

**Borough of Carlisle**  
**Climate Action Commission**  
**Executive Committee**  
**Minutes**  
**March 4, 2021**  
**7:00 PM**

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**I.** Joel Hicks called the meeting to order at 7:00 PM.

Present at the meeting: Joel Hicks, Sean Shultz, Mohamed Badissy, Karla Farrell, Sara Markowitz, Tony Underwood, Tamela Trussell, Susan Armstrong, Owen Snyder, Tony Rymar, Tom Horton, Stephanie Taylor and Joyce Stone.

**II. Meeting Minutes**

- A. The Executive Committee voted 8-0 to approve the February 4, 2021 meeting minutes.

**III. Public Comment**

No public comment was heard

**IV. Chair updates**

- A. Mr. Hicks discussed forming three subgroups within the Projects and Estimates team, Community Engagement team and the Zoning Team and focus on the following action items to help achieve the sector goals: 1) Transportation, 2) Energy Decarbonization, and 3) Energy Efficiency and Behavior. The team leads will provide recommendations over the next month to Mr. Hicks regarding which of their team member will serve on the subgroup. The subgroups will then collaborate with each other on their action items findings.

**V. Recommended Pathways Discussion**

- PAT Lead

Mr. Underwood provided an overview of the proposed pathways for the Borough's 2050 emissions reduction targets. The summary report describes how policies, practices and strategies will effect these emission goals. Included in the document were assumptions and goals that list emissions reduction percentages by modeling both moderate and rapid pathways in each sector. Included in the report are various graphs and charts that represent these models.

The Proposed Pathway Summary Report is attached to these minutes.

- The Executive Committee voted 8-0 to approve the rapid pathway. (Hicks/Trussell)

**VI. Team Lead Updates:**

A. Community Engagement: Sara Markowitz

The team has completed the citizen survey and will begin to introduce the survey at various upcoming events in Carlisle, as well as mailing to residents. Stephanie Taylor suggested adding a commentary option on the new platform to allow citizens to submit their comments and ideas on climate change.

Joel Hicks announced the commission received a grant in the amount of \$7500 from the Dickinson College Center for Civic Learning and Action. The grant money will be used for community outreach expenses.

There was discussion regarding promoting the survey with signage in different areas in the Borough.

Ms. Markowitz announced that a Dickinson College student will join her team as part of an internship through the Social Innovation and Entrepreneurship class at Dickinson College. She also noted that Professor Hans Pfister provided a talk on renewable energy and home efficiency at the Carlisle Tool Library. This presentation can be found on YouTube.

**B. Pathways & Analytics: Tony Underwood**

The team will generate information sheets that contain the research and information regarding specific policies which will help facilitate the future work of the teams.

**C. Zoning: Karla Farrell**

The team met and discussed form-base zoning, which is used to regulate development that controls the building form first and the building use second with the purpose of achieving particular types of places based on community vision. They also reviewed different scenarios to determine what would work best in Carlisle. The team will use Mr. Underwood's summary report to begin discussions on zoning ordinances and planning regulations.

**D. Projects & Estimates: Mohamed Badissy**

The team will now begin using the information gathered from the other teams to begin their work.

**VII. Other EC member Updates**

Mr. Hicks asked for the Borough's website be updated with the pathway that was approved in this meeting. He requested for the team leads to propose two or three objectives from Mr. Underwood's report for each subgroup to focus on. He also mentioned the objective for the next month would be to have enough results from the surveys for the Projects & Estimates team to begin the framework for cost benefit factors.

**VIII. Adjournment**

The meeting was adjourned at 8:15 PM.

# **Proposed Pathways**

## **Summary Report**

Carlisle Borough Climate Action Commission

Pathways & Analytics Team

5 March 2021

## Section 1: GHG Inventory, Forecasts, and Targets

Since the early 1990s, U.S. cities have developed community-wide and local government operations greenhouse gas (GHG) inventories based on accounting protocols created by ICLEI. Known as the [U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions](#) and the [Local Government Operations Protocol](#), these standards created a credible and defensible methodology which accelerated the number of inventories created and provides consistency within and across U.S. communities. In 2014, ICLEI partnered with the World Resources Institute and C40 Climate Leadership Group to create the Global Protocol for Community Scale GHG Emissions, which allows communities around the world to compare their emissions footprint.

Community-wide greenhouse gas emissions were estimated for the Borough of Carlisle by Dickinson College students and staff, assisted by ICLEI Local Governments for Sustainability through the Local Government Climate Action Assistance Program of the Pennsylvania Department of Environmental Protection (DEP). GHG inventories were produced for two years, 2005 and 2017, and future emissions were projected to the year 2050 using ICLEI's ClearPath software tool (ICLEI 2014). Details of the inventory analysis are described in *Carlisle's Greenhouse Gas Emissions, Past and Future* (Leary et al. 2020), which is the source of the past and future emission estimates summarized below.

### 1.1. Community-Wide GHG Emissions

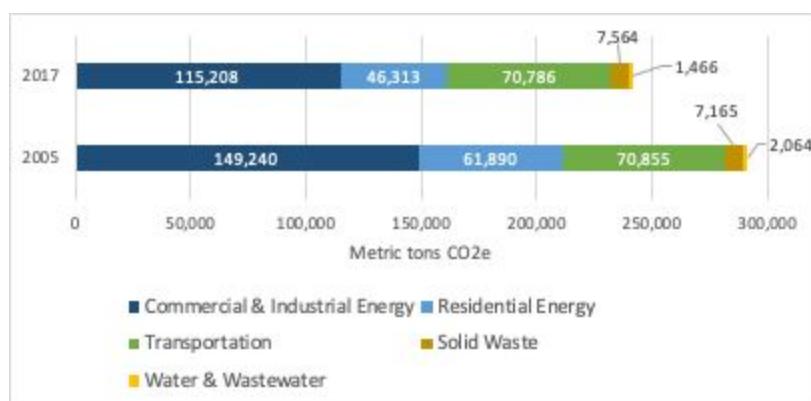
The inventory of Carlisle's GHG emissions includes emissions of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O), each of which add to the capacity of the atmosphere to absorb heat. The emissions are produced by a variety of activities of Borough residents, businesses, organizations and government agencies that include consuming electricity, natural gas, fuel oil and other energy sources for heating, cooling and powering appliances; burning motor fuels for transportation; landfilling solid waste; and treating drinking water and wastewater. Emissions of each type of greenhouse gas produced by these activities are converted into metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e) to provide a standard measurement of their contributions to climate change.

Emissions were estimated for five sectors for the years 2005 and 2017: commercial and industrial energy, residential energy, transportation, municipal solid waste, and water and wastewater. 2017 is the most recent year for which complete data is available to estimate emissions for Carlisle. Emissions were also estimated for 2005 because 2005 is the year used in the Pennsylvania Climate Action Plan as a benchmark against which

emission reductions are measured for the state. 2005 is also the year Carlisle has chosen as the benchmark against which to measure the Borough's emission reductions.

Carlisle's total GHG emissions in 2005 are estimated to be equivalent to just over 291,000 metric tons of carbon dioxide (MTCO<sub>2</sub>e), or 16.1 metric tons per resident (see Figure 1). From 2005 to 2017, estimated emissions declined 17.1% to roughly 241,000 MTCO<sub>2</sub>e, or 12.7 metric tons per resident. The decrease resulted primarily from a reduction in the share of electricity generated with coal, which produces high emissions per kilowatt hour (kWh) of electricity, and an increase in the share generated with natural gas, which produces less emissions per kWh.

**Figure 1: Emissions by Sector, 2005 and 2017**

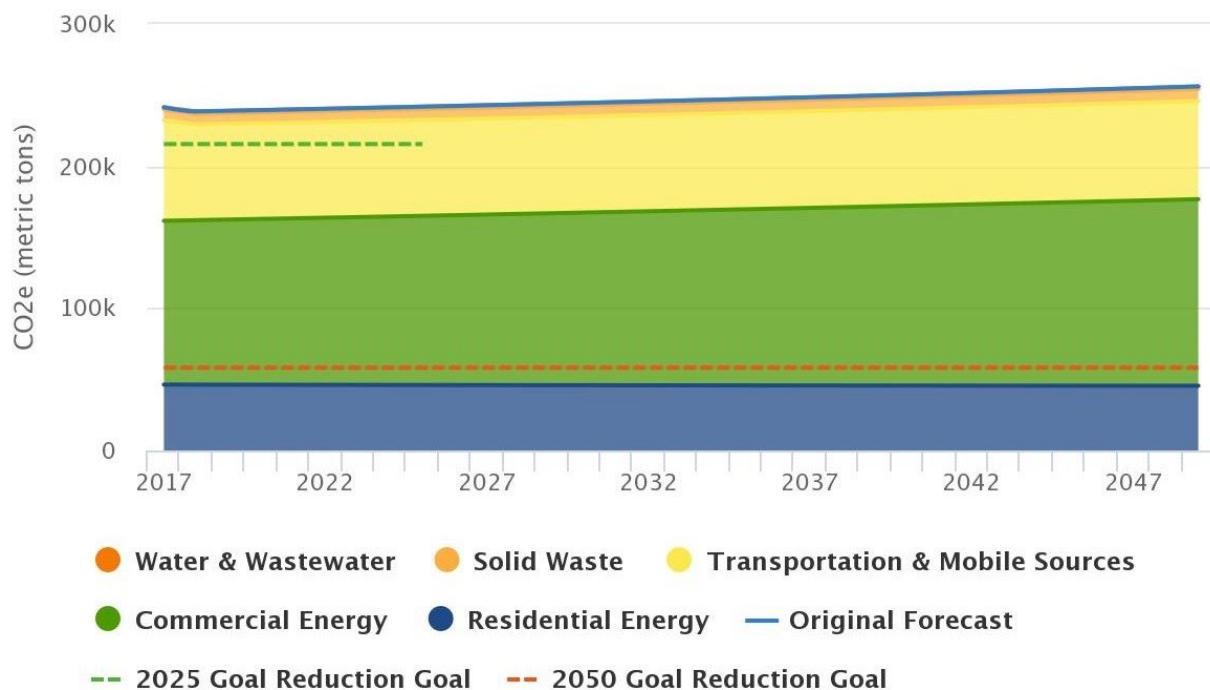


Commercial and industrial energy use produced the largest share of Carlisle's emissions in both 2005 and 2017, followed by transportation, residential energy, solid waste, and water and wastewater (see Figure 1). In 2017, commercial and industrial energy accounted for 47.7% of total emissions, transportation for 29.3%, and residential energy for 19.2%. Solid waste, water, and wastewater combined account for less than 4% of emissions.

## **1.2. Carlisle Borough's GHG Emissions & Emissions Reductions Targets**

While recognizing that the future is uncertain, a scenario of future emissions was constructed for 2020–2050, assuming that no new policies or actions would be implemented to limit emissions. This “No Action” forecast is a scenario estimating future emissions levels if no further local, state, or federal action (i.e. projects within this Climate Action Plan) were to take place. Under this and other assumptions, Carlisle's emissions are projected to grow slowly to almost 242,000 MTCO<sub>2</sub>e by 2025 and 257,000 MTCO<sub>2</sub>e by 2050, as shown in Figure 2.

**Figure 2: No Action Emissions Forecast**



The No Action scenario of future emissions assumes that no new policies or actions are taken at local, state or national levels that are designed to limit GHG emissions, promote fuel switching, or accelerate energy efficiency and conservation. Energy use in Carlisle is assumed to grow over the 2020 to 2050 time period at the same rate as has been projected for the state of Pennsylvania if there are no new policies or actions (PA DEP 2019). The amount of GHG emissions per kWh of electricity used in Carlisle is assumed to match the carbon intensity as was projected for the state, which rises slightly under assumptions that the share of nuclear power generated electricity declines and is replaced primarily by electricity generated with natural gas. Vehicle miles traveled in Carlisle is assumed to grow at the same rate as projected for the nation by the U.S. Energy Information Agency if there are no new policies or actions (USEIA 2020). Emissions from landfilling solid waste and from treating water and wastewater are assumed to grow at the same rate as Carlisle's population is projected to grow by the Cumberland County Planning Department (Cumberland County Planning Commission, 2017).

Through a Borough Council Resolution approved in July 2020, Carlisle Borough set targets to reduce its emissions to **26 percent below 2005 levels by 2025** and to **80 percent below 2005 levels by 2050**. You can see how these targets compare to the No Action Scenario in Figure 2.

## Section 2: Assumptions & Pathways

Local government policies and practices can reduce greenhouse gas emissions from a range of sources and help prepare Carlisle Borough for the anticipated impacts of climate change. In addition, Carlisle Borough will assist residents and businesses in their endeavors to reduce emissions through programs explained in this Plan. By working together, Carlisle Borough can not only do its part toward achieving a stable climate - we can reap the benefits of healthier air, lower costs for utilities and services, improved transportation and accessibility, a more vibrant local economy, and many other positive co-benefits of reducing our carbon footprint. Meeting these climate stabilization goals will require an energy transition using three broad strategies: reducing the carbon intensity of electricity generation by switching away from fossil fuels and replacing them with clean, renewable energy sources; switching away from fossil fuels and to electricity and other alternative energy sources for transportation and residential, commercial and industrial energy uses; and accelerating energy efficiency improvements.

Advancing a transition to a low carbon future will require actions by residents, businesses, utility providers, and local government. Also required are significant policy actions by both federal and state governments and widespread collaboration and partnerships with local government and other stakeholders. The modeling assumptions associated with these actions are laid out in Table 1. These assumptions were informed by careful consideration of the [2018 Pennsylvania Climate Action Plan](#) and actions included in Climate Action Plans from municipalities throughout Pennsylvania (Etna, Lancaster, Millvale, and Bellefonte) and the nation (Bedford, NY; Northfield, MN; Park Forest, IL). State and federal policymaking will be particularly critical in determining the rate at which we can decarbonize the electric grid (through fuel-switching and renewable energy) and how quickly electric vehicles (EV) can displace internal combustion engine (ICE) vehicles in the vehicle fleet. To account for this policy uncertainty, we modeled both “Rapid” and “Moderate” pathways informed by consideration of the [2018 PA Solar Future Plan](#) and [2019 PA Electric Vehicle Roadmap](#).

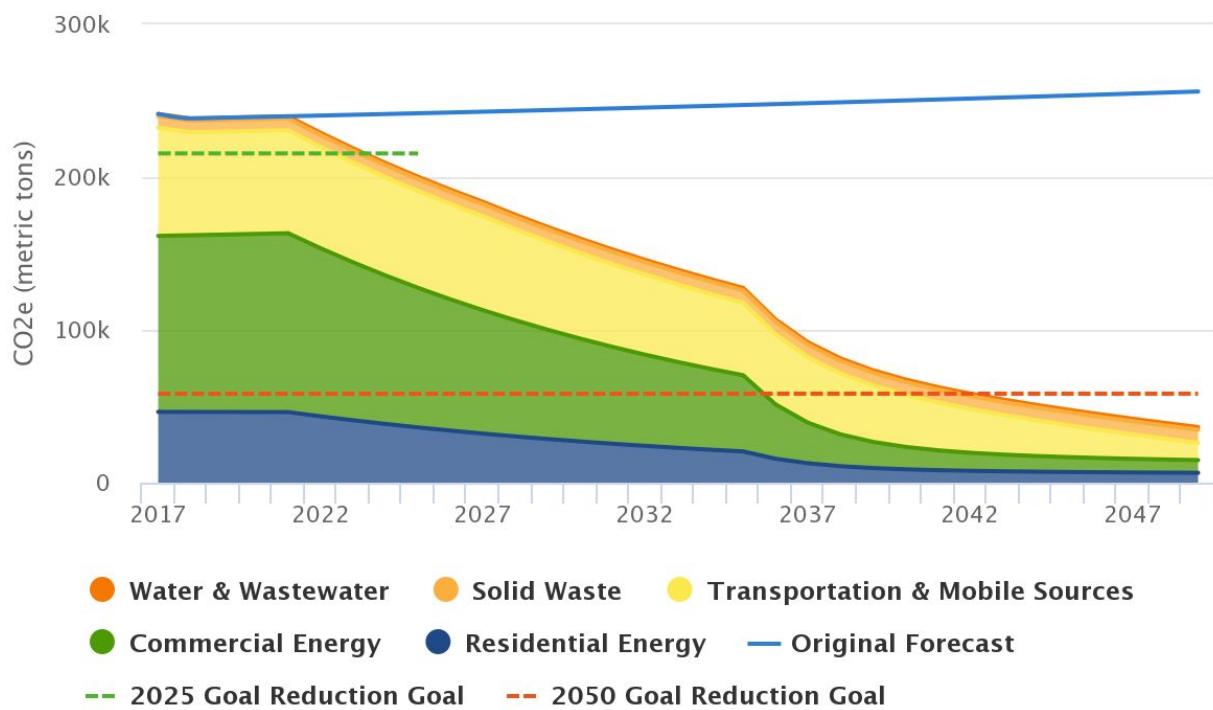
The Rapid and Moderate Reduction Pathways are shown in Figures 3 and 4. These pathways yield the emissions reductions by 2050 in each sector (relative to 2005 levels) in Tables 2 and 3. The Moderate pathway falls short of emissions reduction targets, reaching **25%** (below 2005 levels) in 2025 and **69%** in 2050. The Rapid pathway exceeds the emission reduction targets, achieving **31%** (below 2005 levels) in 2025 and **88%** in 2050.

**Table 1. Assumptions & Goals**

	<b>Moderate</b>	<b>Rapid</b>
<b>Electric Grid</b>		
% zero carbon electricity by 2035	30%	50%
% zero carbon electricity by 2050	60%	100%
<b>Transportation</b>		
<i>Vehicle miles traveled relative to No Action baseline</i>		
Passenger LDV: % reduction VMT by 2050	15%	30%
Commercial HDV: % reduction VMT by 2050	10%	20%
<i>Electric Vehicle Adoption</i>		
Passenger Light Duty Vehicles		
EV % of fleet by 2027	3.50%	5%
EV % of fleet by 2036	21%	30%
EV % of fleet by 2050	63%	90%
Commercial Heavy Duty Vehicles		
EV % of fleet by 2027	1.75%	2.50%
EV % of fleet by 2036	10.50%	15%
EV % of fleet by 2050	31.50%	45%
<b>Commercial energy efficiency &amp; fuel switching</b>		
% reduction electricity use per sq ft by 2050	20%	40%
% reduction gas use per sq ft by 2050	20%	40%
% gas use supplied by renewable gas	40%	80%
% switching from gas to electricity	30%	60%
<b>Residential energy efficiency &amp; fuel switching</b>		
% reduction electricity use per household by 2050	20%	40%
% reduction gas use per household by 2050	20%	40%
% gas use supplied by renewable gas	40%	80%
% switching from gas to electricity	30%	60%

Notably, in Tables 2 and 3, the distribution of emissions reductions across different sectors is driven largely by three factors. First, in 2017, commercial and industrial energy accounted for 48% of total emissions, transportation for 29%, and residential energy for 19%. Solid waste, water, and wastewater combined account for less than 4%. The distribution of emission reductions follow this same pattern. Second, decarbonization of the electric grid, electrification, and fuel-switching from fossil gas to renewable gas are responsible for a majority of emissions reductions in both

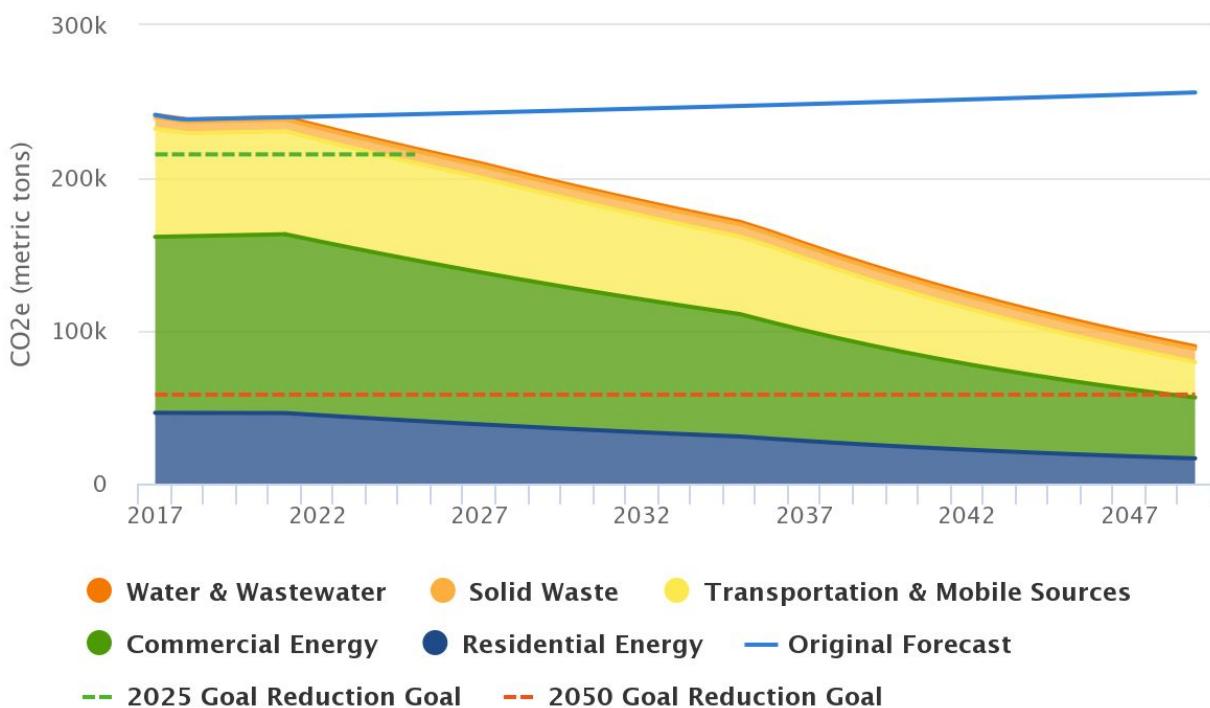
**Figure 3: Rapid Reductions Pathway**



**Table 2: Rapid Reductions Pathway**

Sector	Description	# of Distinct Actions	Rapid			
			Change from 2005 Baseline (mTCO <sub>2</sub> e)	% Change from 2005 Baseline	Target Emissions (mTCO <sub>2</sub> e)	Gap* (mTCO <sub>2</sub> e)
Water & Wastewater	Policies and programs to reduce water demands and corresponding wastewater treatment needs.	TBA	-336	-16.3%		0.1%
Solid Waste	Policies and programs to reduce solid waste generation.	TBA	1,431	20.0%		-0.6%
Transportation & Mobile Sources	Policies and programs to reduce on-road vehicle miles traveled and promote electric or low emission vehicles.	TBA	-59,574	-84.1%		23.4%
Commercial Energy	Policies and programs to reduce commercial, municipal, and industrial sector energy use and emissions through grid decarbonization, fuel-switching, and conservation.	TBA	-140,918	-94.4%		55.3%
Residential Energy	Policies and programs to reduce residential sector energy use and emissions through grid decarbonization, fuel-switching, and conservation.	TBA	-55,458	-89.6%		21.8%
* green = exceed target; red = fall short			<b>TOTALS</b>	<b>-254,855</b>	<b>-87.5%</b>	<b>58,243</b>
						<b>-21,882</b>

**Figure 4: Moderate Reduction Pathway**



**Table 3: Moderate Reductions Pathway**

Sector	Description	# of Distinct Actions	Moderate			
			Change from 2005 Baseline (mTCO2e)	% Change from 2005 Baseline	Target Emissions (mTCO2e)	Gap* (mTCO2e)
Water & Wastewater	Policies and programs to reduce water demands and corresponding wastewater treatment needs.	TBA	-336	-16.3%		0.2%
Solid Waste	Policies and programs to reduce solid waste generation.	TBA	1,431	20.0%		-0.7%
Transportation & Mobile Sources	Policies and programs to reduce on-road vehicle miles traveled and promote electric or low emission vehicles.	TBA	-47,687	-67.3%		23.7%
Commercial Energy	Policies and programs to reduce commercial, municipal, and industrial sector energy use and emissions through grid decarbonization, fuel-switching, and conservation.	TBA	-109,368	-73.3%		54.3%
Residential Energy	Policies and programs to reduce residential sector energy use and emissions through grid decarbonization, fuel-switching, and conservation.	TBA	-45,375	-73.3%		22.5%
* green = exceed target; red = fall short			<b>TOTALS</b>	<b>-201,335</b>	<b>-69.1%</b>	<b>58,243</b>
						<b>31,638</b>

commercial and residential energy. And, third, the absence of modeled reductions in emissions from landfilling solid waste and treating water and wastewater are due to limitations in ClearPath. Changes in the carbon intensity of electricity should change emissions from water/wastewater and solid waste as these sectors would also be using cleaner electricity, but we cannot model these changes in grid intensity in the same way that we were able to for transportation, residential, and commercial. Furthermore, no policies directly targeting these sectors were included in our modelling scenarios in Table 1. As we begin modelling the more granular policies, in consultation with the broader Climate Action Commission the distribution of emissions reductions in Tables 2 and 3 is likely to change.

### Section 3. References

Cumberland County Planning Commission. 2017. [Cumberland County Comprehensive Plan, Background Chapter, Population and Socioeconomic Profile](#), Cumberland County, PA.

ICLEI. 2014. [ClearPath User Guide, An ICLEI USA Tool](#). ICLEI – Local Governments for Sustainability, Denver, CO.

Pennsylvania Department of Environmental Protection. 2019. [Energy Assessment Report for the Commonwealth of Pennsylvania](#). Prepared for the PA DEP, Department of Energy, by ICF.

U.S. Energy Information Administration. 2020. [Annual Energy Outlook 2020 with Projections to 2050](#). U.S. Department of Energy, Washington, DC.