Piedmont Climate Action Plan Task Force
Meeting #2 - Tuesday, April 25th, 2017
Buildings and Energy Use Sector Review

1. Background

Nationwide, residential and commercial energy use comprise about 40% of total U.S. energy consumption. In Piedmont, the building sector has consistently accounted for nearly half of community greenhouse gas emissions, 53% in 2005, 56% in 2010, 49% in 2014, and 50% in 2015. In 2015, the majority of building energy emissions, 46%, are attributed to the residential building sector and 4% to commercial building energy use.

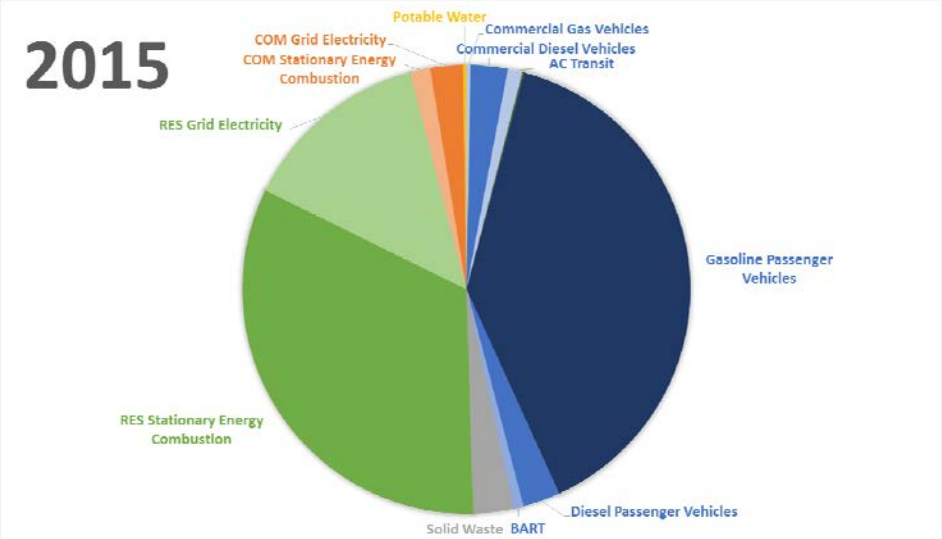

Figure 1. Piedmont's 2015 GHG Emissions by Sector

The Buildings and Energy Use section of the Climate Action Plan addresses GHG emissions produced by the stationary combustion of natural gas within Piedmont's borders and the emissions associated with electricity consumption. Piedmont's current Climate Action Plan has 24 actions aimed at reducing GHG emissions in the Building and Energy sector. These measures included reducing energy use across residential, commercial, and municipal buildings, increasing renewable energy production, and encouraging energy audits. Many of the measures and actions laid out in the current plan have been partially or completely implemented, while others have proven infeasible. These reasons, along with rapidly increasing technology in the building energy sector, has left the current plan with room for improvement. The proposed Buildings and Energy Use objectives and measures presented to you are a combination of existing measures that have been updated and new best practices.

2. Residential Building Energy Forecasting Scenarios

In 2015 Piedmont building's accounted for the following energy consumption and GHG emissions:

- **Natural Gas:** 2,393,177 Therms, 12,728 MTCO2e
- **Grid Electricity:** 27,158,269 KWH, 5,314 MTCO2e
- **Residential Buildings & Energy Total:** 18,042 MTCO2e

Based on energy use trends and population growth, City staff projected Piedmont's GHG emissions 2030. The following three forecasting scenarios allow us to imagine the potential GHG reductions in the Residential Buildings & Energy sector over the next 13 years.

- **Scenario 1:** State enacts policies that achieve its goal of 100% renewable electricity by 2050 and Piedmont's natural gas and electricity usage continue to decrease at their current rates.

  Projected 2030 Emissions:
  - **Natural Gas:** 7,576 MTCO2e - 40% reduction
  - **Grid Electricity:** 1,549 MTCO2e - 70% reduction
  - **Residential Buildings & Energy Total:** 9,125 MTCO2e - **50% below 2015**

  Notes: This linear estimate may be inaccurate due to a dramatic drop in natural gas use in 2014 and 2015. If we return to cooler winters, natural gas use will rise. The reduction in electricity usage is likely attributable to increased efficiency and residential solar panels. Therms and kWh are not provided since modeling was completed using Clearpath.

- **Scenario 2:** Increase energy efficiency resulting in a 50% reduction in stationary energy combustion (natural gas usage) and maintain 2015-level electricity use, but source 80% of electricity from non-carbon sources.

  Projected 2030 Emissions:
  - **Natural Gas:** 1,196,589 Therms, 6,364 MTCO2e
  - **Grid Electricity:** 27,158,269 kWh, 4,227 MTCO2e
  - **Residential Buildings & Energy Total:** 10,592 MTCO2e - **41% below 2015**

  Notes: Efficiency would require retrofitting existing building to more efficiently store heat and upgrading appliances to be efficient as well as constructing highly efficient new buildings. This 50% reduction in building energy use is consistent with state goals for 2030.

- **Scenario 3**: Reduce natural gas use by 95% through fuel-switching, increase electricity use by 200%, and source 80% of electricity from non-carbon sources.

  Projected 2030 Emissions:
  - **Natural Gas:** 119,659 Therms, 636 MTCO2e
  - **Grid Electricity:** 53554429 kWh, 8,337 MTCO2e
  - **Residential Buildings & Energy Total:** 8973 MTCO2e - **50% below 2015**

  Notes: Fuel-switching involves converting existing natural gas appliances to electric appliances. The 200% increase in electricity use comes from estimating the electricity consumption required to replace natural gas space and water heating with electric.

3. Proposed Buildings and Energy Sector Objectives, Measures, and Actions

In order to meet the draft target established by the Piedmont Climate Action Plan Task Force at their first meeting and be in compliance with state targets, Piedmont must reduce its GHG emissions 40% below 2005 levels by 2030 and 80% below 2005 levels by 2050. Given that a substantial portion of

Piedmont's emissions are from buildings, we believe Piedmont should set two main goals for emissions reduction within this sector:

- Source 80% of electricity from renewable sources by 2030; and
- Reduce natural gas use by 50%.

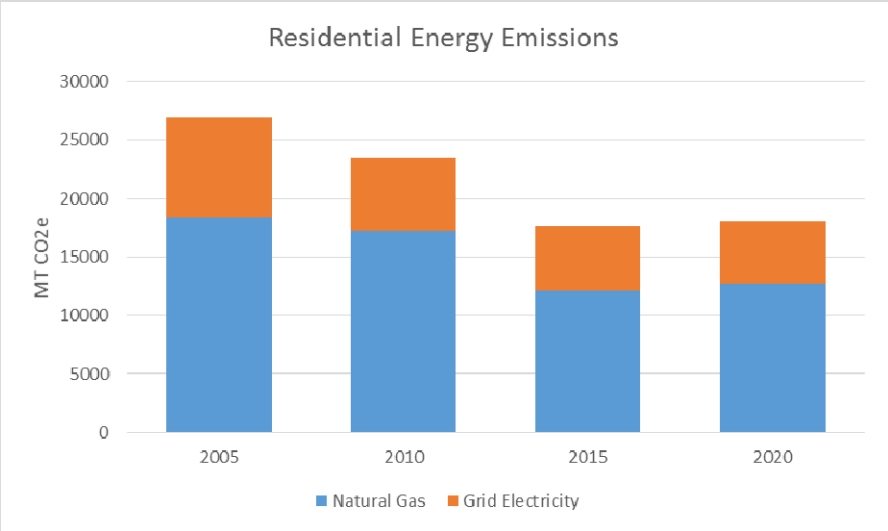

Figure 2. Piedmont's Residential Energy Consumption by Fuel Type

In order to achieve these goals, Piedmont must increase electricity sourced from renewables, combined with distributed energy storage; update utility infrastructure; increase the efficiency of buildings and appliances; and switch from natural gas to electric appliances. These "Measures" and "Actions" are provided in attached tables in support of overarching "Objectives." For the Building and Energy sector, as well as the sectors that will follow in subsequent months, we ask that you:

- Evaluate the **Objectives** for their potential to be accomplished;
- Evaluate the **Measures** for their capacity to serve the objective; and
- Evaluate the **Actions** for (1) their potential to reduce emissions and (2) the likelihood that Piedmont businesses and residents will be able to implement them.

The majority of time in the meeting will be allocated to evaluating the effectiveness of the actions. Please read through the document and provide recommendations on the listed actions and, if necessary, recommend new actions. If possible, we encourage that you provide comments to staff ahead of the meeting so that they may be distributed to your fellow Task Force members. Once a more final list has been recommended, staff will continue to work on projected GHG emissions reductions, costs, feasibility, and other details that will be available for review in the draft 2030 Climate Action Plan.

4. Enclosures:

- Proposed Buildings and Energy Use Sector Measures, Objectives, and Actions

Buildings and Energy Use

Source of emissions: stationary combustion of natural gas, electricity use, and lifecycle emissions of materials

Goal: Reduce building energy consumption, source 80% of electricity from renewable sources by 2030, and reduce natural gas use by 50%

Pathway to success: Increase electricity sourced from renewables combined with distributed energy storage; update utility infrastructure; increase building and appliance efficiency, replace natural gas appliances with electric

	Related 2010 CAP Action (if applicable)
Objective: Reduce Residential Building Energy Use by 65%	
Measure: Disclose building energy consumption	
Develop a residential and/or multi-family energy assessment ordinance requiring disclosure at the time of sale, major remodel, rental, or other trigger point	**BE-2.1 A**
Partner with home energy audit providers to develop public outreach programs on residential energy efficiency retrofits, with a focus on post audit follow-through	**BE-2.3A**
Partner with the energy provider to create a program like EBMUD's "My Water Report Program" to provide residents with efficiency recommendations, comparison to nearby homes, and information on energy efficiency news	**BE-6.3A**
Measure: Reduce electricity and natural gas consumption	
Encourage utilities' to develop and implement demand-side management programs	
Promote and incentivize residential energy conservation and efficiency retrofits (i.e. insulation, energy-efficient windows, etc.) for existing buildings	**BE-2.2A, BE-2.2B, BE-2.2C**
Require the installation of energy conserving appliances and fixtures, such as on-demand tank-less water heaters, Energy Star appliances, and LED lightbulbs	
Promote Property Assessed Clean Energy (PACE) financing and other energy improvement financing programs	**BE-2.2A**
Require Zero Net Energy (ZNE) construction for new construction	
Develop an energy roadmap for homeowners - a basic 'how-to' guide on reducing energy consumption and making cost-effective energy efficiency renovations	
Host educational events on the availability of statewide code changes, energy retrofits, financing options, and the benefits of GHG reduction efforts	
Create a residential energy reduction challenge program	
Provide case studies/awards/highlights for property owners who set good sustainability examples (i.e. solar, LEED, drought-tolerant landscape, etc.)	
Measure: Switch from natural gas to electric appliances, paired with renewable energy	
Educate residents on the options for electric appliances, such as furnaces, water heaters, dryers, stoves, and more, as well the importance of pairing electrification with the installation of renewable energy	
Require electric appliances for new construction	
Provide incentives to convert existing residences from natural gas to electric appliances	
Objective: Reduce Commercial Building Energy Use by 50%	
Measure: Disclose building energy consumption	
Develop a commercial energy assessment ordinance requiring disclosure at the time of sale, major remodel, rental, or other trigger point	**BE-3.1A**
Partner with energy audit providers to develop public outreach programs on commercial energy efficiency retrofits, with a focus on post audit follow-through	**BE-3.2B**
Measure: Reduce electricity and natural gas consumption	
Educate commercial building owners on PG&E's Automated Demand Response and other energy management programs	
Provide 100% of commercial building owners with information on Smart Lights, BEST, and other commercial energy efficiency programs	**BE-3.2C, BE-3.3A**
Promote and incentivize commercial energy conservation and efficiency retrofits (i.e. insulation, energy-efficient windows, etc.) for existing buildings	**BE-3.2A, BE-3.2B, BE-3.2C, BE-3.3A**
Require the installation of energy conserving appliances and fixtures, such as on-demand tank-less water heaters, Energy Star appliances, and LED lightbulbs	
Promote Property Assessed Clean Energy (PACE) financing and other energy improvement financing programs	**BE-3.2A, BE-3.2C**
Require Zero Net Energy (ZNE) construction for new construction	

Measure: Switch from natural gas to electric appliances, paired with renewable energy	
Educate business owners on the options for electric appliances, such as furnaces, water heaters, and more, as well the importance of pairing electrification with the installation of renewable energy	
Require electrification of appliances for new construction	
Provide incentives to convert existing commercial buildings from natural gas to electric	
Objective: Increase Renewable Energy to 100%	
Measure: Pass a City resolution committing Piedmont to being a renewable energy city	
Resolve to meet 100% of community-wide electricity demand with renewable energy sources by the year 2030	
Measure: Install on-site renewable energy	
Require all new construction or existing buildings that increase their area by more than 75% to install on-site solar to off-set at least 75% of their electricity usage	
Target 100% of buildings with solar to install battery storage	
Require buildings that undergo roof replacements to be "solar ready"	
Increase outreach for solar installation programs and incentives, including community-based social marketing campaigns, public workshops, and partnering with utilities	**BE 5-1A, BE-5.1B**
Measure: Increase the amount of renewable energy delivered through the grid	
Join East Bay Clean Energy (EBCE) and provide educational support to residents throughout to transition to Community Choice Energy (CCE)	**BE-6.2A**
Encourage EBCE to have a deep green (100% renewable) option and target 50% of residents selecting this option by 2025 and 75% by 2030	
Objective: Partner with Schools to Reduce Energy Use	
Measure: Reduce energy consumption in school buildings	
Create a building energy performance challenge in schools to both reduce energy use and educate students on energy efficiency	
Partner with public schools to implement green building strategies for new construction or renovations	
Objective: Reduce Local Air Pollution and High Global Warming Potential Gases	
Measure: Decrease the impact of Piedmont's building stock on pollution and GHG emissions	
Prohibit wood-burning fireplaces in new development and encourage retrofitting existing wood-burning fireplaces with natural gas or electric alternatives	
Require that new air conditioning and refrigeration units use refrigerants with low global warming potential (e.g. CO2 or ammonia instead of hydrofluorocarbons)	
Require the installation of exterior electrical outlets to promote the use of electric landscape maintenance equipment	
Objective: Investigate Infrastructure Upgrades and New Technologies	
Measure: Consider district heating	
Assess the potential for district heating in Piedmont, including a density assessment to evaluate potential costs, mapping the City's heating and cooling demand (including building stock and consumption data)	
Map the city's local heat and cooling demand (data on building stock, owners, storage, consumption data)	
create an energy plan that integrates district energy into land use, require energy assessments for new developments	
Measure: Investigate possibilities for micro-grids	
Explore micro-grids as a carbon reduction and resiliency strategy	
Coordinate and map micro-grids for energy reliability in the case of a natural disaster	
Measure: Explore deep decarbonization infrastructure changes	
Phase out natural gas appliances and reduce the need for new natural gas lines	

The following Actions are suggested to be removed and not included in the updated 2030 Climate Action Plan:	Reason for exclusion:
BE-2.1B: Work with StopWaste to verify that the required efficiency upgrade package achieves at least 20% improvement in the average Piedmont home.	Participation rates in Energy Upgrade California have been very low (less than 1% of Piedmont households). Therefore, we instead recommend focusing on uptake in the participation of this program and other similar ones.
BE-3.1B: Verify that the required efficiency upgrade package achieves at least 12% improvement in average Piedmont commercial buildings.	See comment above.
BE-4.1A: Consider adopting an expanded Green Building Ordinance incorporating energy and water efficiency standards contained in Chapter 5 and 6 of the 2008 California Green Building Code if such standards are necessary to achieve the community's GHG reduction target.	CA Building Codes continue to develop aggressively regarding energy efficiency, including pushing towards Zero Net Energy, decreasing the need to enact our own standards.
BE-4.2B: Adopt incentive programs for new construction to exceed required energy efficiency	See comment above. Additionally, the building industry has advanced enough that we could encourage requiring energy efficiency or ZNE in new construction, not just incentives, which is reflected in the proposed Actions.
BE5.2-A: Investigate and join existing efforts to effect renewable transit energy sources	Local transit systems are decreasing the carbon intensity of their fleet and Piedmont has limited influence over this.

Note that Actions under "Objective BE-1: Reduce Energy Use in City Facilities" are excluded from the proposed tables on the previous sheet. These will either be incorporated into a new Municipal Sector or incorporated back into Buildings and Energy Use after review.