



## **ENERGY & CLIMATE COMMITTEE MEETING AGENDA**

Wednesday, December 2, 2020, 8:00 AM

**Virtual Zoom Meeting**

### **TO JOIN THE MEETING:**

The public may join the meeting online by visiting [www.zoom.us/join](http://www.zoom.us/join) or by calling the toll-free # (888) 475-4499 and entering the Meeting ID: **860 6322 7039**. If you encounter any issues accessing this meeting, please call 603-209-4697 during the meeting. More info on how to access this meeting is available on the Energy and Climate Committee webpage at [ci.keene.nh.us/energy-and-climate-committee](http://ci.keene.nh.us/energy-and-climate-committee).

### **Members:**

Dr. Ann Shedd, Chair  
Peter Hansel, Vice Chair  
Terry Clark, Councilor  
Jake Pipp  
Ken Dooley  
Cary Gaunt

Anna Schierioth  
Rod Bouchard  
Andrew Dey  
Zach Luse  
Paul Roth, alternate

### **Staff:**

Rhett Lamb, ACM/Community Development Director  
Mari Brunner, Planner

1. Call to Order and Roll Call
2. Approval of November 4, 2020 Meeting Minutes
3. Energy Plan\*
  - a. Revisions to October 2020 Draft
  - b. Next Steps
4. Carbon Cashback Discussion
5. Community Power Update
6. Committee Membership
7. New Business
8. Next Meeting: January 6, 2020
9. Adjourn

*\*To view draft energy plan documents, please visit the Energy and Climate Committee Google Drive folder:  
<https://drive.google.com/drive/folders/1O1WIR0fADTNijRt13v3DU7k2FxxXDcGs?usp=sharing>*



## ENERGY & CLIMATE COMMITTEE MEETING MINUTES

Wednesday, November 4, 2020, 8:00 AM Virtual Zoom Meeting

### **TO JOIN THE MEETING:**

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### **Members:**

Dr. Ann Shedd, Chair  
Peter Hansel, Vice Chair  
Terry Clark, Councilor  
Jake Pipp  
Ken Dooley  
Rod Bouchard  
Andrew Dey

### **Members not present:**

Cary Gaunt  
Anna Schierioth  
Zach Luse  
Paul Roth, alternate

### **Staff:**

Rhett Lamb, ACM/Community  
Development Director  
Mari Brunner, Planner

**Dr. Shedd called the meeting to order at 8:05 am.**

### **1. Call to Order and Roll Call**

Dr. Shedd read a prepared statement explaining how Emergency Order #12, issued by the Governor of the State of New Hampshire, pursuant to Executive Order #2020-04, gives authority for public meetings to be held remotely and shared information about how members of the public can listen and share comments. She then read aloud the Zoom virtual meeting format rules and roll call was conducted.

### **2. Approval of October 7, 2020 Meeting Minutes**

*Vice Chair Hansel moved to accept the October 7, 2020 meeting minutes, Councilor Clark seconded, and the motion was approved unanimously.*

### 3. Energy Plan

#### a. October 20 Virtual Forum Debrief-

Ms. Brunner asked for member feedback on the virtual forum. She stated that the goals for the forum were to create awareness about the Energy Plan and review the priorities proposed within the Plan and elicit feedback from the public. Vice Chair Hansel stated that he thought the forum went well, although most participants were internal to the process, there were some participants that are not members of ECC. He said the breakout sessions went well and he believes that they adequately met their goals. Councilor Clark agreed and stated that the attendance was probably higher than if the forum had been held in person and the breakout sessions were so successful that some of them went over time.

Ms. Brunner asked if the breakout sessions could have run longer or if an hour was long enough. Vice Chair Hansel replied that the Electric Vehicle (EV) Infrastructure session had enough time, however, the other two sessions could have benefitted from more time. Dr. Shedd stated that more people are engaged around home and commercial energy use than are yet engaged around EVs, therefore, those two strategies will warrant further discussions within the community. She said there were around 50 people on the Zoom meeting altogether. Ms. Brunner said there were over 70 people registered and some came in and logged out but there were about 50 people present at one time. Dr. Shedd stated that a number of those were committee members, panelists, and facilitators but it was still a good turnout. Ms. Brunner noted that this is the first time that ECC has used a virtual platform for a public meeting and asked if members thought it was a sufficient platform for holding a community meeting. Vice Chair Hansel replied that the forum went as well as could be expected it would and he thanked the City staff for helping the Zoom platform operate smoothly. Dr. Shedd said that currently many organizations are finding that turnout might be better if meetings are held online and are developing hybrid models for increasing participation and organization. She said the virtual forum was a good way to get more people involved in the discussion. Ms. Brunner thanked the committee for their help with facilitating the breakout sessions and for their involvement with the community forum.

#### b. Feedback from Public

Ms. Brunner stated that she included a summary of public feedback to date in the meeting packet, including summary notes from the three breakout sessions from the community forum as well as comments received through the Energy Plan website.

Ms. Brunner highlighted the main takeaways for the Community Power session, which included strong support for increasing renewables and decreasing greenhouse gas emissions, however, there was concern about equitability and cost affordability. She said they also received feedback on outreach methods and people seemed to prefer a mix of outreach methods, for example, online and email methods, however, there was also support for articles and direct mailing. She said in terms of goals, there was good discussion around increasing resilience, micro-grids and local power generation, renewable energy overall and offering cost-effective rates and development of green jobs. She stated that in terms of future outreach, one participant proposed online surveys, and recommended doing a video along with a short online survey. She asked for member feedback about the community power breakout sessions.

Vice Chair Hansel said he was not present at that session, but there seems to be a lot of interest in micro-grids and which means there may need to be greater education about what micro-grids are and how they can be accomplished. Councilor Clark stated that partnering with Swanzey's industrial park is a way to proceed with micro-grids. It will take a regional approach, the vendor for the community power showed great interest and it will be very important for resiliency and for building the industrial park that is not getting much action and adding industry can only help the entire region. Dr. Shedd said micro-grids could be an element of the draft Plan itself and asked whether there are elements that might need to be added. She stated that in terms of resiliency there are existing models within the multistate region of municipal projects that keep critical functions running with solar plus storage; micro-grids with significant battery storage are included in that. For example, having a micro-grid on the municipal side and the medical center would be advantageous to keep it running in the event of grid failures. Ms. Brunner said that is a great point and they could more prominently discuss resiliency and micro-grids in the Energy Plan.

Ms. Brunner stated that there was very strong support for the phased approach for the Home Energy Labeling and Benchmarking session which would involve starting with a voluntary program and then over time transitioning to a mandatory program. She stated that there was also very strong support for offering incentives. She said there was not as much support for penalizing people for not participating or making it mandatory right away. She said that benchmarking is sometimes tied to buildings having to reduce energy usage and there did not seem to be a lot of support for that option. Ms. Brunner stated that this takeaway solidifies the recommendation for a phased approach and to start with a voluntary program. She said with respect to home energy labeling, four people responded to an online survey and expressed support for energy labeling for homes that are for sale and for home rentals, or when a building is renovated. She stated several people mentioned it should apply to building renovation or major system upgrades, as well large energy users, multi-unit residential and commercial properties.

Ms. Brunner asked Mr. Pipp if he could add to what was discussed during the Benchmarking and Home Energy Labeling session. Mr. Pipp stated that participants in the session expressed interest in having the City model or take the lead, as well as Keene State College as an institution to model it. He added that Ms. Gaunt did a great job in facilitating the discussion for the home energy labeling group. Vice Chair Hansel stated that home energy labeling and benchmarking might be a new concept to people, however, as time goes on people may learn more about it and the details of the Plan may need to change accordingly. For example, it may begin as voluntary benchmarking but over a few years there may be more buy-in for mandatory benchmarking and labeling. Ms. Brunner added that they can work on building more support for voluntary benchmarking now and build in more mandatory home energy labeling options in the future. She said she spoke to Ms. Jen Green from the City of Burlington about that city's energy efficiency program for rental properties. Ms. Green explained that the City of Burlington requires rental properties where tenants pay the energy bills to go through the program and meet specific energy efficiency standards; however, the landlords who pay energy bills on behalf of their tenants are exempt. She said their program has been going since 1997 and they are a model community to learn from.

Dr. Shedd noted over that time, the City of Burlington has reduced their energy demand by about 80% while still experiencing economic growth. Mr. Pipp added that participants in the session wanted the program to be voluntary to start and have information shared openly, and they also discussed property tax incentives which is an area that may not be covered in depth in the Energy Plan right now. Dr. Shedd agreed that split incentive should require the labeling and is important in achieving progress.

Ms. Brunner stated that participants of the EV breakout session expressed support for the City leading by example by purchasing EVs for the municipal fleets and school buses. She said concern about the impact of diesel exhaust on the health of children, as well as city, state and utility incentives for EV use in NH were also discussed. There is only one utility incentive in the state for EVs and it is not in the region. The fact that NH is not a zero-emission mandate state was discussed in context of states with zero emissions mandates having higher EV adoption rates. One of the barriers participants spoke about is the expense of EVs. Ms. Brunner stated that the session also covered topics around car sharing programs, leasing and buying used EVs, as well as having the City encourage the State to offer more EV incentives, as well as a public/private partnership to install EV charging stations.

Vice Chair Hansel noted that incentives seem to be a common theme, and if they end up with a community power agreement, they can build EV charging into that structure and perhaps EV charging could become an incentive that they can control as a community. He said on a visit Delaware, for example, he was able to plug his car into a municipal charging station that was free, so there are communities doing that. Ms. Brunner added that some time ago she spoke to the Sustainability Manager from Salt Lake City about their EV charging infrastructure program and at that time they had just transitioned to offering EV charging for free in the city and experimenting with that option on the City's budget. She said they offered the free option due to not getting adequate usage initially from their charging stations and the barrier was the cost.

Ms. Brunner stated that she also included comments submitted through the website and said to let her know if there are questions. She said there were some good comments and questions posted to the website about all three breakout sessions, particularly benchmarking and energy efficiency, that she summarized. Dr. Shedd stated that Mr. Bohannon will be speaking about the Honeywell energy contract.

c. Draft Sustainable Energy Plan

Dr. Shedd stated that for today's meeting they will be reviewing the draft Sustainable Energy Plan as a committee; she noted that next month's December 2 meeting would be the final opportunity for the committee to provide input before referring the Energy Plan to City Council for adoption. She said the committee has reviewed sections of the 90 pages of the document and asked if members have any ideas for items that might not be fully addressed, for example, resiliency and peak demand cost shaving. Vice Chair Hansel said he sent some comments by email to Ms. Brunner and asked if she received them. Ms. Brunner stated that she has skimmed the email but has not had time yet to go through it more carefully. She noted that, as far as the data analysis that Cadmus conducted, she is not too comfortable personally questioning that data since they were the experts that they hired to do that. She said the data that is in the Plan now is the same data that was shared with ECC earlier this year. She said unless there are major

concerns with data, she does not want to address that data, however, if there are some major errors, she would be happy to discuss that. Vice Chair Hansel said that the Industrial sector data is way off so they can discuss that concern.

Mr. Dey said that they had discussion about the future of the fossil fuel infrastructure in and around Keene and asked if they want to explicitly recommend that in the Plan. Councilor Clark agreed and asked if they had defined “renewable energy” yet and Dr. Shedd said there is one page in the plan that addresses that and does not include fossil fuels. Ms. Brunner said she put together a couple of slides that give an overview of each of the chapters of the Plan. Dr. Shedd stated that in the Northampton, MA energy plan, the plan addressed the questions of whether cities should prolong the use of fossil fuel in the energy mix, whether for electricity or thermal. Councilor Clark added that they are in negotiations with Liberty Utility right now about Keene’s plan and they could voluntarily put themselves on a timeline plan that would make them zero percent by the City’s goal of 2050. He said he is not sure if they would agree to that or what the next steps would be, however, they should know more about that in a couple of weeks and then the City could potentially work with that plan.

Dr. Shedd asked if there is interest from the committee in having a statement in the Plan about how the City’s permitting process should address future applications for fossil fuel projects. Maintenance of existing projects needs to happen for safety reasons, but the question is in expanding those systems. Ms. Brunner stated that the City has not looked into that type of action yet, the question of whether the City should consider adding fossil fuel systems and that is something that at the staff level they have not discussed yet primarily due to concerns about pushback from the community. She said they can research and consider that, however, it would not be something that she could include in the plan in the next few weeks as it requires a lot more time to research and consider as it is a different type of strategy than what exists in the Plan already. Dr. Shedd agreed that it would be challenging at this point in the game to add the language, however, some sort of reference as a point of discussion for the future would be ideal. Ms. Brunner said she can add language that addresses that this issue has been discussed and is something to consider in the future. Councilor Clark said the Public Utilities Commission (PUC) would have precedent and he is not sure that the City of Keene has that authority and that is why they want to make that a guiding principle because the PUC has precedent, or their rules would apply over the City’s. Dr. Shedd thanked Councilor Clark for his involvement with the PUC.

Dr. Shedd said she would like to bring up the staffing to do this work. She said the big grid in the Energy Plan involves City staff tracking the metrics of the Energy Plan. The 2004 Energy Plan did call for a position in the City to implement the Plan without robust and significant City staff time commitment. She said in the midst of the pandemic and economic impacts on City budgets this is not the time to create a new City position, however, the Plan must address the need for City staff commitment, whether it be carving out time for existing staff, or working toward an eventual position or shared position. Ms. Brunner asked if this would fit into the Action Plan chapter, Chapter 5. Dr. Shedd asked for feedback from committee members. Vice Chair Hansel said they should discuss this somewhere in the Plan; however, the timing and process may be tweaked over time. He said Keene is probably not the only community that needs help in a sustainability coordinator position, perhaps through Southwest Regional Planning Commission (SWRPC), as a partnership. However, they need more time for someone to do this work, whether



it is contracted out or shared with other communities, needs to be discussed. Mr. Roth agreed that there is a bandwidth issue with current staff, and he agrees with Vice Chair Hansel's approach to indirectly refer to that in the Plan. Mr. Bouchard also lent his support for SWRPC to be a natural fit for this position or partnership. Dr. Shedd stated that in the North Country there was a position created called North Country Circuit Rider and Mr. Lamb and Ms. Brunner have participated in those discussions and there are resources available in terms of the scope of work of a sustainability position might look like. Ms. Brunner said she can do some research herself to learn more about shared positions, for example, reaching out to the New England Municipal Sustainability Network which is under the umbrella of the New England region's USDN network and find out about their shared models. She said Brattleboro also recently created a Sustainability position so she may be able to learn more from them. Dr. Shedd added that Lebanon has a staff person for this work as well. Vice Chair Hansel said that the Downtown Coordinator position has been absorbed in to the City and will incorporate some of the duties that were previously done in that position.

d. Next Steps

Ms. Brunner said that she will upload the Energy Plan slides to the Google Drive and the Energy Plan is also available online at [www.KeeneEnergyPlan.com/draftplan](http://www.KeeneEnergyPlan.com/draftplan). She said she is accepting comments in writing and they can be emailed to [communitydevelopment.ci.keene.nh.us](mailto:communitydevelopment.ci.keene.nh.us). Comments will be accepted until November 16 so she will have time to incorporate them as the deadline is November 30.

**4. Updates from Andy Bohannon, Parks and Recreation Director**

a. Human Rights Committee Proposal re: Committee Nominations

Dr. Shedd asked Mr. Bohannon to provide a brief update on what the considerations of the Human Rights committee are in regard to recruitment of committee members. Mr. Bohannon stated that the Mayor asked if the Human Rights committee could help recruit more members to the City's boards and committees. He stated that the Human Rights committee is not a clearinghouse; instead their role is to utilize their network and get people engaged in the City process. The committee has made recommendations for reducing barriers to membership and to increase membership diversity from every part of the community. He said it is ECC's responsibility to bring more diversity to this committee. Mr. Bohannon stated that they are making changes to the City website that have been identified as barriers to the membership process. They are currently working with the IT department to reduce the number of clicks needed to get information. He noted that the City will be making the resumé requirement optional as that requirement has been identified as a barrier to membership. He said that moving forward, only a cover letter detailing a person's background and interest in membership will be required. Mr. Bohannon said there are several glitches on the City's pages that they need to work on to reduce the number of clicks needed for membership vacancies to be seen, as well as posting them on using social media platforms. The overall goal is to reduce barriers to open up membership to more diverse populations. The other change is increasing the number of alternates allowed on a committee to allow members a part-time option with the opportunity to become

full-time over time. Mr. Bohannon stated that is the overview for the committee nomination process and it does not necessarily remove all of the barriers to membership as many committees are still falling short on recruitment.

b. City Energy Services Contract with Honeywell

Mr. Bohannon stated that the City signed an energy services contract in 2010 and part of the addendum involved low hanging fruit, for example, the installation of the solar array on City Hall. He said Honeywell is responsible for energy auditing the City, however, over time the City facilities got ahead of some of the work for the audit, for example, they replaced all of the lights in the City, the lights in Public Works and are completing many projects with their operating budget that have not been widely reported. He stated that over time the reporting audit was very favorable as the City was doing more than they had planned for. Mr. Bohannon said they looked at the service agreement of the contract and they decided to terminate the contract and City Council will be presented with that decision. He explained that the City will aim to hire local people to service mechanical needs and avoid various costs associated with the Honeywell contract. Mr. Bohannon stated that the City aims to become more efficient at utilizing the money they are saving from the contract towards greater sustainability. He said they will still receive an audit this year, however, their contract with Honeywell will not be renewed for next year.

Dr. Shedd said that in regard to benchmarking, it would be great to post a summary of the energy measures the City has taken and the progress being made on the ECC and Keene Energy Plan webpages. She said there is great value in sharing information about the energy work the City has accomplished with the public. Mr. Bohannon added that in regard to the community power opportunity, the City tracks all electricity and fuel use. Vice Chair Hansel said that it is logical to terminate the Honeywell contract and perhaps that extra money could be used to supporting a Sustainability Coordinator position. Mr. Bohannon disagreed since the money they are saving must be funneled into funding mechanical services. Vice Chair Hansel agreed and said it would also be helpful for the City to codify the manner in which the City is monitoring their energy and fuel usage so that other buildings can learn from that method for their own purposes. Mr. Bohannon replied that the City tracks everything through yearly spreadsheets across their buildings so that, when they do go out to bid for these larger contracts, the information is readily available. Dr. Shedd said these are great stories to share about what the City and school districts have accomplished in avoiding substantial costs at a benefit to taxpayers and we need to tell those stories. Mr. Roth said that they need to tell Mr. Bohannon's story that Keene no longer needs Honeywell as contractor as that is a very important story to tell to the public.

**5. Community Power Update**

Ms. Brunner stated that the City is still in the process of reviewing a contract and negotiating with a consultant. She said the next Community Power meeting has been rescheduled and will take place one week later on Friday, November 13 at 8 am.



**6. New Business**

Dr. Shedd said that Councilor Clark, Mr. Weed and Ms. Shepardson brought the Carbon Cash back Coalition initiative to the committee's attention a while back as a concept of putting a price on carbon. There are bills at both the state and federal levels on carbon cashback as one of the most effective ways to rapidly and equitably bring down greenhouse gas emissions. Councilor Clark deferred to Mr. Bouchard. Mr. Bouchard stated that the Commissioners are very interested in a joint meeting with the City about the carbon cashback program and it is something that other municipalities will be interested in and there is a need to join forces to ensure that everyone who is interested has a platform to attend. He suggested that setting something up outside of the ECC agenda, in addition to what will be happening in December, would be ideal. Dr. Shedd thanked Mr. Bouchard for his update, as well as all members for their work and involvement. This item will be added to the December meeting agenda for further discussion.

**7. Next Meeting: Wednesday, December 2, 2020**

**8. Adjourn**

**Dr. Shedd adjourned the meeting at 9:23 am.**

Respectfully submitted by,

Ayshah Kassamali-Fox

Reviewed and edited by Mari Brunner, Planner

# CHAPTER 1 | INTRODUCTION



## Keene's Sustainable Energy Goals

On January 17, 2019 the Keene City Council passed Resolution R-2018-36, which set a goal to transition Keene to a 100% renewable energy future by 2050, with an interim goal to reach 100% renewable energy for all electricity by 2030. This Sustainable Energy resolution highlights the City's long-standing commitment to climate action, and calls on the City to develop a strategic plan to achieve its renewable energy goals by December 2020. The full text of this resolution is included in Appendix A of this plan.

"It is the goal of the City of Keene that all electricity consumed in the City will come from renewable energy sources by the year 2030 and that 100% of all thermal energy and energy used for transportation come from renewable energy sources by the year 2050. This goal will apply to the entire Keene community, not just municipal government operations."  
- Resolution R-2018-36, "Sustainable Energy Goals"

## A History of Climate Action

Keene's commitment to pursuing these sustainable energy goals is consistent with the City's long history as a climate leader. The City made its first formal commitment to climate action in 2000, when it joined the Cities for Climate Protection campaign and formed the "Cities for Climate Protection Committee", later named the "Energy and Climate Committee." This Committee, which is comprised of residents and business leaders in Keene, has worked on a number of initiatives over the past two decades. In 2001, the City's first greenhouse gas (GHG) emissions inventory was completed for baseline year 1995, and in 2004, the City adopted a climate action plan which set 20-year GHG reduction targets for both the community (10% reduction below 1995 levels by 2015) and local government (20% reduction below 1995 levels by 2015). In 2007, the City of Keene was one of the first communities in the nation to develop a Climate Adaptation Plan, and in 2010, many of the City's climate mitigation, adaptation, and sustainability goals were incorporated into the Comprehensive Master Plan.

Leading up to and following the adoption of the 2004 Climate Action Plan and the City's GHG reduction targets, the City took a variety of steps to reduce carbon emissions. Major accomplishments include the following:

- In 1994, the City installed a partial methane recovery system at the municipal landfill, and expanded the system when the landfill was capped in 1999. This methane-to-energy system powered the landfill for over 25 years, until the supply of methane from the capped landfill began to run out. In 2018, the City received an EPA Climate Showcase Community Grant to replace the methane-to-energy system with a generator that runs on biofuel made from 100% post-consumer vegetable oil.
- Since 2002, the City has been using a biodiesel blend to fuel its vehicle fleet to reduce emissions and fumes. In 2005, the City added hybrid vehicles to the fleet to further reduce emissions.
- In 2003, the City installed a geothermal HVAC system at the Public Works facility on Marlboro Street in Keene, and in 2018, the City installed the largest solar PV array in Keene at the time (643.2-kilowatts) on the roof of this same facility.<sup>1</sup>
- Between 2000-2017, all traffic signals, airport beacons, parking facility lights, and street lights in Keene were converted to LEDs.
- The City entered into an energy services contract from 2011-2020 to make various building envelope and lighting upgrades to City facilities and replace outdated systems, such as the chiller at City Hall.
- In 2015, the City made a commitment to the concept of “Complete Streets,” formalizing its long-held approach to designing City streets to enable access and mobility for everyone, including pedestrians, bicyclists, children, older adults, and people with disabilities.<sup>2</sup>
- Over the past three decades, the City has prioritized infrastructure improvements that support reducing emissions, reducing traffic congestion, and increasing safety for walkers and bicyclists. Some of these infrastructure improvements include replacing five signalized intersections with roundabouts, improving rail trails and pedestrian infrastructure in the downtown and near schools, and installing pedestrian bridges over busy state routes to connect the Cheshire Rail Trail and Ashuelot Rail Trail to downtown Keene.
- Since 2007, the City has offered a property tax exemption for renewable energy systems, including solar energy systems (total assessed value), woodheating energy systems (up to \$10,000), and wind powered energy systems (total assessed value).<sup>3</sup>
- In 2019, the City entered a two-year contract with Constellation Energy to procure Green-e® Certified Renewable Energy Certificates equivalent to 100% of municipal electricity use beginning in 2020.

## Spotlight: Clean Energy Team

The Clean Energy Team (CET) is a grassroots group of Keene residents, businesses, and leaders from education, faith, nonprofit and other sectors that works to make energy efficiency and renewable energy options accessible for residents and businesses in the Monadnock region. In 2018, the CET heard about the Sierra Club “Ready for 100” campaign, a national movement to transition communities in the United States to 100% clean and renewable energy. The CET knew they wanted to pursue this in Keene.

At the start of this effort, CET members made it a priority to listen. They interviewed City Council members, the Mayor, city and regional planners, and business owners to hear their concerns and ideas. Then, they led a public outreach campaign to share their vision with the public through tabling at events, participating in a local climate march, and getting signatures for a petition to City Council.

After extensive outreach and building public support for 100% renewable and clean energy goals, CET wrote a letter to the City Council asking them to adopt a 100% Renewable Energy Resolution, and delivered this letter along with a petition with signatures from Keene residents and businesses. The Mayor assigned it to the Municipal Services, Facilities, and Infrastructure Committee. On the night of the Committee’s hearing, the room was filled with supporters of the resolution, all wearing green; over 20 members of the public spoke at the hearing to ask the City to pass the resolution. The Committee ultimately voted for the Resolution to be considered by the full City Council. On January 17, 2019 the City Council voted to adopt the Sustainable Energy Resolution.



*Above: Clean Energy Team (CET) memers and supporters attended a City Council committee meeting on November 19, 2018 to express support for the then-proposed renewable energy goals. Photo credit: CET.*



## Planning & Public Engagement Process

Following the passage of the Sustainable Energy Resolution, City staff began working with the Keene Energy and Climate Committee (ECC) and other community partners to obtain input on the energy plan vision, strategies, and objectives. During the spring of 2019, staff interviewed 18 key stakeholders in the community and worked with the ECC to develop a community engagement plan. This plan called for a series of three focus groups with the following stakeholders: 1) residential landlords, 2) businesses, and 3) large energy users (e.g. Cheshire Medical Center, Keene State College, and Hillside Village). The first focus group was held in August 2019, and the second and third focus groups were both held in February 2020. During this same timeframe, the City hired an energy planning consultant, The Cadmus Group (“Cadmus”), to conduct a baseline analysis of electricity consumption in Keene and help the City identify strategies to achieve 100% renewable electricity by 2030.

Outreach to the public kicked off in October 2019 with an in-person workshop held at Keene State College. Throughout the Fall 2019 and Winter 2020, the City worked with community volunteers to hold a series of 14 volunteer-led group discussions at various locations in the community to gather input from residents of Keene and surrounding towns. In addition, City staff presented at various local schools and civic organizations, including but not limited to MC2 Charter School, Surry Village Charter School (in Keene), the Rotary Club of Keene, and the Elm City Rotary Club. The summary notes and feedback from these discussions were shared with City staff and Cadmus to help inform the strategy prioritization process for the energy plan. Based on the priorities expressed by Keene residents at these meetings, Cadmus developed a preliminary list of criteria to evaluate and rank sustainable energy strategies. These criteria were refined by the ECC, then used to rank and prioritize strategies and actions to achieve the City’s energy goals.

### Public Outreach & Engagement Timeline



Figure 1.1. Summary of the public outreach and engagement timeline for the Sustainable Energy Plan project.

In April 2020, The Cadmus Group gave a public presentation summarizing their final report, “City of Keene Renewable Energy Transition Analysis.” This 1.5-hour virtual community meeting gave an overview of the Keene’s electricity context, summarized the findings of the electricity baseline analysis for the City, and gave a brief overview of six renewable energy strategies for the City to consider. A shorter presentation covering these same topics was provided at the City Council meeting later that same day. The full report prepared by Cadmus is attached to this plan in Appendix B.

Throughout the winter of 2020, staff worked with a group of students from Keene State College to conduct a Resident Energy Use Survey to better understand how energy costs for electricity, heating, and transportation affect residents in Keene. The results of this online survey, which garnered 75 responses, were shared with the ECC and presented at a KSC student research symposium. The summary of responses to this survey are included in Appendix C. In addition, staff collected data for the thermal and transportation energy baseline analysis and compiled baselines for thermal and transportation energy use. These baseline chapters were shared with the ECC at their regular meetings, and are summarized in Chapter 3 of this plan.

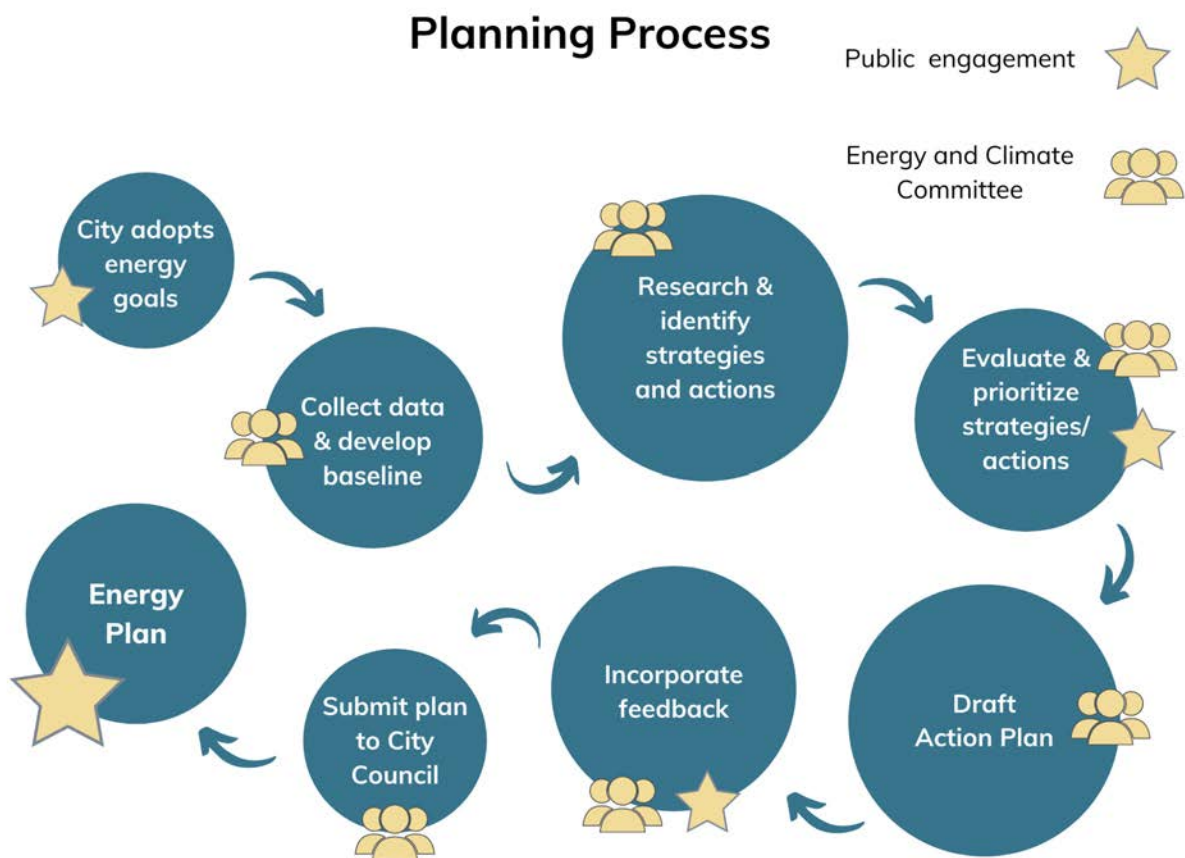


Figure 1.2. A graphic that provides an overview of the planning process that City staff and the Energy & Climate Committee (ECC) followed in developing the Sustainable Energy Plan.



In the summer of 2020, the City worked with a Sustainability Fellow from the University of New Hampshire Sustainability Institute to launch a project website (KeeneEnergyPlan.com) to gather public feedback through online polls and surveys, share educational information and resources, and highlight local success stories. This website also features podcast-style episodes to help explain key programs and actions proposed within this energy plan.

## Energy Plan Guiding Principles

The public input that the City received helped the ECC to identify several key guiding principles for this sustainable energy plan:

- I. **“Renewable Energy” should be defined as green power sources that have the most environmental benefits and the fewest adverse impacts.** The City should transition to sources of energy that are both renewable and clean, such as solar, biomass, geothermal, and low impact hydropower. This approach is aligned with the U.S. EPA’s definition of green power sources.<sup>4</sup>
- II. **Equity should be at the forefront of the City’s efforts for a just transition to a sustainable energy future.** Economically disadvantaged residents, older people and children, people who are experiencing homelessness, people with disabilities or health conditions, and members of minority groups experience the impacts of climate change disproportionately. The City should prioritize strategies and actions that reduce existing inequities and advance a future that benefits everyone in Keene.
- III. **Energy efficiency measures that drive down energy demand should be the first step in the path to a renewable energy future.** The most inexpensive source of energy with the least impact is the energy we do not use. By prioritizing and promoting energy efficiency, the City can help residents, businesses, and others save money and make the goal of sourcing all of our energy from renewable sources more attainable.
- IV. **Keene should harness the economic opportunity of clean energy in order to create jobs and attract new talent.** Clean energy jobs are growing; the renewable energy sector employed approximately 786,000 Americans in 2018,<sup>5</sup> and the energy efficiency sector employed over two million in 2019.<sup>6</sup> As the City increases renewable energy and energy efficiency projects, the demand for talent will increase, too. Keene residents can fill this job demand, which keeps money in our community.
- V. **Keene’s movement towards 100 percent renewable energy use should support climate resilience and preparedness.** The City should anticipate and prepare for disruptions from a changing climate by embracing new technologies and building partnerships with community members, businesses, and institutions. In this way, Keene can better support and respond to residents’ needs.

## Defining Renewable Energy

Renewable energy sources are those that restore themselves. The Energy and Climate Committee recommends refining this definition of “renewable energy” to include only those renewable energy sources that have the most environmental benefits and the fewest adverse impacts. This approach is aligned with the U.S. EPA’s definition of “green power,” which is described as a subset of renewable energy, as shown in Figure 1. Green power sources include, but are not limited to, solar, biomass, geothermal, wind, and low-impact hydropower.

While all green power is renewable energy, not all renewable energy is considered green power. Large scale hydropower, for example, has impacts on fisheries and land use. For this reason, large hydropower is considered to be renewable, but not "green."

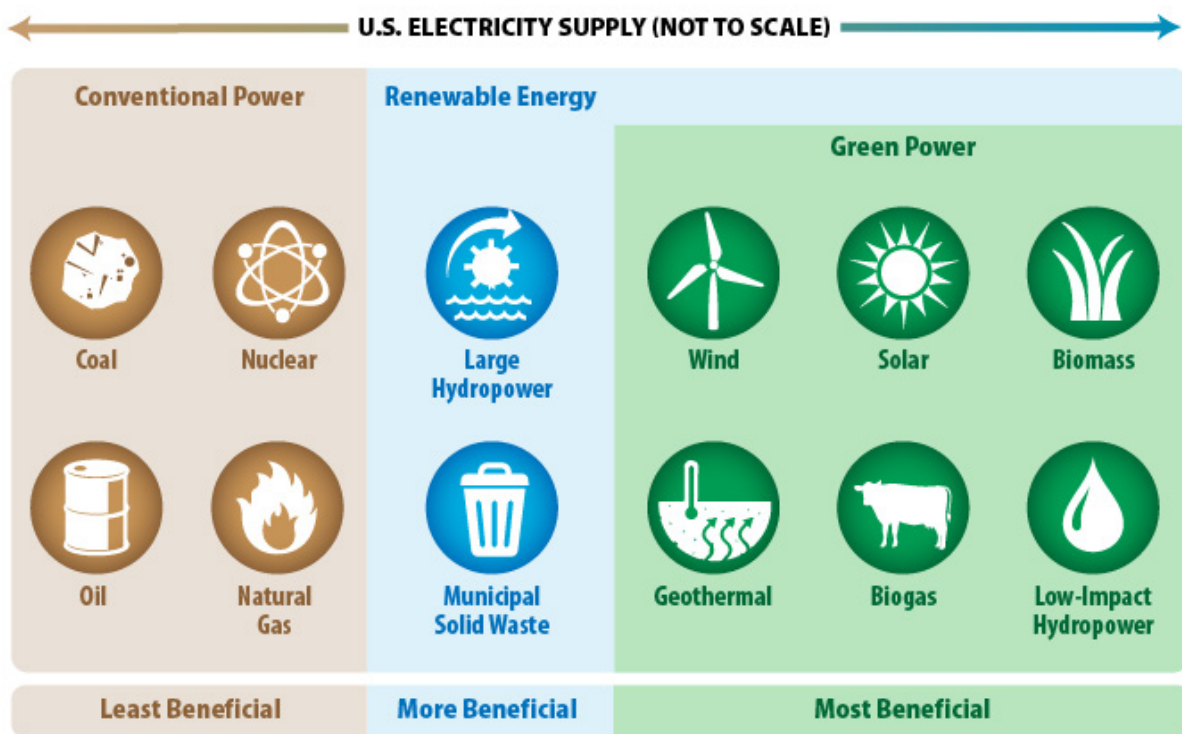


Figure 3. A graphic that depicts how the United States Voluntary Market defines green power based on its relative environmental benefits. Source: U.S. EPA “What is Green Power” webpage.

Keene residents were asked to weigh in on the ECC’s proposed definition of renewable energy through an online poll. This poll included a brief description of renewable energy and green power, and asked residents whether Keene should include all renewable energy sources or just green power sources, or use a different definition. Twenty one people responded to this poll, 15 of whom agreed with the ECC’s proposal to use the definition of green power, 4 said the City should consider all renewable energy sources, and 2 responded “other” (see Figure 4). The full summary of responses to this survey, including written comments, is included in Appendix C.

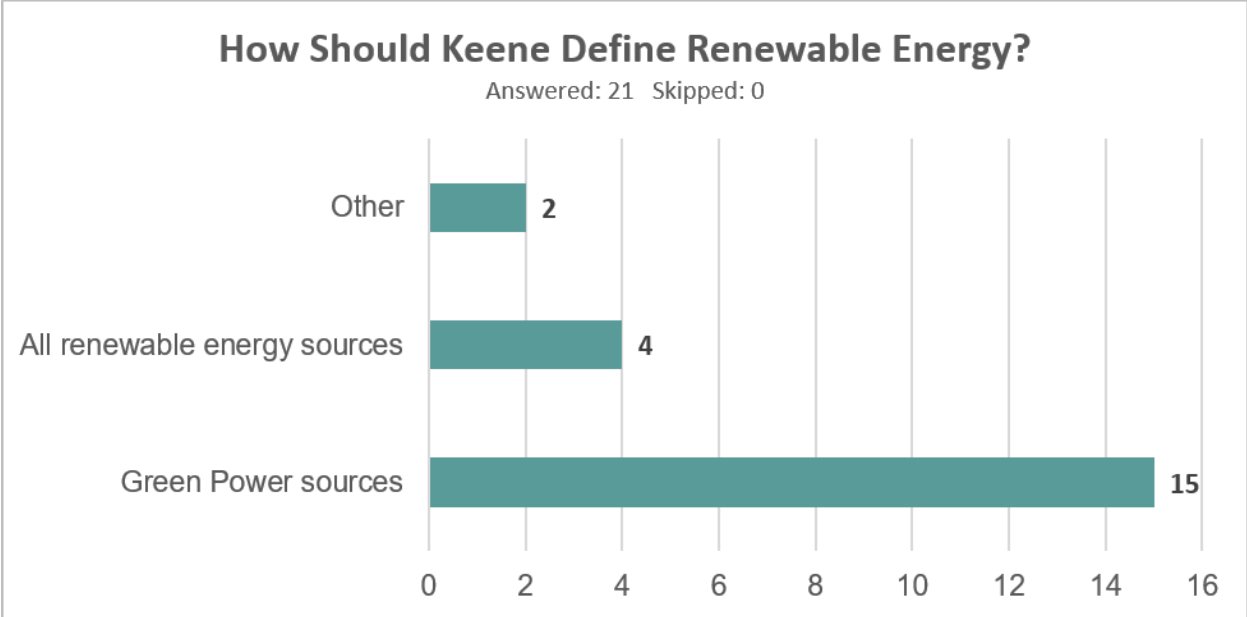


Figure 4. Bar graph summarizing responses to the “Defining Renewable Energy” online survey that was posted throughout July and August 2020 on the [www.KeeneEnergyPlan.com](http://www.KeeneEnergyPlan.com) website.

## Developing a Vision for Keene’s Energy Future

At the beginning of the planning process, the Energy and Climate Committee held a 2-hour retreat to begin discussing their vision and guiding values for the sustainable energy plan. The vision and guiding values were refined as the committee received feedback and input from the public. Then, in July 2020, the ECC put forward a proposed vision statement and asked for input from Keene residents, businesses, and others with a strong connection to Keene. The goal of this vision statement is to provide a concise statement that answers the question: “Where do we want to go?” It describes Keene’s values and aspirations as a community, and a shared image of what the community’s energy future will become in the next 30 years.

**A Sustainable Energy Vision for Keene**

**In 2050, Keene will be a thriving and resilient community powered by affordable, clean, and renewable energy. All electricity and energy used for heating, cooling, and transportation will come from renewable energy sources.**

The public was asked to weigh in on this proposed vision statement using an online poll, which asked residents to indicate the extent to which they agree with the vision statement using a sliding scale of 0 (strongly disagree) to 6 (strongly agree). The results of this poll indicate that, in general, respondents agree with this vision statement. Of the 28 people who responded, 19 said they strongly agreed, 5 said they agreed, 2 were neutral, 1 disagreed, and 1 strongly disagreed. The average value of all responses was 5.1. The full summary of responses to this survey, including written comments, is included in Appendix C.

## Endnotes

- 1 City of Keene. "Solar panels installed on the roof of the Police/Keene/ice/Public Works buildings." <https://ci.keene.nh.us/our-city/news/solar-panels-installed-roof-police-keene-ice-public-works-buildings>
  - 2 City of Keene Community Development Department. "Complete Streets." <https://ci.keene.nh.us/community-development/projects/complete-streets>
  - 3 City of Keene Assessing Department. "Solar/Wind/Wood Energy System Property Tax Exemptions." <https://ci.keene.nh.us/assessing/solar-wind-wood-energy-system-property-tax-exemptions>
- City of Keene 2015 Greenhouse Gas Emissions Inventory (2018). [https://ci.keene.nh.us/sites/default/files/Keene%20GHG%20Report%20FINAL\\_no%20draft%20mark.pdf](https://ci.keene.nh.us/sites/default/files/Keene%20GHG%20Report%20FINAL_no%20draft%20mark.pdf)
- 4 U.S. Environmental Protection Agency. "What is Green Power?" (Accessed 2020). <https://www.epa.gov/greenpower/what-green-power>
  - 5 International Renewable Energy Agency. "Renewable Energy and Jobs--Annual Review 2018." May 2018. <https://www.irena.org/publications/2018/May/Renewable-Energy-and-Jobs-Annual-Review-2018>
  - 6 USEnergyjobs.org. "The 2020 U.S. Energy & Employment Report." 2020. <https://www.usenergyjobs.org/>

# CHAPTER 2 | ROADMAP TO 2050



## Overview

Achieving the City’s vision of becoming a thriving and resilient community powered by affordable, clean, and renewable energy will require collaboration between the City and community partners as well as coordination and support across all levels of government. There is no “silver bullet” strategy to reach this vision; rather, the City will need to enact a diverse array of policies, programs, and incentives with buy-in and support from the community. To reach the City’s goals, it will be essential to reduce total energy use through energy efficiency and conservation, while simultaneously switching to renewable electricity and renewable fuels for heating, cooling, and transportation.

To guide these efforts, the Energy and Climate Committee identified four key pathways, or approaches, to achieving the City’s energy goals: reduce energy use, generate and store renewable energy locally, and meet remaining energy demand through renewable energy procurement or fuel switching. Throughout this process, the City will need to advocate to remove barriers to renewable energy at the state and federal level, and inform the public of renewable energy options and resources.

## Pathways to 100% Renewable Energy:



### **Pathway 1. Reduce energy use.**

By reducing community-wide energy use, Keene will reduce the amount of both nonrenewable and renewable resources consumed in the City.



### **Pathway 2. Generate and store renewable energy locally.**

Generating renewable resources (like solar) in Keene can create jobs locally and keep money circulating in the community.





**Pathway 3. Switch remaining energy purchases to renewable sources.**

The City can meet its remaining energy demand by switching to renewable energy sources from outside Keene and the region.



**Pathway 4. Conduct ongoing advocacy and information sharing.**

Throughout this process, ongoing advocacy and information sharing will be critical in order to reduce barriers at the state and federal levels and increase community buy-in.

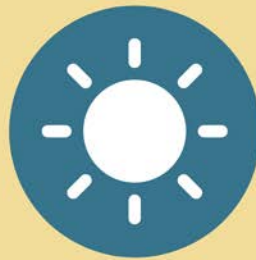
This chapter is organized into three sectors, which correspond to the City’s sustainable energy goals: Electricity, Thermal (Heating and Cooling), and Transportation. Within each sector, a set of strategies and actions were identified as priorities for near-term implementation. These 17 priority actions are listed here and further described in Chapter 5 – Action Plan.

## Sectors in this Plan



### Electricity

This sector includes all electricity consumed within the City, including electricity consumed by residential, commercial, manufacturing/industrial, and municipal electricity accounts.



### Thermal

The thermal sector includes all energy used to heat and cool buildings located in Keene. Electrical energy used to heat and cool is counted under the electricity sector.



### Transportation

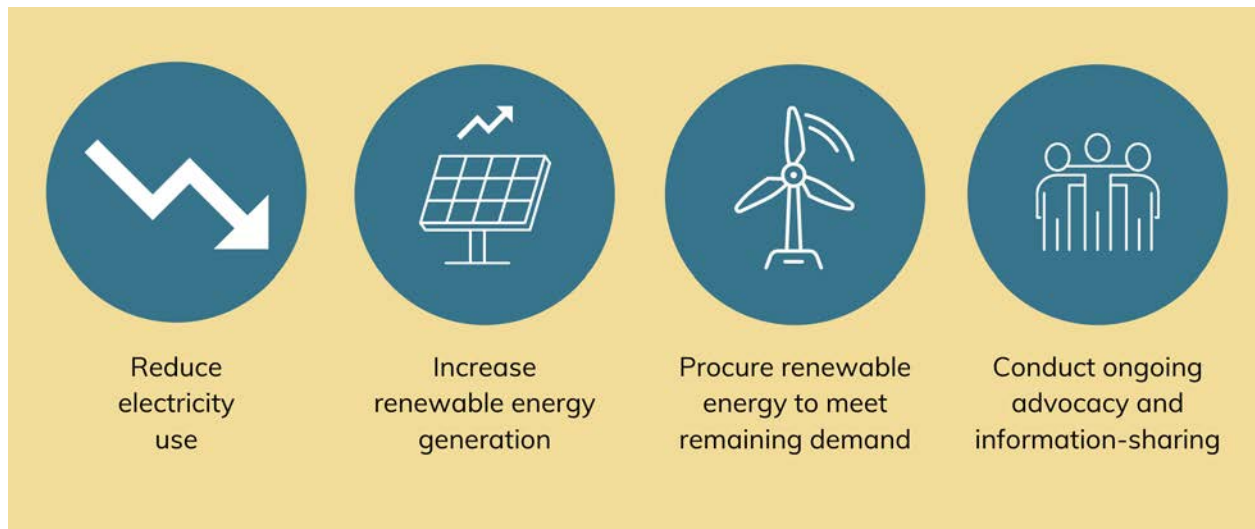
Transportation - In the context of this plan, the transportation sector is defined as the energy consumed by Keene residents to travel from place to place. This sector includes ground transportation only.



# ELECTRICITY SECTOR

Transitioning to a 100 percent renewable electricity supply by 2030 is a critical first step to achieving the City’s goal to have all energy consumed come from renewable sources by 2050, as the electrification of thermal and transportation energy consumption will only be beneficial if the electricity source itself is clean and renewable. The main electric utility in Keene is Eversource, an investor-owned utility that delivers electricity and natural gas service to customers in New Hampshire, Connecticut and Massachusetts. Eversource customers receive electricity from the New England power grid. In 2019, the NEPOOL system mix was approximately 20.1% renewable and 79.9% non-renewable. The 20.1% of renewable energy was comprised of hydropower (8.9%), refuse/other (3.5%), wind (3.4%), wood (2.4%), and solar (1.8%).

Because New Hampshire has a deregulated electricity market, investor-owned utilities, including Eversource, are not permitted to own and operate power plants that generate electricity. Retail customers are free to purchase energy from a competitive supplier, while the utility continues to provide transmission and distribution services. In 2019, there were approximately 15 residential<sup>1</sup> and 25 commercial/industrial<sup>2</sup> energy suppliers active in Eversource’s territory. Eversource reported that approximately 22% of its residential customers and 58% of total customer load in New Hampshire had migrated to the competitive supply market by the end of the third quarter in 2019.<sup>3</sup>



## Pathway 1: Reduce electricity use for all buildings in Keene

Reducing electricity use in all buildings will help control costs by reducing total energy demand and limiting or deferring the need to upgrade the electricity grid. Examples of electric efficiency measures for buildings include weatherization, thermal envelope retrofits, plug load management, LED lighting, and using intelligent sensors and controls to optimize system performance in commercial buildings.

Priority implementation steps that fall within this pathway are listed below. These actions also fall within the Thermal Sector, as they impact both electrical and thermal energy consumption.

- I. Adopt a “Home Energy Labeling” program for residences: Require energy efficiency disclosure for existing and new residential properties at the time a property is listed for sale or rent.
- II. Adopt a Benchmarking Ordinance: Require building owners of certain sizes or in certain districts to report energy use data to the City. This program should start out as a voluntary policy, in order to encourage participation from building owners in a benchmarking effort to collect building energy use data.
- III. Partner with existing weatherization programs to enhance public outreach and education, amplify impact, and increase capacity.

## Pathway 2: Increase renewable energy generation & storage

Generating renewable energy locally will maximize benefits to the local community by creating and supporting local jobs and businesses, reducing reliance on imported fuels, diversifying the electricity supply, and increasing the reliability and resilience of the grid to severe weather events and other potential system disruptions. Energy storage offers further opportunities for enabling increased use of renewable electricity generation, creating a more efficient grid that is resistant to disruptions, and creating jobs in supporting sectors such as manufacturing, engineering, construction, transportation, and finance.<sup>4</sup>

Priority implementation steps that fall within this pathway include the following:

- I. Adopt solar photovoltaic (PV) and electric vehicle (EV) ready guidelines to encourage or require new developments to be built in a manner that accommodates future solar and EV charging station installations.
- II. Partner with a local financial institution to create a loan product to finance renewable energy installations targeted at businesses or residents.
- III. Work with the utility to develop a pilot battery storage program for residents and/or businesses in Keene.

## Electricity Pathway 3: Procure renewable energy to meet remaining electricity demand

The City recognizes that it will not be possible for all of the City’s electricity demand to be met by generating renewable energy locally by 2030. For a variety of reasons, not all residents, businesses, and organizations in Keene will be able to install renewable energy systems. In some instances, up-front costs and financing can be a barrier, and in other situations, the physical limitations of a site (e.g. lack of solar exposure) may limit opportunities for on-site renewable generation. However, there are a variety of options the

City can pursue to provide the benefits of renewable energy to all residents, businesses, and other organizations in Keene, regardless of their ability to install renewable energy systems on their own property.

Priority implementation steps that fall within this pathway include the following:

- I. Establish a Community Power Program – Aggregate community load and purchase electricity from an alternate electricity supplier, while still receiving transmission and distribution service from Eversource.
- II. Virtual Power Purchase Agreements (VPPAs) by City- Enter into a long-term, fixed price contract for renewable energy from a specific project (i.e. agree to a contract for differences, or CfD). The renewable energy system developer sells the energy generated into the normal power market and uses the CfD as a hedge on the variable price of power.

## Electricity Pathway 4: Conduct ongoing advocacy and information sharing

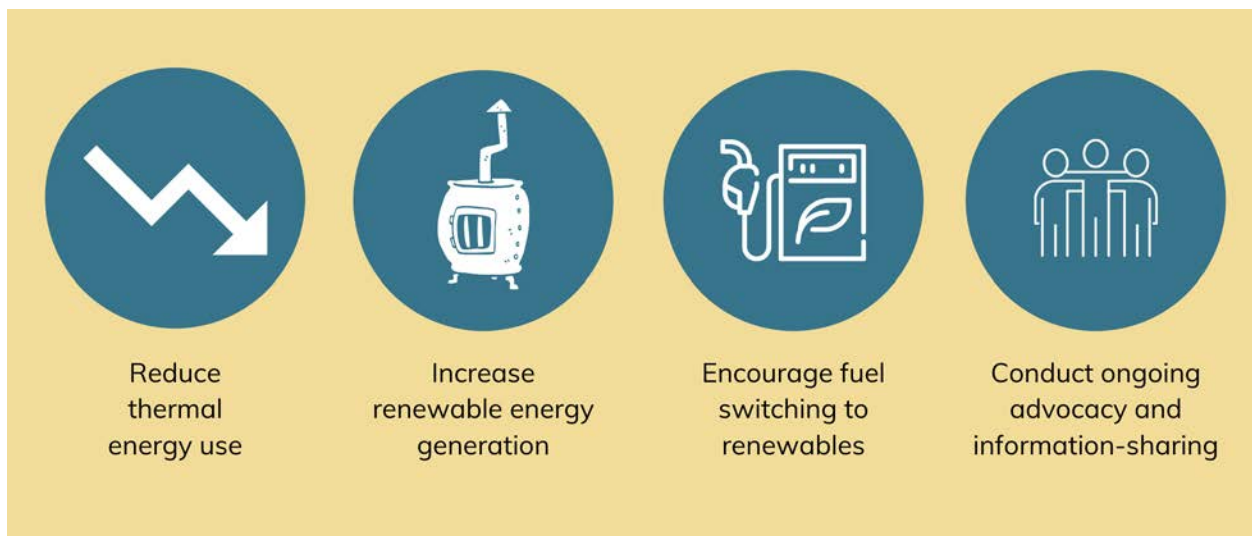
Renewable energy technologies, programs and incentives are constantly changing and evolving over time. For residents and small businesses in particular, it can be challenging to parse out what opportunities exist at any given time, and which are most advantageous to pursue. The City should take an active role in providing resources and sharing information that is most relevant and useful for Keene residents and businesses. One way to do this would be to post information and resources in a central location, such as on a website that is periodically updated and maintained. Other opportunities include hosting workshops for residents, businesses, and other stakeholder groups (e.g. NHSaves “Button Up” weatherization workshops), partnering with local volunteers and organizations to run programs with a large educational component, such as “solarize” campaigns, and collaborating with local educational institutions and job training programs.

Achieving 100 percent clean and renewable energy will require action across all levels of government. In addition to education and resource sharing, the City should advocate for state and federal policies and programs that support energy efficiency and renewable energy in New Hampshire. The City has done this in past by expressing support for legislation that would benefit the City’s residents and businesses. For example, the City has expressed support for continuing New Hampshire’s participation in the Regional Greenhouse Gas Initiative (RGGI), and on a couple of occasions the City has submitted a letter of support for legislation that would have raised the individual project net metering cap in New Hampshire from one megawatt to 5 megawatts, which would have benefitted larger energy users in Keene. Additional opportunities in New Hampshire include strengthening the Renewable Portfolio Standard, allocating a greater share of RGGI funds to energy efficiency, and at the federal level, extending the investment tax credit (also known as the federal solar tax credit).

# THERMAL SECTOR

Achieving 100 percent renewable energy for all heating and cooling will require aggressive energy efficiency and weatherization paired with “beneficial electrification” – i.e. replacing fossil fuel-powered heating and cooling systems with more efficient electrical systems and other fossil fuel-free alternatives. Although 2050 is 30 years away, the average lifespan of a heating system (15-20 years) means that, in order to source 100 percent of all thermal energy from renewable sources by 2050, any new heating systems installed in 2040 or later should be electricity-based or run on renewable fuels. As fossil fuel heating systems come to the end of their useful life, it will be important to provide residents, businesses, and nonprofits with options and incentives to replace them with electric or renewable alternatives.

The two most consumed heating fuels in Keene are No. 2 heating oil and propane. Other heating fuels include electricity, wood (wood/pellet stoves & commercial-scale biomass), compressed natural gas (CNG), biofuel, and solar. There is also a geothermal heating system at the City’s public works complex located at 350 Marlboro Street.



## Pathway 1: Reduce thermal energy use for buildings in all sectors

Energy efficiency within the thermal sector can mainly be accomplished by weatherizing existing buildings, ensuring that new buildings are constructed with proper insulation, sealing, and ventilation, and by upgrading, replacing, or better controlling HVAC and hot water heating equipment so that they use less energy.

Priority implementation steps that fall within this pathway are listed below. These actions also fall within the Electricity Sector as they impact both thermal and electrical energy consumption.

- I. Adopt a “Home Energy Labeling” program for residences: Require energy efficiency disclosure for existing and new residential properties at the time a property is listed for sale or rent.
- II. Adopt a Benchmarking Ordinance: Require building owners of certain sizes or in certain districts to report energy use data to the City. Optional: require a reduction in energy use over time. This could start out as a voluntary policy, in order to encourage participation from building owners in a benchmarking effort to collect building energy use data.
- III. Partner with existing weatherization programs to enhance public outreach and education, amplify impact, and increase capacity.

## Pathway 2: Increase local renewable energy generation and storage

There are already several examples of renewable thermal systems in Keene that use locally generated sources of renewable energy, such as solar thermal and geothermal systems. In addition, there are a number of wood stove and pellet stove systems as well as commercial-scale wood chip plants which may use wood-based biomass fuel sourced within New Hampshire or the New England region. For example, in 2017 Filtrine Manufacturing, a Keene-based manufacturer of water chilling and filtering systems, installed a 1 million BTU wood chip boiler. The company reports that this renewable thermal system reduced Filtrine’s reliance on heating oil by 90%.<sup>5</sup>

Priority implementation steps that fall within this pathway include the following:

- I. Commission a study to assess the potential for a renewable district heating system in Keene to understand what areas of the city would have the appropriate demand characteristics to justify a district energy system, as well as what local renewable sources are available and at what potential and likely cost.
  - A. Explore options for a renewable district heating and/or combined heat and power pilot project, including possible public-private partnerships, grants and other funding opportunities.

## Pathway 3: Encourage fuel switching to renewable fuel sources

Fuel switching, such as replacing furnace and boiler heating systems with air source heat pumps (ductless and/or ducted), will be necessary in order to move away from Keene’s dependency on fossil fuels. Currently, heating oil and propane are the two most widely used heating fuels in Keene. However, some organizations in Keene have already switched to renewable fuel sources. For example, Keene State College switched its heating plant from heavy No. 6 oil to a biofuel made from recycled vegetable oil over a two-year period starting in 2016, and is now one of the New Hampshire’s largest generators of Thermal Renewable Energy Credits (T-RECs), using over 8,000,000 gallons of the biofuel each school year.



Priority implementation steps that fall within this pathway include the following:

- I. Host a renewable heating and cooling (RH&C) campaign (e.g. “Heatsmart” campaign). RH&C campaigns are a type of bulk purchasing program aimed at homeowners and small businesses. These campaigns encourage the installation of renewable thermal technologies for space heating and cooling or for hot water heating through targeted local out-reach efforts and, often, with bulk discount prices.

## Pathway 4: Conduct ongoing advocacy and education

As discussed under the Electricity Sector section, the renewable energy landscape is changeable and constantly evolving. The City should partner with local businesses, contractors, and installers to offer workshops and trainings on energy efficiency and renewable thermal technologies for residents and business. In the spirit of collaboration, the City should promote existing programs, such as New Hampshire Saves, and share information and resources related to energy efficiency and renewable thermal technologies in one central location. In addition, the City should track state and federal legislation and weigh in when opportunities arise to support renewable energy and energy efficiency programs, policies, regulations, and incentives.

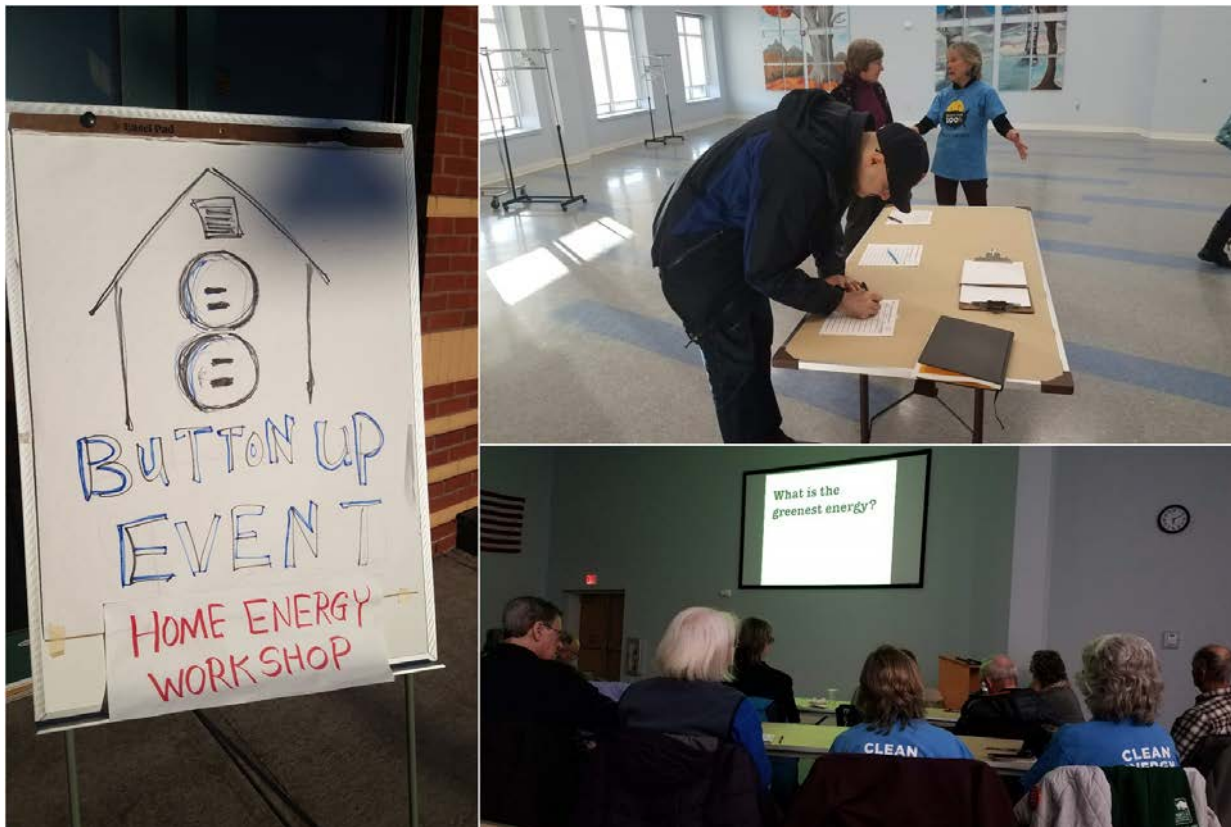



Figure 2.1. In 2019, the City's Energy & Climate Committee and the Clean Energy Team hosted a NHSaves "Button Up Workshop" to provide residents with home energy weatherization resources. Over 50 people attended this free workshop.



# TRANSPORTATION

The Transportation Sector currently relies heavily on fossil fuels. In 2015, ground transportation in Keene accounted for almost half (46%) of all greenhouse gas emissions. The majority of these emissions were generated by on-road gasoline use (84%) followed by on-road diesel use (16%). Only a small fraction, about 0.1%, were attributable to the City Express bus service and the Friendly Bus Service operated by Home, Healthcare, Hospice and Community Services (HCS).<sup>6</sup>

Vehicle emissions are generally a function of three variables: fuel carbon content, vehicle efficiency, and how much people drive (i.e. vehicle miles traveled, or VMT). At the national scale, gains in vehicle efficiency have been more than offset by increases in VMT. From 1990-2020, the US population grew by 32%, whereas VMT grew 51%.<sup>7</sup> According to the U.S. Environmental Protection Agency (EPA), over that same time period, transportation emissions increased about 23% despite overall increases in vehicle efficiency.<sup>8</sup> This trend suggests that the City should focus on reducing overall VMT and switching to carbon-free fuels in order to reach the City’s goal to source 100% of all transportation energy consumption from renewable sources by 2050.



Reduce vehicle miles traveled

Accelerate shift to electric vehicles

Promote efficient growth patterns

Conduct ongoing advocacy and information-sharing

## Pathway 1: Reduce vehicle miles traveled

Enabling people to get around without a car can significantly reduce fossil fuel consumption while providing many co-benefits, such as reducing transportation costs, increasing physical activity, improving air quality, and providing access to jobs and other necessities for people who either cannot afford or choose not to own a car. Increasing transportation choices to encourage more walking, bicycling, and public transit use within City limits is a well-established goal in Keene. The 2010 Comprehensive Master Plan refers to this concept as a “park and walk community.”

Examples of strategies and actions that can help reduce VMT include improving public transportation access and service, improving walkability, and improving bikeability. These strategies encourage people to choose alternate modes of travel. In addition, land use strategies such as increasing density, promoting mixed uses, and increasing local and regional access to jobs can help reduce VMT by reducing trip distances and promoting carpooling and non-car travel modes. Land use strategies are discussed further under Pathway #3, “Promote Efficient Growth Patterns.”

Priority implementation strategies and actions that fall within this pathway include the following:

- I. Promote active transportation (walking, bicycling, and other “human-powered” transportation modes.
  - A. Incorporate the adopted City of Keene Complete Streets Design Guidelines (2015) into the City’s street standards for new streets, and develop Complete Streets standards for re-construction of existing streets.
- II. Promote intra-city and intercity transit options.
  - A. Increase financial support for the City Express and Friendly Bus programs, and encourage HCS to expand services/routes.
  - B. Work with Southwest Region Planning Commission and other community partners to explore options for a multi-modal transportation center in Keene and promote inter-city transit options.

**“Other alternatives should be explored to reduce fuel use by reducing vehicle miles traveled, such as rideshare programs, car-share programs, and the exploration of an official community Zip Car or Segway Safe program. All of these have potential to assist in moving people in a more economical, environmentally friendly way, which will assist in creating a sustainable community as well as highlighting Keene’s creative problem-solving mentality.”**

**–Keene Comprehensive Master Plan (2010)**

## Pathway 2: Accelerate the shift to EVs and other alternative fuel vehicles

Electric Vehicles (EVs) are becoming more widely available and affordable, and as a result, EV market adoption is expected to increase. The Bloomberg NEF “Electric Vehicle Outlook 2020” report predicts that 500 EV models will be available globally by 2022, and by 2040, over half of all passenger vehicles sold will be electric.<sup>9</sup> However, the long average lifetime of vehicles, which in 2019 was 11.8 years in the U.S., can lead to a significant lag between increases in EV sales and increases in the total number of EVs on the road.<sup>10</sup> For this reason, it is important to begin increasing the adoption of EVs now to ensure that a majority of passenger vehicles on the road in 2050 are EVs or other alternative vehicles that use renewable energy sources.

Priority implementation strategies and actions that fall within this pathway include the following:

- I. Install EV charging stations (level 2 and fast-charge) in on-street parking areas and in public parking lots or structures.
- II. Adopt solar PV and electric vehicle (EV) ready guidelines to encourage or require new developments to be built in a manner that accommodates future solar and EV charging station installations.
- III. Work with the Keene School District and local school bus company to encourage the switch to electric school buses. Explore “battery to grid” programs to increase financial viability of electric buses and improve the resilience of the electricity grid.



Figure 2.2. An EV was on display in Keene in August 2019 as part of the NH Department of Environmental Services Air Quality Day, an education event where residents got an opportunity to try out battery-powered lawn equipment and view an EV up close.



## Transportation Pathway 3: Promote efficient grown patterns

As discussed above under Pathway 1: Reduce Vehicle Miles Traveled, reducing driving could generate many public benefits in addition to reducing fossil fuel consumption, such as improving public health through improved air quality, better individual health due to increased exercise from walking and biking, increasing access and equity for low and moderate income people, and enhancing interactions within our communities. However, reducing VMT will require coordinated land use and transportation planning. Local land use policies have the potential to shape and rearrange the origins and destinations of travel and can either support or hinder accessibility and mobility. For example, allowing a mix of land uses, providing thoughtful parking requirements, and permitting an increase in land use densities can decrease distances between different destinations, leading to shorter trip distances, a blend of jobs and housing within a community, and an increase in alternative modes of transportation. On the flip side, local policies that separate out land uses, provide inflexible or high minimum parking requirements, and/or reduce density have the opposite effect and lead to car-dependent communities.

The City of Keene has already taken steps to promote a mixed-use, walkable environment in the downtown and surrounding neighborhoods. For example, there are no minimum parking requirements in the core of the downtown, and as part of the Land Development Code project, the City is considering expanding the area where there are no parking minimums, allowing for shared parking and offsite parking arrangements, and offering parking reductions on a case-by-case basis. The City is also in the process of exploring form-based zoning in Downtown Keene in order to ensure that future development is compatible with historic development patterns and continues to foster a pedestrian-friendly environment, and for many years, the City has promoted a context-sensitive approach to street design through the implementation of a complete streets program. The City should continue to coordinate land use and transportation planning, and prioritize local policies that promote efficient growth patterns.



## Pathway 4: Conduct ongoing advocacy and education

Although there are many actions the City can take to work towards increasing the share of renewable energy within the transportation sector, the City cannot get there on its own without state and federal action to support EVs, public transportation, and other alternative transportation modes. In addition, the City will need to prioritize education and sharing information and resources in order to help residents and fleet managers make informed choices about transportation mode choices and alternative vehicle adoption.

Priority implementation strategies and actions that fall within this pathway include the following:

- I.** Advocate for more funding at the state and federal levels for transportation, including funding for transit and “alternative” transportation options (in addition to funding to maintain / repair bridges, roads, and other infrastructure development and maintenance).
- II.** Advocate for state allocation of funding through the federal Transportation Alternatives Program for “non-infrastructure” Safe Routes to School projects (Education, Encouragement, and Evaluation programs).
- III.** Advocate for state-level policies, programs, and incentives for electric vehicles and other alternative vehicle technologies.
- IV.** Educate community members about the environmental, public health, and social benefits of public transportation and active transportation.
- V.** Promote EVs through education and marketing campaigns. For example, “drive electric” events can be leveraged as opportunities to educate Keene residents about the benefits of EVs as well as existing rebate programs and incentives to reduce costs of buying EVs.



## Endnotes

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- 10 U.S. Department of Transportation Bureau of Transportation Statistics. Average Age of Automobiles and Trucks in Operation in the United States (Accessed 2020). <https://www.bts.gov/content/average-age-automobiles-and-trucks-operation-united-states>

# CHAPTER 3 | ENERGY SNAPSHOT

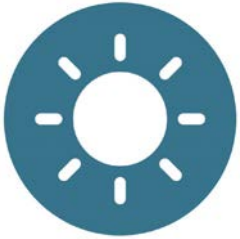


## Overview

This chapter provides a snapshot of energy use and trends in Keene for calendar year 2019.



The electricity baseline, which was prepared by the Cadmus Group, provides an estimate of total electricity consumption for all electricity accounts across the City using Keene-specific data provided by the local utility. In addition, the Cadmus Team developed a business as usual estimate of the projected 2030 electricity supply mix, assuming no further action from the City is taken between now and 2030.



The thermal sector baseline relies heavily on City Assessing data and average energy consumption data from the US Energy Information Administration scaled down to the local level. This baseline involves a number of assumptions in order to provide an estimate of energy consumption for the two most commonly used heating fuels in Keene, No. 2 heating oil and propane. It also provides information about the primary fuel types used for space heating and cooling in Keene by total building area (in square feet).



The transportation sector baseline does not attempt to estimate the amount of energy consumed or the percent energy that comes from renewable sources; however, it does provide information about indirect indicators that can be used to track progress towards the transportation energy goal, such as the number of EVs registered in Keene and transportation mode share.

It will be important for the City to continue to improve these estimates and seek and collect more accurate and reliable sources of data over time in order to accurately track its progress toward its energy goals, particularly for the thermal and transportation sectors.

# 2019 ELECTRICITY BASELINE

## Introduction

The electricity sector includes all electricity consumed in Keene, including electricity consumed by residential, commercial, municipal, and industrial/manufacturing accounts. The electricity baseline was prepared by the City’s consultant, The Cadmus Group, in order to understand the starting point of electricity consumption within the City and the mix of generation resources producing the consumed electricity. The baseline draws from a combination of available state-level data, Keene-specific utility data provided by Eversource, and insights provided by the current regulatory landscape to estimate an electricity baseline for the City. As part of the baseline analysis, the Cadmus Team also developed a business as usual estimate of the projected 2030 electricity supply mix, assuming no further action from the City is taken between now and 2030. This analysis allows Keene to better understand the gap between the business as usual projection and the City’s target of 100% renewable electricity by 2030.

## Electricity Consumption in Keene

In 2019, electricity accounts across the City of Keene consumed over 222 gigawatt-hours of electricity. On average, in 2019, a residential account used 4,089 kWh of electricity, a commercial account used 69,478 kWh, and a manufacturing/industrial facility used 28,930 kWh of electricity. It is important to note that industrial accounts are those that

The commercial sector was the largest consumer of electricity, accounting for 70% of total community usage. Residential accounts made up 27% of usage in 2019, while municipal and industrial/manufacturing accounts made up the remaining 3% of electricity consumption in Keene (see Figure 3.1).<sup>1</sup>

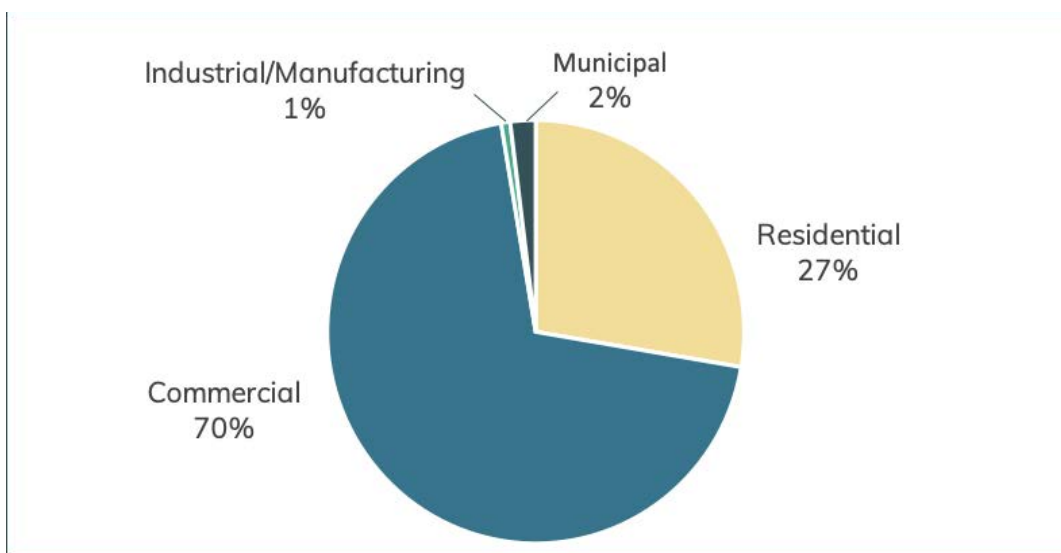


Figure 3.1. Electricity Consumption by Sector 2019

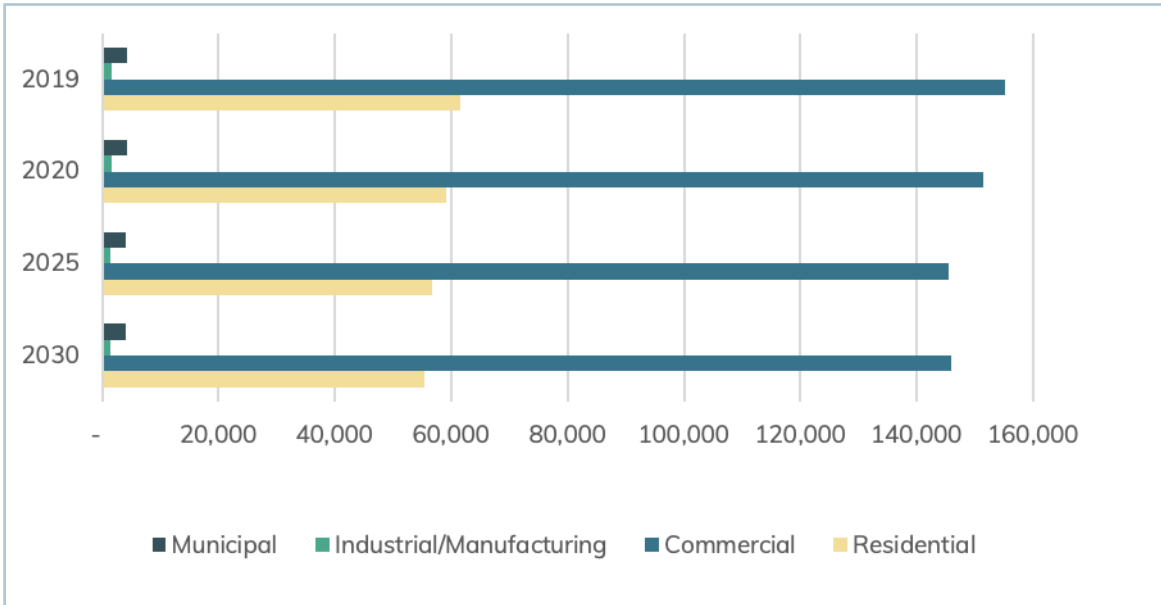


Figure 3.2. Estimated Changes to Electricity Consumption in Keene (MWh)

Over time, consumption is expected to shift due to the impacts of population growth and the increasing effectiveness of energy efficiency. In 2030, 78,315 people are expected to live in Cheshire County, representing an overall growth of 1.25% from 2015.<sup>2</sup> Factoring in both energy efficiency<sup>3</sup> and population growth, it is estimated that overall electricity consumption will decrease by approximately 7% by 2030. However, this analysis does not consider new potential sources of load growth through building electrification, electric vehicle infrastructure, or new capital assets that could drive demand.

## Renewable Energy in Keene

Currently, there are a number of systems in Keene that generate renewable electricity. Keene is home to a micro-hydropower system of 90 kW and over 3,300 kW of installed solar photovoltaic (PV) capacity across local homes and businesses.

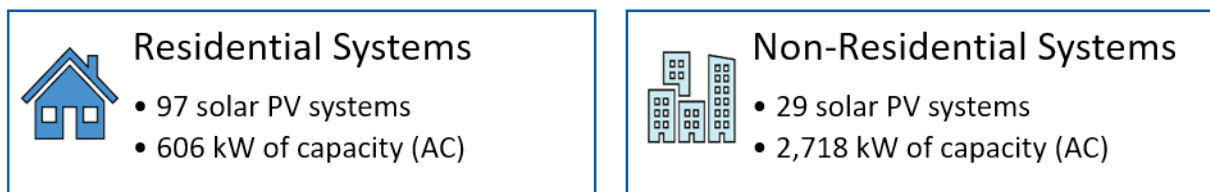


Figure 3.3. Interconnected Solar PV in Keene<sup>4</sup>

Figure 3.3 only includes interconnected systems and does not include off-grid systems within Keene. While distributed generation penetration is expected to grow over time, the 2030 forecast conservatively assumes the number of local renewable energy installations will stay constant over time.

## New Hampshire Energy Supply Mix

The local utility, Eversource, has divested its generation assets and relies on the New England Power Pool (NEPOOL<sup>5</sup>) and local energy generation to meet its customer demand for electricity and RPS requirements. The RPS ratchets up the renewable energy requirements every year. By 2025, in order to comply with the RPS, 25.2% of all electricity provided by Eversource will need to be generated using renewable sources. Currently, the RPS is projected to stay constant at 25.2% in 2025 and thereafter. The 2030 forecast conservatively assumes that the percentage of renewable generation mandated by the RPS will not increase after 2025.

Conservatively, the default electricity supply provided by Eversource will need to comply with the RPS. In actuality, the electricity supply that Eversource purchases may exceed this requirement. Eversource interacts heavily with the New England Power Pool (NEPOOL) to source electricity supply. In 2019, the New England-based generation that feeds into the NEPOOL to serve the electricity load was 20.12% renewable, up from 18.3% renewable in 2018.<sup>6</sup> While the regional 2019 level of 20.12% renewable supply exceeded the New Hampshire 2019 RPS requirement of 19.70%, the conservative RPS projections were the foundation of the Keene electricity baseline analysis. As Eversource’s default supply changes periodically, the RPS provides a conservative baseline for understanding renewable and non-renewable supply over time, assuming the electric utility is compliant.

Generation Type	Natural Gas	Nuclear	Coal	Oil	Hydro	Refuse/ Other	Wind	Wood	Solar	All Renewables
Capacity (MW)	16,563	4,025	917	7,139	3,393	462	415	503	440	5,213
Net Energy for Load (GWh)	39,725	25,182	369	117	7,305	2,895	2,794	2,004	1,474	16,472
% of Total Generation	48.5%	30.8%	0.45%	0.14%	8.9%	3.5%	3.4%	2.4%	1.8%	20.1%

Table 3.1. NEPOOL Generation Sector 2019<sup>7</sup>

As of 2019, the regional grid relies heavily on natural gas (48.5% of total generation) and nuclear (30.8%), despite the recent closures of nuclear plants across the region, including the 2014 closure of Vermont Yankee Nuclear Power Plant in Vermont and the 2019 closure of the Pilgrim Nuclear Power Plant in Massachusetts. Renewable energy resources, including hydropower, refuse, wind, wood, solar and other renewables sources made up a combined 20.1% of total regional generation.

### A Note on Competitive Suppliers

In New Hampshire, customers have the option between default electricity supply from the utility and choosing supply from a competitive supplier. In both scenarios, electricity is still delivered to customers through the electric utility’s transmission and distribution grid. In 2018, Eversource noted that 42% of customer load in New Hampshire was served through default service, while 58% of customer load had migrated to competitive energy suppliers. Competitive suppliers are still subject to the state’s RPS, but may offer products to customers that exceed this requirement by offering contracts with higher renewable energy mixes than the



default service from the utility. Competitive supplier contracts are typically short-term (12-36 months) and can offer fixed or variable pricing to customers for their electricity.<sup>8</sup> In 2020, the City of Keene entered into two competitive supply agreements for 100% renewable electricity for all but one of its municipal facilities. One contract is subject to a one-year term, and the other is two years. The New Hampshire Public Utilities Commission does not regulate the prices offered by competitive suppliers. However, it does provide questions that consumers should ask competitive suppliers while assessing options.<sup>9</sup>

## What this means for 2030

Overall, the business as usual case conservatively estimates that electricity consumption in the City of Keene will be 27% renewable by 2030. The baseline points to a steady increase in renewable electricity supply, largely driven by RPS compliance. Despite population growth, electricity consumption is anticipated to decrease slightly, driven primarily by expected energy efficiency improvements.

Sector	Energy Type	Consumption 2019* (MWh)	Consumption 2030 (MWh)
Residential	Renewable	12,137	13,945
	Non-Renewable	49,471	41,393
Commercial	Renewable	30,563	36,781
	Non-Renewable	124,580	109,176
Industrial / Manufacturing	Renewable	308	370
	Non-Renewable	1,254	1,099
Municipal	Renewable	860	4,109
	Non-Renewable	3,507	0

Table 3.2: Electricity Consumption by Sector. \*Note: The 2019 consumption figures for renewable energy are based on the 2019 NH RPS requirement of 19.70%, to be consistent with the 2030 forecast. The actual renewable energy content in 2019 was 20.1%.

This baseline assumes that the City continues sourcing 100% renewable electricity for its municipal accounts through 2030 from competitive supply agreements. If the municipality chooses not to extend these agreements and default back to the utility supply, then the overall community renewable electricity mix is expected to decrease slightly.

In 2030, it is estimated that the commercial and residential sectors will be the largest consumers of electricity (71% and 27% of electricity consumption, respectively), but that a larger proportion will be sourced from renewable energy due to the RPS. Without further action, it is estimated that the City will achieve 26.7% of its 100% renewable electricity target by 2030.

# 2019 THERMAL BASELINE

## Overview

The Thermal Sector includes all energy except electrical energy used to heat and cool buildings located in Keene. Electrical energy used to heat and cool is already accounted for within the electricity baseline. Information about heating and cooling systems, as well as the area of buildings, was derived from data provided by the City Assessing Department, and thermal energy consumption was estimated using energy intensity figures and average consumption data for residential and commercial properties from the Energy Information Administration.

The Thermal Sector is divided into three types of buildings: Residential, Commercial, and Public / Non-profit.

		
<b>Residential</b>	<b>Commercial</b>	<b>Public/Non-profit</b>
<ul style="list-style-type: none"><li>• Single family homes</li><li>• Two family homes</li><li>• Multi-family buildings</li><li>• Apartments</li><li>• Senior living facilities</li><li>• Group homes</li><li>• College dorms</li></ul>	<ul style="list-style-type: none"><li>• Buildings used for running a commercial or industrial business</li></ul>	<ul style="list-style-type: none"><li>• Charitable organizations</li><li>• Local, state and federal government uses</li><li>• Higher education</li><li>• Public schools</li></ul>

## Data Limitations and Assumptions

The data obtained from the City Assessing Department provides information about the area (in square feet) of livable space by building type, as well as the type of heating or cooling system for each building and heat fuel type. There are several limitations to this data, including gaps in the data (fields not filled in), changes over time in how data is recorded by the Assessing Department, and the frequency with which the data about heating systems and heat fuel is updated. In addition, the data from the City Assessing Department only includes the primary heat source for each building, and does not include secondary heat sources such as wood stoves or pellet stoves. In the case where a home is heated primarily

by a wood stove or pellet stove and there is a back-up heating system for emergencies, the back-up system is typically recorded in the Assessing data and not the wood or pellet stove. Therefore, this baseline is likely to underestimate the amount of biomass consumed in Keene, while over-estimating the amount of heating fuel (heating oil and propane). In addition, in many instances the fuel type field is indicated as “typical,” which means that the fuel type is unknown. This is especially true for commercial buildings and buildings in the “public/nonprofit” category.

## Fuels used for Space Heating and Cooling in Keene

There are a variety of fuels used for space heating in Keene. Figure 4 provides an overview of the total building area that is heated (in square feet), broken down by fuel type and by building category (residential, commercial, and public/nonprofit). Figure 5 shows the percent of total building area that is heated by fuel type. Number 2 heating oil is the most widely used heating fuel, followed by propane and piped propane (propane and air mix), electricity, wood, and solar. About 19% of all heated building space, corresponding to 102 buildings, is heated by an unknown fuel type.

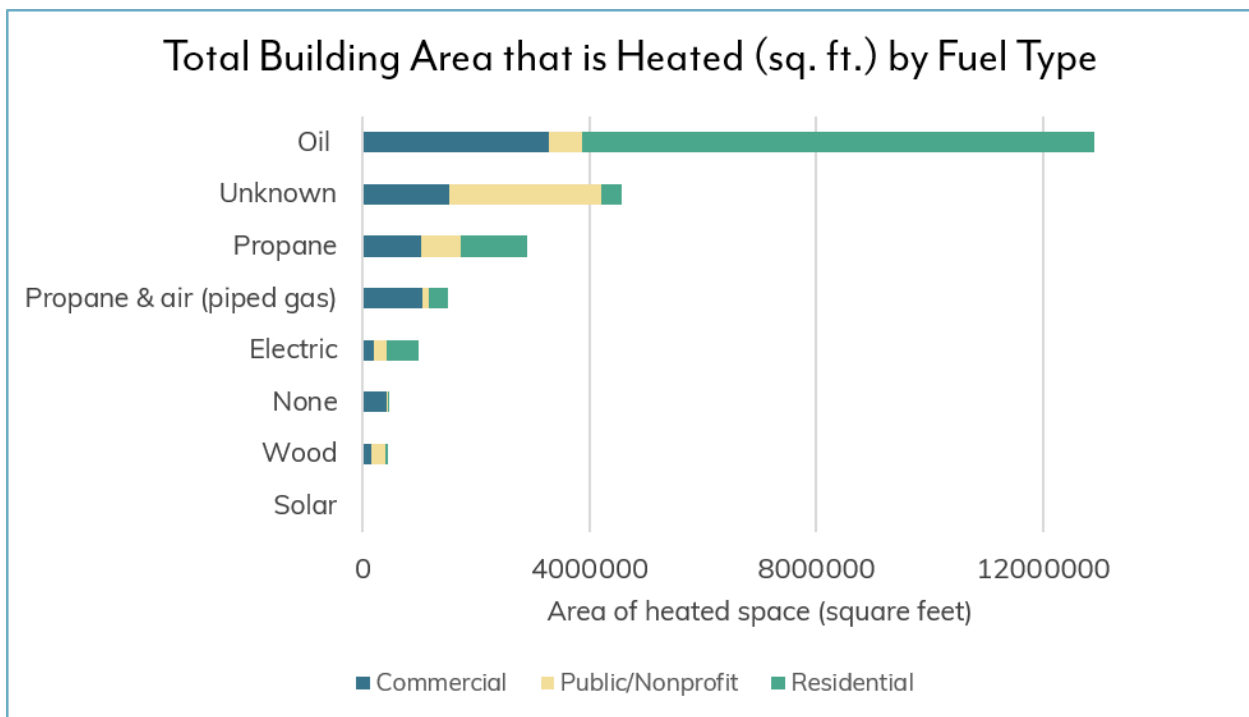


Figure 3.4. Total building area that is heating, in square feet, by fuel type and by building category (residential use, commercial use, or public/nonprofit use).

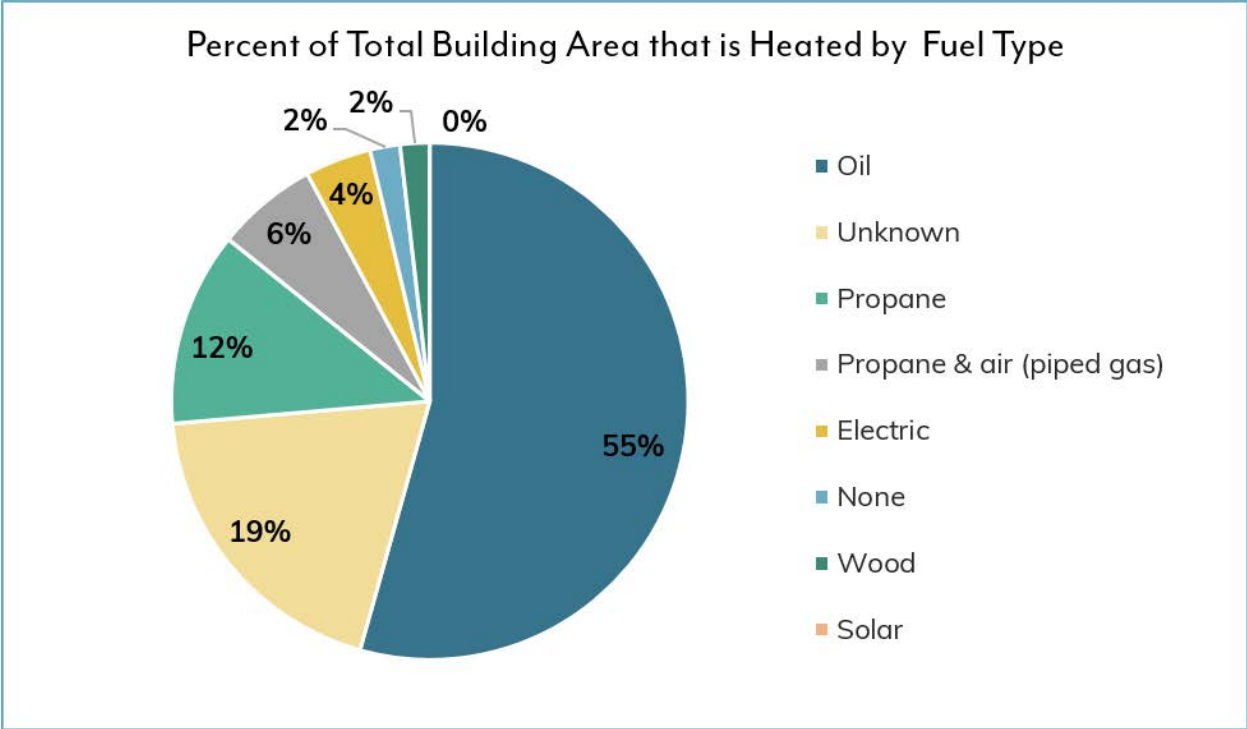


Figure 3.5. Percent of total building area in Keene that is heated, by fuel type.

There are examples of renewable thermal systems in Keene, including (but not limited to) a geothermal heating system at the City of Keene Public Works building, a biofuel plant that uses recycled vegetable oil to heat the Keene State College campus, a wood chip heating plant at the Keene Middle School, and wood chip boiler at Filtrine Manufacturing. Natural gas is not widely available in Keene; however, there are a limited number of buildings located in the Monadnock Marketplace development (about 5% of commercial space) that are heated by compressed natural gas (CNG).

### Fuel Costs and Vulnerability

In general, while the weekly residential heat oil and propane prices in New Hampshire have not increased significantly in the last 15 years, the price of propane and oil have been unpredictable and subject to spikes in the winter months when demand and need are highest (Figure 3.6). In addition, while costs have not increased significantly, average fuel costs in New Hampshire are consistently higher when compared to the rest of the country (Figure 3.7). High average fuel costs, in combination with price variability of the two most consumed fuels in the city, puts many Keene residents in a vulnerable place to meet their winter heating needs, cooking needs, and other critical building costs during high-demand months.

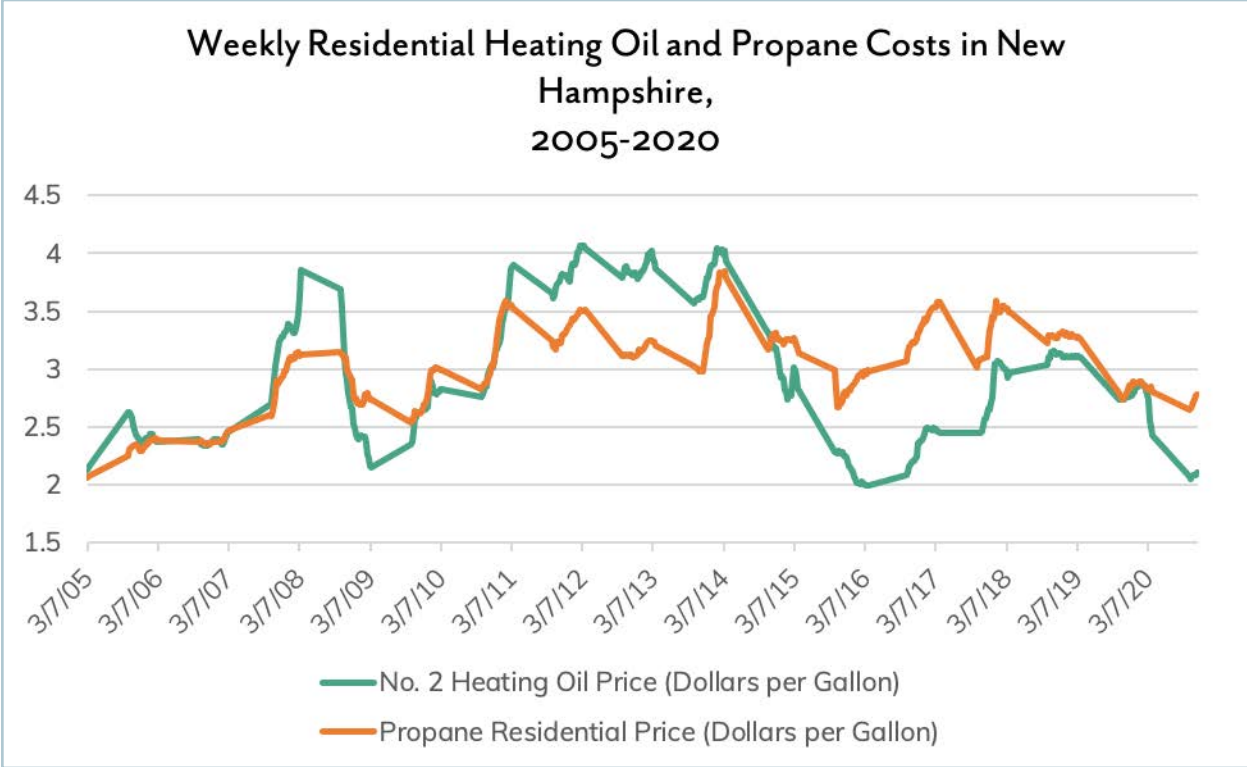


Figure 3.6. Weekly Residential Heating oil and Propane costs for October-March, 2005-2020<sup>10</sup>

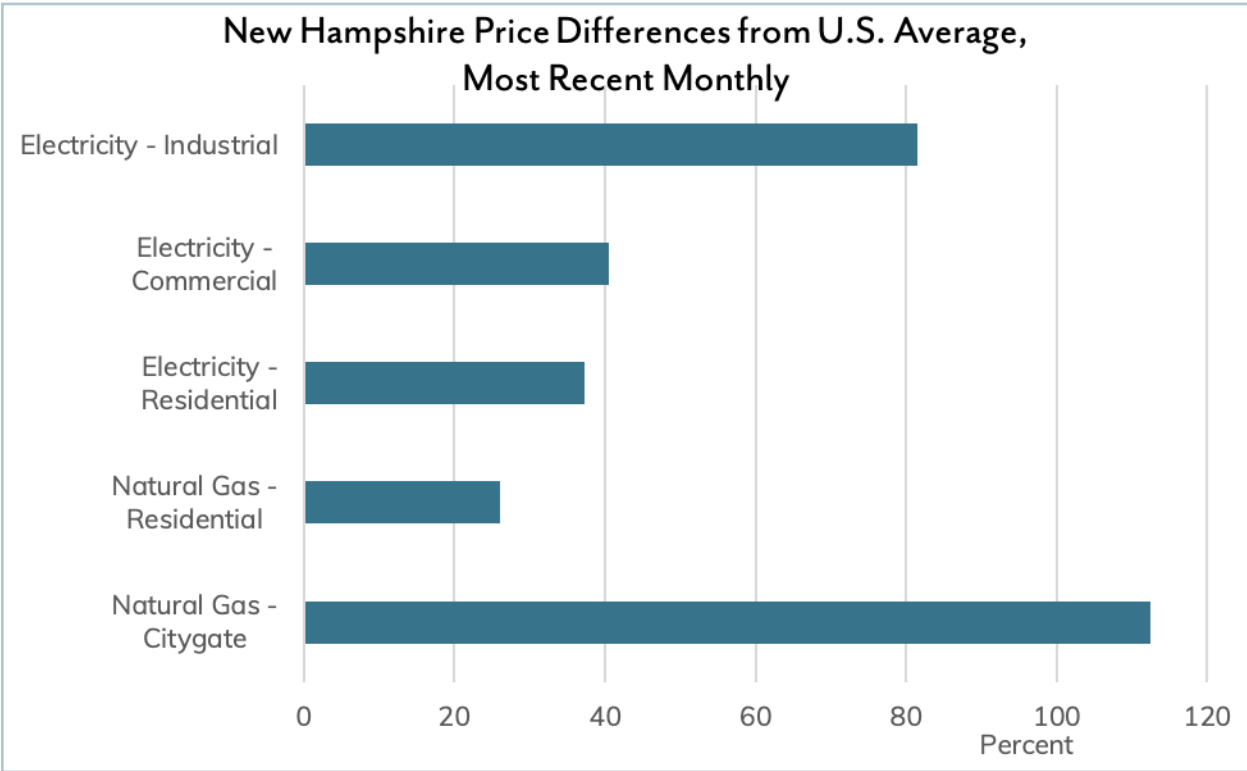


Figure 3.7. Percent above US-average that NH Hampshire residents pay for building costs in January 2020.<sup>11</sup>



## Estimated Fuel Consumption in Keene

While the City’s Assessing data provides some information about the type of heating system and primary fuel type by building, it does not provide information about the amount of fuel used to heat and cool buildings in Keene. In order to estimate the amount of fuel consumed for space heating, average New England and Cold Climate consumption figures were used from the US Energy Information Administration (US EIA) and scaled to best match Keene building data.<sup>12</sup> Because electricity consumed for space and water heating and electricity for plug load cannot be separated, this analysis considers only the two most used heat fuels in Keene: No. 2 heating oil and propane. Electricity energy consumption for space heating and cooling is captured within the 2019 electricity baseline data.

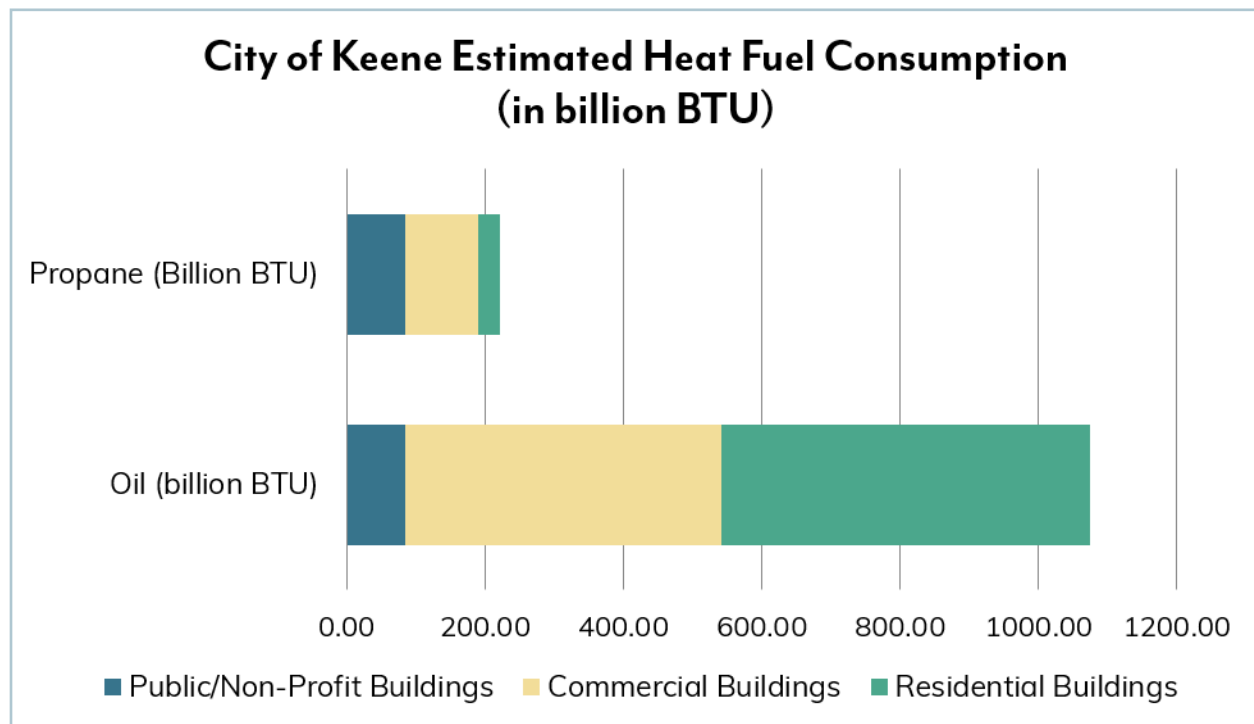


Figure 3.8. Estimated heat fuel consumption (billion BTU) for propane and number 2 heating oil in Keene.

Heating Fuel Consumption Estimates	Oil (billion BTU)	Propane (Billion BTU)
Public/Non-Profit Buildings	85.24	84.95
Commercial Buildings	455.62	105.31
Residential Buildings	534.85	30.44
Total	1075.71	220.69

Table 3.3. Annual heating fuel consumption estimates for buildings in Keene, in billion BTU.

Two methods were used to estimate Keene’s heat fuel consumption for propane and oil. For residential buildings, US EIA data for Average Site Energy Consumption in the Northeast US, recorded in million BTU per household by fuel type, was applied to local figures for Keene. For each fuel – propane and oil in this case – the US EIA provides an average consumption

figure for the following sub-units: single family home attached, single family home detached, multi-family home 2-4 units, multi-family home 5+ units, and manufactured (mobile) homes. Using the assessing data from the City of Keene, the number of households in a given sub-sector were multiplied by the average site consumption per household figure. This includes each residential unit, for example 2-units in a 2 family home, 9 units in a 9-occupancy apartment building, and so on. Each sub-sector total was then combined to approximate total residential energy consumption: 534.85 billion BTU for Oil and 30.44 billion BTU for Propane.

For Commercial and Public/Non-Profit buildings, heat fuel consumption was estimated based on US EIA energy intensity figures (thousand BTU/square foot) for New England (very cold/cold climate designation). The US EIA estimates that the energy intensity for the sum of major fossil fuels in a commercial building is 86.1 thousand BTU/square foot. The EIA also provides specific energy intensity figures for propane (88 thousand BTU/square foot) and fuel oil (115 thousand BTU/square foot). These figures were multiplied by the total area of heated space for each fuel type to estimate fuel consumption in buildings used for a commercial or public/nonprofit purpose.

These energy consumption estimates can be better understood when they are converted from billion BTUs to “native” energy units. Based on average consumption, Keene buildings consume an estimated 221 billion BTUs of propane and 1,076 billion BTUs of Oil per year. Using the US EIA conversion table<sup>13</sup> that equates to:

	BTU consumption	Conversion ratio (US EIA)	Total consumption/year
Propane	221 billion BTUs	1 gallon of propane = 91,333 Btu	2.4 million gallons of propane
Oil	1,076 billion BTUs	1 gallon of heating oil = 138,500 Btu	7.8 million gallons of heating oil

Table 3.4. Estimated annual heat fuel consumption in Keene for propane and number 2 heating oil.

# 2019 TRANSPORTATION BASELINE

## Introduction

The Transportation Sector includes the movement of people and goods within, into, and out of Keene. For the purposes of measuring and tracking progress towards the 2050 Transportation Sector goal, the scope of the baseline metrics is limited to ground transportation of Keene residents. However, the City recognizes that non-residents visiting or working in Keene likely account for a large proportion of the travel that occurs within the City limits. As such, the transportation strategies in this plan are intended to have a broader impact.

The transportation baseline considers how residents choose to get around (transportation mode choice), the types of vehicles residents choose to buy or lease, and the infrastructure and systems in place to support different transportation modes (cars, buses, bicycles, walking, etc.). How people choose to travel directly translates into fossil fuels consumed (or not consumed) and the host of local and global environmental impacts that result from our reliance on combustion fuels.

## Vehicles Registered in Keene

According to data from the New Hampshire Department of Environmental Services, there were 19,911 registered vehicles in Keene as of December 2019, or about 2.1 vehicles for every household and approximately 1 vehicle for every adult age 16 or older. Of these, 92% were light-duty conventional vehicles with internal combustion engines (ICE), 6% were heavy-duty conventional vehicles, 1% (222) vehicles were registered as hybrid electric vehicles (HEVs), 1% were registered as plug-in hybrid electric vehicles (PHEVs), and less than 1% (15 vehicles) were registered as all-electric vehicles (AEVs).

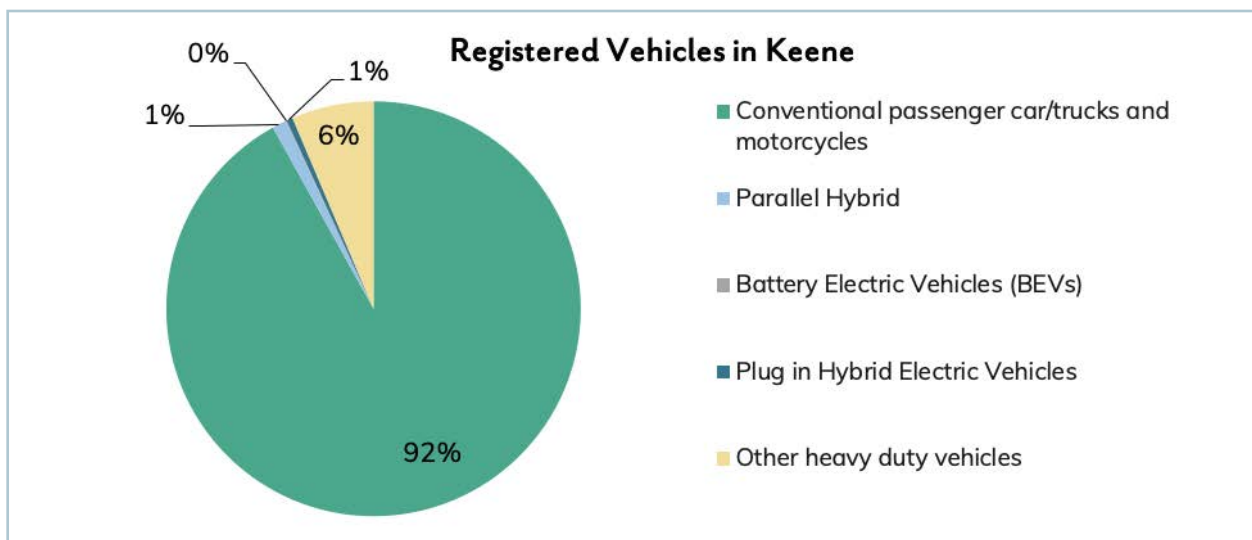


Figure 3.9. Percent total registered vehicles in Keene by vehicle type as of December 2019.

Conventional and Electric Vehicle Designation: An Overview			
Conventional Passenger Car	Hybrid Electric Vehicle (HEV)	Plug-in Hybrid Electric Vehicle (PHEV)	All Electric Vehicle (AEV)
Conventional passenger cars are motor vehicles with internal combustion engines. This includes gasoline, diesel, and flex (ethanol capable) vehicles.	Hybrid electric vehicles (HEVs) are powered by an internal combustion engine and an electric motor. Batteries can be charged by the internal combustion engine or through regenerative braking, but not by an outside electric power source.	Plug-in hybrid electric vehicles (PHEVs) use batteries to power an electric motor and use another fuel, such as gasoline or diesel, to power an internal combustion engine or other propulsion source. Batteries can be charged by an outside electric power source, by the internal combustion engine, or through regenerative braking.	All-electric vehicles (AEVs) operate on electricity alone using batteries charged by an outside electric power source. They include battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs).

## How Residents Choose to Travel

Information about how people commute, or transportation mode share (TMS), indicates that the majority of Keene residents prefer using a personal motor vehicle to get to and from work or school. According to Transportation Mode Share data from the American Community Survey in 2017, 73 percent of survey respondents drove alone for their commute, 8 percent carpooled, 0.2% used public transit, 7% walked, 9% worked from home, and 4% selected “other” (see Figure 10).<sup>14</sup> This data does not include how people choose to travel for other types of trips, such as shopping or recreational trips. However, it is reasonable to assume that the majority of trips made by residents in Keene are made using a personal motor vehicle due to several factors, including long distances that people may need to travel to get to their destination, the lack of alternative transportation options outside of Keene, the convenience of personal vehicles as compared to other options, and climate/weather conditions.

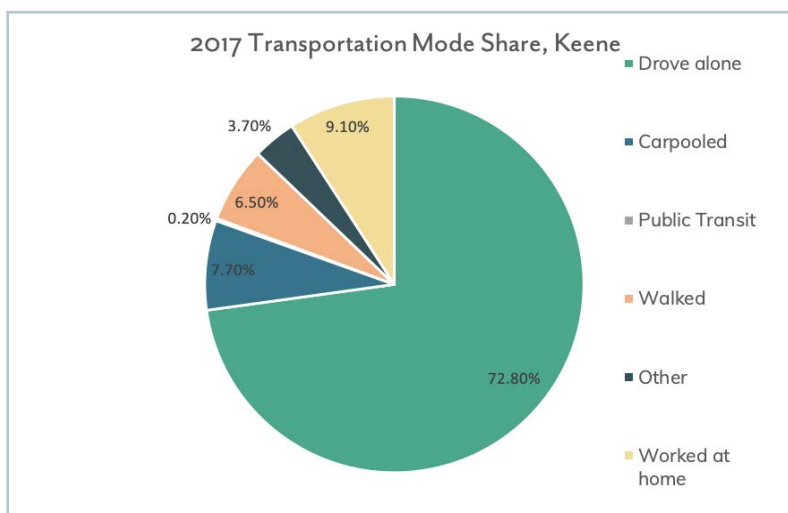


Figure 3.10. Transportation Mode Share among workers age 16+ (data source: American Community Survey, 2017)

## Public Transportation Options

Keene is currently home to one fixed-route bus system, the City Express Bus, as well as a demand-response bus designated to meet the needs of people aged 60 or older, the Friendly Bus. During the academic school year, the Keene State Campus Community Shuttle bus is also available for Keene resident use. The City Express Bus, campus shuttle, and the Friendly Bus are operated by Home, Healthcare, Hospice and Community Services of Southwestern New Hampshire (HCS). The City Express service has two operating bus lines which run outside of typical work hours. Both lines operate Monday through Friday, starting at 8:00 am and finishing at either 4:09 pm or 5:04 pm. Both routes originate and terminate at the Keene Transportation Center, and a bus runs once every hour for each line. While there are 39 set bus stops along the two lines, the bus can be hailed or stopped at the rider's request as long as it is on the bus path.<sup>15</sup> Given these factors, ridership is estimated by the 2018 American Community Survey as 27 (+/-32) people per day,<sup>16</sup> and HCS reports an average of 72 riders per day, with some fluctuation due to whether or not Keene State College is in session.

Two Greyhound Bus routes provide service in Keene, heading either north to beyond White River Junction or south to Springfield, MA. According to Southwest Region Planning Commission (SWRPC), the average ridership for both of those lines is about 5 riders getting on and 5 riders getting off the bus each day.

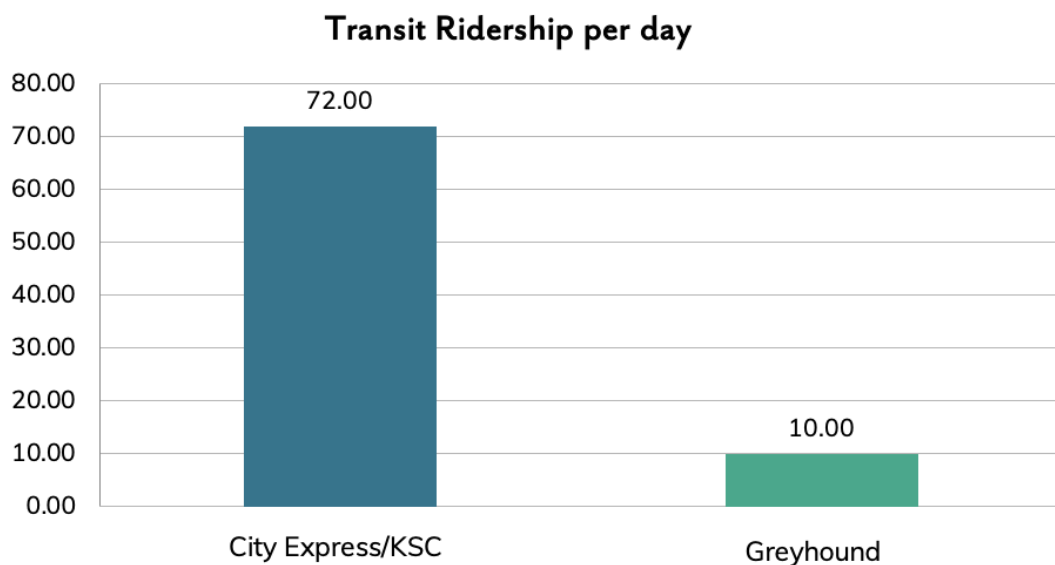


Figure 3.11. Average transit ridership per day in Keene, NH

## Transportation Infrastructure

### Roundabouts

As a way to reduce vehicle delay time and improve the flow and safety of traffic, the City of Keene and NH Department of Transportation have installed six roundabouts throughout the city at busy intersections where traffic delay, congestion, and/or safety issues were identified. Roundabouts are circular intersections where entering traffic yields to traffic



in the circle. Design features, such as a smaller diameter and splitter islands, slow traffic speeds. Because they reduce idle time and improve traffic flow, the replacement of a failing signalized intersection with a roundabout has been shown to reduce fuel consumption and emissions.<sup>17</sup> As of October 2020, Keene had 6 roundabouts and 20 signalized intersections, with an additional two roundabouts planned for construction on Winchester Street in 2021.

**Pedestrian, Bike and Transit Miles**

Infrastructure such as sidewalks, marked crosswalks, bicycle lanes, bicycle boxes, and other supportive infrastructure for pedestrians and bicyclists improves safety and helps promote “human-powered” transportation modes that do not rely on fossil fuels. As of October 2020, the City maintains over 54 miles of pedestrian sidewalks year-round, 3.75 miles of bicycle lanes, and 2.92 miles of shared bicycle lanes. In addition, there are over 13 miles of multi-use trails within the City limits, and over 41 miles of fixed bus routes.



Figure 3.12. Image of a painted "bicycle box" on Central Square in Keene.

The City has installed 15 enhanced pedestrian crossings in locations where traffic speed, traffic volume, or proximity to a grade school or other destination for pedestrians warrants increased safety measures. An example is the two crosswalks on Winchester Street near its eastern terminus, where high volumes of student foot traffic led to the installation of raised crosswalks with automated flashing lights to increase the visibility of pedestrians and slow motorized traffic. In 2017, the City installed “Bicycle Boxes,” or painted areas where bicyclists can queue at an intersection, in order to increase the visibility and safety of people riding bicycles as they enter the busy Central Square intersection (see Figure 3.12).

Figure 3.13 on the next page depicts a map of bicycle infrastructure in downtown Keene, which includes in-street shared lane markings (sharrows) and bicycle lanes, as well as off-street multiuse rail trails. Table 3.5, below, includes counts for the number of bicycle boxes, enhanced pedestrian crossings, road/trail crossings, and bus stops in Keene as of October 2020.

Type of Infrastructure	Count
Bicycle Boxes	2
Enhanced pedestrian crossings	15
Road crossings for multiuse trails/paths	32
Bus stops	39

Table 3.5. Selected bicycle, pedestrian, and transit infrastructure counts in Keene

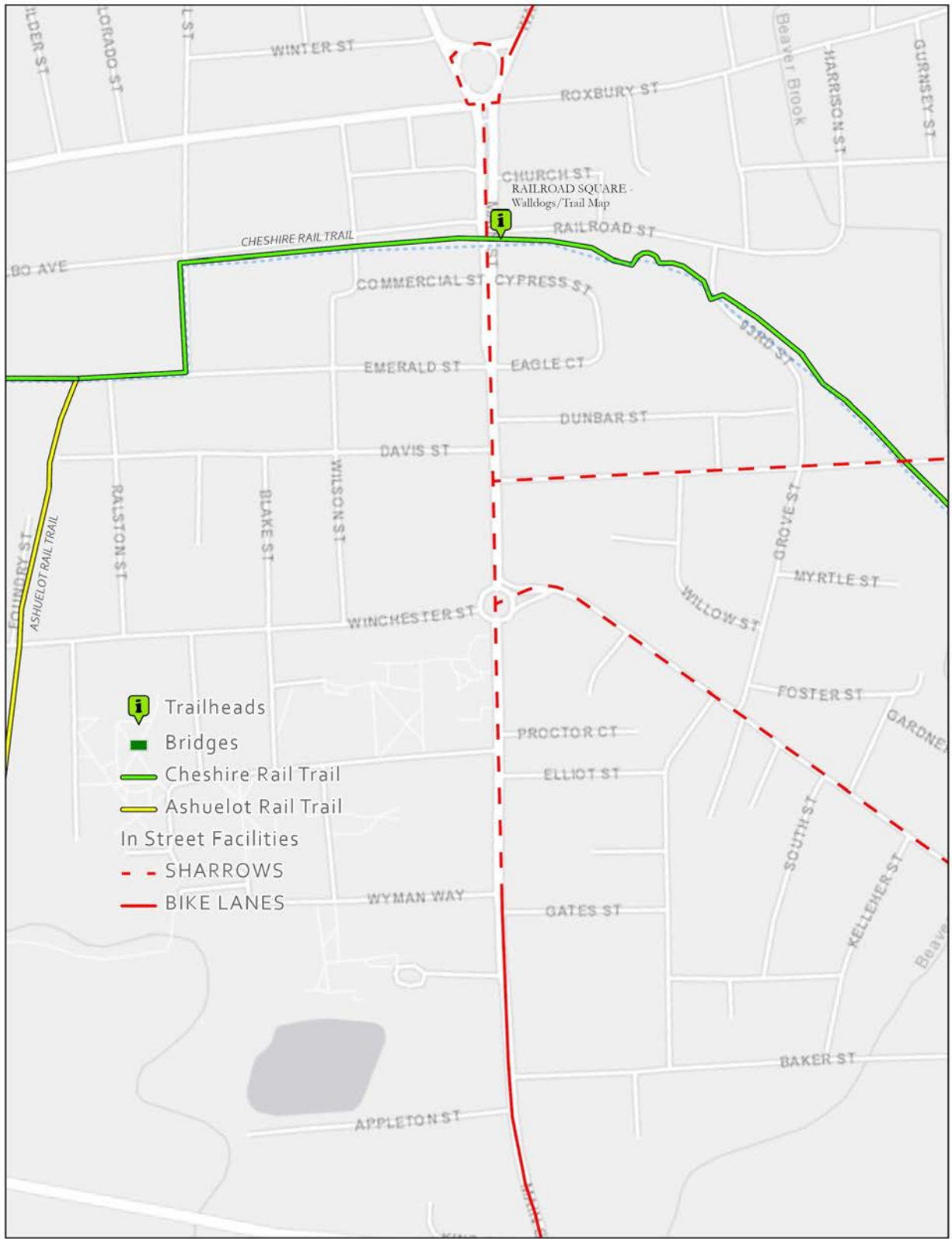


Figure 3.13. A map of bicycle infrastructure in Downtown Keene.

## EV Charging Infrastructure

There are 3 charging locations within the City of Keene, including two “Level 2” charging ports in the Commercial Street parking lot (available for a parking fee of \$1.49/hour), two “Level 2” charging ports at the Fairfield Kia Dealership, and one “Level 2” charging port at the Antioch University New England campus. There are no DC fast charge stations (“Level 3” charging stations) in Keene. However, within 20-30 miles of Keene, there are a number of charging stations and charging ports, most of which are along the Route 91 corridor between Brattleboro and Putney across the Connecticut River in Vermont, including 4 public DC fast charging locations. There are 13 “Level 2” charging locations within 20 miles, and 16 additional “Level 2” charging locations within 30 miles of the City (Figure 3.14).

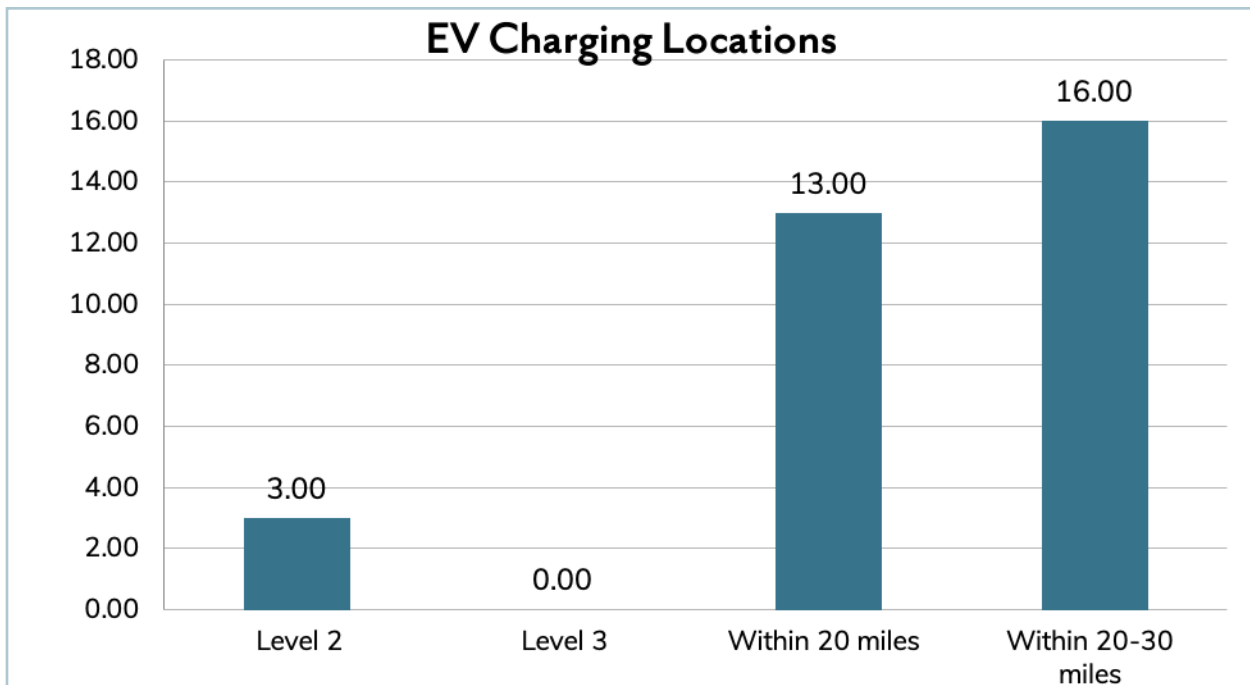


Figure 3.14: Number of EV charging location at varying distances from Keene, NH.

## Transportation and Land Use

Coordinated transportation and land use planning can help reduce energy use within the transportation sector over the long term by shortening trip distances, reducing the need for parking, and supporting sustainable travel modes such as public transit, walking, and bicycling. There are several land use factors that impact how much people drive (vehicle miles traveled) and the number of single occupancy vehicle trips, which is among the most inefficient and energy intensive ways to travel. These factors include the density and mix of land uses, access to transit, interconnected and well-designed streets, and walkable neighborhoods.

## Housing in Mixed Use Areas

According to a housing inventory analysis presented to the Keene City Council in February 2020, 26 percent (2,628 units) of all residential dwelling units in the City are located in the Central Business (7 percent or 725 units), Central Business Limited (1 percent or 111 units), or High Density (17.4 percent or 1,792 units) Zoning Districts. These districts are located in either the downtown or areas directly surrounding the downtown and provide easy access to a multitude of services and resources, including convenient access to public transportation. Most of the City's dense residential developments are located in these areas with 54 percent of all residential buildings with over 8 Units, and 54 percent of all residential buildings with 4-8 units being located in these districts. Figures 3.15 and 3.16 on the next page show a side-by-side comparison of where people work in Keene (Figure 3.15, on the left) and where people live in Keene (Figure 3.16, right) using the US Census "On the Map" tool. This data shows that job centers and population centers within Keene are well-aligned, which can help support more energy-efficient transportation modes such as walking, bicycling, and public transit.

## Complete Streets

In 2015, the City of Keene adopted a Complete Streets policy (in the form of a resolution) which made a commitment to designing, constructing, operating, and maintaining all City-owned transportation facilities to support the needs of all users of the roadway, including bicyclists, pedestrians, transit riders, and motorists. To support this policy, the City also adopted a set of Complete Streets Design Guidelines that establishes a Complete Street Typology system and map (see Figure 3.17). This typology system classifies the streets in Keene based on each roadway's function and surrounding land use context, including right of way width, building types, predominant travel modes, and surrounding land uses. For each street type, the guidelines includes a list of features that should be considered in the form of a checklist. Examples of complete streets features includes pedestrian crossings, medians, pedestrian islands, street furniture, pedestrian-scale lighting, bicycle lanes, sidewalks, and on-street parking in appropriate areas.

In 2018/2019, a group of Keene State College students in the Geography Department prepared a report that addresses the City's progress on its Complete Streets commitment. This analysis was limited to a review of "Slow," "Bicycle," and "Gateway" street types. The students evaluated a random sample of streets throughout Keene within each of these three street types, and assigned letter grades to each street segment based on how well the street matched the list of suggested Complete Streets treatments listed in the City's Design Guidelines (see Figure 3.18). The student report concludes that, of the 24 street segments that were assessed, many do not meet the City's Complete Streets design guidelines, with only one street segment receiving a letter grade of "A" – the segment of Main Street between Central Square and the Winchester Street/Marlboro Street/Main Street intersection.

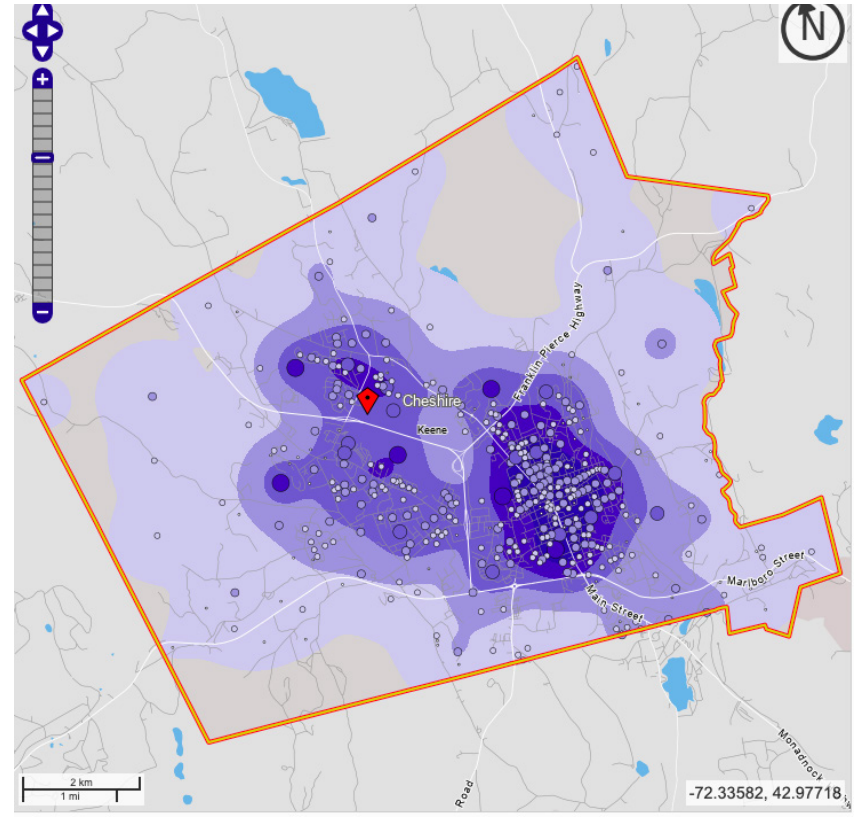
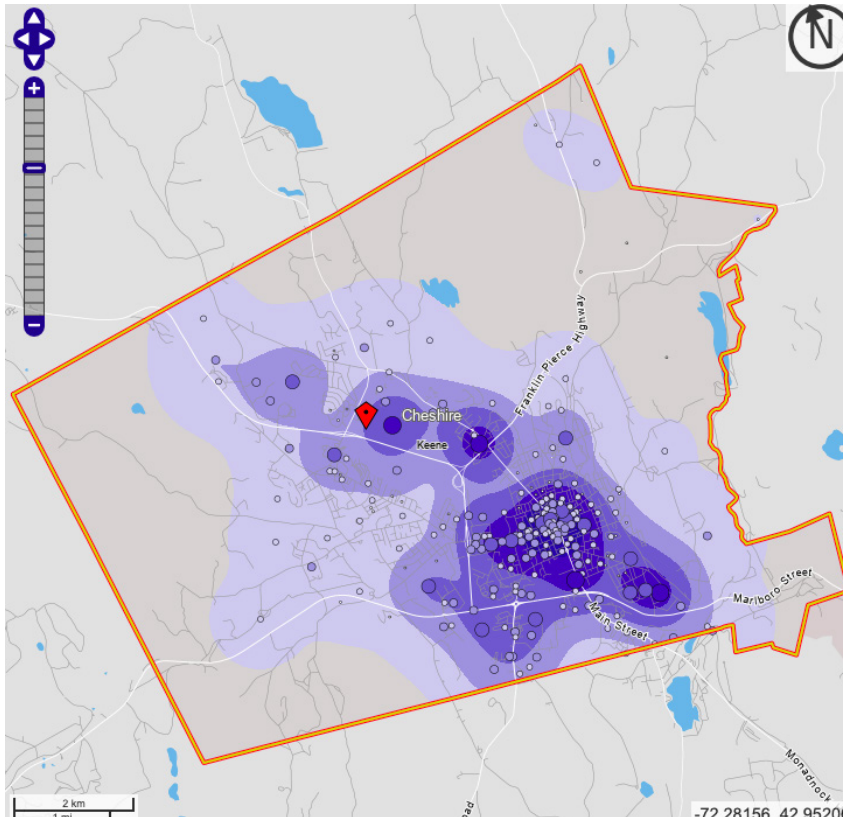
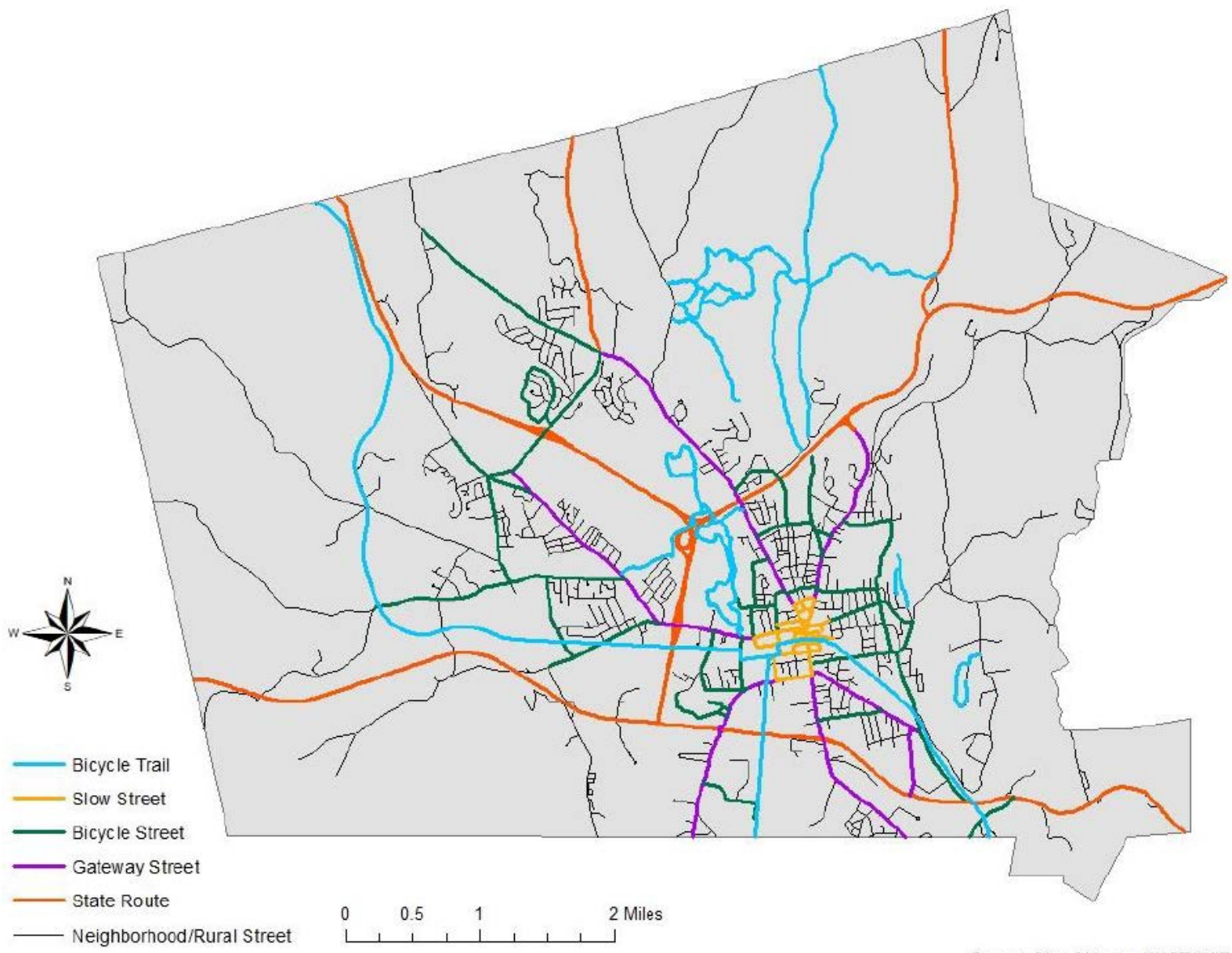


Figure 3.15 (left) and Figure 3.16 (right). Heat maps that show where people work (left) and where people live (right) in Keene, generated by the US Census “On the Map” tool. The darker colors represent higher density areas.<sup>18</sup>





Source: City of Keene, NHGRANIT

Figure 3.17. City of Keene Complete Streets typology.

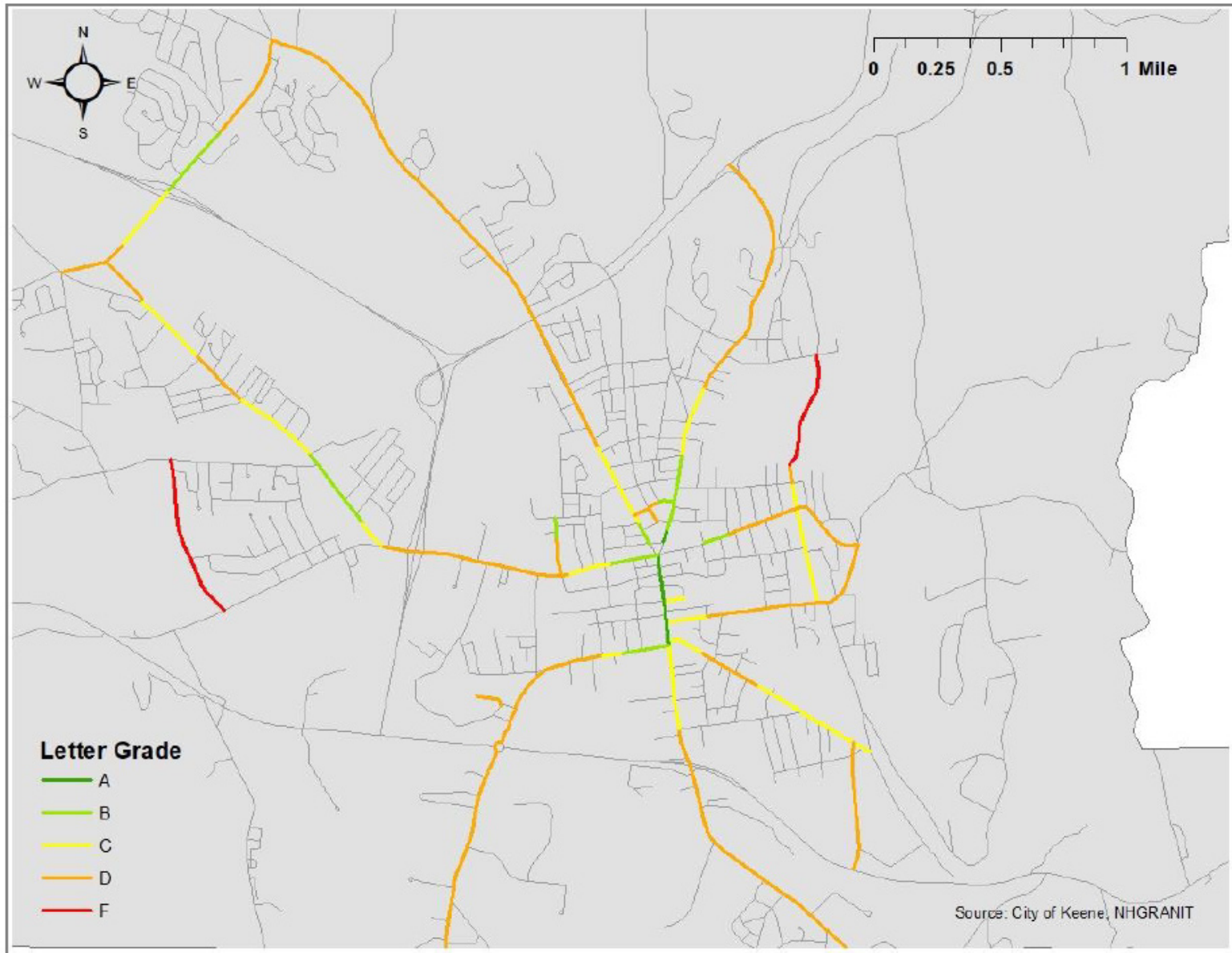
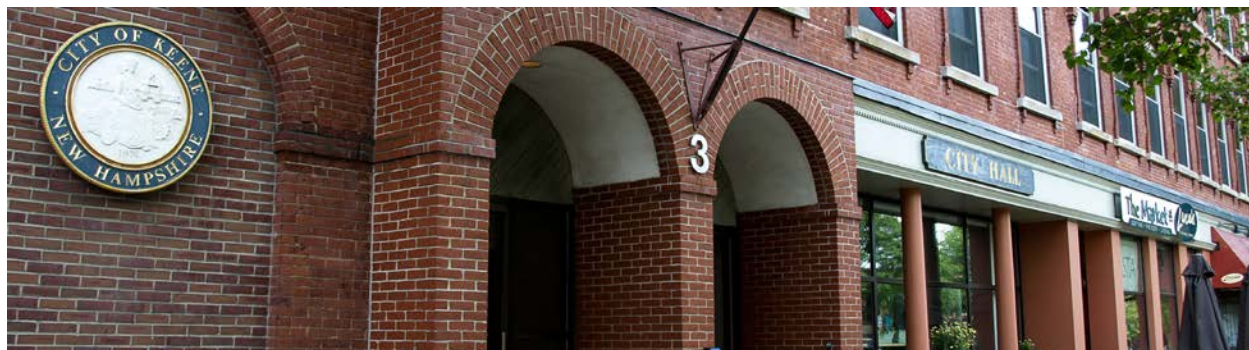


Figure 3.18. City of Keene street grade by segment.

## Endnotes

- 1 Data provided by Eversource. Industrial accounts are those that have peak electricity demand greater than 1,000 kW.
- 2 The New Hampshire Office of Energy and Planning. *State of New Hampshire Regional Planning Commissions: County Population Projections (2016)*. <https://www.nh.gov/osi/data-center/documents/2016-state-county-projections-final-report.pdf>
- 3 Energy efficiency is based on delivered energy from the EIA Annual Energy Outlook (Publication 2019). <https://www.eia.gov/outlooks/aeo/data/browser/#/?id=2-AEO2019&region=1-1&cases=ref2019>
- 4 Distributed generation information was provided by Eversource.
- 5 New England Power Pool (Accessed 2020). <http://nepool.com/>
- 6 New England Power Pool. *Working Together to Shape Tomorrow: Annual Report 2019 (2020)*. [http://nepool.com/uploads/Annual\\_Report\\_2019.pdf](http://nepool.com/uploads/Annual_Report_2019.pdf)
- 7 *ibid*
- 8 Information was not available about the current competitive supply agreements or environmental disclosures of those agreements within Keene. Therefore, this analysis assumes that all electricity mix throughout Keene met the RPS requirements and did not exceed the renewable energy carve outs.
- 9 New Hampshire PUC. *Choosing an Energy Supplier: Suppliers and Aggregators* (Accessed 2020). <https://www.puc.nh.gov/consumer/energysuppliers.htm>
- 10 US Energy Administration. *Weekly Heating Oil and Propane Prices (October-March)*. [https://www.eia.gov/dnav/pet/PET\\_PRI\\_WFR\\_DCUS\\_SNH\\_W.htm](https://www.eia.gov/dnav/pet/PET_PRI_WFR_DCUS_SNH_W.htm)
- 11 US Energy Information Administration. *NH Price Differences from U.S. Average, Most Recent Monthly*. <https://www.eia.gov/state/?sid=NH#tabs-5>
- 12 US Energy Information Administration. *Commercial Buildings Energy Consumption Survey (CBECS)*. <https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/c10.php> and US Energy Information Administration. *2009 RECS Survey Data*. <https://www.eia.gov/consumption/residential/data/2009/#structural>
- 13 US Energy Information Administration. *Units and calculators explained*. <https://www.eia.gov/energyexplained/units-and-calculators/>
- 14 [https://data.census.gov/cedsci/table?q=Keene,%20NH&q=1600000US3339300&tid=ACSST5Y2017.S0801&layer=VT\\_2018\\_160\\_00\\_PY\\_D1&vintage=2017](https://data.census.gov/cedsci/table?q=Keene,%20NH&q=1600000US3339300&tid=ACSST5Y2017.S0801&layer=VT_2018_160_00_PY_D1&vintage=2017)
- 15 [https://static1.squarespace.com/static/57c9cc0d197aead196f1af97/t/5cf1440786f2de0001937201/1559315475747/Bus+Schedule+Three+Route\\_NEW+ROUTE\\_UpdatedJUNE2019.pdf](https://static1.squarespace.com/static/57c9cc0d197aead196f1af97/t/5cf1440786f2de0001937201/1559315475747/Bus+Schedule+Three+Route_NEW+ROUTE_UpdatedJUNE2019.pdf)
- 16 [https://data.census.gov/cedsci/table?q=Keene,%20NH&q=1600000US3339300&tid=ACSST5Y2017.S0801&layer=VT\\_2018\\_160\\_00\\_PY\\_D1&vintage=2017](https://data.census.gov/cedsci/table?q=Keene,%20NH&q=1600000US3339300&tid=ACSST5Y2017.S0801&layer=VT_2018_160_00_PY_D1&vintage=2017)
- 17 U.S. Federal Highway Administration Publication No. FHWA-SA-15-071. *Accelerating Roundabout Implementation in the United States - Volume III of VII: Assessment of the Environmental Characteristics of Roundabouts*. September 2015.
- 18 <https://onthemap.ces.census.gov/>

# CHAPTER 4 | MEASURING OUR PROGRESS



## Why Track Progress?

As the City and community partners work to achieve the sustainable energy goals for electricity by 2030 and for thermal and transportation by 2050, it will be important to track and report our progress towards these goals. Measuring progress will enable improved and informed management of projects and programs, helping to drive continuous improvement. Effectively communicating progress will help generate and maintain interest among residents and stakeholders, increase transparency and trust, and provide quantitative support for existing strategies or, if necessary, for changing course.

## Performance Metrics

A performance metric, sometimes referred to as an “indicator,” is a measurement for understanding impacts of actions and progress toward goals. For example, a good performance metric for a program that aims to increase the number of EV charging stations would be the number of new EV charging stations installed over a given time period.



Metrics can be used to measure the overall impact of a combination of strategies (“system-level metric”), for example, total residential energy use in MMBtu per year. They can also be used to measure the impact of a specific activity or program (“program-level metric” – see EV example above) or to illustrate whether or not a specific action has been taken (“milestone metric”). An effective metric should be aligned with a specific goal or outcome, be relatively easy to understand, rely on trustworthy data (be accurate), and be timely (can be updated frequently enough to be useful).



# 2030 ELECTRICITY GOAL

Due to the shorter timeframe to achieve the electricity goal and the availability of locally specific data through the utility, this plan recommends tracking progress towards the 2030 electricity goal on an annual basis using the metrics listed below. As the City pursues specific programs and actions, additional metrics should be identified and tracked to evaluate the effectiveness of these initiatives.

## Electricity Sector Performance Metrics

Performace Metric	Data Source	Responsibility	Requency
Annual electricity consumption by sector (residential, commercial, industrial/manufacturing, municipal).	Eversource or Community Power program	City staff	Annual
Electricity supply mix (renewable v. non-renewable) by sector (e.g. ISO New England Resource Mix).	Eversource or Community Power program	City staff	Annual
Percent of households/customer load on competitive energy supply (or participating in Community Power program)	Eversource or Community Power program	City staff	Annual
Number of solar installations by sector (residential, commercial, etc.)	Eversource; City Assessing Department	City staff	Annual
Installed solar capacity by sector (residential, commercial, etc.)	Eversource; City Assessing Department	City staff	Annual
Number/percent of eligible homeowners and businesses that take advantage of the renewable energy property tax exemption.	City Assessing Department	City staff	Annual



# 2050 THERMAL GOAL

In contrast to the electricity sector, the thermal sector does not have a readily available, locally-specific source of data to measure the amount of energy consumed for heating and cooling within the City. The metrics listed below are indirect indicators to help the City and public understand trends in weatherization, building energy efficiency, and uptake of renewable thermal technologies. These metrics rely on several data sources with varying degrees of accuracy and timeliness. For example, City Assessing data on the type of heating system and type of heating fuel is not regularly updated, and is unlikely to show any measurable change year to year. Therefore, the recommended frequency for updating these metrics varies depending on the data source(s), accuracy of the data, and the level of effort it will take to collect the necessary data.

As programs such as benchmarking, home energy labeling, and Community Power are adopted and implemented, accurate and reliable data at the local level will become more available to track progress towards the thermal goal on a more frequent basis.

## Thermal Sector Performance Metrics

Performance Metric	Data Source	Responsibility	Frequency
Number of households and businesses that participate in weatherization programs per year (e.g. NHSaves, local weatherization campaign)	NH Saves program; local weatherization programs	City staff, NHSaves, SCS	Annual
Number of high performance buildings in Keene (e.g. NE-CHPS, LEED, etc.)	Local survey; Organization contacts	City staff & Energy and Climate Committee	2-3 years
total building area/ percent of building area using renewable thermal (e.g. biomass, solar thermal, geothermal, etc.) for space and hot water heating, by sector	City Assessing Data; Local surveys or organization contacts	City staff & Energy and Climate Committee	2-3 years
Estimated energy consumption for space heating (per household / per square foot commercial floor space)	Assessing Data (sq. ft of building space); Energy Information Administration (energy intensity figures; average consumption per sq. ft. commercial space, average consumption per household)	City staff	3-5 years

# 2050 TRANSPORTATION GOAL

As with the Thermal Sector, the Transportation Sector lacks a locally-specific source of data to measure the amount of energy consumed for ground transportation directly. However, locally-specific data is available for the number and types of vehicles registered in Keene, allowing the City to track adoption of electric vehicles and other alternative fuel vehicles. In addition, the City has access to data on transportation infrastructure, public transportation ridership, and Census data such as transportation mode share. As with the Thermal Sector, these metrics rely on various different data sources and are associated with varying degrees of accuracy and level of effort for data collection.

## Transportation Sector Performance Metrics

Performance Metric	Data Source	Responsibility	Frequency
Total number of vehicles registered in Keene / Number vehicles per household and per capita	NH Department of Environmental Services (NHDES); US Census	City staff	Annual
Percent of new light-duty vehicle registrations and total light-duty vehicle registrations that are electric vehicles or hybrid vehicles	NHDES	City staff	Annual
Transportation Mode Share (Percent who drive, walk, bike, take transit) for work / school	U.S. Census / American Community Survey (ACS)	City staff	Every 5 years
Transit ridership (City Express Bus)	Home, Healthcare, Hospice and Community Services (HCS)	City staff	Annual
Number of bus stops / Miles of bus routes	City GIS data / City Engineering Office	City staff	Every 2-3 years
Miles of bike/ pedestrian pathways and sidewalks maintained year-round	City GIS data / City Engineering Office	City staff	Annual
Number/distribution of EV charging stations by type (level 2/level 3)	PlugShare.com	City staff	Annual
Proportion of residents living in locations with mixed land uses	City Assessing Department	City staff	Every 5 years
Number of roundabouts compared to signalized intersections	City GIS data / City Engineering Office	City staff	Annual

# CHAPTER 5 | ACTION PLAN



## Implementation

The City recognizes that in order to meet its ambitious energy goals, the City and its community partners need to act now using the tools that are available today. Future technologies, policies and incentives will – and should – influence the specific actions and strategies that the City and others deploy to reach the energy goals by the 2030 and 2050 target dates. However, given the urgency of climate change and the short time frame for achieving the community’s energy goals, implementation must start now. To that end, the City should allocate appropriate staffing and other resources to achieve the priority action strategies outlined in this plan.

The Energy & Climate Committee (ECC) recommends that the City consider the following to ensure implementation happens in a coordinated and effective fashion:

- I. In the near-term (6 months - 1 year), the City should identify a team of existing staff to lead implementation efforts within the City. The membership of this "implementation team" may vary over time depending on the current focus of the group (e.g. Community Power, Benchmarking policy, EV charging infrastructure, etc.). The team would work together in coordination with the ECC and City Council to implement policies and actions to achieve the City's Sustainable Energy Goals. This internal City staff team could be an informal group appointed by the City Manager, or it could be more formally created through a City Council resolution.
- II. Explore options for hiring a shared Sustainability Coordinator position with other local governments or institutions. While hiring a full-time sustainability coordinator may not be feasible at this time, there are existing models for shared sustainability positions that the City could look into. For example, Clean Energy NH has created a "North Country Circuit Rider" position. This person acts as an additional staff person for communities in Coös County, helping them implement energy projects.<sup>1</sup> Just over the border in Maine, the Southern Maine Planning & Development Commission has created a Sustainability Coordinator position that is shared among six towns. This person works with each of the six communities to research effective actions and assist with implementation of programs to help each community reach its local energy and resilience goals.<sup>2</sup>

## Priority Action Strategies

In order to identify priority strategies for implementation, the ECC worked with staff to identify, evaluate and rank a set of policies, programs, incentives, and other actions that the City can pursue in the near-term to make progress its energy goals. These action strategies were ranked using the following evaluation criteria:

- I. Scale of Impact:** Extent to which the action has the potential to increase the level of renewable energy in the electricity mix, thermal energy mix, or transportation energy mix.
- II. Local Impacts:** Extent to which a strategy will increase renewable energy development or generation within the region and increase resiliency to shocks to the energy system.
- III. Environmental & Social Goals:** Extent to which a strategy is expected to contribute to local job growth and impact greenhouse gas emissions.
- IV. Inclusion & Equity:** Extent to which a strategy is expected to be affordable and cost-effective for residents and businesses of all income levels within Keene, and extent to which the benefits associated with the strategy are expected to be distributed equitably.
- V. Feasibility:** Extent to which the City will incur costs to implement the strategy, and extent to which the strategy is technically possible. This rating criteria also includes the availability of existing funding sources and incentives.

The evaluation criteria above were developed based on feedback gathered from a series of outreach events conducted in the fall of 2019 and early winter of 2020. Using these evaluation criteria, the ECC identified 17 priority action strategies, which generally fall into three broad categories:



**Energy Efficiency:** Many of the priority strategies focus on reducing energy use as a first and critical step in reducing the total supply of renewables needed to meet energy demand and control costs. This is especially true with the electricity sector, as the electrification of thermal and transportation energy consumption will lead to a substantial increase in total electricity consumption.



**Renewable Energy – Generation & Procurement:** In order to reach the 100% renewable energy goals, the City, businesses, and residents will need to both procure electricity from renewable sources and substantially increase local renewable energy generation.



**Fuel Switching:** The long lifespan of heating and cooling systems, vehicles, and new construction means that the City should start encouraging and supporting the replacement of fossil fuel systems with electric or renewable systems as soon as possible. Each fossil fuel-based vehicle and/or heating & cooling system purchased today will be around for years to come, and represents a lost opportunity for transitioning away from fossil fuels.

Table 5.1 on the next two pages summarizes the 17 priority implementation tools & strategies by category (energy efficiency, renewable energy, and fuel switching) and sector (electricity, thermal, or transportation). It also includes information about the potential lead organization for each strategy, potential partners, and implementation timeframe (1-2 years, 3-5 years, or 5-10 years).



	Tool / Strategy	Description	Sector(s)	Lead	Partners	Timeframe
Energy Efficiency	Benchmarking Ordinance	Require building owners of certain sizes or in certain districts to report energy use data to the City.	Electricity, Thermal	City of Keene	Business community, large energy users	1-2 years
	Home Energy Labeling Program	Require energy efficiency disclosure for existing and new residential properties at the time a property is listed for rent or sale.	Electricity, Thermal	City of Keene	Association of Realtors, NEEP	1-2 years
	Weatherization Program	Partner with existing weatherization programs to enhance public outreach and education, amplify impact, and increase capacity.	Electricity, Thermal	ECC/ City of Keene	SCS, Eversource, Keene Housing	1-2 years
	Complete Streets Program	Incorporate the adopted City of Keene Complete Streets Design Guidelines (2015) into the City's street standards for new streets, and develop Complete Streets standards for re-construction of existing streets.	Transportation	City of Keene	SWRPC, MAST, BPPAC	3-5 years
	City Express Bus	Increase financial support for the City Express and Friendly Bus programs, and encourage HCS to expand services/routes.	Transportation	HCS	City of Keene, SWRPC	3-5 years
	Multi-Modal Transportation Center	Work with community partners to construct a multi-modal transportation center in Keene and promote inter-city transit options.	Transportation	City of Keene	SWRPC, Greyhound, HCS	5-10 years
	Advocacy for Public Transportation & Active Transportation	Advocate at the federal and state level for more funding to support public transportation and active transportation.	Transportation	ECC/City of Keene	MAST, MRCC	1-2 years
Renewable Energy	Community Power Program	Establish a Community Power Program to aggregate community load and purchase electricity from an alternate electricity supplier.	Electricity	City of Keene	Cheshire County, Other towns	1-2 years
	Virtual Power Purchase Agreement	Enter into a long-term, fixed price contract for renewable energy from a specific project (i.e. agree to a contract for differences, or CfD).	Electricity	City of Keene		3-5 years
	Pilot Battery Storage Program	Collaborate with Eversource to provide a pilot batter storage program for residents and businesses to reduce demand on the grid during peak times.	Electricity	Eversource	City of Keene	3-5 years
	Renewable Energy Loans	Partner with a local financial institution to create a loan product to finance renewable energy installations targeted at businesses or residents.	Electricity, Thermal	Financial Institution(s)	City of Keene	3-5 years
	Solar & EV Ready Guidelines	Adopt Solar & EV Ready Guidelines to encourage new buildings to be built in a way that accommodates future solar installations.	Electricity, Thermal, & Transportation	City of Keene		1-2 years

	Tool / Strategy	Description	Sector(s)	Lead	Partners	Timeframe
Fuel Switching	Heatsmart Campaign	Host a “Heatsmart” campaign to encourage the installation of renewable thermal technologies for space heating and cooling or for hot water heating through targeted local out-reach efforts and bulk discount prices.	Thermal	ECC / Community Volunteers	City of Keene, Local contractors	1-2 years
	Public EV Charging Stations	Install public EV charging stations (level 2 and fast-charge) in on-street parking areas and in public parking lots or structures.	Transportation	City of Keene	Eversource	1-2 years
	Electric Buses	Work with the Keene School District/local school bus company and HCS (City Express and Friendly Bus) to encourage switch to electric buses.	Transportation	First Student / HCS	SAU 29	5-10 years
	Advocacy for EVs and Alternative Fuel Vehicles	Advocate at the federal and state level for more funding to support EVs and other alternative fuel technologies.	Transportation	ECC/City of Keene	MAST	1-2 years
	Renewable District Heating system	Commission a study to assess the potential for a renewable district heating system in Keene to understand what areas of the city would have the appropriate demand characteristics to justify a district energy system, as well as what local renewable sources are available and at what potential and likely cost.	Electricity (co-generation), Thermal	City of Keene		3-5 years

## Endnotes

- 1 Clean Energy New Hampshire North Country Circuit Rider Program (Accessed 2020).  
[www.cleanenergynh.org/north-country-energy](http://www.cleanenergynh.org/north-country-energy)
- 2 Southern Maine Planning & Development Commission - Regional Sustainability and Resilience Program (Accessed 2020). [https://smpdc.org/sustainability\\_resiliency](https://smpdc.org/sustainability_resiliency)



# Carbon Cash-Back: A Climate Change Solution

**What is it?** Put a steadily increasing fee on fossil fuel production and imports based on their climate pollution, give all the money collected to all households on an equal basis, and use border carbon adjustments to protect US jobs and strongly encourage all other countries to match our carbon price. This enables the market to run more efficiently by leveling the playing field, benefitting producers and consumers and addressing the third-party harm.

**Why do it?** Climate pollution is real. Carbon Cash-Back is the most cost-effective way to reduce climate pollution, a fair way to compensate the third party being harmed by the pollution (all of us) and protect US jobs, and a powerful way to address the risk from other countries' climate pollution. The costs of ignoring the problem are already high, and will grow enormous over time on our current slow path of moving to renewable energy.

**Is it a tax?** No, it's not a tax because the government doesn't keep the money or control how it is spent. All the money collected (minus administration costs) is given to all households on an equal basis each month in compensation for damages from the pollution for which the money is being collected. This cash-back dividend also protects household purchasing power.

**Is it income redistribution?** No, there is no means-testing. Everyone begins to pay for the costs to society of the pollution they are responsible for. Everyone gets an equal share of all the money collected for the pollution in compensation for the damages to them from that pollution. Two-thirds of all Americans will break even or get more money in their cash-back dividend than they pay in higher prices because their carbon footprint is average or below average. Those who pollute more will pay more instead of being subsidized by others as happens now, because the pollution is free.

**Who is behind this solution?** Nearly all US economists, and leaders from both parties who agree a bipartisan, effective, and fair policy to address a market failure is a good thing for Democracy and their constituents. See the "Carbon Cash-Back" page on our website for references, and the video at the bottom of the page for many Conservative and Liberal voices in favor of this solution.

**Speak up about climate solutions to ensure that we use good ones!** Subsidies, incentives, regulations, or ignoring the conclusions of science and paying to adapt to problems are all far more expensive and less comprehensive. Some policies are complementary to carbon pricing, and we'll need those too.

Learn more at: [carboncashback.org](http://carboncashback.org)

**From:** [Mari Brunner](#)  
**To:** [Mari Brunner](#)  
**Subject:** FW: Carbon Cashback - Dec. ECC meeting  
**Date:** Tuesday, November 24, 2020 1:12:27 PM

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**From:** Marge Shepardson <>  
**Sent:** Tuesday, November 24, 2020 8:07 AM  
**To:** Mari Brunner <mbrunner@ci.keene.nh.us>  
**Cc:** Chuck Weed <>; Ann Shedd <>; Councilor Terry Clark <>  
**Subject:** Re: Carbon Cashback - Dec. ECC meeting

Hi Mari,

I'm not sure what to include as background. I think a link to the C3 website and a copy of the Resolution might be a good idea.

<https://sites.google.com/view/carbon-cashback-coalition/>

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"New Hampshire Resolution to  
Take Action on Climate Pollution

We the town of (YOUR TOWN) hereby call upon our State and Federal elected representatives to enact carbon pricing legislation to protect New Hampshire from the costs and environmental risks of continued climate inaction. To protect households, we support a Carbon Fee and Dividend approach that charges fossil fuel producers for their carbon pollution and rebates the money collected to all residents on an equal basis. Enacting a Carbon Cash-Back program decreases long-term fossil-fuel dependence, aids in the economic transition for energy consumers, and keeps local energy dollars in New Hampshire's economy. Carbon Cash-Back has been championed by US economists (Jan 17, 2019 WSJ) as the most effective and fair way to deliver rapid reductions in harmful carbon emissions at the scale required for our safety.

We expect our representatives to lead in this critical moment for the health and well-being of our citizens and for the protection of New Hampshire's natural resources upon which we all rely.

The record of the vote approving this article shall be transmitted by written notice to (YOUR TOWN)'s State Legislators, to the Governor of New Hampshire, to (YOUR TOWN)'s Congressional Delegation, and to the President of the United States, informing them of the instructions from their constituents, by (YOUR TOWN)'s Select Board, within 30 days of this vote."

Marge



On Mon, Nov 23, 2020 at 1:15 PM Mari Brunner <[mbrunner@ci.keene.nh.us](mailto:mbrunner@ci.keene.nh.us)> wrote:

Hi All,

The December ECC agenda will be going out this week. Is there any background information that you would like me to include in the packet related to the Carbon Cashback legislation? If so, please send it to me by tomorrow (if possible).

Thank you,

Mari

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