

ISSUE PAPER SERIES



# NYS Climate Policy Implications: A Tug Hill Housing Analysis

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NEW YORK STATE TUG HILL COMMISSION

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### Introduction

New York State has adopted an assortment of policy directives related to climate change, stemming from the 2019 Climate Leadership and Community Protection Act (CLCPA or Climate Act),<sup>1</sup> which amended the narrower 2014 Community Risk and Resiliency Plan (CRRP).<sup>2</sup> The CLCPA required that a Scoping Plan<sup>3</sup> be developed to further expand on the climate policy outlined in the CLCPA. The regulations, incentives, and policy elicited by the Climate Act will inevitably affect the lives of nearly every New Yorker in a variety of ways.

Residents of the Tug Hill region of New York will face many of the same challenges as their fellow New Yorkers, and some unique circumstances in their interaction with the latest New York regulatory landscape and energy transition. Tug Hill housing is older than the state average and less updated to conform to modern efficiency standards, and new housing is being built at a lower rate than statewide. The sharp real estate and material price increases seen nationwide have also impacted the Tug Hill region, putting additional pressure on the housing market and residents in a region with median poverty levels and an average income well below the state average. Home heating sources also differ from NYS at large in that the majority of the region's residents do not have access to municipal natural gas hookups, and so rely more heavily on alternative heat sources such as fuel oil, propane, electric, and wood. Within the core forest region of Tug Hill, wood heat is the most common home heating strategy. The CLCPA, Scoping Plan, and resulting legislation, mandate that new homes be built fossil fuel free starting in 2026 and use a combination of directives and incentives to drive the transformation of existing housing to be more energy efficient.

The CLCPA and related efforts have the common goal of decarbonizing New York's economy to mitigate the state's ongoing contributions to climate change. The Scoping Plan outlines a path where New York saves money overall by creating resiliency and mitigating damaging effects of climate change such as extreme heat, sea level rise, more extreme storm events, decreasing snow cover, and ocean acidification.

This paper gathers statistics on key elements of the housing stock in the Tug Hill region and distills relevant elements of the CLCPA and related NY climate policy in order to provide a clearer picture of the path that Tug Hill residents will face in order to conform to state directives and take advantage of state financial incentives.

### Age of Housing Stock

The age of housing on Tug Hill varies by geographical location, county, and style of home. In this section, we will specifically look at the age of homes by county. This data was collected from various sources and is specific to municipalities within the Tug Hill regional boundary.

For Jefferson County, the data came from the county Real Property parcel records<sup>4</sup> which classified which year homes were built. This set of data was organized into 50-year time blocks starting in the year 1750. There were 120 homes constructed between 1750 and 1800. Between 1801 and 1850, there were 2,114 homes constructed. From 1851 to 1900 there were 6,070 homes built, which is the second highest number of homes constructed during the 50-year time frames. From 1901 to 1950, there

were 4,667 homes constructed. Between 1951 and 2000, there were 11,280 homes constructed, which was the largest number of homes constructed within the 50-year time frames. After 2000, 5,584 homes were constructed, which is the third largest number of homes constructed during one of the time periods, however, this last time frame is much shorter than the others.

In Lewis County, data for the age of homes within the region came from the Census Bureau<sup>5</sup> and a housing study done<sup>6</sup> by Lewis County. This data is not consistent in terms of time intervals. There were 4,933 houses built in 1939 or before which is the largest number of home constructions out of any of the time periods. From 1940 to 1959 there were 1,639 homes constructed. Between 1960 to 1979, there were 2,815 homes constructed. Between 1980 to 1999, there were 4,005 home constructions which is the second largest number of home constructions by time period. From 2000 to 2013, there were 1,871 homes built, and after 2014, there were 201 homes built.

For Oswego County, the data came from the county Real Property parcel records<sup>7</sup> and is organized into 50-year blocks starting in 1750. From 1750 to 1800, there were 110 homes constructed. From 1801 to 1850, there were 1,377 homes built. From 1851 to 1900, there were 8,078 homes constructed, which is the second highest number of homes constructed during a time period. From 1901 to 1950, there were 6,739 homes built which is the third highest number of home constructions during one of the time periods. From 1951 to 2000, there were 18,136 homes built, the largest number of constructions by time period by a significant amount. Lastly, after 2000, there have been 4,638 new homes built in the region.

In Oneida County, the data came from the Census<sup>8</sup>, which was pulled out individually town by town to use data specifically within the Tug Hill region. The data was organized into 20-year time blocks beginning with 1939 or earlier. According to the Census, there were 3,736 homes constructed in 1939 or earlier which is the third largest number of homes constructed by time period. From 1940 to 1959, there were 2,281 homes built. From 1960 to 1979, there were 3,992 homes built which is the second largest number of homes built by time period within the data. From 1980 to 1999 there were 4,359 homes built, which is the largest number of homes built by time period according to the data. From 2000 to 2019, there were 2,170 homes built and in 2020 or after, there have been 27 homes built within the region.

The data shows the bulk of housing on Tug Hill is more than 50 years old, which makes sense as the housing pressure on Tug Hill is not very high. However, this may present an issue, which would be adapting older homes to newer building codes and standards. Upgrading older houses may be an expensive endeavor to meet modern standards and to achieve energy efficiency in a home. In an area where incomes are typically below state average<sup>9</sup>, the feasibility of broadly making existing Tug Hill residences nearly as efficient as new build CLCPA standards is unlikely with the current conditions.



### Housing Occupancy Types

Housing demand and development pressure for residential structures have been mostly steady within the region in the recent past. Housing sales seem to have a cyclical nature with more home sales

happening in the summer months and fewer home sales happening in the winter. This depends on location within the region, and the development conditions of the area. Broader housing market conditions also play a role in the demand for housing within the region as people decide whether it is a buyers' or sellers' market. This section will look at housing patterns within the region as they relate to the number of home sales, average sale price, types of houses sold, and other information relevant to the CLCPA goals.

### Home Sales and Average Prices

Looking at home sales within the four counties that comprise Tug Hill, it is difficult to look only at the parts of the counties within the region. However, the countywide housing market analysis can still be useful in gaining insight into general trends of the county, and in turn, relating those trends to market conditions seen in the Tug Hill region in recent years.

According to Redfin, which shows housing market trends for specific locations, there are similarities and differences between the counties' housing markets. In 2019,<sup>10</sup> the median sale price of a home in Oswego County was around \$80,000 and in 2023, the median sale price was about \$130,000, which is about a 62.5% increase over 5 years. In Lewis County,<sup>11</sup> the median sale price of a home in 2019 was about \$110,000 and in 2023 was about \$170,000, which is a 54% increase over 5 years. In Jefferson County, in 2019,<sup>12</sup> the median sales price of a home was about \$135,000 and in 2023 the median sale price was about \$190,000, which is about a 40% increase over 5 years. In Oneida County,<sup>13</sup> the 2019 median sales price was about \$125,000 and in 2023 the median sale price of a home was about \$175,000, which is about a 40% increase over 5 years. This data indicates a dramatic increase in the cost of housing within the region since early 2020.

For the number of homes sold year on year, there is variation between the counties. Although the number of homes sold fluctuates often, there is a typical baseline rate of homes sold per month that can be averaged from the data. In Oswego County,<sup>14</sup> over the past five years, the highest number of homes sold in a month was 45 in April of 2022 and the lowest number of homes sold in a month was seven in April of 2023. On average, when looking at the yearly cycle of home sales, 19 homes were sold per month in Oswego County over the last 5 years. In Lewis County,<sup>15</sup> the highest number of homes sold in a month was 33, which happened in December of 2020 and November of 2021. The month with the lowest number of homes sold in the past five years was March of 2019. On average, about 18 homes are sold per month in Lewis County. In Jefferson County,<sup>16</sup> over the past 5 years, the month with the lowest number of monthly home sales was February of 2019 with 63 and the month with the highest number of home sales was October of 2021, where 179 homes were sold. Looking at the average number per month over the past 5 years, there seems to be an average of 100 home sales per month in Jefferson County. In Oneida County,<sup>17</sup> the month with the highest number of home sales was 243 in December of 2021, while the month with the lowest number of home sales was February of 2023 with 94 homes sold. Looking over the past 5 years, on average, there were about 150 homes sold per month in Oneida County.

### Affordable Housing Feasibility

Home sales, number of new builds, price trends vs income trends

To understand how affordable housing is for renters in the Tug Hill region, we can look at the percent rent burden of a renter.<sup>18</sup> Rent burden is the percentage of a renter's monthly income that is spent on housing. In the region, the town with the highest rent burden is Western at 61.5% of monthly income being spent on rent, and the lowest is Florence at 8.2%. It is important to note that housing across Tug Hill varies in age and size, and depending on the population profile of the town, income levels also vary. The average rent burden in the region is 35.38% of a renter's monthly income going towards rental housing costs.

Another tool to determine how affordable housing is across Tug Hill is looking at vacancy rates among the total housing stock.<sup>19</sup> In the region, the highest vacancy rate was 9% in both the towns of Constantia and Vienna. The lowest vacancy rate was 0.9% in West Turin. The average percentage of total housing stock that is vacant across the region is 2.65%. If we take the census estimates for total regional households which is 46,323 homes, and apply the 2.65% to that, there are an estimated 1,228 vacant homes in the Tug Hill region. One possible explanation for the large number of vacant homes may be affordability. Another possible explanation may be the transient nature of soldiers at Fort Drum, in the northern part of the region. Another possible explanation may be the many summer homes, camps, tourism rentals, and seasonal use residential structures.

### Averaged Median Income by County (within the region)

County	Average Median Income (\$)
Jefferson County, New York	64,510
Lewis County, New York	60,793
Oswego County, New York	64,132
Oneida County, New York	67,373

### Percentage of People whose Income in the last 12 months is below the Poverty level by County (within the region)

County	% of Poverty
Jefferson County, New York	12.8
Lewis County, New York	11.1
Oswego County, New York	12.7
Oneida County, New York	9.1

## Home Heat Sources in the Tug Hill Region

American Community Survey<sup>20</sup> data was used to estimate the average primary home heating source in the Tug Hill region. In referencing this data, it is important to remember that it refers only to primary heat sources, and that some homeowners may underreport some sources such as wood for insurance premiums or other considerations. Additionally, common secondary heat sources, such as wood, are not accounted for in this data. Data was analyzed for individual towns, individual portions of the four counties within the region, the entire region, and the core forest region. Home heat sources varied across counties with fuel oil, natural gas (utility gas), and propane generally making up the top three heating sources, as seen in figure 1. Jefferson County (Fig. 2) stood out with electric heating being the second most used heating source, and fuel oil being fourth. Oswego County (Fig. 3) had a larger percentage of homes heated with propane than other counties at 31%. In Lewis County, wood heat was the second most common home heating source, followed by natural gas, and propane (Fig. 4). Oneida County differed from other counties in its outsized use of fuel oil, at 43%, and wood heat tying with natural gas for third and fourth most common heating options. For context, the total number of homes in the Tug Hill data set was 45,100, with 10,954 homes in Oswego County, 10,440 homes in Jefferson County, 7,132 homes in Lewis County, and 16,574 homes in Oneida County.

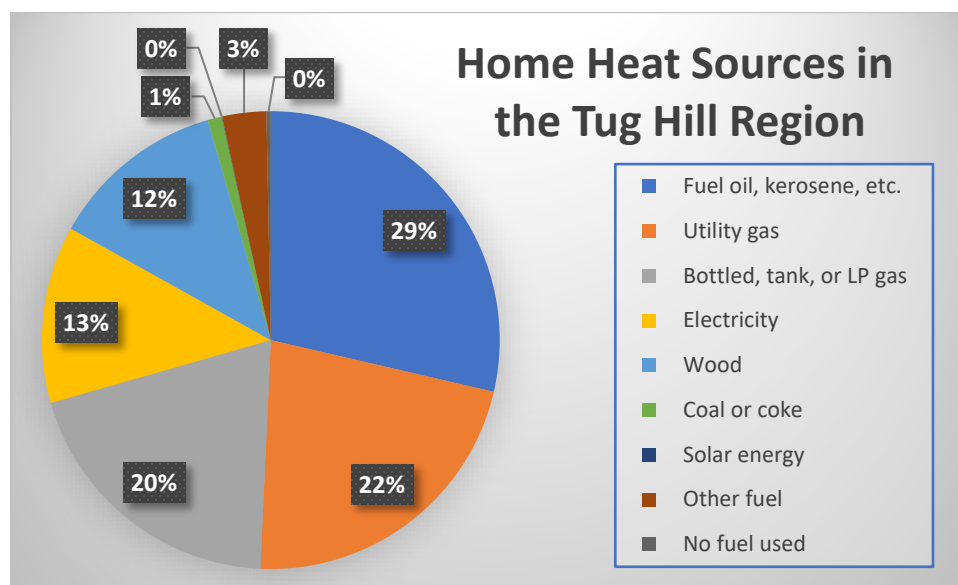


Fig. 1. Primary home heat sources in the Tug Hill region according to the 2022 American Community Survey 5 Year Estimates<sup>20</sup>.



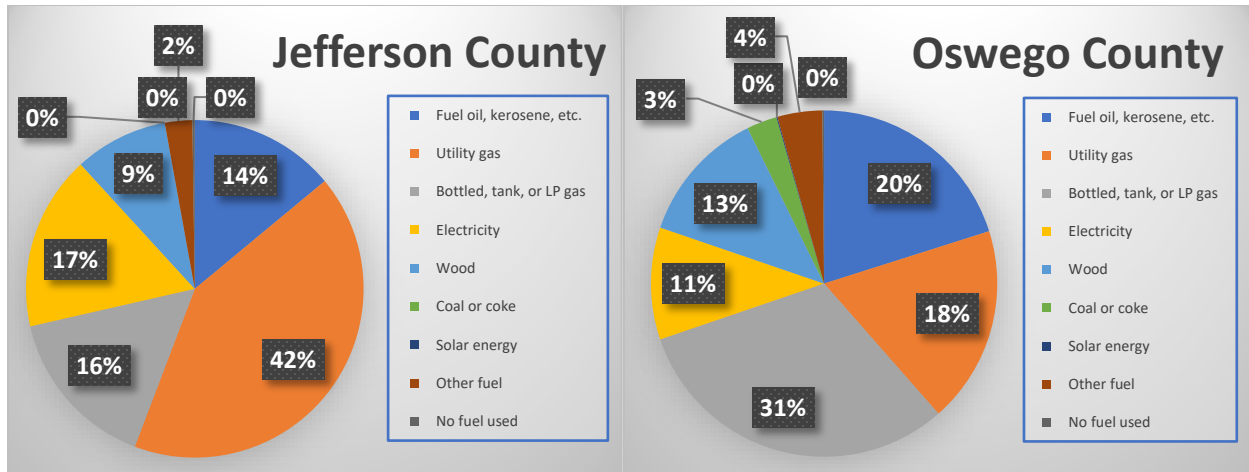


Fig. 2. Primary home heat sources in the Jefferson County portion of the Tug Hill region according to the 2022 American Community Survey 5 Year Estimates.<sup>20</sup>

Fig. 3. Primary home heat sources in the Oswego County portion of the Tug Hill region according to the 2022 American Community Survey 5 Year Estimates.<sup>20</sup>

1. Fuel oil, kerosene, etc.
2. Utility gas
3. Bottled, tank, or LP gas
4. Electricity
5. Wood
6. Coal or coke
7. Solar energy
8. Other fuel
9. No fuel used

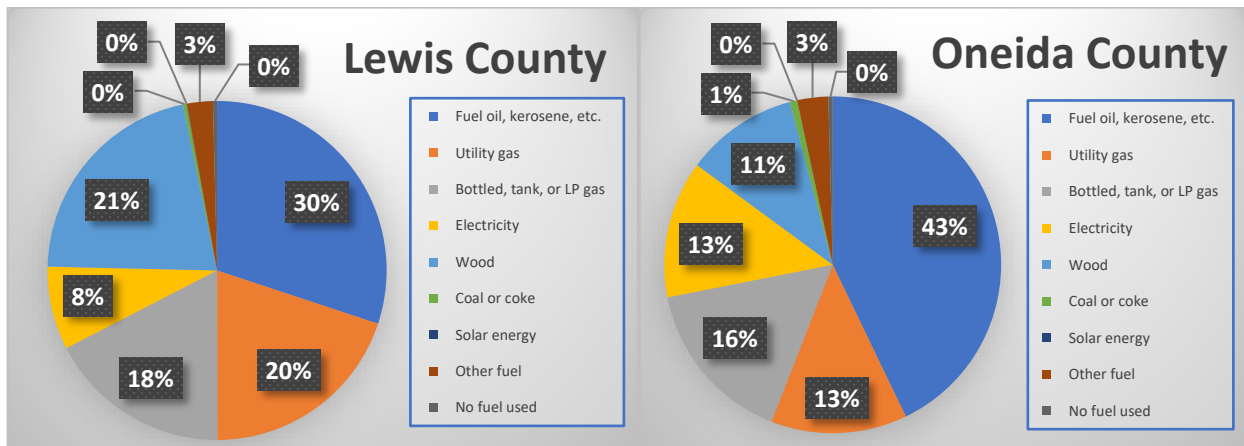


Fig. 4. Primary home heat sources in the Lewis County portion of the Tug Hill region according to the 2022 American Community Survey 5 Year Estimates.<sup>20</sup>

Fig. 5. Primary home heat sources in the Oneida County portion of the Tug Hill region according to the 2022 American Community Survey 5 Year Estimates.<sup>20</sup>

1. Fuel oil, kerosene, etc.
2. Bottled, tank, or LP gas
3. Utility gas
4. Electricity
5. Wood
6. Coal or coke
7. Solar energy
- Other fuel
- No fuel used

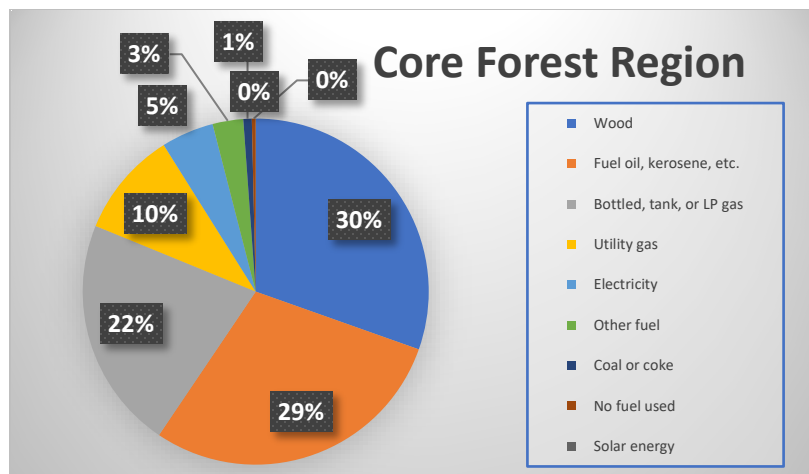


Fig. 6. Primary home heat sources in towns containing portions of the Tug Hill core forest region, according to the 2022 American Community Survey 5 Year Estimates.<sup>20</sup>

Towns containing portions of the Tug Hill core forest are defined here as the towns of Boylston, Lorraine, Redfield, Osceola, Montague, Worth, Martinsburg, Turin, West Turin, and Lewis. Figure 6 demonstrates the stark differences in home heating sources depending on the area within the Tug Hill region. In the core forest, the most common primary heat source is wood, followed by fuel oil, and propane. Utility gas, making up 10% of the heating mix, is relegated almost entirely to the towns of Martinsburg and West Turin. This trend is apparent elsewhere in the data set, with larger, peripheral towns such as Watertown, Hastings, and Lowville, among others, representing the bulk of residents relying on natural gas.

### What is the CLCPA?

The New York State Climate Leadership and Community Protection Act (Climate Act), signed into law in July 2019, amends Environmental Conservation Law, Public Service Law, Public Authorities Law, Labor Law, and the Community Risk and Resiliency Act. The purpose of the Climate Act is to adopt measures to put New York on a path to reducing statewide greenhouse gas emissions by 85% percent by 2050 and net zero emissions in all sectors of the economy, through the development of a scoping plan, which was released in 2022. The Scoping Plan cites the Intergovernmental Panel on Climate Change which states that, “substantial reductions in GHG emissions will be required by midcentury in order to limit the global average increase in temperature to no more than 2°C (and ideally 1.5°C), thus minimizing the risk of severe impacts from climate change.”<sup>21</sup> The Scoping Plan cites climatic changes that are currently and will continue to affect the lives of New Yorkers such as warming ocean and air temperatures, rising sea levels, decreasing snow cover, and more intense heat waves and storm events.

### How much money is the state investing?

New York State’s investment in the clean energy transition totals over \$35 billion for renewable energy and transmission projects, \$6.8 billion to reduce emissions from buildings, \$1.8 billion for the solar build-out, \$1 billion for clean transportation initiatives, and \$1.6 billion in NY Green Bank commitments.<sup>21</sup> The Scoping Plan states that the cost of inaction exceeds the cost of action by more than \$115 billion, due to effects such as improved air quality, more energy efficient homes, and reduced societal damage caused by climate change.<sup>21</sup> NYS also aims to leverage federal funds from the Inflation

Reduction Act (IRA), the Bipartisan Infrastructure Law, and the Chips and Science Act to offset NYS expenses.<sup>21</sup>

### *What are the principal goals of the Climate Act?*

The goals of the Climate Act are: (1) greenhouse gas emissions reduction, (2) renewable energy development, (3) improved energy efficiency, (4) a clean energy economy, and (5) resilient and distributed energy systems.

The Climate Act<sup>21</sup> requires that:

- 70% of statewide electricity come from renewable energy sources by 2030 (70x30)
- The State achieve a zero-emission electricity system by 2040 (100x40)
- 40% reduction in statewide GHG emissions from 1990 levels by 2030
- 85% reduction in statewide GHG emissions from 1990 levels by 2050
- Net zero emissions statewide by 2050
- 6,000 megawatts (MW) of distributed solar by 2025
- 3,000 MW of energy storage by 2030
- 9,000 MW of offshore wind by 2035

The Scoping Plan anticipates annual electricity demand will more than double by 2050. New and upgraded transmission and distribution systems will be needed statewide, including specific transmission and distribution investments that will be necessary to deliver energy from where generation is located (both upstate and offshore), to where the load demand exists. Land-based wind and solar, offshore wind, hydropower, fuel cells that use renewable fuels, and energy storage are all essential parts of the energy transition.<sup>21</sup>

The 100x40 goal requires 15 gigawatts (GW) to 45 GW of electricity from zero-emission, dispatchable resources in 2040 to meet demand and maintain reliability (new tech, storage, or nuclear).<sup>21</sup>

### *Job Transition and Climate Justice*

The CLCPA and Scoping Plan estimate that the clean energy transition will create at least 211,000 jobs by 2030, primarily in sectors such as construction, professional services, manufacturing, and supply chain, with the opportunity to export renewables technologies to other states. The Scoping Plan also highlights climate justice requirements, including that Disadvantaged Communities receive a minimum of 35%, with a goal of 40%, of the benefits of spending on clean energy and energy efficiency programs in the areas of housing, workforce development, pollution reduction, low-income energy assistance, energy, transportation, and economic development.<sup>21</sup>

## Where We Need to Go- Requirements of the CLCPA

### All Electric Buildings Act

The All Electric Buildings Act was passed within the 2023-24 NYS budget.<sup>22</sup> That act mandates that starting in 2026, most new buildings will be required by law to be fully electric, instead of relying on fossil fuels.<sup>22</sup> Cooking stoves will need to be electric, as well as home heating units and other appliances. The prohibition starts in 2026 for new buildings up to 7 stories tall, except for commercial and industrial buildings larger than 100,000 square feet.<sup>23</sup> In 2029, new buildings of all sizes will be required to be fossil

fuel free, with some key exceptions for sectors such as manufacturing facilities, commercial food establishments, laundromats, hospitals, crematoriums, wastewater treatment facilities, emergency backup power, agricultural buildings, manufactured homes, car washes, other medical facilities beyond hospitals, and critical infrastructure including emergency management facilities.<sup>22</sup> The law also allows for existing fossil fuel systems to be replaced, and for new buildings to have standby/backup fossil fuel-based systems. According to the Scoping Plan, by 2030 the majority of new purchases for space and water heating will be heat pumps, with one to two million homes and 10% to 20% of commercial space using them by 2030. The Plan also aims for 85% of homes and commercial buildings to be electrified by 2050 using a combination of heat pump and thermal energy technologies.

Importantly for Tug Hill residents, wood heat is not mentioned or restricted in the Scoping Plan or All Electric Buildings Act.

### Home Energy Efficiency and Weatherization

The Scoping Plan outlines a variety of measures NYS will take to reduce fossil fuel usage and increase the energy efficiency of existing housing and building stock. Firstly, the state will adopt zero-emission codes and standards and require energy benchmarking for buildings.<sup>21</sup> This will require new buildings to be constructed to highly efficient standards, along with being fossil fuel combustion free. The Scoping Plan recommends equipment standards that require existing buildings to transition to modern technologies such as heat pumps when replacing aging equipment, but there is not yet legislation requiring that.

The second strategy outlined in the Scoping plan is a large increase in public financial incentives, and access to public and private low-cost financing with the goal of hastening market wide adoption of weatherization, electrification, and additional energy efficiency and resiliency upgrades.<sup>21</sup> Some funding will specifically target Low and Moderate Income (LMI) households, public housing, and disadvantaged communities. 250,000 housing units each year will need to adopt electric heat pumps and energy efficiency/weatherization measures to meet the goals of the CLCPA. NYS is also continuing to transition away from hydrofluorocarbons used in refrigeration, HVAC, and insulations, and emphasizing the transition to zero-emission vehicles.<sup>21</sup>

## How do we get there?

### Cost of renovations

Referring to the housing data, the majority of Tug Hill housing is over 30 years old and there are relatively few new homes being built in the region. It is more likely that renovations to older homes will be more common than new construction. The CLCPA and other policies mentioned within this paper do not require upgrades to be made to existing homes, only to new buildings. However, to give an idea of what it would cost to complete these upgrades and renovations on existing homes within the region, we can look at the average costs of certain housing elements and compile estimations to help put into perspective the monetary value of current and proposed home energy policies.

### Weatherization

Weatherization is the first, and often most affordable and easiest step towards more energy efficient homes. Weatherization seeks to reduce the amount of energy needed to heat and cool homes,

supply hot water, and provide lighting. Steps such as air sealing, insulating, installing energy efficient appliances, and replacing outdated lighting can be taken. Weatherization must be done before large energy efficiency upgrades such as a heat pump.

### Heating/cooling

One consideration for heating and cooling a home would be the home heating source. A traditional furnace, heat pump, woodstove, and other methods are all possible heating technologies. For the purpose of this paper, the prices of the following home supplies and building supplies are current as of the time of publishing but will be subject to future price fluctuations.

A potentially more efficient alternative to a traditional furnace would be a heat pump. A heat pump is more expensive costing on average \$20,000-\$30,000 to install a fully house wide new system.<sup>24</sup> A key point to emphasize is that a house should be weatherized before the installation of a heat pump. The costs of removals, new work necessary to set up the heat pump, and labor are all considerations. The average dollar amount spent on electricity in Watertown is about \$150<sup>25</sup> per month and about \$170 in Syracuse.<sup>26</sup> Residential electricity costs will increase for homes that switch to heat pumps, along with smaller cost decreases when steps are taken to adhere to energy efficiency and weatherization recommendations of the state. Modern cold-climate air source heat pumps can provide reliable heat down to -15°F to -20°F.<sup>27</sup>

### Windows

More energy efficient windows could also be part of a renovation of an existing house to reduce emissions in the spirit of the CLCPA. The price of upgrading a home's windows will vary widely depending on the size, thickness, material, and other characteristics of the home itself.

### Roofs

A new roof is also a possible upgrade for existing homes. More specifically, a more energy efficient roof to allow for ventilation in the summertime and the maintenance of heat in the wintertime. According to the U.S. Department of Energy,<sup>28</sup> "A cool roof is designed to reflect more sunlight than a conventional roof, absorbing less solar energy. This lowers the temperature of the building just as wearing light-colored clothing keeps you cool on a sunny day." The reduction of heat absorbed through the roof can decrease demand for air conditioning, can extend the life of the roof due to a more tolerable temperature, and can reduce overall energy costs.<sup>29</sup> Funding for roofing repair is very limited, and a sound roof may be a requirement for other weatherization upgrades.

### Plumbing

Plumbing can be another expense when renovating an existing house and in the event of installing an energy efficient system, can cost slightly more. According to Forbes, the average cost of a plumbing system installation costs about \$6,000. Again, additional costs could apply here as well, as varying prices depend on which system and at what size is being installed.<sup>30</sup>

### Gas Stove or Electric Stove

Gas stoves are to be phased out and replaced with electric stoves over time beginning in 2026 applying to certain new buildings, as mentioned previously in the paper. For an existing house with a gas stove, we can look at the replacement cost and compare the two. Overall, the cost of a gas stove or an

electric stove is relatively the same depending on the model.<sup>31</sup> There are differences due to the lack of flame, slower cool down period, and more. A small additional expense can be the installation of a 250-volt, 40-50 amp receptacle that is generally required to plug in an electric stove with either a 3-prong or 4-prong outlet.<sup>32</sup>

### Funding Sources

There are many home improvement programs that incentivize homeowners and contractors to upgrade their homes to reflect energy efficiency upgrades. Some of these programs apply to renters as well. One program is the Weatherization Assistance Program under the division of Housing and Community Renewal. According to the website, the Weatherization Assistance Program “is one of the largest residential conservation programs in the country.”<sup>33</sup> The overall goal of the program is to reduce heating and cooling costs, as well as hot water and lighting usage by providing funding for installation of more energy efficient systems. There are eligibility requirements and an application to receive the funding for this program which vary by size of household.<sup>34</sup> Accounting for all four counties in their entirety, assuming a 4-person household, and using income estimates from the Census, about 100,000 households would likely be eligible to apply for this program. Another program comes from the IRS Energy Efficient Home Improvement Credit.<sup>35</sup> This program grants a tax credit for qualified energy-efficient improvements made by a homeowner for up to \$3,200. There are many requirements to qualify and as mentioned, the improvements must be qualified to receive this tax credit. The HEAP (Home Energy Assistance Program) Program is another example of a funding program for home heating and energy upgrades. This program funds projects in households that meet income requirements. For a four-person household, the household income must be under \$5,838 per month. There are many programs within HEAP such as a cooling benefit, heating benefit, heating equipment repair and replacement benefit, and a clean and tune benefit. There is also the NYS Clean Heat program which can help provide information about the different types of heat pumps, also offering rebates and financing options, as well as tax credits.<sup>36</sup> One last example is the EmPower+ program which is a core NYSERDA program that provides assistance to low to middle income New Yorkers to make energy upgrades to their homes.<sup>37</sup> There is a low-income threshold and a moderate-income threshold that vary by County. In the four counties that include Tug Hill, the low-income threshold for a four person family is \$70,000 and the moderate-income threshold for a four person family is greater than \$70,000 but less than \$93,000. For those who qualify, energy efficient upgrades are evaluated by a contractor, and then completed. There are additional funding opportunities offered through federal programs such as the Inflation Reduction Act (IRA). IRA funding is currently making its way into state programs, and additional funding opportunities for market rate customers are expected to come late this year or early next year. Many incentive of the incentives mentioned above could be significantly enhanced with this funding.

### Challenges

Some challenges that the region will face for residents to decarbonize and make energy efficiency improvements include availability of trained contractors, and affordability of upgrades. Many areas in the United States are facing a labor crunch, often exacerbated by demographic declines in rural areas like the Tug Hill region. The need for trained contractors in this region faces two headwinds; retraining the workforce to apply residential green technology, and sourcing enough skilled labor in a tight labor market. There is a critical need for additional contractors to complete basic home repairs and

upgrades, and to install clean energy technologies. Workforce development programs will be essential to filling this gap.

As referenced on page five, the average median income in the region ranges from \$60,793 in Lewis County to \$67,373 in Oneida County, significantly lower than the NYS median income of \$81,386. Between the costly upgrades and the increased cost of electricity, the region will face challenges in its transition to electricity. However, it is important to remember that the Tug Hill region has lower real estate values and cost of living than many other areas in the state. Nonetheless, when confronting the high costs of renovations and upgrades outlined earlier in this paper, many residents will likely rely heavily on various forms of state and federal assistance in order to meet energy efficiency goals set by the state.

A large portion of Tug Hill's housing stock is aging and has not been remodeled to include efficient and modern components, such as roofs, siding, insulation, windows, electrical, and plumbing. This presents a significant barrier to energy efficiency upgrades because homes cannot receive most energy efficiency upgrades until their basic infrastructure has been brought up to date. The energy transition must accommodate both of these housing needs.

Another major challenge of the area is the weather. The remote nature of Tug Hill combined with its harsh winters, makes access to a reliable heating source a necessity. However, electrical infrastructure can be more vulnerable to outages on many parts of Tug Hill, impacting its reliability to provide central heating. Building the electrical infrastructure would likely be more difficult and expensive per capita than other areas of the state due to the low population density, the terrain of the region, and the extensive water and wetlands. Therefore, we see many people on Tug Hill using wood for heating or other alternative heating methods. Additionally, many households currently have backup fossil fuel powered generators and furnaces, or wood stoves, which will continue to be an important piece of the energy transition in order to ensure continuous electrical supply during outages. Bringing reliable and cost-effective electricity to these remote areas will be a challenge.

## Implications and Conclusions

The Tug Hill region's housing stock is relatively old, with most homes not up to modern energy efficiency standards, and few new homes being built in the region. With lower than state average income levels across the hill, there is no indication that the rate of new buildings will increase significantly in the near future. This means that most people will purchase an older home and renovate it to their liking. The gap between older homes and modern energy efficiency standards is wide, and when upgrading to modern energy efficiency standards and building codes, home renovators may run into major problems like lead pipes or asbestos, which could create an environmental hazard or additional expenses. Additionally, the cost of upgrading to more energy efficient systems without any assistance such as grants, or tax credits may not be feasible for many families in the Tug Hill region. The heating methods of many families, as shown in this paper, are wood, fuel oil, natural gas, electric, or propane with a lack of energy efficient, fossil fuel free heating infrastructure across the core of Tug Hill.

This paper aims to help residents, homeowners, and renters understand the reasons and regulations for energy efficiency upgrades and the opportunities that they can utilize to upgrade their homes and offset costs through the many programs that exist. For the residents of Tug Hill, there are

certain feasible opportunities to upgrade energy efficiency within existing houses and contribute to the goals of the CLCPA and reaching a zero-emission status. There are other requirements for new buildings that will be difficult to achieve broadly for existing houses across the unique area of Tug Hill. The balance between practicality and energy efficiency is something that must be worked out by the homeowners of Tug Hill.



## Appendix 1: Census Data

### Total Households per County (within the region)

County	# of Households
Jefferson County, New York	8,347
Lewis County, New York	5,953
Oswego County, New York	12,718
Oneida County, New York	16,241

### Averaged Median Income by County (within the region)

County	Average Median Income (\$)
Jefferson County, New York	64,510
Lewis County, New York	60,793
Oswego County, New York	64,132
Oneida County, New York	67,373

### Averaged Median Income by County (within the region)

County	% of Poverty
Jefferson County, New York	12.8
Lewis County, New York	11.1
Oswego County, New York	12.7
Oneida County, New York	9.1

### Endnotes

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