MEMORANDUM

To: Burlington City Council

From: Darren Springer, General Manager
Chris Burns, Director of Energy Services
Jen Green, Director of Sustainability and Workforce Development
Bill Ward, Director of Permitting & Inspections
Patricia Wehman, Housing Division Manager

Date: 12/5/2022

Subject: Final Report on Thermal Charter Change Work/City Council Resolution Relating to Decarbonizing All Buildings in Burlington by 2030

Burlington Electric Department (BED) and Department of Permitting and Inspections (DPI) are pleased to provide this final report and policy recommendations to the City Council related to our work on the May 9, 2022 Council Resolution to Decarbonize All Buildings in Burlington by 2030. The Resolution is included as an attachment to this memo, as well as our interim memo from July 18, 2022.

Process and Work Since the July 18, 2022, Memo

In the several months since issuing our interim memo, BED and DPI have engaged in additional outreach and analysis, including:

- The BED and DPI teams held two group stakeholder meetings with building owners on August 30, and October 25, as well as some individual meetings with stakeholders.
- BED participated in a 2030 District webinar with building owners and building design professionals.
- BED has worked intensively with the Building Electrification Institute (BEI) to analyze policy proposals and draw on their expertise working with cities around the nation.
- BED attended NPA meetings to share possible approaches and seek feedback from the community (Wards 1/8 Nov. 9; Wards 2/3 Nov. 10; Ward 5 Nov. 17; Wards 4/7 Nov. 30; Ward 6 Dec. 1).

Policy Recommendations

Based on our additional work, BED and DPI offer the following proposed policy recommendations for consideration, intended to balance cost and technical considerations with the need for additional climate progress in our building sector. *We note and emphasize these recommendations would not apply to existing*

residential buildings (including single family homes, apartment buildings, or condos), or to small commercial buildings. These are focused to solely impact new construction permitted beginning in 2024, large existing commercial buildings, and City buildings.

- **Cross-Cutting Definitions:**

    - ***Carbon Pollution Impact Fee –*** A fee, subject to voter approval, that would be assessed for alternative compliance for new construction or large existing buildings that do not use a renewable technology or renewable fuel under this proposed policy. We propose the fee would start at $150 per ton of greenhouse gas emissions, for permit applications starting in 2024. It would increase annually at the rate of inflation but limited to no more than a 5 percent increase in any given year. The fee would be assessed based on a net present value calculation of the total amount of greenhouse gas emissions that would be produced by the thermal system over its lifetime and charged upfront at the time of permit. The goal would be to level the playing field for renewable technologies and represent the full societal, health, and environmental cost of the carbon pollution of the fossil fuel system.

      We note that some cities are using higher carbon alternative compliance fees in their thermal sector policies. New York is using $268 per ton, and Boston is using $234 per ton. On the other hand, Vermont's Climate Council has looked at analysis suggesting $128 per ton for use as a social cost of carbon in Vermont.

      For existing buildings only, we propose capping the amount of the carbon pollution fee for any thermal system covered by the proposed policy to 75 percent of the system's installed cost. This reflects the fact that existing buildings with existing distribution systems may have fewer cost-effective options in certain scenarios to move to electrification relative to new construction.

    - ***Renewable Technology or Renewable Fuel –*** Any renewable thermal technology or fuel, as defined in Burlington Ordinance Chapter 8, Article V. We would propose also including renewably-sourced hydrogen as an additional option, and creating an option for DPI to certify additional renewable fuel or technology options as new fuels or technologies come online, including options to use customer-procured or on-site renewable electricity generation that supports thermal decarbonization. We also propose clarifying that for a renewable fuel such as renewable gas or renewable thermal credits provided by the proposed McNeil district energy system, compliance could be indicated either by a long-term contract for the fuel with the provider that lasts at least as long as the expected lifetime of the permitted system, or requiring a compliance certification annually from the permit applicant and/or fuel provider that the applicant is purchasing renewable fuel to cover the entire need of the thermal system. In the event the annual certification is selected, non-compliance in a given year would subject the applicant to the carbon pollution impact fee for a pro rata share of the remaining expected life of the conventional thermal system installed.

      Further, starting in 2023 as it relates to renewable district energy, such as is proposed for connecting the McNeil plant to customers in the City, for a customer purchasing Renewable Thermal Credits from the district energy system for utilization in a Burlington building or

buildings prior to incurring a compliance obligation under this proposed policy (either for new construction or related to a large existing building), the total cumulative quantity of district energy Renewable Thermal Credits purchased prior to the compliance obligation can count as a credit toward offsetting the carbon pollution impact fee. This credit could also be applied for customers purchasing other renewable fuel.

- **New Construction**: BED and DPI propose expanding upon the existing primary renewable heating requirement in Ordinance Chapter 8, Article V. We propose that, starting January 1, 2024, any permit for new construction of a building in Burlington require that not only the primary heating system, but all thermal systems – including domestic water heating, back-up heating systems, cooking, and appliances – be renewable under the definition above, or pay the carbon pollution impact fee.

  We note that we heard from affordable housing developers and providers that have raised a concern around the inclusion of domestic water heating in this policy in the near-term due to concerns about operating and maintenance costs in a multi-family building context based on current available technologies, and discussed a delay on the application of that provision to affordable housing developments. It may be appropriate to delay implementation until 2026 of the requirement for renewable domestic water heating in multi-unit residential new construction buildings to allow for additional commercial technology to be available.

  In addition, we propose that the existing renewable primary heating system requirement also be subject to the alternative compliance carbon pollution impact fee, and the exemption process in that Ordinance be removed in lieu of the fee. This will ensure that all new buildings are designed consistent with our Net Zero Energy Roadmap vision and our local climate goals.

- **Major Renovations**: BED and DPI believe this area requires additional study, given the complexities. We recommend taking no action at this time for major renovations, while leaving this open for future action while we gain policy implementation experience with the proposal for new construction and large existing buildings.

- **Large Existing Buildings**:

  - ***Definition*** **-** BED and DPI propose defining a "Large Existing Building" for purposes of a proposed ordinance as a building that is 50,000 square feet or larger, accounting for space-conditioned square footage. The requirement would only be based on that square footage, and would not be impacted by whether, for example, two smaller buildings are connected to a central heating system. There are approximately ~80 buildings that fit this 50,000 square foot or larger definition and are non-residential within the City.

  - ***Exemptions*** **-** We propose that all residential buildings, including affordable housing and rental or condo or dormitory properties, be excluded from this definition. We also propose that buildings listed, or eligible to be listed, on the National Historic Register that would otherwise be covered be allowed to apply for an exemption, provided they can demonstrate that there is no renewable technology or renewable fuel option available to the building due to the historic

nature of the building and limitations imposed by being on the Register, or eligibility to be on the Register.

- ***Requirements –*** We would propose that starting January 1, 2024, buildings in this category that submit a permit to DPI for a new heating system or domestic hot water system be required to use a renewable technology or renewable fuel in order to obtain the new permit. In the event the use of such a technology or fuel is impractical or not cost-effective, the building would be subject to the alternative compliance carbon pollution impact fee. Process steam, including steam for cooking for dining, humidification for library storage or at museums, or for research, and that is not utilized for space conditioning is not included in the requirement. For situations where one or more buildings are over 50,000 square feet and connected to the same central plant, possibly along with other smaller buildings, the requirement should apply to the portion of fossil fuel output attributable to space conditioning and domestic water heating for the building or building(s) that are 50,000 square feet or larger and not the entire central plant.

  Credit – For buildings subject to this requirement, if the building owner undertakes to replace a thermal system not covered under this requirement (i.e. cooking, appliances, process heat, etc.) with a renewable system on or after January 1, 2023, the building would receive credit for the lifetime greenhouse gas emissions reductions from that new system against any future carbon pollution impact fee from a system covered under this requirement (heating or domestic hot water). A portfolio approach may be used to generate credits where a building owner has multiple buildings. For instance, an upgrade that reduces thermal fossil fuel use done in an exempted building. Further, the purchase of district energy or renewable fuel starting in 2023 can create a credit against future obligations as outlined in the definitions section.

- ***Emergency Waiver –*** DPI should have the ability to waive the requirements for an emergency temporary system installation in the event of an unexpected thermal system failure, but the requirements would still apply to any permit for a permanent replacement system.

- **City Buildings**: BED and DPI propose that all City Buildings be subject to the "large existing building" requirements with the exception that the City not be subject to the fee. Instead, the City should ensure that starting January 1, 2024, all City buildings replacing a heating system or water heating system use renewable technology or renewable fuel for the replacement, with no alternative compliance fee option.

BED and DPI recommend that the proceeds from the carbon pollution impact fee could be used for the following purposes:

- Capital needs for the City Fleet to continue to electrify, reducing emissions and saving taxpayers on operating costs;

- A new City fund to support clean heating technology installations for low-income Burlington households and renters, consistent with the Advisory Ballot Question 7 from Town Meeting Day 2021; and

- For existing buildings that are assessed a carbon pollution impact fee, a significant portion could be available to be refunded to the payor, if the payor submits a plan to support new projects at their site or in their Burlington operations to reduce emissions in their own fleet (vehicles, lawn equipment, etc.) or energy efficiency or electrification work that reduces fossil fuel use in their facilities. The payor should submit a reimbursement request for such projects within one year from project close out.

We propose periodic review by the Administration Council and/or Council committees, at least every three years, of the broader policy as well as how certain pieces (such as the ability of payors to utilize a portion of their carbon pollution impact fee at existing buildings to pursue other emissions reduction projects) are working.

Analysis

BED worked with BEI to conduct analysis using real world recent examples of new construction and existing building thermal systems design in Burlington.

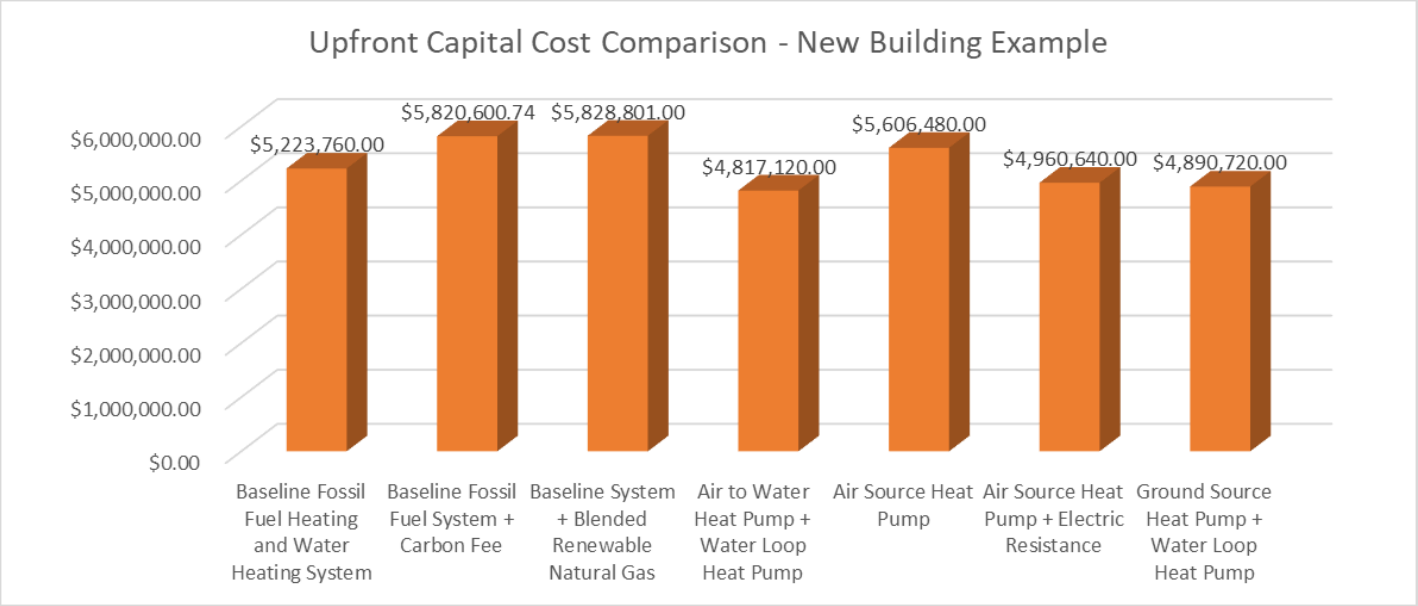
Upfront Capital Costs

Please note these examples are illustrative, but not representative of the economics for all building types. The cost and opportunity to install ground source heat pumps, for example, could vary based on conditions at each individual site. The examples below also look primarily at upfront capital costs, not longer-term operating costs.

- **New Construction -** The below example[1] is based on an actual new construction building in Burlington. It outlines how the fee would work in practice, and how it would impact potential capital investment decisions relative to a baseline fossil fuel system and renewable options. What the chart demonstrates is that in this example, the conventional baseline fossil fuel heating and water heating system was approximately $5.2 million to install. Some electrification technologies had a cheaper upfront cost, such as ground source heat pumps with a water loop (approx. $4.9 million), while some were higher such as air source heat pumps (approx. $5.6 million). When adding in the carbon pollution impact fee, the baseline system cost would be approx. $5.8 million, and all of the electrification technologies would then be lower cost than paying for a conventional system plus the carbon pollution impact fee.

New Construction Building	Install Cost	Fee or Tariff	Total
Baseline Fossil Fuel Heating and Water Heating System	$5,223,760.00	0	$5,223,760.00
Baseline Fossil Fuel System + Carbon Fee	$5,223,760.00	596840.74	$5,820,600.74
Baseline System + Blended Renewable Natural Gas	$5,223,760.00	$605,041.00	$5,828,801.00
Air to Water Heat Pump + Water Loop Heat Pump	$4,817,120.00	0	$4,817,120.00
Air Source Heat Pump	$5,606,480.00	0	$5,606,480.00
Air Source Heat Pump + Electric Resistance	$4,960,640.00	0	$4,960,640.00
Ground Source Heat Pump + Water Loop Heat Pump	$4,890,720.00	0	$4,890,720.00

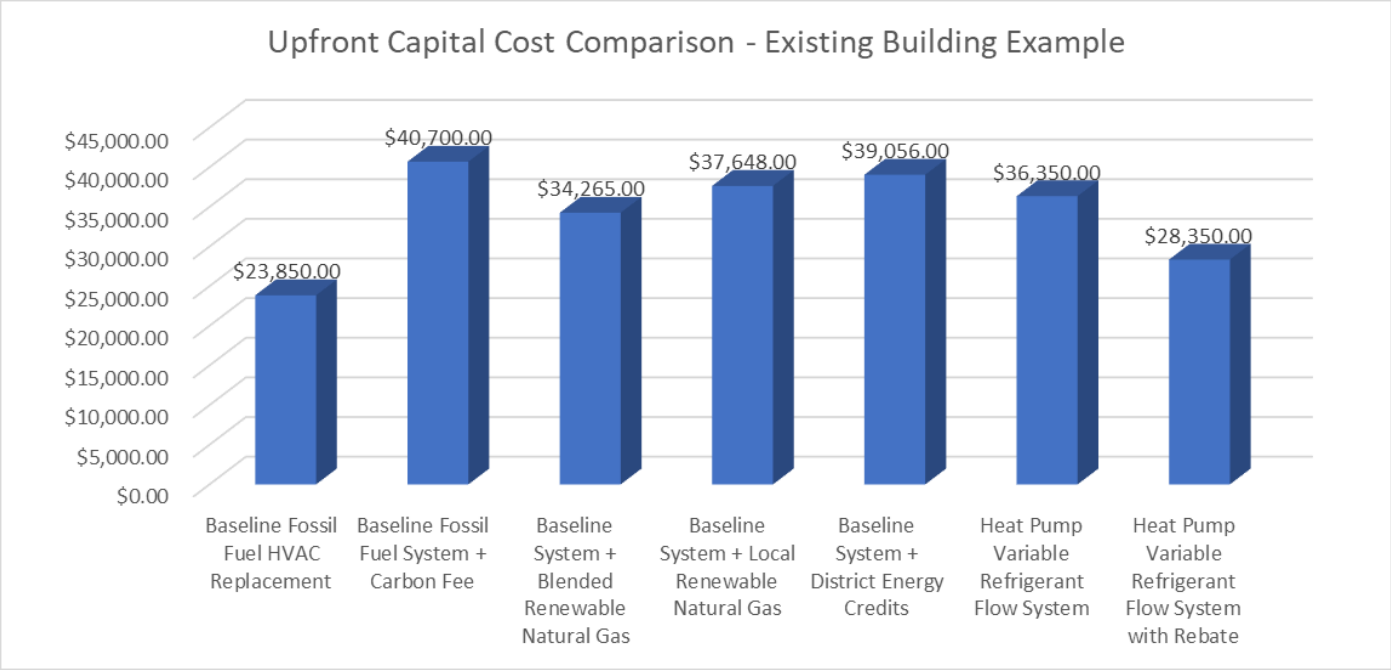
[1] The carbon pollution fee and the renewable fuel options are based on net present values but determined using assumptions for the lifetime fuel use of the system or systems.



We also worked with BEI to analyze an existing commercial building example. The below looks at an existing commercial building in Burlington, just under 50,000 square feet, that replaced a natural gas rooftop unit with a heat pump variable refrigerant flow (VRF) unit.[2] The chart shows that the baseline fossil fuel system had an install cost of $23,850. That was less expensive than a heat pump VRF system which cost $36,350. However, when the baseline system includes a carbon pollution impact fee that accounts for externalized costs of pollution, the conventional system cost would be $40,700, making the heat pump system more cost competitive. Further, when you include the utility rebate for the heat pump system, the comparison would be $40,700 for baseline plus carbon fee compared to $28,350 for the heat pump system. In addition, all renewable fuel options (renewable gas or district energy) all would be more cost-effective than the baseline fossil fuel system plus the carbon pollution fee. The carbon pollution impact fee helps level the playing field.

Building Example	Install cost	Fees/ or Tariff	Total
Baseline Fossil Fuel HVAC Replacement	$23,850.00	$0.00	$23,850.00
Baseline Fossil Fuel System + Carbon Fee	$23,850.00	$16,850.00	$40,700.00
Baseline System + Blended Renewable Natural Gas	$23,850.00	$10,415.00	$34,265.00
Baseline System + Local Renewable Natural Gas	$23,850.00	$13,798.00	$37,648.00
Baseline System + District Energy Credits	$23,850.00	$15,206.00	$39,056.00
Heat Pump Variable Refrigerant Flow System	$36,350.00	$0.00	$36,350.00
Heat Pump Variable Refrigerant Flow System with Rebate	$28,350.00		$28,350.00

[2] Note – District energy system credit price is reduced significantly after first 20 years, when infrastructure financing costs are paid off. The carbon fee, Renewable Natural Gas prices, and district energy system credit prices are net present value (utilizing 4.5% discount rate).



Operating Costs

Operating costs is another aspect that staff considered when developing these policy recommendations. In particular, stakeholders inquired about the annual operating cost difference between conventional natural gas space heating equipment (over 95% of Burlington's buildings utilize natural gas for space heating) and heat pump technology at current rates (current rates can be found on BED's and VGS's websites). Currently, annual operating costs in a single-family residential context for high efficiency heat pumps equipment can be close to, and sometimes lower than, conventional heating systems. This is partly driven by BED's lower residential rates relative to other parts of Vermont and the New England region.

Work with BEI has included the development of a Home Electrification Impact Calculator that models operating costs and greenhouse gas emission reductions. Modeling results of a typical single-family home shows heat pump savings of $80 to $150 annually at current rates. For an apartment in a small multi-family building, heat pump savings at current rates in the Calculator would be $40 to $90 annually. Using a different calculator with different assumptions from Efficiency Maine, but utilizing Burlington rates, shows an $8 annual cost increase for a heat pump relative to a gas boiler. It should also be noted that heat pumps provide air conditioning at much higher efficiency levels so further annual operating savings are possible.

For larger multi-unit residential buildings or commercial buildings, the operating cost economics can vary from the smaller residential analysis above, and the operating costs for domestic water heating systems also can vary. It also is important to recognize that the cost delta for heat pump technology relative to conventional systems has fluctuated over the past decade as rates for electricity and natural gas have changed, and there have been times when heat pumps have cost more to operate. Future operating costs will depend on the relative rate pressure on the various fuel sources. In addition we note some affordable housing developers have raised concern about the maintenance costs and expected system lifetime for heat pump-based systems relative to fossil fuel systems.

We propose ensuring that in drafting the policy, all available state and federal incentives as well as utility incentives be able to be applied to ensure the most cost-effective application of the policy.

Conclusion

BED and DPI make the above recommendations based on our best assessment of the opportunity to make cost-effective, practical progress towards Burlington's Net Zero Energy goals while reducing fossil fuel use in the thermal/building sector. We look forward to answering questions on this report at the December 5, 2022 City Council meeting, and appreciate the multiple steps – including both Council and voter consideration as well as subsequent work on Ordinance language if voters approve the proposal – required to enact these policy recommendations.

Resolution Relating to

IMPLEMENTATION OF A CARBON POLLUTION IMPACT FEE FOR NEW CONSTRUCTION AND LARGE EXISTING COMMERCIAL AND INDUSTRIAL BUILDINGS 50,000 SQUARE FEET OR LARGER

RESOLUTION_____

Sponsor(s):
Introduced: _____
Referred to: _____
_____
Action: _____
Date: _____
Signed by Mayor: _____

CITY OF BURLINGTON

In the year Two Thousand Twenty-Two ……

Resolved by the City Council of the City of Burlington, as follows:

That WHEREAS, The City of Burlington has declared a climate emergency exists, and on September 5th, 2019 the City and Burlington Electric Department issued the Net Zero Energy Roadmap ("the Roadmap") to guide progress in reducing greenhouse gas emissions in buildings and ground transportation; and

WHEREAS, the Roadmap identified emissions from buildings as the second largest source of greenhouse gas emissions in the city; and

WHEREAS, the City enacted new ordinances in 2021 to address rental weatherization standards, and require primary renewable heating systems in new construction; and

WHEREAS in 2022 Burlington's neighboring community, the City of South Burlington, adopted a similar primary renewable heating system ordinance and also include requirements for renewable domestic water heating as well, aligning the two cities in both requiring the use of renewable systems and fuels for new construction; and

WHEREAS, on March 2, 2021, Burlington voters approved a proposed change to the City charter that would allow the City to create policies to regulate greenhouse gas emissions in buildings, and an advisory ballot question focused on providing equity in the development of such policies; and

WHEREAS, on April 20, 2022, the Governor signed the charter change into law after it was approved by the Vermont Legislature; and

WHEREAS, on May 9th, 2022, the City Council passed a Resolution seeking policy recommendations under the charter change from Burlington Electric Department and the Department of Permitting and Inspections; and

WHEREAS, The Burlington Electric Department and Department of Permitting and Inspections issued an interim report July 18th, 2022, and final report December 5, 2022 to the City Council; and

WHEREAS, the Departments recommended proposed requirements to reduce fossil fuel use and greenhouse gas emissions in buildings, including starting in 2024 for new construction to use renewable energy systems or renewable fuels for all thermal energy uses (with the exception of using 2026 as a start date for larger multi-family buildings for domestic water heating), and for large existing buildings and City

buildings to install renewable energy systems or conventional systems with renewable fuels when seeking a permit to replace a space conditioning system or domestic water heating system; and

WHEREAS, the Departments proposed the use of an upfront carbon pollution impact fee that would account for the environmental, health and societal impacts from greenhouse gas emissions from fossil fuel-based systems, as a means of alternative compliance for new construction buildings and large existing commercial and industrial buildings with 50,000 square feet or more of space conditioned area as one option to meet the proposed policy requirements when the building chooses to use fossil fuel systems; and

WHEREAS the charter change approved by voters in March of 2021 and subsequently approved by the Legislature and signed by the Governor requires the City to seek additional voter approval when it proposes to utilize a carbon impact or alternative compliance fee;

NOW, THEREFORE, BE IT RESOLVED that the City Council hereby requests, pursuant to the City Charter Section 48(66), that the following question be placed before the voters on the ballot of the Annual City Meeting to be held on March 7, 2023:

"Shall the City Council, in order to reduce greenhouse gas emissions in the City, be authorized starting January 1, 2024, to implement an upfront carbon pollution impact fee in the permitting process that accounts for the lifetime expected greenhouse gas emissions of the fossil fuel system, with the fee starting at $150 per ton and rising annually at the rate of regional inflation but capped at no more than a 5 percent annual increase, for: new construction buildings that install fossil fuel thermal energy systems instead of using renewable energy systems or renewable fuels, with the exception that the fee would not be implemented until January 1, 2026 for domestic water heating systems in new construction multi-family residential buildings with more than 4 units; and for existing commercial and industrial buildings 50,000 square feet or larger when the building is installing fossil fuel thermal energy space conditioning or domestic water heating systems instead of using renewable systems or renewable fuels?"

The fee proceeds could support one or more of the following: capital investments in converting the City's vehicle fleet to electric vehicles; a new City fund to support clean heating technology installations for low-income Burlington households and renters; and/or in the case of existing building payors, greenhouse gas emissions reductions projects at their building or facilities in Burlington.

DRAFT

MEMORANDUM

To: Burlington City Council

From: Darren Springer, General Manager
Chris Burns, Director of Energy Services
Jen Green, Director of Sustainability and Workforce Development
Bill Ward, Director of Permitting & Inspections
Patricia Wehman, Housing Division Manager

Date: 12/12/2022

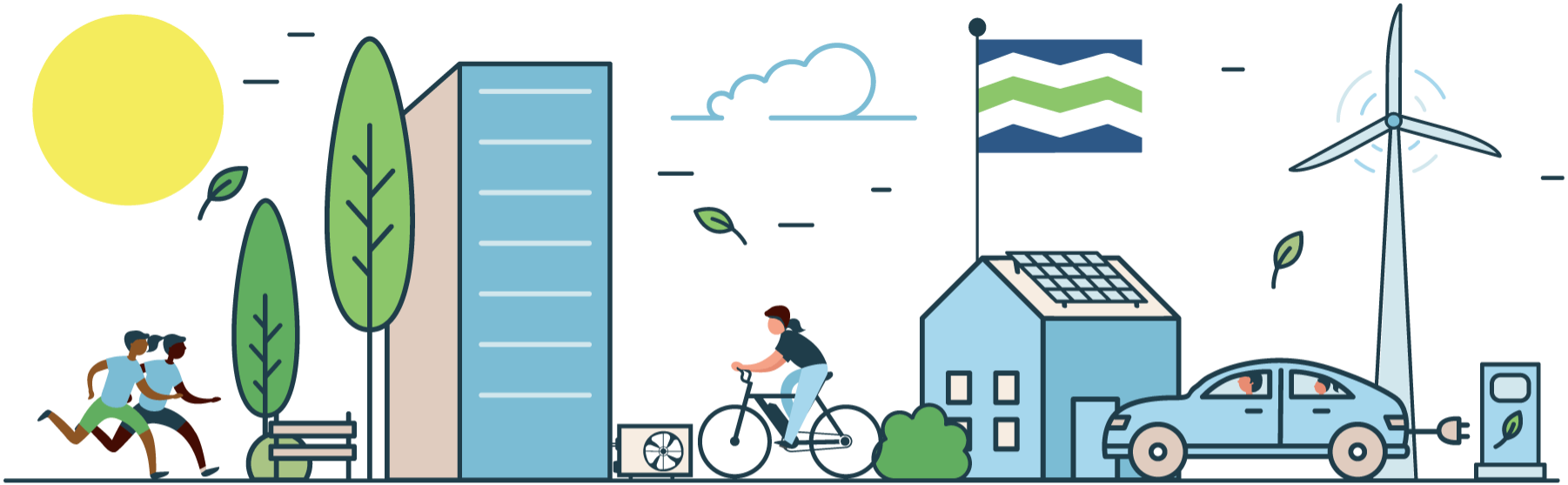
Subject: Resolution for Thermal Policy/Carbon Pollution Impact Fee

On 12/5/2022 Burlington Electric Department (BED) and Department of Permitting and Inspections (DPI) submitting a final report to the City Council related to our work on the May 9, 2022 Council Resolution to Decarbonize All Buildings in Burlington by 2030. Since submitting the report, we have consulted with the City Attorney's Office and understand that an appropriate next step would be to seek referral of the attached Resolution to the Transportation Energy Utilities Committee (TEUC) to review the proposed recommendations and consider possible language to be placed on the 2023 Annual City Meeting ballot related to the carbon pollution impact fee as one option for alternative compliance under the proposed policy.

Our Departments appreciate the Council's time on 12/5 reviewing the report recommendations with us, and we look forward to working with the Council, and if referred there with the TEUC, to continue to advance the proposed recommendations for further consideration.

Burlington Electric Department
585 Pine Street Burlington, VT 05401
burlingtonelectric.com

Phone 802.658.0300



NET ZERO ENERGY

BURLINGTON VERMONT

NET ZERO ENERGY
BURLINGTON VERMONT

Timeline and Context for Thermal Energy Policy Development in Burlington:

- 2019 Net Zero Energy Roadmap presented by Mayor Weinberger and Burlington Electric
- October 2020 Mayor's Building Emissions Reduction Proposal
- Town Meeting Day Ballot Questions Charter Change March 2021
- Rental Weatherization Standards Adopted May 2021
- Renewable Heating Ordinance Adopted Summer/Fall 2021
- Charter Change Enacted by Legislature/Governor Spring 2022
- Council Resolution May 2022 for Decarbonization
- BED/DPI Interim Report July 2022
- BED/DPI Final Report December 2022

NET ZERO ENERGY
BURLINGTON VERMONT

Process Since July 2022 Interim Report:

- The BED and DPI teams held two group stakeholder meetings with building owners on August 30, and October 25, as well as some individual meetings with stakeholders.

- BED participated in a 2030 District webinar with building owners and building design professionals.

- BED has worked intensively with the Building Electrification Institute (BEI) to analyze policy proposals and draw on their expertise working with cities around the nation.

- BED attended NPA meetings to share possible approaches and seek feedback from the community (Wards 1/8 Nov. 9; Wards 2/3 Nov. 10; Ward 5 Nov. 17; Wards 4/7 Nov. 30; Ward 6 Dec. 1).

NET ZERO ENERGY
BURLINGTON VERMONT

Buildings Covered Under Proposed Policy:

- New Construction
- Large Existing Commercial/Industrial Buildings over 50,000 Square Feet
- Municipal/City Buildings

Buildings Not Covered Under Proposed Policy:

- ALL Existing Residential Buildings (including single-family, multi-family, rental, condo, and affordable housing buildings)
- ALL Existing Small Business Buildings
- ALL Existing Commercial/Industrial Buildings under 50,000 square feet

NET ZERO ENERGY
BURLINGTON VERMONT

Policy Recommendations for New Construction:

- **100% Renewable -** Require, starting in 2024 and subject to voter approval, new construction to be 100 percent renewable for thermal energy, including heating, water heating, cooking, appliances, and other systems.

- **Broad definition of renewable** - including geothermal heat pumps, air source and water source heat pumps, heat pump VRF, advanced wood heating, and conventional systems with renewable fuel supply (such as renewable gas, biodiesel, renewable hydrogen, or renewable district energy).

- **Alternative Compliance Carbon Pollution Impact Fee –** If a building does not use a renewable fuel or technology, assess at time of permit a carbon pollution impact fee accounting for the lifetime emissions of the fossil fuel system.

NET ZERO ENERGY
BURLINGTON VERMONT

Policy Recommendations for Large Existing Buildings and City Buildings:

- **Requirement -** Require, starting in 2024, 100 percent renewable technology or fuels for replacement heating or water heating systems at time of permit. If using fossil fuel system, carbon pollution impact fee applies for large existing buildings (with cap of 75% of installed cost of conventional system).

- **Definition of large existing building** - Over 50,000 square feet of space conditioned area. Approximately 80 buildings in the City. Exempts all residential/multi-family/affordable housing, as well as small businesses. Exemption process for historic buildings.

- **Credit for Emissions Reduction –** A building owner taking action to reduce emissions outside the scope of the policy, including purchasing renewable fuel or replacing other systems (cooking, appliances, etc.) with renewable, gets credit against future compliance.

NET ZERO ENERGY
BURLINGTON VERMONT

Policy Recommendations for Use of Carbon Pollution Impact Fee Proceeds:

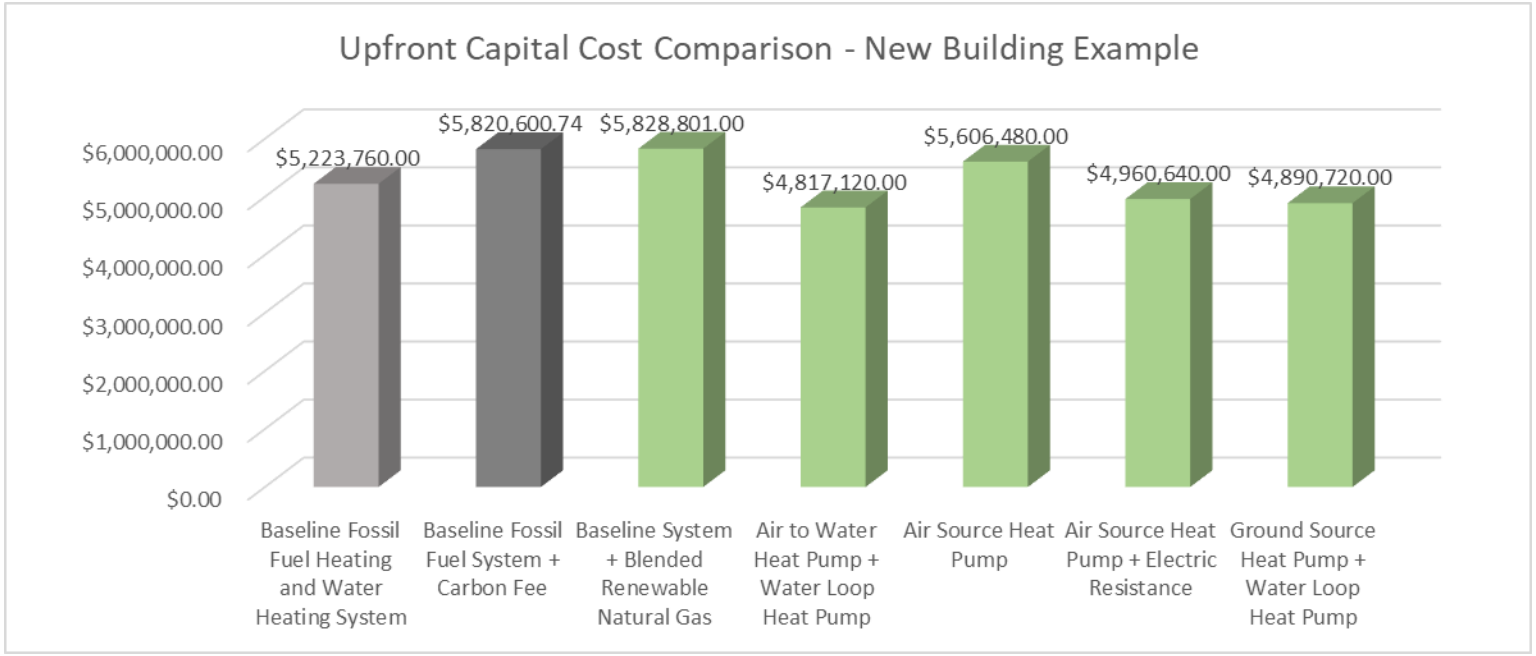
- **City Fleet –** Support capital needs to electrify City vehicles and fleet.

- **Clean Heating Technologies for Low-Income Burlingtonians –** Create new city fund to support installation of clean heating technologies for low-income households and renters, consistent with Advisory Question 7 from Town Meeting Day 2021.

- **For Existing Building Payors –** For fee payors in existing buildings, provide a substantial portion available back to the payor if submit a plan to reduce emissions at their building or facility, including electrification (building systems, vehicles, lawn care) or energy efficiency work.

NET ZERO ENERGY
BURLINGTON VERMONT

Analysis, New Building Example:

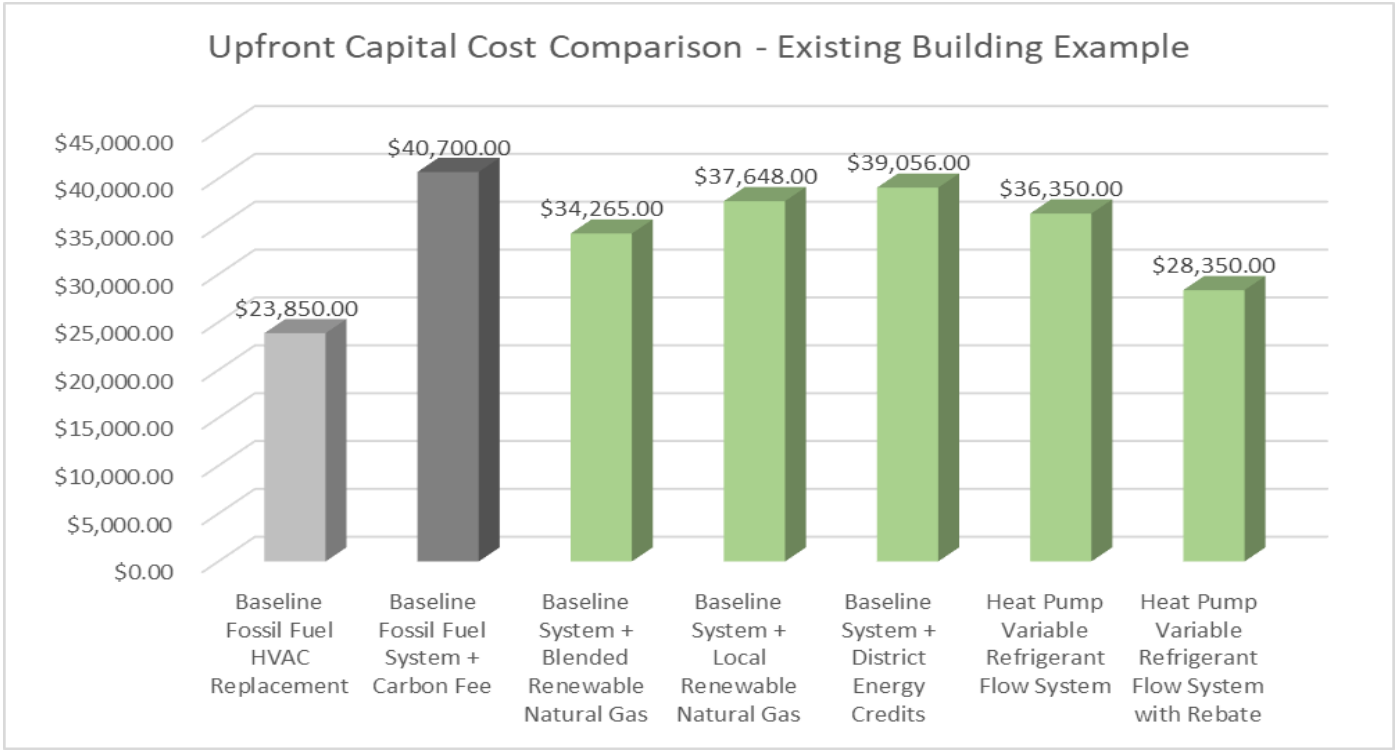


NET ZERO ENERGY
BURLINGTON VERMONT

BURLINGTON Electric DEPARTMENT

CITY OF BURLINGTON, VT. ORGANIZED FEB. 21, 1865

Analysis, Existing Building Example:



OFFICE OF THE CLERK/TREASURER

City of Burlington

City Hall, Room 20, 149 Church Street, Burlington, VT 05401

Voice (802) 865-70
Fax (802) 865-70
TTY (802) 865-71

MEMORANDUM

TO: Transportation, Energy & Utilities Committee Members

FROM: Lori Olberg, Licensing, Voting and Records Coordinator

DATE: December 6, 2022

SUBJECT: 12/5/22 City Council Communication: Pike Porter, re: Fw: Greenhouse Gas, CAP resolution draft for your consideration

Enclosed please find a copy of this communication that was referred to your Committee for further discussion and deliberations. Please keep this as part of your records.

Thank you.

COMMUNICATION
DATE: 12/5/22
AGENDA ITEM # 6.25

Lori Olberg

From: Gene Bergman
Sent: Wednesday, November 30, 2022 3:50 PM
To: Karen Paul; Lori Olberg
Subject: Fw: Greenhouse Gas, CAP resolution draft for your consideration
Attachments: GHG resolution.pdf; DAF Climate Action Plan - FINAL Oct 2022.pdf

At their meeting of _____ the Burlington City Council voted to waive the reading, accept this communication and place it on file.
Attest: Lori Olberg

Karen,

Can you please place Pike's communication and his attachments on the next consent agenda with the act being to waive the reading and refer it to the council's TEUC for further discussion and deliberations?

Thanks.

Gene

From: Pike Porter <pikeporter@gmail.com>
Sent: Wednesday, November 30, 2022 3:40 PM
To: Perri Freeman <pfreeman@burlingtonvt.gov>; Mark Barlow <mbarlow@burlingtonvt.gov>; Jack Hanson <jhanson@burlingtonvt.gov>; Sarah Carpenter <scarpenter@burlingtonvt.gov>; Joseph Magee <jmagee@burlingtonvt.gov>; jcmagee626@gmail.com <jcmagee626@gmail.com>; Gene Bergman <gbergman@burlingtonvt.gov>; Ali Dieng <adieng@burlingtonvt.gov>; Joan Shannon <jshannon@burlingtonvt.gov> Zoraya Hightower <Zhightower@burlingtonvt.gov>; Benjamin Traverse <btraverse@burlingtonvt.gov>; Karen Paul <kpaul@burlingtonvt.gov>
Subject: Fwd: Greenhouse Gas, CAP resolution draft for your consideration

[WARNING]: This email was sent from someone outside of the City of Burlington.

Hello my bold climate crisis warriors,

I noticed this afternoon that while I sent the email below to the TUEC members, I did not send it to the rest of the ci council. Perhaps that is why it has languished.

Last month the Air Force published its climate action plan. I've attached a copy for your reference to this email. The internal highlights are my own.

The AF CAP aligns very well with the goals the city council professed in the 2019 emergency climate resolution. I've taken the liberty to draft a resolution I hope you will consider that recognizes the aligned goals of Burlington and the and seeks to find one or more specific actions to meet those goals. Starting a discussion is a first step to reducing F-3 emissions and a resolution similar to the one I've attached would get that conversation going.

Pike

---------- Forwarded message ---------
From: **Pike Porter** <pikeporter@gmail.com>
Date: Wed, Oct 12, 2022 at 1:27 PM

Subject: Greenhouse Gas, CAP resolution draft for your consideration
To: Karen Paul <kpaul@burlingtonvt.gov>, Gene Bergman <gbergman@burlingtonvt.gov>, Mark Barlow <mbarlow@burlingtonvt.gov>

Hi Mark, Gene, and Karen,

Last week the Air Force published its climate action plan. I've attached a copy for your reference to this email. The internal highlights are my own.

The AF CAP aligns very well with the goals the CC professed in 2019. I've taken the liberty to draft a resolution I ho you will consider that recognizes the aligned goals and seeks to find one or more specific actions to meet those goa

Pike

Please note that this communication and any response to it will be maintained as a public record and may be subje disclosure under the Vermont Public Records Act.

In the year 2023,
Resolved by the City of Burlington as follows that

WHEREAS the United States Air Force published its Climate Action Plan (AFCAP) in October, 2022, known fully as *Department of the Air Force, Office of the Assistant Secretary for Energy, Installations, and Environment. October 2022. Department of the Air Force Climate Action Plan. Washington, DC.*, and

WHEREAS on October 7, 2021 Secretary Of Defense Lloyd J. Austin III stated that "Climate change is an existential threat to our nation's security, and the Department of Defense must act swiftly and boldly to take on this challenge" (2), and

WHEREAS Frank Kendall, Secretary of the Air Force, stated that "Climate change is reshaping the increasingly complex global security environment and the Department of the Air Force must adapt and respond to that threat," and stated that the Air Force must "recognize and reduce the department's role in contributing to climate change," and further stated that the Air Force, "cannot delay in addressing the impacts of climate change," (1), and

WHEREAS the Air Force "recognizes that we are contributing to global climate change. The department is responsible for the largest portion of Department of Defense's (DoD) greenhouse gas emissions" (4), and that "aviation fuel and energy to power aircraft comprises over 80 percent of the department's energy use" (15), and the "reduction of fuel use offers the most significant opportunity to optimize our operational capability while simultaneously reducing greenhouse gas emissions" (15), and

WHEREAS the Air Force is working to "increase the use of simulation and augmented reality systems" for mission training (16), to reduce fuel usage and greenhouse gas emissions, and

WHEREAS the Air Force believes "collaboration with surrounding communities and industry is essential" to reducing greenhouse gas emissions (9), and the AFCAP advises that "collaborating with others is foundational to addressing the effects of climate change and to reducing greenhouse gas emissions. Close cooperation with...state and local entities...and the American people...will help to secure our common interests and promote our shared values" (12-13), and

WHEREAS the Air Force further believes, "To institute enduring advantages while combating the effects of climate change, we must fundamentally shift the way the department thinks, prepares, and acts. As we execute the department's priorities through our planning documents, in our actions, and across our acquisitions, we must be deliberate in considering climate risks and implications" (11), and

WHEREAS, the City Council of the City of Burlington resolved on September 23, 2019 to commit achieving net zero greenhouse gas emissions by 2030, and found "that the United States of America has disproportionately contributed to the climate emergency...and thus bears an extraordinary responsibility to rapidly decarbonize and support global climate efforts going forward," and

WHEREAS the City Council of the City of Burlington further found that "restoring a safe and stable climate requires a society-wide emergency mobilization on a scale not seen since World War II to reach zero greenhouse gas emissions across all sectors at wartime speed, to rapidly and safely drawdown or

remove all the excess carbon from the atmosphere, and to implement measures to protect all people and species from consequences of an abrupt climate crisis;" and

WHEREAS the City of Burlington is not currently on track to meet its net-zero emissions target by 2030, and
WHEREAS the F-35 training mission flights originating from the Burlington International Airport create as a conservative estimate over 100,000 tons to CO2 equivalent greenhouse gas emissions each year, and

WHEREAS, the City Council of the City of Burlington finds the Air Force goals of reducing greenhouse gas emissions and working collaboratively with communities to reduce these greenhouse gas emissions in direct alignment with the City of Burlington's goal of net zero greenhouse gas emissions by 2030, and

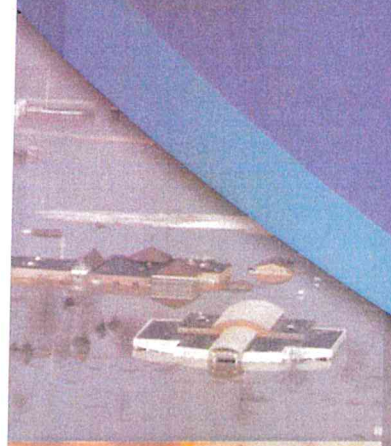
NOW, THEREFORE, BE IT RESOLVED that the City of Burlington calls on the United States Air Force, and the Governor of State of Vermont, as the Commander in Chief of the Vermont Air Force National Guard (VTANG), to work collaboratively with the City of Burlington to draft a specific plan by December 31, 2023 to adopt simulation and augmented reality training systems and take any other such measures as needed to eliminate aviation and ground greenhouse gas emissions at the Vermont Air National Guard base at the Burlington International Airport by 2030, and

BE IT FURTHER RESOLVED that the City of Burlington calls on the Vermont Air Force National Guard Adjutant General beginning in the year 2023, to calculate aviation and ground fuel usage at the VTANG base and to annually provide the Director of the Burlington International Airport a complete record of calculated aviation and ground greenhouse gas emission created at the base no later than April 1 of the year following.

Department of the Air Force

CLIMATE ACTION PLAN

October 2022



PLEASE CITE THIS CLIMATE ACTION PLAN AS:

Department of the Air Force, Office of the Assistant Secretary for Energy, Installations, and Environment. October 2022. Department of the Air Force Climate Action Plan. Washington, DC.

Cover photo descriptions:

Flooding at Offutt Air Force Base

Extensive flooding from the Missouri River in March 2019 forced Offutt Air Force Base, Nebraska, to evacuate nine aircraft. Floodwaters contaminated with raw sewage covered about one-third of the base, including 3,000 feet of runway. About 5,200 personnel lost their workspaces and 137 facilities were damaged, 60 of which were deemed unsalvageable. The re-build effort provides the opportunity to design a new layout of campuses that groups similar missions together. (U.S. Air Force photo by Tech Sgt Rachelle Blake)

Prescribed Burning at Edwards Air Force Base

Crews conduct prescribed burns September 2019 at Edwards Air Force Base, California. The prescribed burns reduce wildfire risk by removing old, dry fu susceptible to wildfire. The burns also support habitat restoration by thinning out an invasive grass that competes with native species for natural resource (U. S. Air Force photo by Harley Huntington)

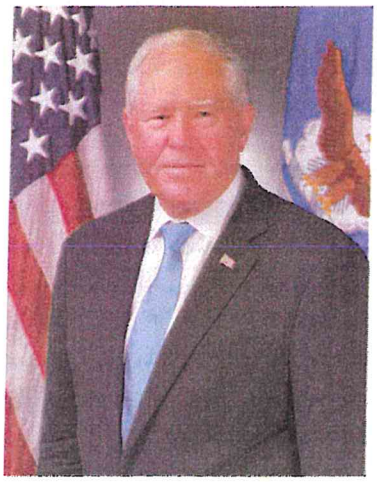
Launch at Cape Canaveral Space Force Station

A United Launch Alliance Atlas V rocket carrying the GOES-T spacecraft for the National Oceanic and Atmospheric Administration and NASA lifts off fro Space Launch Complex-41 at Cape Canaveral Space Force Station, Florida, March 1, 2022. GOES-T will provide NASA and NOAA with continuous image and atmospheric measurements of Earth's Western Hemisphere, lightning detection and mapping, solar imaging and space weather monitoring. (U.S. Sp Force photo by Senior Airman Thomas Sjoberg)

F-35A

The F-35A is the U.S. Air Force's latest fifth-generation fighter. With its aerodynamic performance and advanced integrated avionics, the F-35A will provid next-generation stealth, enhanced situational awareness, and reduced vulnerability for the United States and allied nations. (Getty Images)

CALLING THE DEPARTMENT OF THE AIR FORCE TO ACTION



Climate change is reshaping the increasingly complex global security environment and the Department of the Air Force must adapt and respond to that threat.

Make no mistake – the department's mission remains to fly, fight, and win, anytime and anywhere. We are focused on modernization and improving our operational posture relative to our pacing challenge: China. We remain ready to respond and achieve air and space dominance when and where the nation needs us. Our mission remains unchanged, but we recognize that the world is facing ongoing and accelerating climate change and we must be prepared to respond, fight, and win in this constantly changing world.

Extreme weather and environmental conditions are already imposing high costs on Department of the Air Force installations and operational missions, while simultaneously posing new risks to our ability to train and operate effectively. In recent years, we have seen Tyndall Air Force Base, Florida, and many of its fighter aircraft devastated by Hurricane Michael, a third of Offutt Air Force Base, Nebraska, flooded as the Missouri River overwhelmed levees, and multiple installations across the United States threatened by advancing wildfires. Extreme heat and humidity can also challenge our deployed forces' operational readiness. Environmental changes in the Arctic have led to increased adversary access and activity in the region, driving us to publish the Department of the Air Force Arctic Strategy in 2020.

We must prioritize air and space dominance in a security environment shaped by a changing climate, yet also recognize and reduce the department's role in contributing to climate change. Department capabilities that provide air and space dominance and global reach are fed by a steady diet of fossil fuel, representing the bulk of the Defense Department's carbon footprint and a continual burden on our changing climate. We will, therefore, demand increased efficiency in our warfighting systems and installations as well as strive to reduce our impact on the environment, all while enhancing our warfighting capabilities. Reducing our energy demand both enhances our mission capability and mitigates contested logistics risk.

The department will address the challenges and risks presented by climate change through the implementation of three climate priorities: (1) Maintain air and space dominance in the face of climate risks; (2) Make climate-informed decisions; and (3) Optimize energy use and pursue alternative energy sources.

We cannot delay in addressing the impacts of climate change. Alongside industry, government, and international allies and partners, the Department of the Air Force will invest in critical capabilities and technologies to modernize the force to be more ready and resilient. Our investments will target infrastructure, weapon systems, technology, and equipment that are demonstrably more efficient and combat-credible today to improve Air Force and Space Force warfighting capability tomorrow.

Every Airman and Guardian has a role in helping the department succeed in adapting to and overcoming the effects of climate change to ensure mission success across the force and across the globe. This Climate Action Plan is your roadmap to combat climate change; more than that, it is your call to action.

Frank Kendall
Secretary of the Air Force

OVERVIEW

Climate change is an existential threat to our nation's security, and the Department of Defense must act swiftly and boldly to take on this challenge and prepare for damage that cannot be avoided.

There is little about what the Department does to defend the American people that is not affected by climate change. It is a national security issue, and we must treat it as such.

Secretary Of Defense Lloyd J. Austin III, October 7, 2021

Why Climate Change Matters to the Department of the Air Force

Climate change matters first and foremost to the Department of the Air Force because it impacts ou mission capabilities and those impacts are projecte to increase over time. The department is compose of two military services—the Air Force and the Spa Force. While both services have distinct missions, t role of both services is consistent: to deter conflict and if necessary, defeat adversaries across the air a space domains. Climate change has introduced acu challenges to achieving air and space dominance; climate change impacts our ability to maintain operational readiness, access strategic locations globally, and execute the operational mission.

March 2019 flooding at Offutt Air Force Base, Nebraska, limited runway use, even after floodwaters receded, due to inspection requirements. The new STRATCOM headquarters building, completed earlier in 2017, was built on higher ground, with barriers to reduce flood risk, and thus was not affected by the flooding. (Department of Air Force photo by Tech Sgt Rachelle Blake)

Impacts to Installations and Operational Capabilities

Increasing temperatures, changing precipitation patterns, and more frequent, severe weather conditions driven by climate change pose increasing risks to our installations and operational readiness. We cannot launch or recover aircraft on a flooded runway, nor can we operate from installations devastated by hurricanes and wildfires. In the Arctic, thawing permafrost affects infrastructure across the region, buckling roads and destabilizing building foundations. Melting sea ice accelerates the rate of coastal erosion, further threatening department infrastructure. With the Arctic region warming more quickly than any other parts of the globe, the region has become increasingly more accessible to strategic competitors, creating a demand signal for our response. Across the globe, extreme heat and humidity are a detriment to our ability to execute operations including impacting aircraft performance and payload capacity and directly threatening the health of deployed Airmen and Guardians. We must be able to effectively operate and dominate in evolving environments. Our bases are our power projection platforms and as those bases are increasingly impacted by the effects of climate change, we must adapt to ensure we can execute the mission on behalf of the nation.

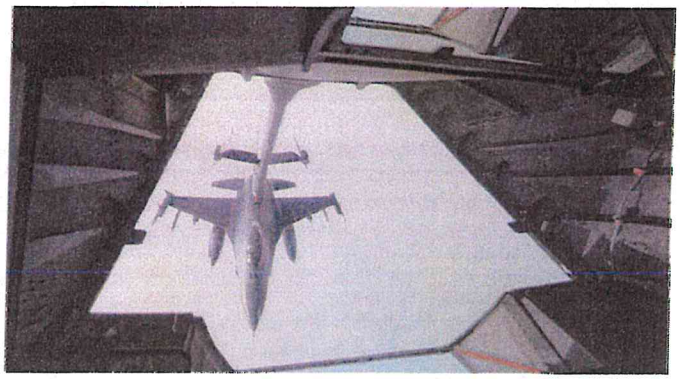
Expanding Mission Requirements

Climate change is aggravating geopolitical unrest and acting as a threat multiplier, which is leading to new and expanded mission requirements for the department. Food insecurity, water scarcity, economic dislocation, and natural disasters perpetuate regional instability and test the capacity of governments around the world to protect their citizens. Violent extremist organizations take advantage of these conditions to increase their influence and power. We may be called upon to respond to increasing numbers of natural disaster to spiraling regional conflicts driven by instability.

Airmen from the 621st Contingency Response Wing at Joint Base McGuire-Dix-Lakehurst, New Jersey, prepare emergency equipment for immediate response to Hurricane Irene at the CRW's Global Reach Deployment Center in August 2011. The roughly 600 Airmen of the CRW specialize in creating aerial port and command-and-control facilities in damaged or hostile environments. Previous missions have included humanitarian responses to Haiti, Pakistan, and Japan in the aftermath of earthquakes, floods, and tsunami in addition to Hurricanes Ike, Rita, Gustav and Katrina. (Department of Air Force photo by TSgt Edward Gyokeres)

Contribution to Global Greenhouse Gas Emissions

The department recognizes that we are contributin to global climate change. The department is responsible for the largest portion of Department o Defense's (DoD) greenhouse gas emissions. While the Air Force fulfills much-needed global mobility and transportation requirements for the DoD, these same capabilities drive a huge demand for fuel. Th increased risks driven by climate change cannot be addressed by emission reductions in the Air Force alone, but the Department of the Air Force will be part of the solution. Improving energy efficiency and deploying advanced energy technologies will



A KC-10 Extender, assigned to the 9th Air Refueling Squadron, refuels an F-16C Fighting Falcon Jan. 28, 2021, over California. The F-16s are assigned to the 177th Fighter Wing at the Atlantic City Air National Guard Base, New Jersey. (Department of Air Force photo by Tech Sgt Traci Keller)

not only decrease emissions but will help mitigate combat risk and increase operational capability.

Department of the Air Force Climate Priorities

We are focused on building enduring advantages across the department. Combating the effects of climate change will enhance the force's resilience and agility, enabling us to field a combat-credible force that can train, fight, and win in an increasingly complex strategic environment. The department will address the challenges and risks presented by climate change through the implementation of three climate priorities: (1) Maintain air and space dominance in the face of climate risks; (2) Make climate-informed decisions; and (3) Optimize energy use and pursue alternative energy sources.

CLIMATE ACTION PLAN GOAL

The department is resilient to the effects of climate change and preserves a combat-credible force that can compete, deter, and win against pacing threats.

1. Maintain Air and Space Dominance in the Face of Climate Risks

Climate change acutely challenges the departme ability to achieve air and space dominance becau climate change impacts our ability to maintain operational readiness, access strategic locations globally, and execute the operational mission. Th department will ensure installation resiliency and adaptability in the face of challenges ranging fron climate change to pacing threats.

Planning charrettes held at Tyndall Air Force Base, Florida, in March 2019 focused on designing an Installation of the Future, resilient and right-sized. (Department of the Air Force photo by Amy Vandeveer)

2. Make Climate-Informed Decisions

To institute enduring advantages while combating the effects of climate change, we must fundamentally shift the way the department thinks, prepares, and acts. As we execute the department's priorities through our planning documents, our actions, and across our acquisitions, we must be deliberate in including climate risks and security implications. How we prepare our personnel, utilize data, and develop strategic plans, requirements, and wargames are foundational to the department. We must seamlessly integrate climate and operational considerations throughout our processes, plans, and decisions to develop and field a more agile, resilient, and responsible combat-credible force for today and into the futu

Air Force senior leaders participating in Operation Uggianaqtuq, an Air Force Arctic Security Expedition, fly on a helicopter before landing on a glacier near Illulissat, Greenland in September 2017. The senior leaders were in Greenland, Canada, and Alaska to better understand the challenges of operating in the Arctic and to build relationships with allies and partner nations. (Department of the Air Force photo by Tech Sgt Daniel DeCook)

3. Optimize Energy Use and Pursue Alternative Energy Sources

The Department of the Air Force aims to reduce the fossil fuel demand of our current and future weapon systems to enhance our ability to operate in contested environments, increase our readiness, reduce our logistics tail, and lower our greenhouse gas emissions. Through our planned initiatives, we will expand the operational range of our weapon systems and our ability to project power and support operations globally while simultaneously reducing greenhouse gas emissions. The department is pursuing alternative energy sources, including piloting projects that produce fewer greenhouse gas emissions and assessing their viability to support installation energy efficiency enterprise-wide.

An engineer checks a small satellite platform powered by environmentally friendly propellant developed by the U.S. Air Force Research Lab and launched aboard a SpaceX Falcon He rocket. (Photo courtesy of Ball Aerospace)

This array of solar panels at Moody Air Force Base, Georgia, saves $700,000 annually. (Department of the Air Force photo by Airman 1 Class Megan Estrada)

DEPARTMENT OF THE AIR FORCE CLIMATE PRIORITIES AND KEY RESULTS

The department recognizes that addressing climate change is not a single, stand-alone effort managed by one program office; climate change affects the entirety of the department's enterprise. Climate policies and actions must be incorporated across the Air Force and Space Force, and continually progress as technology advances, as our understanding of climate change impacts deepens, and as our mission requirements evolve. The Department of the Air Force will provide oversight, monitoring, and implementation direction for our climate efforts through the Senior Leader Climate Forum, comprising the Offices of the Secretariat, Deputy Chiefs of the Air Staff, and Deputy Chiefs of Space Operations, and chaired by the Assistant Secretary of the Air Force for Energy, Installations, and Environment.

Each of the three priority sections below concludes with a summary of objectives and key results. The key results describe the department's future state.

PRIORITY 1 – MAINTAIN AIR AND SPACE DOMINANCE IN THE FACE OF CLIMATE RISKS

Changes in the climate globally have introduced new and complex challenges to Air and Space Force bases, which are critical to the department's abilit to train, deploy, and operate anytime and anywhe Resilient installations enable the accomplishment of all our missions, whether the department is conducting: fifth-generation fighter training; strate missile warning; cargo, fuel or personnel moveme global intelligence, surveillance and reconnaissan or conventional or strategic precision strike attack The department must also protect the health and wellness of our Airmen, Guardians, and their famil and maintain the readiness of our forces by provid safe and healthy communities at our installations worldwide.

A member of the 17th Civil Engineering Squadron enhances the safety of travel routes by clearing snow at Goodfellow Air Force Base, Texas, February 15, 2021. The 17th CES adapted and overcame the challenges of record-breaking snowfall with no proper removal equipment in order to continue the mission (Courtesy photo)

MAINTAIN AIR AND SPACE DOMINANCE IN THE FACE OF CLIMATE RISKS

GOAL

- Department installations are resilient to the effects of climate change to sustain a combat-credible force and enable global power projection.
- Decreased department contribution to future climate risk via the reduction of greenhouse gas emissions.

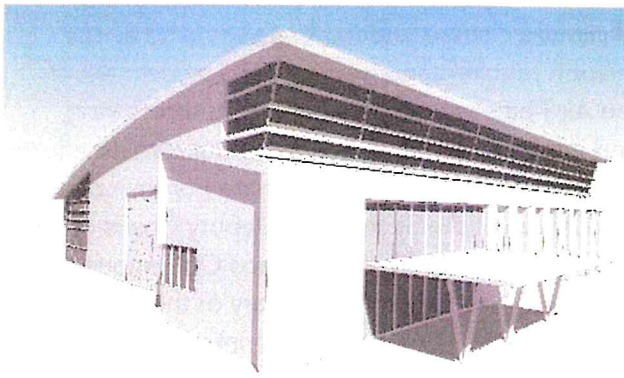
The department operates 175 Air Force and Space Force installations across the globe consisting of 83 Active Duty, 83 Air National Guard, and 9 Air Force Reserve installations. The department is no stranger to the impacts of climate change on its installations. Permafrost thaw presents risks to critical infrastructure at Alaskan facilities. Coastal erosion encroaches on facilities and land at coastal installations. Heavy precipitation overwhelms drainage systems and causes temporary airfield

closures. Incidents of a weakening polar vortex shift the effects of winter storms as far south as our bases in Texas, resulting in power outages and damaged utility infrastructure.

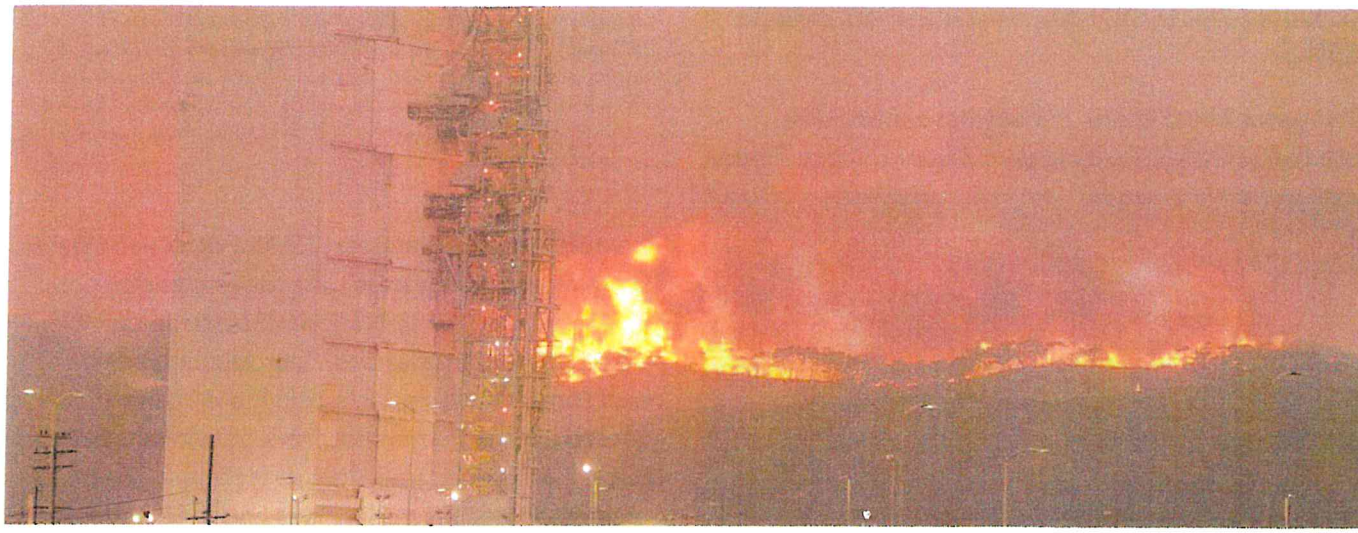
Increased frequency and longevity of drought strains natural water systems and, when combined with increased wind, spur the rapid spread of wildfires. These wildfires threaten the health and safety of department personnel, reduce visibility and our ability to perform testing and training, threaten department infrastructure, and impede the delivery of key resources, such as power and water.

Though wildfires are integral to natural ecological processes, they can also threaten installations and military communities, and disrupt operational missions and readiness. In 2016, the Canyon Wildfire prompted evacuations and a rocket launch delay at Vandenberg Air Force Base (now Space Force Base), California, diverting critical resources and personnel to execute firefighting activities. The Canyon Wildfire alone cost $17.5 million to extinguish and $45 million to accomplish a full recovery.

We are also reckoning with how the department consumes and generates energy on our installatio The department's reliance on fossil fuels is expens and increases future climate risk through the production of greenhouse gases that contribute to climate instability. We must rethink how we can make our installations more resilient to the effects climate change, while simultaneously reducing our impact on the environment through energy efficien measures.



A building concept for Tyndall Air Force Base contains features designed to withstand more frequent and intense hurricane forces following significant damage from Hurricane Michael in 2018. (Department of the Air Force photo)



Flames burn behind the Atlas 5 rocket pad at Vandenberg Air Force Base (now Space Force Base), California, in September 2016. The Canyon Wildfire postponed a launch mission, caused power outages, and destroyed some base power and communications infrastructure. (Photo courtesy of Santa Barbara County Fire Department)

To prevent our critical infrastructure from failing in increasingly extreme conditions, the department must focus on retooling bases and making structures, power grids, fuel distribution systems, and water lines more resistant to these climate-driven impacts. We are using wargames to assess the resiliency of bases and identify vulnerable supply chains, and researching cutting-edge technologies that enable operations off the grid if power fails. The department will also continue to develop secure, digitally integrated infrastructure to minimize vulnerabilities and interruptions to our facility control systems, including power distribution and airfield lighting.

Members of MacDill Air Force Base and the local community build oyster reefs at MacDill Air Force Base, Florida, March 30, 2018. MacDill's eastern shoreline is prone to erosion, however oyster reefs aid in stabilizing the shoreline as well as improving MacDill's vast natural habitats. This build is part of the ongoing Oyste Reef Shoreline Stabilization project, which started in 2004. (Department of the A Force photo by Staff Sgt Tori Long)

Initiatives are underway to assess climate effects, modernize infrastructure, and adapt installations to minimize impacts from future climate threats. Updating current and future department policies, plans, and projects to integrate climate considerations provides an opportunity to address the evolving security environment and develop more resilient installations. Planning tools, such as the *Severe Weather and Climate Hazard Screening and Risk Assessment Playbook* and *Installation Energy Plans*, provide opportunities to baseline extreme weather and climatic conditions, assess energy and water requirements, and develop appropriate strategies to minimize future climate impacts on our infrastructure. Energy Resilience Readiness Exercises further assess and verify an installation's ability to operate despite power outages, thereby increasing installation resilience to man-made and climate-driven disruptions. These activities will inform future investments that protect installations, ensure mission execution, support installation security, and facilitate installation recovery from future climate impacts.

The department released an *Infrastructure Investment Strategy* in 2019 to drive future fundin strategies toward investing in an adaptive, resilien right-sized, and fiscally sustainable infrastructure. The department invests in infrastructure to sustain DoD mission-essential functions, ensure readiness of power projection platforms, moderni infrastructure, innovate installation management practices, and decrease demands to climate-constrained resources, such as energy and water.

Collaboration with surrounding communities and industry is essential. The department will continue t develop solutions and share technologies alongside local communities, industry partners, and allies and partner nations to create holistic solutions for improving installation adaptability and resiliency.

OBJECTIVES AND KEY RESULTS FOR PRIORITY 1 - MAINTAIN AIR AND SPACE DOMINANCE IN THE FACE OF CLIMATE CHANGE

Objective 1: Modernize Infrastructure and Facilities

Invest in climate-ready and resilient installations to provide the platform from which to project air and space combat power.

Key Results (KR):

- **KR 1.1:** Targeted investments to improve base resilience, starting with $36 million in fiscal year (FY) 23 and increasing to $100 million per year by FY27.
- **KR 1.2:** Framework established to evaluate the effects of climate change at all department installations to inform resourcing and basing processes by FY24.
- **KR 1.3:** Department of the Air Force *Severe Weather and Climate Hazard Screening and Risk Assessment Playbook* fully implemented at installations requiring an Installation Development Plan in accordance with Department of the Air Force Instruction 32-1015, by the end of FY26, with identified climate hazards and risks incorporated into planning and project development processes.
- **KR 1.4:** Energy Resilience Readiness Exercises executed at 35 installations by the end of FY27, with results used to inform installation investments and facilitate mission execution from energy-efficient and climate-resilient bases.
- **KR 1.5:** Installation Energy Plans completed for installations requiring an Installation Energy Plan in accordance with Department of the Air Force Instruction 90-1701, by FY23, with identified projects submitted to compete for funding starting in FY24.
- **KR 1.6:** Department of the Air Force's installations portfolio is net-zero emissions by FY46, including a 50 percent emission reduction from 2008 levels by FY33.

PRIORITY 2 – MAKE CLIMATE-INFORMED DECISIONS

To institute enduring advantages while combating the effects of climate change, we must fundamentally shift the way the department thinks, prepares, and acts. As we execute the department's priorities through our planning documents, in our actions, and across our acquisitions, we must be deliberate in considering climate risks and implications. We will examine how we prepare our personnel, utilize data, and develop strategic plans, requirements, and wargames. Climate considerations must be incorporated throughout our processes, plans, and decisions to develop and field a more agile, resilient, combat-credible force for today and into the future.

Lt. Gen. Kenneth Wilsbach, Alaskan Command commander, and Gen. Ellen Pawlikowski, Air Force Materiel Command commander, look at a cold weather gear display during an Arctic Security Expedition Sept. 8, 2017 at Eielson Air Force Base, Alaska. Air Force senior leaders from Headquarters Air Force and major commands visited Eielson AFB and other locations in Alaska to learn and discuss the challenges units face operating in the Arctic region and the effects climate change may have on their mission. (Department of Air Force photo by Staff Sgt Jerilyn Quintanilla)

Developing a climate-literate workforce ensures that department personnel have the knowledge, skills, and abilities to understand when, why, and how to apply climate considerations to improve t department's ability to field a ready force. Mission requirements remain our highest priority; we seek inform plans, processes, and decisions with climat change considerations. The department will rely on this climate-literate force to develop innovative solutions for using energy and addressing climate risks, improving our ability to adapt and to reduce greenhouse gas emissions.

A climatology education session for a 14th Weather Squadron course includes discussions of climate projection methodolog (Department of the Air Force photo by 14th Weather Squadron

MAKE CLIMATE-INFORMED DECISIONS GOAL

- Department is equipped with the knowledge, skills, and abilities to mobilize, deploy, and sustain a combat-credible force globally in the face of climate threats.
- An established culture of incorporating climate change considerations across our processes, plans, and decisions to build a more climate resilient force while also reducing future climate risk.

By instilling a culture in which Airmen and Guardians understand the implications of climate change, our personnel will be empowered to make climate-informed decisions to improve the readiness and operational capability of the force.

Accurate climate data and predictive analytics are critical to decisions that impact everything from the development of engineering standards for installations, to the acquisition and life-cycle sustainment of weapon systems, to planning and operations.

The department will continually acquire improved extreme weather sensing solutions, develop expertise, and analyze authoritative climate and extreme weather data to enable an informed understanding of the operating environment. This understanding serves as a strategic advantage over adversaries and assists the department in optimizing our operational performance and our resourcing decisions.

Our strategic efforts align with the National Defense Strategy, the DoD Climate Adaptation Plan, and the DoD Climate Risk Analysis, which call upon the military services to fully incorporate climate considerations into their plans and policies. Our strategic efforts are also consistent with the 2020 Department of the Air Force Weather Enterprise Strategy, which outlines the department's plan to develop and augment our space-based environmental monitoring capabilities for timely and accurate weather products to make informed decisions for Joint operations, especially over denied and austere areas. We are actively working to incorporate climate change considerations into our internal documents, ranging from futures and foresight analysis to our methodology in developin future war-fighting concepts to our requirements in developing future war-fighting capabilities. The department is seeking ways to better measure energy use in its current weapon systems and creating criteria to emphasize energy optimization the development of future weapon systems.

Wargaming is one of the department's primary evaluation tools, helping us test new platforms, optimize fuel delivery logistics, and factor in environmental risks that could impact our ability to win in a contested environment. Future wargames will include an increase emphasis on incorporating allies and partner nations, and on testin sustainment capabilities, as both aspects of warfare have proven to be key to successful power projection.

Collaborating with others is foundational to addressing the effects of climate change and to reducing greenhouse gas emissions. Close cooperation with

The 607th Weather Squadron setting up a tactical meteorological observing system used to support mission operations. (Department of the Air Force photo by American Forces Network Humphreys)

national security stakeholders (Federal agencies, Congress, state and local entities, private industry, academia, non-governmental organizations, and the American people), as well as allies and partner nations, will help to secure our common interests and promote our shared values. As we undertake departmental transformation, we will also ensure interoperability with our allies and partner nations, a key component to maintain integrated deterrence. Further, we will expand collaborative planning opportunities to exchange knowledge and share innovative technologies and to achieve economies of scale with our stakeholders, other military services, and international partners. Our activities will also reflect the forthcoming, updated DoD Environmental Justice Strategy. Environmental justice considerations require that department programs, policies, and activities address disproportionately high and adverse human health, environmental, climate-related, and other cumulative impacts on disadvantaged communities.

Finally, as we work to incorporate climate considerations into supply chain guidance and strategies to increase supply chain resilience for the delivery of goods and services, we will reduce risk to the industrial base, and better prepare the department to project power globally. Ultimately, climate considerations in requirements developm and acquisition have a direct impact on long term mission assurance and effectiveness.

An integrated Air and Missile Defense Wargame at Joint Base Pearl Harbor-Hickam, Hawaii. Wargames can improve understanding of potential operational impacts from extreme weather and climate. (Department of the Air Force photo)

OBJECTIVES AND KEY RESULTS FOR PRIORITY 2 - MAKE CLIMATE-INFORMED DECISIONS

Objective 2.1: Develop a Climate-Informed Workforce

Developing a climate-informed workforce ensures that department personnel have the knowledge, skills, and abilities to understand when, why, and how to apply climate considerations to improve the department's ability to field a ready, combat-credible force.

Key Results (KR):

- **KR 2.1.1:** Climate considerations integrated into department professional military education curriculum by FY24.
- **KR 2.1.2:** Climate considerations integrated into department technical and continuing education curriculum by FY24.

Objective 2.2: Integrate Security Implications of Climate Change into Department Strategy, Planning, and Operations

Incorporating the security implications of climate change into our processes, plans, and decisions enables the department to develop a more agile, responsive, and ready force that extends the department's ability to support integrated deterrence and project power globally.

Key Results (KR):

- **KR 2.2.1:** Climate considerations, security language and goals incorporated in Air Force and Space Force concept development and Air Force Major Command and Space Force Field Command operational plans and campaign plans starting in FY24.
- **KR 2.2.2:** Climate considerations incorporated into department Title 10 wargames starting in FY23.
- **KR 2.2.3:** Potential effects and security implications of climate change included in engagements with allies and partner nations starting in FY23.

Objective 2.3: Incorporate Climate Considerations into Department Requirements, Acquisition, and Supply Chain Processes

Incorporating climate considerations into the department's requirements process, materiel acquisition regulatory guidance, and supply chain guidance and strategies enables the department to purchase, field, and continuously supply a more agile, resilient, combat-credible force to support integrated deterrence and power projection globally.

Key Results (KR):

- **KR 2.3.1:** Energy Key Performance Parameters incorporated in weapon system capability requirements in accordance with the Joint Capabilities Integration and Development System Manual.
- **KR 2.3.2:** Effects of climate change identified for select supply chains by end of FY23 with risk mitigation approaches informed by the end of FY24.

PRIORITY 3 – OPTIMIZE ENERGY USE AND PURSUE ALTERNATIVE ENERGY SOURCES

Reversing the effects of climate change will require a global response—we cannot do this alone. The actions we undertake today to optimize our energy use and to diversify energy sources will make a difference in increasing the department's air and space dominance and combat effectiveness.

OPTIMIZE ENERGY USE AND PURSUE ALTERNATIVE ENERGY SOURCES

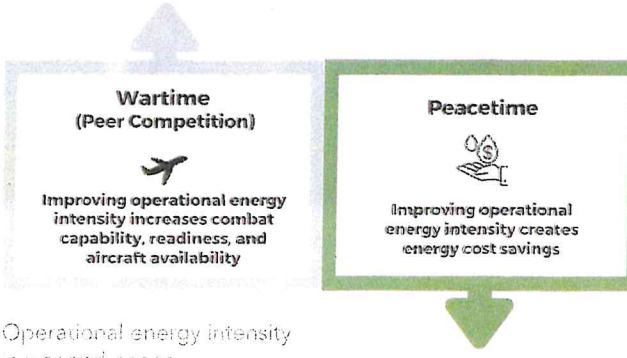
GOAL

- Reduced demand on the department's logistics and sustainment tail and improved ability to sustain a combat-credible force in support of integrated deterrence.
- Decreased department contribution to future climate risk via the reduction of greenhouse gas emissions.

Fuel is simultaneously a vital enabler and a limiting factor to our operational capability; fuel is often the primary determining factor in how far we can go and where we can go around the globe. Throughout wargames and real-world scenarios, fuel storage, logistics support, and lines of communication are consistently shown to be a liability that is frequently targeted by our adversaries. As we retool our warfighting and power projection capabilities, we must decrease our fuel demand and diversify how we generate power.

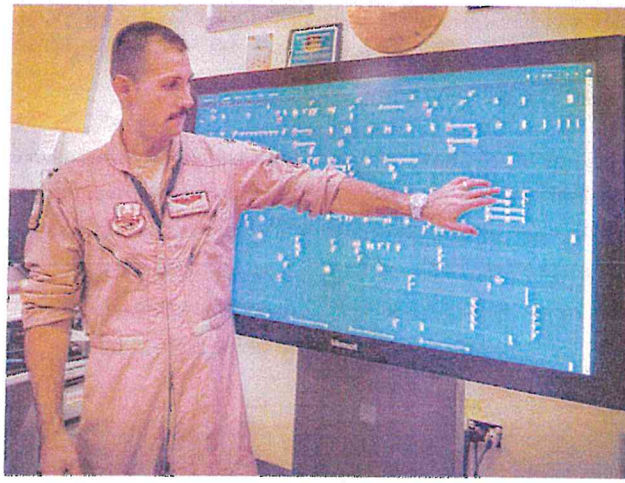
Operational energy (aviation fuel and energy to power aircraft) comprises over 80 percent of the department's energy use. Reduction of fuel use offers the most significant opportunity to optimize our operational capability while simultaneously reducing greenhouse gas emissions. To accelerat change and meet 21st century energy demands, we will continue to optimize our processes, technologies, and weapon systems to support joint all-domain operations globally as we combat the growing threat to our logistics capabilities and capacity. Collaborating with joint and internationa partners, through such forums as the Global Air Forces Climate Change Collaboration and the Sta Partnership Program, will remain foundational to our success as we share valuable knowledge and innovative technologies and ensure interoperabilit In the short term, the pursuit of low-cost, high-retu investments will optimize aviation fuel use, increas range and time-on-station, decrease maintenance issues, and streamline planning for our platforms.

Our overall goal is to deliver more combat power the warfighter using less fuel. For the Air Force, th is measured by operational energy intensity, referr to as "lethality per gallon." For example, if a mobi aircraft consumes less fuel to deliver the same amount of cargo or fuel to the warfighter, whether is because of aerodynamic advancements or more streamlined flight planning, then the operational energy intensity improves – providing more lethalit per gallon. Each initiative's individual metric, such as test events per gallon or offload per gallon, is then aggregated into an overall operational energy intensity metric, allowing us to effectively measure percentage improvements over time.

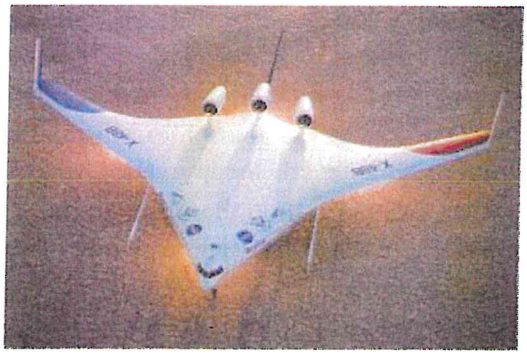


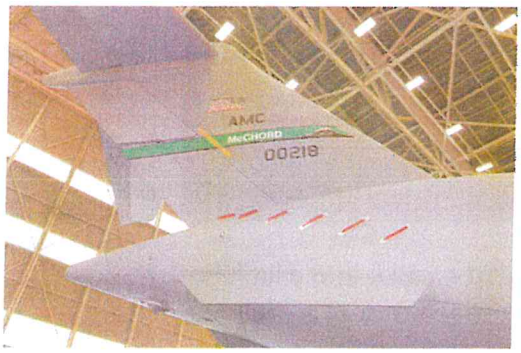
Operational energy intensity in war and peace

The department is working with industry to incorporate commercially proven drag reduction technologies onto current platforms, modernize aircrew and aircraft planning and allocation software, employ engine sustainment technologies, and increase the use of simulation and augmented reality systems. We will also employ cost-savings rebates to incentivize energy-aware behavior in Airmen. The Mission Execution Excellence Program (MEEP) is a new initiative focused on optimizing fuel usage in mobility aircraft that consume the largest portion of the Air Force's fuel. The program leverages innovative ideas from Airmen, employs commercial aviation best practices, and equips aircrew members with more precise fuel planning tools. This will help instill a culture of efficiency among Airmen, both to prepare for conflict with a near-peer adversary and reduce total fue consumption by an estimated 26 millio gallons annually.



Capt Gary Olkowski demonstrates how to use Jigsaw, a tanker planner tool, which digitizes and streamlines aerial refueling planning. Jigsaw reduces fuel use by 180K gallons per week a prevents 46K metric tons of CO2 emissions annually. (Departm of the Air Force photo)





Upper left: The X-48B Blended Wing Body technology demonstrator aircraft, developed by NASA and Boeing (Boeing photo). Upper right: Six Microvanes™ bonded to the aft end of a C-17 Globemaster III fuselage (U.S. Air Force photo). Lower right: The engine of an AC-130U Ghostrider is washed with Aerocore's nucleated foam wash (Aerocore photo). Lower left: U.S. Air Force student pilots train on a virtual reality flight simulator (U.S. Air Force photo).

Over the next five years, we estimate these efforts will cut greenhouse gas emissions by a combined 3.7 perce (or approximately 650,000 metric tons annually), the equivalent of 67 million gallons of fue By 2032, we aim to double this reductio in greenhouse gases

To meet our ambitious objective, we will need additional investment in fuel-saving projects such as advanced winglets, compressor blade coatings and scanning, and engine wash technology.

The department is also pursuing longer term initiatives that promise revolutionary advances in aircraft propulsion and design, as well as in development and use of alternative fuel sources. Agility Prime, an Air Force-led innovation program, is exploring the electrification of rotorcraft and small mobility aircraft to decrease fuel logistics risk and improve readiness. We are also collaborating with the Defense Innovation Unit, the National Aeronautics and Space Administration, and industry partners to accelerate prototyping of ultra-efficient aircraft designs for future tanker and mobility aircraft. For example, development of blended wing body aircraft could drive transformative changes, as this aircraft design increases aerodynamic efficiency b at least 30 percent over current Air Force tanker a mobility aircraft and enables dramatically greater fuel offload at range to ensure strike capabilities i contested environment.

The department is piloting projects that produce fewer greenhouse gas emissions and assessing their viability to support installation energy efficiency enterprise-wide. At Eielson Air Force Base, Alaska, the department is piloting the DoD's first micro-reactor to promote energy security and independence by employing a safe and resilient source of carbon pollution-free energy. Efforts are also underway to electrify non-tactical support vehicles and equipment, including deployment demonstrations to test their integration with existi

The solar array installed at Hill Air Force Base, Utah, in 2018 increased the amount of renewable energy produced on base and will be incorporated into future microgrid planning. The new system was installed through an Energy Savings Performance Contract that cost the government no upfront money. Energy Solutions Group will operate and maintain the system during the 23-year arrangement. Pictures show a conduit line being installed and electrical wiring clips attached to the new panels. (Department of Air Force photo by R. Nial Bradshaw)

infrastructure and to inform strategic implementation across the department. These innovative solutions will promote energy resilience and lead technological innovation over competitors.

The department is expanding the use of renewable and alternative energy sources at Air Force and Space Force bases by executing over 300 renewable energy projects. In FY 2021, 6.9 percent of Department of the Air Force electricity came from renewable sources including from a 3.55 megawatt (MW) solar array at Hill Air Force Base, a 15MW solar array at Nellis Air Force Base, a 28MW solar array at Vandenberg Space Force Base, and a 33.5MW solar array at Eglin Air Force Base. We will continue to research opportunities for exploring alternative energy sources for both installations and weapon systems to diversify our energy options while sending a "demand signal" to industry, which will need to supply those options for our use.

Finally, in order to achieve our fuel efficiency objectives, we must collect, access, and analyze operational energy data to identify additional areas of improvement. Fuel use data is critical to understanding how operational energy impacts department combat capability. With accurate, comprehensive, and accessible data on aviation an launch vehicle fuel use, the department can accou for fuel use impacts to mission effectiveness and greenhouse gas emissions, as well as evaluate the impact of operational efficiency optimization actio Further, tracking and analyzing installation and infrastructure energy use will help capture progress towards modernizing our infrastructure and facilitie

Workers prepare to splice a "T" pipe while installing a geothermal system at Selfridge Air National Guard Base, Michigan, September 29, 2011. (Department of Air Force photo by John Swanson)

OBJECTIVES AND KEY RESULTS FOR PRIORITY 3 - OPTIMIZE ENERGY USE AND PURSUE ALTERNATIVE ENERGY SOURCES

Objective 3.1: Improve Operational Energy Intensity

Optimized aircraft energy use increases the readiness and operational capability of the department, decreases risk to logistics supply chains, and informs operational plans while reducing greenhouse gas emissions. Optimization includes the adoption of ultra-fuel-efficient aircraft designs, which provide an opportunity to significantly improve combat capability.

Key Result (KR):

- **KR 3.1.1:** Operational energy intensity of Air Force flying missions increased 5 percent by FY27 and 7.5 percent by FY32 through standardized use of aircraft drag reduction technologies, modern software scheduling tools, and enhanced engine sustainment practices.
- **KR 3.1.2:** Development and testing of a full-scale blended wing body prototype completed by FY27.

Objective 3.2: Adopt Alternative Energy Sources

While the department cannot singularly reverse the causes of climate change, we can reduce our energy footprint and increase demand for zero-carbon-based energy sources. We must both reduce our energy consumption and move toward carbon pollution-free energy sources.

- **KR 3.2.1:** Completed successful pilot of drop-in compatible sustainable aviation fuel at two operational Air Force locations by FY26 where 10 percent of all purchased aviation fuels consist of sustainable aviation fuel blends at the same or less cost than traditional aviation fuel. The pilot project will validate operational, infrastructure, and logistical requirements for blending and quality control in the use of sustainable aviation fuel.
- **KR 3.2.2:** Completed successful pilot of micro-reactors by FY28 to demonstrate viability of this technology as a feasible alternative energy source.
- **KR 3.2.3:** 100 percent carbon pollution-free electricity on a net annual basis by FY30, including 50 percent 24/7 carbon pollution-free electricity.
- **KR 3.2.4:** 100 percent zero emission non-tactical vehicles by FY35, including 100 percent zero emission light-duty vehicle acquisitions by FY27 and aircraft support equipment by FY32.

CONCLUSION

By maintaining air and space dominance in the face of climate risks, making climate-informed decisions, and optimizing energy use and pursuing alternative energy sources, the department will prove resilient to the effects of climate change and preserve a combat-credible force that can compete, deter, and win.

GLOSSARY

24/7 Carbon Pollution-Free Electricity: Carbon pollution-free electricity procured to match actual electric consumption on an hourly basis and produced within the same regional grid where the energy is consumed (Executive Order 14057, Catalyzing Clean Energy Industries and Jobs through Federal Sustainability)

Adaptation: Adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects. (DoD Directi 4715.21, Climate Change Adaptation and Resilience, August 31, 2018)

Climate Change: Variations in average weather conditions that persist over multiple decades or longer that encompass increases and decreases in temperature, shifts in precipitation, and changing risk of certain type of severe weather events. (DoD Joint Publication 1)

Climate-Literate: An understanding of future climate conditions and risks to inform strategies, plans, and operations. (Department of Air Force working definition)

Carbon Pollution-Free Electricity: Electrical energy produced from resources that generate no carbon emissions, including marine energy, solar, wind, hydrokinetic (including tidal, wave, current, and thermal), geo-thermal, hydroelectric, nuclear, renewably sourced hydrogen, and electrical energy generation from fossil resources to the extent there is active capture and storage of carbon dioxide emissions that meets U.S Environmental Protection Agency requirements. (Executive Order 14057, Catalyzing Clean Energy Industries and Jobs through Federal Sustainability)

Non-Tactical Vehicles: Any commercial motor vehicle, trailer, material handling or engineering equipment that carries passengers or cargo acquired for administrative, direct mission, or operational support of military functions. All DoD sedans, station wagons, carryalls, vans, and buses are considered "non-tactical." (DoD Instruction 4500-36, Acquisition, Management, and Use of Non-Tactical Vehicles (NTVs))

Operational Energy Intensity: Measurement of lethality (e.g., the unit output or mission activity) per gallon Example metrics: actual ton miles per gallon, offload per gallon, test events per gallon, time on station per gallon, simulated/actual weapons released per gallon, collections per gallon, pilots (B-course equivalent) per gallon, and syllabus events per gallon.

Resilience: Ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions. (DoD Directive 4715.21, Climate Change Adaptation and Resilience, August 31, 2018)

Right-sized: A "right-sized" installation portfolio optimizes infrastructure quantity and quality to assure combat readiness and protect our operational capability, enabling multi-domain missions across the full spectrum of operations. (Department of Air Force Basing and Logistics Flight Plan, Civil Engineer Annex, January 2020)

FOR MORE INFORMATION:
Visit https://www.safie.hq.af.mil

City of Burlington
Department of Public Works

Technical Services Engineering Division
645 Pine Street, Suite A
Burlington, VT 05402
P 802-863-9094 / F 802-863-0466 / TTY 802-863-0450
www.burlingtonvt.gov/DPW

Memo

Date: December 19, 2022

To: Transportation, Energy, and Utilities Committee

From: Laura Wheelock, P.E., Senior Public Works Engineer
Olivia Darisse, P.E., Public Works Engineer

CC: Chapin Spencer, Director of Public Works
Norm Baldwin, P.E., City Engineer/Asst. Director – Technical Services
Robert Goulding, Public Information Manager
Megan Moir, Water Resources Division Director

Subject: Great Streets Main Street Project Update

The Great Streets Main Street team is pleased to provide this project update to the Transportation, Energy and Utilities Committee (TEUC). This communication has been drafted with the intention to share with advisory groups, stakeholders, and the community.

In May 2022, the City Council approved the proposal to reduce Main Street's curb-to-curb width to 40 feet in order to convert the on-street parking configuration from diagonal to parallel. The approval allowed the project team to move forward with preliminary engineering and design development of an enhanced cross section along Main Street that will accommodate widened pedestrian areas, dedicated bicycle facilities, tree belts, stormwater treatment, landscaping, seating, and other amenities. The design consultant recently submitted preliminary design plans which are currently under review with the City team. The Main Street project also includes a significant overhaul of our aging underground water resources utility network. Water and sewer infrastructure will be rehabilitated and replaced throughout the project in order to reduce the need for disruptive repairs within the completed project area in the future. These plans will be made available to the public after the review is complete in January on the project website, www.greatstreetsbtv.com. This communication will summarize the progress that has been made on the design, and outline the next steps for the project.

Ravine Sewer

As part of the Great Streets Main Street project, the City is addressing a long-standing infrastructure challenge – the current problematic pathway of the 150 year old combined wastewater and stormwater ravine sewer, which crosses Main Street and is an impediment to future development of the Gateway block parcel located on northeast corner of Main Street and

South Winooski Avenue. At a minimum, the City team recognized that future maintenance or repair of the aging ravine sewer (which is 20' below the surface) within the Main Street right-of-way would require major disruption of the newly constructed streetscape. However, with significant work advancing on Main Street (a potential pathway for ravine sewer combined sewer flow redirection), it was also a clear opportunity to holistically address multiple issues by pursuing a coordinated capital project that would maximize the relocation of a significant portion of the wastewater and stormwater flow entering the lower sections of the ravine sewer.

Currently, the ravine sewer crosses the Gateway Block from College Street to Main Street just to the east of the Fire Station building. It then passes under Main Street as it continues generally south-west underneath private parcels and buildings down to Maple Street. The chosen alternative involves microtunnelling a new 48-inch diameter sewer main between the existing ravine sewer (just to the east of the Fire Station building) down to Main Street along the border of the surface parking lot parcel at the northeast corner of Main and South Winooski. From there, flow will be collected in a newly constructed combined sewer main along Main Street to Church Street, then south on Church Street to connect to King Street.

The design team considered a number of other alternatives for rehabilitating and relocating the flow from the ravine sewer, including relining the existing ravine, rerouting the ravine all the way down to Battery Street, and rerouting the flow around College Street to South Winooski Avenue. The project team arrived at the chosen alternative by evaluating the costs, benefits, and feasibility. In addition to being the most cost effective solution that meets the City's goals, it provides three major benefits: relocates the ravine sewer from current problematic position within the Gateway block; significantly reduces the amount of combined sewer flow that reaches King Street (an area with capacity issues) from both the ravine sewer and the South Winooski sewer; redirects substantial flow away from a 150 year old brick/stone sewer which is well beyond its useful life; reduces the risks involved with having a sewer with substantial flows underneath buildings and private properties by bringing the flow within the right-of-way will facilitate easier future maintenance; and it will bring the City one step closer to relocating all flow away from the ravine sewer so that it can be abandoned.

Intersection Study

The project team received requests from the DPW Commission to prepare an intersection evaluation matrix to compare safety, functionality, environmental impacts, property impacts, and long-term cost effectiveness of signalized intersections and roundabouts. In response to these requests, the design consultant investigated each of these interests. Projected traffic volumes were modelled to analyze the feasibility of roundabouts along Main Street from an operational standpoint. The analysis revealed that roundabouts would not be able accommodate projected peak volumes in Main Street's busy downtown setting, where high pedestrian and cyclist volumes place further strain on the system. Further, while roundabouts have been shown to reduce speeds and severity of vehicle-vehicle crashes, they have been shown to increase bicycle-vehicle crashes which would be a significant safety concern along this corridor. The consultant also evaluated the conceptual geometry at each intersection, and determined that roundabout construction would require major impacts to buildings and private properties in most locations. The Great Streets concept is grounded in the idea of creating more space for activity along the corridor, particularly at the intersections. The new activated space will be used for landscaping, seating, public art, playful elements, stormwater treatment, public and alternative transportation hubs, and other uses that support improved user experience and quality of life. Installing roundabouts at the

intersections would eliminate these opportunities. Given these findings, the consultant recommended proceeding with signalized intersections for the design. The full study is available on the project website, and included as Attachment A to this communication.

Downtown Parking Study

During the public engagement process, the project team heard concerns, primarily from business owners, around the reduction of parking along Main Street. In order to investigate and address potential impacts of the parking changes, the projected team is administering a Downtown Parking Study concurrent with the redesign of Main Street. The first step of the study was a data collection effort which was completed in July 2022, which surveyed the occupancy and turnover rates of all on-street parking spaces and off-street private and public lots within two blocks of the Main Street corridor. The data was used to analyze and understand parking demand and behaviors, and identify underutilized parking resources downtown. Subsequent phases of study will determine whether parking demands can be satisfied with the existing inventory (reduced by the project) and additional wayfinding signage, or if additional facilities are needed. Parking turnover rates are being analyzed along with feedback from businesses to identify where flexible or time-restricted spaces would be warranted in order to accommodate short-term parking needs for businesses. The Downtown Parking Study Findings will be made available on the project website in January.

To accompany these efforts, the project team assembled a Parking Advisory Committee to oversee and advise the project team throughout the study. The Parking Advisory Committee includes members of City leadership and the Burlington business community. A comprehensive list of committee members is included as Attachment B to this communication. This effort is being advanced in coordination with the Main Street project in an effort to understand and address these needs before Main Street goes to construction.

Public Art

The project team has been working closely with Burlington City Arts (BCA) to develop a public art strategy for Main Street. The public art strategy is grounded in input heard throughout the public engagement process, as well as the idea that Main Street can be divided into three distinct character zones: Lake, City, and Mountain. BCA issued a Request for Qualifications (RFQ) which was advertised on the project website from November 2 to December 16, as a first step to procuring art for the project, which outlines the design criteria and various project goals. A selection committee will be assembled to follow BCA's public art procurement process. The selection committee will review applications and determine finalists to advance to the next round of proposals in January 2023. In February 2023, the selection committee will hear presentations from finalists, and make selections in March 2023.

Grant Funding and Permitting

The City received a $500,000 stormwater grant from the State of Vermont, which will be used toward the construction portion of this project. In order to utilize the funding, the project needs to meet the requirements of the National Environmental Policy Act (NEPA) permitting process. The consultant has completed an environmental analysis under this process and submitted the draft materials to the State, which are currently under review. The permitting process will need to be complete before construction can commence.

Public Engagement

In early 2022, the City reintroduced the Main Street project to the community through Neighborhood and Business Owner Meeting, along with presentations to City leadership, advisory boards, and neighborhood planning assemblies. The project team also hosted a series of meetings for four focus groups - Refugees and BIPOC, Youth, Business Owners, and Mobility - which were intended to elicit input from communities that are generally more difficult to engage. The project team also received input through online surveys, emails, as well as door-to-door outreach for businesses.

All public input received to date has been documented and considered throughout the design process, and has included the desire for affordable shopping and dining options, the need for inclusive, accessible, comfortable and interactive spaces, interest in creative approaches to aesthetics through landscaping and public art, the need for sustainability solutions, interest in alternative transportation infrastructure, and parking and safety concerns. The project team incorporated input in a manner that balanced the needs and preferences of the various groups that will utilize Main Street, while preserving the multi-modal function of the corridor.

The project team will continue to provide updates on the project website, www.greatstreetsbtv.com, where the preliminary plans will be available for viewing in January. Close engagement and coordination with advisory groups, businesses and stakeholders will continue through final plan development and into construction. The project team continues to accept questions and comments on the project, which may be submitted through the contact information listed on the website.

Next Steps

The preliminary plans are currently under review and will be made available to the public upon completion of the review in January. The project team will then move to have final plans and final permitting completed in early summer 2023, with plans to advertise for construction bids in July. According to the current schedule, construction will begin as early as September 2023.

Please do not hesitate to contact us with any questions or comments (Laura Wheelock, lwheelock@burlingtonvt.gov or Olivia Darisse, odarisse@burlingtonvt.gov). Thank you.

Attachments:

A. Intersection Evaluation Memo
B. Parking Advisory Committee Members

Attachment A

Intersection Evaluation Memo

Memorandum

To: Burlington DPW
Attn: Chapin Spencer
645 Pine St
Burlington, VT

Date: November 7, 2022

Project #: 58691.00

From: Jenn Conley, PE, PTOE
Karen Sentoff
Evan Haugh

Re: Main Street Intersection Alternatives

As a part of the Main Street Great Streets project, an evaluation of two types of traffic control, signalized intersections and roundabouts, was conducted for each of the study area intersections. This memorandum presents the results of that evaluation.

Traffic volumes for future year conditions (2037) were developed consistent with previous City-accepted traffic impact studies, based on available traffic count data and anticipated traffic growth within this time horizon. Traffic volumes were increased by seven percent to represent background traffic growth until 2037. Additionally, the traffic associated with permitted developments, including residential and hotel space as well as the redevelopment of Burlington City Place and the impact of the Champlain Parkway, were added. This conservative approach resulted in volumes approximately 40% higher than the traffic volumes originally modeled for the Champlain Parkway project and 90% higher than the CCRPC 2040 regional model.

In each case, a goal of reducing traffic speeds to 20 miles per hour was a consideration in the design criteria during development of alternatives. In either case, throughout the corridor, bicyclists and pedestrians are provided separate accommodation along Main Street.

Roundabouts

The feasibility of constructing roundabouts was considered at each of the seven project intersections. The effects of each traffic control type on right of way, building structure impacts, safety for all users, bike and pedestrian operations, and vehicular traffic operations, was evaluated.

Design Criteria

The industry standard design criteria for roundabouts is outlined in National Cooperative Highway Research Program (NCHRP) Report 672. The design criteria for roundabouts in the Main Street corridor was developed using that report.

One of the City's key goals for this project is to reduce speeds along Main Street. As such, a design speed of 20 miles per hour was chosen.

Two basic designs were developed for this corridor. Space-saving mini roundabouts were considered at any location that is not intended to accommodate a heavy volume of large truck traffic. The intersections of Main with South Champlain, Church, and South Union Streets were designed including one travel lane (20 feet), bike lanes (5 feet), sidewalks (7 feet), a buffer between vehicles and cyclists (4 feet), and a center paved island (40-foot diameter), the total impact footprint's diameter would be 112 feet. On these mini roundabouts, center islands must be fully mountable for trucks to be able to travel through the intersection. This results in a roundabout with little green space – the center island must be fully paved.

At the other four intersections (Battery St, Pine St, St Paul St, and South Winooski Ave) larger roundabouts with a 142' diameter footprint (includes 20' travel lane, 5' bicycle lane, 7' sidewalks, 4' buffer between cyclists and vehicles, and

Memorandum

70-foot diameter center island) would be needed to accommodate the heavier volume of large trucks. On the larger roundabouts, a 20' diameter raised interior center island would be included that could include some vegetation. Figures 1 and 2 illustrates the two roundabout designs. At each location, the roundabout footprint was located to reduce impacts to property, and in particular, structures as much as possible.

Figure 1: Mini Roundabout (80-foot diameter circulation area)

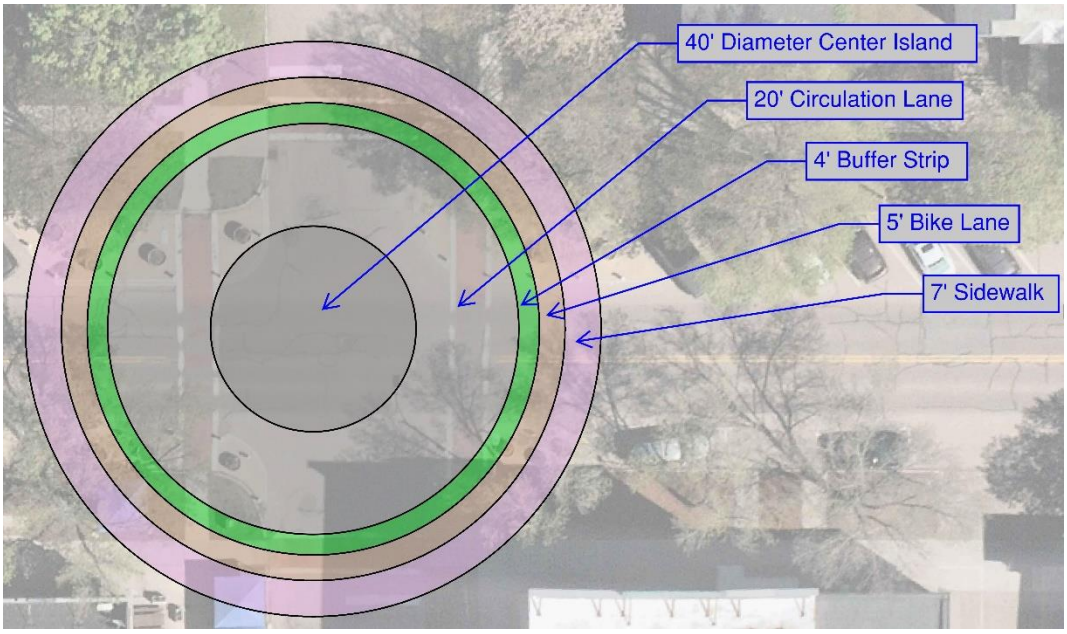
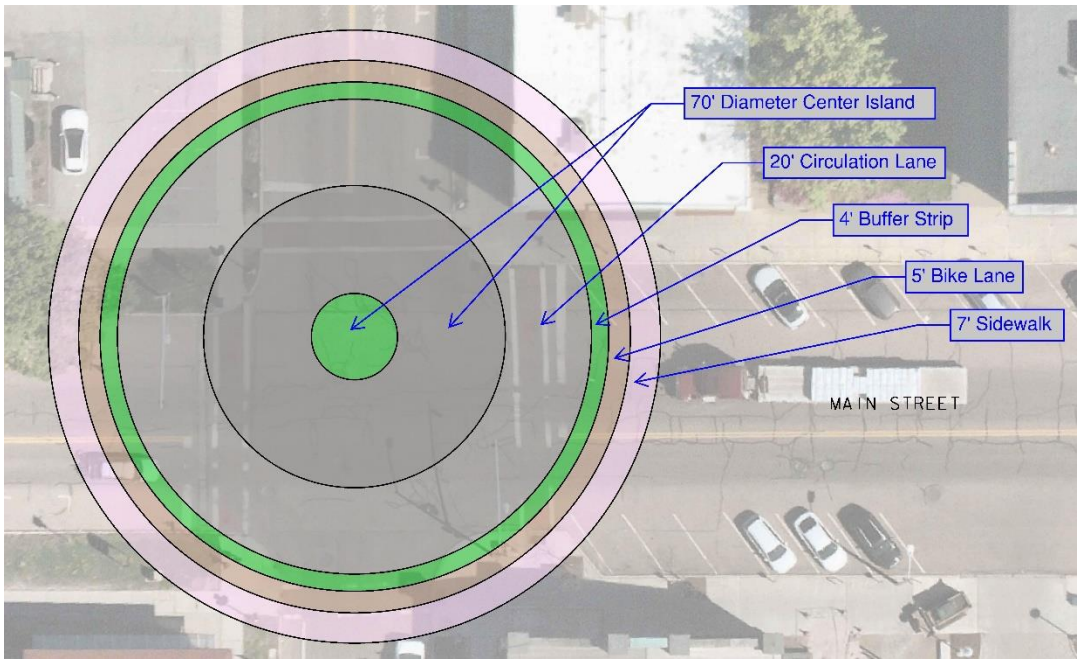


Figure 2: Standard Roundabout (110-foot diameter circulation area)



Memorandum

NCHRP 672 also dictates grades across and entering and exiting a roundabout. The entry grades should not exceed three percent, exit grade should not exceed four percent and the roundabout itself should not exceed four percent. Due to the existing grades on Main Street, meeting these criteria would be impossible at many locations. At Battery, Pine and S. Union Streets, the roundabout grades would be well over four percent (ranging from 4.3 to 4.6 percent) and at S. Champlain Street, the entry and roundabout grades would be over three percent.

Right of Way and Building Impacts

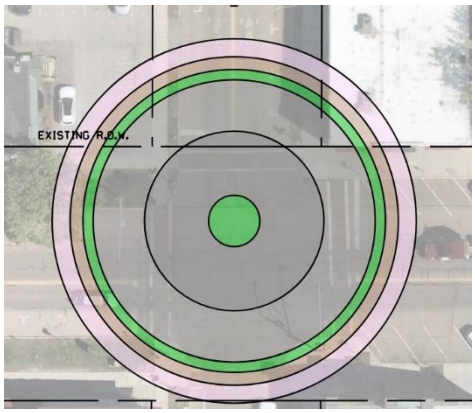
Roundabouts have large footprints. Ultimately, most intersections along the corridor would require at least some additional right of way. When estimating these impacts, roundabouts were located to minimize overlap with buildings and private property. It should be noted that these placements reduce the potential safety benefit by having some approaches enter the roundabout straight on instead of at an angle.

The intersections of Main with S. Champlain and Church could accommodate mini roundabouts within existing right of way. The intersections of Main at Battery and S. Union would require relatively modest amounts of right of way (under 100 square feet each). This would come from currently paved or landscaped areas. However, even a small acquisition adds cost and complexity to the project. The tight fit also leaves minimal design flexibility.

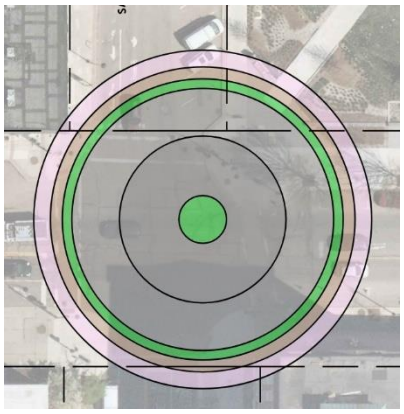
The other three intersections all require more substantial right of way acquisitions with building impacts. The intersections of Main with Pine, Saint Paul, and S. Winooski would each require 900-1300 square feet of new right of way. These impacts occur even when the roundabouts are best placed to reduce impacts to structures and other property.

Figure 3: Roundabout Footprints Shown with Right of Way Boundaries

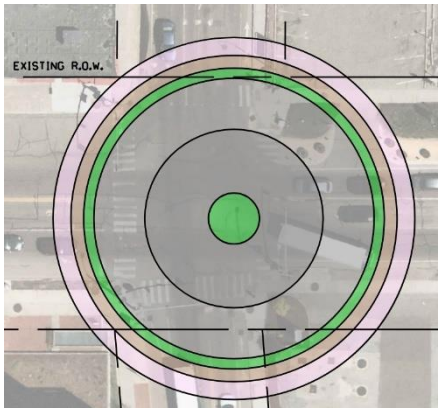
Main & Pine



Main & Saint Paul



Main & S. Winooski



Bike and Pedestrian Operations

This corridor sees high pedestrian and cyclist volumes. At roundabouts, pedestrians use a crosswalk to cross approach legs. They do not encounter the delay of waiting for a signal, but their travel path is longer to continue along the same roadway. Pedestrians cross one travel direction at a time.

There is a school crossing location at S. Union Street. The introduction of a roundabout may require additional assistance as the crossings of each side of the street are separated.

Cyclists can travel through the roundabout as a vehicle but are also provided a separated facility along Main Street and will cross the roundabout legs at unsignalized crossings next to pedestrians. The more experienced cyclists may choose to travel through the roundabout and would typically have to use the entire lane to establish their space and avoid conflicts with merging and diverging vehicles.

Heat Island Impacts

The heat island effect in Burlington is exacerbated when natural ground surfaces are replaced by pavement. The net change in impervious area indicates whether the design will improve or worsen the heat island effect.

Due to the footprint of the roundabout being larger than the existing conditions, as well as the addition of the separated bicycle facilities and activation spaces, these concepts result in increased impervious area relative to existing conditions, an overall average of nearly 800 sf per intersection.

Safety Impacts

Roundabouts are often considered a safety improvement over signalized intersections. Roundabouts effectively prevent head-on and broadside crashes because conflicting vehicles do not meet at those angles. Roundabouts are also designed to slow traffic through intersections, which reduces sever outcomes. Roundabouts have however been observed to increase bicycle-vehicle crashes[1], which would be a downside on this corridor.

Traffic Operations

To reach efficient operating conditions in a roundabout, the circulation lane is always free-flowing. If queues from adjacent intersections stretch into a roundabout exit, it freezes the entire intersection. This means that queues must be under one block long for a roundabout to operate properly. Signalized intersections can tolerate longer queues because other movements still operate when one is blocked. This corridor has high vehicle, bicycle, and pedestrian volumes. In traffic simulations of the roundabout alternatives, queues spilling back to other intersections were unavoidable.

In the traffic simulations, roundabouts eventually reached gridlock. Pedestrian volumes are one cause. Traffic entering or exiting roundabouts yields to pedestrians, so high pedestrian volumes (such as 192 hourly crossings of Main at Church) significantly interrupt traffic flow. Travel delays would be severe under a roundabout design. The operating levels of service and queuing for roundabouts is displayed in **Table 1**.

[1] In 46 studies reported to the CMF Clearinghouse (cmfclearinghouse.org), roundabout conversions increased vehicle-bicycle crashes by an average of 38%.

Table 1: Roundabout Performance

Intersection	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	Queue (ft)	Delay (s)	LOS	Queue (ft)
Battery St						
Overall	31.4	D		265.3	F	
EB	3.8	A	54	271.7	F	136
WB	4.0	A	78	10.8	B	60
NB	4.7	A	87	409.3	F	682
SB	56.7	F	432	255.8	F	502
S Champlain St						
Overall	3.9	A		583.5	F	
EB	4.6	A	72	516.3	F	477
WB	3.3	A	55	116.3	F	252
NB	2.9	A	38	1412.2	F	1085
SB	2.6	A	23	781.3	F	466
Pine St						
Overall	5.8	A		643.3	F	
EB	6.4	A	160	538.6	F	422
WB	6.4	A	169	251.3	F	301
NB	5.4	A	111	1286.5	F	1128
SB	3.8	A	89	569.5	F	485
St Paul St						
Overall	3.8	A		755.5	F	
EB	2.8	A	77	521.5	F	405
WB	4.9	A	153	488.0	F	431
NB	3.8	A	88	1285.9	F	1176
SB	3.1	A	62	788.8	F	594
Church St						
Overall	2.5	A		475.5	F	
EB	2.2	A	54	386.5	F	428
WB	2.6	A	59	520.1	F	455
NB	1.7	A	15	666.7	F	402
S Winooski Ave						
Overall	7.7	A		547.3	F	
EB	4.8	A	115	301.2	F	452
WB	4.0	A	92	507.7	F	468
NB	2.8	A	56	876.8	F	1240
SB	16.4	C	278	638.3	F	465
S Union St						
Overall	96.9	F		564.0	F	
EB	3.1	A	74	149.8	F	399
WB	141.5	F	917	704.5	F	1151
NB	119.5	F	1115	894.9	F	1225

Signalized Intersections

A design that included signalized intersections was created for each of the study area intersections. Similar to the roundabout evaluation, the effects of each traffic control type on right of way, building structure impacts, safety for all users, bike and pedestrian operations, and vehicular traffic operations, was evaluated.

Design Criteria

The appropriate design for each signalized intersection was determined based on the projected 2037 volumes. Even with the increased volumes, Main Street will be a two-lane cross section throughout with turn lanes only at select intersections.

Based on heavy turn volumes, a westbound right turn lane will be maintained at Battery Street. A westbound left turn lane will remain at Pine Street to accommodate the increased traffic associated with the Champlain Parkway as well as a desire to be consistent with previous permitting conditions in place at this location. Eastbound and westbound left turn lanes will be retained at S. Winooski Avenue due to heavier turning volumes.

On side streets, only minor changes occurred. On Pine Street, a southbound left turn lane will be formalized and the northbound approach restriped to a northbound thru/right-turn lane with a separate left-turn lane. In the analysis, Battery Street northbound was even modeled as one single lane. Elsewhere, the same number of lanes as current conditions will remain on side streets.

Champlain Street sees very low volumes of vehicles and pedestrians. A signal is not warranted, so it will remain stop-controlled.

Signal Operation

With the exception of Battery Street, each intersection is anticipated to be controlled by a two-phase signal, that is, all Main Street traffic receives a green indication in one phase and all side street traffic receives a green indication in a second phase. The presence of turning vehicles in the thru lanes results in friction for that thru traffic and a slower speed network. Pedestrians will receive the walk signal and be processed at the same time as vehicles (i.e. pedestrians will cross side streets at the same time as Main Street receives the green ball) but will be provided the walk signal in an advance lead interval for better visibility and operations.

Battery Street will operate as the only three phase signal in order to better accommodate pedestrians. The additional phase will simultaneously serve southbound lefts and westbound rights. The westbound right will be controlled by arrows and will display a red arrow when the walk signal is indicated. This movement is too heavy to be served concurrently with pedestrians.

The corridor will be timed to optimize westbound progression in the morning and eastbound progression in the evening. One of the City's key goals is reducing speeds along Main Street. As such, a design speed of 20 miles per hour was chosen for the progression speed throughout the network.

Right of Way and Building Impacts

The signalized designs, including turn lanes, fit comfortably within existing right of way and in fact, at most locations, narrow the width required for vehicular traffic and provide opportunities for wider sidewalks and activations spaces. These designs will not require additional right of way or have impacts on buildings.

Bike and Pedestrian Circulation

By bumping curbs out, the signalized design significantly shortens crossing distances for pedestrians. Pedestrians will receive the walk to cross side streets when vehicles on Main Street receive the green indication. Pedestrians crossing Main Street will receive the walk when vehicles on side streets receive the green indication. In addition, crossing pedestrians have 7 seconds of walk time in advance of vehicles receiving the green signal, establishing the pedestrian in the space and increasing sight lines from turning drivers to pedestrians. There is a school crossing across Main Street at S. Union Street and this crossing is reduced by 18 feet versus the existing condition.

Similar to in the roundabout alternative, cyclists have two options for travel. Commuter cyclists, who wish to travel as a vehicle in the travel lane, will be processed via signalized control and be provided two stage turn boxes at intersections. To use these, cyclists cross to the far side of the intersection, stop and wait in the painted bike box, and then cross the second leg of the intersection when that direction is served. In addition, a separated facility will be provided along each side of Main Street that protects the cyclist and allows for crossing of side streets at the same time as pedestrians receive the walk signal. These cyclists will be provided the same advanced time as pedestrians to cross the side streets before Main Street vehicular traffic receives the green indication.

Heat Island Effect

The signalized design will slightly increase impervious area, adding about 140 sf per location for the addition of the separated bicycle facility and new activation spaces. The traveled portion of the roadway's footprint, and its heat island effect actually decreases.

Safety

The design and timings proposed for Main Street will result in traffic speeds at or below 20 mph. The traffic signals will be designed to progress traffic at 20 miles per hour. The low speeds are further reinforced by the presence of turning traffic in the shared thru lanes acting to slow traffic as it turns onto side streets.

These low speeds will minimize crash severity, even at higher-risk collision angles associated with signalized intersections. Signalized intersections also have fewer bicycle-vehicle crashes than roundabouts, an important consideration on this corridor. In either case, the pedestrian crossing distance, or the distance that a pedestrian is exposed to traffic is significantly reduced.

Traffic Operations

All intersections report acceptable performance in the signalized plan. Signals are coordinated, with offsets set to optimize westbound progression in the morning and eastbound progression in the afternoon. At the high volumes (relative to capacity) anticipated, this is needed to keep an acceptable level of delay even with the added advance pedestrian time.

Progression works well, with queues on Main Street generally clearing each cycle. Side streets have longer delays and can take several cycles to clear queues during peak periods (similar to how they perform today). Traffic simulations included realistic numbers of pedestrians and bus blockages for a more accurate evaluation.

Delays and queues associated with the signalized alternatives are illustrated in Table 2.

Memorandum

Table 2: Signalized Performance

Intersection	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	Queue (ft)	Delay (s)	LOS	Queue (ft)
Battery St						
Overall	64.4	E		72.8	E	
EB	32.5	C	95	67.7	E	156
WB	151.8	F	435	126.1	F	613
NB	125.8	F	645	108.1	F	692
SB	36.0	D	375	102.7	F	545
S Champlain St						
Overall	40.6	E		145.8	F	
EB	20.4	C	328	83.3	F	482
WB	64.3	F	409	42.2	E	482
NB	240.4	F	194	1389.8	F	1090
SB	250.1	F	143	315.0	F	121
Pine St						
Overall	56.4	E		115.0	F	
EB	63.9	E	418	151.8	F	417
WB	146.8	F	387	87.9	F	377
NB	44.8	D	337	279.5	F	1121
SB	108.7	F	199	145.2	F	562
St Paul St						
Overall	48.6	D		106.2	F	
EB	37.1	D	205	63.2	E	410
WB	56.2	E	450	23.8	C	356
NB	140.1	F	726	243.5	F	1082
SB	56.4	E	108	267.3	F	555
Church St						
Overall	28.1	C		24.9	C	
EB	17.6	B	188	98.8	F	402
WB	163.0	F	452	16.2	B	312
NB	248.7	F	62	57.8	E	83
S Winooski Ave						
Overall	56.9	E		80.6	F	
EB	49.0	D	275	193.0	F	348
WB	46.6	D	545	93.9	F	458
NB	178.9	F	317	49.1	D	103
SB	94.7	F	576	180.8	F	481
S Union St						
Overall	130.7	F		126.6	F	
EB	58.5	E	465	37.7	D	583
WB	150.0	F	908	137.8	F	966
NB	196.4	F	1057	295.4	F	1169

Intersection Control Evaluation

In this space-constrained corridor, roundabouts would be challenging to design and construct. They would require impractical or impossible large land acquisitions, including building demolitions at some intersections.

At Pine Street, a roundabout would require acquiring the North Star Sports (100 Main Street) building. At St. Paul Street, the roundabout would impact 131 Main Street (a seven-story building) and 122 Main Street. A roundabout at S. Winooski Ave would not require demolitions, but would involve relocating underground fuel storage tanks at the Shell gas station and relocating air vents for the Courthouse Plaza building. Demolishing buildings for the Great Streets project is not desirable, especially since a signalized design can achieve equivalent safety and mobility.

Table 3: ROW and Building Impacts1

Intersection	Roundabout		Signalized Intersection	
	ROW Impacts	Building Impacts	ROW Impacts	Building Impacts
Battery St	80 sf	None	None	None
S Champlain St	None	None	None	None
Pine St	Major – 1324 sf of buildings and parking	Unavoidable impact to North Star Sports	None	None
St Paul St	43 sf (includes buildings) and 1090 sf of City Hall Park	IUnavoidable impact to The Gryphon and Mad River Distillery	None	None
Church St	None	None	None	None
S Winooski Ave	974 sf, mostly Champlain Farms Lot	Underground Storage at Champlain Farms; Air Vents on Courthouse parcel	None	None
S Union St	15 sf	None	None	None

[1] Colors indicate the changes from existing with red being a negative change and green a positive change

The signalized designs dedicate more activation space for pedestrians. These are the spaces where people gather and enjoy the Main Street corridor. These spaces provide a benefit to those users and activation on the street. Although this amenity does increase the heat island effect, it is not as significant as the increased heat island effect caused by roundabout alternatives. Table 4 provides the impacts to the activation space as well as resulting heat island effects along the corridor.

Table 4: Activation Space and Heat Island Impacts as compared to Existing Conditions

Intersection	Roundabout		Signalized Intersection	
	Activation Space Impacts (Gain or Loss in sf)	Heat Island Impacts (Gain or Loss of Pervious in sf)	Activation Space Impacts (Gain or Loss in sf)	Heat Island Impacts (Gain or Loss of Pervious in sf)
Battery St	-76	-3122	3000	-1987
S Champlain St	-15	-4696	2600	-3746
Pine St	None	-1161	3800	-746
St Paul St	None	1669	None	1737
Church St	-207	2578	3000	2784
S Winooski Ave	-190	884	840	1594
S Union St	-368	-1769	None	-644

*Changes in area are relative to the existing geometry with red showing negative changes and green illustrating positive changes.

Pedestrian paths along Main Street become longer at roundabouts than at signalized intersections, as they must traverse the outer perimeter of a larger intersection. Both designs shorten pedestrian crossings of travel lanes relative to current conditions. Roundabouts reduce the crossings to conflicts with single traffic directions, while the signalized designs fully stop vehicles during an advance crossing period each cycle. Both designs significantly calm traffic speeds, the critical piece in mitigating potential for severe crashes.

Cyclists are accommodated in both alternatives in separate facilities, but for the advanced cyclists who prefers traveling as a vehicle, the roundabout does present challenges as the cyclist visibility to motorists is not as clear during merging and diverging movements in a roundabout as a thru movement along a corridor or stopped at a signalized intersection.

Operationally, signalized intersections offer the most flexibility. Capacity of each approach, progression, and speeds can be manipulated by swapping timing and coordination plans during different times of day. Roundabouts do not offer the same control and become gridlocked when queues spill back more than one block.

Table 5 compares operations for the existing road design, a roundabout corridor, and the proposed signalized design. Each scenario is compared under the 2037 PM peak hour volumes.

Table 5: Performance Comparison (2037 PM Peak Hour)

Intersection	Existing Conditions			Roundabout			Signalized		
	Delay (s)	LOS	Queue (ft)	Delay (s)	LOS	Queue (ft)	Delay (s)	LOS	Queue (ft)
Battery St									
Overall	28.6	C		265.3	F		72.8	E	
EB	41.6	D	154	271.7	F	136	67.7	E	156
WB	14.4	B	241	10.8	B	60	126.1	F	613
NB	20.1	C	235	409.3	F	682	108.1	F	692
SB	44.1	D	461	255.8	F	502	102.7	F	545
S Champlain St									
Overall	90.9	F		583.5	F		145.8	F	
EB	69.3	E	465	516.3	F	477	83.3	F	482
WB	3.1	A	117	116.3	F	252	42.2	E	482
NB	696.1	F	971	1412.2	F	1085	1389.8	F	1090
SB	424.9	F	299	781.3	F	466	315.0	F	121
Pine St									
Overall	81.4	F		643.3	F		115.0	F	
EB	102.8	F	438	538.6	F	422	151.8	F	417
WB	29.2	C	363	251.3	F	301	87.9	F	377
NB	66.0	E	562	1286.5	F	1128	279.5	F	1121
SB	193.3	F	477	569.5	F	485	145.2	F	562
St Paul St									
Overall	110.6	F		755.5	F		106.2	F	
EB	69.7	E	407	521.5	F	405	63.2	E	410
WB	17.9	B	307	488.0	F	431	23.8	C	356
NB	205.5	F	982	1285.9	F	1176	243.5	F	1082
SB	344.2	F	562	788.8	F	594	267.3	F	555
Church St									
Overall	34.5	C		475.5	F		24.9	C	
EB	65.1	E	408	386.5	F	428	98.8	F	402
WB	6.7	A	247	520.1	F	455	16.2	B	312
NB	115.4	F	125	666.7	F	402	57.8	E	83
S Winooski Ave									
Overall	65.4	E		547.3	F		80.6	F	
EB	91.4	F	395	301.2	F	452	193.0	F	348
WB	62.2	E	487	507.7	F	468	93.9	F	458
NB	44.0	D	226	876.8	F	1240	49.1	D	103
SB	56.2	E	587	638.3	F	465	180.8	F	481
S Union St									
Overall	75.6	E		564.0	F		126.6	F	
EB	13.7	B	399	149.8	F	399	37.7	D	583
WB	156.6	F	1266	704.5	F	1151	137.8	F	966
NB	48.4	D	454	894.9	F	1225	295.4	F	1169

A mixed corridor with both signals and roundabouts would give up the timing and progression advantages. A roundabout anywhere in the corridor breaks the progression because you cannot control the pattern of arrivals to adjacent intersections.

Overall safety is significantly improved in both alternatives thru the reduction of travel speeds improving crash outcomes. The roundabout benefits of single direction vehicular conflicts are likely similar to the benefit of providing the advanced, protected walk time.

Given these findings, signalized intersections are the preferred alternative for Main Street. Signalized intersections offer more safety and operations benefits with lower impacts to adjacent business structures and properties than roundabouts. We recommend proceeding with the signalized design.

Attachment B

Downtown Parking Study - Parking Advisory Committee Members

Olivia Darisse, Public Works Engineer, Department of Public Works
Laura Wheelock, Senior Public Works Engineer, Department of Public Works
Charles Dillard, Principal Planner, Office of City Planning
Samantha Dunn, Assistant Director for Community Works, Community & Economic Development Office
Jeff Padgett, Division Director for Parking & Traffic, Department of Public Works
Kara Alnaswari, Director of Business & Workforce Development, Church Street Marketplace
Will Clavelle, Assistant Director of Business Development, Church Street Marketplace
Kelly Devine, Director, Burlington Business Association
Meg McGovern, Senior Associate, Donahue & Associates
Zandy Wheeler, Owner, Ski Rack

Lake Street Shared Use Path Connection

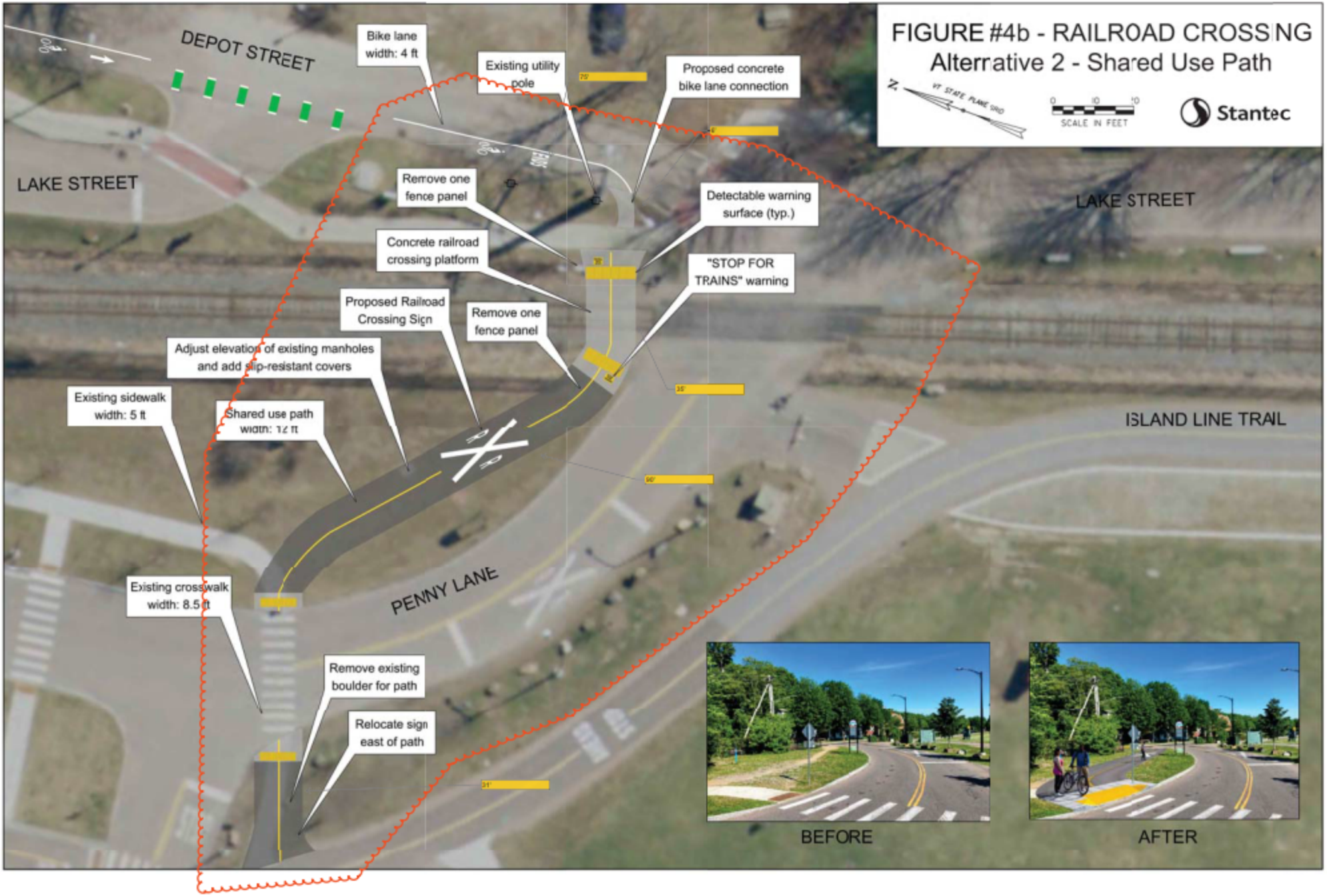


FIGURE #4b - RAILROAD CROSSING
Alterrative 2 - Shared Use Path
VT STATE PLANE SRID
SCALE IN FEET
Stantec
DEPOT STREET
LAKE STREET
LAKE STREET
ISLAND LINE TRAIL
PENNY LANE
Bike lane width: 4 ft
Existing utility pole
Proposed concrete bike lane connection
Rerrove one fence panel
Detectable warning surface (typ.)
Concrete railroad crossing platform
"STOP FOR TRAINS" warning
Proposed Railroad Crossing Sign
Remove one fence panel
Adjust elevation of existing manholes and add slip-resistant covers
Existing sidewalk width: 5 ft
Shared use path width: 12 ft
Existing crosswalk width: 8.5 ft
Remove existing boulder for path
Relocate sign east of path
BEFORE
AFTER

Timeline

2020: Scoping Study (Stantec/CCRPC)

- Reviewed by TEUC 6/23/2020

9/13/2021: BOF/CC VTrans Transportation Alternatives Grant Acceptance

6/2022: Design Contract (Stantec through VTrans On Call)

- Concept Reviewed by TEUC 12/19/22

Fall 2023: Final Design Plans

Spring 2024: Anticipated Construction

Questions?

Contact:

Maddy Suender

Associate Public Works Engineer

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Councilor Mark Barlow, **Chair,** *North District*
Councilor Gene Bergman, *Ward 2*
Councilor Karen Paul, *Ward 6*

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Transportation, Energy and Utilities Committee of the City Council
Tuesday, November 22, 2022, 5PM

Chair Barlow started meeting at 5:04 PM
–DRAFT MINUTES–

1. **Agenda**

Councilor Bergman moved to approve agenda. Seconded by Chair Barlow. All in favor passed unanimously, Councilor Paul not present.

2. **Minutes of 10/22/22**

Councilor Bergman requested to change minutes in the Councilors' Updates section, to say, " funding information" and to say, "airport emissions and expansion information from GMT" in the second sentence. He then moved to approve the minutes. Seconded by Councilor Barlow. All in favor passed unanimously.

3. **Public Forum**

Public comment from Pike Porter:

PP: To manage emissions, I would like the airport to seek ACI level 4 accreditations. Additionally, I request that the airport monitor VTANG CO2 emissions in its emissions scoping. Moreover, the airport must set specific emissions reduction goals of at least 70,000 tons CO2 annually. Also, the airport must cap total airport emissions, including aircraft emissions, at 2010 levels. Carbon off-set programs are ripe with fraud and accountability issues. Any off-set programs the BIA might seek to engage with will first be put through a public input process. Additionally, city council should require 3rd party verification of any carbon off-sets purchased. Finally, city council should require all airport tenants to calculate and report their emissions to the airport director Nic Longo.

Ashley Adams public comment:

AA: An ever-expanding airport and ever-increasing flights will lead to ever-increasing emissions. Wind generators and solar panels do not stop aviation emissions. Burlington's net-zero plan is a lie because it excludes airport emissions. Nic Longo is seeking to bring more flights and partners to the airport. This contradicts his desire to make the airport one of the most sustainable in the nation. The airport director must be committed to reducing atmospheric CO2. I am imploring this body to do the following:

- Stop the airport director's efforts to expand flights
- Include aviation emissions from all sources including civilians and military in Burlington's greenhouse gas inventory
- Actively reduce aviation emissions from all sources at the airport

Michael Arnold public comment:

MA: I am asking you to consider how our transportation funding should change during an affordability crisis. What tangible steps is the city taking to expand bus services? I ask that you take small investments to reduce transportation operating costs. Maximize GMT bus stops.

Dan Castrigano public comment:

DC: I support everything Michael said. We have to go against centuries of capitalism, decades of the aviation industry, and fossil fuels. Endless growth must stop. We must stop burning fossil fuels. I cannot believe aviation is still expanding. I am an educator focused on climate change. We have to measure emissions and we must reduce them. All emissions must be lowered including aviation emission. It has to be fast and bold. We can follow the Dutch model for airports. A lot of people are not going to like this, but it is the right thing to do.

James Le~~a~~e public comment:

J~~L~~A: It is essential that we stop airport expansion, measure emissions, and then reduce emissions. Let's take a serious look at the military and its flights from the airport. The military adds nothing to the economy.~~-~~ F-35 from the airport would not only slash the airport's greenhouse gas emissions but will also greatly lower the airport's noise level so desperately needed housing can be restored on the now-vacant 44 acres facing the airport~~and housing could be created where military aircraft is stored.~~
~~-We could house more people if we weren't storing aircraft~~

Dan Kirk public comment:
DK: Changing solar setbacks on roofs. I understand that these setbacks exist for the fire department for fire safety. Can we make these setback standards looser? This would increase my motivation to add solar panels to my real estate.

Robert Herendeen public comment:

RH: Net zero energy program stays away from air emissions. Can we improve air emissions on a short timescale? We have improved automotive emissions. Can we do the same for airplanes? Until that time, we must reduce air traffic.

Dan Batton (Save Public Forests) public comment:
DB: Immediate action is needed now to reduce aviation emissions. We must cap the number of flights from BTV.

Jak Tiano public comment:
JT: I want to speak from an engineering perspective. What technology are we going to be used to reduce emissions? Is this a realistic expectation? The airline industry is pushing to switch to sustainable aviation fuels. I want us to be skeptical of this. Biofuels emit the same amount of carbon into the air. Even though they come from renewable sources, we would be depleting carbon from soils when using biofuels. Biofuels still rely on the petroleum industry.

Closes at 5:38 PM

4. **Burlington International Airport**

- Nic Longo
- Marie Friedman
- Donny Goris-Kolb
- Iarry Lackey
- Shelby Losser

See presentation.

Councilor Bergman:

-We need to make large scale systematic changes
-What are the differences between the scopes?
- Requests report in March to the committee to more directly speak to emissions
-He is happy that he is seeking accreditation
-He wants to know if the airport is aspiring to level 6 accreditation and what is their timeline
-He wants the airport to address emissions more directly
-No more harm to the neighborhood, wants a report on community engagement

CB: What AIC level is the airport seeking?

Nic Longo:
NL: Tier 3

CB: What is the difference between the different scopes?

NL:
-Scope 1: airport operations emissions on a small scale
-Scope 2: indirect emissions
-Scope 3: indirect and optional emissions

CB: Is your goal to hit ACI level 6?

NL: Ultimately yes. Current level the airport is seeking is level 1.

CB: In March, can we see a written report on these matters? We need to address climate change now. We have talked about small changes, but how are you setting big goals and targets? Small changes are insufficient.

NL: Via the bilateral infrastructure bill, we have 1 million dollars set aside for our sustainability actions.

CB: Are we grappling with difficult truths? We need to study aviation emissions. I am very compelled by the public comment tonight. We need to integrate this into our conversations.

NL: I appreciate how you have described this. Reducing the number of flights is a huge challenge for airports. In fact, may be an FAA violation. This is something we need to look at creatively. Maybe we can partner with new technologies such as electric aviation.

CB: We need to look into this. If the FAA is a problem, we need to identify this problem and push to have it fixed. It is not okay to not understand these impediments. I hope your report will take this into account.

Chair Barlow:
CHB: This is the beginning of a conversation and we will have you back in March. I do wonder if this isn't a topic for a special meeting.

CB: Sure.

CHB: Can you expand on what level of accreditation the airport is currently pursuing?

NL: Current level the airport is seeking is level 1. Very few airports in the world are above level 4. You can find this information from ACI. This is challenging for airports, as it should be.

CHB: It is good that there are global standards here. How are you coordinating with the Vermont National Guard?

NL: The VHG and our other tenants have a great relationship with us and is in tune with the conversations we are having about these topics.

CHB: Are you coordinating with other airports in the region? If we were the only airport in the region and we reduced the number of flights that could make an impact. But we are not. So, it seems to me that this has to be a regional conversation. Reducing flights also doesn't have to mean we fly less people. Rather it could be that we fly more people on fewer aircraft.

NL: Within a two-and-a-half-hour radius of our airport there are about 2.5 million people flying. We do compete with other nearby airports for their flights. And we do coordinate with these other airports. Small companies work with large companies to lease their aircraft. And these small companies can push to use larger aircraft to reduce the number of flights.

CHB: For the sake of time, we do not have time for further public comment. You may continue presenting.

See presentation.

CB: I want to see no more harm to the neighborhood near the airport. We need to see you working with the public on this issue.

CHB: Is there public engagement on this issue?

NL: Yes, we are partnering with Intervale, various schools, and some neighbors.

AA: I am a neighbor and I am not part of that conversation.

NL: Not all neighbors, but the subcommittee of the resilience task force. And there will be the opportunity for public meetings in the future.

CHB: Wants to see good public engagement with the neighbors. Because we have given an hour and forty minutes to this topic, which is longer than we usually grant to topics at this meeting. We will not accept more comments at this time. I would like to close this item.

Public Comment from Zoom Chat:
Bob Atchinson (he, him, his) 06:12 PM
If you expand the capability of the airport, then are you not inviting more polluting flights? I.e. build it and they will come?
Also, it is VERY important that you carefully assess the upstream and downstream impacts of "sustainable" aviation fuels. When you create biofuels from something, such as soy oil, then you upset the food chain, and spread the impacts worldwide.
Staff instructed this participant to follow up with councilors as there was no time to answer this question in person.

Closed at 6:41 PM

5. **GMT Proposed FY24 Budget and Regional Funding**

- Nick Foss, Chapin Spencer

Chapin Spencer:

CS: From the last meeting we started talking about FY24. We brought this forward to the committee because with the reduction of COVID funds we are facing a situation where GMT is proposing to reinstate fares. Nick has been great at providing information and data so that is why he has joined me today.

Nick Foss
NF: The proposed budget will be brought before the finance committee next month, hopefully for approval. Looking at Burlington's assessment, we take the most recent fiscal years ride count and our cost estimation and allocate that. We have seen incredible increases with SSTA. This fiscal year, we are projecting an increase in capital costs. Last year, Winooski faced a big hit and this year it appears to be Burlington. We are working on our assessment now and we want to work with everyone to create a fair solution.

See provided presentation.

CB: I am curious about the ADA increase. Is this an increase in the numbers of people?

NF: We do know that ride count is up. ADA numbers are even higher than pre-pandemic numbers. With changes to the Medicaid funding, our funding is reduced.

CB: I want to know what we can do to keep fare free in Burlington.

CS: My though is that we request two things: one to initiate a reform to the ADA assessment and two to recommit to advancing state and regional funding.

CB: I feel that the utility fee is sensible. I think we can be acting faster on this.

CHB: The increases are based on last year?

NF: Based on FY23

CS: The members of the committee can sponsor this without approving it.

CB: Ask staff to assemble a resolution focused on funding

CS: Great

Sponsored by Councilor Bergman and seconded by Councilor Barlow

Closed at 7:05

6. **CSWD Drop Off Center Strategy**
   - Chapin Spencer

https://www.burlingtonvt.gov/sites/default/files/Agendas/SupportingDocuments/Joint%20DPW%20CSWD%20Memo%20on%20195-201%20Flynn%20Ave%2011-18-22%20TUEC%20with%20attachments.pdf

CS: We are seeking a 6-month extension on their current MOU with CSWD. There is interest in a parent alignment between our organizations for a purchase agreement. This will improve soil management. Burlington deserves a modern drop off center and this gives us time to negotiate a drop off center at Flynn Ave.

CHB: Are there any barriers to this happening?

CS: The cost is a potential barrier. We are having committee time for these negotiations

Approved by Councilor Bergman and seconded by Councilor Barlow.

Closed at 7:10

7. **Boundary Line Adjustments for the Pearl and Prospect Intersection**

- Phillip Peterson, Laura Wheelock

https://www.burlingtonvt.gov/sites/default/files/Agendas/SupportingDocuments/TEUC%20Memo%20-%20Boundary%20Line%20Adjustments%20for%20the%20Pearl%20and%20Prospect%20Intersection_0.pdf

PP: This is looking at the intersection of Pearl and Prospect. This is a high crash location. It is the 25th worst in the state. We would like to get a signer on board and create a non-binding MOU to adjust the property lines between the city and UVM.

LW: On one side of the intersection, we are looking to sell, and on the other side we are looking to buy the land from UVM.

PP: It is not a "swap". We would be selling and buying. We are working with the attorney's office on this.

CHB: This would allow us to straighten out this intersection?

CS: Correct. This would create a safer intersection and a more efficient intersection. This is informational only. This is timed well with the University Place construction.

CB: Make sure you are prioritizing bike safety here.

PP: Certainly.

LW: We bring this to you because we may need to bring this to a Board of Finance meeting and want the TEUC to be informed.

Approved by Councilor Bergman and seconded by Councilor Barlow.

Closed at 7:18

7. **Councilors' Update**

CHB: Appreciative of completion of North Ave paving. Some puddling on North Ave where roadway meets driveways during first big storm but that appears to have been addressed afterwards with additional paving work.

Closed at 7:20

8. **Next Meeting 12/19/22 before sundown**
9. **Adjourn**

Councilor Bergman motions to adjourn. Seconded by Councilor Barlow. Passes unanimously. Meeting ends 7:26 PM.

CITY OF BURLINGTON, VERMONT
CITY COUNCIL TRANSPORTATION, ENERGY & UTILITIES COMMITTEE

c/o Department of Public Works
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Councilor Mark Barlow, **Chair,** *North District*
Councilor Gene Bergman, *Ward 2*
Councilor Karen Paul, *Ward 6*

Inquiries:
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Transportation, Energy and Utilities Committee of the City Council
Monday, December 19, 2022, 3:00PM

DPW Front Conference Room
645 Pine St, Burlington, VT 05482
Masks Optional

Join via Zoom, https://us02web.zoom.us/j/84603122855
To call into the meeting, including to speak during public comment:
Phone number: 312-626-6799, Webinar ID: 846 0312 2855
If you prefer to attend in a physical location, you may join us at 645 Pine St in the front conference room

–DRAFT AGENDA–

1. **Agenda**
2. **Minutes of 11/22/22**
3. **Public Forum**
4. **BED Thermal Policy Recommendations**
   - Darren Springer
   - 30 Minutes
   - **Charter Change Report**
   - **Draft Resolution**
   - **Memo**
   - **Presentation**
5. **Lake St Shared Use Path Concept Plans**
   - Corey Mims, Maddy Suender
   - 10 Minutes
   - Presentation
6. **Main Street Great Streets Update**
   - Laura Wheelock, Olivia Darisse
   - 15 Minutes
   - Memo
7. **Bike Share RFP Process**
   - Rob Goulding, Chapin Spencer
   - 15 Minutes
8. **Director's Report**
9. **Councilors' Update**
10. **Next Meeting TBD**
    - Early January meeting available as needed.
    - Standard time booked: 1/24/23 5PM at 645 Pine.
11. **Adjourn 4:30PM**

City of Burlington
Department of Public Works
645 Pine St
Burlington, VT 05401
802-863-9094
Burlingtonvt.gov/dpw

Chapin Spencer
Director of Public Works

MEMORANDUM

TO: Members of the Transportation, Energy, Utilities Committee

FROM: Chapin Spencer, Director, Public Works
Robert Goulding, Public Information & Customer Service Manager, Public Works

CC: Cindi Wight, Director, Parks, Recreation & Waterfront
Julia Ursaki, Technical Services, Public Works
Laura Wheelock, Technical Services, Public Works
Sandy Thibault, Executive Director, CATMA
Joshua Katz, Program Analyst, CATMA
Bryan Davis, Senior Transportation Planner, CCRPC

DATE: December 19, 2022

RE: Regional E-Bikeshare Update

Update:
A regional bikeshare system continues to be an important policy tool in Chittenden County's transportation portfolio – with the goal of using these systems for purpose driven "last mile" trips like commuting or grocery shopping. While nationwide transit ridership dropped 81% between 2019 and 2020 due to pandemic trends, docked bikeshare declined only 24%. Bloomberg reports that "bikeshare has almost completely bounced back" from a decline during the pandemic. The industry continues to have potential to help transform the way we get around our communities. At this time, Chittenden Area Transportation Management Association (CATMA) plans on taking a lead coordinating role in pulling interested municipalities and institutional partners back together, issuing an RFP responsive to our needs and hopes to have a new system on the ground by late spring 2023.

Lessons Learned:
Our original vendors Gotcha and then Bolt showed promise of flexibility, local hiring and responsiveness, but the industry has changed rapidly and unforeseen factors like the pandemic have shown that the young industry faces headwinds as it matures.

- With that in mind, we will be looking for demonstrated operational success, available inventory and flexibility for a new bikeshare system.
- We will continue to coordinate with local recreational vendors (e.g., bike shops, etc) so that they are aware of the RFP, have an opportunity to apply or are made aware of other ways to grow their

footprint inside of Burlington. For instance, there is a contract in place for two local bike shops to rent a DPW facility on the waterfront for rental storage, as well as an adjacent parcel for rental sales. Our colleagues in Parks, Recreation & Waterfront have had other discussions to help facilitate waterfront access for other vendors.

- CATMA has committed that the City's previous priorities will be a part of any exclusive contract with a future bikeshare operator. This includes: geofenced speed and motor restrictions; equity and customer service commitments; waterfront hub management, and data sharing.
- License agreements and further City Council approval will be necessary for any right-of-way spaces; Parks and Church Street Commission approval will be necessary for any parcels on their properties.

Moving Forward:
The DPW Director and DPW Public Information & Customer Service Manager have led the communications with CATMA and the regional bike share team over the past six months given the open positions in the DPW Technical Services' team. Now that the two DPW transportation planning positions will be filled in the coming weeks, Technical Services will be the point of contact again for the City's role in this regional effort in 2023.

It is our understanding that CATMA will be releasing the Request For Proposals (RFP) within the next week or so. The DPW requested this item be on the Transportation, Energy & Utilities Committee (TEUC) agenda before the RFP was released so that the committee members and the community could be briefed and offer feedback.

We look forward to the conversation at the upcoming TEUC meeting. Feel free to reach out in advance with any questions.

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Transportation, Energy and Utilities Committee of the City Council
Monday, December 19, 2022, 3:00PM

DPW Front Conference Room
645 Pine St, Burlington, VT 05482
Masks Optional

Call to order at 3:02PM

–DRAFT MINUTES–

1. **Agenda**

Councilor Bergman moves to adopt agenda. Seconded by Chair Barlow. All in favor. Passes Unanimously.

2. **Minutes of 11/22/22**

Councilor Bergman moves to adopt minutes - notes there are a few typos for staff to address. Seconded by Chair Barlow. All in favor. Passes Unanimously.

3. **Public Forum**

Martha Lang – UVM Trinity Campus increasing campus pedestrian traffic. Is this an appropriate Committee to discuss this?
Director Chapin Spencer – Yes.

Ashley Adams – Comment regarding District Energy Plan not being sustainable. Other options that should be considered.

Deniz Dutton – Comment against District Energy Plan. Not sustainable. Not Carbon neutral.

Zack Porter – Founder of Standing Trees, a New England wide community. Against the District Energy Plan. Can't meet decarbonization goals with biomass energy source. Other options that could decarbonize Burlington.

Catherine Bock – Live 2 blocks from McNeil. Comment against District Energy Plan.

Laura Simon – Standing Trees volunteer. Comment against District Energy Plan.

Cheryl Joy Lipton – Comment against District Energy Plan.

Pike Porter – Neet to reevaluate energy source sustainability. Reevaluate Net Zero and Climate Action Plan and account for carbon generated by McNeil, airport, etc.

Zoom comment: Laura Simon: Please understand that many Vermonters agree with Ashley Adams comment. Please visit standingtrees.com to learn more about what she is saying. I worked for Burlington Authority for 14 years. I ask you to NOT allow McNeil to keep burning.

Zoom Comment: Catherine Bock: I would like to add my voice to the points Ashley and Deniz have made. Please consider that to continue burning wood at the McNeil plant is a bad move for the climate.

Zoom Comment; Cheryl Joy Lipton: Biogenic emissions aren't listed or counted by McNeil and hasn't been reported to you by them. This is what is causing problems, since it is still carbon emissions, even though it isn't reported. It's an accounting error that needs to be corrected. The biomass task group of the VCC is also recommending that wood heating should be looked at next. This is another thing that needs to be removed to be carbon free. Burning wood for any reason will emit carbon dioxide and other pollution, harming climate, biodiversity, and human health.

4. **BED Thermal Policy Recommendations**
   - Darren Springer
   - 30 Minutes
   - **Charter Change Report**
   - **Draft Resolution**
   - **Memo**
   - **Presentation**

Darron Springer – Plan to work with Council on ballot language for January Council consideration.

Councilor Gene Bergman – Question on the Resolution and the definitions. Concerned and sympathetic to the points that have been made with regards to the definition of renewable fuels.
Resolution – the paragraph about uses must be included in the question that is posed to the voters. Break up text into bullet points, resolution is confusing as is. No problem with sequencing or amount of money for the fee.

Chair Mark Barlow – Supportive generally. Want to coordinate more with other communities and have policies with neighboring communities. So Burl recently passed a similar ordinance. Would like to change our language to allow for room to determine appropriate pricing.

Kim Sturtevant – City Attorney. Could help with structuring paragraph. Could reword language to say “Up to 150$”. Need to consider how would we then decide what the actual number is. Will have to follow that up with ordinance language to have fee structure in place.

GB – Supportive and should keep 5% cap. Have something like “to be set by ordinance” vs “to be set by resolution.”

KS – I can work on language with staff and have it checked prior to it coming back to full Council.

GB – Supportive. Definitions of renewable, it is appropriate we engage in this conversation in the place where the definition is which is in ordinance.

DS – Appreciate the resolution discussion. Understand the updates and will continue to move this forward in advance of Town Meeting Day if possible.
We love electrification from a clean energy standpoint and good for locally used power. We are supportive of strategic electrification. That said, we are conscious that there is a larger policy conversation and other fuels that are in play. We are looking to be as cost effective and broad as possible. Left space for things to be done on a case-by-case basis.

MB – Is McNeil operating at its capacity?

DS – Current discussion is not about McNeil. 10-20% renewables on the market. Not here to talk about District Energy Plan. This policy does not have anything to do with McNeil’s operations. This resolution does not mean we will need a higher output from McNeil.

GB – Maybe a joint meeting with Ordinance Committee, a work session, etc. Longer more involved conversation for definition of renewables would be helpful.

DS – Always happy to talk about our resources and what we are doing. Happy to join another meeting or whatever is helpful.

MB– Good idea to coordinate a time for further discussion

Move that we amend the proposed resolution as indicated and ask the City Attorney to do the drafting necessary to make that happen and confirm with Committee members to allow this to get back to Council to get this back to the March ballot.

Item closes at 3:48PM

5. **Lake St Shared Use Path Concept Plans**
   - Corey Mims, Maddy Suender
   - 10 Minutes
   - Presentation

See presentation.

Councilor Bergman – Supportive of concept.

Chair Barlow – Supportive as well. Will support commuter and recreational traffic that uses Depot Street, or people going to waterfront. What are long-term plans for Depot Street?

Director Chapin Spencer – It has been on our paving list for several years but given financial challenges and high paving bids over last few years we have not been able to do this. Still have it in our paving plans as soon as it is feasible.

6. **Main Street Great Streets Update**
   - Laura Wheelock, Olivia Darisse
   - 15 Minutes
   - Memo

Memo summary by Olivia Darisse, see memo.

Councilor Gene Bergman – We need to stay on business relations and disruptions from this project. A CEDO concern as well.

Laura Wheelock - Going to DPW Commission on Wednesday at 6:30. Will have a presentation from the consultant that will be helpful. Informational meeting, we hope to know what they will feel comfortable with moving forward. No ordinances proposed so no action to be taken.

GB – BWBC and Local Motion and other folks that raised concerns with the shared use path should be made aware of meeting.

Director Chapin Spencer – Important to note City ordinance already lists these intersections are signalized so our plan is to move ahead if no intervention. We want to get input now. We will reach out to those groups.

Chair Mark Barlow – Section on roundabouts was helpful. Revine sewers – does it need to be stabilized?

Laura Wheelock – Yes, certain sections will be abandoned and filled.

MB – Parking study – how were they counted?

OD – We looked at historic peak parking and physically collected data during that time. Working with Parking to see trends and revenue to compare current to historic data.

MB – Can there be recommendations on ways to implement mitigation of loss of diagonal parking in report published in January? Will there be additional input opportunities for businesses?

LW – Good suggestion. Wayfinding will be installed through the project.

OD – We are looking to make sure the spaces are signed in the best way possible to fit the parking needs of the specific area. Will take recommendation to businesses for feedback.

Item ends at 4:17PM

7. **Bike Share RFP Process**
   - Rob Goulding, Chapin Spencer
   - 15 Minutes

Director Chapin Spencer – Tech Services is down planning staff but will be taking over this project. CATMA is working on proposals for new bikeshare program starting in 2023. CATMA is including language that reflects the concerns we heard from the community and local bike shops throughout process.

Sandy Thibault, Executive director at CATMA – Bikeshare is a key option that compliments that system we have in place. Committed to seeing it continue. CATMA is regional system so we are appropriate group to be moving this RFP forward.

Josh Katz, CATMA – Timeline Update: RFP released this week, proposals until end of January. Will work with partners to choose vendor by end of February and get bikes implemented by May. We recently did a community bikeshare survey to gauge what the community wants. We saw support from over 75% of respondents to reboot the system. We received great feedback and worked to incorporate it.

Councilor Gene Bergman – Want to ensure proposal is able to be integrated into Zoning requirements. To provide a bikeshare membership to all residents/employees for all for the first two years and then a 50% discount thereafter.

ST – Dependent on how the vendor operates. A membership option was great and we would like to continue this.

GB – Would like to have RFP be responsive to membership option.

MB – Local Bike shops and waterfront concerns from first program. How are you incorporating that into RFP so we don't repeat that?

CS – We received an email from Zandy Wheeler, Skirack, during meeting with feedback. Ongoing conversation.

Josh Katz – We have met with bike shops to see what they would like from new system. As a result, we are emphasizing need for hubs in neighborhoods and continual engagement with local bike shops is included in RFP. City is having some initiates to allow for vendor space on the waterfront.

Item ends at 4:33PM

8. **Director's Report**

Director Chapin Spencer – N Winooski Ave - finalizing shared parking option. Proposing City offer to manage and enforce at times and in places when the owners would welcome that. Plan is to go out after Holidays. Mapped out a timeline to talk to owners about shared parking option, parking regulations on

street, Will Clavel, CEDO, will be joining us to talk about loan support programs. On street regulatory changes taken to Commission at February meeting. Following up with CHC to see how we can assist with their off-street parking needs.

Councilor Bergman – Would like to join on site outreach.

9. **Councilors' Update**

Councilor Bergman – Thinks we should tackle District Energy and question of renewable fuels at a January or February Special Meeting.

Chair Mark Barlow – Agree. We should have broader conversation about base line measurement of emissions of both BED and Airport.

10. **Next Meeting TBD**
    - ~~Early January meeting available as needed.~~
    - Standard time booked: 1/24/23 5PM at 645 Pine.
        - Move forward with this time.

11. **Adjourn 4:30PM**

Councilor Bergman moves to adjourn. Seconded by Chair Barlow. All in favor. Passes Unanimously.

Meeting ends 4:39PM