CITY OF DANVILLE, VIRGINIA ENERGY ACTION PLAN

A Plan for Saving Energy Costs and Creating a Resilient Community

April 2024

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GLOSSARY

Terms	Definition
Co-benefits	Additional benefits to emission mitigation efforts. Co-benefits include, but are not limited to enhanced economy, public health, water and air quality.
Emissions	Production of gases which are harmful to the environment and human health
Energy audit	An assessment of the energy requirements and loss for buildings
Energy consumption	Total amount of energy utilized within a time period.
Mitigation Strategies	Reducing emissions and the severity of greenhouse gases in the atmosphere.
Resiliency	The ability to recover and cope from severe climate events and maintain function.
Task force	A group of key community stakeholders engaged in dialogue and guiding the creation of an Energy Action Plan.

ACRONYMS

Acronym	Definition
ADUs	Accessory Dwelling Units
AEE	Association of Energy Engineers
AFOLU	Agriculture, Forestry, and Other Land Use
BEV	Battery Electric Vehicle
CH4	Methane
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
C-PACE	Commercial Property Assessed Clean Energy
C-SITE	Communities Sparking Investment in Transformative Energy
DERs	Distributed Energy Resources
DOE	Department of Energy
EAP	Energy Action Plan
EPA	Environmental Protection Agency
ESCOs	Energy Service Companies
EV	Electric Vehicle
GHG	Greenhouse Gas
HOA	Homeowners Association
HUD	Housing and Urban Development
ICLEI	International Council for Local Environmental Initiatives
IRA	Inflation Reduction Act
kWh	Kilowatt Hours
LSS	Large Scale Solar
MSW	Mixed Waste
MT	Metric Tons
N2O	Nitrous Oxide
PHEV	Plug-in Electric Vehicle
PV	Photovoltaic
RECs	Renewable Energy Credits
SBT	Science-Based Target
USDA	US Department of Agriculture
VDOE	Virginia Department of Energy
VDOT	Virginia Department of Transportation
VMT	Vehicle Miles Travelled

EXECUTIVE SUMMARY

The City of Danville presents this Energy Action Plan as a pathway for the community to conserve energy, save money, increase energy security and independence, and ensure a more sustainable and resilient community.

In the summer of 2023, George Mason University and the City of Danville agreed to work together to develop an Energy Action Plan. Over the course of the next twelve months, university faculty and students worked with municipality employees to (1) measure and model the municipalities' energy consumption and greenhouse gas emissions, (2) identify and invite key community stakeholders to join a task force, and (3) conduct a series of meetings with the task force to identify Energy Action Plan goals, strategies, and actions.

The municipality seeks to develop and implement this Plan for several reasons. First, residents face higher energy costs and increasing economic burdens when purchasing essentials, such as gasoline, diesel, heating oil, and electricity. Second, residents confront the realities of a changing environment with increased flooding, precipitation, and heat conditions, which have imposed hardships on human health, livelihood, and property damages—and these conditions will continue to increase and worsen in the future. Third, our region has been reliant on external energy resources—from power plants to oil companies—but the means to increase our energy self-resilience and independence exist with local energy technologies and energy efficient practices. And finally, the federal government has created opportunities that will convey significant amounts of funding to shift from costly energy sources to more efficient and clean energy sources, practices, and technologies. This funding is available to local governments. To date, larger urban areas have taken advantage of these funds, but more rural areas in Virginia must also avail themselves of the benefits of these funds.

To access these funds and opportunities, many of the federal and state grant opportunities for local governments require developing and implementing energy and climate action plans. By creating this Plan, Danville best positions itself to receive these benefits. The Energy Action Plan represents a community-driven, transparent, and equitable examination of the municipalities' energy consumption and emissions profile and the means to reduce, conserve, and protect its energy future. This plan represents our goals, strategies, and actions that we hope will assist our community in achieving greater energy savings, independence, and resiliency.

GOALS

Danville has an intermediate goal to reduce our community's greenhouse gas emissions by 50 percent by 2030 (from the base year of 2005). We also have a long-term goal to reach carbon neutrality by 2050. We use greenhouse gas emissions as a proxy to understand and set goals for energy savings and resilience. For every unit of greenhouse gas emissions that we reduce, we conserve energy, reduce costs, and make our community more resilient.

When we examine our community's highest sectors for energy consumption, our modeling reveals that the top energy sectors are:

(1) Residential & Commercial Energy, and
(2) Transportation.
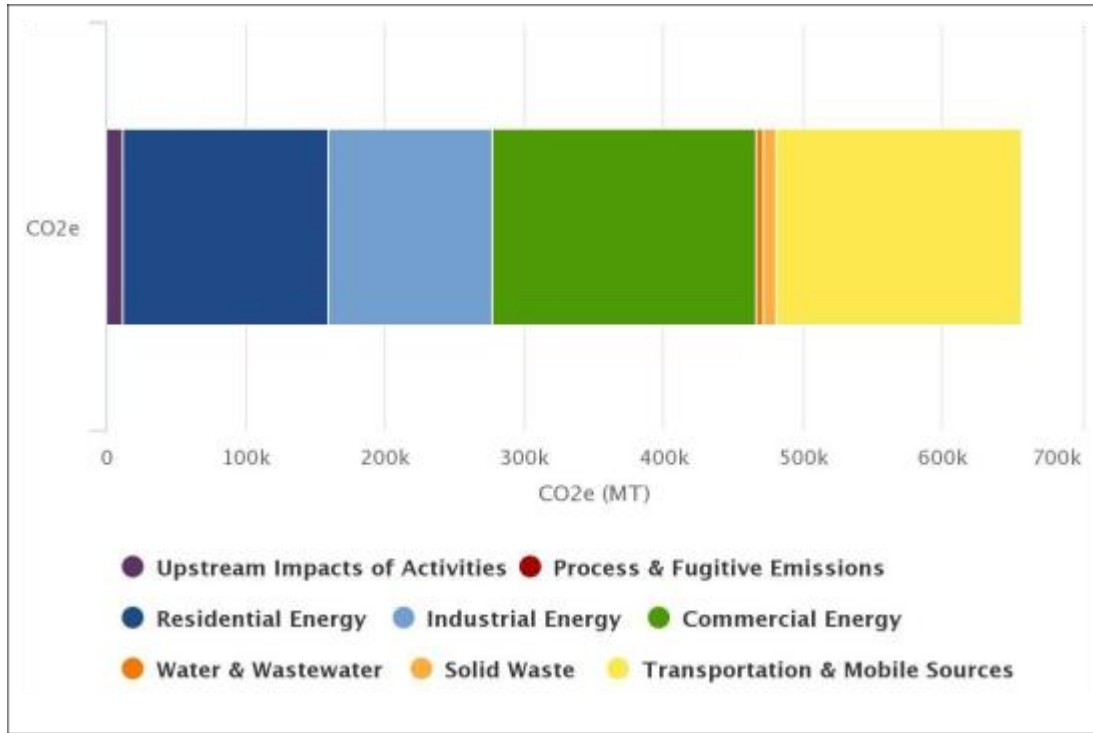
We must address these two sectors if we want to meet our goals. Note, electricity is used by end-use sectors such as homes, businesses, and factories. We must examine consumption and emissions by end-use sector to assist with our understanding of energy demand and changes in energy use over time. Therefore, our Plan will focus on six end-use sectors:

<div align="center">

Buildings
Electricity
Transportation
Water & Wastewater
Solid Waste
Land Use

</div>

We will also touch upon these two additional sector considerations because both are needed to meet our goals.

<div align="center">

Partnerships
Organizational Structure

</div>

STRATEGIES

The community task force selected a set of strategies that will assist with achieving the overall goals of the Plan. The strategies identified below are considered higher level, qualitative descriptions that address the goals of conserving energy, reducing emissions, and enhancing community sustainability and resilience.

STRATEGY: BUILDINGS	
Increase energy efficiency and deploy clean energy technology in existing buildings (residential and commercial).	
STRATEGY: TRANSPORTATION	
Increase alternative forms of transportation.	Increase transition to electric vehicles.
STRATEGY: ELECTRICITY	
Increase transition to clean and renewable energy sources.	
STRATEGY: LAND USE	
Improve management of lands and native trees.	
STRATEGY: WASTE & WASTEWATER	
Improve the quality of waterways.	
STRATEGY: SOLID WASTE	
Reduce the amount of solid waste going into landfills.	
STRATEGY: PARTNERSHIPS	
Develop partnerships with key stakeholders to advance energy efficiency and clean energy projects.	
STRATEGY: ORGANIZATIONAL STRUCTURE	
Create a structure and invest in human resources that assist implementing energy and sustainability initiatives.	

SUB-SECTOR STRATEGIES

The community task force identified strategies for each of the six core sectors that will assist with achieving the intermediate and long-term goals. The sub-sector strategies identified below represent quantitative measures for each core sector.

BUILDINGS	
(1) Retrofit at least 100 residential housing units with cumulative energy efficiency improvements of 25% (existing buildings) by 2030.	(3) Retrofit at least 50 commercial building with cumulative energy efficiency improvements of 30% (existing buildings) by 2030.
(2) Convert 30% of fossil fuel residential building systems (e.g., space or water heaters) to highly efficient electric options (e.g., heat pumps).	(4) Convert 30% fossil fuel commercial building systems (e.g., space or water heaters) to highly efficient electric options (e.g., heat pumps) by 2035.
TRANSPORTATION	
(1) By 2030, the municipality should convert 30% of its publicly owned light-duty internal combustion engine vehicles to plug-in electric vehicles (PHEVs) and battery electric vehicles (BEVs) vehicles.	(3) Community: Increase PHEVs/BEVs to at least 12% of all light-duty vehicle registrations by 2030.
(2) By 2030, the municipality should convert 30% of its publicly owned medium and heavy-duty vehicles to PHEV/BEV or other clean vehicle technology (e.g., propane, natural gas).	(4) Community: Reduce 15% of passenger vehicle miles traveled by shifting to active or public transport (e.g., biking, walking, or taking the bus) by 2030.
ELECTRICITY SECTOR	
Transition 40% of the electricity used in the municipality to clean energy sources (e.g., solar, wind, hydropower, nuclear, and geothermal) ahead of Virginia's Renewable Portfolio (state law requires 45% renewable in 2035).	
SOLID WASTE	
Divert 40% of solid waste produced in the city (e.g., recycled, composted, reused) by 2030.	

ACTIONS

The community task force identified the following <u>high-priority</u> actions for the core sectors, which will assist with achieving the overall and sub-sector goals (medium and low priority actions are included in Chapter 3). In selecting actions, the community task force was guided by six principles: effectiveness, cost savings, feasibility, equity, co-benefits, and consistency with government plans.

BUILDINGS	
(1) Survey residents and businesses about a rebate program for converting to more energy efficient practices and technology (for example, heat pumps, insulation, storm windows, or solar water heaters and panels). Specifically, determine the amount of rebate that would motivate maximum participation. After the survey, provide recommendations on how to proceed with a rebate program.	(2) Evaluate how to best reuse or repurpose existing buildings into more energy efficient buildings through zoning changes, such as new mixed-use retail, or residential and community buildings. After evaluation, provide recommendations on how to best proceed with this plan. Include zoning recommendations in the City's Comprehensive Plan.
(3) Create an information clearinghouse for residents and businesses about tools, technology, and incentives for installing and using energy efficiency and clean energy technologies and practices. Clearinghouse should focus on conveying actual experiences from residents and businesses. See comments section below about contents of the information clearinghouse.	
TRANSPORTATION	
(1) For publicly owned vehicles, purchase electric vehicles (replace existing internal combustion vehicles), for both light-duty and heavy-duty applications, when the vehicle has reached its normal life expectancy and is scheduled to be replaced.	(2) Prepare a plan for future deployment of EV charging stations in public spaces, and when appropriate implement this plan.
(3) Evaluate and plan to expand or create new bike lanes and pathways connecting homes to businesses. After evaluation, provide recommendations on how best to proceed.	
ELECTRICITY	
(1) Work with a private solar company developer to survey and inventory all public buildings for solar PV potential (for example, roof measurements, shade analysis).	(2) Identify best management practices, from other jurisdictions, for installing solar on public buildings.
(3) Encourage and provide information to the public about Community Solar Projects. Identify and address any challenges with advancing this opportunity.	(4) Create permit fee and property tax reductions and other incentives for solar PV installations.
(5) Deploy an electricity demand reduction program to reduce energy usage at peak times (or work with third party company to do this).	
LAND USE	
(1) Support the adoption of a long-term plan for more sustainable development (for example, green zoning plans for energy and water-efficient buildings, multi-family and mixed use, and transit-oriented development). This includes expanding public parkland and	(2) Streamline and clarify the process to achieve planting of native tress, food forest tree plantings, green landscapes, and managing non-native plants. Identify clear lines of government authority and processing. Identify challenges or obstacles and provide recommendations to overcome these.

establishing natural green space guidelines in community planning.	
WASTE & WASTEWATER	
(1) Educate and inform residents about green infrastructure solutions for water conservation (natural or nature-based approaches such as constructed wetlands, rain gardens, and vegetation buffers).	(2) Identify and promote best management practices to reduce harmful run-off of pesticides and chemicals into waterways.
(3) Create a partnership with local university/college students and community members to create citizen-scientists trained in monitoring the health of waterways and identifying any water quality issues. Ensure lines of communication exist between students/community members and government.	
SOLID WASTE	
(1) Conduct a feasibility study on food composting program (residents and businesses; drop off or curbside pick-up).	
PARTNERSHIPS	
(1) Contact the Chamber of Commerce and the Virginia Extension Program to develop partnerships with the local business community to encourage and facilitate energy and resilience-oriented practices and mentorship. Include business representatives on energy/climate committee (see Organizational Structure below).	(2) Partner with local universities and colleges to seek state and federal grants to build the capacity and train the energy efficiency and renewable energy workforce of the future.
(3) Create a local green certification program to recognize local businesses and adopt the Virginia Green Schools program. The program should recognize those businesses that use energy efficiency measures and clean energy technology.	
ORGANIZATIONAL STRUCTURE	
(1) Create an energy and climate committee comprised of residents who are appointed and empowered to provide advice and recommendations to the City's leaders.	(2) Hire a Sustainability Specialist who will serve as the point person on all energy, climate, and resilience issues.

CONSISTENCY WITH COMPREHENSIVE PLAN

The City of Danville Comprehensive Plan 2030 provides the foundation and framework to help guide and base decisions on the City's future. Its purpose is to "encourage the continued development of a safe and healthy community by offering a distinctive "vision" for the continued growth of Danville." At a high level, the comprehensive plan has three themes: (1) rebuilding and expanding the economic base; (2) redeveloping older parts while protecting historic character and natural resources; and (3) proving public safety and maintaining quality of life. All three fit squarely withing the energy sector paradigm. The energy sector presents a prevailing and omnipresent component of our lives. We need energy to fuel our vehicles, heat and cool our homes, and cook our food. Yet, energy and its contributions to our climate also raise the risks of increased flooding, precipitation, and heat events, which affect our health and quality of life.

The Energy Action Plan is consistent with the goals of the City of Danville Comprehensive Plan 2030 in the following areas:

Comprehensive Plan Goals	Energy Action Plan
Sustainable Growth & Land Use: encourage well-planned development/redevelopment opportunities for new businesses and residents while at the same time protect the historic, architectural, cultural, and natural environment of Danville.	See Chapter 3, Buildings (Actions 2, 3), Electricity (Actions 1-7), Land Use (Actions 1-2), Waste & Wastewater (Actions 1-2), Solid Waste
Transportation: ensure that the location, character, and capacity of the City's existing and future transportation facilities are supportive of sustainable growth and enhance the City's livability and economic vitality.	See Chapter 3, Transportation (Actions 1-8)
Housing & Neighborhoods: promote opportunities for a wide variety of housing types in the City by adaptive reuse, redevelopment, and new development through sustainable and well- planned new development.	See Chapter 3, Buildings (Actions 1-4).
Economic Development: support and promote the City's existing economic base while actively recruiting other economic development opportunities in the areas of basic industry; advanced manufacturing; technology; sustainable/green energy, automotive.	See Chapter 3, Partnerships (Action 1), Buildings (Actions 1,3), Transportation (Action 4), and Electricity (Actions 3,4)

At the time of this report, the City of Danville is updating their Comprehensive Plan. It is recommended that the new Comprehensive Plan reflect the strategies and implementation goals of this Energy Action Plan.

MEETING GOALS

If Danville takes no additional concrete actions to reduce emissions ("Business as Usual"), it will emit over 590,000 metric tons of CO2 equivalent annually by 2030. The graphic below depicts emission reductions based on Danville implementing the *measurable* actions recommended by its task force. In this scenario, Danville will reduce almost 55,000 metric tons of CO2 equivalent by 2030, but this is short of its 50% reduction target which would require an additional 100,000 metric tons of CO2 equivalent reductions. It is important to note that this graphic only depicts the results of actions that can be measured by models. There are many actions, such as education, that can result in more emission reductions but simply cannot be modeled. If Danville implements all of its recommended actions, the City may meet both the intermediate and long-term goals.

Projected CO2e Values With Reductions Applied
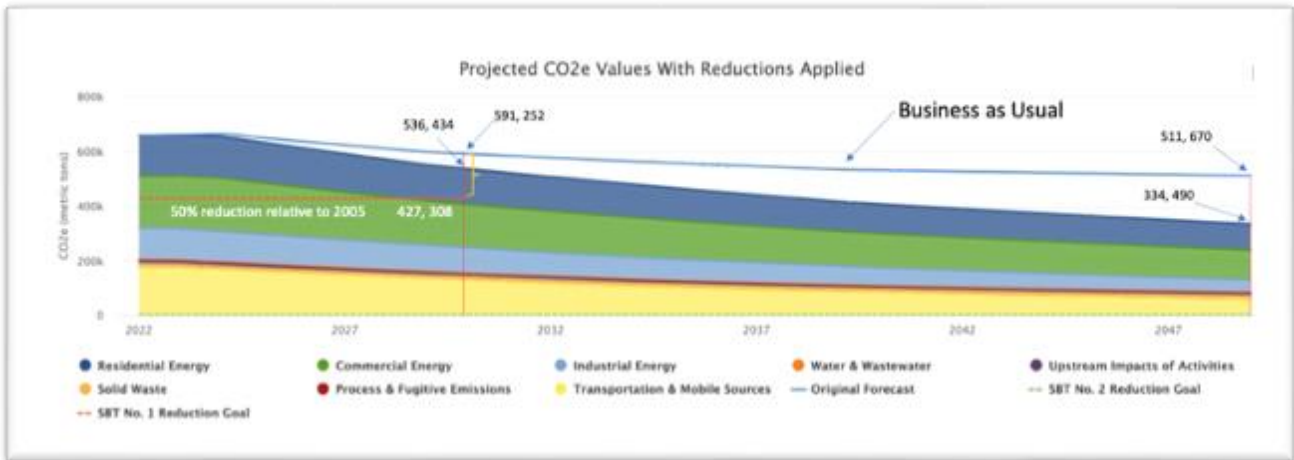
CHAPTER 1 – INTRODUCTION

An energy action plan examines the sources of a municipalities' energy consumption and seeks to reduce this consumption, and in turn, reduce emissions of greenhouse gases. Within a municipality, energy is consumed from various end-use sectors, such as buildings, electricity sector, transportation, land use, water and wastewater, and solid waste. Each has its own means of consuming energy, and therefore each presents unique opportunities to reduce this consumption and emissions.

The first step in building an energy action plan involves understanding the current energy consumption levels in the municipality for each of the sectors identified above. For every unit of energy consumed, a unit of greenhouse gases is emitted. The use of greenhouse gases serves as a metric to understand the communities' energy and sustainability profile. This is accomplished by obtaining and analyzing data on energy use throughout the community. This data provides an inventory of past and current consumption, and most importantly, allows for projecting future scenarios involving reduction (mitigation) techniques and practices. This data is translated into a community profile to illustrate the main areas of energy consumption, which are important when prioritizing energy strategies and actions. For example, if the model finds that the transportation sector produces 10 tons per year of energy-related greenhouse gas emissions and the municipalities' goal is a 50% reduction, then the municipality will want to implement actions that reduce these emissions by half, or 5 tons per year. Thus, the municipality models greenhouse gas emissions to understand its current baseline, develop goals and strategies based on this baseline, and ensure and evaluate progress by reevaluating emissions.

Reducing energy consumption, and by extension greenhouse gas emissions, are important to ensure that Danville has a sustainable and resilient community. We want our citizens to save money on energy, and we also want our community to live in a more sustainable and resilient place. This requires reducing energy consumption. We are aware of the changes in our environment, from increased precipitation, flooding, and extreme heat days. By reducing our energy consumption, we are saving money and making our community a more comfortable and livable place.

Energy Action Plan: Development Process

GHG Modeling

To accurately calculate emissions for Danville, Virginia, George Mason University utilized the ICLEI Local Governments for Sustainability, USA ClearPath model and followed the protocol for a Community-Wide Greenhouse Gas Inventory. Energy consumption, solid waste and water treatment characteristics are attributed to greenhouse gas emissions and were included in emission calculations. Utility providers supplied energy consumption data for buildings within Danville, Virginia. Non-utility energy consumption was retrieved from state and federal databases. This data was entered into the ICLEI ClearPath calculators to quantify emissions. The U.S. Community Protocol and the Danville GHG Inventory Memorandum provide general and specified information regarding the 2022 Danville Community-Wide Greenhouse Gas Inventory.

Community Meetings

George Mason University worked with Danville government officials to identify community members to serve on a task force. The community task force members were selected based on their ability to represent diverse community needs, backgrounds, and professional experience. George Mason University approached each prospective member and reviewed the project goals and task force obligations.

The community task force met over four weeks in February 2024, meeting on consecutive Fridays for two hours per meeting. Each meeting was in-person, with some task force members appearing via video. These meetings were open to the public and held in the City Municipal Building. In addition to task force members, there were some students from Averett University attending these meetings as well. The first two meetings focused on educating and exchanging information on key terminology, greenhouse gas models, energy mitigation strategies, and the results of the municipality greenhouse gas inventory. The community task force was provided with a binder of information that consisted of the goals and process, examples of guiding principles, examples of other municipality energy actions plans, and case studies on energy mitigation actions. The mitigation case studies and greenhouse gas modeling were developed by university students under faculty supervision. The mitigation case studies provided detailed information on potential energy reduction actions, strategies, and policies in each of the core sectors. The case studies also provided objective information on the action's effectiveness, cost, feasibility, equity, and co-benefits. The greenhouse gas modeling is discussed in detail in Chapter 2.

The latter two meetings were designed to facilitate community task force discussion on selecting actions that would assist the municipality in achieving its goals. Community task force members reviewed case studies and engaged in structured analytic techniques and dialogue to identify the recommended action items, priority status (high, medium, low, not a priority), and time frame for implementation (1 year, 2-3 years, 4+ years, continuous). Community task force members engaged in dialogue amongst themselves and interacted with local government officials. The meetings were recorded, and draft reports of the recommended action items were approved by both community task force members and local government officials.

Guiding Principles

Community task force members were given an opportunity to identify which principles should guide their decision making on their recommended actions. The guiding principles were then used to evaluate each potential action item. The guiding principles selected are:

Effectiveness

- The recommended action meets the goals of energy savings and efficiency and reducing greenhouse gas emissions.

Costs, Economic Benefits, & Savings

- The recommended action has a positive impact on the local economy and employment. State or federal funds and financing are available to implement this action. Citizens, businesses, and/or the government will likely save money.

Feasibility

- The recommended action can be implemented by the municipal government (currently or soon). The municipal government has control over this action or can advocate for policies that support the action. Consider availability of financing and return on investment.

Equity

- The recommended action ensures (or can be designed to ensure) equitable distribution of benefits to all parts of the community (e.g., for low and middle-income citizens).

Co-Benefits

- The recommended action provides benefits beyond energy savings and emissions reductions to the community, such as public health, quality of life, economic gains, social benefits, or other environmental benefits.

Consistency

- The recommended action is well integrated with established community plans and policies or should be included in such plans and policies.

CHAPTER 2 – MUNICIPALITY GREENHOUSE GAS EMISSIONS

A community greenhouse gas (GHG) inventory is a systematic and comprehensive assessment of all GHG emissions produced within a specific community or geographic area. This inventory provides a detailed account of the sources and amounts of greenhouse gases released into the atmosphere because of human activities within the community of Danville.

Key elements of a Community GHG inventory include:

1. **Emission Sources:** Electricity, Transportation, Solid Waste, Water and Wastewater, AFOLU (Agriculture, Forestry, and Other Land Use), Fugitive Emissions, and Grid Loss.

2. **Greenhouse Gasses:** Measurement of different types of greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and refrigerants. The reduction of each gas contributes to resiliency and sustainability.

3. **Data Collection:** Where the data comes from, such as vehicle miles traveled, reports from utility companies, and other relevant factors.

4. **Inventory Period:** The time frame in which the inventory is taking place.

Total Emissions

Across all sectors, Danville produced just over 650k metric tons of CO_2 equivalent (CO_2e) in 2022 (see Figure 1). Rather than comparing various greenhouse gases and their varying Global Warming Potentials (GWP), CO_2e creates a standard measure to compare all GHGs across all sectors.
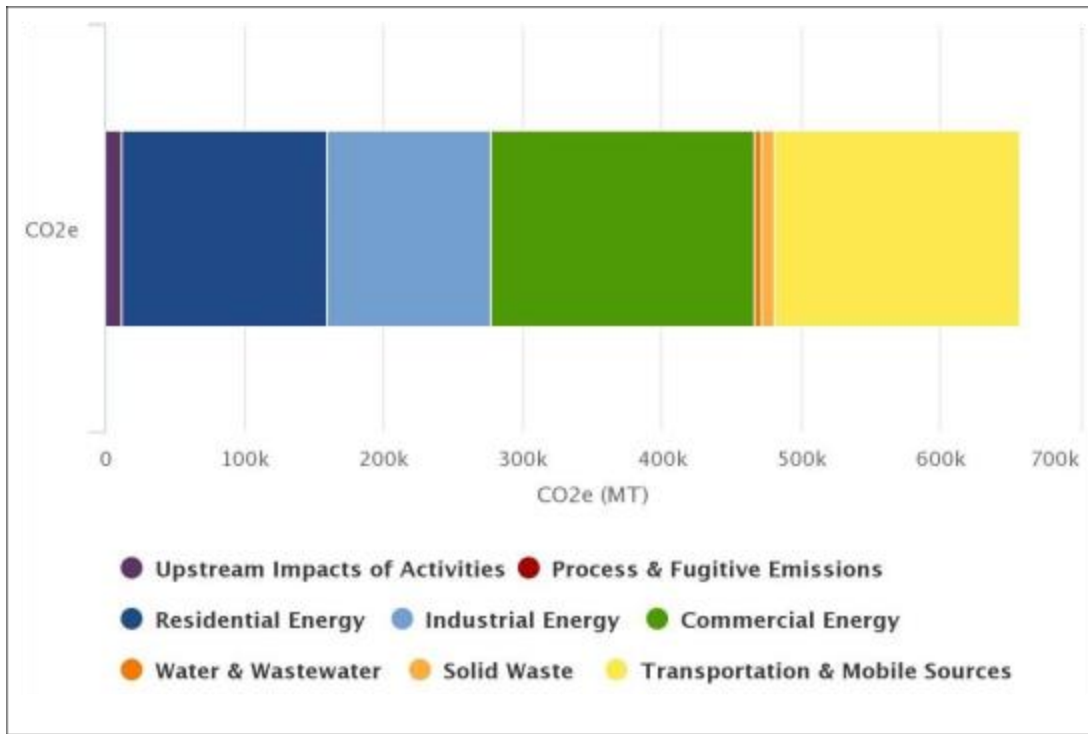
Figure 1: Total CO2 Emissions

Electrical Data

> a. Emission & Generation Integrated Database (eGRID)

To calculate emissions, Danville zip codes were entered into power profiler.com. There are two eGRID regions from which Danville receives electricity. RFCW provides most of the electricity and SRVC supplemented electricity. All emissions are assumed to result from the RFCW region, due to this region providing most of the electricity. While eGRID regions do not always correlate with the locally purchased sources of electricity generation, they do give the most representative cross-section of *dispatched* generation associated with demand loads in their area. Thus, the carbon intensity of electricity generation is geographically associated with demand. All electrical consumption use was duplicated in both eGRID regions, with SRVC indicated as "Information Only", to avoid double counting. The emissions produced by each region were recorded into a factor set for each 2021 SRVC and 2021 RFCW eGRID regions. 2021 eGRID data is the most current data available for the 2022 GHG inventory.

> b. Residential, Commercial, and Industrial

Residential, Commercial, and Industrial electrical consumption data was provided by Danville Utilities for the Calendar year of 2022. Metered usage is the most accurate form of data to measure consumption. The electrical consumption was provided in kWh for each sector.
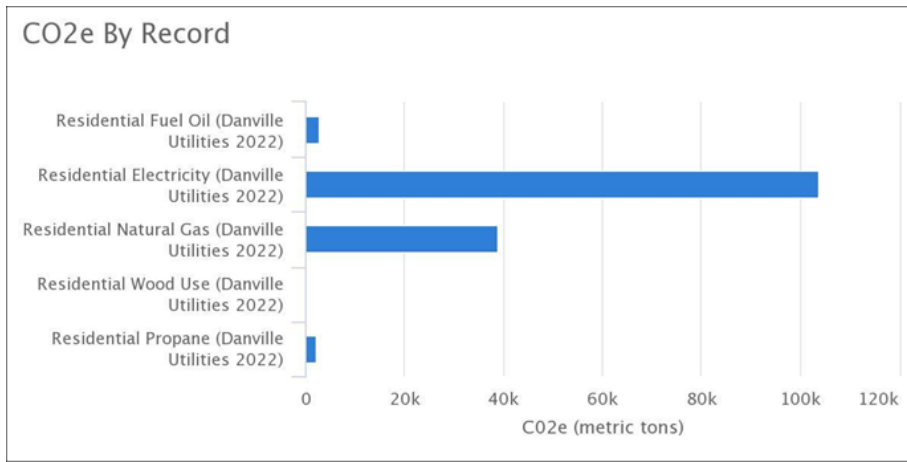
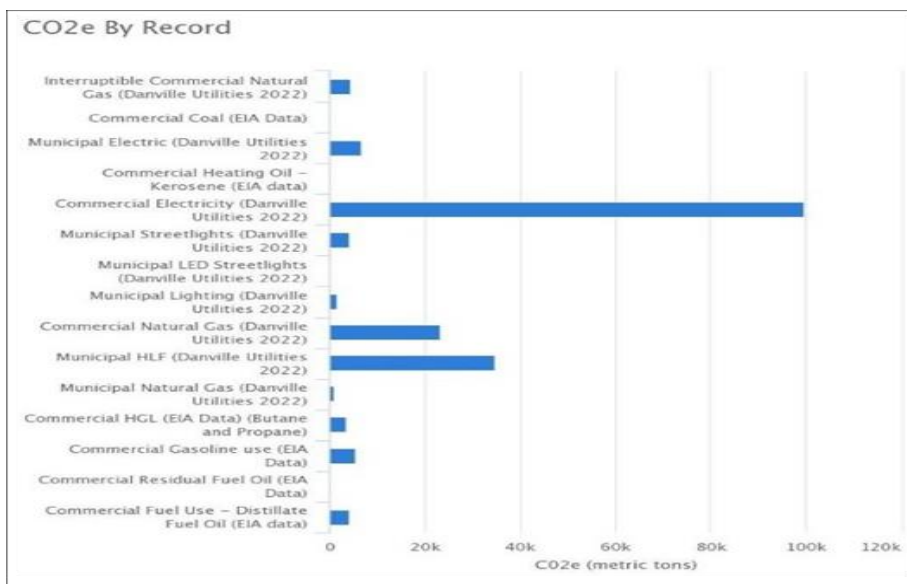Figure 2: Residential Energy - 147,644 metric tons CO2e

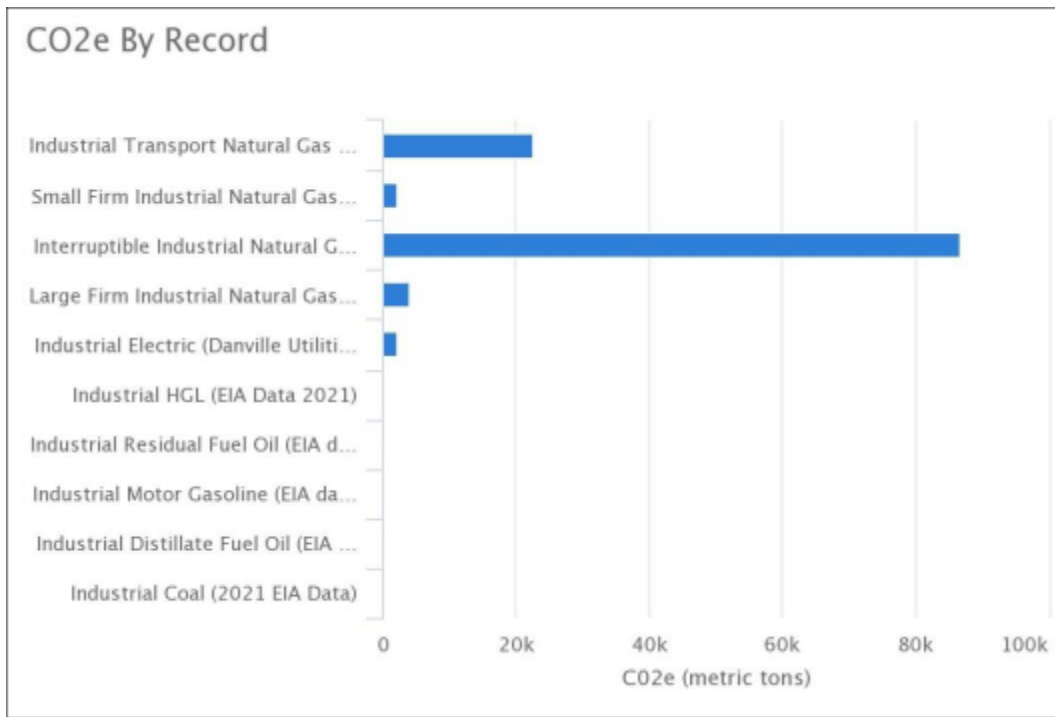Figure 3: Commercial Energy 188,515 metric tons CO2e

Figure 4: Industrial Energy- 117,524 metric tons CO2*e*

    c. Municipal

The municipal sector had several categories, including LED Streetlight, Streetlights, HLF, and Lights. For each category under municipal, kWh consumption was input, and number of fixtures recorded (if available). Since there is no specific sector in ClearPath for Municipal Energy, all Municipal energy is placed under commercial. Note that the electricity used to treat potable water and water treatment was subtracted from municipal power consumption in order to prevent "double counting" the electricity consumed by the city. Those emissions are included under water and wastewater treatment, respectively.

Natural Gas

    a. Residential and Commercial

Data for natural gas was provided by Danville Utilities in therms for each sector, residential, commercial, municipal, and industrial. For residential and commercial, data was simply input according to Danville Utilities' measured consumption for the two sectors. Like electricity, the number of households which utilize natural gas was recorded in residential. The number of commercial businesses which utilize gas monthly was recorded as well. All information was input in the Emissions from Stationary Fuel Combustion.

    b. Industrial

Industrial natural gas was categorized as Industrial Transport, Large Firm Industry, Small Firm Industry, and Interruptible Industry. The data was recorded for each category in therms, as reported by Danville Utilities. All information was input in the Emissions from Stationary Fuel Combustion.

    c. Municipal

Municipal natural gas was reported by Danville Utilities, but the value was not just input into ClearPath. The quantity of natural gas used in water treatment for wastewater and potable waste treatment was deducted from the Municipal natural gas. This prevents "double counting" and overestimating natural gas use. All information was input in the Emissions from Stationary Fuel Combustion.

Non-Utility Fuel Use (Coal, Propane, Butane, Wood, Residual Fuel Oil, Distillate Fuel Oil)

   a. Residential

Data from Danville Utilities natural gas consumption for residential households compared to 2020 US Census Bureau Household heating types to obtain data for non-utility fuels. Since this is federal level data, rather than measured or metered usage, there is potential for variation in CO2e due to reporting and/or estimation errors. While more exact energy usage is not available as it is for utility-provided energy, the Census information *does* provide exact estimates for Danville.

   b. Industrial and Commercial

2021 Energy Information Administration (EIA) data was obtained for Industrial Energy Consumption for the State of Virginia. 2020 State workforce data was compared to city workforce data. A ratio was created by comparing jobs distinguished as Industrial jobs for Virginia, to the City of Danville's Industrial workforce. For each of the fuel types provided by the EIA, the ratio was applied, and assumed as Danville's consumption. 2021 EIA is the most current data available for Industrial and Commercial Energy Consumption. Since this data is state level data, statistics could vary from true values. Since there is no accurate reporting for true consumption values for non-utility fuel types, these values are estimated based on Danville's workforce size and characteristics.

   c. *FLIGHT- GoodYear Tire and Rubber*

For facilities which emit more than 25,000 tons of CO2, the EPA requires reporting to the Facility Level Information on Greenhouse gases Tool. GoodYear Tire and Rubber is the only facility within Danville boundaries which requires this reporting. Fuel oil #6 and natural gas was recorded for GoodYear Tire & Rubber but marked as information only as to not double count the data statistics created from 2021 EIA data. GoodYear Tire & Rubber reports this data to the EPA, which records the information in FLIGHT. The total 2022 CO2e produced from GoodYear Tire & Rubber is 63,538 tons of CO2e.
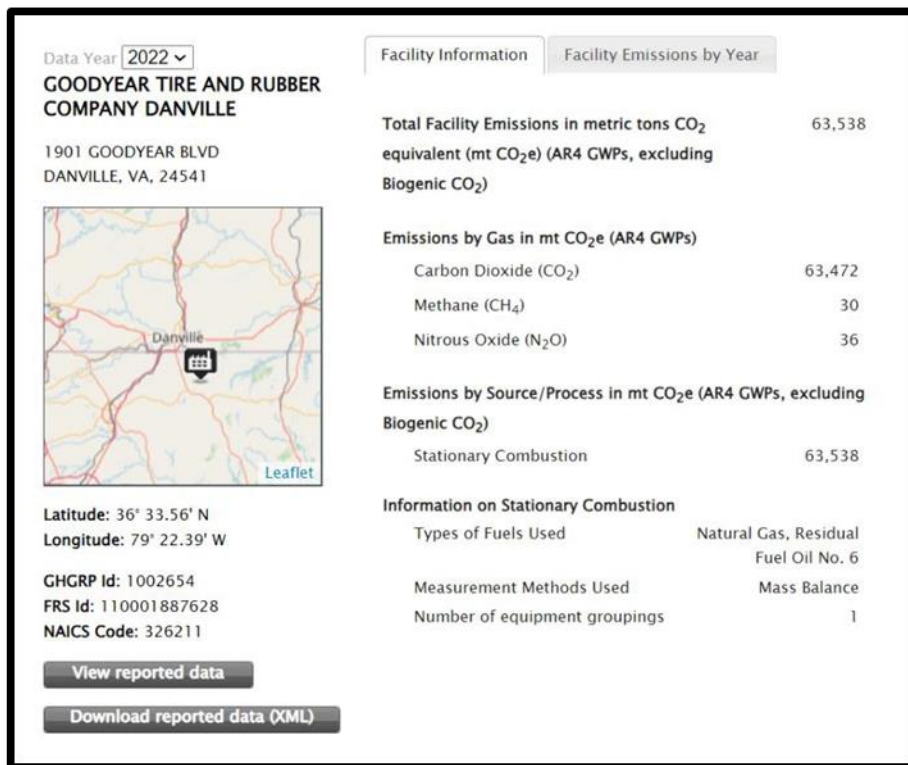
Figure 5. EPA FLIGHT data of GoodYear Tire & Rubber – 63,538 tons CO2e

Transportation

a. Virginia Department of Transportation (VDOT) provided Vehicle Miles Traveled (VMT) for 2021. This file included vehicle types and daily VMT within the City of Danville's boundaries. Annual VMT data for each was input into the ClearPath calculator for On Road Transportation for each category listed below:

    i.   Passenger vehicles were assumed to be all motorcycles, passenger cars, two axle, four tire single unit vehicles, and two axle, six tire single unit trucks. It is assumed, all passenger vehicles are gasoline. Daily VMT for all passenger vehicles was aggregated, then multiplied by 365 to create an annual VMT figure.

    ii.   Freight vehicles are assumed to be three axle single unit trucks, four or more axle single unit trucks, four axle or fewer single trailers, five axle single trailers, and six or more axle single trailers. All freight is assumed to be diesel. All forms of freight vehicles were aggregated, then multiplied by 365 to create an annual VMT figure for Freight.

    iii.   Passenger buses were classified separately in the VDOT report. Daily VMT was multiplied by 365 to create an annual VMT figure for Passenger Buses.

All On Road Transportation calculators included Annual VMT for the year of 2021, travel type (passenger, freight, or passenger bus), and location (within Danville's boundaries). A 2021 factor set was created based on U.S. Department of Transportation (DOT) fuel efficiencies for vehicle type groupings, including passenger

vehicles, light duty vehicles, and heavy duty vehicles. The emissions were calculated based on the Annual VMT for each vehicle type within each category. Due to the absence of exact measured annual VMT for each vehicle make/model, there are likely some slight errors in estimation.

b. Emissions taken directly from EPA Nation Emission Inventory (NEI) tool for off road transportation for the year of 2020. This is the most current available data for the City of Danville's 2022 Community GHG Inventory. Exact and precise emissions are provided for Locomotives, Off-Road Gasoline vehicles, Off-Road Diesel vehicles, and other non-point emission sources. Data is provided by the EPA on a local level. Values for these emissions are not likely to vary from these reported values.

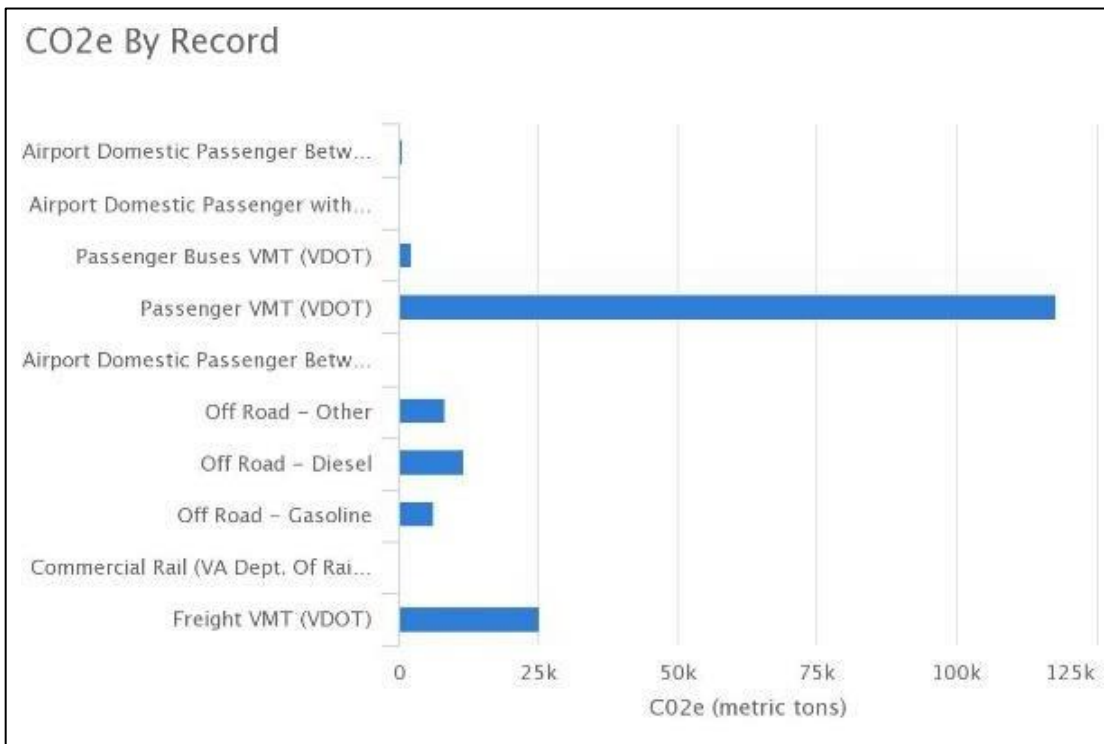c. Airplane data provided by Averett University. The data provided includes fuel types and quantity of fuel used.

CO2e By Record

Figure 6: Transportation- 172,427 metric tons CO2*e*

Solid Waste

Pittsylvania County provided information on the characteristics of the landfill. First Piedmont Corporation provided the weight (tons) of solid waste transported for Danville. The landfill was uncovered (wet), out of boundary, and did not collect methane. These characteristics were entered into ClearPath's Landfilled Waste Calculator which uses a first-order-of-decay (FOD), passive model of emissions determination. Public Works data was input as information only. The weight (in tons) was input into ClearPath and the composition of the waste was entered into a factor set. Both quantity and composition will determine emission. This only includes waste picked up by the city. There is missing data on industrial and commercial waste which is not picked up by the Danville Public Works.

Public Works provided information on weight (tons) of yard waste. The tons of yard waste were entered into the Biologic Treatment of Solid Waste (composting) calculator in Clear Path.
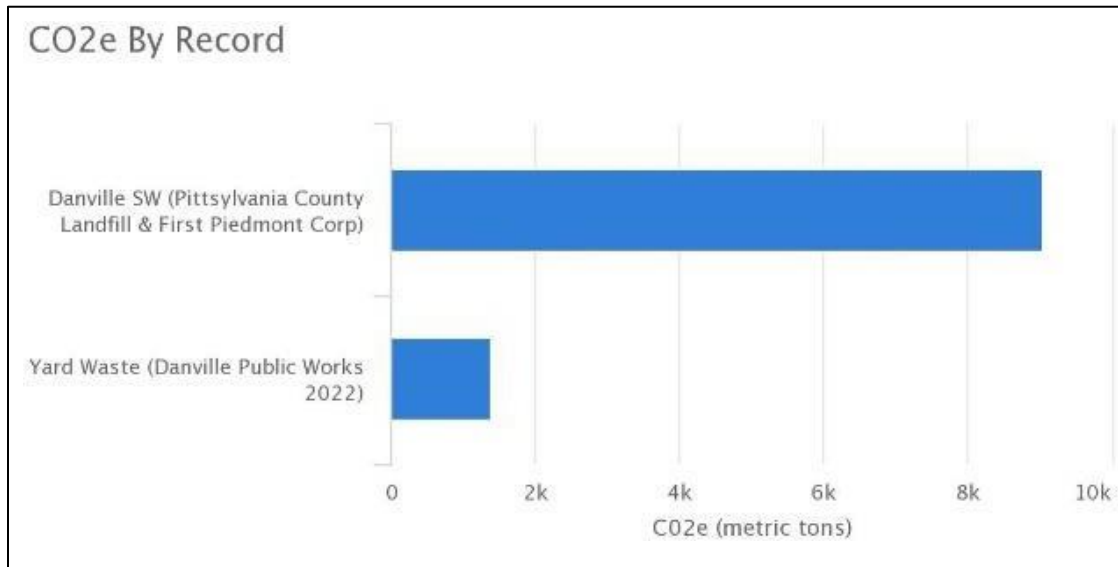

Figure 7: Solid Waste- 10,417 metric tons CO2e

Wastewater and Potable Water

Potable Water and Wastewater characteristics, including electricity and natural gas required for the process was provided by Danville Utilities. The kWh and therms reported from Danville Utilities was recorded in the Emissions from the Supply Potable Water, as well as gallons of water produced. Both values for natural gas and electricity were subtracted from the municipal records.

N2O Effluent Discharge was calculated by entering data into Process N2O from Effluent Discharge.

Characteristics of wastewater facility provided by Danville Utilities. Water treatment was recorded as aerobic and no denitrification processes in place. Wastewater was treated within Boundaries. Wastewater emissions from treatment were recorded by entering N2O Emissions from Wastewater Treatment data. A ClearPath default value of 1.25 was used for Industrial Commercial Discharge Multiplier as the City of Danville treats wastewater for both commercial and industrial sectors.
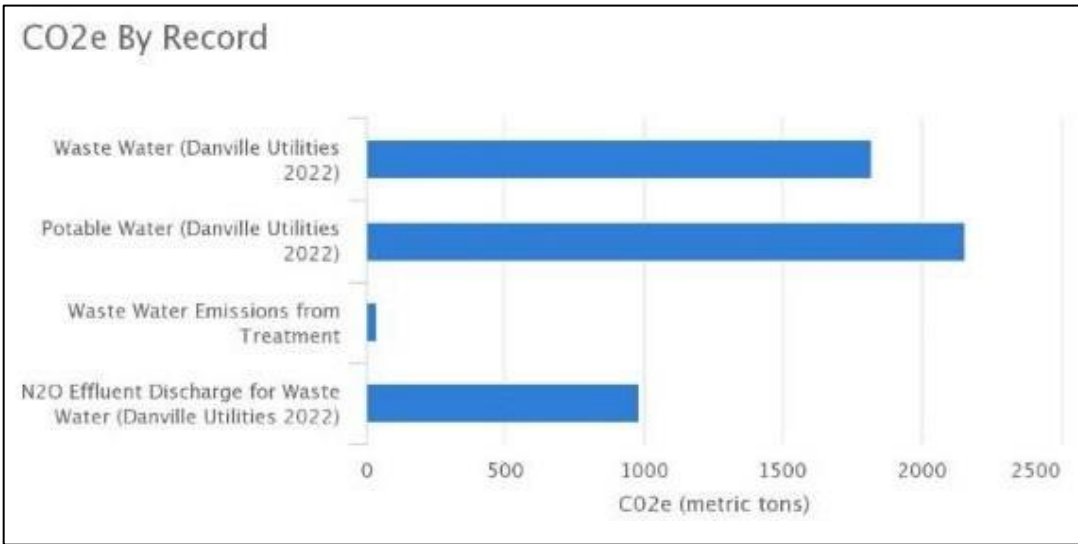
Figure 8: Wastewater and Potable Water- 4,997 metric tons CO2e

Agriculture, Forestry, and Other Land Uses (AFOLU)

LEARN Tool obtained data for the City of Danville from 2013 to 2019. The change in forestry, grasslands, settlement over time was recorded. The change over time in forestry was then compared to the closest city available—Baltimore, MD. The PDF provided from the LEARN Tool provided changes in hectares for each type of forestry change, and CO2 emitted or sequestered. All AFLOU data is entered as "Information Only" for documentation purposes only.

Process & Fugitive Emissions

All of Danville's natural gas was aggregated into one value, and across all sectors. This value was input into the Fugitive Emissions for Natural Gas calculator. Defaults for Leakage rate, Natural Gas density, % methane, and % carbon dioxide were all provided by ClearPath.
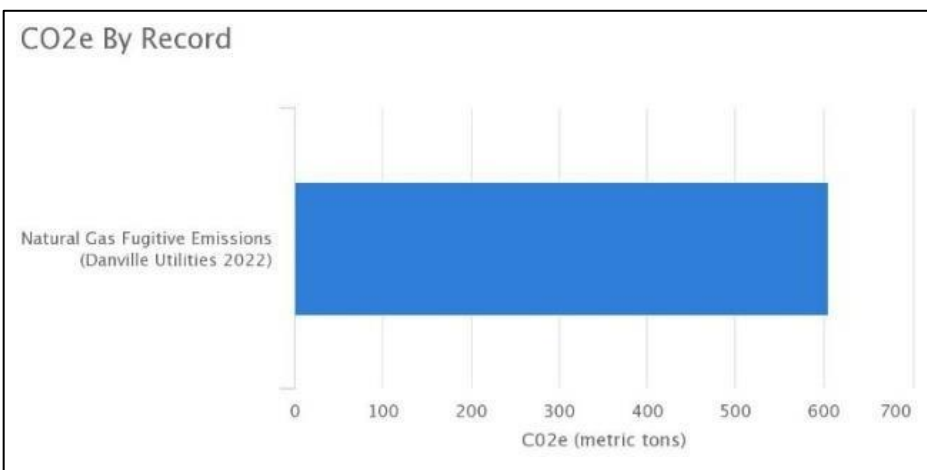

Figure 9: Process and Fugitive Emissions- 605 metric tons CO2*e*

Upstream Impacts of Activities

Each sector which provided electrical data was input into Upstream Impacts Used by the Community calculator. This included electricity consumption reported for residential, commercial, municipal, and industrial sectors. All separate electricity categories for municipal electric were also recorded. ClearPath default factor for Grid Loss was applied, and sector selected. Grid Loss is the electricity lost from transmission of electricity. Grid Loss is dependent upon quantity of electricity transmitted. The Grid Loss value used in ClearPath is 4.5%. This value was applied to the measured electrical usage provided by Danville Utilities.
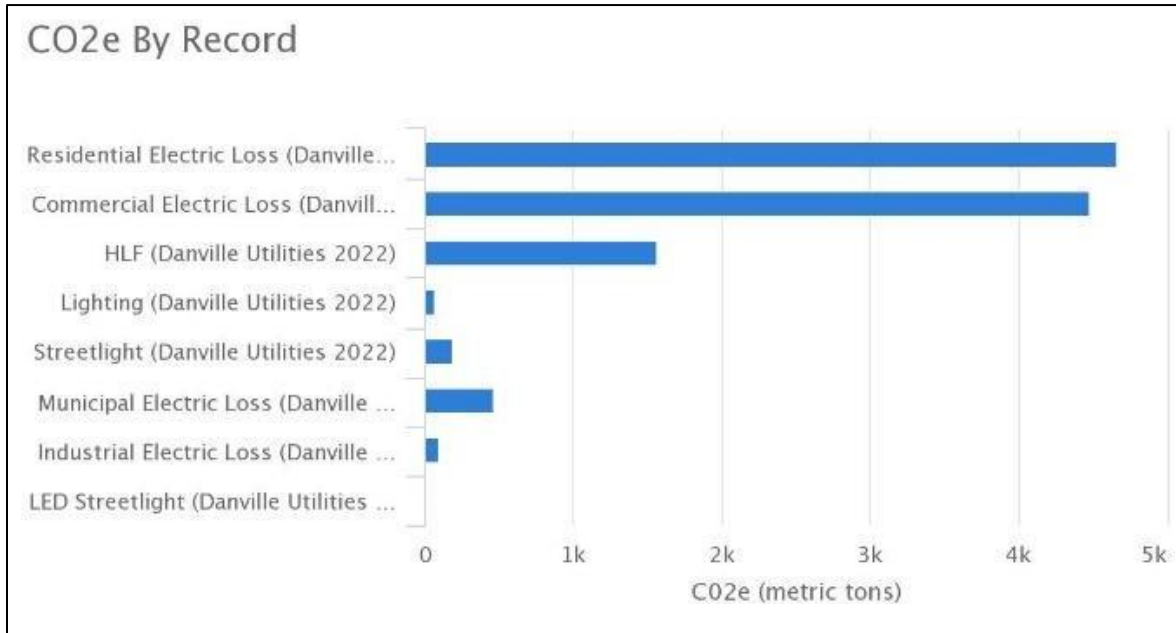

Figure 10: Upstream impacts of activities- 11,541 metric tons CO2e

CHAPTER 3 – GOALS, STRATEGIES & ACTIONS

Danville recommends an overall goal consistent with international, national, and regional goals—but influenced by local needs. Our goal is based on the best available science today which provides a pathway to conserve energy, reduce greenhouse gas emissions, and improve the resilience and sustainability of our community.

Our goal is to reduce our community's greenhouse gas emissions in the short-term by 50% by 2030 (from the base year of 2005). Since the U.S. has reduced emissions by approximately 15% in 2022, we can adjust our goal so that we only need to reduce emissions by 35% by 2030 relative to current levels. Our long-term goal would be to achieve carbon neutrality by 2050, which means the amount of greenhouse gases released into the atmosphere is equal to the amount removed.

The sections below outline the community task force recommended strategies and actions. Each section represents the core categories (buildings, transportation, electricity sector, land use, waste and wastewater, and solid waste). Within each section, there are four sub-parts: action, priority level, timeframe for implementation, lead government official, and comments.

> *GOAL: reduce emissions by 35% by 2030; achieve carbon neutrality by 2050.*

All actions have been assessed by the community task force to comply with the guiding principles of effectiveness, feasibility, equity, and co-benefits.

Sector: BUILDINGS				
Strategy: Increase energy efficiency and deploy clean energy technology in existing buildings (residential and commercial).				
Sub-Sector Goals: (1) Retrofit at least 100 *residential* housing units with cumulative energy efficiency improvements of 25% (existing buildings) by 2030; (2) convert 30% of fossil fuel *residential* building systems (e.g., space or water heaters) to highly efficient electric options (e.g., heat pumps); (3) Retrofit at least 50 *commercial* building with cumulative energy efficiency improvements of 30% (existing buildings) by 2030; and (4) convert 30% fossil fuel *commercial* building systems (e.g., space or water heaters) to highly efficient electric options (e.g., heat pumps) by 2035.				
Actions		**Priority**	**Timeframe**	**Gov't Dept**
1. Survey residents and businesses about a rebate program for	• Pursue state and federal grant opportunities	High	Short (1 yr)	Utilities

converting to more energy efficient practices and technology (for example, heat pumps, insulation, storm windows, or solar water heaters and panels). Specifically, determine the amount of rebate that would motivate maximum participation. After the survey, provide recommendations on how to proceed with a rebate program.	to create this rebate program. • Evaluate how to apply rebate program to low and medium-income residents.			
2. Evaluate how to best reuse or repurpose existing buildings into more energy efficient buildings through zoning changes, such as new mixed-use retail, or residential and community buildings. After evaluation, provide recommendations on how to best proceed with this plan. Include zoning recommendations in the City's Comprehensive Plan.		High	Short-Medium (1-3 years)	Planning Division
3. Create an information clearinghouse for residents and businesses about tools, technology, and incentives for installing and using energy efficiency and clean energy technologies and practices. Clearinghouse should focus on conveying actual experiences from	Post clearinghouse on government websites and conduct active information delivery at public events.	High	Continuous	Utilities, Housing, Economic Development, Inspections

residents and businesses. See comments section below about contents of the information clearinghouse.			
4. Conduct a pilot study on the benefits of a "green roof" on public building. Evaluate the costs, energy savings, and reduced water run-off; and then promote the findings to the public on website and other active means.	Medium	Medium (2-3 years)	Community Development, City Manager's Office, Industrial Development Authority

Comments:

•*Need to focus rebate program on industrial and commercial owners.*
• *Need to link the rebate program to a requirement to have a third-party energy audit performed.*
• *Need access to large pool of funds so more projects can be done (perhaps lower cap on individual awards so more awards can be made).*
• *Need to work with utility provider to create and implement the rebate program.*
• *Need to create an information clearinghouse that helps residents make smart, informed decisions. The clearinghouse should be carefully constructed by researching and presenting objective data.*
• *Need to ensure the clearinghouse is more than a passive website by actively presenting information.*
• *Need to include in the following in the clearinghouse: information on green building design principles, any existing tax or other incentives to encourage building developers to incorporate energy efficiency, list of companies (non-endorsed) that install energy efficiency upgrades and then customer pays back cost through energy savings (known as Energy Service Companies) or customer pays back through their property tax bill (known as Property Assessed Clean Energy), recommendations for real estate companies to promote energy efficiency and renewable energy in home sales, information about real estate tax exemption or reduction for energy-efficient buildings, and recommendations on how industrial plants can reduce emissions and conserve energy.*
• *Need to prioritize state or federal funds based on the findings from George Mason University's emission inventory.*

Sector: TRANSPORTATION				
Strategy: (1) Increase alternative forms of transportation. (2) Increase transition to electric vehicles.				
Sub-Sector Goals: (1) By 2030, the municipality should convert 30% its publicly owned light-duty internal combustion engine vehicles to plug-in electric vehicles (PHEVs) and battery electric vehicles (BEVs) vehicles; (2) By 2030, the municipality should convert 30% its publicly owned medium and heavy-duty vehicles to PHEV/BEV or other clean vehicle technology (e.g., propane, natural gas); (3) Community: Increase PHEVs/BEVs to at least 12% of all light-duty vehicle registrations by 2030; (4) Community: Reduce 15% of passenger vehicle miles traveled by shifting to active or public transport (e.g., biking, walking, or taking the bus) by 2030.				
Actions		**Priority**	**Timeframe**	**Gov't Dept**
1. For publicly owned vehicles, purchase electric vehicles (replace existing internal combustion vehicles), for both light-duty and heavy-duty applications, *when the vehicle has reached its normal life expectancy and is scheduled to be replaced.*	Seek state and federal grants to off-set costs of these purchases.	High	Continuous	Public Works
2. Prepare a plan for future deployment of EV charging stations in public spaces, and when appropriate implement this plan.	a. For any deployment of EV charging stations, streamline permitting and inspection procedures; and b. Coordinate with local utility to ensure adequate and safe installations.	High	Short (1 year)	Public Works
3. Evaluate zoning requirements and parking ordinances for EVs and deploy these incentives for all new residential and commercial buildings (look to best practices from other jurisdictions). After evaluation, provide recommendations on		Medium	Short (1 year)	Planning Division

how best to proceed with these requirements.				
4. Create a clearinghouse for information about EVs and charging infrastructure financing, rebates, & tax incentives.	Post clearinghouse on government websites and conduct active information delivery at public events.	Medium	Medium (2-3 years)	Planning Division, Utilities
5. Evaluate and plan to expand or create new bike lanes and pathways connecting homes to businesses. After evaluation, provide recommendations on how best to proceed.		High	Medium (2-3 years)	Planning Division, Public Works
6. Evaluate current program on reduced transit bus fare programs and discounted passes, identify challenges to greater adoption, and address these challenges to increase usage.		Medium	Medium (2-3 years)	Transportation, Parks & Recreation
7. Evaluate the need for more convenient routes and accessible public transportation to encourage more ridership. After evaluation, provide recommendations on how best to proceed with these requirements.		Medium	Short (1 year)	Transportation, Public Works
8. Evaluate current programs for alternative travel (for example, dial-a-ride, on-demand transit, volunteer driver program, carpool, or community shuttles), identify challenges to greater adoption, and address these challenges to increase usage.		Medium	Short (1 year)/Medium (2-3 years)	Transportation, Parks & Recreation

Sector: ELECTRIC SECTOR			
Strategy: Increase transition to clean and renewable energy sources.			
Sub-Sector Goal: Transition 40% of the electricity used in the municipality to clean energy sources. (e.g., solar, wind, hydropower, nuclear, and geothermal) ahead of Virginia's Renewable Portfolio (state law requires 45% renewable in 2035)			
Actions	**Priority**	**Timeframe**	**Gov't Dept**
1. Work with a private solar company developer to survey and inventory all public buildings for solar PV potential (for example, roof measurements, shade analysis).	High	Short (1 year)	Utilities, City Manager's Office
2. Identify best management practices, from other jurisdictions, for installing solar on public buildings.	High	Short (1 year)	Utilities, Inspections
3. Encourage and provide information to the public about Community Solar Projects. Identify and address any challenges with advancing this opportunity.	High	Medium (2-3 years)	City Manager's Office
4. Create permit fee and property tax reductions and other incentives for solar PV installations.	High	Medium (2-3 years)	Inspections, Real Estate
5. Deploy an electricity demand reduction program to reduce energy usage at peak times (or work with third party company to do this).	High	Short (1 year)	Utilities
6. Pursue state and federal grant program to install energy-efficiency upgrades for low-income customers.	Medium	Medium (2-3 years)	Community Development
7. Identify any solar project possibilities in brownfields locations and encourage development of these sites for solar.	Low	Medium (2-3 years)	Zoning, Planning
Comments: • *Need to identify organizations that provide best management practices for installing solar on public buildings.* • *Need more shade in parking lots.* • *Need more cohesiveness among parking lots and businesses. You should not have to get back on the main road from one parking lot to go to another store right beside it.* • *Note, there are no large-scale solar facilities within the City boundaries. Danville Utilities' service territory extends into the county, where there are solar systems and plenty of land for future utility scale solar.* • *Note, Community Choice aggregation project would not apply since the City already does this for its residents (i.e., it owns its own electric facility), but Community Solar projects would apply.* • *Note, the City has already installed LEDs in streetlights.* • *Note, the City tried a smart thermostat program but found that it would not increase the benefits beyond the costs.* • *Any time you can reduce energy demand, this is a good thing because you are not running the power plant.*			

• *Note, there is a grant program for low-income residents, but this needs to be re-defined to target energy efficiency measures. Danville Utilities should offer sleeved PPAs for industrials to purchase clean energy. Also, if the City purchased RECS at say $75 per rec, this would be a huge incentive to install solar.*
• *Regarding solar, strong consideration needs to be given to which company panels will be purchased from, what is in the panels, their lifespan, what can be done with them after usage, etc.*

Sector: LAND USE				
Strategy: Improve management of lands/native trees				
Sub-Sector Goal:				
Actions		**Priority**	**Timeframe**	**Gov't Dept**
1. Support the adoption of a long-term plan for more sustainable development (for example, green zoning plans for energy and water-efficient buildings, multi-family and mixed use, and transit-oriented development). This includes expanding public parkland and establishing natural green space guidelines in community planning.		High	Short (1 year)	Zoning
2. Streamline and clarify the process to achieve planting of native tress, food forest tree plantings, green landscapes, and managing non-native plants. Identify clear lines of government authority and processing. Identify challenges or obstacles and provide recommendations to overcome these.	a. Ensure there is a robust maintenance plan for any tree planting projects, so the trees survive long-term. There needs to be a common understanding and acceptance of responsibility and roles. b. Better coordinate the education and outreach (e.g., involve local university and community college) by creating partnerships and engaging in continuous communication. Make this a formal, on-going program.	High	Short (1 year)	Zoning, Public Works
Comments: • *Note, the City is considering a separate effort to create and adopt a sustainability plan so these actions should be merged.* • *Note, the government should be open to making a genuine effort to identify and resolve obstacles.* • *Long term planning on sustainability is a continuous process.* • *The City has plans to make changes to zoning, such as mixed zoning, new building and development codes. This is part of another effort on sustainability.* • *Land use planning is linked with transportation goals such as bikeable and walkable communities (cross-over actions).* • *With tree plantings there is some frustration with the lack of progress on some projects, which could be improved with clear lines of authority and responsibility within the government.* • *The City does conduct outreach and education about tree plantings (e.g., with Rotary Club), but turn-out is low.*				

Sector: WASTE & WASTEWATER					
Strategy: Improve the quality of waterways.					
Sub-Sector Goal: None					
Actions			**Priority**	**Timeframe**	**Gov't Dept**
1. Educate and inform residents about green infrastructure solutions for water conservation (natural or nature-based approaches such as constructed wetlands, rain gardens, and vegetation buffers).	Ensure that the City's green infrastructure spaces are promoted so residents recognize and take pride in them.		High	Continuous	Zoning, Public Works
2. Identify and promote best management practices to reduce harmful run-off of pesticides and chemicals into waterways.			High	Continuous	Public Works
3. Create a partnership with local university/college students and community members to create citizen-scientists trained in monitoring the health of waterways and identifying any water quality issues. Ensure lines of communication exist between students/community members and government.			High	Short (1 year)	Zoning
Comments: • *The City needs to better promote its green projects, so residents recognize and appreciate their City more.* • *While building codes are set by the state, the City can create incentives for building developers (in land development plans) to consider more green spaces and more recreation areas which minimizes run-off.* • *The protocols for testing waterways are already in place. Need to create a structure or channel to communicate the health of waterways to City government.*					

Sector: SOLID WASTE			
Strategy: Reduce the amount of solid waste going into landfills.			
Sub-Sector Goal: Divert 40% of solid waste produced in the city (e.g., recycled, composted, reused) by 2030.			
Actions	**Priority**	**Timeframe**	**Gov't Dept**
Conduct a feasibility study on food composting program (residents and businesses; drop off or curbside pick-up).	High	Medium (2-3 years)	Public Works, City Manager's Office
Comments: *• The City composts yard waste (leaves, tree branches) at a drop-off location.* *• There are issues with costs for curbside pick-up of recycling and food waste (it was not profitable). The City should set a waste diversion goal of 90% for City Hall. They could also have a goal to get a City Hall TRUE Zero Waste certified by 2030. They could expand on the program from there.*			

Sector: PARTNERSHIPS			
Strategy: Develop partnerships with key stakeholders to advance energy efficiency and clean energy projects.			
Sub-Sector Goal: None			
Actions	**Priority**	**Timeframe**	**Gov't Dept**
1. Contact the Chamber of Commerce and the Virginia Extension Program to develop partnerships with the local business community to encourage and facilitate energy and resilience-oriented practices and mentorship. Include business representatives on energy/climate committee (see Organizational Structure below).	High	Continuous	Utilities
2. Partner with local universities and colleges to seek state and federal grants to build the capacity and train the energy efficiency and renewable energy workforce of the future.	City should provide internships for local students, which may improve chances for getting grants.	High	Short (1 year)	Utilities
3. Create a local green certification program to	Work with the Chamber of Commerce to create this program.	High	Short (1 year)	Economic Development, Utilities

recognize local businesses and adopt the Virginia Green Schools program. The program should recognize those businesses that use energy efficiency measures and clean energy technology.				

Comments:

• City needs to motivate its residents about all the good things happening in the energy action plan. The City and its residents should take pride in what it is accomplishing or attempting to accomplish. The City should be strident in promoting itself as a city working to address climate change, reduce energy costs, and building a more resilient community.

• There are some efforts to work with the business community, but they lack any formal structure.

• The Danville Community College does offer training for the energy sector, but not for the clean energy sector.

Sector: ORGANIZATIONAL STRUCTURE			
Strategy: Create standing committee and hire specialists that assist with guidance and implementation of energy and sustainability initiatives.			
Sub-Sector Goal: None			
Actions	**Priority**	**Timeframe**	**Gov't Dept**
(1) Create an energy and climate committee comprised of residents who are appointed and empowered to provide advice and recommendations to the City's leaders.	High	Short (1 year)	City Manager Office
(2) Hire a Sustainability Specialist who will serve as the point person on all energy, climate, and resilience issues.	High	Short (1 year)	City Manager Office

Comment:

• An energy/climate committee can be comprised of appointed residents who serve a specific amount of time on the committee (e.g., two-year terms), and meet monthly to discuss current issues and provide recommendations to City for items in energy action plan.

• A City employee should serve as the liaison between this committee and the City government.

• A "sustainability specialist" would coordinate with all government offices.

• The "sustainability specialist" should not be an existing employee who is given these additional duties. It should be a new hire.

CHAPTER 4 – IMPLEMENTATION

Danville's overall goal is to reduce community greenhouse gas emissions in the short-term by 50% by 2030 relative to 2005 levels (or 35% relative to 2022 levels). In Chapter 3, both sub-sector goals and actions were identified to achieve these overall goals. In many cases, the community task force recommended actions will contribute to meeting the sub-sector goals. For example, one of the sub-sector goals for buildings is to retrofit at least 100 residential housing units with energy efficiency improvements. An action that will support achieving this goal includes "Identify and evaluate how existing incentive programs (for example, Enterprise Zones) can incorporate energy efficiency and clean energy requirements or targets." In this chapter, we will discuss how the recommended actions contribute to the overall goal and how the municipality can implement the action. We will also discuss how best to monitor progress towards meeting the goals.

Sub-Sector Goals

The sub-sector goals defined in Chapter 3 were approximated, as described below, to forecast potential emission reduction scenarios.

<u>Buildings</u>

- For non-electric households – Fuel Switching

    - 3.0% of housing stock retrofitted per year [Total of 30% over next 10 years]
    - 25% energy savings
    - Coefficient of Performance for Heat Pumps 2.7
    - Furnace efficiency = 80%

- For electric households – No Fuel Switching

    - 2.5% of housing stock retrofitted per year [Total of 25% over next 10 years]
    - 20% energy savings
    - Coefficient of Performance for Heat Pumps 2.7
    - Furnace efficiency = 80%

- For non-electric commercial buildings – Fuel Switching

- 5% of building stock retrofitted per year [Total of 30% over next 6 years]
- 30% energy savings
- Coefficient of Performance for Heat Pumps 2.7
- Furnace efficiency = 80%

- For electric commercial buildings – No Fuel Switching

  - 5% of building stock retrofitted per year [Total of 30% over next 6 years]
  - 20% energy savings
  - Coefficient of Performance for Heat Pumps 2.7
  - Furnace efficiency = 80%

- Industrial Building – 1% reduction in electricity/natural gas per year

Transportation

- 20% reduction in Vehicle Miles Traveled (VMT) by 2035
- 40% EV's (on the road) by 2050 – Gasoline engines
- 20% EV's (on the road) by 2050 – Diesel engines

Electric Sector

- Transition 25% of the electricity used in the municipality to clean energy sources. (e.g., solar, wind, hydropower, nuclear, and geothermal) ahead of Virginia's Renewable Portfolio
- VCEA requires 45% renewable in 2035 [Modeled]

Solid Waste

- Divert 90% of solid waste produced in the city (e.g., recycled, composted, reused) by 2030

Danville's 2030 target – a science-based target—seeks to reduce greenhouse gas emissions (GHG) by 50% relative to 2005 levels by 2030 However, in 2022, the U.S. had reduced by ~15% of its GHG emissions. Thus, Danville only needs to reduce **35% of its GHG emissions relative to 2022,** as depicted here.
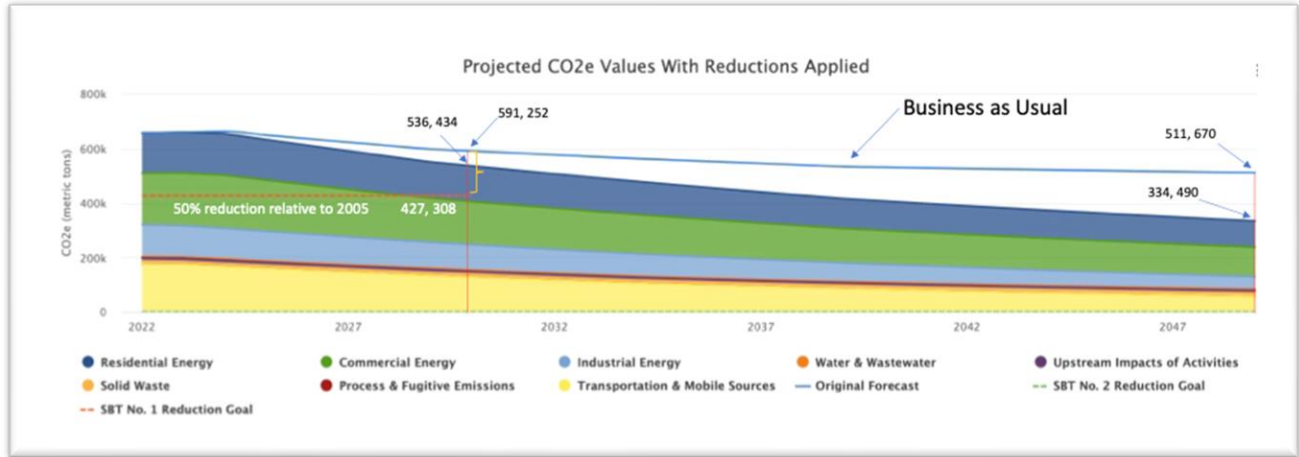
Figure 1- Projected GHG emission reductions based on sub-sector goal achievement

If the above sub-sector goals are successfully implemented, Danville should make progress towards meeting its goals. As Figure 1 depicts, Danville falls short of meeting its science-based targets by almost 109,000 metric tons of CO2e (536,434 – 427,308) in 2030 for the current actions that can be modeled. However, not all action items can be modeled. For example, educating the community about the benefits of electric vehicles and energy efficiency can result in financial savings and emissions reductions, but modeling the educational impact is difficult, if not impossible, to measure. Therefore, additional benefits will likely accrue for the actions that cannot be modeled.

Next Steps

To implement the recommended actions, Danville must consider the steps necessary for successful implementation. Below, an implementation methodology is provided for some of the recommended actions. This provides guidance on preliminary steps towards implementing the action.

Buildings

Action Item B1: Pursue state and federal grants to establish a rebate program for transitioning to energy efficient and clean energy technology (for example, electric heat pumps, weatherization, solar water heaters or panels). As a prerequisite for participation in the rebate program, require the completion of a comprehensive energy audit. This rebate program should have a carve-out for low-income residents.

Implementation Method:

1.   Weatherization Assistance Program

The U.S. Department of Energy (DOE) Weatherization Assistance Program (WAP) reduces energy costs for low-income households by increasing the energy efficiency of their homes, while ensuring their health and safety.

Steps to Apply:

1. Determine eligibility for weatherization services.
2. Identify local weatherization provider.
3. Complete the weatherization application process.
4. Prepare for weatherization services.

For more information: Consult DOE's website here.

2.   The Green and Resilient Retrofit Program

The U.S. Housing and Urban Development Green and Resilient Retrofit Program is available for assisted multifamily housing. Direct loans and grants are available to fund projects that improve energy or water efficiency, enhance indoor air quality or sustainability, implement the use of zero emission electricity generation, low emission building materials or processes, energy storage, or building electrification strategies or address climate resilience.

For more information: Consult HUD's website here.

Action Item B2: Evaluate how to best reuse or repurpose existing buildings into more energy efficient buildings through zoning changes, such as new mixed-use retail, or residential and community buildings. After evaluation, provide recommendations on how to best proceed with this plan. Include zoning recommendations in the City's Comprehensive Plan.

Implementation Method:

1.   Market and promote the community's available vacant and underutilized buildings.

2.   Create a community task force of key business stakeholders to assist with business-to-business outreach, local financing and marketing efforts, and understanding prospective new owner's needs.

3.   Seek out experienced developers with specialization in repurposing historic buildings. These developers are familiar with tax incentives and economic tools and may be willing to engage with the municipality on this action.

4.   Advertise on "historic buildings for sale" websites. Because of the unique nature of historic properties, there are many national websites that specialize in marketing historic buildings that may be worth utilizing to appeal to historic property buyers. Consult this website for more information, including grant opportunities.

5.   Consult with real estate professionals who specialize in commercial properties, are experienced with the local real estate market, and have knowledge of historic buildings.

For more information: This community guide provides further information on repurposing vacant and underutilized buildings.

Action Item B3: Create an information clearinghouse for residents and businesses about tools, technology, and incentives for installing and using energy efficiency and clean energy technologies and practices. Clearinghouse should focus on conveying actual experiences from residents and businesses. See comments section below about contents of the information clearinghouse..

Implementation Method:

1.   Establish baseline understanding of communities' awareness and attitudes towards energy efficiency and clean energy technology. For example, conduct in-depth interviews with community members, conduct public focus groups, or issue surveys or polls.

2.   Based on research results, develop a targeted communication strategy which seeks to disseminate objective information about energy efficiency practices and renewable energy resources.

3.   Identify and work with key partners that will effectively convey the communication strategy. For example, partner with schools, associations, and businesses.

For more information: consult the Virginia Department of Energy website here. For information on energy efficiency, consult VDOE's page here. For information on clean energy, consult VDOE's page here.

Action Item B5: Conduct a pilot study on the benefits of a "green roof" on public building. Evaluate the costs, energy savings, and reduced water run-off; and then promote the findings to the public on website and other active means.

Implementation Method:

1.   Consult with Green Lease Leaders, an organization that provides reference guides for tenants and landlords, sample lease clauses, case studies, and recorded training.

2.   Develop and disseminate outreach material based on their guides.

For more information: Consult the Green Lease Leaders website.

Transportation

Action Item T1: For publicly owned vehicles, purchase electric vehicles (replace existing internal combustion vehicles), for both light-duty and heavy-duty applications, when the vehicle has reached its normal life expectancy and is scheduled to be replaced. Seek state and federal grants to off-set costs of these purchases.

Implementation Method:

Municipality should consider the following grants to apply and aid in the implementation of this action.

Congestion Mitigation and Air Quality Improvement Program. *Funds for local governments for transportation projects and programs to help meet the requirements of the Clean Air Act* *Available funding: $10,000,000 – $505,000,000* *Available annually* *Link*	*Charging and Fueling Infrastructure Discretionary Grant Program.* *Funds for implementing publicly accessible electric vehicle charging infrastructure* *Corridor Program: $1,000,000 – no maximum.* *Community Program: $500,000 - $15,000,000.* *Available annually* *Link*
Grants for Buses and Bus Facilities Programs. *Funding to replace, rehabilitate, and purchase buses and related equipment, including vehicles that produce low or no emissions (Low-No) for public transportation services.* *Grants for Buses and Bus Facilities: $115,000-$54,000,000* *Low-No Bus: $167,257-$116,000,000* *Available annually* *Link*	*Clean School Bus Program.* *Funds for local governments to replace existing school buses with clean and zero-emission models* *Serving high-priority school districts: Maximum of $285,000 – $375,000 per bus* *Serving other eligible school districts: Maximum of $190,000 – $250,000 per bus* *Funding available through 2026* *Link*

Action Item T2: As EV ownership increases, deploy more public EV charging infrastructure to meet demand.

Implementation Method:

1. Start by electrifying government-owned vehicles and build the infrastructure needed for these vehicles. In parallel, begin to plan community locations to install EV charging spaces.

2. Create a plan for numbers and types of chargers by assessing local factors including electric vehicle numbers, access to home charging, and future targets.

3. Seek government funding and investments from developers, energy companies and local businesses. Deploying at scale can drive down charging infrastructure costs.

4. Collaborate with landowners, electricity companies and others to gain permissions, build support and get the technical details right.

For more information, consult C40's guidance on "Deploying Charging Infrastructure [here](#) and DOT's funding opportunities [here](#).

Action Item T3: Evaluate zoning requirements and parking ordinances for EVs and deploy these incentives for all new residential and commercial buildings (look to best practices from other jurisdictions). After evaluation, provide recommendations on how best to proceed with these requirements.

Implementation Method:

1. Prioritize site selection in lower-income and underserved communities.

2. Incorporate community input into investment decisions including site selection, mode preference, amenities, and design.

3. Ensure that priority communities where charging infrastructure will be deployed are also provided with targeted EV incentives and awareness campaigns.

4. Enhance mobility through strategies such as car share, mobility hubs, and EV infrastructure co-location with other transportation services.

For more information, read more on equitable distribution of EV parking infrastructure [here](#). For information on zoning requirements see DOE's guidance [here](#). For examples of parking ordinances see this [website](#).

Action Item T5: Evaluate and produce a plan to create more bikeable and walkable pathways with an emphasis on connecting homes to businesses.

Implementation Method:

1. Conduct a survey on desirability for walkable and bikeable pathways and potential locations.

2. Develop the plan and seek public review and comment.

3. Secure funding for the plan.

For more information, funding for bicycle and pedestrian can come from a variety of sources, such as from this biking organization. Information on incorporating bikeable and walkable communities into municipality comprehensive plan can be found here.

Action Item T2: Conduct training and education for government employees on the feasibility and cost-benefit of clean and alternative vehicles.

Implementation Method:

The U.S. Department of Energy's Clean Cities program supports a network of nearly 100 coalitions across the country, which work to promote alternative fuels, advanced vehicles, and fuel-saving strategies. Many of these coalitions offer training programs and workshops tailored to government fleets and transportation stakeholders. *Link*	*For the most objective information on the cost-benefits of EVs, consult DOE's website here*

Electric Sector

Action Item E1: Work with a private solar company developer to survey and inventory all public buildings for solar PV potential.

Implementation Method

1. Research and select a reputable solar company developer with experience in conducting solar assessments for public buildings. The Solar Energy Industries Association maintains a list of Virginia solar developers here.

2. Draft a partnership agreement outlining the municipalities' needs.

3. Work closely with the solar company developer to conduct a preliminary assessment of public buildings to identify potential candidates for solar PV installations.

4. Engage relevant stakeholders, such as building owners, facility managers, and local government officials, to obtain necessary permissions and access to public buildings for conducting surveys and assessments.

Action Item E3: Encourage and provide information to the public about Community Solar Projects. Identify and address any challenges with advancing this opportunity.

Implementation Method:

1.   Provide information about community solar programs.

2.   Form community partnerships with community solar organizations.

3.   Schedule learning conversations with local stakeholders in your community to explore the possibilities for community solar development.

For more information, DOE provides general information on states implementing community solar projects here. The Coalition for Community Solar Access provides resources on programs here.

Action Item E6: Pursue state and federal grant program to install energy-efficiency upgrades for low-income customers.

Implementation Method:

1.   DOE offers a program, Communities Sparking Investment in Transformative Energy (C-SITE), that supports local governments with implementing clean energy projects and programs for disadvantaged communities, energy communities, and small-to –medium-sized jurisdictions.

2.   C-SITE supports initiatives that could cover enhancing building efficiency or electrification, promoting electric transportation, upgrading energy infrastructure, advancing microgrid implementation, fostering renewable energy projects, establishing resilience hubs, and facilitating workforce development.

For more information, DOE provides a list of federal grant opportunities *here*. For rural areas, USDA provides grant opportunities here.here.

Action Item E5: Identify any solar project possibilities in brownfields locations and encourage development of these sites for solar.

Implementation Method:

1.   Argonne National Laboratory (a DOE lab) provides resource maps to help identify the most suitable lands for renewable energy development.

2.   EPA offers an interactive web application to identify contaminated lands, landfills, and mine sites for renewable energy development.

Land Use

Action Item L1: Support the adoption of a long-term plan for more sustainable development. This includes expanding public parkland and establishing natural green space guidelines in community planning.

Implementation Method:

Consider using the [EPA's Green Streets, Green Jobs, Green Towns](#) (G3) approach to implement more sustainable development. To implement a G3 approach a municipality should consider:

1. Repairing, resurfacing or replacing roadways and parking lots.

2. Repairing or replacing damaged sidewalks and curbs.

3. Upgrading or replacing utilities in the public right-of-way (e.g., sanitary sewer 4. systems, storm sewer systems, drinking water supply lines).

4. Redeveloping vacant or abandoned properties.

For More information, consult EPA's Green Infrastructure Design and Implementation program [here](#).

Action Item L2: Streamline and clarify the process to achieve planting of native tress, food forest tree plantings, green landscapes, and managing non-native plants. Identify clear lines of government authority and processing. Identify challenges or obstacles and provide recommendations to overcome these.

Implementation Method:

Applicable grants:

1. *Virginia Trees for Clean Water Grant Program*
   - *Funds tree planting efforts that raise public awareness of the benefits of trees and impact on water quality*
   - *Available funding: $1,000- $50,000*

   [Link](#)

2. *Urban and Community Forestry Grant*
   - *Funds projects that promote protection and enhancement of urban and community forest ecosystems, tree planting, the care of trees, and education*
   - *Available funding: for matching grants, up to $50,000 on a 50% of total project basis. For non-matching grants under the Inflation Reduction Act, $250,000*
   - *This is a reimbursement grant*

   [Link](#)

> 3. *Community Forest Revitalization Program*
>   - *A technical assistance program that encourages local government and citizen involvement in creating and supporting long-term and sustained community forestry projects and programs in underserved and disadvantaged communities.*
>   - *Funds are administered through direct technical assistance instead of a typical dollar amount.*
>
> [Link](#)

Waste and Wastewater

Action Item W1: Educate and inform residents about green infrastructure solutions for water conservation (natural or nature-based approaches such as constructed wetlands, rain gardens, and vegetation buffers).

Implementation Method:

1. Look to federal resources that provide education and information, such as EPA's Green Infrastructure [webpage](#). This site contains several case studies from other municipalities.

Action Item W2: Identify and promote best management practices to reduce harmful run-off of pesticides and chemicals into waterways.

Implementation Method:

1. The EPA provides resources on the best practices to reduce pesticide run-off from agriculture [here](#).

2. Utah State University provides best management practices to manage land and mitigate pollution of surface and groundwater [here](#). The best practices include agriculture, urban, and forest run-off.

Solid Waste

Action Item SW1: Conduct a feasibility study on food composting program (residents and businesses; drop off or curbside pick-up).

Implementation Method:

1. One example of a food composting feasibility study can be found at the Washington DC Department of Public Works website [here](#). Per this study, the municipality contracted with

Resource Recycling Systems to ascertain the feasibility and costs. The City of College Park, MD implemented a food scrap collection program that includes both collection and drop-off.

Partnerships

Action Item P3: Create a local green certification program to recognize local businesses.

Implementation Method:

1. One example of a green certification program is Montgomery County, MD's Green Business Certification Program, which is a voluntary recognition program designed to encourage businesses and other organizations to take steps that reduce their ecological footprint. The program was initiated by the local government, but then transitioned the program to a non-profit which runs it today. The local county chamber of commerce was involved in the initiation and development of the program.

2. Environmental Innovations maintains a how-to guide for municipalities interested n creating their own green business certification program here.

Organizational Structure

Action Item: Create an energy and climate committee comprised of residents who are appointed and empowered to provide advice and recommendations to the City's leaders.

Implementation Method:

1.   Determine the scope, objectives, and potential structure of an energy and climate committee. For example, see the charter for the Montgomery County, MD Energy and Air Quality Committee here. The committee is comprised of about a dozen county residents who serve 2-year terms. The committee meets once a month with an assigned county employee, and its members discuss energy-related issues of importance to residents and provide recommendations to the county executive and council.

2.   Present the proposal to the city/county council or relevant governing body for approval. Advocate for the establishment of the energy and climate committee by highlighting its potential benefits for the community, such as promoting sustainability, reducing greenhouse gas emissions, and enhancing resilience.

3.   Advertise the opportunity for residents to apply or nominate candidates for the energy and climate committee. Utilize various outreach channels, including social media, local

newspapers, community newsletters, and neighborhood associations. Ensure outreach efforts are inclusive and accessible to all residents.

Communication and Outreach

The Energy Action Plan will be posted on the municipality's website. The municipality will engage in efforts to inform residents about the plan, including annual updates. The municipality will also utilize various channels such as social media, workshops, and community events to raise awareness and foster engagement.

The greenhouse gas emissions modeling and inventory will be updated every five years. The Energy Action Plan should be evaluated, and amended as appropriate, in this same five-year period.

Monitoring and Verification

It is recommended that Danville seek to implement two action items that will be important to ensure effective monitoring and verification.

1. Create an energy and climate committee comprised of residents who are appointed and empowered to provide advice and recommendations to the City's leaders.

2. Designate a Sustainability Specialist to serve as the point person on all energy, climate, and resilience issues.

The energy and climate committee should consist of residents who volunteer to serve on the committee for a period, such as a two-year term, and meet monthly to discuss issues related to energy and the climate. A government employee serves as the liaison between the committee and the government. The committee has the potential to monitor and verify progress on the energy action plan and provide advice and guidance.

The Sustainability Specialist acts as the lead person to assist with implementation of the Energy Action Plan. It is recommended that the City of Danville create a new position with the responsibility of coordinating various parts of the Energy Action Plan with the appropriate government offices and identified partners.

CONCLUSION

The Energy Action Plan seeks to reduce the energy burden (costs) on Danville residents, as well as ensuring equitable distribution of the benefits of energy savings. The plan also seeks to ensure energy independence, security, community-wide sustainability and resilience.

This Plan represents a joint community-government effort at addressing mutual concerns about Danville's energy and climate future. The Plan's success will depend on continued engagement with community members, both inside Danville, throughout Virginia, and throughout the country.