Material in the garbage is sent to Covanta, an incinerator, or energy-from-waste facility.

FIG. 12

Life cycle of consumer products.
Every step of a product's journey generates carbon emissions. Recycling or reusing saves emissions, bypassing the emissions that would be released from consuming a new product.)



Silverton's largest waste producers are the hospital, the school district, and Bruce Pac, which is a local meat packer. In 2018 Silverton produced 10,223 tons of waste. Over half of that waste came from industrial sources such as Bruce Pac, with residential and commercial sectors accounting for the remaining amount (D. Lynn, 2020).

2018 Waste Produced in Silverton

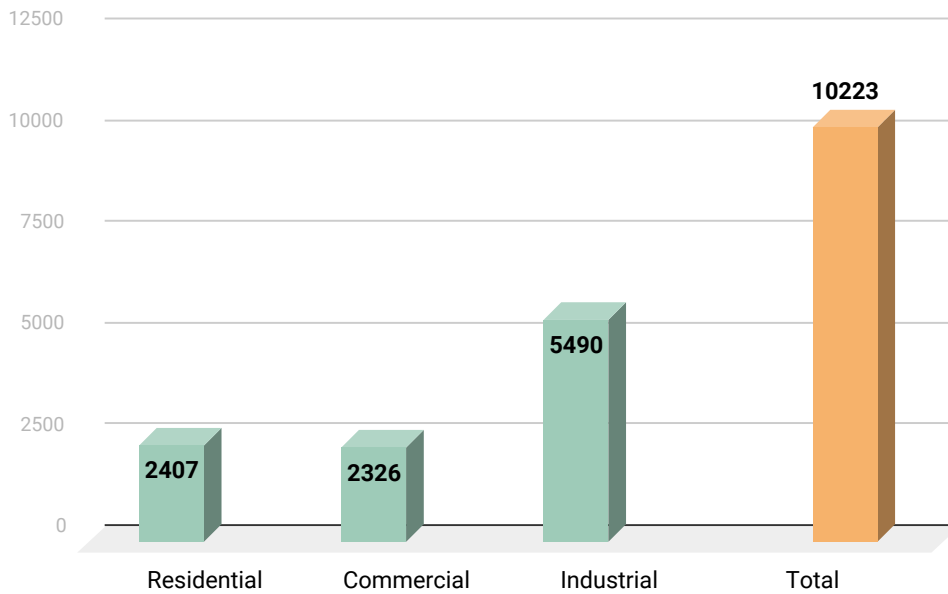


FIG. 13
Waste produced in Silverton

Waste incinerators such as Covanta produce far more CO₂ emissions than a landfill (Cascadia Partners, 2019). Furthermore, the incinerator poses an environmental justice problem. Communities within 7 miles of the Covanta facility “rank in the 88th percentile for cancer and respiratory risks” and there are many minority and low-income communities in that area (Gaia, 2019).

The city of Eugene found that consumption is responsible for more greenhouse gas emissions than transportation or building energy use. Those emissions are mostly derived from food, construction materials, and electronics. These emissions can be reduced by reducing consumption of non-essential consumer goods and single-use packaging (City of Eugene, 2019).

Silverton has some existing community outreach programs such

as Marion County’s Master Recycler Program and EarthWise programs. The Master Recycler Program trains people to create projects that focus on waste prevention and EarthWise

Other cities’ plans to reduce consumption and waste informed students’ recommendations around sustainability of businesses and community outreach. Corvallis, Oregon, plans to adopt a standard for labeling products with their carbon-footprint (Corvallis City Council, 2016). Eugene, Oregon, aims to increase composting in schools and host Fix-It Fairs for repairing goods at home (City of Eugene, 2019). San Francisco, California, adopted plans to charge businesses according to the volume of waste, and require businesses and residents to compost and recycle (Sf Environment).

ACTION FRAMEWORK

Vision

The city of Silverton will have significantly reduced consumption and waste, which contributes to the City being healthier, cleaner, and economically sustainable.

Goal 1: Reduce the amount of consumption.

Strategy 1: Increase reuse

China's elimination of US recycling imports presents a great opportunity to change Silverton's behavior from producing waste to learning how to reuse products.

Actions:

- Increase policies that decrease single-use items through banning and raising prices of certain products.
- Implement incentives to increase the use of reusable items.

Strategy 2: Education

Educating the public about consumption and waste through events, programs, and community meetings has the potential to be very effective and is imperative to reducing consumption in Silverton.

Actions:

- Hold community meetings about consumption and waste every other month for the public.
- Start an annual waste reduction event that educates the public about waste and consumption and has stations to provide DIY services that show citizens how they can reuse and fix their products.
- Develop a consumption based GHG inventory and label products based on carbon footprint.

Goal 2: Reduce the amount of waste produced by the City.

Strategy 1: Increase recycling efficiency/rate and sustainability

The processing of waste, especially at incinerators like Covanta, produces significant greenhouse gas emission, thus it is recommended to reduce the amount of waste.

Actions:

- Decrease trash can size and increase recycling bin size (64 gallon recycling bin, 32 gallon composting bin, 16 gal trash bin).
- Increase sustainability in schools and businesses.

Strategy 2: Business agreement

It is important to increase businesses' sustainability because they supply consumer goods to citizens.

Actions:

- Update franchise agreement with Republic Service and direct them to send waste to landfill instead of Covanta Incinerator.
- Mandate local business participation in local programs such as Marion County Master Recycling classes and EarthWise.

Goal 3: Increase composting while reducing food wasteStrategy 1: Increase city-wide composting

Decreasing food waste through increased composting will decrease the amount of waste that the City produces.

Actions:

- Implement a policy to require or incentivize businesses to donate or compost food waste.
- Create a program to distribute compost to community gardens and residents for home gardens.
- Implement an education campaign to reduce food waste and increase composting in households.

Priority Strategy for Implementation

Students' selected priority strategy is to come up with recommendations for Silverton's new franchise agreement with Republic Services. The franchise agreement is a contract that lays out services Republic is expected to provide for the city of Silverton as well as Silverton's responsibilities. Students chose this priority strategy because it will be easy to implement, as the Solid Waste Management Ordinance Silverton had with United Disposal has expired and the City is now working with Republic Services to create a franchise agreement. This means that the City can advocate for more sustainable actions in the new agreement.

Recommendations for Revised Franchise Agreement:

Republic Services will provide commercial composting services that will collect composting and food waste produced by businesses. All of the collected compost and food waste will be sent to community gardens in Silverton to provide free nutrients that will keep the soil healthy. By collecting food waste that is produced by local businesses and putting it in community gardens, Silverton will create healthier soil for residents along with other co-benefits.

Benchmarks:

- Track the amount of local businesses that implement composting services until all of the businesses in Silverton have composting services.
- Have composting sent to one community garden and then gradually expand.

Republic Services hauler will send 100% of Silverton's waste to the landfill instead of the Covanta Energy from Waste Facility. This will decrease the amount of GHG emissions produced and reduce toxic pollution that harms the communities around Covanta.

Benchmarks:

- Once the franchise agreement is signed all the waste collected from Silverton will be sent to landfill. Republic Services will provide recycling, waste, and compost receptacles for all of the City's major community events. Community events have been known for increasing consumption and waste in a short amount of time. It is important that all waste is collected to keep the streets of Silverton clean.

Benchmarks:

- Republic Service will first implement recycling, waste, and compost receptacles for sustainability themed events then gradually expand to all events.

SPECIFIC DESIGN RECOMMENDATION

Students' specific design recommendation is to create a recycling festival. The festival idea is inspired by the work of Keep America Beautiful. Through providing expertise, programs, and resources, this nonprofit works to prevent littering, increase recycling, and be a resource to help communities help themselves.

This event could be titled "Silverton's First Annual Recycling for Mother Nature Festival" and show the positive impact that recycling can have on the environment and community. The concept of sustainability and Mother Nature will help the event appeal to a wider audience beyond those who support recycling. The festival could be located at The Oregon Garden, Coolidge McClain Park, or the Old Mill Park. By combining Silverton's love of art, community, and sustainability, Silverton's recycling festival will be an amazing event to encourage recycling while inspiring artistic pursuits within the community.

FIG. 14

Dumpster painting
at Sarasota County
America Recycles Day



Festival activities could include the following:

- Local Vendors: a showcase of sustainable products and services
- Food Carts: local food with reusable kitchen ware like forks and plates
- Educational Presentations: trivia, recycle bottle prep, and a compost demonstration
- Recycling Collection Competition: to educate the community about the importance of recycling, the recycling process, and how to properly clean and prep recyclable objects before throwing them away
- Dumpster Painting: encourages people to use dumpsters to throw away waste while making them more visually appealing
- Sustainable Swap: space to trade clothes, toys, art materials, games, books, and other items. An opportunity to educate community members to not purchase fast fashion and visualize the amount of clothes thrown away each year.
- Recycled Musical Instruments: children will be able to use recycled bottles and cans, reusable wood and string to create musical instruments encouraging creativity, musical interest, and sustainable thinking
- Recycled Material Art Contest: children can learn about sustainability through making art. After the festival the art pieces can be displayed in community buildings.

Adaptation and Community Resilience

It is important for Silverton to make a climate change adaptation plan to reduce risk of severe impacts to community health and the City's functioning in the event of a disaster or emergency. The global average temperature will rise between 1 and 3.5 degrees Celsius in the next 30-80 years with global consequences for weather patterns and resource availability (IPCC 2018). Silverton may face many increased hazards resulting from climate change. Wildfires could displace people from their homes and interrupt critical services. Extreme heat poses a serious health risk, especially for vulnerable community members. As climate change shifts wind and rain patterns, Silverton may see longer summer periods without rainfall and experience increased drought. Silverton is also in proximity of the Cascadia Subduction Zone and its associated magnitude 9.0+ earthquake. Precipitation in the winter may increase in intensity and is likely to increase flooding unless steps are taken to accommodate increased storm flows (Marion County 2017).

Critical community services and infrastructure may be at risk from climate and natural hazard impacts. Infrastructure such as roads and bridges could be damaged by floods or an earthquake and should be assessed for integrity. Important evacuation routes such as State Highways 213 and 214 must be well maintained. Buildings and road access

to fire, police, and medical facilities should be protected and assessed for resilience. Severe climate events could impact the local food supply, which will disproportionately impact disadvantaged community members. Marion County recommends updates to the Silverton Flood Insurance Rate Maps and the dam breach inundation scenario map, a seismic evaluation of Silver Creek Dam and Silverton water supply reservoir, an evacuation strategy for both local and regional dam failure scenarios, and a seismic evaluation of West C and Main Street bridges over Silver Creek (Marion County 2017).

As the population is set to increase 1.3% each year, preparing for an influx of new inhabitants is important (ECONorthwest 2020). Climate migration may bring even more people, and Silverton should plan accordingly.

The effects of climate change will disproportionately affect vulnerable groups of people such as children, the low-income, minority, and the elderly. These groups have less access to resources and increased health risks from environmental changes such as extreme heat. Students recommend that Silverton develop community resilience centers that could function as cooling centers in the event of extreme heat or as shelters in the event of an earthquake or wildfire. Disaster preparedness training can help communities in Silverton develop emergency plans, especially to support vulnerable residents.

Conclusion

Student work identifies actions that Silverton can take to reduce its impact on the climate while increase its climate resiliency. It is recommended for Silverton to focus on actions that are feasible for a small city yet can have a large impact. Silverton could prioritize the following implementation strategies and actions from the student work to see immediate impact:

1. Increase energy efficiency of existing buildings through educational workshops.
2. Increase vanpooling to decrease emissions from single-occupancy commuter trips.
3. Support schools and residents to purchase low-carbon, local food options.
4. Plant trees and native plants in key areas to mitigate urban heat, buffer against flooding, filter stormwater, and sequester carbon from the atmosphere.
5. Send waste to the landfill instead of the incinerator.
6. Reduce food waste and increase composting.

Students were asked to identify funding sources, timing, co-benefits, and lead partners for implementation. This information is available in the appendices. Because students did not have time to formulate reasonable quantitative goals and strategies, the goals and strategies in the report are not quantitative. Some students included quantitative goals and strategies, which are available in the appendices. However, we recommend that Silverton develop a timeline that includes reasonable goals and strategies to achieve by 2025, 2030, and 2050. The IPCC report in 2018 states that the world needs to reduce emissions by 45% by 2030 and become carbon neutral by 2050. We recommend that Silverton formulate goals in line with this, but it is beyond the scope of the class to formulate how much of which actions will get Silverton to those benchmarks.

We recommend that Silverton incorporate these findings into the creation of an official climate action plan. The plan could be a framework to guide and monitor progress. Many cities create climate action plans that then go unrecognized and unimplemented. To ensure that climate action is implemented, Silverton could update and incorporate climate actions throughout all applicable city plans and programs including the comprehensive and transportation system plans. Hold community events to educate people about climate impacts and actions and to hear from residents their concerns about climate change. We recommend that climate action planning should be an on-going process and conversation in Silverton.

References

Land Use and Transportation

About the Energy Efficiency and Conservation Block Grant Program. <https://www.energy.gov/eere/wipo/about-energy-efficiency-and-conservation-block-grant-program>

Get There Oregon. <https://getthereoregon.org>

Hodges, Tina. 2010. "Public Transportation's Role in Responding to Climate Change." U.S. Department of Transportation Federal Transit Administration. <https://www.transit.dot.gov/sites/fta/dot/gov/files/docs/PublicTransportationsRoleInrespondingToClimateChange2010.pdf> <%22>

Silverton Community Survey. 2016. City of Silverton Community Service Center. https://www.silverton.or.us/DocumentCenter/View/3790/Silverton-Survey-2016-Report_FINAL?bidId=

Silverton Downtown Master Plan. 2007. City of Silverton Downtown Silverton Task Force. <https://www.silverton.or.us/DocumentCenter/View/337/Silverton-Downtown-Master-Plan?bidId=>

Silverton Transportation System Plan. 2008. City of Silverton Public Works Department. <https://www.silverton.or.us/DocumentCenter/View/742/2008-Transportation-Master-Plan?bidId=>

U.S. Census Bureau. 2018. American Community Survey. <https://datausa.io/profile/geo/silverton-or/>

United States Environmental Protection Agency. 2019. "Transportation Sector Emissions." <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

Wamsley, Laurel. 2019. "Oregon Legislature Votes To Essentially Ban Single-Family Zoning". NPR. <https://www.npr.org/2019/07/01/737798440/oregon-legislature-votes-to-essentially-ban-single-family-zoning>

Building and Energy Use

EnergySage. 2020. "How Much Does Energy Efficiency Cost?" <https://www.energysage.com/energy-efficiency/why- conserve-energy/cost-of-ee/>

ECONorthwest. 2020. "City of Silverton: 2020-2040 Housing Needs Analysis." https://www.silverton.or.us/DocumentCenter/View/6352/Silverton-HNA-Report_FINAL-Jan-2020

Ko, Yekang. 2013. "Urban Form and Residential Energy Use: A Review of Design Principles and Research Findings." *Journal of Planning Literature*. DOI: 10.1177/0885412213491499.

Pendleton Public Works. 2020. "Solarize Pendleton." <https://pendleton.or.us/public-works/solarize-pendleton>

Silverton Comprehensive Plan. 2002. <https://www.silverton.or.us/DocumentCenter/View/806/Silverton-Comprehensive-Plan-Part-1?bidId=>

Stagi, Shelby. 2019. "Developing Sustainable ADU Guidelines for San Jose, CA." University of Oregon Department of Landscape Architecture.

United States Environmental Protection Agency. 2019. "Sources of Greenhouse Gas Emissions." <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

Food and Agriculture

Center for Sustainable Systems, University of Michigan. 2019. "Carbon Footprint Factsheet." Pub. No. CSS09-05.

Hawken, Paul. 2017. *Drawdown : The Most Comprehensive Plan Ever Proposed to Reverse Global Warming*. New York, New York: Penguin Books.

Poore, J. and T. Nemecek. 2013. "Reducing food's environmental impacts through producers and consumers". *Science* 01 Jun 2018:Vol. 360, Issue 6392, pp. 987-992 .DOI: 10.1126/science.aaq0216

Sustainable Denton. 2012. Simply Sustainable: A Strategic Plan for Denton's Future. City of Denton, Texas.

Warhurst, Pam. 2012. How we can eat our landscapes. TEDSalon London

Urban Natural Resources

Doppelt, Bob. 2009. Climate Change Preparation for the Upper Willamette River Basin. <https://climatewise.org/projects/798-upper-willamette#Future%20Climate%20Conditions>

Campbell, L., & Wiesen, A. (2009). Restorative Commons: Creating Health and Well-Being Through Urban Landscapes. <https://doi.org/10.2737/NRS-GTR-P-39>

Dirrenberger, Jonathan et al. 2014. San Francisco Urban Forest Wood Reuse Study. https://sfenvironment.org/sites/default/files/agenda/attach/sf_urban_forest_wood_reuse_study_0.pdf

McPherson, E. Gregory. 1999. Carbon Dioxide Reduction through Urban Forestry : Guidelines for Professional and Volunteer Tree Planters. General Technical Report PSW ; 171. Albany, Calif.: U.S. Dept. of Agriculture, Forest Service, Pacific Southwest Research Station.

Nowak, D. J., Stevens, J. C., Sisinni, S. M., & Luley, C. J. (2002). Effects of urban tree management and species selection on atmospheric carbon dioxide. *Journal of Arboriculture*. 28(3): 113-122., 28(3). <https://www.fs.usda.gov/treearch/pubs/18815>

Livesley, Stephen J. 2010. Soil-atmosphere exchange of carbon dioxide, methane and nitrous oxide in urban garden systems: Impact of irrigation, fertiliser and mulch | SpringerLink. <https://link.springer.com/article/10.1007/s11252-009-0119-6>

US Environmental Protection Agency. (n.d.). National Water Program Strategy: Response to Climate Change. Retrieved February 16, 2020, from <https://nepis.epa.gov/Exe/ZyNET.exe/P1001KG5.txt?ZyActionD=ZyDocument&Client=EPA&Index=2006%20Thru%202010&Docs=&Query=%28Stormwater%29%20OR%20FNAME%3D%22P1001KG5.txt%22%20>

AND%20FNAME%3D%22P1001KG5.txt%22&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C06THRU10%5CTXT%5C00000004%5CP1001KG5.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=3#

University of Oregon. (2017). Marion County Multi-Jurisdictional Hazard Mitigation Plan (Vol. 2).

US EPA, O. (2017, February 8). Inventory of U.S. Greenhouse Gas Emissions and Sinks [Reports and Assessments]. US EPA. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>

Vargas-Hernández, J. G., Pallagst, K., & Zdunek-Wielgołaska, J. (2018). Urban Green Spaces as a Component of an Ecosystem. In J. Marques (Ed.), *Handbook of Engaged Sustainability* (pp. 1-32). Springer International Publishing. https://doi.org/10.1007/978-3-319-53121-2_49-1.

Consumption and Waste

Cascadia Partners. (2019). Salem Oregon Community Greenhouse Gas Inventory. <https://www.cityofsalem.net/citydocuments/final-community-greenhouse-gas-inventory.pdf>

City of Eugene. (2019). Eugene's Community Climate Action Plan 2.0: Playbook for Eugene's Climate Journey Draft. <https://www.eugene-or.gov/DocumentCenter/View/48138/CAP20-Full-Documents-Appendices>

Corvallis City Council. (2016). Corvallis Climate Action Plan <https://archives.corvallisoregon.gov/public/ElectronicFile.aspx?dbid=0&docid=920368>

References

Gaia. (2019). Toxics and Climate Activist Unite Against Covanta. <https://www.noburn.org/toxics-climate-activists-unite-against-covanta/>

Lynn, Deanna. (2020). Personal Communication. Interview with Julie Jackson.

Sarasota County America Recycles Day. Sarasota County, Florida. <https://www.scgov.net/government/public-utilities-water/keep-sarasota-county-beautiful/america-recycles-day>

SF Environment. (n.d.) Recycling & Composting in San Francisco - FAQs. <https://sfenvironment.org/recycling-composting-faqs#what>

Adaptation and Community Resilience

ECONorthwest. 2020. "City of Silverton: 2020-2040 Housing Needs Analysis." https://www.silverton.or.us/DocumentCenter/View/6352/Silverton-HNA-Report_FINAL-Jan-2020

IPCC, 2018: Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. In Press

Marion County Multi-Jurisdictional Hazard Mitigation Plan. 2017. Prepared by University of Oregon. https://www.co.marion.or.us/PW/EmergencyManagement/Documents/Marion_HMP_Volume%20I_01022018.pdf

Appendix A

Implementation Tables

Implementation for Land Use and Transportation

Strategy/Action	Type	Control	Lead Agency	Timing	Cost	Co-benefits
Tactical Urbanism installation	physical investment	Community, city government	Sustainable Silverton, Public Works	Short-term (within 3 years)	Low (less than \$20,000)	Neighborhood improvement, public health and safety, equity
Improve active transportation infrastructure	Policy, capital/physical investment, maintenance	Local government	Community Development (City), Marion County, ODOT	Policy change: 1-2 years, Implementation: long-term (more than 5 years)	High (over \$100,000)	Public health and safety, Pollution prevention/air quality, neighborhood improvement, equity
Increase use of transit and vanpool options	Policy, program development/improvement, physical investment	Community, city government	Community Development (City), Cherriots, Sustainable Silverton, ODOT	Short-term (within 3 years)	Medium (\$20,000-\$100,000)	Public health and safety, Pollution prevention/air quality, equity
Increase mixed-use zoning parcels	Policy	Local government	Community Development (City)	Policy change: 1-3 years, Implementation: Mid-term (3-5 years)	Medium (\$20,000-\$100,000)	Walkability, equitable access to resources
Eliminate single-family zoning	Policy	City government	Community Development (City)	Short-term (within 3 years)	Low (less than \$20,000)	Financial savings (allows more affordable housing to be built), equity
Purchase of electric fleet vehicles	Capital investment	City government	Finance (City)	Short-term (within 3 years)	Medium-High (more than \$50,000)	Pollution prevention/air quality
Build out charging network downtown	Policy, physical investment, maintenance	Commercial, City government	Community Development (City)	Mid-term (3-5 years)	Medium (\$20,000-\$100,000)	Pollution prevention/air quality

Implementation for Buildings and Energy

Strategy/Action	Type	Control	Lead Agency	Timing	Cost	Co-benefits
Reduce residential energy consumption	Program development, education/outreach	Community, city government	Sustainable Silverton, Public Works (City)	Midterm (3-5 years)	Medium (\$20,000-\$100,000)	Education, energy efficiency, financial savings
Identify historic buildings for energy renovations	Research/analysis, program development	City government, commercial	Community Development (City)	Analysis: short-term (within 3 years), Renovations: mid-term (3-5 years)	Low (less than \$20,000)	Cultural Preservation
Incentivize creation of business energy renovation plans	Program development, education/outreach	Community, city government	Community Development (City), Silverton chamber of commerce	Policy/program creation: short-term (within 3 years), Implementation of plans: mid-term (3-5 years)	Medium (\$20,000-\$100,000)	Financial savings
New residential construction approaching net-zero	Policy	City government	Community Development (City)	Long-term (more than 5 years)	Medium (\$20,000-\$100,000)	Financial savings, energy efficiency
Generate energy from wastewater treatment plant	Policy, research/analysis	Community, city government	Public Works (City)	Mid-term (3-5 years)	High (over \$100,000)	Energy efficiency, Resilience
Incentivize installation of solar panels on local businesses	Program development, education/outreach	Community, city government	Public Works (City), Finance (City)	Mid-term (3-5 years)	Medium (\$20,000-\$100,000)	Financial savings, Resilience
Guide for sustainable ADUs	Program development, education/outreach	City government	Community Development (City)	Short-term (within 3 years)	Low (less than \$20,000)	Equity, Prepared for future growth

Implementation for Food and Agriculture

Strategy/Action	Type	Control	Lead Agency/ partners	Timing	Cost	Co-benefits
Reform school food quality and sustainability	Policy, program development/improvement	School District	Silver Falls School District	Mid-term (3-5 years)	Medium (\$20,000-\$100,000)	Public health, education, equity
Support local food through new co-op	Physical/capital investment, program development/improvement	City government	Community Development (City)	Mid-term (3-5 years)	Medium (\$20,000-\$100,000)	Public health, education, equity
Community food outreach	Education/outreach	City government	Sustainable Silverton, The Oregon Garden, neighboring schools, The Grange Garden, Farmer's markets	Short-term (within 3 years)	Low (less than \$20,000)	Public health, education, equity
Develop community garden	Physical investment, program development, education/outreach	Community, city government	Public Works (City), Sustainable Silverton, neighboring schools	Short-term (within 3 years)	Medium (\$20-50,000)	Public health, education, community character, equity
Plant public food forest	Physical investment, program development, education/outreach	Community, city government	Public Works (City), The Oregon Garden, Sustainable Silverton	Short-term (within 3 years)	Low (less than \$20,000)	Public health, education, community character, equity

Implementation for Urban Natural Resources

Strategy/ Action	Type	Control	Lead Agency/ partners	Timing	Cost	Co-benefits
Utilize urban forest for climate resiliency and mitigation	research/ analysis, policy, outreach, physical investment (in trees)	City government	Public Works (City), partner with universities	Research/analysis/ planning: Short-term (1-3 years), Implementation: long term (more than 3 years)	Medium (\$20,000-\$100,000)	Air quality, pollution prevention, Public health and safety, Neighborhood improvement, Community character, equity, habitat for native species, resiliency
Climate-smart landscaping	policy, program development, outreach	City government, community	Public Works (City)	Short-term (within 3 years)	Low (less than \$20,000)	Pollution prevention, Neighborhood improvement, Community character, habitat for native species, resiliency
Establish a robust green-infrastructure network	Policy, program development/ improvement, physical investment	City government	Public Works (City), Marion County	Policy and program development: short-term (1-3 years), implementation: Long-term (more than 5 years)	Medium-High (more than \$20,000)	Air quality, water quality, pollution prevention, Public health and safety, Neighborhood improvement, Community character, habitat for native species, resiliency
Improve stormwater management	Policy, physical/capital investment	City government	Public Works (City)	Policy and program development: short-term (1-3 years), implementation: Long-term (more than 5 years)	High (over \$100,000)	Pollution prevention, Water quality, Public health and safety, Neighborhood improvement, Community character, habitat for native species, resiliency
Modify water utility rate system	Policy	City government, water utility	Public Works (City)	Short-term (within 3 years)	Low (less than \$20,000)	Financial savings, water conservation

Implementation for Consumption and Waste

Strategy/Action	Type	Control	Lead Agency/ partners	Timing	Cost	Co-benefits
Increase reuse of consumer products	Policy, outreach	Community, city government	Sustainable Silverton	Mid-term (3-5 years)	Medium (\$20,000-\$100,000)	Financial savings, economic development
Education and outreach about consumption and waste	Education/outreach	Community, city government	Public Works (City) / Sustainable Silverton	Short-term (within 3 years)	Low (less than \$20,000)	Education, community character
Increase commercial and residential composting	Policy, program development/improvement, education/outreach	City government, commercial	Public Works (City), Republic Services	Policy/program creation: short-term (within 3 years), Implementation of plans: mid-term (3-5 years)	Medium (\$20,000-\$100,000)	Neighborhood improvement
Send waste to landfill instead of incinerator	Policy	City government	Public Works (City), Republic Services	Short-term (within 3 years)	Low (less than \$20,000)	Air quality, Environmental justice
Start an annual recycling festival	Education/outreach, event	Community, city government	Public Works (City), Sustainable Silverton, Marion County	Short-term (within 3 years)	Low (less than \$20,000)	Education, community character