City of Ketchum

CITY COUNCIL MEETING AGENDA MEMO

Meeting Date:	May 19, 2025	Staff Member/Dept:	Paige Nied, Associate Planner Robyn Mattison, City Engineer Eve Preucil, Blaine County Sustainability Coordinator

Agenda Item:	Recommendation to review and provide policy direction regarding snowmelt installation within the public rights-of-way.

Recommended Motion:

No motion required. Requesting feedback on policy direction.

Reasons for Recommendation:

- On April 3, 2023, the City Council gave a policy directive that they would no longer approve of applications for residential snowmelt systems within the City right-of-way as it impeded the City's sustainability efforts. This excluded areas where a snowmelt system was required by City departments for public safety, access, or street maintenance reasons.
- In Ketchum's 2024 greenhouse gas emissions inventory report, residential energy use accounted for 52% of total emissions, and 59% of all energy related emissions. Together, commercial and residential energy use made up 88% of Ketchum's total emissions. The new inventory shows a 3 mt increase in per capita emissions in the county as a whole since the 2018 inventory. Additionally, Ketchum's residential energy emissions have increased by 2% since the 2018 inventory, indicating that residential energy continues to consume an outsized portion of Ketchum's greenhouse gas emissions.
- On September 16, 2024, Ketchum adopted Blaine County's Climate Action Plan. Chapter six of the Climate Action Plan has two goals, increasing the supply of renewable energy and reducing demand for energy through energy efficiency initiatives and consumption reduction methods. Snowmelt systems are highly consumptive and place a demand on the energy system. By requiring either a renewable energy credit purchase or onsite generation, as well as increasing the efficiency requirement, this policy would directly contribute to achieving both of the Climate Action Plan's Clean Energy and Green Building goals.
- Since the Council's policy directive, staff has encountered challenges with its practical implementation.
- Staff has drafted a revised snowmelt policy that allows for snowmelt systems within the right-of-way that have additional mitigation measures which will better meet the goals of the City's Climate Action Plan and result in a greater impact than prohibiting them outright.

Policy Analysis and Background:

INTRODUCTION

On April 3, 2023, staff presented the City Council with policy options for residential snowmelt systems within the City right-of-way (ROW). The staff report from that meeting is included as Attachment 1 and the recording of the meeting can be viewed here. Following the discussion, the Council gave the policy directive that they would no longer permit residential snowmelt systems within the ROW, unless required for public safety, access, or street maintenance by the Fire and Streets Departments or City Engineer. The rationale for this decision was because snowmelt systems are energy-intensive and they impede the City's ability to reach its sustainability goals. The purpose of this discussion is to update the Council on the challenges that have arisen with the practical implementation of the policy directive and provide a new draft policy option that seeks to better balance the City's climate objectives with community interest in snowmelt systems.

Since the policy directive was given, staff has encountered challenges with implementation. These include unpermitted work being done in the ROW, resulting in stop work orders; community members in disagreement with the policy and requesting approval from Council; and property owners not obtaining approval prior to replacing existing systems. Each of these instances has required significant staff time working with applicants to bring their snowmelt systems into compliance.

Following the last City Council discussion where an applicant was requesting approval for a snowmelt system in the ROW, the Council directed staff to explore other policy options and expand the emissions analysis research for a follow-up policy discussion. Staff has collaborated with the County's sustainability team to identify relevant goals and policies of the adopted Climate Action Plan, further the snowmelt emission analysis, meet with the local contractor community, review other mountain town's standards for snowmelt systems, and develop a draft policy for snowmelt systems in the ROW. Based on this effort, staff believe that the snowmelt policy implemented in 2023 should be revised. Below is an outline of the draft policy and a detailed analysis of the information staff has gathered to inform the draft policy for snowmelt systems.

DRAFT POLICY OVERVIEW

During the work outlined above, staff identified two things: 1) there is a strong desire for snowmelt systems in this community, and 2) allowing snowmelt systems in the ROW with additional mitigation measures in place would better meet the City's sustainability goals and have a greater impact than prohibiting them outright. The draft policy currently proposed by staff allows for residential and commercial snowmelt systems within the ROW, provided they meet specific design and operational standards, and a renewable energy requirement to mitigate the carbon emissions generated from the system. Outlined below is a summary of the proposed policy. The more detailed policy draft can be found in Attachment 2.

<u>System Design & Operation Requirements</u>

To ensure energy efficiency and reduce environmental impact, all snowmelt systems in the ROW must meet the following minimum requirements:

- Pavement Temperature & Moisture Sensors
    - Must accurately measure surface temperature and ambient temperatures, as well as detect snowfall, ice, or precipitation on the surface.
- Automated Controls:
    - System activation is only triggered when both temperature and moisture sensors warrant operation
- Insulation & Drainage
    - Insulate below and perimeter with minimum R-10 structural insulation

- Drainage must be retained within the private property boundary and designed to eliminate standing water

Renewable Energy Requirement

Property owners wishing to voluntarily install snowmelt systems in the ROW must have renewable energy credits or generation for the entire system, through one of the following ways:

1. Renewable Energy Credit Program Enrollment

The property owner must demonstrate enrollment in an approved renewable energy program through the local utility provider that purchases clean energy for 100% of energy use generated by the entire snowmelt system. An example of this would be Idaho Power's "Clean Energy Your Way" program which costs $1 per 100 kilowatt hour (kWh) block. If the property owner has a natural gas system rather than an electric system, they should use the provided kWh equivalent calculator. The property owner must maintain active participation in the renewable energy program for as long as the snowmelt system is operational. The owner would be required to submit proof of enrollment documentation to the City on an annual basis for staff to verify compliance.

2. Onsite Renewable Energy Generation

The property owner must install a source of renewable energy onsite, such as solar, and demonstrate that the renewable energy system generates enough energy to power 100% of the energy used by the snowmelt system. Once the renewable energy system is installed and operational, the property owner would be required to submit documentation that demonstrates sufficient generation capacity.

3. In-Lieu Payment

The fee in lieu option has not been fully developed, but the concept would involve a one-time payment, due in full prior to ROW permit issuance, that is based on the cost equivalent of installing a solar system onsite. Several other communities with exterior energy mitigation requirements use the cost of solar installation to calculate the fee in lieu. The revenue generated through the in lieu fees would go into a fund dedicated to energy efficiency and sustainability projects for the City. Staff is also exploring a hybrid pathway that would allow for a combination of an in lieu fee and installation of renewable energy onsite. However, the in lieu fee structure needs to be further vetted with additional data collection and legal review.

Snowmelt Systems in the Community Core Zone District

For projects in the Community Core Zone District where the City ROW standards require the installation of snowmelt (such as in bulb outs) for public safety, access, or street maintenance, the system is required to comply with the new system design and operational standards, but the City will cover the cost of the renewable energy requirement. For projects in the Community Core voluntarily installing snowmelt systems, where it is not a required ROW standard, are required to comply with the new system design and operation standards as well as the renewable energy requirement.

Municipal Buildings

All new snowmelt systems installed at City-owned buildings or facilities must comply with the new design and operational standards and renewable energy requirement of this policy. By requiring municipal projects to meet the same standards as private applicants, the policy ensures consistency and transparency. It also reinforces the City's priority of advancing its sustainability goals.

Pre-Existing Snowmelt Systems

The policy addresses both pre-existing and new snowmelt systems by distinguishing between a repair and a full replacement. Repairs to existing systems refers to leaks, pump motor replacements, resetting of pavers/tubbing, boiler replacement, and electrical disconnect/failures. Repairs to existing systems in the ROW which does not increase the pre-existing energy consumption would be exempt from the new policy requirements. However, if replacing a boiler, the policy stipulates that it must be replaced with a high efficiency boiler.

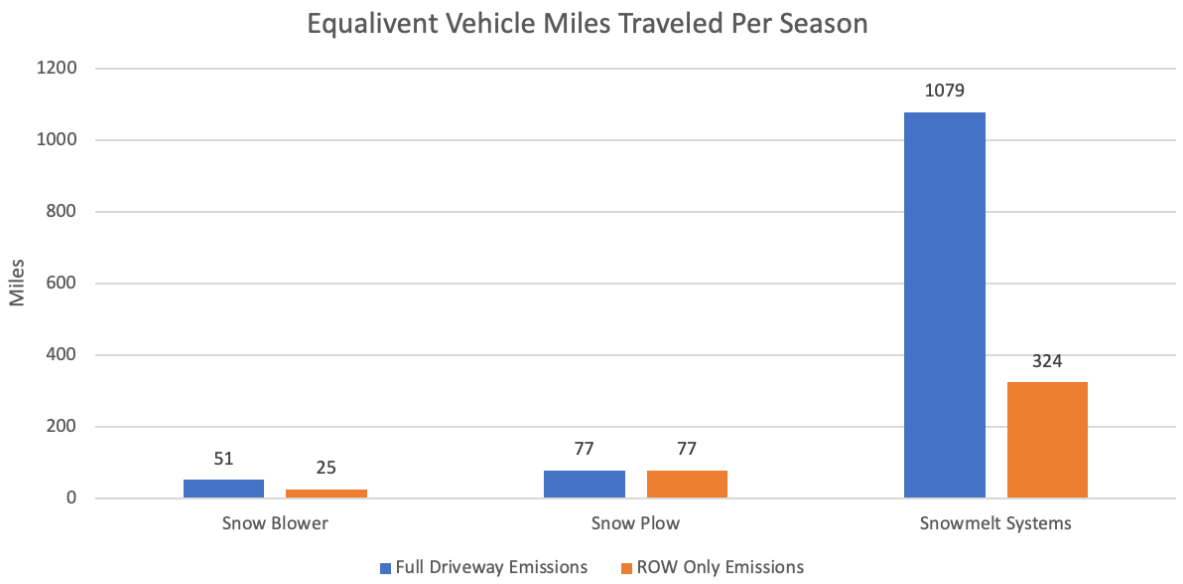
A full system replacement refers to either the complete removal of all elements and installation of a new snowmelt system or a significant modification to an existing system, such as reconfiguring its layout or expanding its coverage area. In either case, the scope of work goes beyond routine maintenance or minor repairs and constitutes a substantial alteration to the original installation. When an existing snowmelt system in the ROW is being replaced, the new system would be required to comply with the new policy, which includes system design and operation standards and a renewable energy requirement.
If it is found that a pre-existing snowmelt system in the ROW does not have an approved ROW encroachment agreement, the owner would be required to obtain one.

Application Process

As is required for all improvements in the ROW, snowmelt systems would be required to obtain a ROW encroachment permit. The encroachment permit applications would be required to submit the snowmelt system specifications, engineering or installation plans illustrating the snowmelt system and its extension in the ROW, calculation of energy usage for the entire driveway, and compliance with the renewable energy requirement. Staff recommend that these ROW applications be processed administratively, subject to review and approval of the Planning and Building Director, to streamline the permitting process.

DATA ANALYSIS

Staff's prior policy analysis focused on estimating carbon dioxide emissions from the three most common snow removal practices; snowmelt systems, snow plowers and haulers, and snowblowers. Staff then converted the pounds of CO_2 to vehicle miles traveled equivalent to help illustrate emissions produced from each snow removal technique. The following figure shows equivalent vehicles miles traveled per season for the three most common snow removal practices.



Given that the preferred method of snow removal in Ketchum involves natural gas-powered hydronic snowmelt systems, staff concentrated efforts on refining carbon dioxide emissions estimates from this type of system. To do so, an energy use per area factor is employed. Industry articles pertaining to design of snowmelt systems indicate that these values can vary from 100-200 BTU/hr*square foot for natural gas hydronic snowmelt systems. Staff used a value of 150 BTU/hr*square foot to estimate the energy efficiency of these systems in Ketchum. Utilizing Ketchum climate data, staff estimated an annual operation time duration and used a carbon dioxide emission coefficient by fuel factor to calculate the annual CO_2 emissions. Staff estimated the annual carbon dioxide emissions from three example driveways of varying sizes: small, medium, and large. The estimates include emissions from the snowmelt systems on private property and the adjacent public right of way. These three driveways represent three actual driveways that were recently approved to install hydronic snowmelt systems on private property that extend into the ROW. Please see Attachment 3 for a full review of staff's snowmelt emissions analysis methodology.

To conceptualize the equivalent emissions, staff input the estimated annual driveway CO_2 emissions into EPA's Greenhouse Gas Equivalencies Calculator online tool. This tool helps translate measurements into concrete terms that are easier to understand. Please refer to Table 1 below for a summary of CO_2 emissions and equivalent emissions.

Table 1 – Ketchum Driveway CO_2 Emission Summary and Equivalent Emissions

	Small Driveway	Medium Driveway	Large Driveway
Full Driveway Size (including ROW) (ft^2)	683	2,114	4,050
Energy Use (BTU/hr)	102,480	317,100	607,500
Energy Use per Year (BTU)	15,679,440	48,516,300	92,947,500
CO_2 emissions per year (lbs)	1829	5659	10,842
This is equivalent to CO_2 emissions from:			
Gallons of gasoline consumed	93.4	289	553
Gallons of diesel consumed	81.5	252	483
Pounds of coal burned	922	2,851	5,463
This is equivalent to carbon sequestered by:			
Tree seedlings grown for 10 years	13.7	42.4	81.4
Acres of U.S. forests in one year	0.83	2.6	4.9

Although these figures may initially seem negligible, the cumulative effect becomes significant when considering the total number of driveways in Ketchum currently equipped with snowmelt systems, in addition to the number of new applications the City receives annually. Each individual installation contributes meaningfully to a broader collective impact.

Methodology for Purchase Renewable Energy Calculation

Staff explored what purchasing renewable energy through a utility's renewable energy credit program would look like for various driveway sizes. Staff used Idaho Power's "Clean Energy Your Way" program for this calculation, as they are the main utility in the area. The program gives customers the option to choose to exclusively utilize renewable energy rather than Idaho Power's average energy mix for their home

electricity usage. Idaho Power's program gives users two options for using renewable energy for their energy consumption: customers can either purchase a selected number of 100 kWh blocks or they can choose to purchase renewable energy for their entire energy bill. For this policy's purposes, staff selected to use the block option so that calculations were exclusively based off energy used for the snowmelt system. For this program, Idaho Power charges $1 per 100kWh purchased. Note that this adds an additional dollar to your existing bill, rather than replace it. The table below provides three case studies estimating what the cost of purchasing renewable energy for a snowmelt system could look like.

Table 2 -- Renewable Energy Purchase Program Cost for Driveway Sizes

	Small Driveway	Medium Driveway	Large Driveway
Driveway Size (ft^2)	683	2,114	4,050
Energy Use (BTU/hr)	102,480	317,100	607,500
Energy Use per Year (BTU)	15,679,440	48,516,300	92,947,500
KWh Equivalent	4,595	14,219	27,241
Cost of Renewable Energy Purchase per Year ($)	45.95	142.19	272.41
Cost of Renewable Energy Purchase Over 30-Year System Lifetime ($)	1378.61	4,265.79	8,172.41

CONTRACTOR MEETING

In early spring, staff presented the preliminary draft policy to members of the local contractor community that specialize in snowmelt systems for feedback. From this meeting, staff gained a better understanding of the types of systems that are installed locally. Contractors noted that it is the standard for installations to include temperature and moisture sensors, and they provided clarification on what distinguishes a repair from a full system replacement as well as the typical lifespan of these systems. Overall, the feedback was generally supportive of the policy, and they echoed staff's sentiment that snowmelt is highly desired in the community. The contractors stated that the lifespan of these systems is generally 30 years. One piece of feedback received was that replacing a boiler is considered a repair and does not classify as a full system replacement. However, it was recommended that staff include a requirement for the installation of a high efficiency boiler when a replacement occurs. One component of the policy that contractors had concerns with was the insulation requirement, particularly related to challenges with implementation.

The draft policy includes a requirement to install a minimum of R-10 structural insulation below and around the perimeter of the snowmelt system. However, the contractors expressed that incorporating insulation can be challenging as it may lead to uneven melting and surface settlement, which creates impervious surface. Staff recommend adhering to the insulation requirements outlined in the policy. In Ketchum, frost depth penetrates several feet into the subsoil. Insulation directs heat upwards, preventing unnecessary heating of the subsurface which increases the carbon emissions of the system. Insulation enhances the system's efficiency by approximately 15-20%.

RECOMMENDATION

Based on the information outlined above, staff believes that to best achieve the Ketchum's sustainability goals, the City should allow snowmelt systems in the ROW that are subject to design and operational requirements and a renewable energy requirement to mitigate emissions. Allowing for regulated installations within the ROW will ensure energy efficient design, responsible use, and carbon mitigation while preserving flexibility for property owners.

Staff is requesting feedback on the policy and answers to the following questions:

- Do you generally support the policy, or do you have any proposed changes?
- Do you support retaining the insulation requirement?

NEXT STEPS

Based on the Council's feedback at the meeting, listed below are the next steps:

- Resolution regarding outstanding enforcement cases
- In lieu fee follow up
- Codify the policy
- Outreach and education

Sustainability Impact:

In September of 2024, Ketchum formally adopted Blaine County's Climate Action Plan (CAP). Ketchum Resolution #24-017 for the adoption of the CAP can be found linked here. The CAP is a roadmap towards achieving meaningful greenhouse gas mitigation countywide while also adapting to the changes that are already occurring. One of the four focus areas of the CAP is Clean Energy and Green Building. In this chapter, the County identified two main strategies: increasing the supply of renewable energy and reducing the demand of energy overall. The proposed policy addresses both of those strategies. Requiring moisture and temperature monitors as well as requiring insultation of the systems works to ensure that the snowmelt systems that are installed are as energy efficient as possible, reducing overall energy demand. The options of onsite solar or the purchase of renewable energy credits (REC) work towards achieving the goal of increasing the supply of renewable energy, either directly through onsite generation or indirectly through market influence with the local utility. The third option of paying a fee in lieu of generation or renewable energy purchases further contributes to accomplishing the CAP's goals by contributing to a dedicated sustainability fund that will be used for implementing a range of initiatives that align with the CAP.

Financial Impact:

None	There is no financial requirement from the City at this time.

Attachments:

1. April 3, 2023, City Council Staff Report – ROW Residential Snowmelt Policy Discussion
2. Draft ROW Snowmelt Policy
3. Snowmelt Carbon Emissions Analysis

City of Ketchum

Attachment 1:

April 3, 2023, City Council Staff Report - Residential ROW Snowmelt Policy Discussion

City of Ketchum

CITY COUNCIL MEETING AGENDA MEMO

Meeting Date:	April 3, 2023	Staff Member/Dept:	Paige Nied, Associate Planner Planning and Building Department

Agenda Item:	Recommendation to review information and provide policy direction regarding snowmelt allowance within the public rights-of-way.

Recommended Motion:

No motion required. Requesting feedback on policy direction.

Reasons for Recommendation:

- Ketchum adopted Resolution 20-031 on December 21, 2020, which set a goal to achieve 100% clean energy for all energy use in the community by 2045. On January 24, 2020, the City of Ketchum adopted a Sustainability Action Plan which prioritizes goals to reduce greenhouse gas emissions and to increase the use of renewable energy technologies.
- During the September 19th, 2022, meeting, the City Council directed Staff to evaluate policy options for heated driveways for further discussion.
- Residential indoor and outdoor energy use is the largest contributor of greenhouse gas emissions in Ketchum, accounting for 50% of total emissions, according to a 2019 ICLEI (Local Governments for Sustainability) report.
- Ketchum needs to evaluate policy options that address both indoor and outdoor residential energy consumption to meet the city's sustainability goals.
- Snowmelt systems are one of many outdoor residential energy uses that can be addressed through policy direction.

Policy Analysis and Background:

INTRODUCTION

During their meeting on September 19th, 2022, the City Council reviewed three Right-of-Way Encroachment Agreements for residential snowmelt systems that extended into the public rights-of-way from private property. Two of the Council members did not support the proposed encroachments, outlining concerns that the residential snowmelt systems do not meet the city's sustainability goals or provide a public benefit. The City Council directed staff to evaluate the environmental impact of snowmelt systems and provide policy options for further discussion. As noted above, outdoor residential energy uses include snowmelt systems, hot tubs, pools, and spas. For this discussion, staff focuses solely on snowmelt systems. Future discussions could expand into the other residential outdoor energy uses if recommended by the Council. The purpose of this discussion is to provide the City Council with information and policy options to consider for residential snowmelt systems within the public rights-of-way.

Since the Council's directive on snowmelt systems, staff has reviewed the city's sustainability commitments, evaluated the current code requirements, discussed public benefits of snowmelt systems with city departments, reviewed other mountain town's standards regarding snowmelt systems, and developed a carbon emissions analysis to compare various snow removal techniques. In general staff has found the following:

- None of the peer communities restrict snowmelt in the rights-of-way, however many have mitigation programs to offset impacts.
- Of the three primary snow removal techniques: snowmelt systems, snow plowing, and snow blowing. The emissions produced by snowmelt systems were 21 times more than snow blowing and 14 times more than snow plowing.
- There is no significant benefit to city street maintenance operations with the allowance of snowmelt within the public rights-of-way in residential areas.
- There are public safety benefits in providing snowmelt in residential areas where driveway conditions limit access or create unsafe working conditions for emergency service personnel.
- There are public safety benefits in providing snowmelt in sidewalks in the Tourist and Community Core zone districts as these areas may have steep sidewalks and may not be cleared by adjacent property owners as required by code.

Snowmelt systems installed for downtown development projects in the Community Core Zone are in the public interest as they keep sidewalks clear of snow and ice during the winter and provide a safe pathway for pedestrians and promote active transportation. Heated sidewalks proposed for new development projects downtown must extend the snowmelt system to the curb and gutter. This extension allows the Streets Department to clearly identify the sidewalk so that they can easily avoid hitting the curb with their snow removal equipment, which helps reduce damage to sidewalk infrastructure.

Snowmelt systems installed for residential private driveways do not provide the same public benefits as snowmelt systems installed for downtown projects. Snowmelt systems reduce icy conditions on driveways and circulation areas creating a safe pathway for property owners accessing their individual homes. Thoughtful design and planning can also reduce icy conditions by siting the driveway in an area with maximum solar exposure.

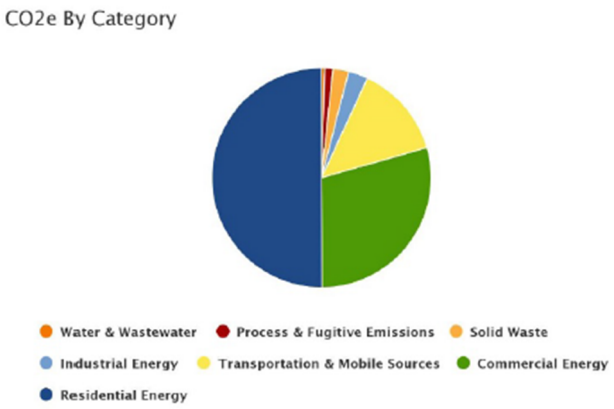
Below is a detailed analysis of the information staff has gathered to inform the policy options for residential snowmelt systems. Based on the information and the findings outlined above, staff believes that to advance the city's sustainability commitments, the city should either:

- Prohibit the use of snowmelt in public rights-of-way in residential areas unless required by the streets or fire departments to meet street standards or fire code requirements, OR
- Allow the use of snowmelt in public rights-of-way in residential areas but develop additional design requirements to increase the efficiency of the systems to reduce energy usage.

BACKGROUND

In 2018, Ketchum collaborated with other jurisdictions in the Wood River Valley and ICLEI to collect a current greenhouse gas emissions inventory. Residential energy use is the largest contributor of greenhouse gas emissions in Ketchum accounting for 50% of total emissions (see Figure 1 below for details). Greenhouse gas emissions from residential energy use is produced through the use of electricity, natural gas, and propane. Residential energy use in Ketchum produced 40,025 metric tons of carbon dioxide equivalent emissions in 2018.

Figure 1: Ketchum Community-Wide Emissions 2018



The City Council adopted the Ketchum Sustainability Action Plan on January 24, 2020, which prioritizes goals to reduce greenhouse gas emissions and to increase the use of renewable energy technologies (Attachment 1). On December 21, 2020, the City of Ketchum adopted Resolution No. 20-031 which established renewable energy goals for the community, including 100% clean energy for all energy use in the community by 2045 (Attachment 2).

The city-adopted building and energy codes regulate the efficiency of buildings but do not address exterior energy consumption. In 2015, the city adopted exterior energy conservation requirements for snowmelt systems as further discussed below.

ANALYSIS

Below is an evaluation of the Ketchum Municipal Code regulations for snowmelt systems and green building codes. Further, it examines peer mountain communities' regulation of snowmelt systems and exterior energy mitigation programs. Lastly, staff developed a carbon emissions analysis for the snow removal techniques of snowmelt systems, snow plowing, and snow blowing and provides policy options for the Council's consideration.

<u>Current Code Standards for Snowmelt Systems</u>

Ketchum's Zoning Regulations allow the use of snowmelt in-lieu of snow storage requirements provided certain design and construction standards are met. In February of 2021, Ketchum adopted the 2018 International Energy Conservation Code (IECC). Sections R403.9 and C403.12.2 require that snowmelt systems: (1) include automatic controls capable of shutting off the system when the pavement temperature is above 50°F and precipitation is not falling and (2) include an automatic or manual control that will shut off the system when the outdoor temperature is above 40°F. Additionally, Ketchum's green building code includes standards for snowmelt systems, which are specified in Ketchum Municipal Code 15.20.050.

Ketchum Municipal Code 15.20.050: Exterior Energy Conservation

- Prescriptive Path
    - Snowmelt Requirements
        - Insulate below and perimeter with minimum R-10 structural insulation
        - Minimum 92 percent efficiency boiler or Energy Star heat pump
        - Automated controls capable of shutting off the system when the pavement temperature is above 50 degrees Fahrenheit and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40 degrees Fahrenheit

    - Positive drainage off driveway (use geofabric under pavers).
- Performance path. Provide engineered, stamped drawings by an engineer licensed in the state of Idaho, showing that the system will perform using 25 percent less energy than a standard, current energy code compliant design.

Neither the IECC nor the city's Green Building code limits the size or restricts the use of snowmelt systems. The Fire Department requires residential snowmelt systems for nonconforming driveways, such as steep driveways with grades that exceed 10% slope or narrow driveways that do not meet the 20-foot-minimum-width for emergency service access. The snowmelt system can increase the fire protection of the home by providing a clear and unobstructed access along steeply sloped or narrow driveways for ambulances responding to emergencies.

Staff had internal discussions with all city departments and the Streets and Fire Department were in favor of retaining snowmelt within the Community Core Zone District and for properties with steeply sloped driveways but did not have other comments for residential snowmelt systems.

Mountain Towns Snowmelt System Regulations

Staff reviewed driveway snowmelt regulations in mountain towns across the west. Few of the communities specifically referenced snowmelt systems in their codes and none of the communities expressly prohibit installation of snowmelt on private property or the public rights-of-way. See the chart below for a sample of mountain towns regulations.

City	Snowmelt Regulations
McCall, Idaho	No regulations regarding snowmelt systems.
Vail, Colorado	Permits heated driveways. Any heated portion of the driveway located within the public rights-of-way must be on a separate control zone.
Mammoth Lakes, California	Permits heated driveways. Areas of heated pavement are encouraged in pedestrian corridors, stairs, ramps, or terraces at building entrances and in heavily used pedestrian paths. Heated pavement areas are exempt from snow storage requirements.
Park City, Utah	Permits heated driveways. Park City requires an encroachment permit for snowmelt systems in the public rights-of-way. The encroachment permits are reviewed and approved by the City Engineer.

Many communities also have energy mitigation programs to offset outdoor energy usage. Of Colorado, Aspen and Pitkin County adopted the first renewable energy mitigation program in 2000 and Basalt, Carbondale, Crested Butte, Eagle County, Snowmass, Telluride, and Breckenridge have implemented similar programs. Many of these programs require 100% of the outdoor energy used by snowmelt systems, pools, hot tubs, and natural-gas fire pits be offset 100% by on-site renewable energy. In Pitkin County, the total energy used by a snowmelt system is converted into kilowatt hours of electricity to determine the amount of solar photovoltaic energy needed to offset 100% of the energy used by the snowmelt system. If unable to offset through on-site renewable energy systems, fees are calculated based on the cost of installing solar photovoltaic. Fees collected through the program provide grants to local homeowners and businesses for energy efficiency and renewable energy projects. These programs provide certain exemptions, including portable spas not more than 64 square feet and snow-melted areas critical for emergency access or accessible routes.

Teton County, Wyoming has an energy mitigation program to offset the disproportionate energy consumption of large buildings as well as nonessential building elements, including exterior snowmelt systems, pools, and hot tubs. These nonessential building elements must be offset through providing on-site renewable energy or paying a fee in-lieu. The fee in-lieu for snowmelt systems, pools, and hot tubs is $10 per square foot. Renewable energy credits are offered for the installation of photovoltaics solar systems, solar hot water systems, ground source heat pumps, super-insulated thermal envelopes, average fenestration U-factor less than 0.29, zone ductless primary heating systems, and whole house ventilation utilizing heat recovery systems.

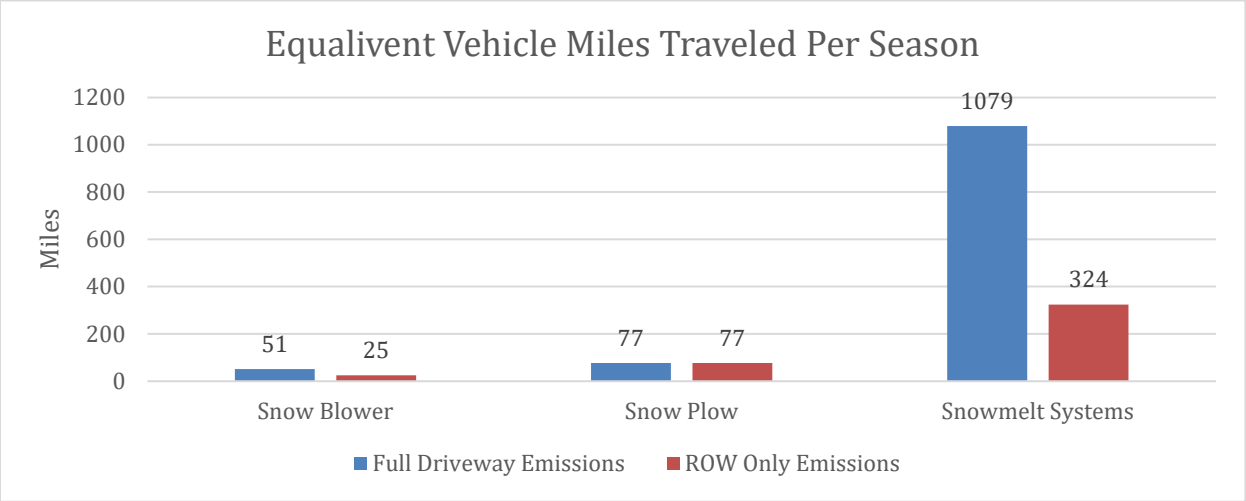
Blaine County adopted its Exterior Renewable Energy Mitigation Program through its BUILDSMART code amendments in 2016 (Attachment 3). The program requires that 50% of the energy used for new snowmelt systems, pools, and hot tubs is subject to a fee or can choose to produce on-site renewable energy credits from installing either solar photovoltaic, solar hot water systems, or micro-hydro to offset the payment option. The payment option is based on the amount of energy required to operate the exterior energy use systems.

Carbon Dioxide Emissions Analysis of Snow Removal Techniques

The three most common snow removal techniques in Ketchum are snowmelt systems, snow plowers and haulers, and snowblowers. Each process involves machinery that produce carbon dioxide emissions. To understand the quantity of carbon dioxide associated with each, staff developed a carbon dioxide emissions analysis which evaluates the energy usage of snow removal and subsequent emissions associated with each. Please see Attachment 4 for the methodology used to evaluate the carbon dioxide emissions of the snow removal techniques. Emissions related with each were extremely difficult to quantify due to differences in machinery for snowblowers, miles traveled, vehicles used for snow plowers/haulers, and design and materials for snowmelt systems. Further challenges arose in measuring emissions produced because of the variables associated with snowfall events, such as: snowfall amount, type of snow (wet/heavy or dry/light), and event occurrence. Staff developed averages for each technique to determine how many pounds of carbon dioxide emissions each produced per driveway (including public and private property):

Snowmelt System = 1606 lbs. of CO_2 emissions
Snow Plowing Service = 115 lbs. of CO_2 emissions
Snow Blower = 76 lbs. of CO_2 emissions

To better understand the significance of carbon dioxide emissions produced by each snow removal technique, staff converted the pounds of CO_2 to its vehicle miles traveled equivalent. Vehicle miles traveled is a commonly understood measurement that will help illustrate emissions produced from snow removal of each technique. In general, the portion of driveways within the public rights-of-way is less than the portion on the private property. For comparison, the table below shows vehicle miles traveled for a full driveway length (including both public and private property) and vehicle emissions from only the public rights-of-way portion of the driveway.



Policy Options for City Council Consideration

Based on the information and the findings outlined above, staff believes that to advance the city's sustainability commitments, the city should either:

- Prohibit the use of snowmelt in public rights-of-way in residential areas unless required by the streets or fire departments to meet street standards or fire code requirements, OR
- Allow the use of snowmelt in public rights-of-way in residential areas but develop additional design requirements to increase the efficiency of the systems to reduce energy usage.

The policy recommendations above are specific to snowmelt within the public rights-of-way in residential areas. If the council has a desire to pursue additional restrictions on snowmelt systems or other outdoor energy uses, staff recommends these discussions be held in conjunction with the city's rewrite of the land use regulations.

Sustainability Impact:

Ketchum needs to evaluate policy options that address both indoor and outdoor residential energy consumption to meet the city's sustainability goals.

Financial Impact:

None	There is no financial requirement from the city for this action at this time.

Attachments:

1. Ketchum Sustainability Action Plan 2020
2. City of Ketchum Resolution No. 20-031
3. Blaine County, Idaho Code: Chapter 6 BUILDSMART amendments: 7-6-6 Appendix A, Exterior Renewable Energy Mitigation Program
4. Snow Removal Carbon Emissions Analysis

City of Ketchum

Attachment 2:

Draft ROW Snowmelt Policy

Draft Policy for Snowmelt Systems Within the City Right-of-Way

Purpose

The purpose of this policy is to establish standards under which property owners may install a snowmelt system that encroaches into the city-owned right-of-way. These standards are intended to balance safety, environmental responsibility, and compliance with regulatory standards while mitigating the carbon emissions of these systems.

Applicability

The standards of this section apply to private property owners who voluntarily wish to install, repair, replace, or extend snowmelt systems into the city owned right-of-way.

New Snowmelt Systems in the Right-of-Way

- System Design & Operation Requirements
    - Pavement Temperature & Moisture Sensors
        - The system shall accurately measure surface and ambient temperatures and must accurately detect snowfall, ice, or precipitation on the surface.
    - Automated Controls
        - System activation is only triggered when both temperature and moisture conditions warrant operation.
    - Insulation and Drainage
        - Insulate below and perimeter with minimum R-10 structural insulation
        - Drainage must be retained onsite and designed to eliminate standing water
- Renewable Energy Requirement
    - The Property Owner must choose one of the following to meet the renewable energy requirement:
        - Renewable Energy Purchase Program Enrollment
            - At time of permit submittal, the property owner must provide proof of enrollment in an approved renewable energy purchasing program through the local electric utility provider that purchases 100% of the energy or equivalent energy generated by the entire snowmelt system.
                - Property owners must use this formula to calculate the equivalent kWh of yearly energy consumption by the system:
                    - (System dimensions sqft x efficiency of system BTU/hr/sqft x estimated yearly operational hours/ 3412=total kWh
                    - Total kWh/100 = cost of renewable energy purchasing program (If using Idaho Power's "Clean Energy Your Way")

        - Example: For a natural gas system that is 683 square feet, with an efficiency of 150 BTU/hr/sqft and an expected operational time of 153 hours, the equation would be: (683 x 150 x 153)/3412=4,594kWh. This would cost the owner an additional $46/year via the "Clean Energy Your Way Program"
      - The property owner must maintain active participation in the renewable energy purchasing program for as long as the snowmelt system is operational
      - The property owner is required to submit proof of enrollment to the City on an annual basis.
    - Onsite Renewable Energy Generation
      - The property owner must install renewable energy onsite and submit documentation demonstrating that the renewable energy system generates sufficient energy to power 100% of the energy used by the snowmelt system.
    - In Lieu Fee
      - *The fee in lieu option has not been fully developed, however, it would involve a one-time payment that is due in full prior to ROW permit issuance that is based on the cost equivalent of installing solar onsite. Using the cost of solar installation as the fee in lieu calculation is used by other communities that have exterior energy mitigation requirements. The fee shall be transferred to the City's dedicated sustainability fund for reallocation into community sustainability and energy efficiency projects.*
    - Combination of Onsite Renewable Energy Generation and In Lieu Fee
      - *Staff are also exploring a hybrid pathway that would allow a property owner to propose a combination of onsite renewable energy and in-lieu payment to satisfy the renewable energy requirement.*
- Enforcement
  - Failure to comply with any provision of this section may result in permit revocation.
  - The city reserves the right to require the removal of a snowmelt system that encroaches in the city-owned right-of-way at the owner's expense if it is found to be noncompliant with this section.
- Application Process
  - The owner must submit a right-of-way encroachment permit application subject to administrative approval with the following:
    - Snowmelt system specifications
    - Engineering or installation plans illustrating the snowmelt system and its extension in the right-of-way
    - Calculation of energy usage for entire driveway
    - Proof of 100% energy consumed is renewable through participation in a renewable energy purchasing program or onsite renewable energy generation for 100% of emissions generated by snowmelt system

Pre-Existing Snowmelt Systems in the Right-of-Way

- Repair
    - Repairs to existing systems include but are not limited to leaks, pump motor replacements, resetting of pavers/tubbing, boiler replacement, and electrical disconnect/failures
    - Repairs to existing snowmelt systems in the right-of-way which do not increase the pre-existing energy consumption are exempt from the requirements of this section.
        - For boiler replacements, the replacement must be a high efficiency boiler
- Replacement
    - Replacements include but are not limited to replacing/reconfiguring/expanding existing snowmelt system
    - For the replacement of pre-existing snowmelt systems in the right-of-way, the new system must comply with the design and operational standards and renewable energy requirement of this section.
- A right-of-way encroachment permit is required for all improvements within the City right-of-way. If it is found that a pre-existing snowmelt system in the right-of-way does not have an approved encroachment agreement, the owner is required to obtain one.

Authority of the Administrator

- The administrator is authorized to approve right-of-way encroachment permit applications for snowmelt systems that encroach into the right-of-way.

Snowmelt Systems in the Community Core Zone District

- For projects in the Community Core Zone District where the City right-of-way standards require the installation of a snowmelt for public safety, access, or street maintenance, the system shall comply with the new system design and operational standards and the City shall pay the cost of the renewable energy requirement.
- For projects in the Community Core Zone District voluntarily installing snowmelt systems in the right-of-way, and its installation is not required, the system shall comply with the design and operation standards as well as the renewable energy requirement of this section.

Snowmelt Systems for Municipal Buildings and Facilities

- All new snowmelt systems installed at City-owned buildings or facilities must comply with the new design and operational standards and renewable energy requirement of this

City of Ketchum

Attachment 3:

Snowmelt Carbon Emissions Analysis

Carbon Dioxide (C02) Emission Estimates for One Typical Lot in Ketchum
Estimated by R.Mattison 3/28/2023

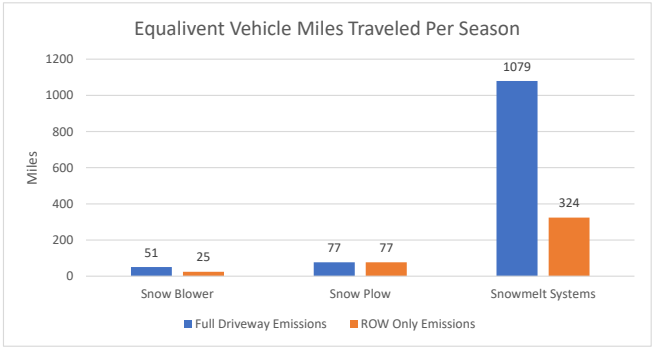
Snowmelt System

Energy Usage Calcuation	Full Driveway	ROW Only	Unit	Notes
Driveway Size	600	180	square ft	20ft x 30ft full driveway, 20ft x 9ft ROW only
Heat Flux Rate	150	150	BTU/hr*sf	estimate based on on-line research
Calculated energy usage	90,000	27,000	BTU/hr	
Heating Time Calculation				
Annual average snow	102	102	inches	Link: https://www.currentresults.com/Weather/Idaho/Places/ketchum-snowfall-totals-snow-accumulation-averages.php
Assumed snowfall rate	1	1	inch per hour	
Pre/post heating factor	1.5	1.5		factor to include false runs and heating prior and after snowfall
Calculated heating time	153	153	hrs of heating time per season	
CO2 Emission Estimate Calculation				
Annual energy usage	13.77	4.13	BTU per year	
CO2 emission coefficient for natural gas	116.65	116.65	Lbs CO2 emissions per Million BTU	Link: https://www.eia.gov/environment/emissions/co2_vol_mass.php
Calculated CO2 emission estimate	**1,606**	**482**	**Lbs CO2 emissions per year**	

Snow Removal Service

Miles Traveled Calcuation	Full Driveway	ROW Only	Unit	Notes
Miles traveled per event	100		miles	Average miles traveled data from 4 local companies (pers.com P. Nied)
No. of events	13		times plowed	Ave of data for winter '21 and '22 from 3 local companies (pers.com. P.Nied)
Total miles traveled per year	1300		miles	
Miles Traveled Per Lot Calculation				
Average # of properties serviced	16.875		per snow plow vehicle	Based on data from 1 local company (8 trucks service 135 homes) pers.com P.Nied
Calculated miles traveled per lot	77.04		miles, per year	
Carbon Emission Estimate Calculation				
Fuel efficiency of plow	12		mpg	
Gasoline usage	6.42		gallons per year per home	
CO2 emission coefficient for natural gas	17.86		Lbs CO2 per gal finished motor gasoline	Link: https://www.eia.gov/environment/emissions/co2_vol_mass.php
Calculated CO2 emission estimate	**115**		**Lbs CO2 emissions per year**	
	14		x times CO2 emission per year then snowmelt system	

Snow Blower	Full Driveway	ROW Only	Unit	Notes
Time to remove 1-inch snow	10	3.33	min	Estimate from Juerg Stauffacher (pers. com P.Nied)
Annual average snow	102	102	inches of snow per year (annual ave for Ketch	Link: https://www.currentresults.com/Weather/Idaho/Places/ketchum-snowfall-totals-snow-accumulation-averages.php
Total annual time snowblowing	1020	340	min	
Total annual time snowblowing	17	6	hours	
Fuel efficiency estimate	4	4	hrs/gal	Estimate from Juerg Stauffacher (pers. com P.Nied)
Estimated annual fuel usage	4.25	1.42	Gal	
CO2 emission coefficient for natural gas	17.86	17.86	Lbs CO2 per gal finished motor gasoline	Link: https://www.eia.gov/environment/emissions/co2_vol_mass.php
Calculated CO2 emission estimate	**76**	**25**	**Lbs CO2 emissions per year**	
	21		x times CO2 emission per year then snowmelt system	



	Natural Gas		
Contributing Factor	**Small**	**Medium**	**Large**
Total Driveway Area (SF)	683	2114	4050
Energy use for operation (BTU/hr OR W)	102,480	317,100	607,500
Energy use per year (BTU)	15,679,440	48,516,300	92,947,500
Energy use per year (therms)	157	485	930
Energy use per year in million BTUs	15.679	48.516	92.948
CO2 emissions per year (lbs)	1829	5659	10842
CO2 emissions per year (tons) (pre-offset)	0.9145	2.8297	5.4212
KWh (true or equivalent)	4595	14219	27241
Cost of REC offset per year	45.95	142.19	272.41
Cost of REC offset over lifetime	1378.61	4265.79	8172.41
Cost of FIL per year	32.56	100.74	192.99
Total FIL	976.69	3022.13	5789.80

Assumptions		**Sources**
102	Inches of snow per season in Ketchum	https://www.currentresults.com/Weather/Idaho/Places/ketchum-
1	Inch per hour snow rate	
35.6	Average global carbon price ($) per ton of carbon	https://carbonpricingdashboard.worldbank.org/compliance/price
150	BTU/hr*sf of energy use	https://www.pmmag.com/topics/6653-plumbing-mechanical-
116.65	Lbs of CO2 per million BTU of natural gas	https://www.eia.gov/environment/emissions/co2_vol_mass.php
1	Dollar/100 KWh for Idaho Power's block option rate	https://www.idahopower.com/energy-environment/green-choices/clean-energy-your-way/clean-energy-for-your-home/clean-energy-your-way-flexible/
1.5	Pre and post slab heating factor	
153	hours of heating time	
0.635	lbs of CO2 equivalent per KWh	https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results
0.0003	tons of CO2 equivalent per KWh	https://www.epa.gov/energy/greenhouse-gas-equivalencies-

This is equivalent to CO2 emissions from:			
Gallons of gasoline consumed	93.4	289	553
Gallons of disel consumed	81.5	252	483
Pounds of coal burned	922	2851	5463

This is equivalent of carbon sequestered by:			
Tree seedlings grown for 10 year	93.4	289	553
Acres of U.S. forests in one year	81.5	252	483
	922	2851	5463

Driveway Examples

	Total Driveway	ROW Only
Small: 691 E 5th St	24.4'x28'	9'x28'
	683.2	252
Medium: 219 Hillside Drive	20-26' x 96.7'	20x33
	2114	660
Large: Snowbird Townhomes	4050	320