ASPEN'S CLIMATE ACTION PLAN

A Roadmap to Our Sustainable Future

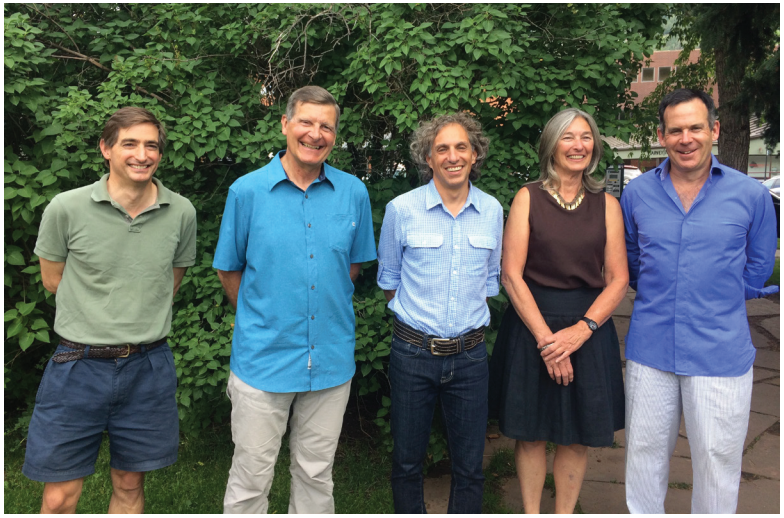
Letter from Aspen City Council

December 12, 2017

To the Aspen community and our visitors,

It is our pleasure to introduce Aspen's new Climate Action Plan (CAP), which sets the stage for continuing and growing Aspen's legacy of climate leadership. When Aspen released its first CAP in 2007, we became one of the first mountain communities in the United States to adopt ambitious climate goals. This commitment reflects the community's understanding that a stable climate is foundational to the Aspen that we know and love, and that climate action delivers direct quality of life benefits.

Opportunities to reduce emissions are more practical, abundant and economical than they ever have been. To accelerate our movement in the right direction, the CAP maintains Aspen's ambitious greenhouse gas (GHG) reduction targets. We are confident that Aspen and the Roaring Fork Valley community can rise to the challenge of meeting these goals, based on our past work and forward thinking, committed community, policy makers, and businesses.



Aspen's 2017 City Council is proud to continue and expand the community's legacy of climate leadership. From left: Bert Myrin, Ward Hauenstein, Mayor Steve Skadron, Ann Mullins, Adam Frisch

One of Aspen's hopes in becoming an early leader was that other communities would take notice. Today, local governments acting on climate is a global phenomenon. In 2007, few cities had adopted formal commitments. Today, thousands of communities around the world, hundreds around the country and dozens in Colorado have committed to climate action. Collectively, these commitments embody the potential for reducing global GHG emissions at the volumes necessary to maintain a livable planet.

There has never been a better time to turn commitment into action. As history has shown, Aspen has a civic responsibility to act on behalf of its constituents, a moral imperative to take the steps necessary to meet the challenge of climate change, and the potential to be a catalyst for meaningful and effective action around the state, country and world. Implementing this CAP refocuses Aspen's commitment to its future and will usher in the next phase of local climate leadership.

We urge all to join us. Together we can make a difference that benefits our beautiful region and has an impact far beyond it.

Mayor Steve Skadron and City Council members Adam Frisch, Ann Mullins, Bert Myrin and Ward Hauenstein

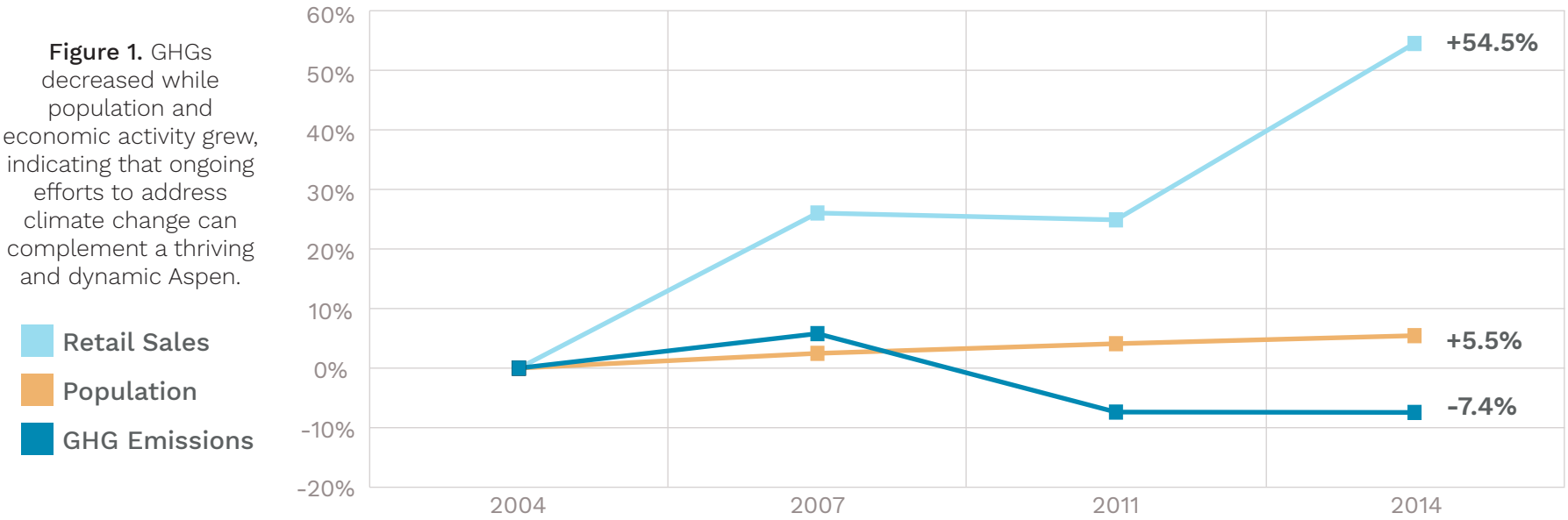
Table of Contents

Letter from Aspen City Council 2
Executive Summary 4
Welcome to Aspen's Climate Action Plan 6
High-Impact Sectors 8
Climate Action Mitigates Risk and Creates Opportunities 9
Climate Action is a Community Value 10
CAP and Toolkit: What's the Difference? 11
Aspen's GHG Emissions 12
GHG Emissions Forecast 14
GHG Reduction Potential 15
Understanding the CAP's Recommendations 16
Key & Definitions 17
Energy Supply 18
Residential Energy 22
Commercial Energy 26
Vehicles & Transportation 30
Waste & Landfill 35
Aviation & Airport 40
Considerations for Implementation 45
Organizational Capacity Recommendations 46
Conclusion 47
Acknowledgments 48
Appendix A: How the CAP was Developed 50
Appendix B: A Summary of Relevant Climate Science 51
Appendix C: Related Documents 53
Appendix D: Literature Cited 54

Executive Summary

The Aspen community's first Climate Action Plan was adopted in 2007 and set the stage for 10 years of targeted and effective programming. Originally written as a two-year strategy, decision-makers and community members have continued leveraging the framework and priorities, resulting in an Aspen that has been able to reduce greenhouse gas (GHG) emissions despite growth in population and economic activity (Figure 1). Successful implementation of and growth from the original plan also positioned Aspen as a community known for leadership in climate planning, policy, and action; a position that has provided City leaders with a credible voice in a variety of state, national and international climate-related initiatives. Given the success of the original Climate Action Plan, direction from community members and elected official to bolster efforts, a need to align climate planning with the current priorities and opportunities, and an accelerated impetus to reduce GHGs, this substantive update is timely.

Figure 1. GHGs decreased while population and economic activity grew, indicating that ongoing efforts to address climate change can complement a thriving and dynamic Aspen.



Aspen's new Climate Action Plan (CAP) identifies 46 actions to reduce GHG emissions in six sectors and recommends their implementation. Conceived as a roadmap for achieving the community's long-term GHG reduction goals, this CAP is one segment on the longer journey to reducing emissions 80% by 2050. The CAP focuses on actions that can be taken beginning in 2018 and through 2020, setting the stage for the programs and initiatives of the future — those have been identified in the comprehensive GHG Reduction Toolkit[1]. Analysis and modeling were a key component of the CAP process and indicate that it is technologically possible to get very close to the near carbon-free Aspen that community members and leaders have long aspired to achieve. Unless local and regional climate action initiatives are significantly bolstered, GHGs will grow slightly by 2050, even if today's level of commitment is maintained (Figure 2).

[1] The GHG Reduction Toolkit is a companion document to the CAP, containing a comprehensive list of objectives and actions to reduce GHG emissions. It is available at: https://www.cityofaspen.com/DocumentCenter/View/1705.

Executive Summary (Continued)

Analysis and modeling were but one component of the CAP's development: its greatest substance lies in the robust stakeholder process that identified many possibilities for reducing GHGs, and then prioritized a subset for implementation over the next three years. The selected actions create a CAP that is innovative but also implementable. The recommendations can be found in corresponding sector chapters, and are accompanied by rankings on how much each one could reduce GHG emissions and information on the co-benefits that might accompany implementation.

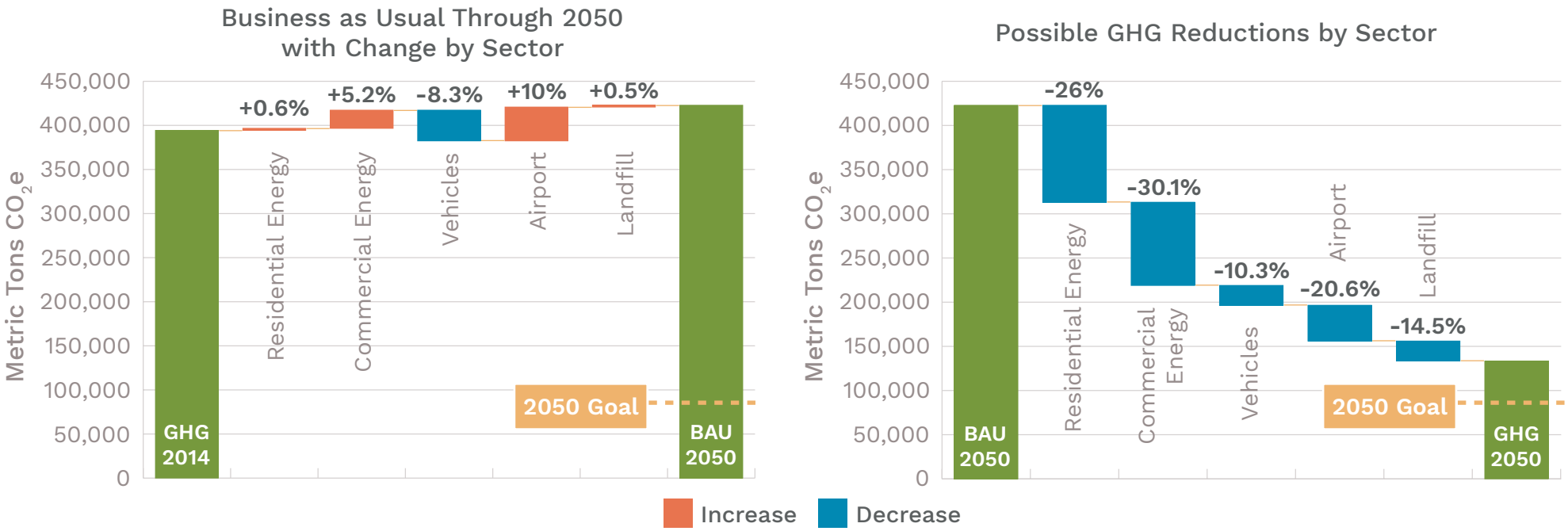


Figure 2. Community-wide GHGs are likely to grow between now and 2050 if the current level of climate action in Aspen continues. On the other hand, if efforts increase dramatically and all objectives in the GHG Reduction Toolkit are achieved, Aspen could get very close to reaching its 2050 goal.

The CAP was developed in collaboration with a diversity of partners representing all GHG sectors, which cultivated a spirit of shared ownership for the real work of moving from Plan development to actual implementation. This is the **community's CAP**, and while specific organizations, entities or City departments may take the lead in implementing certain initiatives, success will require deliberate partnership and collaboration. In short, no single organization or department is solely responsible for full execution of the CAP. Success must be realized as an all hands-on deck effort.

Welcome to Aspen's Climate Action Plan

A roadmap to our sustainable future: This Plan is the Aspen community's roadmap for reducing GHG emissions and envisioning what a low-carbon Aspen and Roaring Fork Valley could look like. Intended for policy makers, citizens, planners, and others interested in reducing GHGs while enhancing quality of life, Aspen's CAP sets immediate priorities while providing a comprehensive planning resource for the mid- and long-term future.

Measurable and target-oriented: The CAP is a strategy to intentionally move toward achieving the community's long-term GHG reduction goals. Aspen began measuring its community-wide GHG emissions in 2004 and is committed to reducing them 30% by 2020 and 80% by 2050. The long-term target is consistent with what the international scientific community believes is necessary to constrain global warming to 2°C[i] and is aligned with multinational commitments that uphold the Paris Climate Agreement.

A three-year plan looking far beyond: While looking forward to 2050, Aspen's CAP presents a three-year strategy focusing on innovative yet implementable steps that should be taken beginning in 2018 and maturing by the end of 2020. While directly reducing GHG emissions, the recommended actions also set the stage for continued and expanding reduction opportunities. A comprehensive list of strategies that could build on the CAP from 2020 onward have been identified and published in a companion document, the GHG Reduction Toolkit. The actions prioritized in the CAP, as well as those identified in the Toolkit, were developed over the course of four work sessions with a group of more than 40 regional experts known as the Advisory Committee[2]. The CAP pulls its priorities from the Toolkit, and the actions presented for implementation between 2018 and 2020 were selected by the Committee. Thus, this CAP considers a full spectrum of GHG reduction opportunities, reflecting and prioritizing those that regional experts agree merit focus over the next three years.

Intended use: The CAP should be used as a roadmap and springboard for developing implementation strategies for each of the recommended actions, and then applying them. The implementation pathway for each CAP action will be unique, requiring stakeholder input and support, and relying on a variety of mechanisms to be effective.

Aspen's Climate Action Plan is the community's second CAP, and the first comprehensive update to the original, adopted by Aspen City Council in 2007.

[2] A list of Advisory Committee members is available in the *Acknowledgments* section.

Welcome to Aspen's Climate Action Plan (Continued)

A comprehensive approach: This CAP is not simply a literature review of best practices and innovative ideas that might work in Aspen. The recommendations in each sector are based on extensive analysis, modeling, deliberation, stakeholder input, and community engagement[3] to ensure buy-in and feasibility. Further, the CAP aims to complement the multitude of existing or developing plans and City-wide goals in related areas such as transportation, energy supply, and waste diversion.

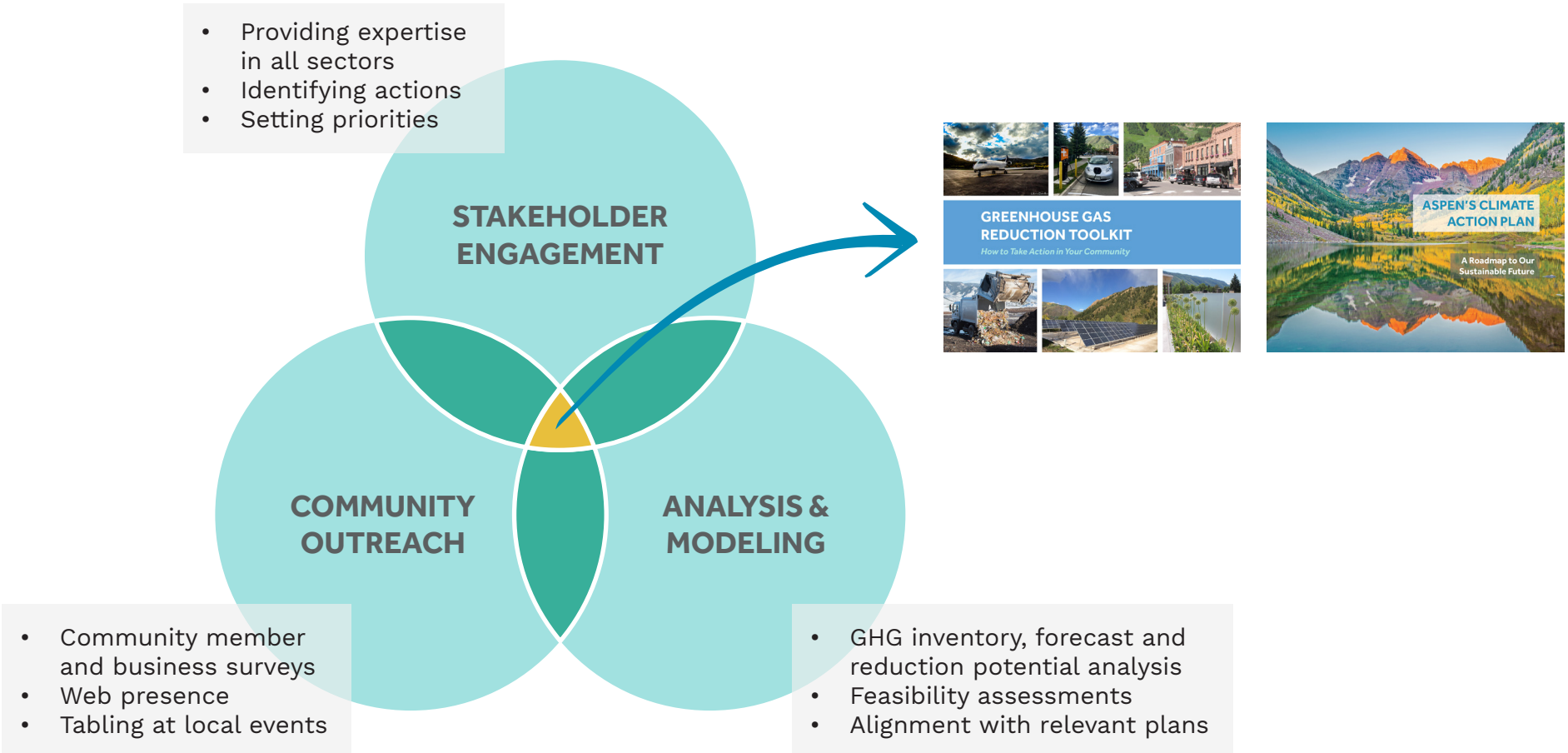


Figure 3. This comprehensive approach has produced a CAP that is innovative, implementable, and correlates with the community's willingness to act.

[3] The Climate Action Planning Outreach and Engagement Report is a companion document to the CAP and details community outreach, surveying and engagement efforts that occurred during the planning process to complement and inform CAP implementation. It is available at https://www.cityofaspen.com/DocumentCenter/View/1783 or by emailing climate@cityofaspen.com.

High-Impact Sectors

The CAP addresses emissions stemming from Aspen's six most significant GHG sectors[4].

Full descriptions of these sectors are provided in their respective chapters.

ENERGY SUPPLY

How electricity powering the community is generated

RESIDENTIAL ENERGY

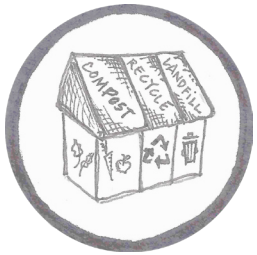
How energy of all types is used in residential buildings

COMMERCIAL ENERGY

How energy of all types is used in commercial buildings

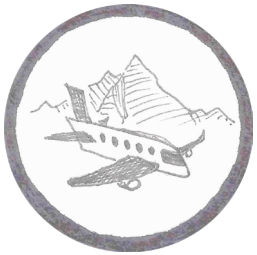
VEHICLES & TRANSPORTATION

The on-road movement of people, goods and services in private, transit and fleet vehicles



WASTE & LANDFILL

The solid waste generated by the community and how it is transported to the landfill



AVIATION & AIRPORT

Aircraft operations as well as energy use and transportation directly attributable to airport operations and passengers

[4] Tracking and mitigating GHGs from these sectors aligns with national and international best practices as stipulated by both the *US Community Protocol* (ICLEI) and the *Global Protocol for Communities* (World Resources Institute).

Climate Action Mitigates Risk and Creates Opportunities

Aspen has been a leader in local climate action for 15 years. During that time, the community's resolve for reducing GHGs has strengthened. A wealth of scientific data, empirical local results, applied experience, and community sentiment indicate that:

- The severity of climate change in Aspen is directly tied to global GHG emissions.
- Cumulatively, local action provides a significant opportunity to affect global emissions.
- Climate action in Aspen has and will continue to improve local quality of life. Examples include reduced traffic and congestion, improved air quality, stable and affordable electricity rates and a more comfortable and efficient built environment.
- Reaching Aspen's GHG reduction goals is a long-term process made up of incremental accomplishments made possible by a large variety of organizations and individuals.
- Doing all we can in Aspen allows local governments and community groups to more credibly and effectively be a voice for favorable progress in state and federal policy.

Now more than ever, Aspen faces unprecedented risk and opportunity related to climate change. But Aspen does not face this risk alone. Without substantial reductions in global GHG emissions, it is almost certain that this region will experience significant and damaging warming during the lifetimes of its residents and visitors[ii]. Aspen is poised to take advantage of opportunities to reduce its carbon output. There has never been such a diversity of locally-implementable solutions available, nor the ability to leverage local success stories to advance state and federal policy.

Aspen's climate efforts include local action, in addition to multi-city efforts that leverage successes and commitments at the state, national and international level. These partnerships include:

1. **Compact of Colorado Communities**
2. **Colorado Communities for Climate Action**
3. **Global Covenant of Mayors**
4. **America's Pledge/We are Still In**
5. **Climate Mayors**
6. **CDP**
7. **ICLEI USA and Carbonn**
8. **Urban Sustainability Directors Network**
9. **Citizens' Climate Lobby**

Climate Action is a Community Value

Aspen and Pitkin County's commitments to protecting the health, prosperity and safety of its residents by acting on climate are not new. Efforts date to the 1989 adoption of the Ecological Bill of Rights. This philosophy stipulates rights to clean air, healthy ecosystems, and renewable energy. The community has since advanced and maintained these values as an integral part of its fabric in a multitude of ways, which include:

- Formation of the Canary Initiative (the original name for the City of Aspen's Climate Action Department) and completion of the first GHG inventory in 2004.
- Development of first the Climate Action Plan and adoption of GHG reduction targets (-30% by 2020, -80% by 2050) in 2007.
- Prioritization to reduce GHGs, energy use, and traffic congestion in the 2012 Aspen Area Community Plan.
- Updates to the community-wide GHG Inventory and affirmation of commitment to the reduction target in 2007, 2011, and 2014.
- Publication of Aspen-specific climate change vulnerability and impact assessments in 2006 and 2014.
- Achievement of the 100% renewable electricity target for Aspen Electric in 2015.
- Creation of a resilience strategy in 2016.
- Finalization of the Aspen Community Sustainability Report in 2017.
- Implementation of an updated Climate Action Plan, beginning in 2018.

Photo courtesy Aspen Chamber Resort Association, Jeremy Swanson Photography

CAP and Toolkit: What's the Difference?

One process, two documents: The Climate Action Plan and GHG Reduction Toolkit are individual documents. Each is an output of Aspen's most recent climate action planning process, during which the Advisory Committee identified more than 250 actions that could be taken to reduce GHGs in Aspen and throughout the region.

The GHG Reduction Toolkit[5] is the complete list of actions developed by the Advisory Committee throughout the CAP process. It has been published as a standalone resource for communities throughout the region, Colorado, and the United States. In addition to presenting the full list of actions and providing information about each one's GHG reduction potential and co-benefits, it touches on best practices for climate action planning, defines how to use the Toolkit during that process, and provides considerations for community leaders. One desired outcome is that the Toolkit facilitates greater regional collaboration around shared GHG sectors, increasing the likelihood of meeting reduction goals while making the process more efficient, collaborative, and multijurisdictional. The Toolkit also informs Aspen's CAP, and has been used according to its intent: to prioritize actions for near-term implementation without losing sight of the full range of possibilities. Fundamentally, the Toolkit provides Aspen and others with an immediate-, mid- and long-term planning resource. It is likely that future climate action plans will continue drawing from it.

The Climate Action Plan is built on actions drawn from the Toolkit that have been selected for implementation over the next three years. These prioritized actions have been adapted from the Toolkit's general language into more specific language that fits the Aspen community. The CAP prioritizes actions that both move the needle and establish building blocks for longer-term opportunities.

One desired outcome is that the Toolkit facilitates greater regional collaboration around shared GHG sectors.

[5] The GHG Reduction Toolkit is available at https://www.cityofaspen.com/DocumentCenter/View/1705 or by emailing climate@cityofaspen.com.

Aspen's GHG Emissions

Overview: Aspen conducts a community-wide GHG inventory every three years to measure progress towards the 2020 and 2050 reduction targets. Inventories have been published for calendar years 2004, 2007, 2011, and 2014[6] (a 2017 inventory is planned for 2018). As of 2014, the Aspen community had reduced GHG emissions by a total of 7.4%[iii], with the largest decreases occurring in the Commercial Energy and Vehicles and Transportation sectors.

Geographic Boundary: Aspen's GHG analysis and planning work addresses emissions corresponding to sources and activities in the Emissions Inventory Boundary (EIB)[7]. GHG inventories will continue measuring progress based on this geographic boundary, and fundamentally, the CAP applies directly to the EIB. However, CAP initiatives should not be limited to sources and activities within the EIB. Successfully reducing GHG emissions at the scale necessary to achieve the 2050 goal will require action and policy at the local, regional, state, and federal levels.

Sources of GHG emissions: By far, the largest source of Aspen's GHG emissions is energy consumed in buildings, accounting for 56% of the total (31% of total emissions come from residential buildings and 25% from commercial buildings). Vehicles and transportation also represent a significant portion of Aspen's GHGs, totaling 19% (Figure 4). These percentages are expected to shift somewhat over time. If the electricity supply continues to become more renewable, Residential and Commercial Energy may become smaller portions of the pie, magnifying the contributions of other sectors.

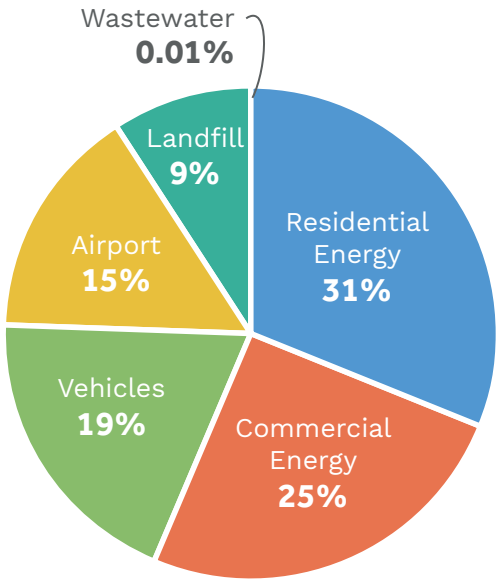
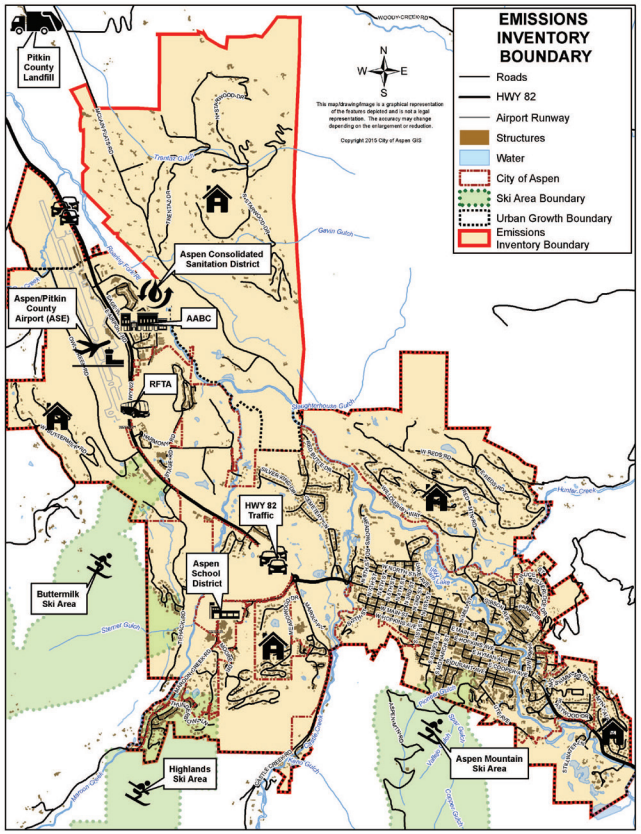


Figure 4: Aspen's GHG emissions by sector in 2014. A large portion of Aspen's GHGs come from energy consumed in buildings, followed by Vehicles and Transportation, Aviation and Airport, and Waste and Landfill.



The **EIB** is nearly identical to the City of Aspen's Urban Growth Boundary but also includes 1) the Starwood and the White Horse Springs section of the McLain Flats residential areas; 2) the residential areas within and contiguous to the Aspen city limits such as Red Mountain, Mountain Valley (on the southeastern edge of town), Highlands, Buttermilk West, the Aspen-Pitkin County Airport, the Aspen Airport Business Center, Burlingame and North Forty; and 3) the electricity and natural gas used to run ski lifts and facilities on Aspen Mountain, Aspen Highlands, and Buttermilk ski areas.

[6] The 2014 Community-wide GHG Inventory is available at http://www.aspenpitkin.com/DocumentCenter/View/1795.
[7] The EIB has been used since 2004 under the rationale that this geographic area represents Aspen's core functionality, and assumes that the contiguous outlying areas included in the EIB would likely not exist in the same capacity were it not for the existence of the Aspen community.

Aspen's GHG Emissions (Continued)

Progress to date: Between 2004 and 2014, Aspen's total emissions decreased by 7.4%. This net decline in emissions represents the combination of increases in some sectors with decreases in others (Figure 5). For example, while GHGs increased 5% in the Residential Energy sector, they dropped 26% in the Commercial Energy sector. Similarly, emissions associated with activities at the Aspen Pitkin County Airport rose 15% while GHGs from Vehicles and Transportation decreased by 13% (Figure 6). Aspen's GHG inventories provide foundational information for climate action planning. Two conclusions emerging from the inventories that underscore this CAP are that:

1. Achieving the 2020 and 2050 goals requires dramatically accelerating the community's rate of reduction; and
2. While the magnitude of achievable GHG reductions varies by sector, overall movement in the right direction relies heavily on maximizing reduction opportunities in each sector.

Given the critical yet broad nature of the takeaways from the GHG inventories, the CAP process included GHG forecasting and mitigation potential modeling to further the understanding of what it would take to achieve the 2020 and 2050 targets.

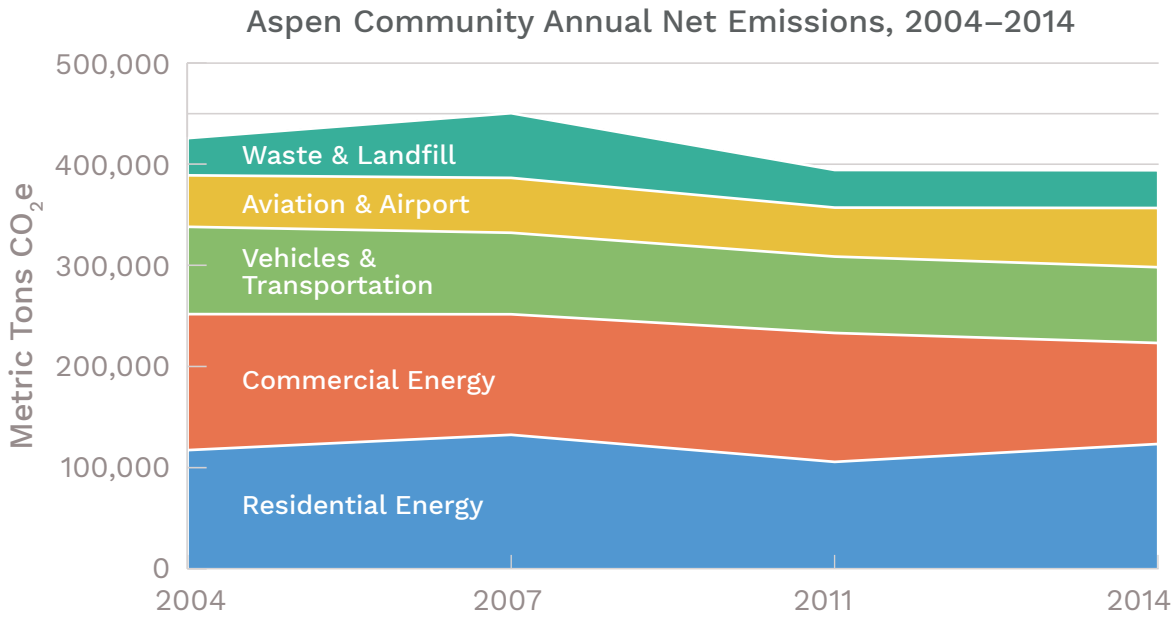


Figure 5. Total community-wide GHGs declined by 7.4% over the first 10 years of measurement; a rate that must accelerate dramatically if Aspen's targets can be met.

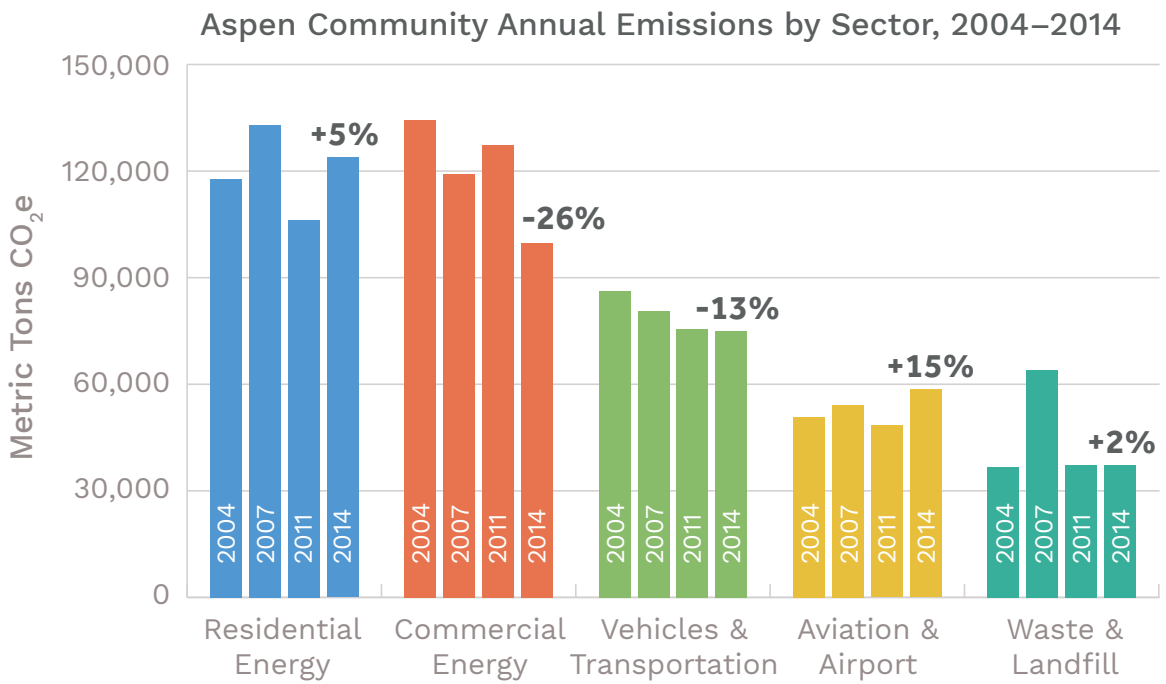


Figure 6. Changes in total GHGs are driven by the trends in each sector; reductions in each are necessary to drive down the total to desired levels.

GHG Emissions Forecast

Aspen's GHG emissions forecast provides a professionally-modeled estimate of how much emissions might increase or decrease through the year 2050. Forecasting possible future GHG emissions is a best practice for climate action planning and sets a context for the necessary scale of action to achieve desired targets. As an early step in the CAP process, Aspen completed a business-as-usual (BAU) forecast in partnership with Western State Colorado University. BAU in this case is defined as the continuation of existing mitigation efforts and population trends, illustrating what Aspen's 2015–2050 GHGs could look like if current efforts are maintained but no additional action is taken. The BAU scenario considers population growth by projecting forward the 2004–2014 trend, and constrains per-capita and per-square foot energy consumption at 2014 levels. The forecast confirms that getting close to achieving the long-term GHG reduction goals will require a significant uptick in programming and impact. Further, the forecast results are striking given that they consider Aspen's current level of climate action, which is already considered robust and ambitious. In effect, the BAU forecast indicates that significant change is necessary to achieve Aspen's long-term GHG reduction goals.

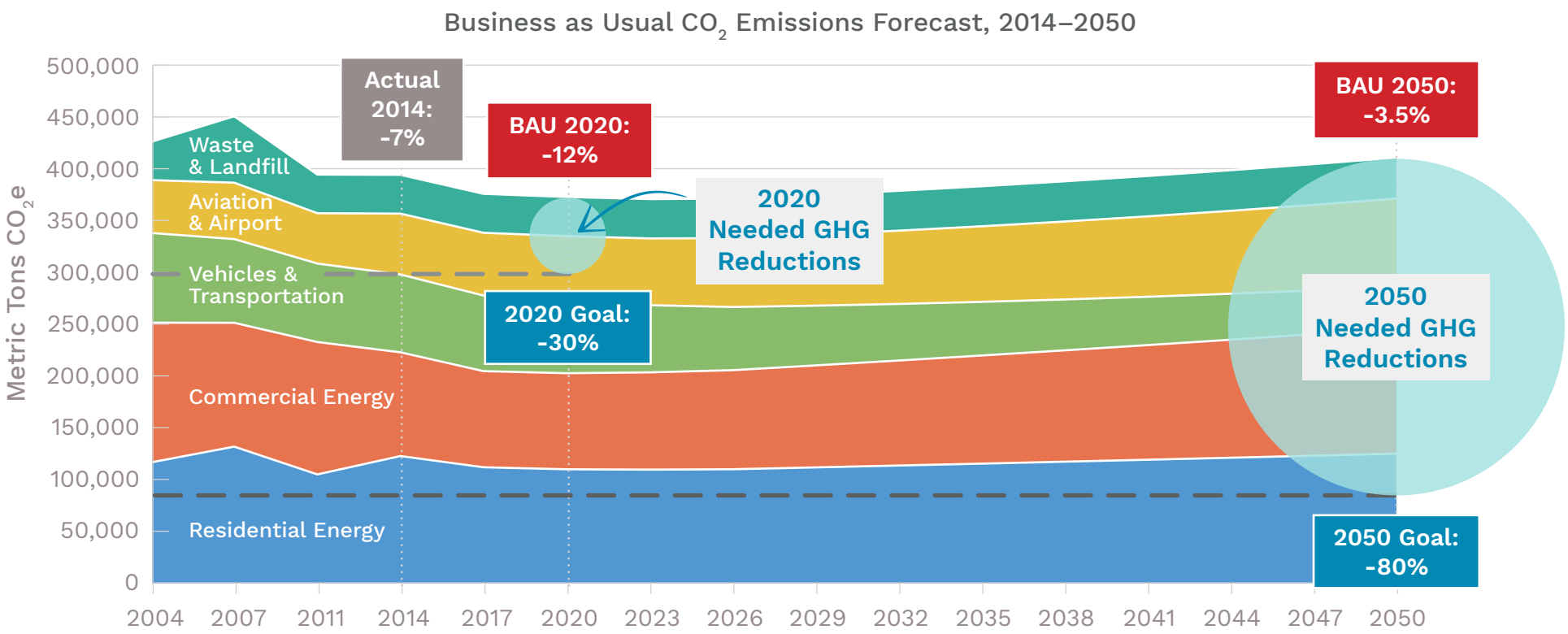


Figure 7. Under business as usual, Aspen's GHGs are likely to continue declining modestly until about 2024, and then slowly rise through 2050, ultimately resulting in a 3.5% decrease below 2004 levels. Accordingly, the CAP process aspired to identify ways to reduce GHGs an additional 76.5% by 2050.

GHG Reduction Potential

The 'GHG reduction potential' of a specific action is a measurement of how much that action could reduce emissions. It is valuable to evaluate the GHG reduction potential of various actions being considered for inclusion in the CAP because it informs which individual actions could likely reduce GHGs the most and the scale of total community-wide reductions that might be achievable. By calculating the GHG reduction potential of the proposed actions and adding them together, the CAP estimates how far Aspen could go in its effort to reduce emissions.

The CAP used a 'reduction potential' model designed by Western State Colorado University to evaluate how much the complete set of identified actions could reduce community-wide emissions through 2050. **The modeling exercise revealed that if Aspen successfully implemented all objectives and actions presented in the GHG Reduction Toolkit, it could reduce its GHGs 71% by 2050[8] (Figure 8).**

The results of the modeling are encouraging in revealing that currently identified opportunities and technologies could likely get Aspen close to realizing its 2050 climate goal.

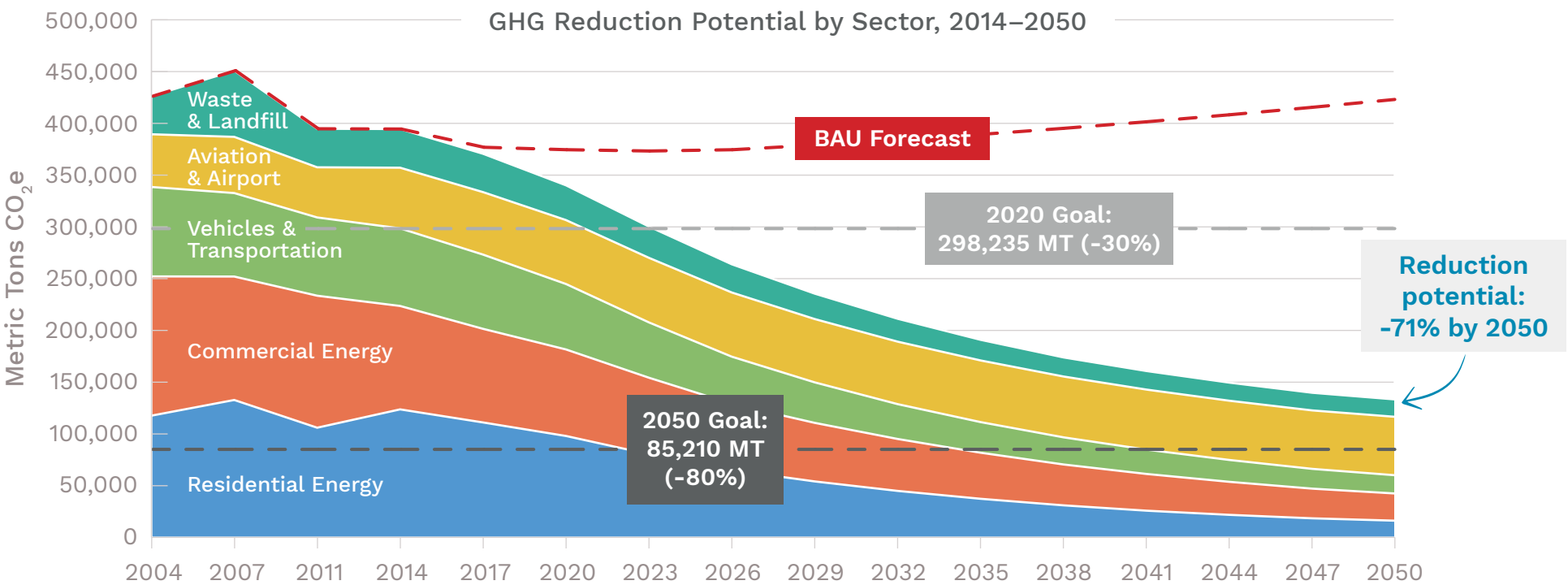


Figure 8. If Aspen can successfully implement every objective contained in the Toolkit by 2050, it could reduce GHGs 71% below 2004 levels — far greater than the forecasted BAU scenario. Successfully implementing this CAP continues building the foundation to move in that direction.

[8] Modeling results inherently contain uncertainty. Assumptions built into the model are based on staff expertise and Advisory Committee deliberation.

Understanding the CAP's Recommendations

During the CAP process, the Advisory Committee identified over 250 potential actions for reducing the Aspen community's GHG emissions. Through a deliberative process, the Committee prioritized 46 of those actions for implementation over the next three years. Several criteria guided that decision-making and yielded implementation priorities that:

- Have the potential to significantly reduce GHGs
- Are innovative yet feasible
- Could create desirable co-benefits
- Complement existing plans and priorities
- Are positioned at the nexus of building on past efforts, while setting the groundwork for those that will be necessary in the future
- Are generally aligned across sectors
- Fully capitalize on the variety of opportunities in each sector to avoid overreliance on any one
- Represent a consensus from stakeholders, who represent the full spectrum of sectors

The following sections of the document address each GHG sector, presenting the actions that meet these criteria.

The CAP Advisory Committee is comprised of 40 community leaders representing 15 organizations and 5 City departments. Committee members provided expertise in energy, building science, transportation, waste, aviation, forestry, community development, public administration, business, climate science and resilience.

Key & Definitions

In addition to presenting the recommendations to reduce GHG emissions in each sector, the CAP presents a 'GHG reduction potential' ranking and a list of potential co-benefits of each 'Objective' and 'Action'. The schematic below explains the elements of the tables throughout the rest of the document.

OBJECTIVE:

The broad and big picture activities or changes that must occur to make significant progress in reducing community-wide and regional GHG emissions.

ACTIONS:

The programs, policies and steps that help achieve each Objective.

CO-BENEFITS:

Co-benefits are the additional positive benefits related to the reduction of greenhouse gases. Nearly all of the Objectives and Actions in this toolkit have co-benefits that achieve at least one of these measures:

Objective co-benefits:
The primary co-benefits of accomplishing the Objective.

Action co-benefits:
The specific co-benefits of implementing the Action.

- Promotes Equity
- Fosters Economic Sustainability
- Improves Local Environmental Quality
- Enhances Public Health & Safety
- Builds Resilience

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	SECTOR PARTNERS	SECTOR RELATED PLANS
Mandate decarbonization of energy supply	C C C C	$ ❄ ✚ ∞		
ACTIONS				
Establish a collective of local governments, large consumers and utilities to drive regional clean energy transition	C C C C	$ ❄ ∞		

GHG REDUCTION POTENTIAL (BLUE):

GHG reduction potential for each **Objective** represents how much it could reduce GHG emissions in the context of the sector it is a part of if fully and successfully implemented. These rankings were quantified using a proprietary model and simplified to a scale of 1 to 4:

- C C C C — Reduces CO_2e by 4 to 1,900 MT by 2050
- C C C C — Reduces CO_2e by 1,900 to 3,200 MT by 2050
- C C C C — Reduces CO_2e by 3,200 to 9,600 MT by 2050
- C C C C — Reduces CO_2e by 9,600 to 46,000 MT by 2050

GHG REDUCTION POTENTIAL (GREEN):

GHG reduction potential for each **Action** represents how much it could reduce GHG emissions in the context of the Objective it is a part of. Reduction potential was approximated and is presented using a 1 to 4 scale:

- C C C C — Marginal reduction
- C C C C — Small reduction
- C C C C — Medium reduction
- C C C C — Large reduction

PARTNERS:

Describes which individuals, groups or organizations are leading and collaborating on implementation.

RELATED PLANS:

CAP recommendations align with key aspects of these relevant plans and community goals.

Sector Overview

ENERGY SUPPLY

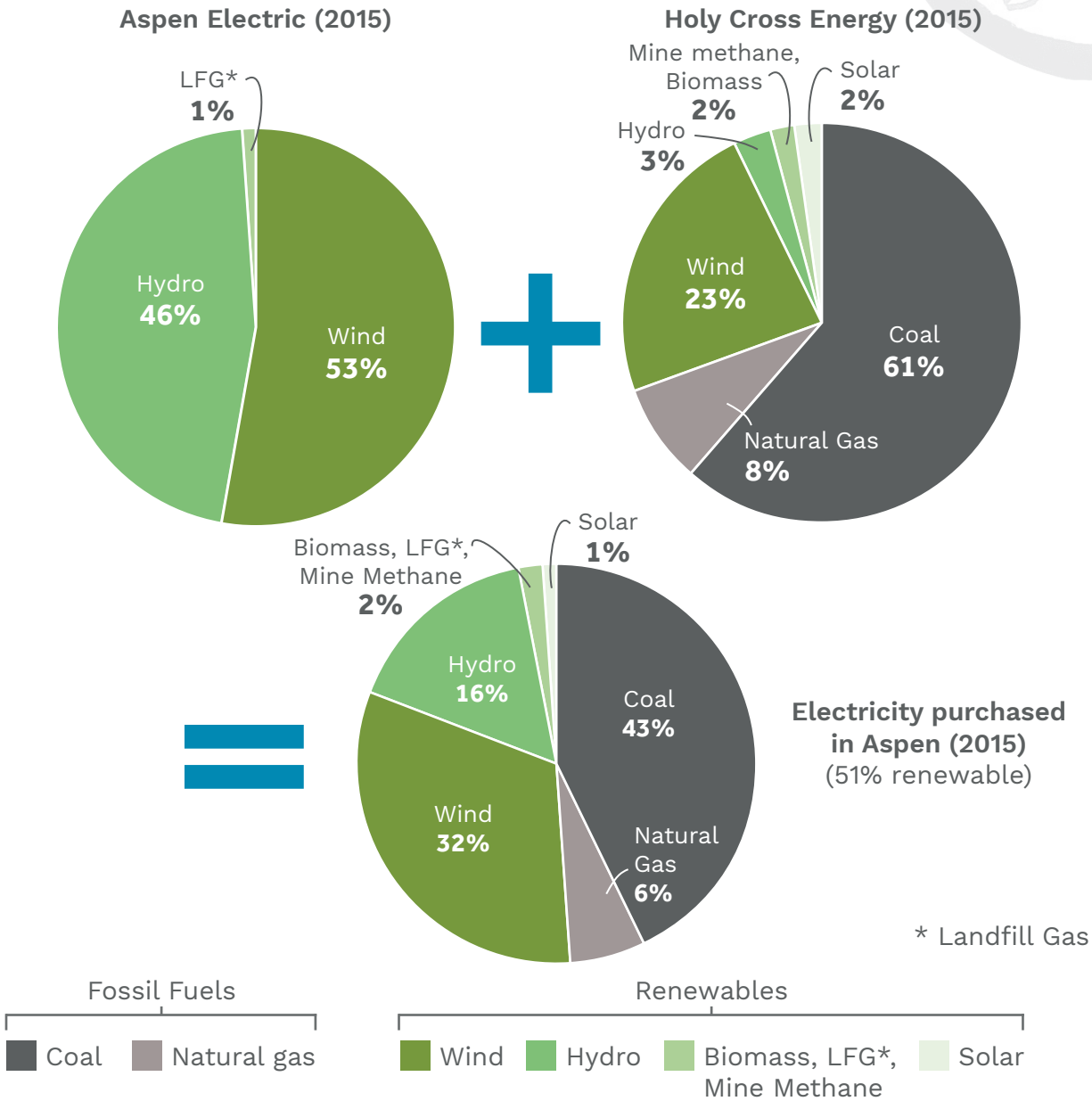
GHG emissions in the Energy Supply sector are associated with purchased electricity and the use of natural gas in residential and commercial buildings. Energy Supply is accounted for and embedded in both the Residential Energy and Commercial Energy sectors. During the CAP process, a decision was made to isolate Energy Supply as its own planning sector because changes to how energy is produced impacts GHGs in both residential and commercial buildings. Isolating Energy Supply actions into their own category brings focus to supply-side planning as its own, high-impact endeavor.

The carbon intensity of Aspen's electricity supply is the result of the resources used to generate the power (fossil resources are significantly more carbon-intensive than renewable energy sources) and locally-serving electric utilities have incrementally become more renewably powered in recent years. Electricity in the EIB comes from two utilities: Aspen Electric, which became 100% renewable in 2015, and Holy Cross Energy (HCE), which was 30% renewable in 2015. Given that more than half of electricity sales in the EIB come from HCE (70%), significant opportunity remains for moving to an Aspen predominantly powered by renewable electricity.

Broadly, opportunities to reduce emissions in the Energy Supply sector range from shifting generation assets to fuel switching. The co-benefits of successfully reducing Energy Supply GHGs can include widespread improvements to environmental quality, increased resiliency, innovation and the creation of regional employment opportunities.

Electricity Portfolio Trends

In 2015, Aspen Electric became 100% renewable and represented 30% of the electricity consumed in the Aspen EIB. That same year, Holy Cross Energy was 30% renewable and represented 70% of the electricity consumed in the EIB. Taken together, electricity consumed in the Aspen EIB is 51% renewable. Significant opportunities remain to reduce GHGs in the Energy Supply sector.



Energy Supply: Recommended Actions

During the CAP process, the Advisory Committee initially brainstormed over 20 potential actions for reducing GHG emissions in the Energy Supply sector. **The CAP recommendation is to pursue implementation of the following seven actions** over the next three years. These actions align with the criteria described in the 'Understanding the CAP Recommendations' section of this document.

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Decarbonize Aspen's energy supply	C C C C	Primary Co-Benefits: $ ❄ ✚ ∞
ACTIONS		
Establish a collective of local governments, large consumers and utilities to drive a regional clean energy transition	C C C C	$ ❄ ∞
Enable the regional production and consumption of more renewable energy	C C C C	Primary Co-Benefits: = $ ❄ ✚ ∞
ACTIONS		
Implement and expand Advanced Metering Infrastructure (AMI)	C C C C	= $
Support distributed energy storage to address the intermittency of wind and solar	C C C C	= $ ❄ ✚ ∞

ENERGY SUPPLY PARTNERS

Holy Cross Energy

Aspen Skiing Company

Pitkin County

Community Development Department

Utilities Department

Community Office for Resource Efficiency

Citizens' Climate Lobby

Colorado Communities for Climate Action*

The Mountain Pact*

* These organizations were not part of the CAP process but are key partners for state and federal policy work.

Energy Supply continues on the next page.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | ✚ Enhances Public Health & Safety | ∞ Builds Resilience

Energy Supply: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Maximize local and regional renewable energy generation	C C C C	Primary Co-Benefits: = $ ∞
ACTIONS		
Encourage regional solar development through supportive land use policies	C C C C	$ ❄ ∞
Streamline and incentivize rooftop solar installation process	C C C C	= $ ❄ ∞
Incentivize both community- and utility-owned renewable generation	C C C C	$ ❄ ∞
Support relevant federal and state policies through active legislative and regulatory engagement	C C C C	Primary Co-Benefits: = $ ❄ + ∞
ACTIONS		
Through continued engagement with community members, elected officials and partner organizations, Aspen will advance climate and energy policy to the benefit of the community. Given the dynamic nature of the policy landscape, Aspen will continue a formal process for prioritizing and advocating on key issues.	C C C C	= $ ❄ + ∞

ENERGY SUPPLY RELATED PLANS

Aspen City Council Top 9 Goals (#7) 2017-2019:

Decrease the carbon footprint of the community's energy supplies

Holy Cross Energy:

35% by 2025 renewable power supply goal

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | + Enhances Public Health & Safety | ∞ Builds Resilience

Sector Overview

RESIDENTIAL ENERGY

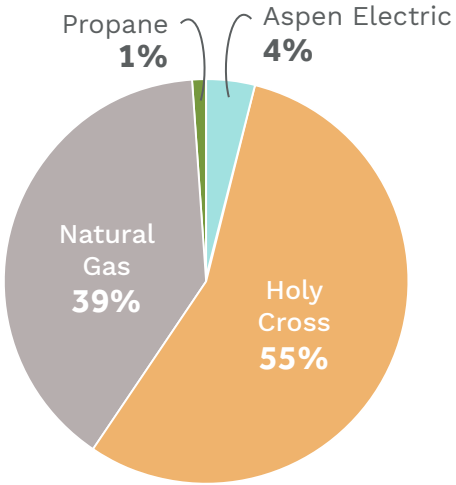
GHG emissions in the Residential Energy sector are associated with the use of electricity and natural gas in residential spaces. Aspen's residential community is comprised of free market and workforce housing rentals and ownership properties that vary in age, quality, size and occupancy, and include single family homes, multifamily properties, mobile homes, and residences in mixed-use buildings.

The residents and visitors occupying these spaces are served by three energy utilities. Roughly 6,300 residential electric accounts in the Aspen EIB are served by the regional cooperative utility, Holy Cross Energy, while 2,000 are served by Aspen Electric (the City's municipal electric utility). The 3,700 residential natural gas accounts in the EIB are served by the regional utility, Black Hills Energy. Opportunities to reduce GHG emissions are tied to making the supply of energy flowing to the unit more renewable and consuming less of it. The co-benefits of successfully reducing Residential Energy sector GHGs include direct consumer savings and improved dwelling safety and comfort.

Residential Energy GHG Trends

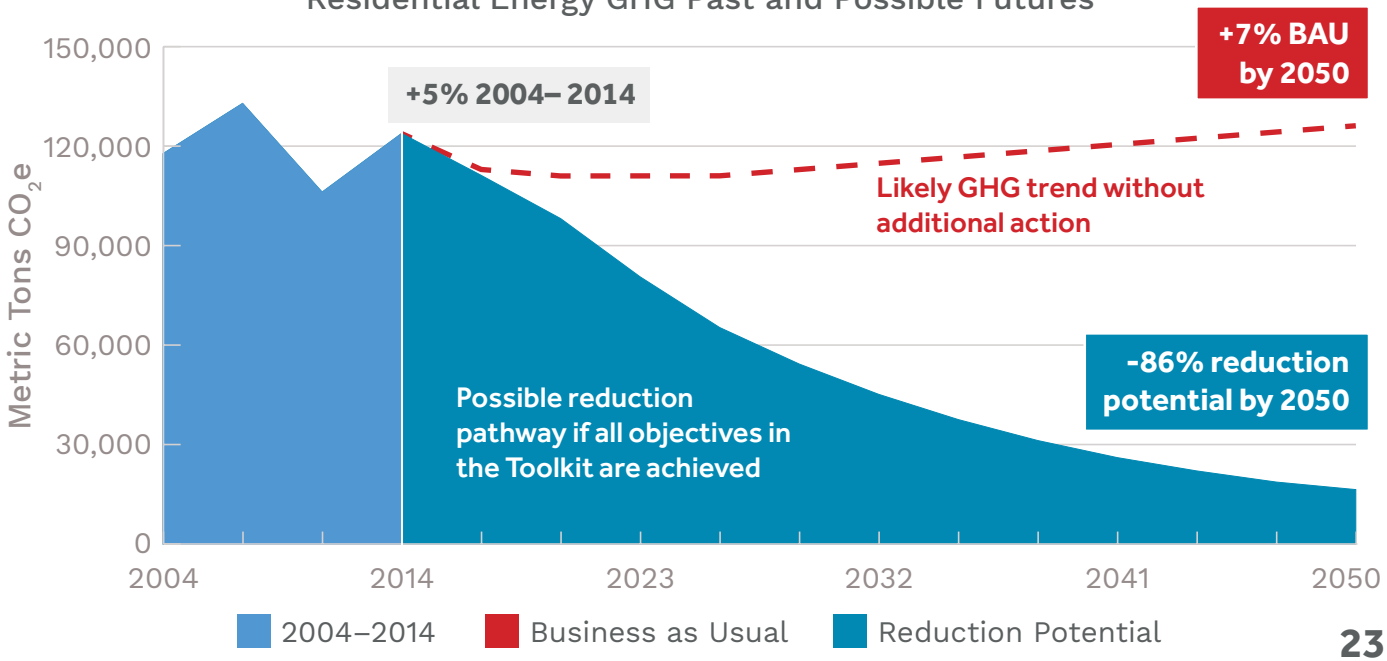
Residential Energy GHGs grew 5% between 2004 and 2014 despite active energy efficiency programming. A majority of GHGs come from use of electricity on the Holy Cross Energy grid and from natural gas. Under business as usual GHGs could decline 6% below 2004 levels by 2020 but then rise 7% above them by 2050. If, however, all objectives in the Toolkit are fully and successfully implemented, Residential Energy GHGs could be reduced 86% below 2004 levels by 2050.

Sources of Residential Energy GHGs



If all objectives in the Toolkit are fully and successfully implemented, Residential Energy GHGs could be reduced 86% below 2004 levels by 2050.

Residential Energy GHG Past and Possible Futures



Residential Energy: Recommended Actions

During the CAP process, the Advisory Committee initially brainstormed over 30 potential actions for reducing GHG emissions in the Residential Energy sector. **The CAP recommendation is to pursue implementation of the following five actions** over the next three years. These actions align with the criteria described in the 'Understanding the CAP Recommendations' section of this document.

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Increase the efficiency of space and water heating with conversions and retrofits to high efficiency electric	C C C C	Primary Co-Benefits: ❄ ✚ ∞
ACTIONS		
Integrate space and water heating equipment standards into building codes	C C C C	❄ ∞
Improve the energy efficiency performance of existing residential buildings	C C C C	Primary Co-Benefits: = $ ❄ ✚ ∞
ACTIONS		
Facilitate education and accreditation for contractors, architects and property managers	C C C C	= ∞
Implement sleep mode technology for second homes when unoccupied	C C C C	❄ ∞

RESIDENTIAL ENERGY PARTNERS

Holy Cross Energy

Pitkin County

Building Department

Utilities Department

Community Office for Resource Efficiency

Aspen Skiing Company

Residential Energy continues on the next page.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | ✚ Enhances Public Health & Safety | ∞ Builds Resilience

Residential Energy: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Reduce energy consumption in rentals, apartments and multifamily buildings	C C C C	Primary Co-Benefits: = $ ❄ + ∞
ACTIONS		
Encourage and require energy efficiency upgrades for rental units	C C C C	= ❄ ∞
Anticipate and mitigate likely expansion of air conditioning use in new & existing buildings	C C C C	Primary Co-Benefits: ❄ ∞
ACTIONS		
Require high efficiency air conditioning systems as AC use becomes more prevalent	C C C C	$

RESIDENTIAL ENERGY RELATED PLANS

Aspen City Council
Top 9 Goals (#7)
2017-2019:

Decrease the carbon footprint of the community's energy supplies

2012 Aspen Area Community Plan:

Reduce our dependence on non-renewable energy sources and instill an ethic of energy accountability.

By 2020, reduce electricity and natural gas consumption in the Urban Growth Boundary.

Require new development and redevelopment to minimize their energy usage and use on-site renewable energies as the site allows.

Existing development should minimize energy usage and use onsite renewable energies as the site allows.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | + Enhances Public Health & Safety | ∞ Builds Resilience

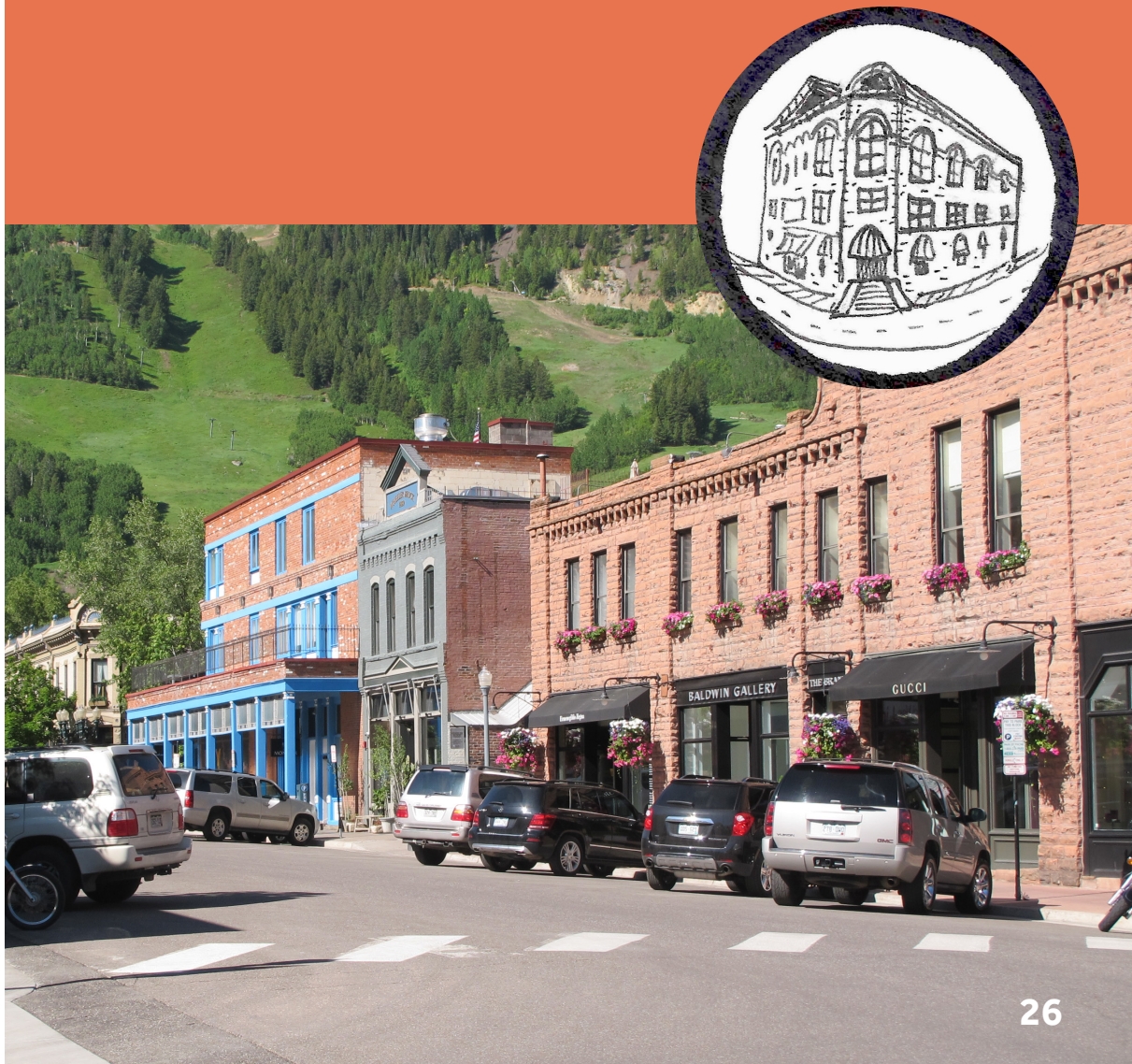
Sector Overview

COMMERCIAL ENERGY

Aspen's commercial building stock is made up of free market and subsidized properties that vary in age, quality, size and occupancy, and include owner-occupied and tenant-occupied businesses in single occupancy, condominiumized, and mixed-use buildings. GHG emissions in the Commercial Energy sector are associated with the use of electricity and natural gas in those spaces, and most are served by both types of utilities.

Roughly 800 commercial electric accounts in the Aspen EIB are served by Holy Cross Energy, while 1,000 are served by Aspen Electric. The 900 commercial natural gas accounts in the EIB are served by Black Hills Energy. These commercial properties have a variety of utility metering configurations, from single common meters to individualized sub-metering.

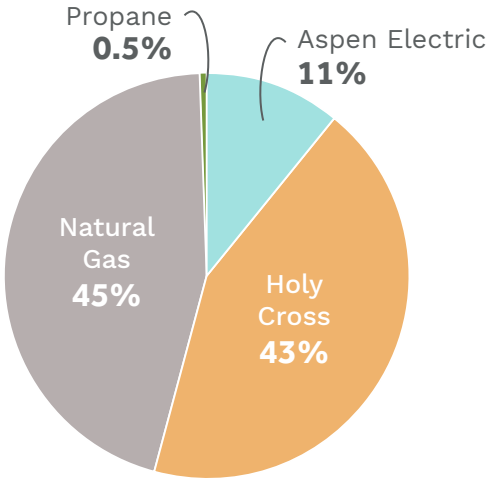
Opportunities to reduce GHGs include making the supply of energy flowing to commercial properties more renewable and consuming less energy in them. The co-benefits of successfully reducing Commercial Energy sector GHGs include direct financial savings for businesses and enhancing the health, safety, and comfort of the built environment.



Commercial Energy GHG Trends

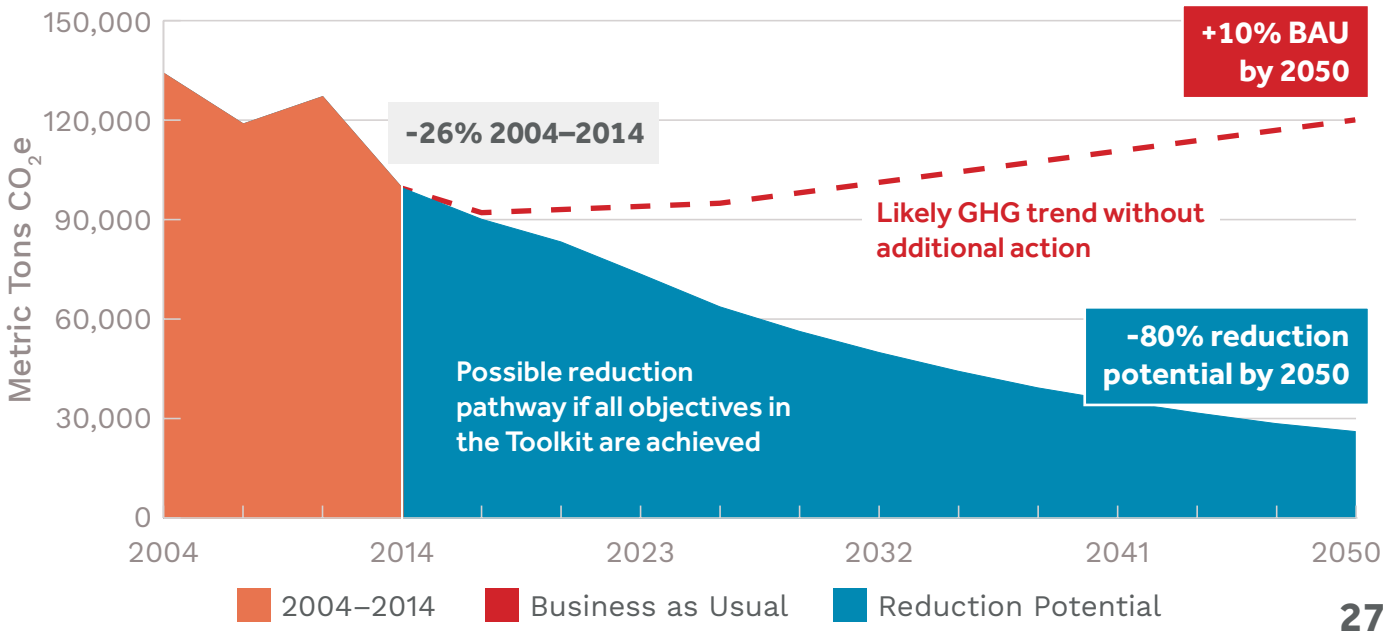
Commercial Energy GHGs declined 26% between 2004 and 2014 thanks to increases in renewable electricity generation and active energy efficiency programming. A majority of GHGs come from use of natural gas and from electricity on the Holy Cross Energy grid. Under business as usual, GHGs could decline 31% below 2004 levels by 2020 but then rise 10% above them by 2050. If, however, all objectives in the Toolkit are fully and successfully implemented, Commercial Energy GHGs could be reduced 80% below 2004 levels by 2050.

Sources of Commercial Energy GHGs



If all objectives in the Toolkit are fully and successfully implemented, Commercial Energy GHGs could be reduced 80% below 2004 levels by 2050.

Commercial Energy GHG Past and Possible Futures



Commercial Energy: Recommended Actions

During the CAP process, the Advisory Committee initially brainstormed over 38 potential actions for reducing GHG emissions in the Commercial Energy Sector. **The CAP recommendation is to pursue implementation of the following seven actions** over the next three years. These actions align with the criteria described in the 'Understanding the CAP Recommendations' section of this document.

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Promote energy benchmarking and reporting in commercial buildings	C C C C	Primary Co-Benefits: $ ❄ ✚ ∞
ACTIONS		
Support commercial energy benchmarking and incremental EE improvements through policy	C C C C	$ ❄ ✚
Enhance energy and resource efficiency in new commercial developments	C C C C	Primary Co-Benefits: = $ ❄ ✚ ∞
ACTIONS		
Provide incentives for new and remodeled buildings to build above code	C C C C	❄ ✚
Limit GHG emissions from future development through the use of controlled growth and coordinated land use in and around the Urban Growth Boundary	C C C C	❄ ✚
Delay the need for air conditioning via building design and management	C C C C	$ ∞

COMMERCIAL ENERGY PARTNERS

Community Development Department

Building Department

Utilities Department

Holy Cross Energy

Aspen Skiing Company

Aspen Chamber Resort Association

Commercial Energy continues on the next page.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | ✚ Enhances Public Health & Safety | ∞ Builds Resilience

Commercial Energy: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Bring all commercial buildings up to current building codes or retrofit a majority of existing commercial buildings	C C C C	Primary Co-Benefits: $ ❄ ✚ ∞
ACTIONS		
Establish new program to bring existing buildings to meet current energy codes	C C C C	❄ ✚ ∞
Model best practices through energy retrofitting of government buildings and properties	C C C C	Primary Co-Benefits: $ ❄ ✚ ∞
ACTIONS		
Retrofit government buildings, offices and facilities (including affordable housing units and complexes) to comply with current energy code	C C C C	$ ❄ ✚ ∞
Optimize utility rates	C C C C	Primary Co-Benefits: = $ ∞
ACTIONS		
Adapt utility rates as necessary to incentivize and balance current and future priorities (i.e. EVs, fuel switching, time of use, peak shaving, energy efficiency, DSM)	C C C C	= $ ❄ ✚ ∞

COMMERCIAL ENERGY RELATED PLANS

Aspen City Council Top 10 Goals (#8) 2015-2017:

Energy efficiency-related code changes to transform the energy use of buildings within the community

2012 Aspen Area Community Plan:

Require new development and redevelopment to minimize their energy usage and use on-site renewable energies as the site allows.

Existing development should minimize energy usage and use onsite renewable energies as the site allows.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | ✚ Enhances Public Health & Safety | ∞ Builds Resilience

Sector Overview

VEHICLES & TRANSPORTATION

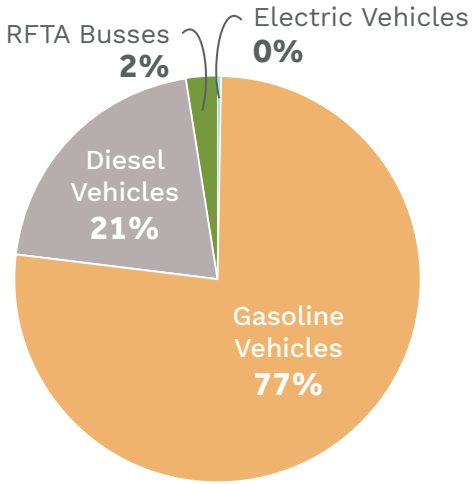
The Vehicles and Transportation sector encompasses the ground transportation of people and goods traveling within, to, from, and passing through Aspen. GHGs are caused by the combustion of liquid fuels in a wide range of vehicles and can be impacted by a variety of factors, including, but not limited to, consumer choices, business demand, urban design, housing and business density, transit corridors, commuter and visitor choices, and fuel type. Types of vehicles include but are not limited to gasoline and diesel personal vehicles, light trucks, transit buses, commercial transport vehicles, heavy duty vehicles, and motorcycles.

Opportunities to reduce emissions in this sector are diverse, and include shifting transportation modes away from single occupancy vehicle use and transitioning personal and commercial vehicle fleets to low or zero-emission options like electric vehicles. Some of the co-benefits of successfully reducing Vehicles and Transportation GHGs include reduced congestion and improved air quality.

Vehicles & Transportation GHG Trends

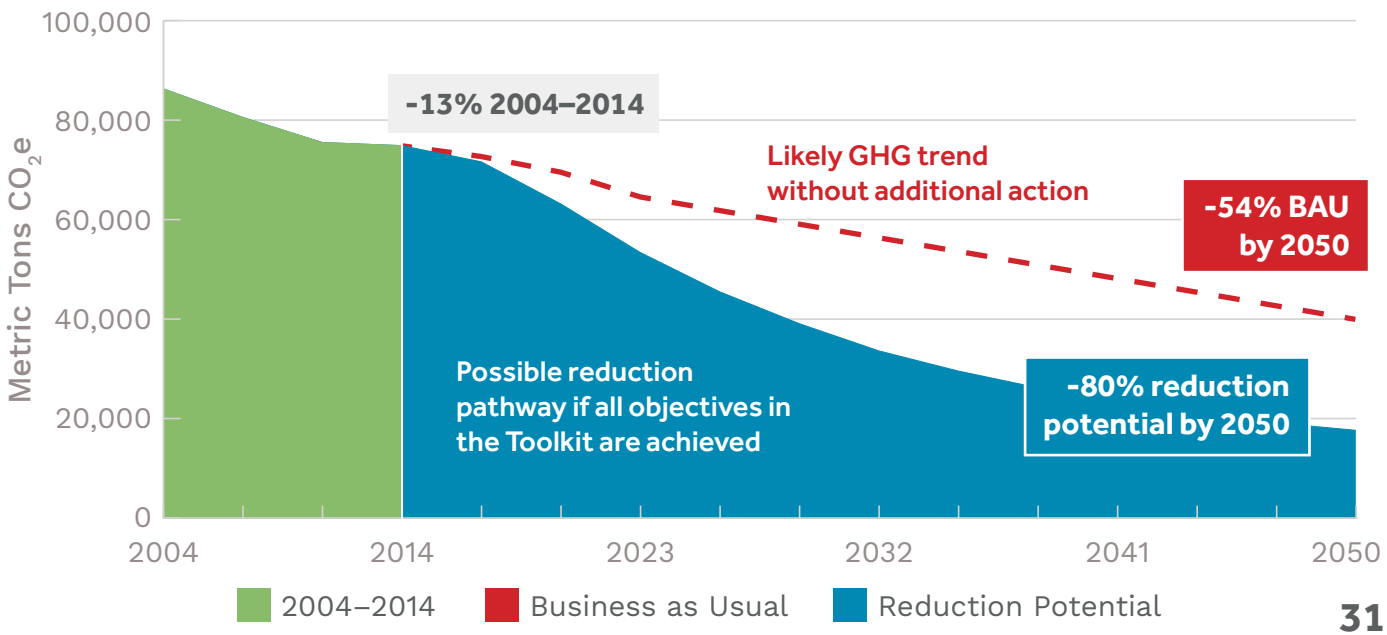
Vehicles and Transportation emissions decreased 13% between 2004 and 2014, thanks to a decrease in overall vehicle miles traveled (VMT) coupled with an increase in fleet wide fuel economy. In the business-as-usual scenario, GHGs could decline 19% below 2004 levels by 2020 and 54% by 2050. If, however, all objectives in the Toolkit are fully and successfully implemented, GHGs could be reduced 80% below 2004 levels by 2050.

Sources of Vehicles & Transportation GHGs



If all objectives in the Toolkit are fully and successfully implemented, Vehicles & Transportation GHGs could be reduced 80% below 2004 levels by 2050.

Vehicles & Transportation GHG Past and Possible Futures



Vehicles & Transportation: Recommended Actions

During the CAP process, the Advisory Committee initially brainstormed over 50 potential actions for reducing GHG emissions in the Vehicles and Transportation sector. **The CAP recommendation is to pursue implementation of the following ten actions** over the next three years. These actions align with the criteria described in the 'Understanding the CAP Recommendations' section of this document.

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Reduce VMT by promoting alternatives to single occupancy vehicles	C C C C	Primary Co-Benefits: = $ ❄ + ∞
ACTIONS		
Collaborate with employers to subsidize transit and mobility options for employees	C C C C	= ❄ +
Enhance first and last mile connectivity to transit	C C C C	Primary Co-Benefits: = $ ❄ + ∞
ACTIONS		
Establish and expand feeder transit network to increase access to primary transit stops (e.g., circulators, mobility as a service)	C C C C	= $ ❄ + ∞
Expand bike and walk options between population and work centers to primary transit stops	C C C C	= $ ❄ + ∞
Support and expand mobility options for the first and last mile and/or full trips	C C C C	= $ ❄ + ∞

VEHICLES & TRANSPORTATION PARTNERS

Clean Energy Economy for the Region

Transportation Department

Utilities Department

Aspen/Pitkin County Airport

Aspen Skiing Company

Roaring Fork Transportation Authority

Aspen Chamber Resort Association

Colorado Communities for Climate Action*

The Mountain Pact*

* These organizations were not part of the CAP process but are key partners for state and federal policy work.

Vehicles & Transportation continues on the next page.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | + Enhances Public Health & Safety | ∞ Builds Resilience

Vehicles & Transportation: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Promote the adoption of alternate fuel vehicles for individuals and fleets	C C C C	Primary Co-Benefits: $ ❄ ✚ ∞
ACTIONS		
Increase the ratio of electric vehicles in all fleets in the community (e.g., rental cars, hotel shuttles, private fleets, government fleets, personal vehicles)	C C C C	= ❄ ✚
Redesign urban form and population density to reduce vehicle use	C C C C	Primary Co-Benefits: ❄ ✚ ∞
ACTIONS		
Further develop bicycle infrastructure (i.e., missing connections system, more bike and share lanes in key locations, solutions to key locational conflict/hazard areas)	C C C C	= $ ❄ ✚ ∞
Promote new mobility technologies and business models	C C C C	Primary Co-Benefits: $
ACTIONS		
Support increased and targeted service during peak times on transit routes	C C C C	= $ ❄ ✚ ∞

Vehicles & Transportation continues on the next page.

VEHICLES & TRANSPORTATION RELATED PLANS

Aspen City Council Top 9 Goals (#4) 2017-2019:

Mobility Lab

Short Range Transit Plan

EV Readiness Plan

Integrated Transportation Systems Plan

Upper Valley Mobility Study

Upper Valley Mobility Report

Bicycle Pedestrian Master Plan

2012 Aspen Area Community Plan

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | ✚ Enhances Public Health & Safety | ∞ Builds Resilience

Vehicles & Transportation: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Increase the cost of driving in certain places	C C C C	Primary Co-Benefits: ❄ ✚
ACTIONS		
Use parking policies and prices to disincentive single-occupancy vehicle travel	C C C C	❄
Support and research regional road pricing (e.g., congestion fees, tolls, dynamic pricing)	C C C C	❄
Support relevant federal and state policies through active legislative and regulatory engagement	C C C C	Primary Co-Benefits: = $ ❄ ✚ ∞
ACTIONS		
Through continued engagement with community members, elected officials and partner organizations, Aspen will advance transportation and clean fuels policy to the benefit of the community. Given the dynamic nature of the policy landscape, Aspen will continue a formal process for prioritizing and advocating on key issues.	C C C C	= $ ❄ ✚ ∞

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | ✚ Enhances Public Health & Safety | ∞ Builds Resilience

Sector Overview

WASTE & LANDFILL

Waste generation in Aspen, estimated at 11 pounds per person per day[iv], is above both the state and national average. The average for Colorado is 9 pounds, which is twice the national average of 4.5 pounds. Some of the factors driving Aspen's higher numbers include the tourist population and the active development economy. GHG emissions in the Waste and Landfill sector come from waste generated within the Aspen EIB, then transported to, and processed at the Pitkin County Landfill. Organic components within the waste stream generate methane as they decompose[9]. Organic components flowing from Aspen to the Pitkin County Landfill include food waste, yard waste, drywall and wood. The drywall and wood are a part of the construction and demolition (C & D) waste category, which equates to 80% of the total waste sent to the landfill[10]. Heavy duty vehicles hauling waste to the landfill and processing it on site combust liquid fuels.

Opportunities to reduce emissions in this sector include diverting or salvaging organic components of the waste stream and increasing the efficiency of hauling and processing. The co-benefits of successfully reducing Waste and Landfill sector GHGs include extending the life of local landfills and improving local environmental quality.

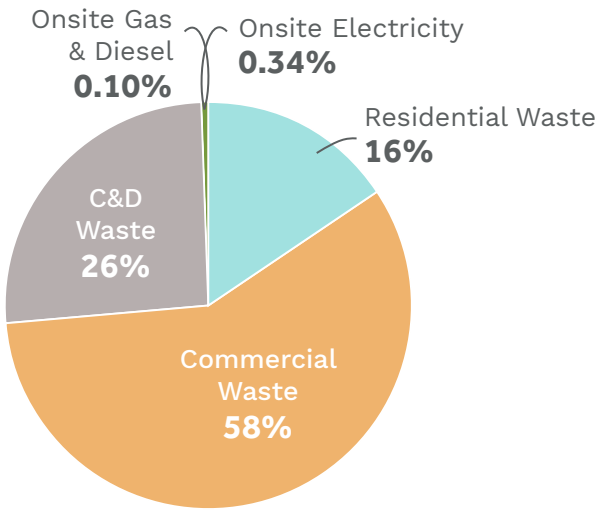
[9] Organics like food scraps and wood in landfills are a major source of methane, a GHG with a global warming potential 84x more potent than carbon dioxide in the short term. Inversely, when converted into compost and applied to the land, compost sequesters carbon (Source: Institute for Local Self-Reliance, 2017).

[10] Diverting C & D waste could extend the life of the landfill, lower energy consumption and carbon emissions, create new jobs with the reuse of construction materials and lower the cost of construction materials for projects.

Waste & Landfill GHG Trends

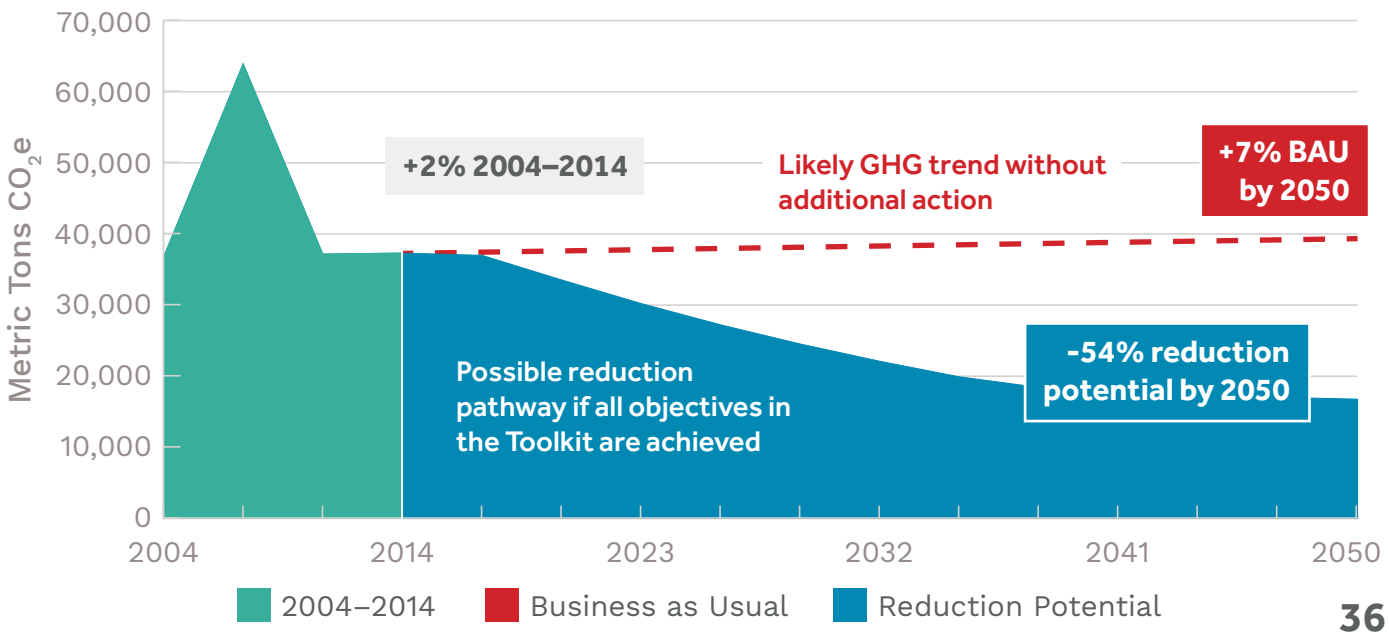
Waste and Landfill emissions increased 2% between 2004 and 2014, driven predominantly by significant increases in the volume of C&D waste. Under business as usual, GHGs could increase 2% above 2004 levels by 2020 and 7% above them by 2050. If, however, all objectives in the Toolkit are fully and successfully implemented, GHGs could be reduced 54% below 2004 levels by 2050.

Sources of Waste & Landfill GHGs



If all objectives in the Toolkit are fully and successfully implemented, Waste & Landfill GHGs could be reduced 54% below 2004 levels by 2050.

Waste & Landfill GHG Past and Possible Futures



Waste & Landfill: Recommended Actions

During the CAP process, the Advisory Committee initially brainstormed over 50 potential actions for reducing GHG emissions in the Waste and Landfill sector. **The CAP recommendation is to pursue implementation of the following nine actions** over the next three years. These actions align with the criteria described in the 'Understanding the CAP Recommendations' section of this document.

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Increase rates of, and participation in, composting and recycling	C C C C	Primary Co-Benefits: $ ❄ ∞
ACTIONS		
Use codes and regulations to increase composting rates	C C C C	= $ ❄ + ∞
Maximize diversion of construction and demolition (C&D) waste	C C C C	Primary Co-Benefits: $ ❄ ∞
ACTIONS		
Create a system for moving C&D waste to markets	C C C C	$ ∞
Adopt and enforce a requirements for C&D waste diversion	C C C C	$ ❄ + ∞
Provide increased opportunities for deconstructed building materials to be salvaged and reused	C C C C	= $ ❄ + ∞

WASTE & LANDFILL PARTNERS

Pitkin County

Pitkin County Landfill

Environmental Health and Sustainability Department

Aspen Zero Impact

Aspen Skiing Company

Aspen Chamber Resort Association

Waste & Landfill continues on the next page.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | + Enhances Public Health & Safety | ∞ Builds Resilience

Waste & Landfill: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Increase community compliance with waste diversion ordinances	C	Primary Co-Benefits: = ❄ ✚
ACTIONS		
Create incentives for recycling and disincentives for contaminating recycling loads	C	$ ❄ ✚
Align city, county and regional waste policies and codes	C	=
Improve existing waste hauling practices	C	Primary Co-Benefits: $ ❄ ✚
ACTIONS		
Investigate haulers' routes and look for opportunities to optimize route efficiency	C	$ ❄ ✚
Encourage the use of cleaner vehicles for local waste haulers	C	❄ ✚

WASTE & LANDFILL RELATED PLANS

Roaring Fork Valley Comprehensive Waste Diversion Plan

Pitkin County Internal Climate Action Plan

Waste & Landfill continues on the next page.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | ✚ Enhances Public Health & Safety | ∞ Builds Resilience

Waste & Landfill: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Support relevant federal and state policies through active legislative and regulatory engagement	C C C C	Primary Co-Benefits: = $ ❄ + ∞
ACTIONS		
Through continued engagement with community members, elected officials and partner organizations, Aspen will actively engage in waste and waste-diversion policy to the benefit of the community. Given the dynamic nature of the policy landscape, Aspen will continue a formal process for prioritizing and engaging on key issues.	C C C C	= $ ❄ + ∞

C Level of Potential GHG Reduction
= Promotes Equity
$ Fosters Economic Sustainability
❄ Improves Local Environmental Quality
+ Enhances Public Health & Safety
∞ Builds Resilience

Sector Overview

AVIATION & AIRPORT

GHG emissions in the Aviation and Airport sector are associated with aircraft operations (primarily landings and takeoffs), ground support equipment, on-road vehicle use, and energy consumed in buildings (such as the terminal) at the Aspen/Pitkin County Airport (Airport, ASE). Opportunities to reduce emissions in this sector include increasing the operating efficiency of aircraft, electrifying ground support equipment and ground access vehicles and maximizing the energy efficiency and on-site energy production of airport buildings. It is likely that the Airport will undergo both a runway and terminal expansion in the coming years, and elements of the CAP have considered this while being developed alongside Airport officials.

Only two percent of GHGs occurring at ASE are directly controlled by Pitkin County[11], making this sector one of the most difficult to affect directly. While airlines have created voluntary targets to reduce GHGs related to aircraft operations, mandatory fuel economy requirements (which would need to be set by the U.S. Federal Aviation Administration) do not exist. Nonetheless, the difference between intentional local action and business as usual is substantial and a necessary component of the Aspen community's climate action efforts. Specific actions recommended in this CAP involve both local action and pursuing more efficient or alternative fuel aircraft via engagement with airlines and federal regulators. The co-benefits of successfully reducing Aviation and Airport GHGs include improvements to both public health and environmental quality.

Photo: Gloria Bouillon

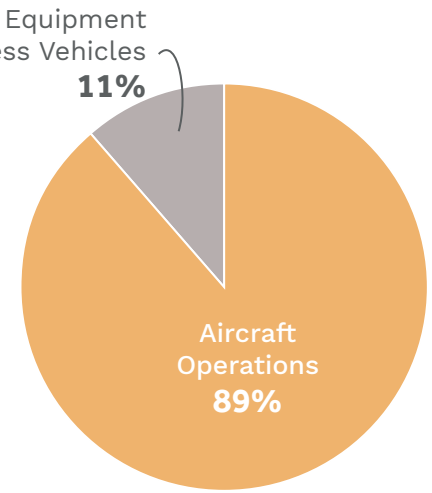
[11] 98% of ASE's GHG emissions come from aircraft operations, which are regulated by the US Federal Aviation Administration. While local governments and airports cannot mandate aircraft fuel types or economy standards, they can partner with stakeholders to offer and incentivize cleaner fuels and to provide infrastructure for more fuel-efficient aircraft. Source on 98% statistic: Aspen/Pitkin County Airport GHG Inventory, 2014.

Photo: Gloria Bouillon

Aviation & Airport GHG Trends

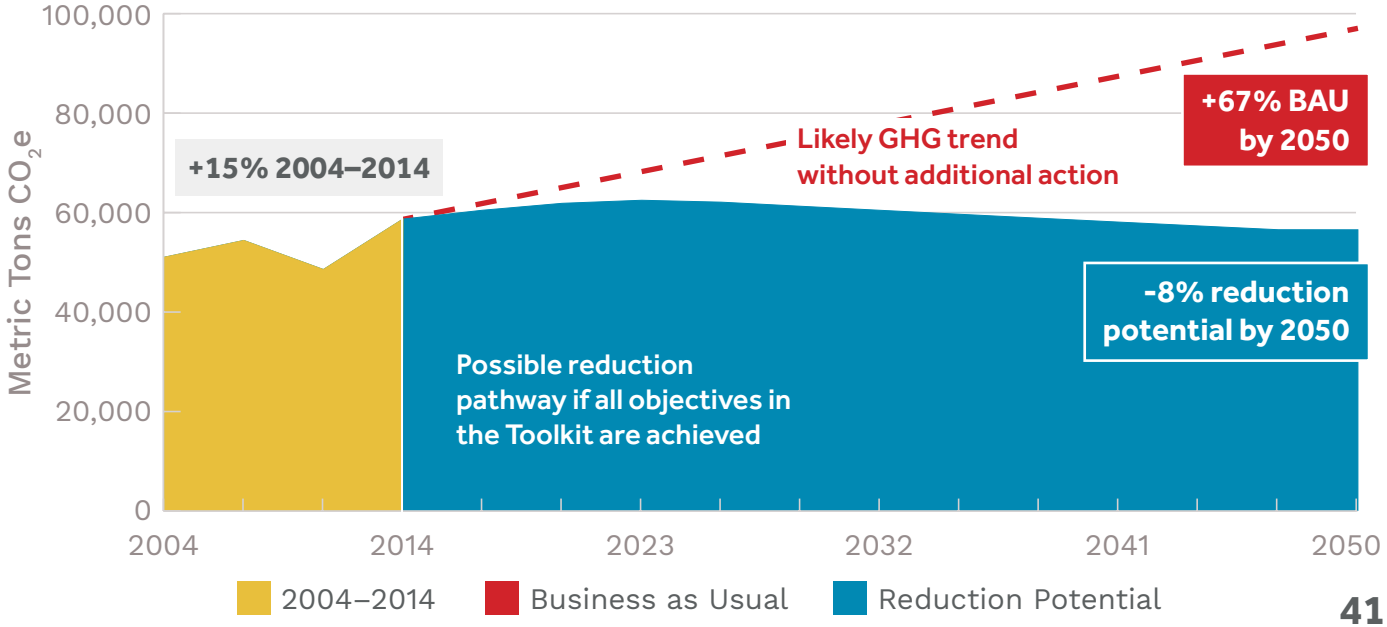
Aviation and Airport emissions increased by 15% between 2004 and 2014, driven predominantly by more passengers flying longer distances. Under business as usual, GHGs could increase 22% above 2004 levels by 2020 and 67% above them by 2050. If, however, all objectives in the Toolkit are fully and successfully implemented, GHGs could be reduced 8% below 2004 levels by 2050.

Sources of Aviation & Airport GHGs



If all objectives in the Toolkit are fully and successfully implemented, Aviation & Airport GHGs could be reduced 8% below 2004 levels by 2050.

Aviation & Airport GHG Past and Possible Futures



Aviation & Airport: Recommended Actions

During the CAP process, the Advisory Committee initially brainstormed over 28 potential actions for reducing GHG emissions in the Aviation and Airport sector. **The CAP recommendation is to pursue implementation of the following eight actions** over the next three years. These actions align with the criteria described in the 'Understanding the CAP Recommendations' section of this document.

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Reduce airport controlled GHGs	C C C C	Primary Co-Benefits:
ACTIONS		
Support the use of electric vehicles or other clean fuel vehicles for ground support vehicles and ground support equipment (GSE)	C C C C	
Upgrade airfield lighting with LED lighting	C C C C	$ ∞
Encourage taxi and airport shuttles to achieve high fuel economy or clean-fuels standards	C C C C	
Reduce aircraft and aviation related GHGs	C C C C	Primary Co-Benefits:
ACTIONS		
Promote and incentivize the use of aviation biofuels in aircraft servicing local airport	C C C C	$ ∞

AVIATION & AIRPORT PARTNERS

Aspen/Pitkin County Airport

Pitkin County

Aspen Chamber Resort Association

Community Office for Resource Efficiency

Aspen Zero Impact

Aspen Skiing Company

Aviation & Airport continues on the next page.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | Improves Local Environmental Quality | + Enhances Public Health & Safety | ∞ Builds Resilience

Aviation & Airport: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
If a new terminal is developed, ensure that it represents the pinnacle of energy efficiency and sustainability	C C C C	Primary Co-Benefits: $ ❄ ✚ ∞
ACTIONS		
Encourage and support new terminal or Airport building to be net-zero	C C C C	$ ❄ ✚ ∞
Encourage passengers to use transit and mobility services to access airport	C C C C	Primary Co-Benefits: = $ ❄
ACTIONS		
Encourage rental car companies to have electric vehicle (EV) options. Pursue EVs becoming a certain percentage of the rental fleet	C C C C	= $ ❄
Provide transit service directly to and from Airport and/or wayfinding from terminal to existing transit	C C C C	= ❄ ✚

AVIATION & AIRPORT RELATED PLANS

Pitkin County Internal Climate Action Plan

Aviation & Airport continues on the next page.

C Level of Potential GHG Reduction | = Promotes Equity | $ Fosters Economic Sustainability | ❄ Improves Local Environmental Quality | ✚ Enhances Public Health & Safety | ∞ Builds Resilience

Aviation & Airport: Recommended Actions (Continued)

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS
Support relevant federal and state policies through active legislative and regulatory engagement	C C C C	Primary Co-Benefits:
ACTIONS		
Through continued engagement with community members, elected officials and partner organizations, Aspen will advance relevant policy to the benefit of the community. Given the dynamic nature of the policy landscape, Aspen will continue a formal process for prioritizing and advocating on key issues.	C C C C	

Photo: Gloria Bouillon

Level of Potential GHG Reduction | Promotes Equity | Fosters Economic Sustainability | Improves Local Environmental Quality | Enhances Public Health & Safety | Builds Resilience

Considerations for Implementation

The publication of this CAP is a launch point for the real work of implementation. It is the intent of the partners that developed this Plan to begin implementation in 2018 and make significant progress by the end of 2020. The actions listed in this CAP and slated for implementation over the next three years build on past and existing efforts in each sector while setting the groundwork for the mid- and long-term actions that will be necessary to achieve the Aspen community's GHG reduction goals.

One of the reasons for developing the CAP in collaboration with a diversity of partners representing all GHG sectors was to cultivate a spirit of shared ownership around both achieving community wide goals and by association, for implementing actions. This is the community's plan — no single organization or department is solely responsible for full execution of the CAP. Rather, implementation is an all hands-on deck effort.

To foster successful implementation, the City of Aspen's Climate Action Department will:

- Continue convening the Advisory Committee as it develops an implementation strategy for each recommended action
- Provide research capacity and expertise to inform decision-making
- Compile and formalize the Advisory Committee's feedback into implementable strategies for execution
- Support entities and organizations leading implementation on all actions
- Assume a leadership role in implementing relevant and appropriate actions
- Maintain implementation timelines
- Establish necessary outreach efforts and engage entities and constituencies that can help guide and support successful implementation
- Measure progress in both action implementation, GHG trends and progress towards reduction goals
- Keep decision-makers, community members, and stakeholders informed on progress and results

Most broadly, the CAP is but one of many current planning efforts that could affect GHG emissions in Aspen and the Roaring Fork Valley. Accordingly, an underlying priority is coordination with those related efforts, plans, and priorities. Other key implementation principles are building on previous experiences and successes, remaining apprised of evolving best practices, maintaining a clear prioritization of actions, and regular evaluation and redesign once implementation begins. Linkages and overlap with priority actions in other sectors will also be addressed and leveraged. Successful implementation will be pursued using similar principles to how the CAP was developed: through collaborative development with stakeholders, by leveraging local expertise, building strong partnerships, employing capable staff, responding to supportive leaders, and actively engaging with community members.

Organizational Capacity Recommendations

The Advisory Committee's engagement in developing the CAP demonstrates substantial capacity and support from regional leaders to advance climate action. Successfully moving Aspen along the path to its -80% GHG target is contingent on leaders and elected officials continuing to foster a supportive culture and providing adequate resources. The City's Climate Action Department requests that Council help ensure success of CAP implementation by supporting staff to:

1. **Secure and prioritize the necessary organizational capacity.**
2. Ensure that **stakeholders from all relevant sectors** are included.
3. Ensure that **representatives of all impacted populations** are included.
4. **Identify champions** to take the lead on implementation.
5. **Identify and allocate funds** for implementation.
6. **Continue enhancing technical capacity** as necessary.
7. **Engage in relevant state and federal policy efforts.** Often, local priorities can be bolstered by enabling legislation.
8. **Collaborate across jurisdictional boundaries.** Regional collaboration in all sectors enhances efficiency and magnifies impact.
9. **Track performance, celebrate successes, and adjust course** when necessary.

Photo courtesy Aspen Chamber Resort Association, Jeremy Swanson Photography

Conclusion

Aspen's first decade of climate action has seen many successes in areas related to energy, transportation and waste, showing that it is possible to reduce emissions during times of population growth and heightened economic activity. Further, experience to date shows that bold actions to reduce GHGs improve quality of life and coincide with community values and priorities, such as those illustrated in the Aspen Area Community Plan.

At the same time, Aspen's forward momentum in reducing GHGs must ratchet up substantially if the community's long-term reduction goals of 30% below 2004 levels by 2020 and 80% below those levels by 2050 are going to be met. To date, community-wide emissions have been reduced by 7% below 2004 levels, and business-as-usual forecasting indicates that without significant additional action, it would be reasonable to expect a 3% reduction below 2005 levels by 2050. Conversely, modeling indicates that on paper, it is possible for the community to get very close to achieving the long-term goals. If every objective in the GHG Reduction Toolkit is achieved, Aspen could plausibly reduce emissions 71% by 2050.

Implementing the actions described in this Climate Action Plan is the community's next step in that direction. These actions could offer immediate reductions in GHG emissions, create a variety of co-benefits for the community, and set the stage for building on successes to continue forward progress.

An Aspen that has reduced its GHG emissions by 80% is one in which transformative change has occurred in the way community members produce and consume energy, travel to destinations, consume products, and dispose of waste. Many experts believe that these changes align closely with the type of community that residents want to live in and that guests hope to visit: An Aspen with clean air and water, accessible mobility that reduces congestion and promotes health, buildings that are safe and comfortable to occupy and affordable to power, and a waste stream where maximum diversion has been achieved.

Thanks to the support of the Aspen community and their elected representatives on Aspen City Council, the diversity of experts and stakeholders that helped conceive this Plan will continue their momentum by getting down to the real work of implementation. Successful implementation will be contingent on collaboration and a diversity in the ownership of various initiatives. The authors of this document thank both Council and the community for their support and look forward to keeping all parties apprised of progress moving forward.

City of Aspen staff with Aspen Mayor Steve Skadron at the Compact of Colorado Communities kickoff event, May 2017

ACKNOWLEDGMENTS

Aspen's Climate Action Plan was prepared by the City of Aspen with extensive input from expert stakeholders representing all sectors. It would not be possible without the expertise, time, and dedication of this Advisory Committee. We would like to express our thanks to the following individuals and the organizations they represent:

Advisory Committee (AC):

Person	Title	Organization
Adam McCurdy	Forest Programs Director	Aspen Center for Environmental Studies
Ashley Perl	Director of Canary Initiative	City of Aspen
Auden Schendler	Vice President of Sustainability	Aspen Skiing Company
Bert Myrin	Council Member	City of Aspen
Chris Hildred	Power Supply & Special Projects Supervisor	Holy Cross Energy
Chris Lane	Chief Executive Officer	Aspen Center for Environmental Studies
Chris Menges	Data Research and Project Planner	City of Aspen
Cindy Houben	Director of Community Development	Pitkin County
Claire Sacco	Member Services Coordinator	Aspen Chamber Resort Association
Clem Kopf	Board Member	Holy Cross Energy
David Hornbacher	Director of Utilities and Environmental Initiatives	City of Aspen
Ellen Sassano	Long Range Planner	Pitkin County
Jack Johnson	Executive Director	Aspen Zero Impact
Jamie Mandel	Prinicipal	Rocky Mountain Institute
Jamie Werner	Forest Programs Director (former)	Aspen Center for Environmental Studies
Jane Wilch	Climate Outreach Coordinator	City of Aspen
Jannette Whitcomb	Sr. Environmental Health Specialist – Air Quality	City of Aspen
Jed Miller	Operations Foreman	Pitkin County Landfill
Jen Wolchansky	Project Manager	Mead & Hunt
Jesse Morris	Principal	Rocky Mountain Institute
Jessica Garrow	Community Development Director	City of Aspen
John Katzenberger	Executive Director	Aspen Global Change Institute
John Kinney	Director of Aviation	Aspen/Pitkin County Airport
John Krueger	Director of Transportation	City of Aspen
Kate Andrus	Project Manager, Aviation Services	Mead & Hunt
Laura Armstrong	Climate and Sustainability Programs Associate	City of Aspen
Liz Chapman	Sr. Environmental Health Specialist – Waste	City of Aspen
Mary Vigilante	President	Synergy Consultants LLC

ACKNOWLEDGMENTS

(Cont.) Advisory Committee (AC):

Person	Title	Organization
Matt Hamilton	Sustainability Director	Aspen Skiing Company
Matthew Shmigelsky	Energy Consultant	Clean Energy Economy for the Region
Michael Miracle	Director of Community Engagement	Aspen Skiing Company
Mirte Mallory	Executive Director	We-Cycle
Mona Newton	Executive Director	Community Office for Resource Efficiency
Phillip Supino	Long Range Planner	City of Aspen
Randy Ready	Assistant City Manager (former)	City of Aspen
Richard Heede	Director	Climate Accountability Institute
Robert Gardner	Board Member	Holy Cross Energy
Ruth Brown	Co-chair	Aspen Chapter, Citizens Climate Lobby
Ryk Dunkelberg	Vice President of Aviation Services	Mead & Hunt
Ryland French	Utilities Efficiency Specialist	City of Aspen
Sara Ott	Assistant City Manager	City of Aspen
Sarah Gruen	Community Sustainability Coordinator	Community Office for Resource Efficiency
Stephen Kanipe	Chief Building Official	City of Aspen
Steve Child	Commissioner	Pitkin County

Facilitation and meeting assistance:

Person	Title	Organization
CJ Oliver	Director of Environmental Health and Sustainability	City of Aspen
Julia Farwell	Sustainability Intern – Waste Reduction	City of Aspen
Larissa Read	Principal Owner	Common Ground Environmental Consulting
Missy Stults	Program Officer	Climate Resilience Fund
Mitzi Rapkin	Community Relations Director	City of Aspen

Preparer and contact information:

City of Aspen Climate Action Department: climate@cityofaspen.com

CAP author and project manager: Chris Menges, Data Research and Project Planner, City of Aspen. chris.menges@cityofaspen.com

Project assistance and meeting facilitation: Larissa Read, Common Ground Environmental Consulting. larissa@commongroundenv.com

Graphic design and layout: Kate Lohnes and Claire Lukens, Lilja Communications. kate@lilja.com, claire@lilja.com

Icon illustration: Ellie Barber, Aspen Global Change Institute. ebarber@agci.org

Forecasting and reduction potential models: Dr. Abel Chavez and Brandon McNamara, Western State Colorado University. achavez@western.edu, brandon_mcn@outlook.com

APPENDIX A: How the CAP was Developed

The recommendations presented in the CAP culminate a year and a half of work by the Advisory Committee including experts in energy, building science, transportation, waste, aviation, forestry, community development, public administration, business, climate science, and resilience. Throughout the course of four facilitated, in-person meetings centered around extensive analysis performed by the City of Aspen's Climate Action Department, the Committee was able to select and recommend specific actions. Re-capping the four-meeting framework provides an overview about how the CAP was developed:

Advisory Committee Meeting 1:

- Reviewed GHG Inventory and GHG forecast to understand trends
- Defined what a successful CAP looks like
- Reviewed background information on each sector
- Discussed GHG reduction objectives in each sector
- Brainstormed list of 400+ possible actions

Meeting 2:

- Reviewed refined list of possible actions (original list of 400 was refined to 250 "feasible" actions)
- Identified co-benefits of the 250 actions
- Developed modeling assumptions for each action (for reduction potential modeling)

Meeting 3:

- Reviewed GHG reduction potential related to successful implementation of all actions
- Reviewed which actions have the highest reduction potential in each sector
- Discussed Toolkit concept

Meeting 4:

- Reviewed draft Toolkit
- Chose three to seven actions in each sector for implementation over next three years
- Finalized list of 46 priority actions for the Aspen CAP

The stakeholder engagement process began with the Advisory Committee defining what a successful CAP would look like. Aspen's CAP been designed around these measures of success:

- **Actionable**
- **Implementable**
- **Innovative**
- **Integrated**
- **Cross jurisdictional**
- **Meets GHG reduction goals**

APPENDIX B: A Summary of Relevant Climate Science

While questions remain about the exact specifics of future climate conditions, the basic facts of climate science and solutions are well understood, and more relevant and accessible to local communities than they ever have been. The following insights have been compiled to provide accessible climate change information that is relevant to the Aspen community.

Our climate is changing, and more rapidly than at any point on record[v].

- "Every single year since 1977 has been warmer than the 20th century average, with 16 of the 17 warmest years on record occurring since 2001, and 2016 being the warmest year on recorded history."[vi]
- Global temperatures have risen by 1.5°F since 1880[vii] and national temperatures have increased 2°F since 1978[viii].
- In Colorado, average temperatures have risen by 2.5°F since the 1950s[ix].
- In Western Colorado, there are 23 fewer frost free days than there were before the 1980s, and annual snowfall has declined by 10 inches[x].

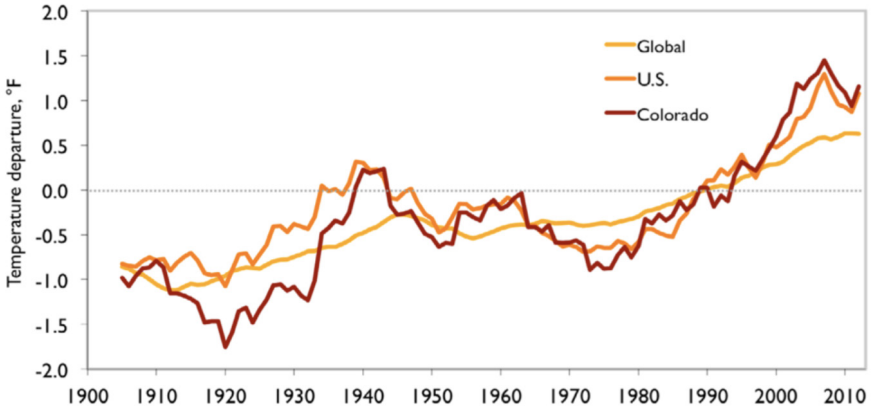
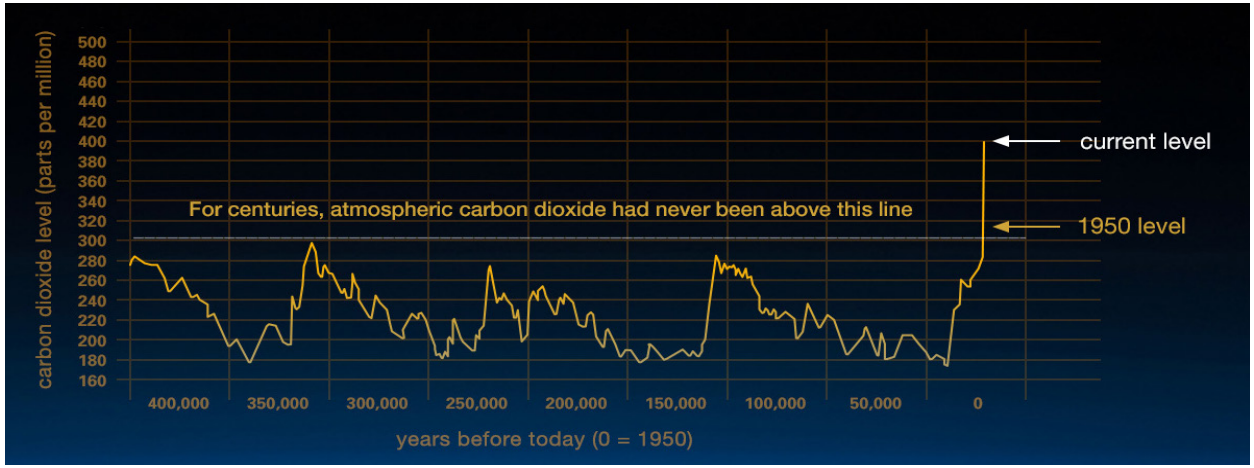


Figure 9. Observational record of annual mean temperature: Global, U.S. and Colorado (Aspen Global Change Institute[v])

Human activity, namely GHG emissions, is driving most of this change.

- 97% of climate scientists agree that the warming over the past century is due to human activity. Most leading scientific organizations worldwide have issued public statements affirming this[xi].
- Atmospheric concentrations of CO_2 have risen 40% since the industrial revolution[xii].

Figure 10. Evidence that atmospheric CO_2 has increased since the Industrial Revolution (NASA[vii])



APPENDIX B: A Summary of Relevant Climate Science

The severity of future climate change is directly linked to GHG emission levels.

- Current and future GHG emissions are the single most significant factor in the amount of future global temperature change[xiii].
- Currently, the world is on a high emissions trajectory. Unless GHGs are mitigated, this could lead to a 9.7°F increase in Western Colorado by 2100[xiv].
- The best available science indicates that the world, Colorado and communities should reduce GHGs 45% below 2005 levels by 2030 and 90% below 2005 levels by 2050, to limit warming to 1.5 to 2°C above preindustrial levels[xv].

We know how to solve it.

- Robust and effective climate solutions are developed and ready for implementation at the international, national, state and local level[xvi].

Acting now is less expensive than inaction and can create healthy, thriving communities.

- Dramatically reducing GHG emissions is much less expensive than the anticipated costs of dealing with the impacts of unchecked climate change[xvii xviii].
- Effectively addressing climate change at the scale necessary to solve the problem could be the largest wealth creation opportunity of our time[xix].
- In communities, climate action typically creates numerous co-benefits such as increased resilience and economic activity, healthier citizens and improved environmental quality. (The CAP and Toolkit define some of the co-benefits that are associated with various actions.)
- Climate action is frequently complementary to existing priorities for communities and regions.

Local action matters.

- While future climate will be determined by global GHG emissions and levels, the cumulative impact of local action is significant and meaningful.
- 78% of energy globally is consumed in cities[xx]. Local action can significantly accelerate a transition away from fossil fuels.
- Local governments in the US currently have some of the most ambitious climate action commitments. More than 350 US mayors have signed a pledge to uphold the Paris Climate Agreement through local action and necessary policy at the state, federal and international levels[xxi]. Globally, over 7,500 cities representing over 700 million people have committed to climate action[xxii].

APPENDIX C: Related Documents

The following documents provide additional context to the Climate Action Plan:

1. The Climate Action Planning Outreach and Engagement Report. During the CAP process, three surveys were conducted to deepen understanding about the willingness of community members, local businesses and visitors to act on reducing energy use, waste generation and vehicle miles traveled. Further, the surveys identified both motivations for, and barriers to, taking action in these areas. The Outreach and Engagement Report provides survey results, methodology and analysis, and is available at https://www.cityofaspen.com/DocumentCenter/View/1783. Survey insights will be used in developing implementation plans for CAP actions.
2. The GHG Reduction Toolkit is available at https://www.cityofaspen.com/DocumentCenter/View/1705.
3. The 2014 Community-wide GHG Inventory is available at http://www.aspenpitkin.com/DocumentCenter/View/1795.

All related documents can also be obtained by emailing climate@cityofaspen.com.

APPENDIX D: Literature Cited

[i] Climate Interactive. 2016. "Deeper, Earlier Emissions Cuts Needed to Reach Paris Goals." Press release of May 18. https://www.climateinteractive.org/wp-content/uploads/2015/12/Stronger-Pledges-May-2016.pdf.

[ii] Aspen Global Change Institute. Climate Change and Aspen: 2006 study and 2014 report. http://www.agci.org/project/climate-change-and-aspen.

[iii] City of Aspen, 2014. 2014 Aspen Community-Wide GHG Inventory. http://www.aspenpitkin.com/DocumentCenter/View/1795.

[iv] Pitkin County and City of Aspen, 2016. Comprehensive Waste Diversion Plan Phase 1. http://www.aspencommunityvoice.com/245/documents/67.

[v] American Meteorological Society, 2017. State of the Climate in 2016, https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/state-of-the-climate.

[vi] NASA, 2017. Release 17-006. https://www.nasa.gov/press-release/nasa-noaa-data-show-2016-warmest-year-on-record-globally.

Quotation from Union of Concerned Scientists: http://www.ucsusa.org/global_warming/science_and_impacts/science/human-contribution-to-gw-faq.html#.WdvDKmhSzxU.

[vii] IPCC, 2013. Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution 12 of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

[viii] Aspen Global Change Institute, 2014. Climate Change and Aspen 2014, p.28.

[ix] Aspen Global Change Institute, 2014. Climate Change and Aspen 2014, p.29.

[x] Ibid p. 14.

[xi] NASA, 2017. Climate change: How do we know? https://climate.nasa.gov/evidence.

[xii] NOAA, 2014. Global Warming FAQ. https://www.climate.gov/news-features/understanding-climate/global-warming-frequently-asked-questions#hide7.

[xiii] Aspen Global Change Institute, 2014. Climate Change and Aspen 2014, p.43.

[xiv] Ibid p. 44.

[xv] Western Resource Advocates, 2017. Colorado's Climate Blueprint. https://westernresourceadvocates.org/publications/colorados-climate-blueprint.

[xvi] Hawken, P., 2017. Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming. http://www.drawdown.org.

[xvii] Universal Ecological Fund, 2017. The Economic Case for Climate Action in the US. https://feu-us.org/case-for-climate-action-us2.

[xviii] American Security Project. http://www.americansecurityproject.org/resources/pnpl/Colorado%20FINAL.pdf.

[xix] Shah, J., 2013. Creating Climate Wealth: Unlocking the Impact Economy.

[xx] CDP Cities, 2015 report infographic.

[xxi] https://www.wearestillin.com/cities-counties/initiatives.

[xxii] Global Covenant of Mayors, 2017. http://www.globalcovenantofmayors.org.

THE CITY OF ASPEN

PARTNERS

ACES Aspen Center for Environmental Studies
ASPEN CHAMBER RESORT ASSOCIATION
ASPEN GLOBAL CHANGE INSTITUTE
ASPEN/PITKIN COUNTY AIRPORT
ASPEN SNOWMASS. ASPEN SKIING COMPANY
ASPEN ZERO IMPACT
Citizens' Climate Lobby
CLEER
CLIMATE ACCOUNTABILITY INSTITUTE
CORE Community Office for Resource Efficiency
Mead & Hunt
PITKIN COUNTY
SYNERGY CONSULTANTS, INC.

DECEMBER 2017

City of Aspen
130 South Galena Street
Aspen, Colorado 81611
(970) 429-1798
Canary@CityofAspen.com
www.CityofAspen.com

The City of Aspen strives to be an environmental leader and to promote environmental stewardship throughout the Roaring Fork Valley, across the state of Colorado, and around the globe. We recognize Aspen's dependence on climate and natural resources for a thriving economy, healthy ecosystems, and exceptional quality of life. In an effort to do our part to reduce the threat of climate change, Aspen's City Council adopted the Canary Action Plan in 2007, which commits to reducing community-wide emissions 30% by 2020 and 80% by 2050, below 2004 levels.

Cover photo courtesy Aspen Chamber Resort Association, C2 Photography