ALL-IN CLARK COUNTY

BOLD ACTION FOR A SUSTAINABLE FUTURE

Las Vegas-Henderson-Paradise MSA Priority Climate Action Plan

February 2024

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List of Acronyms

BRT – Bus Rapid Transit

CNG – Compressed Natural Gas

CPRG – Climate Pollution Reduction Grant Program

DOE – U.S. Department of Energy

EECBG – Energy Efficiency and Conservation Block Grant Program

EFN – EnergyFit Nevada

EPA – U.S. Environmental Protection Agency

GHG Emissions – Greenhouse Gas Emissions

IRA – Inflation Reduction Act

LEAD – Low-Income Energy Affordability Data Tool

LIDAC – Low-Income/Disadvantaged Community

MPO – Metropolitan Planning Organization

MSA – Metropolitan Statistical Area

NREL – National Renewable Energy Laboratory

PCAP – Priority Climate Action Plan

RTC – Regional Transit Commission of Southern Nevada

SNBTU – Southern Nevada Building Trades Union

SNWA – Southern Nevada Water Authority

UNLV – University of Nevada Las Vegas

About *All-In Clark County*

Clark County, Nevada, is a dynamic and diverse region renowned for its vibrant communities and unique characteristics. With five incorporated cities—Boulder City, Henderson, Las Vegas, North Las Vegas, and Mesquite—the County is a hub of regional activity. Home to a rapidly growing population and booming tourism industry, Clark County embraces its role as a leading destination, attracting millions of visitors annually and anticipating to add another 820,000 residents by 2060. At the same time, Southern Nevada has undergone notable shifts in its climate, witnessing a rise in high heat days, intense precipitation events, regional wildfires, strong winds, and prolonged drought conditions. These changes are affecting the well-being, economy, and safety of the region. Notably, Las Vegas has been deemed one of the fastest-warming cities, experiencing the impacts of climate change firsthand, and Southern Nevada is situated in the Mojave Desert, the driest desert in North America.

The *All-In Clark County* initiative takes a smart, bold, and inclusive approach to creating a sustainable community. Sustainability in Clark County goes beyond ensuring clean air and water; it encompasses affordable housing, clean energy, a variety of sustainable employment opportunities, and a climate conducive to the overall prosperity and well-being of present and future generations. Individually, jurisdictions and agencies in Southern Nevada have been moving forward over the last decade on various programs and initiatives that drive reductions in greenhouse gas (GHG) emissions and foster a more resilient region. From solar array installations, building efficiency programs, clean fuel transit and electric fleets, and a nationally recognized water conservation program, the region knows what it takes to be sustainable. In 2021, during the development of the *All-In Clark County Community Sustainability and Climate Action Plan*, and amidst the hottest year on record (at the time) and record low water levels in Lake Mead, it became clear that regional coordination would be a more effective way to address the climate crisis.

Timeline of Recent *All-In Clark County* Efforts to Address Climate Change in Southern Nevada:

- **August 2020** – In an effort to lead by example, Clark County launches the *All-In* Initiative by first addressing County operations.
- **March 2021** – On behalf of all Southern Nevada, Clark County funds the update of the *2014 Regional Greenhouse Gas Emissions Inventory*.
- **June 2021** – The *All-In Climate Vulnerability Assessment* process kicks off to assess how resilient Southern Nevada's people, natural resources, economy, and infrastructure are to climate change.
- **July 2021** – Launch of the planning process for the *All-In Clark County Community Sustainability and Climate Action Plan*.
- **September 2021** – Final *All-In Climate Vulnerability Assessment* released.
- **December 2021** – Release of the *All-In Regional Community Greenhouse Gas Inventory* with results for the whole region and for each municipality.
- **August 2022** – Local government and regional agency key staff hold first roundtable to discuss need for and interest in regional climate collaboration.
- **October 2022** – A second meeting of local government and regional agency key staff is held to determine the most appropriate regional climate collaboration model for Southern Nevada.
- **March 2023** – EPA announced the Climate Pollution Reduction Grant (CPRG) to states, local governments, tribes, and territories to tackle climate pollution.
- **April 2023** – Clark County Commissioners unanimously approve and adopt the *All-In Community Plan*.

- **August 2023** – County awarded EPA grant to create a Priority Climate Action Plan (PCAP).
- **September 2023** – First meeting held of the *All-In* Regional Climate Collaborative.
- **November 2023** – Clark County and regional partners launched community engagement efforts as part of the PCAP development.
- **December 2023** – Clark County submits application for funding through the Energy Efficiency Conservation Block Grant (EECBG) program to design and launch pilot program for the *All-In* Home and Building Improvement Program.
- **January 2024** – The *All-In* Regional Climate Collaborative is official as all necessary boards and councils have approved their organization's participation through an executed interlocal agreement that defines how the region will work collaboratively to further the goals and actions of the *All-In Community Plan* and the PCAP.

Community Engagement

Community and stakeholder engagement has been a core pillar of the *All-In Clark County* Initiative. During the *All-In* planning process, more than 150 organizations were engaged via 56 meetings and events, with over 6,000 survey responses. This engagement process led to the development of a Sustainability and Climate Advisory Group and Engagement Team, which jointly partnered with organizations and stakeholders to incorporate geographically, ethnically, and socioeconomically diverse representation. To date, this planning process has reached more than 220,000 individuals.

To develop this PCAP, the County continues to leverage and build upon this solid foundation of inclusive and equitable community and stakeholder engagement. It has been determined that public communication around action on climate change in Southern Nevada led by the Collaborative will remain under the *All-In* brand, so as not to cause confusion for the public. As such, all references in this section to *All-In,* should be considered synonymous with CPRG. Below we have highlighted the primary engagement activities that occurred between August 2023 and February 2024 in alignment with the development of the PCAP.

All-In Regional Climate Collaborative

The need for regional collaboration to drive action on climate change became clear through the development of the *All-In Community Sustainability and Climate Action Plan.* After a series of roundtables with key staff from the County, the cities, and regional agencies, the establishment of the *All-In* Regional Climate Collaborative ("Regional Climate Collaborative") was identified as a priority action in the final *All-In Community Plan*. The PCAP requirement for interlocal coordination helped spur the regional partners to formalize the Regional Climate Collaborative through a fully executed interlocal agreement in January 2024.

First meeting of the *All-In* Regional Climate Collaborative held on September 28, 2023.

Regional Climate Collaborative participating entities include Clark County, the five cities within the County—City of Boulder City, City of Henderson, City of Las Vegas, City of North Las Vegas, and City of Mesquite—and two regional agencies, Southern Nevada Water Authority (SNWA) and the Regional Transportation Commission (RTC) of Southern Nevada. Between September 2023 and February 2024, the Regional Climate Collaborative hosted six working sessions to review the CPRG requirements, discuss updated data and analyses for the GHG inventory, identify high impact strategies for the PCAP, and develop and begin to implement a communications and engagement

strategy. The Regional Climate Collaborative is continuing to meet on an ongoing basis after submittal of the PCAP to EPA. The agendas from the working sessions are included in Appendix A.

All-In Education Program

One of the highest priority items identified through the *All-In* process was the need to provide basic climate education for Southern Nevada's diverse community. Based on the previous outreach experience, it was determined that growing climate literacy generally and debunking common myths about climate solutions would be essential to gaining any traction with the community on climate action. Therefore, to ensure engagement through the CPRG program would yield desired outcomes, Clark County and the Regional Climate Collaborative focused first on developing an outreach and engagement strategy and refined the initial All-In brand messaging. This strategy leverages the relationships developed with CBOs through the *All-In* process to reach target audiences, particularly LIDACs. These materials are included in Appendix A. While this approach requires more upfront time, providing a foundation of climate literacy will help to build the necessary community support to implement the plan, adopt climate policies, and to shift behavior to reduce emissions and enhance resilience.

Additionally, Clark County is re-launching its successful Climate Ambassadors program to educate the community about the *All-In Clark County* Initiative. The County launched the first round of the Climate Ambassadors program during the planning process for the *All-In Community Plan*. The program had a significant impact by mobilizing a network of dedicated individuals who can actively work towards creating awareness, improving literacy levels, and promoting positive behavior change within their communities. Clark County began recruitment for Climate Ambassadors in February 2024 and has received 45 applications as of February 28, 2024. Climate Ambassadors will support *All-In* by staffing outreach events, distributing *All-In* engagement materials, creating social media content for *All-In*, giving presentations to community groups, promoting high impact strategies, and building relationships with CBOs. The County will hold three in-person trainings with Climate Ambassadors on climate awareness, organizational goals, communications, and collaboration, and Ambassadors will be paid $25 per hour through the program. By equipping Climate Ambassadors with knowledge and resources, they will work to raise awareness of *All-In Clark County*, build climate literacy, and inspire collective action. Recruitment materials for the program are included in Appendix A.

Stakeholder Meetings, Presentations, Focus Groups

While the education and outreach strategy was in development, Clark County representatives focused on smaller, more intimate meetings with key stakeholders. Between August 2023 and February 2024, *All-In* team members met with and presented to stakeholders and community-based organizations (CBOs) representing low-income and disadvantaged communities (LIDACs) and other diverse groups to better understand priorities and needs. Stakeholders are detailed in Table 1.

Table 1. Description of Stakeholder Meetings (August 2023 – February 2024)

Stakeholder Meetings	Representatives	Topics Discussed
Advanced Energy Group, Caesars Entertainment, Impact NV, JPI Group, Nevada Clean Energy Fund, NV Energy, SNWA	7	Discussed implementation priority actions and climate education.
Allegiant Stadium	2	Discussed potential partnerships for community engagement around sustainability initiatives.

Stakeholder Meetings	Representatives	Topics Discussed
BlueGreen Alliance and Nevada Conservation League	2	Discussed direct pay options for public entities and nonprofits pursuing renewable energy projects.
Chispa (League of Conservation Voters)	3	Discussed implementation priority actions, barriers to implementation, and Implementation Workshop.
CHR, Inc.	1	Discussed hosting a focus group for LIDACs and the barriers associated with home upgrades for low-income community members.
Clark County Department of Juvenile Justice Services	6	Discussed sustainable practices, youth recycling programs, and grant opportunities.
College of Southern Nevada (CSN) and City of Las Vegas	2	Discussed implementation priority actions and climate education.
Conservation District of Southern Nevada	8	Introduced them to the *All-In* Home and Building Improvement Hub priority measure and discussed how their organization might support the effort.
Ennovara	1	Discussed recent HVAC projects with NV Energy, including heat pump programs.
McKinstry	1	Discussed educational and training opportunities related to energy retrofits.
Nevada Electric Vehicle Association	2	Discussed potential partnerships for community engagement.
NFL Green	1	Discussed potential partnerships for community engagement.
NV Energy	4	Discussed gaps in and synergies with existing programs.
Rocky Mountain Institute (RMI)	4	Requested support with providing a fact sheet on heat pump use in the southwest. Discussed messaging for the technology. As a result, we are now referring to heat pumps as two-way A/Cs.
Southern Nevada Building Trades Union (SNBTU)	4	Discussed workforce development and training needs and capacity and toured Joint Apprentice Training Centers.
The Energy Coalition	2	Discussed best practices and lessons learned in designing and managing residential energy efficiency programs.
University of Nevada Las Vegas (UNLV)	2	Discussed the UNLV Rebel Climate Action Plan and intersections with *All-In Community Plan*.
Western Resources Advocates	2	Discussed priority actions, barriers to implementation, existing resources, and Implementation Workshop.

In December 2023, leaders from Clark County's Department of Environment and Sustainability attended and presented at the Nevada Climate Justice Convening hosted by the EPA and Dream.org. The County's presentation was focused on the *All-In* Initiative and the potential funding and partnership opportunities that exist for implementation.

In February 2024, the County hosted a focus group with CHR, Inc., a CBO that has been leading workshops for the Black and mostly low-income community on energy efficiency and clean energy for NV Energy. There were 15 individuals in attendance who participated in a conversation to understand their current priorities and challenges and to share their barriers to keeping their homes healthy, efficient, and affordable. Concerns raised included: rising utility costs, identifying trustworthy contractors, gaps in assistance for low- to moderate-income households who are often left out of income-qualified programs, and the digital divide. An additional focus group is scheduled for March 2024 with Chispa (League of Conservation Voters) to hold similar discussions with Spanish-speaking residents. To ensure equitable engagement, all focus group participants are provided a meal and $50 gift cards as compensation. Additionally, the organizations that helped recruit for and co-host the events were also paid for their time. Meeting materials from the focus groups are included in Appendix A.

In February 2024, members of the *All-In* Engagement Team attended the 3rd Annual Spring Festival to celebrate the lunar new year at Desert Breeze Community Center. County staff educated attendees about the *All-In* Initiative and recruited potential applicants for the forthcoming Ambassador Program.

The *All-In* Engagement Team has additional events planned for April and May, including a 4-part webinar series on electric vehicles, an in-person community Earth Day Celebration, and an in-person presentation focused on pollinators.

The *All-In* Engagement Team at the 3rd Annual Spring Festival.

All-In Implementation Workshop

In November 2023, the County hosted a workshop for stakeholders and CBOs to identify priorities from the existing *All-In Community Plan* and to discuss opportunities, resources, and barriers associated with implementation of these priority actions. The County invited a diverse group of stakeholders to this workshop to ensure an array of communities and priorities were represented.

During the workshop, participants voted on actions they felt were the highest priority for the groups they represent and discussed steps, timeline, funding sources, partners, and equity considerations for each of those actions. These actions were then considered for inclusion in the PCAP or the CCAP. The County encouraged the CBOs to consider mechanisms for ongoing collaboration and shared leadership for implementation of priority actions.

Thirty-four individuals attended the event representing the following organizations:

- American Institute of Architects
- BlueGreen Alliance
- Celtic Energy
- Chispa (League of Conservation Voters)
- Impact NV
- Moms Clean Air Force
- Native Voters Alliance Nevada
- Nevada Conservation League
- Nevada Environmental Justice Coalition
- Nevada Division of Forestry
- Progressive Leadership Alliance of Nevada (PLAN)
- Sierra Club
- Southwest Energy Efficiency Project
- Southwest Gas
- The Ferrato Company
- UNLV
- Western Resource Advocates

Workforce Development Planning

Effectively reducing GHG emissions in Southern Nevada will require the expertise of tradespeople who have the skills and knowledge needed to electrify and upgrade buildings and maintain electric vehicles. The County recognizes the need to develop a robust workforce with high-quality jobs available for LIDACs for this purpose. In December 2023 and January 2024, the County met with the SNBTU to discuss current and future workforce needs that will be essential to ensure that high-impact strategies for emissions reductions can yield the greatest impact in the shortest amount of time. In March 2024, Clark County is hosting a listening session with contractors throughout the region to gain an understanding of the current capacity and resource needs of the workforce in order to adequately support them through implementation of *All-In*.

Next Steps

Currently, all materials from the *All-In* process—including all deliverables and reports—are publicly available on the Clark County website at https://allinclarkcounty.com. As stated above, Clark County will continue to partner with municipalities, agencies, and diverse stakeholders to execute the *All-In* Education Program and conduct engagement activities throughout the CPRG Program from development of the PCAP to the Comprehensive Climate Action Plan (CCAP) and beyond.

Greenhouse Gas Emissions Inventory

Introduction

Clark County conducted an inventory of GHG emissions from calendar year 2019 to better understand how activities in communities across the County contribute to the region's emissions. This regional inventory includes emissions from the City of Boulder City, the City of Henderson, the City of Las Vegas, the City of Mesquite, the City of North Las Vegas, and the unincorporated areas within Clark County. This inventory, along with the *All-In Climate Vulnerability Assessment*, provides a foundation to develop strategies and actions to address climate change throughout Southern Nevada and provide a benchmark from which to measure progress.

The data used to generate regional GHG emissions estimates was drawn from local and national sources that capture and report activity data from multiple sectors across the county. The EPA Local Greenhouse Gas Inventory Tool (LGGIT) Community Module was used to determine regional GHG emissions from the activity data. The names and organization of sectors presented in this inventory align with the organization of the LGGIT. While these differ somewhat from the *All-In Regional GHG Inventory*, this organization will better align the region's inventory with others performed under the CPRG program. These sectors are detailed in Table 2.

Table 2. Description of GHG Inventory Sectors

Sector	Description
Stationary Combustion	Emissions from natural gas, propane, and fuel oil combustion in residential, commercial, industrial, and municipal buildings and properties in Clark County.
Electricity Consumption	Emissions from electricity consumption in electric vehicles, water treatment and distribution processes, and residential, commercial, and municipal facilities (including street and traffic lights) in Clark County.
On-Road Mobile Combustion	Emissions from fossil fuel combustion in passenger and commercial vehicles, as well as public transit.
Non-Road Mobile Combustion	Emissions from fossil fuel combustion in railways, watercraft, aviation, and non-road equipment.
Solid Waste	Emissions from landfilled and composted waste.
Wastewater Treatment	Process and fugitive emissions from wastewater treatment plants and septic systems.
Natural Gas Leaks	Fugitive emissions from the natural gas distribution system.
Urban Forestry	Carbon removed by trees within urban areas of Clark County.
Power Generation	Emissions from natural gas combustion in power plants.

Inventory results included here are for calendar year 2019 and are calculated using 5th IPCC Assessment Report 100-Year Global Warming Potential values for non-CO_2 greenhouse gases. This inventory also reflects a location-based perspective for the purposes estimating GHGs from electricity consumption, which are based on emissions factors source from EPA eGRID for the AZNM region which includes Clark County. While Clark County is home to significant and growing renewable energy resources, and individual energy providers such as City of Boulder City owns significant renewable generation sources, the location-based approach provides the most accurate representation of the physical impact of electricity consumption from the electric grid.
Note that there are some differences between the inventory figures reflected here and the previously published 2019 inventory associated with the *All-In Community Plan.* Some of these changes reflect differences in updated methodologies and categorization used by the LGGIT Community Module, some

changes reflect corrections to the *2019 All-In Regional GHG Inventory* made during this process. A full description of these changes is included in a separate errata summary in Appendix B. A summary of methodologies and sources for all analyses included in this PCAP is included in Appendix C.

GHG Emissions by Sector

Clark County was responsible for over 25 million metric tons of carbon dioxide equivalent ($MTCO_2e$) in 2019. The breakdown of emissions is demonstrated by sector in Figure 1, and by source and scope Table 3. The relative size of each sector provides some information to help identify where the biggest opportunities for reductions are, avoiding the most serious climate change impacts will require reductions from across all sectors, which will be further explored in the development of the CPRG Comprehensive Climate Action Plan.

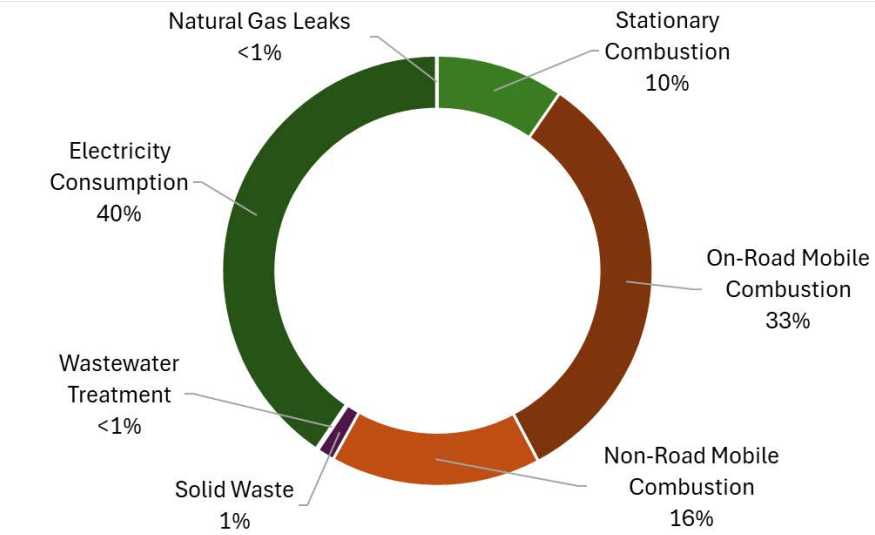


Figure 1. Clark County 2019 Gross GHG Emissions Inventory by Sector

*Table 3. Clark County 2019 GHG Emission Sources by Sector**

Sector	$MTCO_2e$	% of Gross GHGs
Stationary Combustion (Scope 1)	**2,439,214**	**9.60%**
Buildings (Natural Gas)	2,427,773	9.55%
Buildings (Propane)	10,657	0.04%
Buildings (Fuel Oil)	784	< 0.00%
Electricity Consumption (Scope 2)	**10,262,248**	**40.38%**
Buildings	9,728,092	38.27%
Electric Vehicles	10,529	0.04%
Water Treatment & Delivery	523,627	2.06%
On-Road Mobile Combustion (Scope 1)	**8,306,306**	**32.68%**
Passenger Vehicles (Gasoline & CNG)	6,481,289	25.50%
Heavy-Duty Vehicles (Diesel)	1,741,527	6.85%
Transit (Biodiesel & CNG)	83,490	0.33%
Non-Road Mobile Combustion (Scope 1)	**4,014,316**	**15.79%**
Non-Road Equipment	2,511,070	9.89%
Watercraft	17,565	0.07%
Aviation	1,485,681	5.85%

Sector	$MTCO_2e$	% of Gross GHGs
Solid Waste (Scope 1)	**333,014**	**1.31%**
Landfilled Waste	304,996	1.20%
Composted Waste	28,018	0.11%
Wastewater Treatment (Scope 1)	**43,206**	**0.17%**
Natural Gas Leaks (Scope 1)	**18,360**	**0.07%**
Urban Forestry (Scope 1)	**(142,624)**	
Gross Emissions	**25,416,665**	
Net Emissions	**25,274,041**	
Power Generation (Scope 1)	**8,572,298**	

* Note totals may not sum perfectly due to rounding.

GHG Emissions by Activity

For the prioritization of GHG reduction actions, it is also useful to organize data around the underlying activity driving emissions as opposed to the specific source of GHGs. This breakdown is demonstrated in Figure 2 and detailed in Table 4. This summary presents the results of the inventory in sector categories that may be more accessible to general audiences with additional context for how they contribute to the emissions profile of the region.

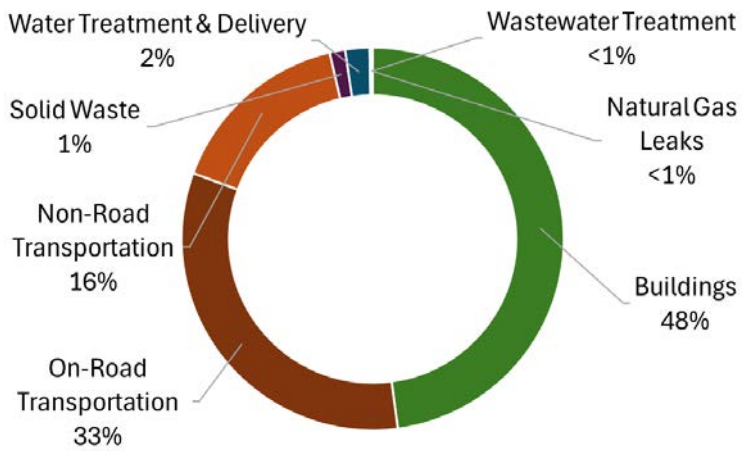


Figure 2. Clark County 2019 Gross GHG Emissions Inventory by Activity

Table 4. Clark County 2019 GHG Emission Sources by Activity

Activity	$MTCO_2e$	% of Gross GHGs
Buildings	**12,167,306**	**47.87%**
Electricity	9,728,092	38.27%
Natural Gas	2,427,773	9.55%
Propane	10,657	0.04%
Fuel Oil	784	0.00%
On-Road Transportation	**8,302,798**	**32.72%**
Fossil Passenger Vehicles	6,481,289	25.50%
Fossil Heavy Duty Vehicles	1,741,527	6.85%
Public Transit	83,490	0.33%
Electric Vehicles	10,529	0.04%

Activity	$MTCO_2e$	% of Gross GHGs
Non-Road Transportation	**4,014,316**	**15.79%**
Non-Road Equipment	2,511,070	9.89%
Aviation	1,485,681	5.85%
Watercrafts	17,565	0.07%
Solid Waste	**333,014**	**1.31%**
Water Treatment & Delivery	**523,627**	**2.06%**
Wastewater Treatment	**43,206**	**0.17%**
Natural Gas Leaks	**18,360**	**0.07%**
Urban Forestry	**(142,624)**	
Gross Emissions	25,416,665	
Net Emissions	25,274,041	
Power Generation	8,572,298	

* Note totals may not sum perfectly due to rounding.

Building Energy

Emissions associated with this sector come from both the purchased electricity used to power & cool buildings and the fuels used for heating, cooking, and other building energy uses. Energy use from buildings makes up the largest percentage of regional GHG emissions in Clark County contributing 12,167,306 $MTCO_2e$ in 2019, or 47.87%.

These emissions were generated mostly from electricity consumption (38.27%) and natural gas combustion (9.55%) in buildings. The remainder of residential and commercial building emissions comes from propane and heating fuels. To rapidly reduce energy use and emissions, investing in high-efficiency retrofits and reducing stationary combustion in existing buildings has significant potential for reductions. Both strategies are necessary to ensure we minimize demand for electricity, enabling a faster transition to all clean generation resources.

Transportation

The transportation sector includes the GHGs emitted from the movement of people and goods within the community across different modes, contributing 12,331,150 $MTCO_2e$ in 2019, or 48.52%.

On-road transportation specifically includes GHGs emitted by electricity and fossil fuels used in cars, trucks, buses, and vans – accounting for 32.35% of gross GHG emissions. Most on-road transportation emissions come from fossil fuel powered passenger (25.50%) and heavy-duty (6.85%) vehicles, with small additions from public transit (0.33%) and electric vehicles (0.04%).
Non-road transportation and mobile sources includes emissions from fossil fuels used in watercrafts, aviation, and construction, landscaping, and other ground support equipment—accounting for 15.79% of gross GHG emissions.

Solid Waste

Emissions associated with solid waste accounted for in this inventory represent escaping landfill gas that occurred in 2019 from waste deposited in landfills over many preceding decades. Direct landfill emissions in 2019 totaled 333,014 $MTCO_2e$. This approach to assessing landfill gas can help identify the potential benefits of quick short-term actions to provide better capture and utilization of landfill gas in alignment with the goals of the PCAP. Other approaches to evaluating waste related GHGs, using a methane commitment approach may be more helpful in long-term strategies to address waste generation rates and alternative management practices.

Additional Sources

Other sectors—including energy for water treatment and delivery, wastewater treatment, and natural gas leaks—when aggregated, accounted for 2.3% of Clark County's gross GHG emissions.

Urban Forestry

At over 8,000 square miles in size, Clark County the potential for emissions and biologic carbon removal is large, but also limited by the vegetation type common in a mostly desert landscape. This assessment focused on removals associated with urban forestry to align with both the LGGIT Community Module and the overall goals of CPRG program to relate climate-action with potential benefits to disadvantaged communities. Carbon sequestration associated with urban trees located within Clark County was estimated to remove 142,624 $MTCO_2e$. This value for carbon removal represents the difference between total gross and net emissions for the inventory.

Power Generation

This sector includes emissions from combustion in power plants. In the original *All-In Regional GHG Inventory*, these sources within Clark County were purposefully omitted because their emissions are represented within those accounted for in electricity consumption. The CPRG Program requires an accounting of all major sources of emissions including those from the power generation sector. However, standard reporting under the BASIC/BASIC+ reporting framework excludes scope 1 emissions from energy generation supplied to the grid to avoid double counting.[1] As such, emissions from power generation were not included in the total GHGs for the Inventory but are included as an informational item.

Jurisdiction Breakdown

Clark County consists of several jurisdictions, each with unique operations, geographies, and populations. To the extent possible, this inventory disaggregates GHG emissions from across these jurisdictions to allow for a more comprehensive understanding of what the largest contributors are for each jurisdiction and to identify targeted reduction strategies. The jurisdictions included in this analysis are Boulder City, Henderson, Las Vegas, Mesquite, North Las Vegas, and Unincorporated Clark County.

As energy use in buildings contributes to almost half of regional GHG emissions, it is important to breakdown the associated electricity and natural gas use on a jurisdiction level to inform targeted implementation of building electrification and energy retrofit measures. This breakdown for natural gas and electricity use is detailed in Tables 5 and 6, respectively. In 2019, Unincorporated Clark County represented the largest share of regional emissions from energy use in buildings, contributing 43.56% and 53.04% of natural gas and electricity consumption, respectively. This includes the unincorporated area within the Las Vegas Valley as well as all other regions within the County.

*Table 5. 2019 Natural Gas Use in Buildings by Jurisdiction and Sector**

Natural Gas Stationary Combustion (therms)				
Jurisdiction	**Residential**	**Commercial & Institutional**	**Industrial**	**Total**
Boulder City	2,342,921	805,681	-	3,148,602
Henderson	57,540,511	14,319,227	740,610	72,600,348
Las Vegas	95,444,194	37,508,218	-	132,952,412
Mesquite	-	13,844	-	13,844
North Las Vegas	32,703,197	11,813,035	2,179,579	46,695,811

[1] Global Protocol for Community-Scale Greenhouse Gas Inventories. An Accounting and Reporting Standard for Cities Version 1.1. https://ghgprotocol.org/sites/default/files/standards/GPC_Full_MASTER_RW_v7.pdf

Jurisdiction	Residential	Commercial & Institutional	Industrial	Total
Unincorporated Clark County	131,343,888	65,009,155	743,967	197,097,010
Total	**319,374,711**	**129,469,160**	**3,664,156**	**452,508,027**

* Note totals may not sum perfectly due to rounding.

Table 6. 2019 Electricity Use in Buildings by Jurisdiction and Sector

Electricity Use in Buildings (MWh)			
Jurisdiction	**Residential**	**Commercial & Institutional**	**Total**
Boulder City	100,254	54,419	154,674
Henderson	1,549,595	1,296,041	2,845,637
Las Vegas	2,763,289	2,381,547	5,144,836
Mesquite	198,341	198,993	397,335
North Las Vegas	896,754	1,086,407	1,983,160
Unincorporated Clark County	4,049,205	7,838,501	11,887,706
Total	**9,557,438**	**12,855,909**	**22,413,347**

* Note totals may not sum perfectly due to rounding.

Priority GHG Reduction Measures

As revealed by the GHG Inventory, emissions associated with building energy and transportation are the two largest GHG generating activities. These are also the activities that touch the wallets of every household across the County and can deliver multiple co-benefits if designed to advance climate equity. While there are many actions that can be taken to address these emissions sources, additional criteria were considered in the selection of GHG reduction measures for this PCAP, including: ability to provide regional benefits, ability to address the biggest climate resilience challenge for the region—water availability, ability to provide benefits to LIDACs, and feasibility and readiness to move on the measure now. These criteria were reviewed and assessed through feedback gathered through the *All-In Community Plan* development process, Regional Climate Collaborative Working Sessions, and the community engagement activities held since August 2023.

Ultimately these considerations led to the selection of two priority GHG reduction measures for the Las Vegas-Henderson-Paradise MSA PCAP. The first is the development of the ***All-In*** **Home and Building Improvement Hub** to advance building efficiency and decarbonization while addressing household energy burdens and indoor air quality. The second measure is to invest in **Carbon-Free Shared Mobility**, which will drive the transformation of the RTC bus fleet to rely substantially on liquid hydrogen and expand the RTC Bike Share, alleviating first-and-last mile challenges for many potential riders.

A more comprehensive set of actions to address remaining GHGs and other community benefits will be explored in detail through the development of the Comprehensive Climate Action Plan (CCAP) for Clark County under the CPRG Program.

All-In Home and Building Improvement Hub

Building energy efficiency and decarbonization represent some of the biggest opportunities for reducing GHGs in Clark County and delivering the most community benefits. The residential sector alone has a high reduction potential as well as a significant challenge to address. With over 730,000 total residential structures, a concerted effort is needed to transform this sector.

However, in this moment of historic support for climate action, there is the potential to kickstart the workforce and build the momentum needed to complete the transition over the long term.
With historic levels of support for home energy improvements comes a risk that available rebates and tax credits will disproportionately accrue to wealthier households.[2] Creation of a community-driven building retrofit program will ensure that not only CPRG funds are focused on achieving the goals of the Justice40 Initiative, but also create the local infrastructure to ensure funds from other federal programs will contribute to meeting their contribution towards this important national goal. The overall concept is not new to the region and demonstrated successfully through EnergyFit Nevada (EFN)[3], which was supported by the first iteration of the US Department of Energy (DOE), EECBG program. This concept will learn from lessons past and approach the problem at a scale that generates momentum for a sustained program beyond immediate funding opportunities.

[2] Elevate, Building Electrification Institute, Emerald Cities Collaborative, the Greenlining Institute, Greenlink Analytics, Rising Sun Center for Opportunity, and NRDC. “Guidelines for Maximizing the Benefits of Federal Investments in Buildings.” January 8, 2024. https://www.elevatenp.org/publications/guidelines-for-maximizing-the-benefits-of-federal-investments-in-buildings/
[3] Carvill, Anna, Bushman, Kate, & Ellsworth, Amy. EnergyFit Nevada (formerly known as the Nevada Retrofit Initiative) final report and technical evaluation. United States. https://doi.org/10.2172/1135825

Description

The *All-In* Home and Building Improvement Hub would provide a one-stop shop for resources that support improvements that enhance indoor air quality, safety, and comfort, increase water and energy efficiency, and reduce utility bills. Resources would include a combination of facilitated water, energy and healthy buildings assessments, individualized support to access and leverage all complementary incentives, direct financial assistance for qualifying participants, and training support to ensure a qualified workforce is able to install the equipment and complete the upgrades. The initiative would focus on driving transformational change in hard-to-reach and otherwise disadvantaged communities that have not historically benefitted as much from energy efficiency rebates, due to the requirement of paying upfront. The *All-In* Home and Building Improvement Hub will also serve as a knowledge resource for all residential and commercial property owners to maximize utilization of complementary funding streams from multiple sources.

GHG Reduction Potential

Through the *All-In* Home and Building Improvement Hub, the County intends to set the ambitious, but achievable goal of retrofitting 10% of residential structures, or 73,000 structures, by 2030. Utilizing savings estimates for the most cost-effective approaches to comprehensive energy savings from the National Renewable Energy Laboratory (NREL) ResStock End Use Savings Shapes[4] dataset, it is estimated that by 2030, annual GHG reductions would total over 148,000 $MTCO_2e$. Assuming 20% of the target was reached each year, the cumulative savings would total approximately 444,000 $MTCO_2e$. Achieving this level of implementation would set the conditions for transformational change.

Roles of Key Implementing Agencies

Clark County will lead the effort and will be responsible for establishing the administrative home for the hub. The County will seek support from experienced CBOs or other organizations to lead the delivery of the program and walking participants through the entire customer journey.

Local governments participating in the Regional Climate Collaborative will promote the program within their communities and build channels for accessing the program from existing housing and community support initiatives. As administrator of existing water conservation rebates, the SNWA will have additional opportunities for cross-promotion through their programs. RTC may also promote the program through existing resources, which could include use of advertising space on buses, distribution of materials at mobility centers and hubs, and through online communications.

Geographic Location

This program will be available throughout the full boundary of Clark County, inclusive of all incorporated cities, to deliver the maximum benefits to both urban and rural communities.

Milestones for Authority

As this will be a voluntary program providing technical and financial assistance, the County and its partners are fully authorized to move this program forward. If the County were to seek grant funding for this priority action, approval by the Clark County Board of Commissioners will be required.

Funding Sources

Clark County has already applied to direct its formula allocation from the US DOE, EECBG program to design and pilot the *All-In* Home and Building Improvement Hub. Design and implementation of the program will seek to gap-fill and extend all other funding resources directed at building efficiency. It is also assumed that the additional marketing will demonstrate a significant increase in the use of existing utility and state incentive programs. The initial pilot funded through the EECBG program will focus on

[4] National Renewable Energy Laboratory. ResStock End Use Savings Shapes, 2022.1 Release. https://resstock.nrel.gov/datasets

low-income homeowners. It is anticipated that the County will seek additional funds from other federal programs or other sources to expand this program to also include residential rental and commercial properties.

A key component of the program concept is 'braiding' with other sources of funding to support retrofit opportunities. Utility administered efficiency programs will be leveraged to the fullest extent possible as well as any complementary government funds that can be combined to support comprehensive retrofit projects. Significant funding is available for home water conservation measures through the SNWA, which will also be delivered to program participants wherever possible.

Metrics for Tracking Progress

The *All-In* Home and Building Improvement Hub will track installation of each individual improvement installed through the program. Additional evaluation strategies may be added such as pre- and post-retrofit utility bill comparisons and follow-up surveys to monitor social outcomes and reductions in in-door air pollution from combustion.

Specific metrics for tracking progress could include:

- Number and area of homes or businesses assessed for efficiency measures, by demographic or business type;
- Number of homeowners or business owners moving forward with upgrades, by demographic or business type (conversion rate of program participants);
- Total water and energy conservation measures installed by type;
- Total water and energy savings and associated GHG reductions delivered through the program;
- Total investment leveraged from Federal, State, utility programs, and other sources; and
- Number of highly skilled workers trained to meet program needs.

Carbon-Free Shared Mobility

Mobile combustion sources are a significant source of GHGs nationally as well as within Clark County. While some transformation towards electric vehicles is already underway for private fleets, more could be done to spur the transition of the transit system that serves a greater share of the residents of the County. There are approximately 65,000 households in Clark County which do not own a private vehicle.[5] These households are dependent on the transit and shared mobility options that exist and without changes to those systems, they have limited choices to reduce the carbon impact of their journey to work and other critical destinations, especially during inclement weather events. In addition, by ensuring that the public transportation system is low or no-carbon, every further enhancement that increases utilization of the system will have a bigger emissions reduction than would occur if it continued to run on fossil fuels.

Description

RTC provides mass transit that connects all of Las Vegas Valley and parts of Boulder City. It serves as the transit authority, the Metropolitan Planning Organization (MPO), and regional traffic management agency for Southern Nevada. The RTC works to improve sustainability, air quality improvement, enhanced mobility, and increased quality of life in the region. As the region's primary transit provider, RTC operates a fleet of over 400 buses and provides over 40 million passenger trips annually.[6] While the RTC transit fleet primarily relies on compressed natural gas (CNG) fuel, pilot projects are underway to test battery electric and hydrogen buses. RTC intends to expand the hydrogen fuel fleet by 5 buses and provide a hydrogen fueling skid that allows use of liquid hydrogen. The project implements the

[5] U.S. Census. American Community Survey 2021, 1-Year Estimates. Table DP04, Selected Household Characteristics. https://data.census.gov/table/ACSDP1Y2022.DP04?q=vehicle%20ownership&g=050XX00US32003
[6] Regional Transportation Commission of Southern Nevada (2022). RTC Report Card.

RTC's Zero Emission Vehicle Plan, which establishes a strategy to reduce GHG emissions from the transit bus fleet.

Additionally, RTC Bike Share, located in downtown Las Vegas, is the valley's first and only public bike share system. RTC Bike Share offers community members, commuters, and tourists the opportunity to access downtown Las Vegas destinations by e-bike. To continue Bike Share's success in getting people out of cars and onto bikes, expansion is planned to the Maryland Parkway corridor and UNLV.

GHG Reduction Potential

Transitioning five CNG transit buses to hydrogen is estimated to reduce GHG emissions by 307 $MTCO_2e$ per year. The operation of hydrogen buses from July 2027 to September 2029 (2.25 years) is estimated to result in a 691.01 $MTCO_2e$ reduction by 2030 GHG reduction potential of bus conversion was calculated based on average block lengths, as provided by RTC Metropolitan Planning Organization and Transit. The GHG reduction calculation is based on the following factors or assumptions:

- Hydrogen buses will be operated in the same way as CNG buses.
- Emission factor used to calculate CNG bus GHG emissions is based on an average factor of all transit buses provided by Clark County Department of Environment and Sustainability (2022).
- Emission factor for hydrogen buses is based on the FTA Transit Bus Electrification Tool.[7]

The expansion of bike share stations and related e-bikes is expected to result in a GHG emissions reduction of 19.3 $MTCO_2e$ annually, or a 77.2 $MTCO_2e$ reduction by 2030.

All calculation methodologies and assumptions are documented in Appendix C.

Roles of Key Implementing Agencies

Transit service with hydrogen buses will be provided by RTC Transit. Service is currently provided across the region, resulting in benefits to communities in Clark County and the cities of Las Vegas, North Las Vegas, Henderson, and Boulder City. Roles for partner agencies have not been identified.
RTC Bike Share expansion is planned in the City of Las Vegas, Clark County, and near the UNLV; therefore, these organizations would be consulted during the identification of new bike share stations. The RTC will also partner with non-profit organizations to expand "how to bike" education programs and use of bike share by vulnerable populations.

Geographic Location

Hydrogen fleet expansion would benefit the entire RTC service area. The area's population has steadily increased over the past 20 years and is currently just under 2.3 million. The population within one-quarter mile of the RTC fixed route service area is 1,285,000. Population forecasts estimate Clark County's population to reach about 2.72 million by 2035, and by 2060, it is predicted to reach nearly 3.38 million. The growth trend in the area has continued and presents opportunities for the RTC to ensure that planning for future public transportation needs includes a focus on climate, safety, and equity for all residents and visitors in Southern Nevada.

RTC would expand its bike share system to connect to the newly constructed Maryland Parkway bus rapid transit (BRT) line. New bike share stations would be located at BRT stops along the line, with additional stations added within a half mile to form a connected bike share network. The expanded network would be centered along Maryland Parkway and serve a large area on both sides of the corridor, which is located just east of the Las Vegas Strip and UNLV.

[7] FTA (2022). Transit Bus Electrification v1.0: User Guide. https://www.transit.dot.gov/regulations-and-programs/environmental-programs/transit-bus-electrification-user-guide

Milestones for Authority

As the primary transit agency for the region, RTC has authority to procure fleet and fueling facilities. RTC operates the downtown Las Vegas bike share system with the ability to implement expansion.

Funding Sources

RTC actively seeks discretionary grant opportunities to fund procurement of hydrogen vehicles and hydrogen infrastructure as the existing sales taxes allocated to transit are not enough to cover the additional costs associated with the hydrogen buses.

RTC could apply for competitive federal transportation funding through the Carbon Reduction Program or the Congestion Mitigation and Air Quality Program to supplement the capital costs for bike share expansion. Alternatively, local funds administered by the RTC could fill funding gaps.

Metrics for Tracking Progress

The following performance metrics will be tracked for hydrogen fleet expansion:

- Total GHG reduction from tailpipe emissions;
- Fuel efficiency (liquid hydrogen gallons/mile);
- Fuel efficiency (liquid hydrogen gallons/mile) compared to outdoor temperature; and
- Customer satisfaction measured through community outreach (e.g., surveys).

The following performance metrics will be tracked for bike share system expansion:

- Increase in the number of bike share participants;
- Total number of trips taken from expanded system;
- Miles traveled using the service; and
- Emissions avoided relative to private vehicle use.

Benefits Analysis

Clark County conducted a benefits analysis to assess the benefits of the GHG reduction measures across the region. This section includes a broad assessment of benefits associated with the GHG reduction measures, including an analysis of air quality improvements, improved public health outcomes, and increased climate resilience. Also included in this section is a preliminary analysis of benefits for LIDACs anticipated to result from the GHG reduction measures, including air quality benefits and decreased costs from energy efficiency improvements.

Summary of Community Benefits

The proposed GHG reduction measures encompass a comprehensive strategy to yield multifaceted benefits for LIDACs. A high-level summary of these benefits is outlined in Table 7. Measures related to improving building energy efficiency provide indirect benefits to air quality and public health, primarily from reduced demand from fossil fueled electric power generation, which is a source of sulfur dioxide (SO2), nitrogen oxides (NO_X), particulate matter (PM), carbon dioxide (CO_2), mercury (Hg), and other pollutants.[8] More direct impacts can be achieved from actions aimed at decarbonization and onsite combustion of fuels within new and existing buildings. For example, eliminating the use of natural gas for cooking not only significantly improves air quality, but also leads to tangible benefits for public health such as reduced incidences of respiratory diseases like asthma and bronchitis. The *All-In* Home and Building Improvement Hub will also provide direct economic benefits through reduced energy expenditures and can enhance climate resilience by reducing peak demand for electricity.

Table 7. Community Benefits Matrix

		Air Quality (e.g., Reduction of air pollutants)	**Public Health Outcomes** (e.g., Reduced respiratory and cardiovascular diseases)	**Economic Benefits** (e.g., Reduced energy burden)	**Climate Resilience** (e.g., Extend regional water supply, Reduced power outages)
***All-In* Home and Building Improvement Hub**	Efficiency (water and energy)	*Indirect*	*Indirect*	*Direct*	*Direct*
	Decarbonization	*Direct*	*Direct*	*Direct*	*Direct*
Carbon-Free Shared Mobility		*Direct*	*Indirect*	*Direct*	*Direct*

Indirect: Action has subsequent impacts occurring later in time or is farther removed.
Direct: Action has an immediate and focused impact in terms of time and location.

Measures related to bolstering the regional transit system and transitioning to zero-emission vehicles provide a mix of indirect and direct benefits. Transit-focused measures enhance accessibility, mitigate traffic-related pollutants, and stimulate economic development at an average rate of $5 for every dollar invested.[9] Enhancements in public transportation would not only yield a decrease in individual carbon

[8] U.S. Environmental Protection Agency, Power Plants and Neighboring Communities Webpage. Retrieved from: https://www.epa.gov/power-sector/power-plants-and-neighboring-communities
[9] American Public Transit Association (2020). Economic Impact of Public Transportation. Retrieved from https://www.apta.com/wp-content/uploads/APTA-Economic-Impact-Public-Transit-2020.pdf

footprints but also create job opportunities and enhance economic prospects for residents[10] by increasing access to jobs, specifically in low-income areas with limited access to private transportation.

Potential Disbenefits

Clark County understands that the only way to achieve its vision for a more resilient and sustainable future is to lead with equity. Acknowledging historic and current institutional and structural discrimination and injustices, the County focused extensively on removing barriers to engagement and education by proactively engaging groups and organizations that represent marginalized communities throughout the planning process. The identified GHG reduction measures, if not implemented thoughtfully, could result in potential disbenefits to LIDAC populations. As such, identification of equity considerations was essential during the planning process. Potential disbenefits are included below for each of the GHG reduction measures.

All-In Home and Building Improvement Hub

While the program will prioritize providing positive impacts to LIDACs, there are potential disbenefits that are important to consider and proactively address. Potential disbenefits and mitigation strategies to ensure they are avoided include:

- Residents from LIDACs could face barriers in accessing the program due to lack of awareness, language barriers, lack of access to digital materials, or limited time to be present for upgrades. As such, the project team will partner directly with community-based organizations to conduct extensive outreach and educational campaigns in multiple languages and through diverse communication channels.
- Even with financial incentives, the up-front costs of home or building improvements could be prohibitive for some households or business owners, highlighting the need for grants to cover upfront costs for participants, as feasible.
- Due to the reliance on utility rebates and programs, effective collaborative with and buy-in of utilities will be critical to ensure that existing programs remain in place and become stronger through integration with the Hub's services rather than be replaced by them. Through the development of this PCAP, Clark County has engaged with utilities to understand gaps in and synergies with existing programs.
- It is expected that a program of this scale will have a transformative impact on the home and building upgrade industry with the drive to all-electric, high-efficiency buildings. Availability and capacity of the local workforce is an important aspect to consider and may necessitate new training programs and resources for workers. If services provided through the program do not maintain high quality installations and deliver intended benefits, trust to engage in any energy savings program could continue to erode. Through the development of this PCAP, Clark County has engaged with workforce and trades allies to understand gaps and needs in the industry. It is anticipated that training programs will need to be bolstered to support the growth and capabilities of the local workforce. In addition, the Hub will actively seek feedback to ensure high quality standards are delivered.

Carbon-Free Shared Mobility

Potential disbenefits of implementing an expanded hydrogen fleet, as well as mitigation strategies to ensure they are avoided, include:

- There are increased fuel and operations costs in comparison to CNG and battery electric vehicles.

[10] Boarnet, M. G, Flores Moctezuma, D., & Gross, J. (2022). New Open-Source Analyses of Transit Job Access and Transit Ridership. UC Davis: National Center for Sustainable Transportation. http://dx.doi.org/10.7922/G2862DSW.

- While use of green hydrogen fuel is intended, it is possible that hydrogen will be produced with natural gas. If so, the GHG emissions reduction impact from transitioning current CNG buses to new hydrogen buses may be less significant than desired. Projecting this with certainty is difficult, but final rules for the 45V Clean Hydrogen Production Tax Credit should help to create better availability of truly clean hydrogen.[11]

Potential disbenefits of the proposed bike share fleet and station expansion, as well as mitigation strategies to ensure they are avoided, include:

- As a small bike share system, the fleet does not currently include accessible bikes for use by people of all abilities, or cargo bikes for use by caregivers traveling with others or people traveling with large items. Therefore, project benefits do not extend to these population groups, however, RTC's existing paratransit services can provide accessibility to these groups.
- Roadways connecting to Maryland Parkway and downtown Las Vegas are often auto-oriented and uncomfortable for the average cyclist. Therefore, bike share use may be limited until the region's complete streets network is expanded.

[11] US Department of Energy. Financial Incentives for Hydrogen and Fuel Cell Projects. https://www.energy.gov/eere/fuelcells/financial-incentives-hydrogen-and-fuel-cell-projects

Low-Income and Disadvantaged Communities Benefits Analysis

Consistent with the Justice40 initiative, as well as the *All-In Clark County*'s guiding principles, this section identifies LIDACs across Southern Nevada and conducts a preliminary analysis of the benefits to these communities. Census tracts identified as disadvantaged through the Climate & Economic Justice Screening Tool (CEJST) are illustrated in Figure 3 and used throughout this analysis to identify potential benefits to disadvantaged communities.[12] A list of census tracts identified as disadvantaged are included in Appendix D.

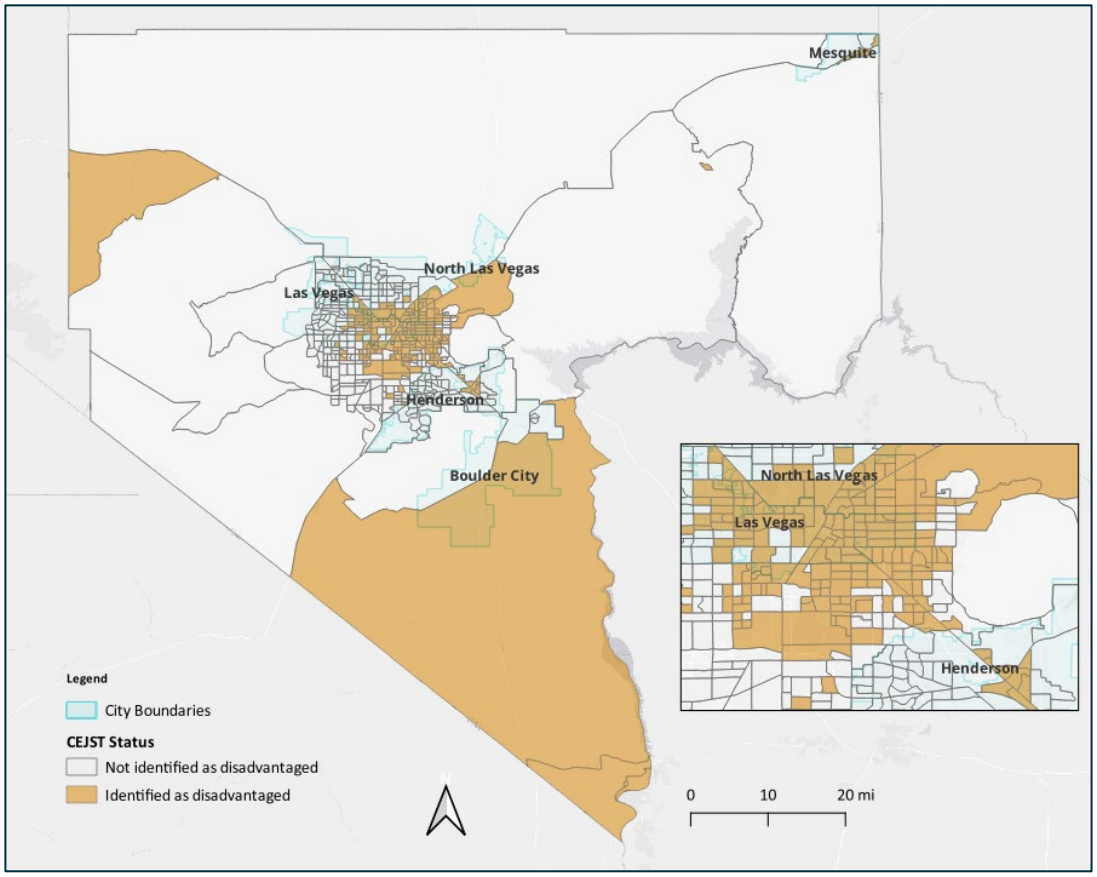


Figure 3. Low-Income and Disadvantaged Community Status defined by CEJST

All-In Home and Building Improvement Hub

The *All-In* Home and Building Improvement Hub would provide a one-stop shop for resources that support improvements that enhance indoor air quality and comfort, increase water and energy efficiency, and reduce utility bills. This program will be available throughout Clark County to deliver the maximum benefits to all communities in the region, urban and rural.

[12] U.S. Environmental Protection Agency, Climate & Economic Justice Screening Tool.

Reduced Energy Burden

Providing accessible financial and technical assistance for whole-home retrofits can reduce energy burden, or the percentage of income spent on energy costs, for households in LIDACs. The map shown in Figure 4 illustrates the current average energy burden in each census tract, representing the communities that serve to benefit the most from retrofits. Energy burden data is sourced from CEJST.

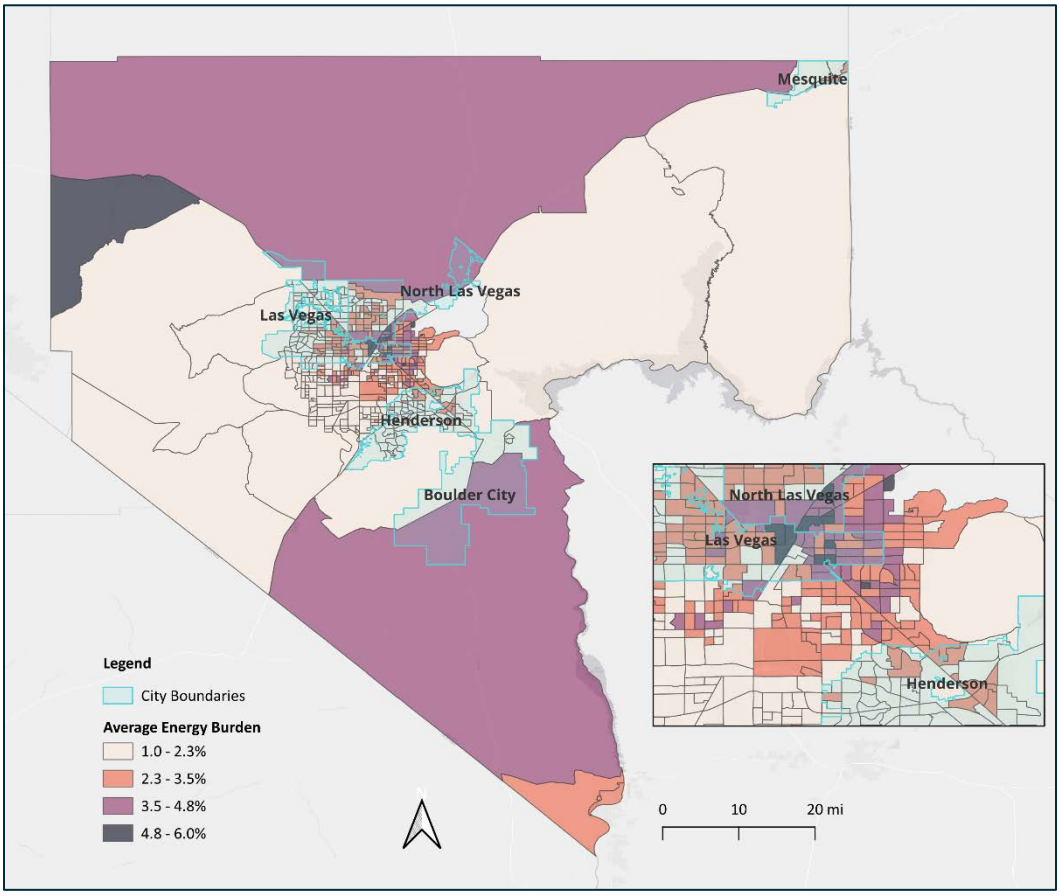


Figure 4. Energy Burden by Census Tract in Clark County

Annual average cost savings from home efficiency and decarbonization retrofits could be as much as $1,000 per household per year for an existing home currently using natural gas for heating, cooking, and water heating. In addition, there are substantial rural areas of Clark County not served by natural gas. Many of these homes are heated with energy intensive electric resistance heating or propane. For these homes, annual cost savings could be much higher. Additionally, homes that take advantage of future potential incentives for solar arrays (i.e., through the prospective Solar for All program) would see even further home energy cost savings and GHG reductions.

Leveraging opportunities to deliver the maximum benefits to disadvantaged communities would mean targeting home improvements specifically to those homes that would benefit the most financially from the action. By summarizing data from the Low-Income Energy Data (LEAD) tool from US Department of Energy[13], the impact of reduced energy cost relative to total income and average energy spending by Federal Poverty Level Classifications is illustrated in Table 8.

[13] U.S. Department of Energy, Low-Income Energy Affordability Data Tool. Retrieved from: https://www.energy.gov/scep/slsc/low-income-energy-affordability-data-lead-tool

Table 8. Projected Reductions in Energy Burden

Federal Poverty Level	Average CO_2e Savings ($MTCO_2e$)	Average Annual Income	Current Average Energy Burden	Average Cost Savings	Improved Energy Burden	Savings as Share of Income
0-100%	2.6	$11,651	17%	$954	8%	8%
100-150%	3.1	$26,325	7%	$1,154	3%	4%

Implementing comprehensive home energy reduction retrofits across 73,000 homes by 2030 would keep an additional $82 million from leaving these communities each year, which would have multiplier effects that would further improve the economic well-being of low-income residents throughout Clark County.

Improved Indoor Air Quality

A significant share of the GHG savings in each household comes from the reduction of stationary combustion of natural gas, which also has associated air pollution impacts.

Co-Pollutant Reductions

Modeled savings from eliminating natural gas use in 73,000 residences would reduce over 23 million therms of natural gas. Applying those savings to criteria air pollutant and hazardous air pollutant emissions factors sourced from the AP 42 compendium of emissions factors[14] would yield the following annual reductions, as outlined in Table 9. A summary of methodologies and sources for all analyses included in this PCAP is included in Appendix C.

Table 9. Modeled Air Pollutant Annual Reductions

	Criteria Air Pollutant Emissions Annual Reductions (metric tons)
NOx	29.45
Total Particulate Matter	2.38
SOx	0.19
VOCs	1.72

An additional 3.53 tons would be reduced across all hazardous air pollutants and the average reduction within each home would be approximately 0.35 pounds per year.[15] While the total tonnage of reductions here appears small relative to CO_2, the impact to households could be significant given the risk associated with some of the chemicals, especially given the location of the combustion source within residences that may not have adequate ventilation.

Health Benefits

Reducing energy use and GHG emissions in buildings decreases air pollutants, fostering cleaner air and potentially lowering asthma rates in low-income communities. The map shown in Figure 5 illustrates the current asthma prevalence for adults (aged greater than or equal to 18 years) as a percentile across all the census tracts in Clark County. Asthma prevalence data is sourced from CEJST. There is significant

[14] U.S. Environmental Protection Agency AP 42, Fifth Edition, Volume I Chapter 1: External Combustion Sources, Section 1.4, Natural Gas Combustion. 1998. https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf

[15] Includes 2-Methylnapthalene, 3-Methylnapthalene, 12-Dimethylbenz(a)anthracene, Acenaphthene, Acenaphthylene, Anthracene, Benz(a)anthracene, Benzene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Butane, Chrysene, Dibenzo(a,h)anthracene, Dichlorobenzene, Ethane, Fluoranthene, Fluorene, Formaldehyde, Hexane, Indeno(1,2,3-cd)pyrene, Napthalene, Pentane, Phenanathrene, Propane, Pyrene, Toluene.

overlap with the census tracts identified as disadvantaged, illustrating the opportunity to improve health outcomes for the region's most vulnerable populations.

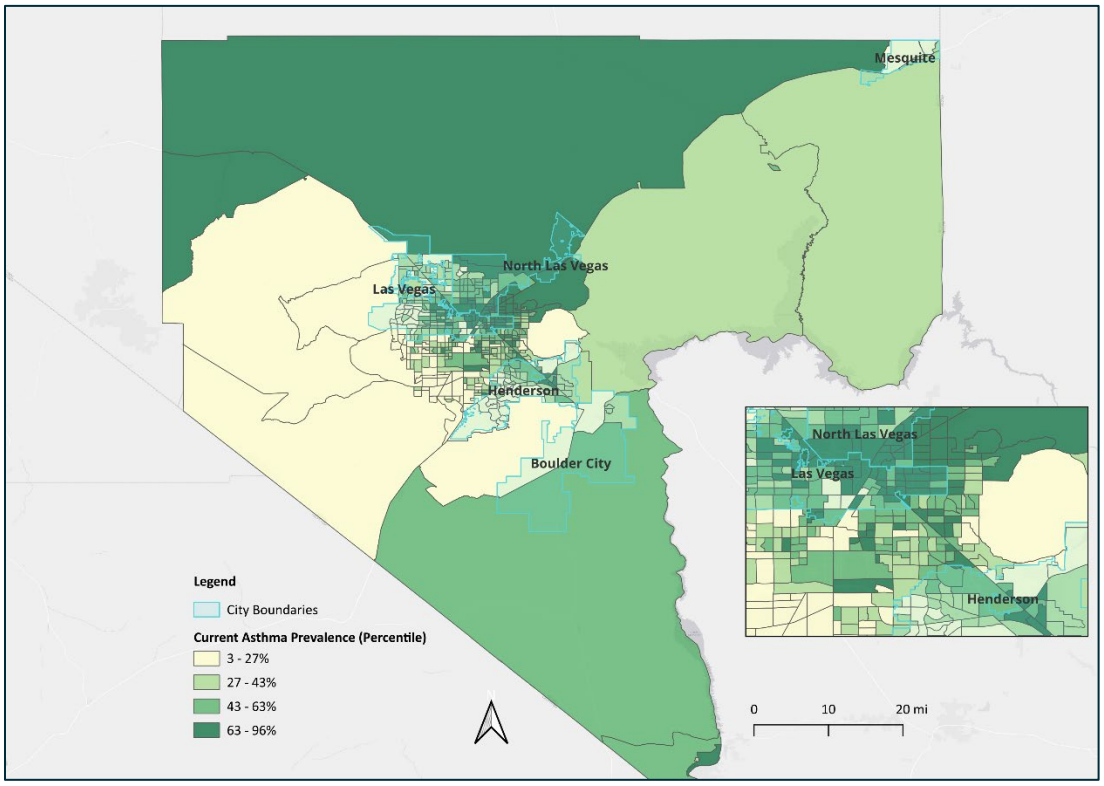


Figure 5. Current Asthma Rates Among Adults by Census Tract in Clark County

Enhanced Water Conservation

As the program leverages SNWA's existing water conservation and efficiency rebates, home and building upgrades will also contribute to increased water savings. Using average annual household water savings, it is assumed that implementing water main leak replacement, indoor appliance retrofits, and water smart landscaping upgrades contribute to an average savings of 6,560 gallons, 18,807 gallons, and 17,410 gallons per home per year, respectively.[16] Scaling up these household-level estimates to the intended reach of the program will yield significant water savings community-wide. Additionally, increasing household water savings will serve to reduce household water bills, reducing the burden on low-income households in LIDACs.

Carbon-Free Shared Mobility

Expansion and enhancement of regional transit services, including the incorporation of hydrogen buses into the fleet and expanding the existing bike share system, contribute uniquely to the well-being and sustainability of the region.

Transit Access

At the heart of these projects is the commitment to equitable transit access and enhanced mobility and connectivity. The proposed projects promote equity and remove barriers to opportunity through mitigating climate change and improving the transit experience.

[16] Average household water savings provided by the Southern Nevada Water Authority.

Hydrogen Fleet

Transit service provided by an expanded hydrogen fleet has many benefits to LIDACs. In Clark County, NV, 13.4% of residents live below the poverty line and more than 50% of residents belong to minority groups.[17] Within the RTC service area, there are identified historically disadvantaged communities whose residents heavily rely on public transportation to access employment opportunities, social services, and healthcare.

This project will benefit the entire RTC service area. Census data (2020) for the RTC service area details that residents are 42% White, 31% Hispanic, 11% Black, 10% Asian, 4% two or more races, and 1% Islander. More than one third (34%) speak a language other than English at home, more than 1.5 times the rate of the U.S. (22%).[18] Of the 809,026 households within the service area, more than half are married couples (54%); 19% are female householders; 18% are non-families; and 9.0% are male householders. The median household income is $61,048 compared to the U.S. at $64,994; and 13.4% of residents live below the poverty line, which is higher than the U.S. at 12.8%. The percent of residents with a high school graduation or higher is 86.3%, compared to the U.S. at 88.5%; and 25.2% have a bachelor's degree or higher, compared to 32.9% for the U.S. Over 22% of residents are foreign-born, more than 1.5 times the U.S. rate.

Within the RTC service area, there are identified historically disadvantaged communities whose residents heavily rely on public transportation to access employment opportunities, social services, and healthcare.[19] This overlap is illustrated in Figure 6, which displays RTC bus routes overlayed with LIDACs. Based on recent survey results of bus riders in Las Vegas, 60% of RTC customers are from minority populations and primarily ride the bus (70%) to and from work, 15% higher than the industry average.[20] Nearly 20% of riders experience barriers to accessing jobs and social services and 95% of RTC customers are dependent on buses for travel. Almost 30% of riders have household incomes below $20,000 per year.

Bike Share System

The bike share system would connect the newly constructed Maryland Parkway BRT line. New bike share stations would be located at BRT stops along the line, with additional stations added within a half mile to form a connected bike share network. The expanded network would serve not only transit riders, but the surrounding neighborhoods in and around the Maryland Pkwy BRT corridor as well. While vibrant, the roughly 8-square-mile target area has experienced economic, social, and environmental challenges. All 16 census tracts that fall within the area are either "disadvantaged" and/or "Areas of Persistent Poverty," per the Climate and Economic Justice Screening Tool, as illustrated in Figure 7.

The median household income of the target area ($35,300) is nearly half that of the region ($65,300), and almost a quarter of the target area's population is below the poverty level. Approximately three-quarters of workers in the area do not have a college degree, and about a third work in the Retail Trade or Accommodation or Food Services industries. Target area residents are more than four times more likely to rely on public transportation to get to work than the average Southern Nevadan (9.6% compared to 2.3%) and are more than four times more likely to walk or bike to work (6.3% compared to 1.5%). Unsurprisingly, the share of car-less households in the target area (26.2%) is roughly four times that of the region (7.5%).

[17] U.S. Census American Community Survey (2020).
[18] U.S. Census American Community Survey (2020).
[19] U.S. Environmental Protection Agency, Climate & Economic Justice Screening Tool.
[20] Regional Transit Commission of Southern Nevada (2023). On Board Transit Survey.

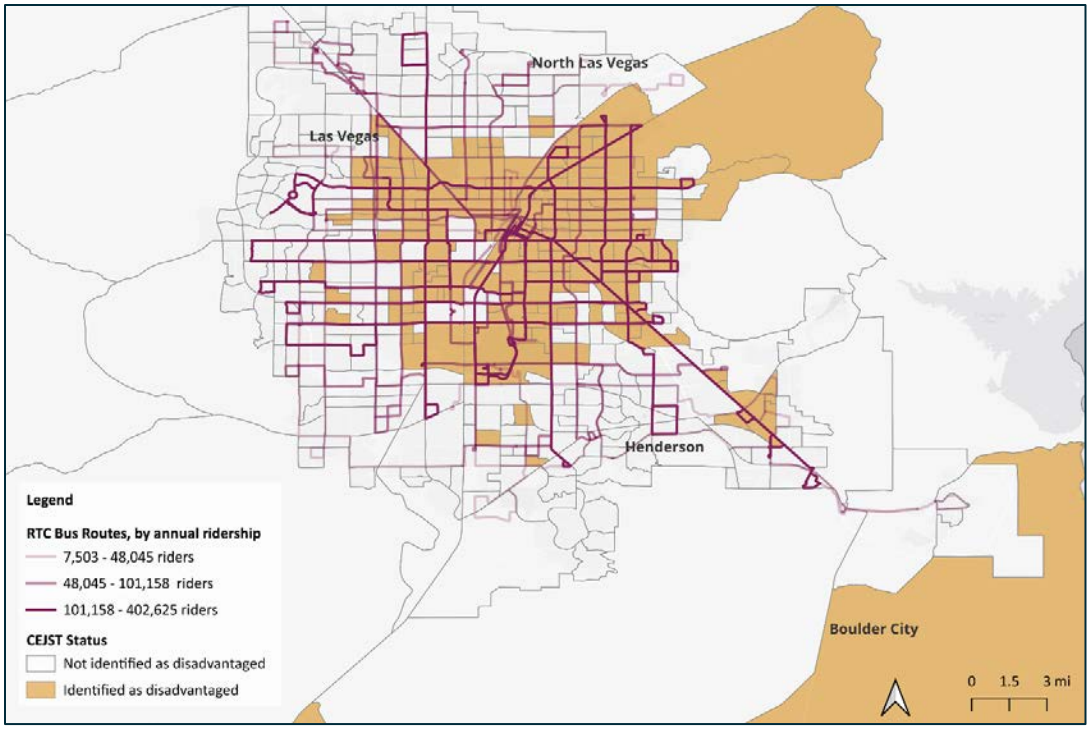


Figure 6. RTC Bus Routes Ability to Serve Disadvantaged Communities

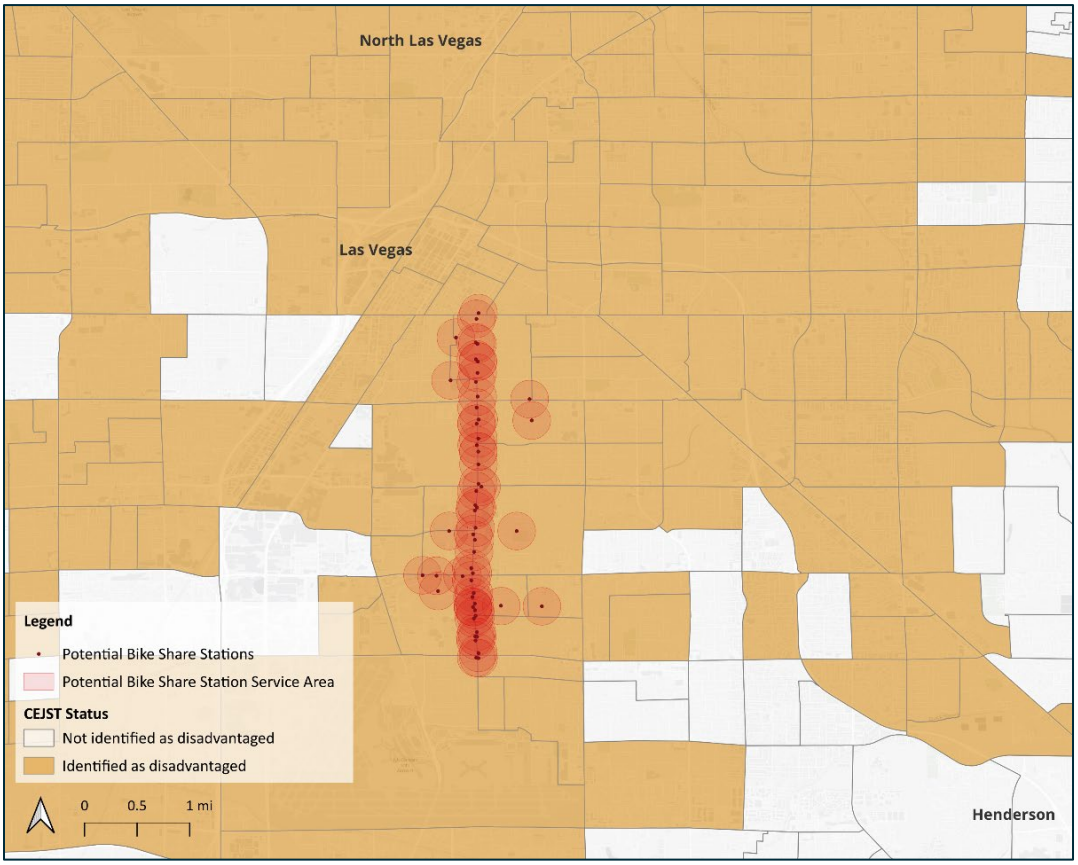


Figure 7. Potential Bike Share Station Service Areas Ability to Serve Disadvantaged Communities

Air Quality and Health

Improving air quality is a key focus of these initiatives. Considering the connection between air quality and the ways that lower income populations are more exposed to harmful pollutants has been a trending research topic. A 2018 study conducted by Environmental Protection Agency (EPA) scientists published in the American Journal of Public Health found that minority and poorer communities are disproportionately affected by air pollution relative to the overall population.[21]

Hydrogen Fleet

The project supports the Justice40 Initiative by positively impacting disadvantaged communities within the RTC service area. Low-income, high unemployment, and racially segregated communities served by the RTC will benefit from a reduction in air pollution through the replacement of CNG vehicles with clean hydrogen vehicles.

Bike Share System

The RTC Bike Share system promotes active transportation options that improve public health and improve air quality. Since the program was launched in 2016, more than 200,000 trips have been logged, with cyclists traveling more than 1.1 million miles and reducing CO2 emissions across Southern Nevada by more than 3.8 million pounds. More than 75% of riders make up minority ethnic groups and more than 10% of riders use Bike Share as an essential means to get to and from work. Further, in 2021, the RTC, in partnership with the Southern Nevada Health District, setup a special membership for low-income residents who do not have debit or credit cards to instead access the bike share system using their Nevada SNAP EBT card at a significantly discounted cost. The addition of more electric bikes to the fleet will bolster the viability of the RTC Bike Share system and provide residents and visitors an affordable, healthy, and active transportation option.

Residents in the target area are also disproportionately burdened by climate and environmental impacts, chiefly poor air quality and extreme heat. Investing in non-auto modes of transportation, such as Bike Share and the new BRT line, stands to reduce GHG emissions which contribute to warming temperatures.

[21] U.S. Environmental Protection Agency (2018). Our Nation's Air. Retrieved from: https://gispub.epa.gov/air/trendsreport/2018/

Workforce Planning Analysis

As the County navigates the imperative to reduce GHG emissions, it becomes increasingly apparent that the pursuit of sustainability is interconnected with the creation of high-quality employment opportunities. Aligning with the Department of Labor's Good Jobs Principles, the proposed GHG reduction measures not only aim to mitigate environmental impact but also adhere to the principles that prioritize fair wages, safe working conditions, and inclusive economic growth, as documented below. While there will undoubtably be challenges that arise with a shifting workforce landscape, the focus on sustainability will foster equity, empowerment, and shared prosperity in the workforce. This section assesses workforce development activities that are needed to implement the GHG reduction measures.

All-In Home and Building Improvement Hub

Implementing comprehensive home energy reduction retrofits across 73,000 homes by 2030 is expected to have a cumulative cost of $3.3 billion for direct installations. Implemented at a steady pace of $677 million per year, it is estimated that the program could sustain approximately 4,200 high skilled jobs annually by applying a rate of 6.21 jobs per $1 million in investment. These jobs could have multipliers of up to an additional 3,700 jobs in upstream manufacturing industries supplying materials and equipment at a rate of 88 jobs per 100 primary jobs, and another 3,700 local jobs in services at a rate of 89.6 per 100 primary jobs. Job quality measures will be put in place to ensure workers are paid prevailing wages and that DBE contractors have capacity to participate in the program. It is intended that the program will also support jobs in adjacent industries as the program leverages home health and water conservation assessors.

In addition to the workforce development opportunities within buildings trades, administration of the program provides significant opportunities for professional development opportunities within non-profit management which the program would seek to fill with members from the communities which the program serves and increase the capacity of CBOs over time.

Carbon-Free Shared Mobility

With a 5.4% unemployment rate in the Las Vegas metro region as of December 2023, the expansion and enhancement of regional transit services will contribute to the economic competitiveness of Clark County and will help to ensure the preservation of good-paying jobs. New public transportation vehicles will not only improve GHG emissions and air quality but will provide increased safety and comfort in travel which will in turn improve reliable and timely access to job opportunities and employment centers.

Additionally, with new zero emission technology implemented in the RTC's day-to-day operations, the need for qualified operators, mechanics and maintenance staff is growing. Additional training and required certifications for employees working with the new buses will warrant increases in pay for skilled labor in an in-demand industry. RTC and its contractors recognize the value of providing good jobs with fair pay and are committed to fair labor standards and strong investments in workforce development that result in sustainable career pathways with growth opportunities.

Review of Authority to Implement

Feasibility was a crucial component of prioritizing GHG reduction measures. The existing statutory or regulatory authority to implement each of the GHG reduction measures is outlined below.

All-In Home and Building Improvement Hub

As this will be a voluntary program providing technical and financial assistance, the County and its partners are fully authorized to move this program forward. If the County were to seek grant funding for this priority action, approval by the Clark County Board of Commissioners will be required. It is expected that the Board of County Commissioners will review and approve any applications for grant funding prior to the time of funding request.

Additionally, the *All-In* Home and Building Improvement Hub is strategically building on the previous successful model established by EFN. With $5 million in seed funding from the U.S. DOE's Better Buildings Neighborhood Program, EFN addressed the state's needs by growing the workforce and upgrading homes in key metropolitan areas. The collaboration of nonprofit organizations, municipal governments, and universities, including the University of Nevada (Reno and Las Vegas), played a crucial role in achieving the program's objectives. This precedent provides evidence of a multi-stakeholder approach with similar community partners successfully achieving over $520,000 in total annual energy cost savings. Based on the history of the successful prior model, no additional limits on authority to implement are expected.

Once the program is operational, Clark County has the authority to issue grants to residents and businesses for the purposes of community improvement, as demonstrated through various existing grant programs (e.g., Emergency Solutions Grant program administered through Clark County Social Services).

Carbon-Free Shared Mobility

RTC is the Transit Agency and Designated Recipient of Federal Transit Administration (FTA) funds for the Las Vegas Urbanized Area in Nevada. Statutory and regulatory authority for RTC is established through NRS 277A. As the primary transit agency for the Las Vegas metropolitan area, RTC has authority to procure transit fleet and fueling facilities. The transition to Zero Emission Vehicles is identified in the RTC's ZEV plan.

RTC currently operates the downtown Las Vegas bike share system with the ability to implement expansion. Due to the small footprint of bike share docks, stations are typically located within the amenity zone of existing public sidewalks. Local agencies authorize stations within the public right-of-way through a permitting process.

Intersection with Other Funding Availability

The passage of the Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) marks a pivotal moment in history, unleashing unprecedented levels of funding for critical climate action. New funding opportunities created through this legislation, along with other preexisting state and federal funding programs, may support the implementation of the GHG reduction measures, as outlined below.

All-In Home and Building Improvement Hub

The *All-In* Home and Building Improvement Hub is envisioned as a one-stop-shop, designed to provide gap filling where funding is needed and "braid" other sources of funding to direct them towards the priority communities of the Justice40 Initiative. In addition, the initiative itself aims to leverage federal funding to establish the hub. For the initial design and pilot of the *All-In* Home and Building Improvement Hub, the County has pursued funding through the EECBG program. This program will help finance consultant services for program design, including training Energy Concierges, establishing a pool of qualified contractors, developing a program website and assistance portal, and collaborating with CBOs for outreach and engagement. While these funds will support program design and piloting, additional funds are crucial for achieving large-scale transformation. With over 730,000 residential structures across the County alone, scaling up these efforts demands a more extensive financial commitment than what current sources like EECBG may provide at a pilot level.

Additionally, there is another funding source for the region already underway that is more specific to solar energy. The Nevada Clean Energy Fund (NCEF) has applied for funding through the Solar for All program, to facilitate affordable, resilient, and clean solar energy for low-income households. This provides an important complement to the Home and Building Improvement Hub's focus to reduce energy use and costs.

The DOE Weatherization Assistance Program is administered locally through HELP of Southern Nevada, which currently serves around 250 homes per year.[22] There is potential to support furthering the existing program, however a gap remains to weatherize homes at the scale needed for transformational change. The program will also leverage existing funding available through SNWAs existing programs, such as rebates for water smart landscaping, leak detection, or smart irrigation controllers.

Lastly, there are utility incentives supported through rate payer funds. These programs have been limited in recent years in Nevada due to high cost-effectiveness requirements.[23] These requirements often result in programs focusing on lower-cost, lower-impact upgrades like lighting efficiency, as well as limited targeted spending on low-income programs.[24, 25] As a result, there is a need to fill gaps in funding needed to achieve whole-building or whole-home upgrades, particularly in low-income communities.

[22] HELP of Southern Nevada. "2020 Impact Report". https://www.helpsonv.org/financials
[23] Geller, Howard. Southwest Energy Efficiency Project. August 11, 2018. "Maintaining Strong Utility Energy Efficiency Programs Beyond 2018: Challenges and Prospects in the Southwest". https://www.swenergy.org/directory/maintaining-strong-utility-energy-efficiency-programs-beyond-2018-challenges-and-prospects-in-the-southwest/
[24] Reif, et al. ACEEE. February 2020. "2020 Utility Energy Efficiency Scorecard". https://www.aceee.org/utility-energy-efficiency-scorecard-2020
[25] Specian, et al. ACEEE. August 2023. "2020 Utility Energy Efficiency Scorecard." https://www.aceee.org/research-report/u2304

The *All-In* Home and Building Improvement Hub aims to gap-fill around these existing funding sources as well as find ways to best integrate and deliver funding resources that are still in development such as the U.S. DOE's Home Energy Rebate Program, which will be administered by the State of Nevada. Bringing all these funding sources together in a "one-stop-shop" will help Southern Nevada make the most of the combined opportunity they provide, as this approach is credited with up to seven times higher program uptake compared to when homeowners are left to navigate them alone.[26]

Carbon-Free Shared Mobility

RTC will actively seek discretionary grant opportunities to fund procurement of hydrogen vehicles and hydrogen infrastructure, intending to use existing sales taxes allocated to transit for the local share.

In FY2020, the RTC received federal funding through the FTA Low or No Emissions discretionary grant program to construct the initial phase of hydrogen fueling infrastructure and procure the first two hydrogen fuel cell buses for the RTC fixed route fleet.

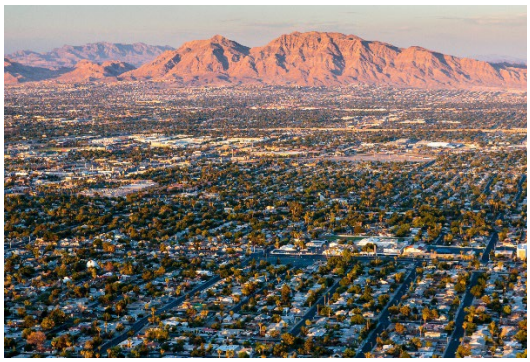
Additional FTA discretionary funding in FY2021-2022 allowed the RTC to purchase seven more hydrogen fuel cell buses expected to be operational in early 2025.For expansion to the regional Bike Share system, the RTC could apply for federal transportation funding through the Congestion Mitigation and Air Quality Program to supplement bike share expansion. Alternatively, local funds administered by the RTC could be utilized to fill funding gaps.

The RTC bike share program received federal funding through FY2022 Community Project Funding to expand the existing program, adding 37 new e-bikes and 24 stations to the program.
The enthusiastic support of the community for the bike share program has been demonstrated by local grant funding through NV Energy and the Southern Nevada Health District that has contributed to the growth of the program.

[26] Elevate, Building Electrification Institute, Emerald Cities Collaborative, the Greenlining Institute, Greenlink Analytics, Rising Sun Center for Opportunity, and NRDC. "Guidelines for Maximizing the Benefits of Federal Investments in Buildings." January 8, 2024. https://www.elevatenp.org/publications/guidelines-for-maximizing-the-benefits-of-federal-investments-in-buildings/

Conclusion

This PCAP was developed pursuant to the timing and guidance of the EPA CPRG Program. Its purpose is to describe the immediate opportunities presented by the priority measures identified for implementation by the Regional Climate Collaborative. Clark County and all participants in the Collaborative look forward to building on this snapshot of opportunity through the development of a CCAP, which will chart new pathways to reducing GHG emissions throughout the region.



Appendix A. Community Engagement Materials

The *All-In Clark County* Initiative is committed to transparent and inclusive community engagement. The following materials included in this Appendix A showcase our efforts to involved various stakeholders, organizations, and the community in shaping a resilient and sustainable future for Southern Nevada.

Materials include:

- **Regional Climate Collaborative Meeting Agendas**: Agendas from the monthly Regional Climate Collaborative Working Sessions held between October 2023 and February 2024.
- **Education Program Strategy**: A comprehensive document outlining the engagement approach created collaboratively with the Regional Climate Collaborative for the development of the PCAP and for implementation of the *All-In Community Plan*. The Strategy includes measures to increase climate literacy and ensure diverse representation.
- ***All-In Clark County* Brand Narrative and Messaging Bank**: A bank of basic branding language about the *All-In* initiative that was created collaboratively with the Regional Climate Collaborative.
- **Climate Ambassador Recruitment Materials**: Flyer used for recruiting Climate Ambassadors, a team that will engage and educate members of the community around the *All-In Clark County* Initiative.
- **Focus Group Recruitment and Meeting Materials**: Materials used to recruit participants for the Home Improvement Focus Group held in partnership with CHR, Inc., as well as event materials, including presentation slides.

All-In Regional Collaborative Working Session #1
4701 W. Russell Road, 1st Floor Room 1116
September 28, 2023
9-11am

Key Objectives:

- **Confirm Interlocal Agreement Approval Timing**
- **Review and Discuss CPRG Requirements & the Role of Collaborative Members**
- **Feedback on Messaging for All-In Education Campaign**

Agenda

830-859 **Refreshments & Self-Driven Comments on the All-In Messaging Board**

900-915 **Introductions and Overview of Regional Climate Collaborative**

916-935 **Discussion on the Interlocal Agreement**

- Any pressing issues/questions/edits before everyone moves it forward for approval?
- Decision-making criteria/process
- Status update on previous/upcoming regional priorities
    - IECC 2021/2024
    - EV Infrastructure Ordinance
    - Leveraging Other Funding Opportunities

936-950 **Review of the Climate Pollution Reduction Grant Requirements**

- Presentation of the required deliverables for the Priority Climate Action Plan and the Comprehensive Climate Action Plan and how we intend to deliver them in Southern Nevada.
- Overview and discussion on the role for each participating member of the Collaborative.

951-1025 **Interactive Session to Identify Priority Actions**

- Facilitated working session to lay a foundation of mutual understanding of each jurisdiction's priorities based on what is in the All-In Community Plan and/or other regional or local plans OR based on gaps for priority high impact strategies in existing plans.

1036-1050 **Initial Feedback on All-In Education Program Messaging**

- A brief overview and exercise on key terms and messaging for an effective regional education and outreach campaign.

1051-1059 **Action Item Review & Next Steps**

The All-In Regional Collaborative Working Sessions are supported by the USEPA's Climate Pollution Reduction Grant program.

All-In Regional Collaborative Working Session #2
4701 W. Russell Road, 1st Floor Room 1116
November 1, 2023
2:00 – 4:00pm

LOCATION DETAILS

4701 W. Russell Road
Las Vegas, NV 89118

OBJECTIVES

- Update on CPRG Planning Requirements
- Confirm Priority Actions for the PCAP
- Receive Feedback on Initial Draft Approach for All-In Education Campaign

AGENDA

2:00 – 2:20 pm	**Welcome & CPRG Planning Grant Updates**
2:21 – 3:30 pm	**Discussion on the Priority Actions and the CPRG Implementation Grant Requirements**
3:31 – 3:45 pm	**Review of the Draft All-In Education Campaign**
3:46 – 3:50 pm	**Scheduling Out Regional Collaborative Working Sessions through March 2024**
3:51 – 4:00 pm	**Action Item Review & Next Steps**

The All-In Regional Collaborative Working Sessions are supported by the USEPA's Climate Pollution Reduction Grant program.

All-In Regional Collaborative Working Session #3
4701 W. Russell Road, 1st Floor Room 1222
November 29, 2023
2:00 – 4:00pm

LOCATION DETAILS

Room 1222 *(East Entrance)*
4701 W. Russell Road
Las Vegas, NV 89118

OBJECTIVES

- Updates on Interlocal Agreement Approval
- Review Timeline and Action Items for Development of Implementation Grant Application(s)
- Receive Feedback on Initial Draft Approach for All-In Education Campaign

AGENDA

2:00 – 2:05 pm	**Welcome & Overview of Objectives**
2:06 – 2:15 pm	**Updates on Interlocal Agreement Presentations**
2:16 – 3:35 pm	**Review of Implementation Grants & Application Timeline/Action Items** Review of MOA Requirements for CPRG Implementation Grant
3:36 – 3:50 pm	**Review of the Draft All-In Education Campaign**
3:51 – 4:00 pm	**Action Item Review & Next Steps**

The All-In Regional Collaborative Working Sessions are supported by the USEPA's Climate Pollution Reduction Grant program.

All-In Regional Collaborative Working Session #4
4701 W. Russell Road, 1st Floor Room 1222
December 13, 2023
2:00 – 4:00pm

LOCATION DETAILS

Room 1222 *(East Entrance)*
4701 W. Russell Road
Las Vegas, NV 89118

OBJECTIVES

- Review Draft Memorandum of Agreement
- Review Reduction and Benefits Analysis Work Completed To-Date
- Recap Timeline for Development of Implementation Grant Application(s)

AGENDA

2:00 – 2:05 pm	**Welcome & Overview of Objectives**
2:06 – 2:25 pm	**Review & Discuss Draft MOA**
2:26 – 3:40 pm	**Review Reduction and Benefits Analysis**
3:41 – 3:50 pm	**Recap Timeline for Development of Implementation Grant Application(s)**
3:51 – 4:00 pm	**Action Item Review & Next Steps**

The All-In Regional Collaborative Working Sessions are supported by the USEPA's Climate Pollution Reduction Grant program.

All-In Regional Collaborative Working Session #5
2250 Las Vegas Blvd N, North Las Vegas, NV
Wednesday, January 24, 2024
2:00 – 4:00pm

LOCATION DETAILS

2250 Las Vegas Blvd N
North Las Vegas, NV 89030

OBJECTIVES

- Discuss Edits to Memorandum of Agreement and Confirm Dates for Approval
- Discuss Building Improvement Hub Program Design to Maximize Benefits
- Confirm the final action(s) to be included in the PCAP
- Review Request for Information (RFI) for Community Organizations

AGENDA

2:00 – 2:03 pm	**Welcome & Overview of Objectives**
2:04 – 2:30 pm	**Maximizing Reductions and Benefits**
2:31 – 2:59 pm	**Final Confirmation of PCAP Action(s)**
3:00 – 3:30 pm	**Review & Discuss MOA**
3:31 – 3:55 pm	**External Communications** *Review Draft Request for Information (RFI) for Community Organizations*
3:56 – 4:00 pm	**Action Item Review & Next Steps**

The All-In Regional Collaborative Working Sessions are supported by the USEPA's Climate Pollution Reduction Grant program.

All-In Regional Collaborative Working Session #6
495 S Main Street, Las Vegas, NV 89101
Wednesday, February 14, 2024
2:00 – 4:00pm

LOCATION DETAILS

Las Vegas City Hall
495 S Main Street
Las Vegas, NV 89101

OBJECTIVES

- Confirm MOA Approval Timeline and Capacity Needed for Support
- Discuss Edits to Priority Climate Action Plan
- Review Updates on Implementation Grant Narrative Development
- Review External Communications Updates, Including Press Releases and the Request for Information (RFI) for Community Organizations

AGENDA

2:00 – 2:03 pm	**Welcome & Overview of Objectives**
2:04 – 2:20 pm	**MOA Approval Process**
2:21 – 2:59 pm	**Review & Discuss PCAP**
3:00 – 3:30 pm	**Implementation Grant Narrative Development**
3:31 – 3:55 pm	**External Communications Updates**
3:56 – 4:00 pm	**Action Item Review & Next Steps**

Regional Climate Collaborative participants will be asked to individually participate in 15-minute video interviews throughout the 2-hour meeting.

The All-In Regional Collaborative Working Sessions are supported by the USEPA's Climate Pollution Reduction Grant program.

Education Program Strategy

October 2023

The *All-In* Education Program is supported by the US EPA's Climate Pollution Reduction Grant program.

One of the three priority, cross-cutting strategies identified in the *All-In Community Plan* is to develop and implement a **County-wide Climate Education Program**.

A comprehensive, coordinated education and outreach program can enhance climate literacy as well as encourage community members to take action.

Three Primary Objectives

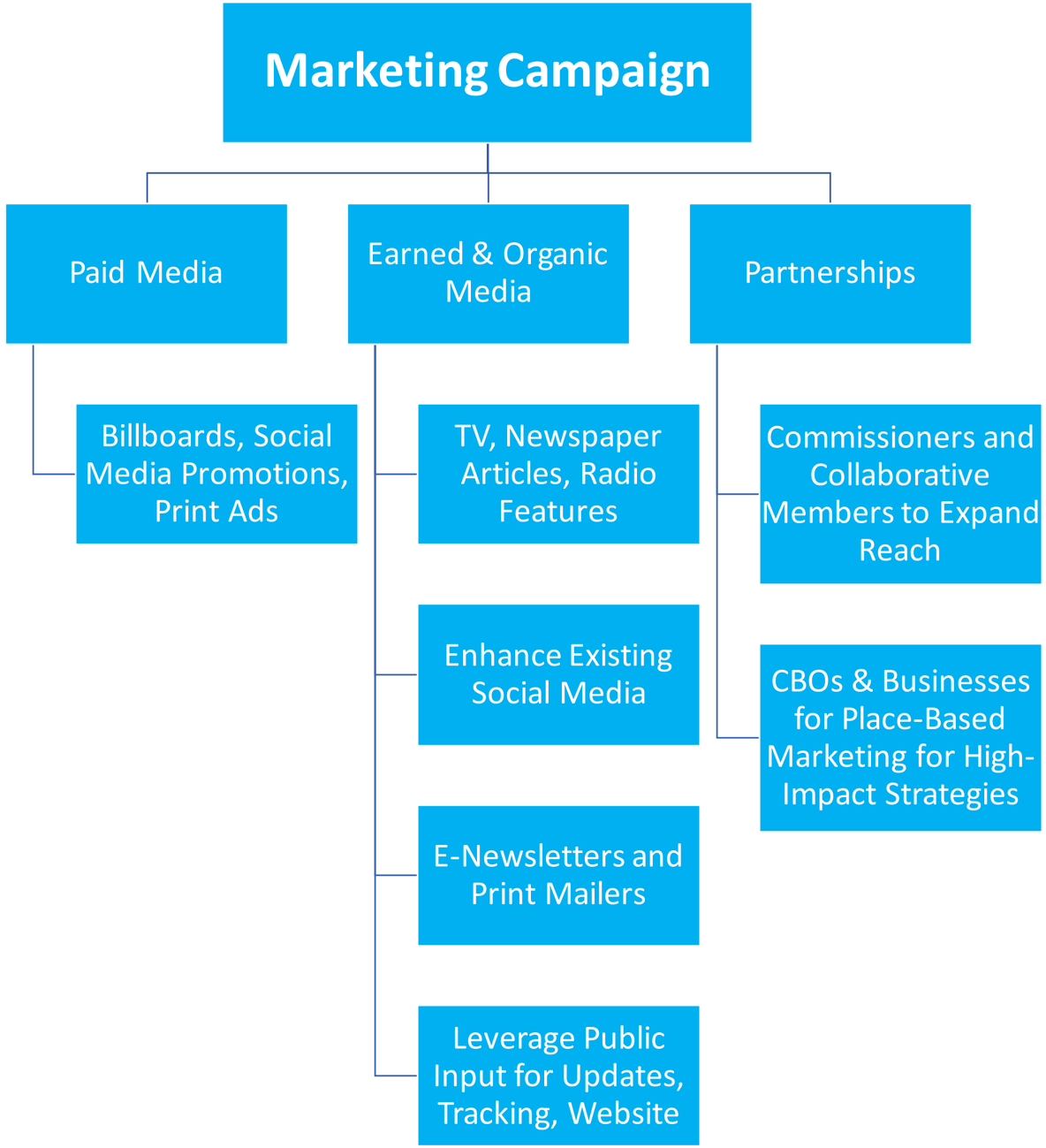
1. Raise Awareness of *All-In* Clark County
2. Grow Climate Literacy Among Community Members
3. Be a Catalyst for Behavior Change in Support of High-Impact Strategies

Tactics to Reach Our Objectives

1. Raise Awareness
2. Grow Climate Literacy
3. Catalyze Behavior Change

Marketing Campaign

***All-In* Action Programs**


Marketing Campaign
Paid Media
Earned & Organic Media
Partnerships
Billboards, Social Media Promotions, Print Ads
TV, Newspaper Articles, Radio Features
Enhance Existing Social Media
E-Newsletters and Print Mailers
Leverage Public Input for Updates, Tracking, Website
Commissioners and Collaborative Members to Expand Reach
CBOs & Businesses for Place-Based Marketing for High-Impact Strategies

All-In Action Programs

- Education Program & Curriculum Development
  - Leverage Existing Program
  - Speaker Series
  - Integration with Mojave Max
  - Activity Kit for Elementary Schoolers
- Climate Ambassador Program
  - Design and Launch Revamped Program
  - Recruit and Train Ambassadors
- Train-the-Trainer Program
  - Ongoing Trainings for CBOs to Support All-In
- Targeted Workshops & Events
  - Open Houses / Drive Electric Events
  - HOA Workshop Series
  - Community, Neighborhood Pop-Ups
  - Attendance at Community Events
- Toolkits
  - Climate Literacy Toolkit
  - Electric Vehicles Toolkit
  - Rooftop Solar Toolkit
  - Building Electrification Toolkit
  - Energy Efficiency Toolkit
  - Waste Reduction Toolkit

Toolkits are intended to support All-In staff, County employees, Ambassadors, CBOs, and municipalities with messaging and encouraging behavior change around high-impact strategies. Will include fact sheets, social media content, videos, website content, etc.

Q4 2023 Priorities: **Marketing Campaign**

Organize and optimize Public Input to use as a CRM

Confirm and implement a cadence for *All-In* newsletters and updates

Create and implement a plan for enhancing social media channels

Identify upcoming opportunities for paid or organic media (e.g., Super Bowl)

Q4 2023 Priorities: **Action Programs**

Build out content for initial toolkits: Climate Literacy and Electric Vehicles

Host first Train-the-Trainer for CBOs

Identify existing Employee Education Program resources that can be used for the community

Design an *All-In* Climate Ambassadors Program for spring launch

All-In Clark County
Brand Narrative & Messaging Bank

January 2024

The *All-In* Education Program is supported by the US EPA's Climate Pollution Reduction Grant program.

This messaging bank is intended to be used by communications staff and partners of Clark County, the cities, and regional agencies who distribute communications materials (e.g., press releases, website content, social media, newsletters, fact sheets) related to *All-In Clark County* and other climate change and sustainability initiatives.

Using this messaging bank when communicating about *All-In* will help to ensure that community members receives consistent and easily understood messaging about this initiative across Southern Nevada. You are encouraged to pick and choose the words, phrases, and narratives in this messaging bank that are best suited for your intended audience and communications channels.

For additional resources, please visit the All-In Communications and Media Toolkit.

All-In Brand Narrative – Version 1

Basic branding language that describes All-In's "why" and "what."

Whether you are here to celebrate, raise a family, or build your career, we all want Southern Nevada to be one thing: sustainable. To create a sustainable future for Southern Nevada, we will need much more than just clean air and clean water. We also need more affordable housing, clean energy, diverse jobs, and a stable climate. *All-In Clark County* is our bold action to address these challenges head on and create a healthy and more resilient future for all.

All-In Brand Narrative – Version 2

Basic branding language that explicitly connects climate change and climate hazards with All-In.

Across Southern Nevada, we are already experiencing the impacts of a changing climate: extreme heat, flash flooding, wildfires, and drought. To protect our health, our communities, and our infrastructure, we are going *All-In* on ambitious goals to address climate change and create a stronger community in the process. Today, the County, cities, and regional agencies are working collaboratively to build this sustainable future for our current and future residents. This is *All-In Clark County*.

Clean & Reliable Energy

Words and phrases to use when messaging about ENERGY:

- Clean and reliable energy
- Renewable energy and renewable sources
- Encouraging renewable energy production in Nevada
- Using energy efficiently and decreasing energy use
- Powering our community with clean energy

Connected & Equitable Mobility

Words and phrases to use when messaging about TRANSPORTATION:

- Safe, connected, and accessible transportation system
- Reliable, low-emissions transportation options
- Encourage the transition to EVs
- Ensure biking, walking, and public transit are safe and accessible options to get around

Diverse and Circular Economy

Words and phrases to use when messaging about WASTE and ECONOMY:

- Use resources efficiently
- Minimize waste
- Reuse materials
- Creating good, green jobs
- Support sustainable businesses

Resilient & Healthy Community

Words and phrases to use when messaging about CLIMATE and HEALTH:

- Extreme heat
- Severe drought / Decades-long drought
- Permanent transition to a more arid future / Aridification
- Preparing for emergencies
- Keeping people safe and healthy
- Protecting infrastructure and homes

Smart Buildings & Development

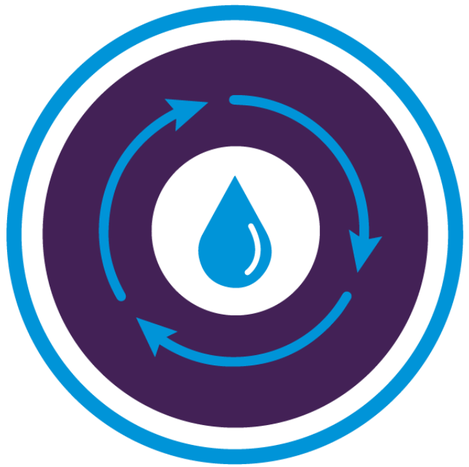
Words and phrases to use when messaging about BUILDINGS and HOMES:

- Energy efficient buildings
- Energy- and water-saving buildings
- Green buildings
- Safe, high-quality buildings
- Good indoor air quality / Healthy homes
- Affordable utility bills

Sustainable Water Systems

Words and phrases to use when messaging about WATER:

- Water is essential, water is life
- Water sustains us
- We have a shared responsibility to conserve
- Safe drinking water
- Use water efficiently
- Sustainable and reliable water supply



Have questions or need support, particularly with media requests related to *All-In?* Please contact Kevin MacDonald, Clark County Public Information Administrator (kevmac@ClarkCountyNV.gov) or Annie Suttle, Consultant Marketing Director (annie@kimlundgrenassociates.com).

For additional resources – including quick facts, fact sheets, graphics, photos, and a promotional video – access the All-In Communications and Media Toolkit.

JOIN OUR TEAM!

- $25/HOUR
- 10-20 HOURS/MONTH (FLEXIBLE)
- POSITION OPEN UNTIL FILLED

We are seeking passionate individuals to join the ***All-In Climate Ambassador Team!*** Ambassadors will engage and educate members of our community around the *All-In Community Plan* for a cleaner, healthier, and more sustainable Southern Nevada.

The All-In Climate Ambassadors Program is supported by the USEPA's Climate Pollution Reduction Grant program.

SCAN TO APPLY

Visit **allinclarkcounty.com** to learn more.

KLA KIM LUNDGREN ASSOCIATES, INC.

HOME IMPROVEMENT FOCUS GROUP

Scan to Register *(Required)*

Lunch Will Be Provided!

Tuesday, February 13th
11:00am - 12:30pm
Mountaintop Faith Ministries
2845 Lindell Rd.
Las Vegas, NV 89146

Overwhelmed by all of the financial opportunities available to upgrade your home? Struggling to take action and find the support you need?

WHAT: As part of the *All-In Clark County* Initiative, Southern Nevada is creating a **Home Improvement Hub.** This Hub will be a "**one-stop-shop**" that will consolidate and navigate new and existing programs for energy efficiency, weatherization, water conservation, indoor air quality, and other similar programs on behalf of homeowners.

WHY: If you are interested in **saving money on your utility bills** and making your home **safer, healthier, and more affordable,** please join our homeowner's focus group.

WHO: We are looking for **one participant per household** who is actively looking to make home improvements but has experienced barriers along the way. Share your experiences and help make the Hub as effective as possible!

This event is supported by the US EPA's Climate Pollution Reduction Grant program.

allinclarkcounty.com

All-In Home Improvement Focus Group

This event is supported by the US EPA's Climate Pollution Reduction Grant program.

February 13, 2024

Meeting Objectives

- Introduce the *All-In* Home & Building Improvement Hub
- Identify challenges to retrofitting and upgrading homes to make them safer, healthier, and more affordable
- Identify opportunities for the *All-In* Home & Building Improvement Hub to fill gaps, improve access to various financial and technical resources, and make the process easier and more streamlined

Agenda

11:00 am	Participants arrive
11:15 am	Welcome, Hub overview, quick polls
11:30 am	Breakout group discussions
12:20 pm	Reporting out and wrapping up
12:30 pm	Adjourn

What is the **ALL-IN**
Home & Building Improvement Hub?

ALL-IN Home & Building Improvement Hub

The Hub is a one-stop shop for home and building improvements that enhance indoor air quality and comfort, increase water and energy efficiency, and reduce utility bills. It provides residents and businesses with the technical assistance, financial resources, and contractors needed to do the work.

Technical Assistance

Conducting home audits and assessments to identify appropriate improvements.

Financial Resources

Identifying grants, tax credits, utility programs, low- or no-interest loans, and other programs to fund improvements.

Contractors

Installing improvements and documenting the process.

Energy & Water Efficiency

Installing energy and water efficiency upgrades (e.g., water-smart landscaping) to conserve resources while lowering utility costs.

Electrification

Transitioning buildings to run on electricity, renewable energy, and support EV charging.

Health & Well-Being

Addressing health concerns, such as asthma and mold exposure, to foster a safe and comfortable space.

HENDERSON

Mesquite Nevada

RTC

SOUTHERN NEVADA WATER AUTHORITY

What is the *All-In* Home & Building Improvement Hub?

The Hub is a **one-stop shop** for home and building improvements that enhance indoor air quality and comfort, increase water and energy efficiency, and reduce utility bills.

It provides residents and businesses with the **technical assistance**, **financial resources**, and **contractors** needed to do the work.

ALL-IN CLARK COUNTY

BOLD ACTION FOR A SUSTAINABLE FUTURE

ALL-IN CLARK COUNTY

BOLD ACTION FOR A SUSTAINABLE FUTURE

Technical Assistance

Conducting home audits and assessments to identify appropriate improvements.

Financial Resources

Identifying grants, tax credits, utility programs, low- or no-interest loans, and other programs to fund improvements.

Contractors

Installing improvements and documenting the process.

ALL-IN CLARK COUNTY

BOLD ACTION FOR A SUSTAINABLE FUTURE

Energy & Water Efficiency

Installing energy and water efficiency upgrades (e.g., water-smart landscaping) to conserve resources while lowering utility costs.

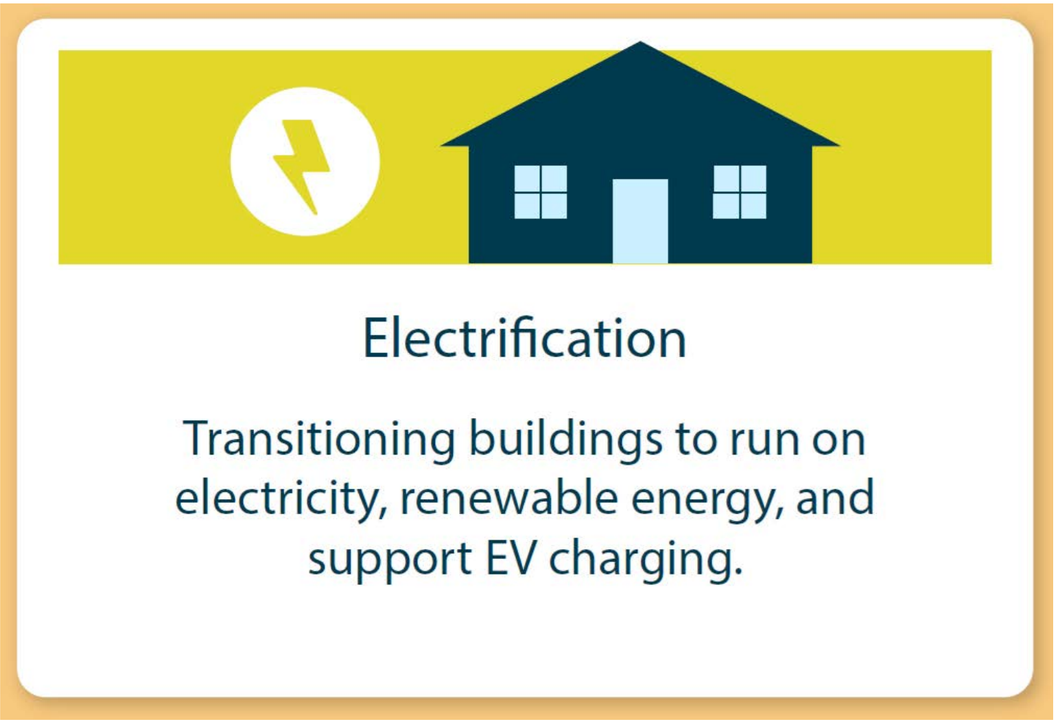
Electrification

Transitioning buildings to run on electricity, renewable energy, and support EV charging.

Health & Well-Being

Addressing health concerns, such as asthma and mold exposure, to foster a safe and comfortable space.

Why Electrify?

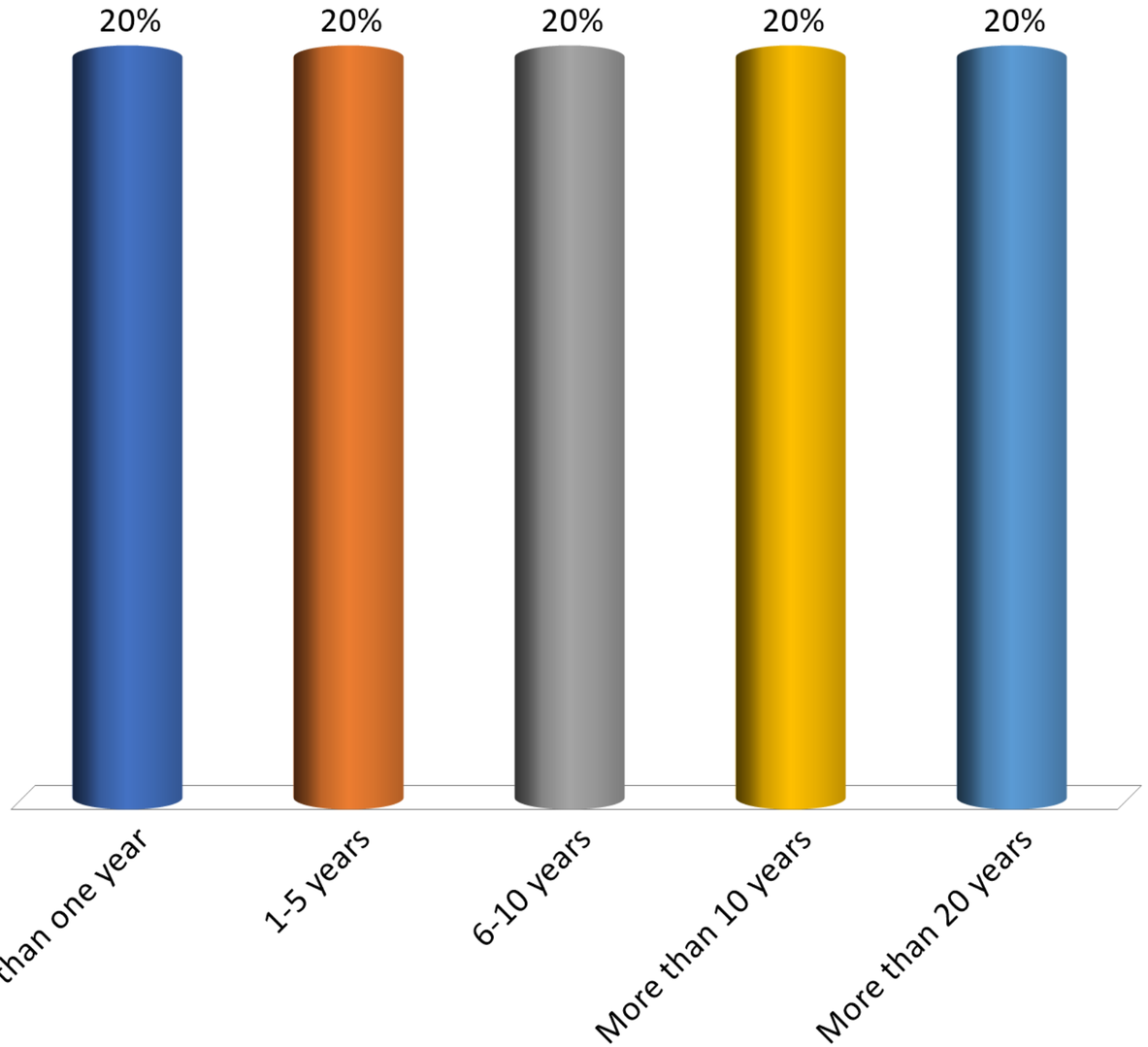


Transitioning our homes to run on electricity instead of natural gas or other fossil fuels means...

- *Better indoor air quality*
- *Safer living spaces*
- *More efficient energy use and potential for utility bill savings*
- ***Fewer emissions***

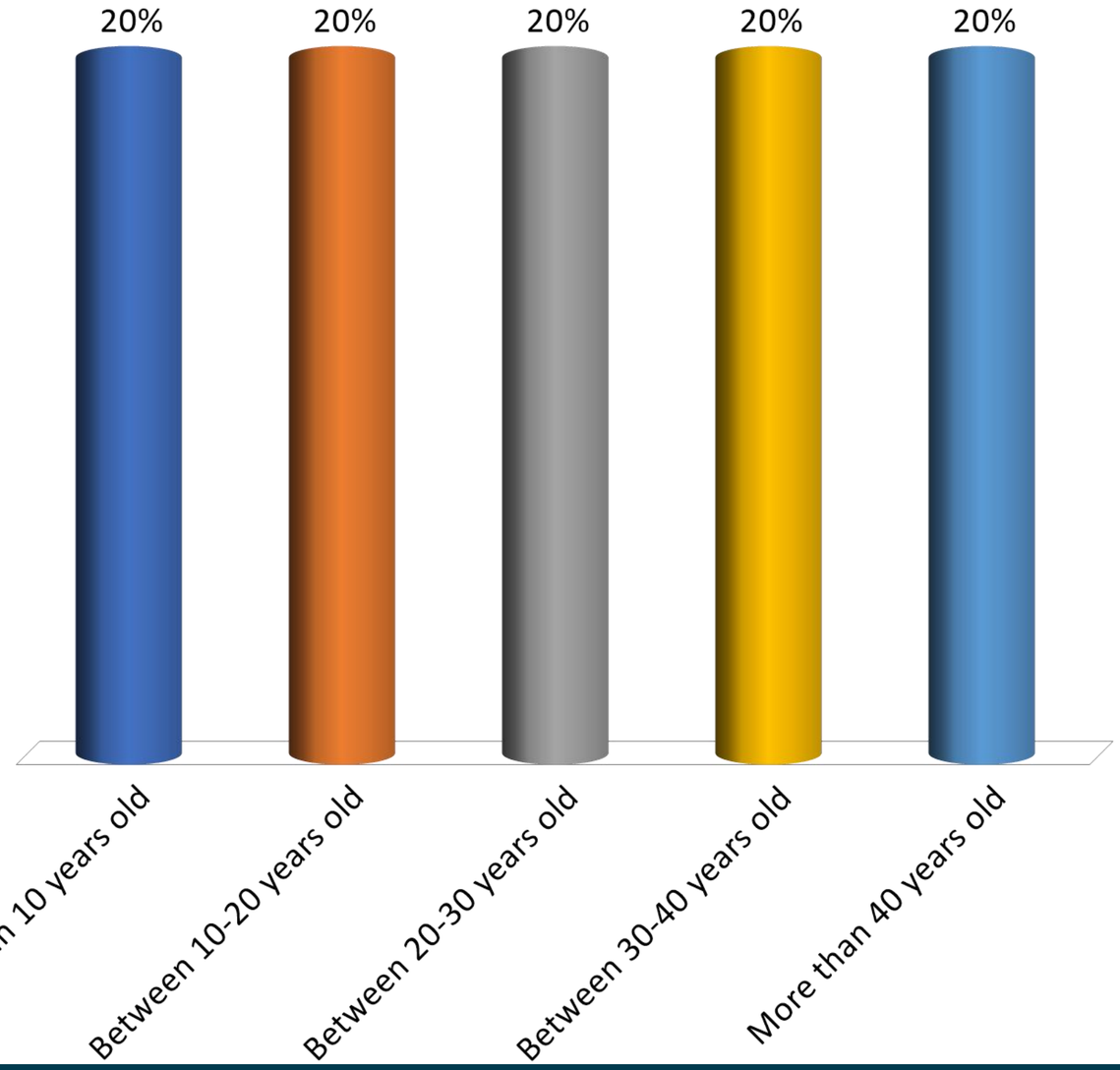
How long have you lived in Southern Nevada?

A. Less than one year
B. 1-5 years
C. 6-10 years
D. More than 10 years
E. More than 20 years



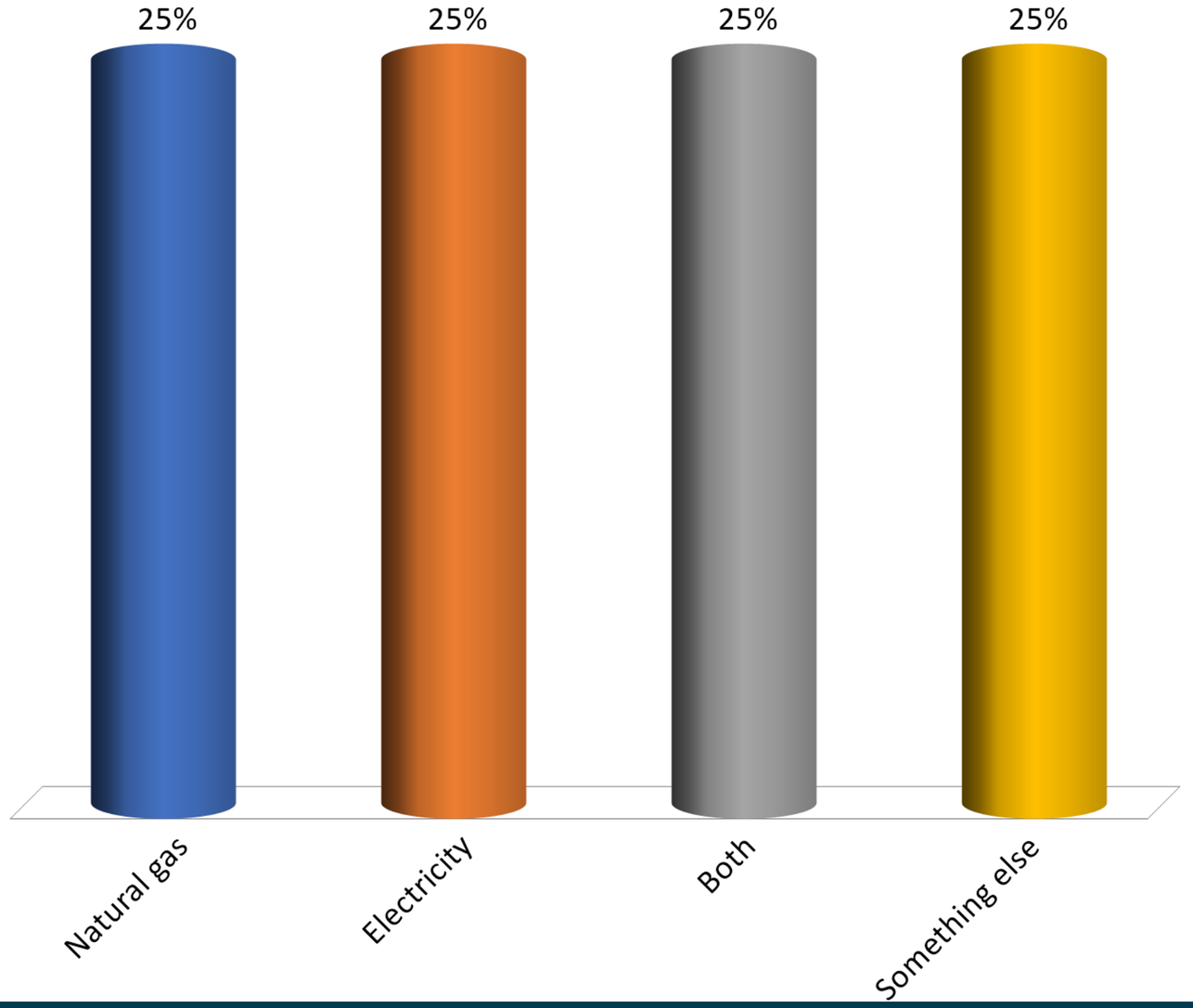
How old is your home?

A. Less than 10 years old
B. Between 10-20 years old
C. Between 20-30 years old
D. Between 30-40 years old
E. More than 40 years old



What fuels are you using in your home?

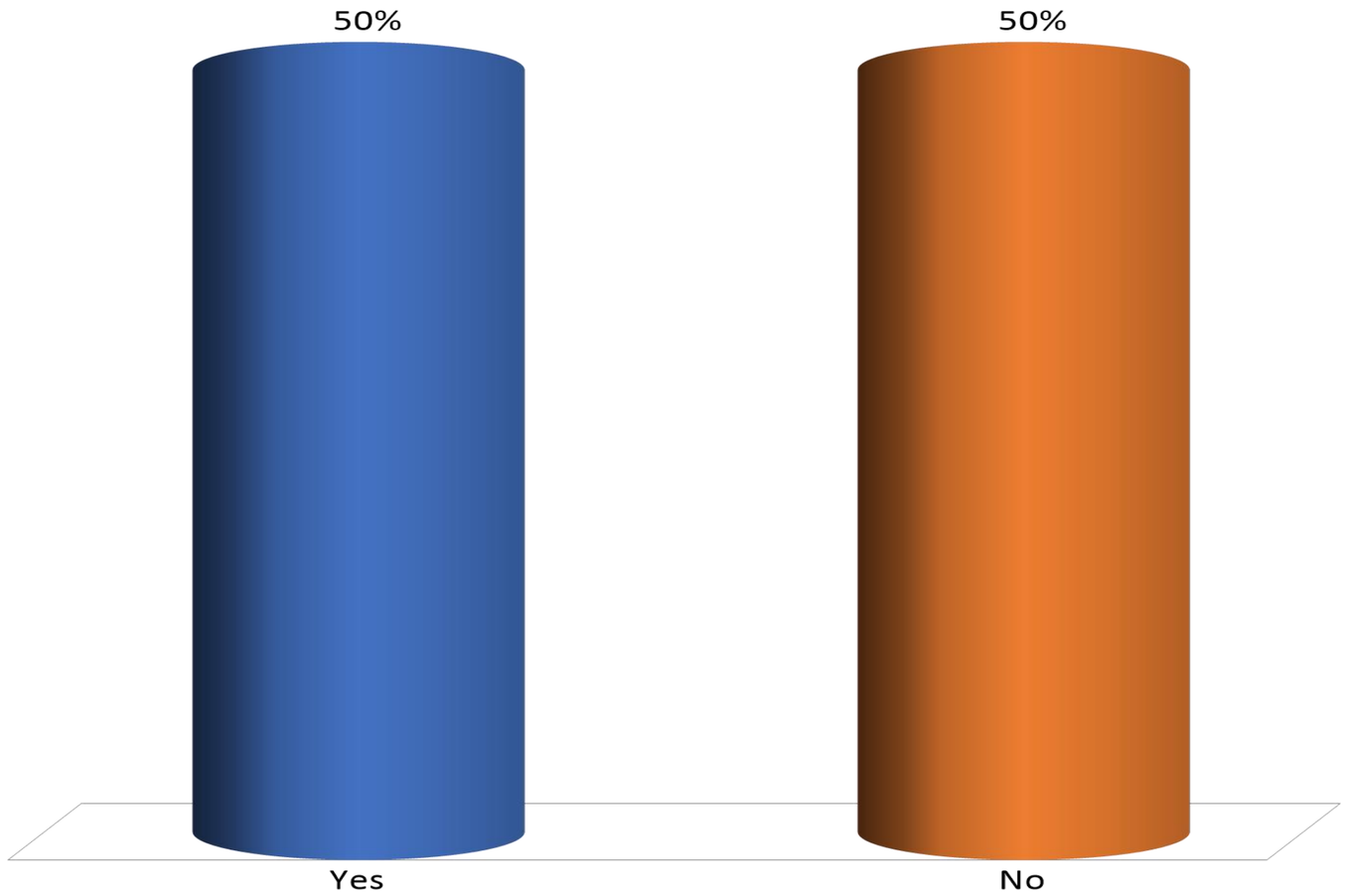
A. Natural gas
B. Electricity
C. Both
D. Something else



Have you made improvements to your home in the last three years beyond changing light bulbs and your thermostat?

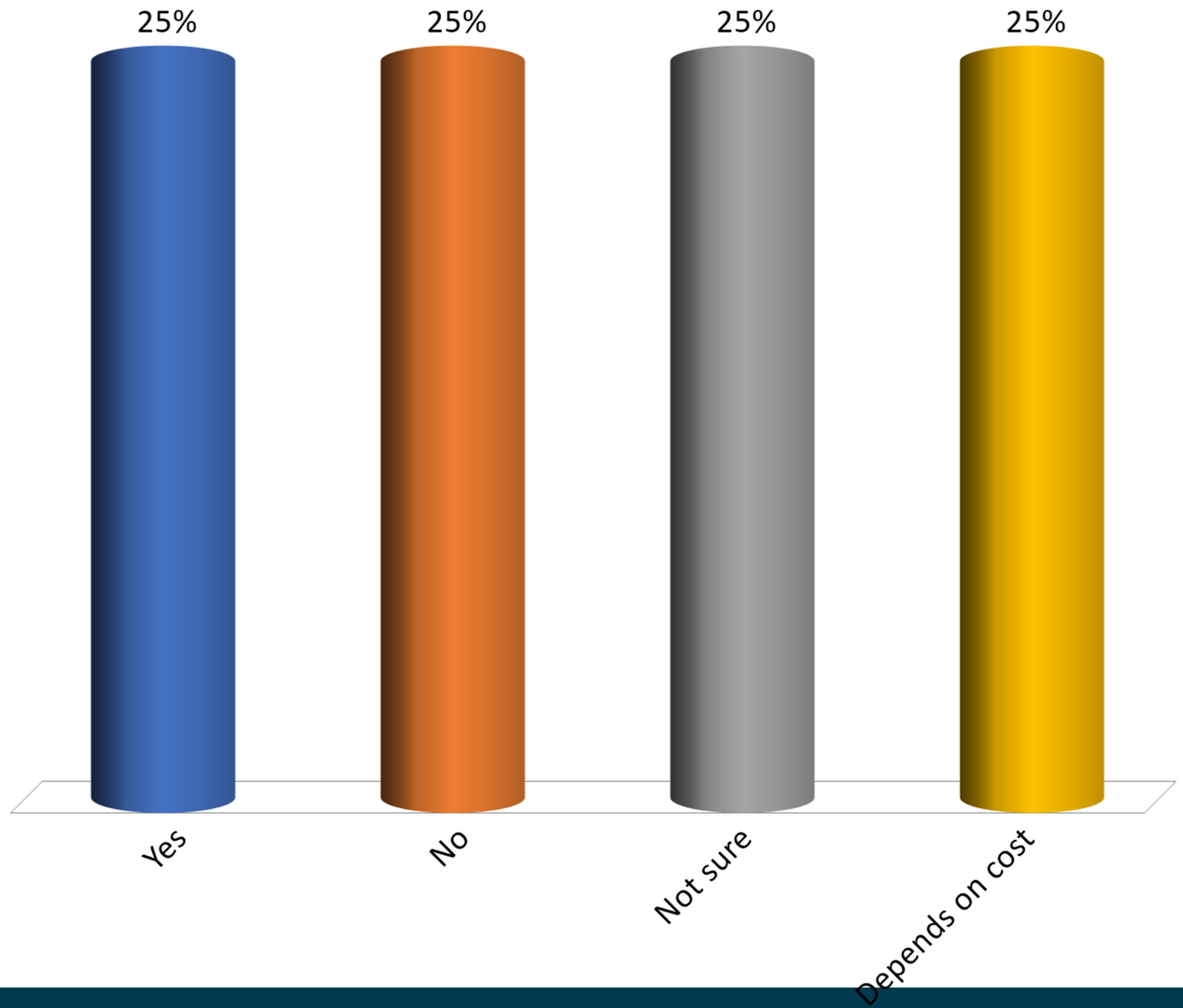
A. Yes

B. No



Are you actively looking to make upgrades to your home in the next year?

A. Yes
B. No
C. Not sure
D. Depends on cost



Appendix B. Adjustments from the All-In Regional GHG Inventory

Introduction

This Appendix B is a supplement to the Las Vegas-Henderson-Paradise MSA PCAP, under the US EPA's CPRG Program. The PCAP Inventory was prepared with EPA designated tools and accounting perspectives. In the interest of aligning this effort with the other regions across the nation participating in the CPRG Program, approaches and results produced by the EPA Local Greenhouse Gas Inventory Tool (LGGIT) Community Module were used wherever possible for the PCAP Inventory.

As Clark County has a previously developed *All-In Regional GHG Inventory* (*All-In Inventory*), there are several key differences in the results reported here as compared to that original effort. Some differences are a result of adjustments to align with the methods and input format of the EPA Local Greenhouse Gas Inventory Tool (LGGIT) Community Module. In addition, the process of re-calculating all the original data used in the *All-In Inventory* revealed some calculation errors which have been corrected in the PCAP Inventory.

This comparison report is intended to explain the source of differences between the results of the two inventories and provide guidance on data sources and calculation tool selections for future inventory efforts taken under the CPRG Comprehensive Climate Action Plan phase and/or other future GHG accounting activities undertaken in Clark County, NV. The results of this report also summarize the findings of the review process to compare results of LGGIT calculations to previous estimation approaches recommended by the Quality Assurance Plan for this project. This document is not intended as a complete methodology summary detailing the sources of underlying activity data, though some of that information is presented where necessary to describe differences in how calculations were performed.

Comparison Summary

To better compare the *All-In Regional GHG Inventory* with the LGGIT Regional GHG Inventory, Clark County recategorized its sectors and associated emission estimates to align with the EPA LGGIT Source Categories. Table 1 describes the activities and emissions sources for each of the LGGIT categories.

Table 7 Description of GHG Inventory Sectors

Sector	Description
Stationary Combustion	Emissions from natural gas, propane, and fuel oil combustion in residential, commercial, industrial, and municipal buildings.
Electricity Consumption	Emissions from electricity consumption in electric vehicles, water treatment and distribution processes, and residential, commercial, and municipal facilities (including street and traffic lights) in Clark County.
On-Road Mobile Combustion	Emissions from fossil fuel combustion in passenger and commercial vehicles, as well as public transit.
Non-Road Mobile Combustion	Emissions from fossil fuel combustion in railways, watercraft, aviation, and non-road equipment.
Solid Waste	Emissions from landfilled and composted waste.

Sector	Description
Wastewater Treatment	Process and fugitive emissions from wastewater treatment plants and septic systems.
Natural Gas Leaks	Fugitive emissions from the natural gas distribution system.
Urban Forestry	Carbon removed by trees within urban areas of Clark County.
Power Generation	Emissions from natural gas combustion in power plants located in Clark County. Note that while included, these emissions are not added to total emissions, following accounting conventions of the Global Protocol for Community Scale Emissions Inventories.[27]

Sector level differences between the two inventories are summarized below in Table 2 with a brief description of the source of differences between them.

Table 2 All-In vs LGGIT Regional GHG Inventory Comparison by Sector

GHG Emissions by Sector	All-In Estimates ($MTCO_2e$)	LGGIT Estimates ($MTCO_2e$)	Primary Source of Difference
Stationary Combustion (Scope 1)	4,164,244	2,439,214	Reallocation of unattributed "transportation"/wholesale natural gas consumption to the Power Generation sector
Electricity Consumption (Scope 2)	10,262,128	10,262,248	Minor difference attributable to rounding within calculation tools.
On-Road Mobile Combustion (Scope 1)	6,738,498	8,292,269	Correction to include VMT from rural roadways.
Non-Road Mobile Combustion (Scope 1)	4,137,778	4,014,316	Methodology change in aviation calculations with fuel-based emissions factors rather than "landing/take-off" based factors.
Solid Waste (Scope 1)	3,682,344	333,014	Change in calculations perspective from Scope 3 waste generation using methane commitment to Scope 1, in-jurisdiction emissions.
Wastewater Treatment (Scope 1)	41,317	43,206	Small adjustments to population-based allocations to treatment processes.
Natural Gas Leaks (Scope 1)	30,851	18,360	Reallocation of "Transportation"/ Wholesale Gas to Power Generation sector removed usage from calculations based on distribution system leakage rates.
Land Use & Urban Forestry (Scope 1)	92,398	(142,624)	Methodology change for focused attention on tree management within urban areas for policy relevance.
Gross Emissions	**29,057,160**	**25,402,628**	
Net Emissions	**29,149,558**	**25,260,004**	

[27] Global Protocol for Community-Scale Greenhouse Gas Inventories. An Accounting and Reporting Standard for Cities Version 1.1. https://ghgprotocol.org/sites/default/files/standards/GPC_Full_MASTER_RW_v7.pdf

GHG Emissions by Sector	All-In Estimates ($MTCO_2e$)	LGGIT Estimates ($MTCO_2e$)	Primary Source of Difference
Power Generation (Scope 1)		**8,572,298**	Allocation of "transportation"/wholesale natural gas use to this sector.

As demonstrated in Table 2, even though some sectors grew or shrank by substantial amounts, the contributions of the three largest sectors of GHG emissions – electricity consumption, mobile combustion, and stationary combustion – dominate in both versions.

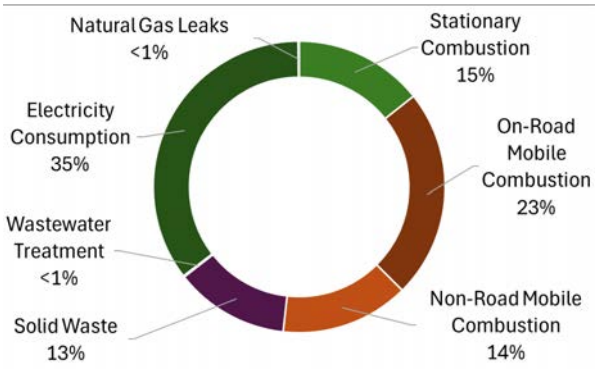


Figure 1. All-In Regional GHG Inventory (Gross Emissions)

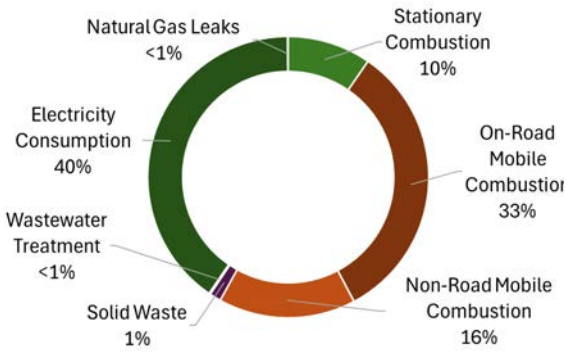


Figure 2. LGGIT Regional GHG Inventory (Gross Emissions)

The tables in the *Comparison by Sector* in the following section describe key differences in calculation approaches between the two inventories that describe the source of differences in greater detail.

Comparison by Sector

Calculations used in this inventory as well as the original *All-In Inventory* are based on limited information. All activity-based inventories rely on the availability of data that fully describes the activity that leads to the creation of GHGs and supports unambiguous categorization of the end results. This is a particular challenge for a regional scale inventory. Many of the decisions made in the preparation of the PCAP inventory were to minimize assumptions made for the sake of categorization in favor of aligning wherever possible with other reference points, such as those already published by Federal agencies.

Results between the existing All-In GHG Inventory and the LGGIT GHG Inventory were compared so that the source of any differences (such as those that result from difference in emissions factor, unit conversion, or format of activity data) could be clearly identified and described. The following tables provide an overview of the underlying data and calculation methodologies used for each sector category, as well as an explanation of the differences between the two inventories.

Stationary Combustion

Table 3. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Buildings & Facilities – Natural Gas

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Natural gas consumption (therms)	Natural gas consumption (mcf)
Calculation Approach	Natural gas consumed within Clark County for residential and commercial buildings as well as industrial process energy was sourced from local utility provider (Southwest Gas). Emissions factors were applied to fuel use to determine GHGs.	Fuel use was copied from the existing inventory and converted to mcf units using the conversion factor supplied by the LGGIT. Emissions factors were applied to fuel use to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **Decrease by 1,724,884 $MTCO_2e$** The original *All-In* estimate attempted to allocate a portion of Southwest Gas (SWGas) "Transportation"/ Wholesale Gas to power generation based on limited publicly available information for the jurisdiction of the point of sale and the location of power plants. This process had several limitations, including involving multiple assumptions to allocate usage to powerplants, the results left a substantial portion of gas un-allocated to any identifiable end use, which was bucketed as "large industrial", and the final result did not align with the total gas reported by power plants operating in Clark County. For the purposes of the PCAP Inventory and in the interest of minimizing assumptions, all "Transportation"/Wholesale Gas was considered to be used for Power Generation as opposed to attempting to allocate it among power powerplants and other uses. Accounting for the Power Generation sector sourced emissions data directly from the EPA FLIGHT Database. The total GHGs from power generation with this approach is larger than the estimate that would be produced by accounting for SWGas billing records alone. This indicates other wholesale suppliers contribute to this sector in addition to SWGas that was initially identified for its role as a retail supplier. The overall result of this change improves inventory estimates in several ways: • The amount of GHGs accounted for is increased. • Alignment with EPA FLIGHT Data is improved. • The distinction between stationary combustion end-uses for building-energy vs process-energy is improved. In addition, there was a difference in the CH_4 emission factors for natural gas combustion between the two inventories. The All-In Inventory referenced a factor of 1 g CH_4/MMBtu from the EPA Corporate Leaders Emissions Factors Hub[28], whereas the LGGIT tool utilized a factor of 4.7 g CH_4/MMBtu from The Climate Registry Default Emissions Factors compendium[29].	

[28] US EPA Center for Climate Leadership. Emissions Factors for Greenhouse Gas Inventories. 2023. https://www.epa.gov/sites/production/files/2020-04/documents/ghg-emission-factors-hub.pdf
[29] The Climate Registry. June 2023. "Default Emissions Factors". https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf

Table 4. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Buildings & Facilities – Propane and Fuel Oil

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Propane and fuel oil consumption (gallons)	Propane and fuel oil consumption (gallons)
Calculation Approach	Propane and fuel oil consumed within Clark County household was estimated with a combination of ACS Home Heating Fuel counts and average usage from the EIA Residential Energy Consumption Survey. Emissions factors were applied to fuel use to determine GHGs.	Fuel use was copied from the existing inventory. Emissions factors were applied to fuel use to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **Decrease by 67 $MTCO_2e$** There is a negligible difference between the two inventories due to rounding of emissions factors.	

Table 5. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Buildings & Facilities – Wood

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Wood use (MMBtu)	GHGs estimated in existing inventory
Calculation Approach	Wood Use (MMBtu) was determined from the number of households by heating fuel type (obtained from the U.S. Census Bureau American Community Survey) and the average household energy intensity. GHGs were calculated using standard EPA emissions factors.	
Supplemental Information	The LGGIT Community Module does not have an input option for stationary combustion of wood, so the existing All-In estimate was added under the Additional Sources section of the LGGIT.	

Electricity Consumption

Table 6. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Electricity Consumption – Buildings & Facilities

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Electricity consumption (kWh)	Electricity consumption (kWh)
Calculation Approach	Electricity consumption of residential, commercial, and municipal buildings was obtained from NV Energy, Boulder City Utilities, and Overton Power District. The annual average carbon intensity of electricity supplied to the regional electric grid (eGRID AZNM) was applied to electricity consumption to determine GHGs.	Electricity consumption was copied from the existing inventory. The annual average carbon intensity of electricity supplied to the regional electric grid (eGRID AZNM) was applied to electricity consumption to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **Increase by 114 $MTCO_2e$** There is a negligible difference between the two inventories due to rounding of emissions factors.	

Table 7. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Electricity Consumption – Electric Passenger Vehicles

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Electricity consumption (kWh)	Electricity consumption (kWh)
Calculation Approach	Vehicle miles traveled (VMT) was estimated from the approximated number of registered EVs in the county, the national average annual miles traveled for passenger vehicles, and average fuel economies by fuel type classification. Electricity consumption was then calculated from VMT estimates assuming an average fuel economy of 100 miles per gallon gasoline equivalent (MPGGe). The annual average carbon intensity of electricity supplied to the regional electric grid (eGRID AZNM) was applied to electricity consumption to determine GHGs.	Electricity consumption was copied from the existing inventory. The annual average carbon intensity of electricity supplied to the regional electric grid (eGRID AZNM) was applied to electricity consumption to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **<0.1 $MTCO_2e$** There is a negligible difference between the two inventories due to rounding of emissions factors.	

Table 8. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Electricity Consumption – Electric Monorail

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Electricity consumption (kWh)	Electricity consumption (kWh)
Calculation Approach	Electricity consumed for traction power was obtained from the Las Vegas Convention and Visitors Authority. Monorail electricity was subtracted out of commercial electricity use to prevent double counting. The annual average carbon intensity of electricity supplied to the regional electric grid (eGRID AZNM) was applied to electricity consumption to determine GHGs.	Electricity consumption was copied from the existing inventory. The annual average carbon intensity of electricity supplied to the regional electric grid (eGRID AZNM) was applied to electricity consumption to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **<0.1 $MTCO_2e$** There is a negligible difference between the two inventories due to rounding of emissions factors.	

Table 9. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Electricity Consumption – Water Treatment & Delivery

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Electricity consumption (kWh)	Electricity consumption (kWh)
Calculation Approach	Metered electricity use for wastewater treatment, potable water treatment and distribution, and other water pumping was obtained from Silver State Energy Authority and NV Energy. The annual average carbon intensity of electricity supplied to the regional electric grid (eGRID AZNM) was applied to electricity consumption to determine GHGs.	Electricity consumption was copied from the existing inventory. The annual average carbon intensity of electricity supplied to the regional electric grid (eGRID AZNM) was applied to electricity consumption to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **Increase by 6 $MTCO_2e$** There is a negligible difference between the two inventories due to rounding of emissions factors.	

On-Road Mobile Combustion

Table 10. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Passenger/Commercial Vehicles (Gasoline, Diesel, and CNG)

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Vehicle miles traveled (VMT)	Gasoline, diesel, and CNG fuel use (gallons/GGE)
Calculation Approach	VMT data was obtained from a combination of Regional Transportation Commission (RTC) and Highway Performance Monitoring System. Fuel use was then estimated from VMT data using local vehicle mix classifications and national average fuel economies. Emissions factors were applied to fuel use to determine GHGs.	Fuel use was copied from existing inventory calculations. Emissions factors were applied to fuel use to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **Increase by 1,554,199 $MTCO_2e$** The original *All-In Inventory* attempted to meet multiple objectives for assessing GHGs from on-road transportation. A primary goal was to make use of and align with the RTC Regional Planning model used for compliance with Federal Highway Administration processes. Disaggregate the regional model by individual jurisdiction within the model region (Las Vegas Valley area).	

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Comparison	Supplement and add VMT for Mesquite which is not within the model area using NVDOT road count segment data from the TRINA system[30]. With the primary focus of attention of those areas, the remainder of on-road travel in the County that was not allocated to a specific jurisdiction or the unincorporated area of the RTC Model region and was erroneously omitted from the countywide total. Areas omitted would include rural roads and interstate highways as well as roads in Laughlin and other small communities. This inventory corrects that, raising emissions from on-road transportation. It is worth noting minor additional differences were introduced due to differences in combinations of vehicle-fuel type and model year combinations for CH_4 and N_2O emissions factors. Due to other changes in the overall VMT used, the impact of these differences is not readily apparent, but given the small contribution of these gases to total GHGs in any mobile combustion calculation, the impact is likely also small.	

Table 11. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Transit – Biodiesel (B5) & CNG

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Biodiesel (B5) and CNG fuel use (gallons/therms)	Biodiesel (B5) and CNG fuel use (gallons/GGE)
Calculation Approach	Fuel use was obtained from Regional Transportation Commission (RTC) service operations obtained from reports to the National Transit Database. Biodiesel and CNG emissions were calculated using standard emissions factors for volume of fuel. The quantity of diesel used in the calculation of CO_2 was reduced by 5% to account for the B5 biodiesel blend.	Fuel use was copied from the existing inventory. Emissions factors were applied to fuel use to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **Increase by 16,378 $MTCO_2e$** Calculations for biofuels within the LGGIT tool have a number steps that are difficult to trace within the tool, but involve calculating biogenic emissions from biofuel portions and then subtracting them from the final result. The difference between the methods was a decrease of 23 $MTCO_2e$. More substantial changes were caused by a difference in calculations for CNG. The All-In Inventory calculated GHGs from this source using emissions factors based in therms, common for stationary combustion. The LGGIT uses emissions factors on the basis of gallon of gasoline equivalent energy. The difference in this portion was an increase of 16,355 $MTCO_2e$.	

[30] NVDOT TRINA Web Viewer
https://gis.dot.nv.gov/agsportal/apps/webappviewer/index.html?id=278339b4605e4dda8da9bddd2fd9f1e9

Table 12. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Freight Rail

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Ton-miles multiplied by ton-mile based emissions factors from EPA Emissions Factors Hub.[31]	Diesel consumption (gallons)
Calculation Approach	Ton-miles were estimated by multiplying total tons (obtained from the Bureau of Transportation Statistics Freight Analysis Framework) by the total rail mileage in Clark County. Emissions factors were applied to ton-miles to determine GHGs.	Fuel consumption was estimated by back-calculating from the total ton-miles reported in the existing inventory using freight fuel economy reported by CSX Corporation.[32] Emissions factors were applied to fuel use to determine GHGs.
Comparison	Difference between All-In and LGGIT estimates: **Decrease by 2,769 $MTCO_2e$** The difference in GHG emissions is a result of the different calculation approaches between the two inventories and the subsequent difference in emission factors per the respective input data.	

Non-Road Mobile Combustion

Table 13. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Non-Road Equipment & Watercrafts

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Primary Data	Modeled CO_2 and CH_4	GHGs estimated in existing inventory
Calculation Approach	GHGs from Non-Road Mobile sources (including equipment and marine vessels) were obtained from the US EPA MOVES Model run for Clark County using model defaults. The EPA MOVES Model is based primarily on estimates of the number of equipment pieces operating within a region based on the local employment of industries that use various types of off-road equipment.	
Supplemental Information	Fuel use data for non-road mobile sources was not available. As an alternative approach, GHG emissions estimates were obtained from the EPA Motor Vehicle Emission Simulator (MOVES). It should be noted that the version of MOVES run at the time of the original inventory does not model N_2O from non-road sources, so the reported emissions reflect only CO_2 and CH_4. Following guidance of the CPRG QAPP, one additional QA check was made by comparing the local MOVES estimate to outputs from the 2020 National Emissions Inventory (NEI) dataset[33] which has comparable source categories at the county level. Estimates from NEI were 30,990 tons of the local MOVES model run estimate, a difference of 1% in a sector that totals 2,511,500 $MTCO_2e$.	

[31] US EPA Center for Climate Leadership. Emissions Factors for Greenhouse Gas Inventories. 2023. https://www.epa.gov/system/files/documents/2023-03/ghg_emission_factors_hub.pdf
[32] CSX. Fuel Efficiency. Accessed 1/5/2024. https://www.csx.com/index.cfm/about-us/the-csx-advantage/fuel-efficiency/
[33] US EPA. 2020 National Emissions Inventory (NEI) Data. Online. Accessed 12/20/23. https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data

Table 14. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Aviation

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Landing and Take-Off Operations from the Federal Aviation Administration's Traffic Flow System Counts Database[34].	Aviation gasoline and jet fuel consumption during landing and take-off operations (gallons)
Calculation Approach	Total flight operations from airports in Clark County were multiplied by emissions factors for each landing and take-off operation (LTO), matched by aircraft class.	Fuel consumption was estimated by applying fuel factors (kg/LTO) of jet fuel or aviation gas to flight operation. Fuel estimates were entered into the LGGIT for final calculations.
Comparison	Difference between All-In and LGGIT estimates: **Decrease of 123,032 $MTCO_2e$** The original All-In Inventory estimated GHGs from Aviation on the basis of the count of landing and take-off operations (LTOs) at all airports in Clark County and applying LTO-based emissions factors to those activities sourced from the International Civil Aviation Organization (ICAO).[35] The EPA LGGIT Community workbook is set up to calculate GHGs only from data on the volume of fuels consumed. For this inventory, fuel use was estimated using LTO fuel-factors also sourced from ICAO and final calculations of GHGs were performed in the LGGIT. The existing *All-In Inventory* estimate reflects only CO_2 emissions whereas the LGGIT estimates include CH_4 and N_2O emissions from back-calculated fuel use – resulting in a significant increase in the total GHG emissions from the aviation sector.	

Solid Waste

Table 15. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Landfilled Waste

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Tons of waste collected within Clark County and landfilled in 2019	CH_4 emissions from landfills located within Clark County
Calculation Approach	Future GHG emissions from inventory-year waste deposits calculated using factors derived from the US EPA WARM Model Documentation, Exhibits 6-7 and 6-11.	There are two sources of data for this calculation. First, landfills that emit over 25,000 $MTCO_2e$ are subject to reporting requirements where their annual emissions data is readily available from the EPA FLIGHT database. The Apex, Sunrise, and Laughlin landfills are listed here and emissions from this source was obtained directly from the Subpart HH portion of their records, though an adjustment was made to update methane global warming potential values for these records to the AR5 values from AR4 values used in the FLIGHT database records.

[34]US Federal Aviation Administration Traffic Flow System Counts. Online. https://aspm.faa.gov/tfms/sys/main.asp
[35]ICAO. 2011. Airport Air Quality Manual. https://www.icao.int/environmental-protection/Documents/Publications/FINAL.Doc%209889.Corrigendum.en.PDF

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Calculation Approach		One other significant landfill exists within Clark County, but it is below the reporting threshold and is not listed in the FLIGHT database. Emissions from the Boulder City landfill were estimated using a first-order-decay model based on data from the EPA Landfill Methane Outreach Program[36] for the total waste-in-place at the site and years of operation. The California Air Resources Board Landfill Emissions Tool[37] was used for this process and as suggested by guidance contained in the LGGIT Community workbook.
Comparison	Difference between All-In and LGGIT estimates: **Decrease by 3,349,330 $MTCO_2e$** The original *All-In* inventory calculated GHGs from solid waste disposal using the "methane commitment" approach which allocates all projected future-emissions from landfills that will result from the slow decomposition of waste generated in the inventory-year. As the results of this perspective are not confined to a discrete calendar year, they are classified as a scope 3 emissions source. While the methane commitment approach has benefits for informing solid waste management decisions, it is less reliable for providing a reference point accounting of the sources of GHGs present. Due to the emphasis of the CPRG program in a comprehensive understanding of Scope 1 and 2 sources, this sector was re-evaluated to focus on the calendar year emissions that are emitted from landfills that are within the Clark County boundary. The result is a much smaller estimate of methane from solid waste management. <u>Additional adjustments to the original All-In estimate for solid waste</u> The results contained in this PCAP provide a complementary perspective to the methane commitment methodology used previously. In the course of re-evaluating the original estimate, a calculation error in the original estimate was discovered. The original methane commitment estimate incorporated a factor of 63% to account for the lifetime landfill gas capture rate which reduces the quantity of gas leaked to the atmosphere. In the original estimate, the 63% rate was applied to total methane generation directly. The result in this case is the estimate of the quantity of gas that would be captured. The calculation should have applied the inverse (1-63% or 37%) to estimate the leaked share of emissions. The result of this error led to an overestimate of methane-commitment GHGs of 1,495,808 $MTCO_2e$ in the 2019 inventory. Methane commitment values are not used in this PCAP inventory, but future updates to estimated methane commitment emissions potentially made for other purposes will reflect this change. Further improvements to the methane commitment approach could be made with a locally developed waste characterization that captures the unique mix of businesses in the region.	

[36] US EPA Landfill Methane Outreach Program. Online. https://www.epa.gov/lmop.
[37] California Air Resources Board. Local Government Operations Protocol and Tools. Online. Accessed 1/5/2024. https://ww2.arb.ca.gov/local-government-operations-protocol-greenhouse-gas-assessments

Table 16. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Composted Waste

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Tons of composted yard and food waste	GHGs estimated in existing inventory
Calculation Approach	Tons of green waste and food waste obtained from the Southern Nevada Health District Solid Waste Management Authority recycling report were multiplied by standard emissions factors.	
Supplemental Information	The LGGIT Community Module does not have an input option for composted waste, so the existing All-In estimate was added under the Additional Sources section.	

Wastewater Treatment

Table 17. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Process Emissions from WWTP with Nitrification/ Denitrification

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Population served by wastewater treatment plants	Population served by wastewater treatment plants
Calculation Approach	N_2O process emissions were estimated using Equation WW.7 in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.	N_2O process emissions were estimated using Equation WW.7 in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.
Comparison	Difference between All-In and LGGIT estimates: **Increase by 83 $MTCO_2e$** There is a negligible difference between the two inventories due to an updated population value. The All-In and LGGIT estimates are consistent in methods and emission factors.	

Table 18. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Process Emissions from Effluent Discharge to Rivers and Estuaries

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Population served by wastewater treatment plants that specifically discharge to rivers and estuaries	Population served by wastewater treatment plants
Calculation Approach	The population served by wastewater treatment lagoons was subtracted from the total population served by wastewater treatment plants to determine the population associated with discharge to rivers and estuaries. N_2O process emissions were estimated using Equation WW.12 (alt) in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.	N_2O process emissions were estimated using Equation WW.12 (alt) in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.
Comparison	Difference between All-In and LGGIT estimates: **Increase by 244 $MTCO_2e$** There was a slight difference in the population served input value between the two inventories. The EPA LGGIT tool does not have the option to enter separate populations for different treatment and discharge facility types in the “Wastewater-Entry” tab. As such, the LGGIT estimate assumes that all wastewater treatment plants discharge to rivers and estuaries. Whereas the All-In estimate accounts for the share of population supported by wastewater treatment lagoons	

Table 19. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Process Emissions from Wastewater Treatment Lagoons

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Population served by wastewater treatment plants that specifically utilize wastewater treatment lagoons	Population served by wastewater treatment plants that specifically utilize wastewater treatment lagoons
Calculation Approach	CH_4 process emissions were estimated using Equation WW.6 (alt) in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.	CH_4 process emissions were estimated using Equation WW.6 (alt) in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.
Comparison	Difference between All-In and LGGIT estimates: **Increase of 1,568 $MTCO_2e$** There was a slight difference in the population value between the two inventories. Additionally, there was a difference in the factor for industrial discharge into systems between the two estimates. The All-In estimate assumes that there is no industrial load whereas an un-editable default factor of 1.25 was applied to the LGGIT estimate under the assumption that there is industrial load.	

Table 20. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Septic Systems

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Population served by septic systems	Population served by septic systems
Calculation Approach	CH_4 fugitive emissions were estimated using Equation WW.11 (alt) in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.	CH_4 fugitive emissions were estimated using Equation WW.11 (alt) in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.
Comparison	The All-In and LGGIT estimates are equivalent due to consistent input data, methods, and emission factors.	

Table 21. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Incomplete Combustion of Digester Gas

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Standard cubic feet of digester gas produced per day	Standard cubic feet of digester gas produced per day
Calculation Approach	CH_4 stationary emissions from incomplete combustion of digester gas were estimated using Equation WW.1.a in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.	CH_4 stationary emissions from incomplete combustion of digester gas were estimated using Equation WW.1.a in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F.
Comparison	The All-In and LGGIT estimates are equivalent due to consistent input data, methods, and emission factors.	

Natural Gas Leaks

Table 22. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Fugitive Natural Gas

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	Natural Gas leakage (therms)	GHGs estimated in existing inventory

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Calculation Approach	Regional natural gas leakage rates identified by region and utility provider were multiplied by natural gas consumption. GHGs were calculated using Southwest Gas emissions factors.	
Supplemental Information	Difference between All-In and LGGIT estimates: **Decrease of 12,491 $MTCO_2e$** The difference observed between the two inventories is the result of the reallocation of natural gas to the power generation sector where it is not flowing though the local distribution network which leakage calculations are based on. The LGGIT Community Module does not have an input option for fugitive natural gas, so the existing All-In estimate was added under the Additional Sources section.	

Land Use and Urban Forestry

Table 23. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Urban Forestry

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data	GHG released and sequestered by land conversion.	Total urban area and % urban area with tree cover, obtained from the Tree Equity Score online tool.[38]
Calculation Approach	GHGs were obtained from the ICLEI land Emissions and Removal Navigator (LEARN) tool. The tool applies USDA Forest Inventory Analysis (FIA)-derived emissions and removal factors to the average annual change between forest and non-forest land, forest remaining forests, and urban trees as reported in the USDA National Landcover dataset for all of Clark County.	The EPA carbon sequestration factor was applied to the share of urban area with tree coverage to determine GHGs removed.
Comparison	Difference between All-In and LGGIT estimates: **Decrease by 235,022 $MTCO_2e$.** The original All-In inventory looked at land cover and land cover change comprehensively across the entire Clark County area. Using the LEARN Tool from ICLEI-USA which is based on the USDA National Land Cover dataset. While comprehensive and providing an accounting of GHGs resulting from land cover change, this approach is coarse scale and does not provide information that is related to other services for shading and air quality improvement provided to disadvantaged communities. Meanwhile, the LGGIT tool was oriented specifically towards urban forestry as opposed to changes in landscape scale land cover. The EPA LGGIT sequestration factor accounts for only sequestration of standing trees. It does not account for releases and removals from changes to tree cover from one year to the next, it is a categorically different approach than was taken in the *All-In Regional GHG Inventory*.	

[38] American Forests. Tree Equity Score. Methodology, Data Downloads. Last Checked 2.25.2024. https://www.treeequityscore.org/methodology

Power Generation

Table 24. All-In vs LGGIT Regional GHG Inventory Comparison by Sector, Natural Gas Combustion

	All-In Regional GHG Inventory	LGGIT Regional GHG Inventory
Input Data		Reported CO_2e emissions from EPA FLIGHT Database.
Calculation Approach		GHGs from natural gas combustion in Power Plants located in Clark County were obtained from the EPA FLIGHT database.
Comparison	Inclusion of the Power Generation sector was new to this PCAP. Note that while GHGs for the sector are documented, however standard reporting under the Global Protocol for Community Scale Greenhouse Gas Inventories reporting frameworks excludes scope 1 emissions from energy generation supplied to the grid to avoid double counting[39]. As such, emissions from power generation were not included in the total GHGs for the Inventory but are included as an informational item.	

Summary

This PCAP Inventory was carried out to utilize tools provided by US EPA to the greatest extent possible, including use of the LGGIT Community Module for handling GHG calculations. The overall process resulted in substantial improvements to the 2019 *All-In Regional GHG Inventory* and was worthwhile.

It is important to note that while the totals estimated in the inventory have shifted, the reduction potential of strategies identified in the *All-In Regional Climate Action Plan,* have not. For example, while on-road emissions are much higher, the substantial driver of emissions reduction from that sector is from vehicle electrification which was assumed to occur on a percentage change per year for the share of electric vehicles. Going forward, the same percentage change would simply be applied to a larger number of miles traveled, resulting in the same trend to zero. The other substantial difference in solid waste perspectives is primarily a difference in the timing of GHGs rather than their quantity. Future updates to GHG reduction estimates made in the CPRG Comprehensive Plan can likewise adjust to reflect the impact on present day emissions, similar to the change in perspective in the inventory estimate.

The CPRG Comprehensive Plan will likely require the inclusion of industrial process and product use GHGs. These were not added to the PCAP due to data limitations on distributed sources of these gases in a short period of time to locate them. This sector will likely provide an additional source of GHGs accounted for by the end of the CPRG Program.

[39] Global Protocol for Community-Scale Greenhouse Gas Inventories. An Accounting and Reporting Standard for Cities Version 1.1. https://ghgprotocol.org/sites/default/files/standards/GPC_Full_MASTER_RW_v7.pdf

Appendix C. Approaches for Quantifying GHG Reductions & Co-Benefits

Introduction

This appendix is a supplement to the Las Vegas-Henderson-Paradise Metropolitan Statistical Area Priority Climate Action Plan (PCAP), in support of the Environmental Protection Agency's (EPA) Climate Pollution Reduction Grant Program (CPRG). This appendix details methodologies, data, sources, assumptions, and results of quantitative assessments performed in support of the priority actions in the PCAP, including quantifications of estimated greenhouse gas (GHG) emissions reductions and associated co-pollutant reductions, as well as energy burden reduction and workforce development estimates where relevant.

All-In Home and Building Improvement Hub

Measure Description

Through the All-In Home and Building Improvement Hub, a goal of 10% of residential structures, or 73,000 structures should be retrofitted by 2030.

Analysis Approach

Residential building emissions and co-pollutant reductions were based on the impact of electrifying and upgrading 10% of residential structures, or 73,000 of structures, by 2030. Calculations are based on the differences in energy use between the base-case and upgraded performance of individual modeled buildings, using energy efficiency upgrade packages, sourced from the NREL ResStock End Use Savings Shapes (EUSS) dataset.[40] Changes in energy use were calculated to determine the electricity rebound that would occur when natural gas was removed, and high efficiency upgrades were implemented.

The ResStock EUSS datasets contain several different packages of energy conservation measures. For the purposes of the PCAP, this analysis was simplified to assume all retrofitted homes would pursue a comprehensive efficiency and decarbonization strategy illustrated by Package 9. Upgrades included in Package 9 include:

- Attic floor insulation up to IECC-Residential 2021 levels for dwelling units with vented attics and lower-performing insulation.
- General air sealing: 30% total reduction in ACH50 for dwelling units with greater than 10 ACH50.
- Duct sealing to 10% leakage, R-8 insulation.
- Drill-and-fill insulation (R-13) for dwelling units with no insulation and wood stud walls.
- High-efficiency heat pump (Measure Package 4) for all dwelling units with non-electric heating or less-efficient electric heating.
- Heat pump water heater for all dwelling units with non-electric heating or less-efficient electric water heating.

[40] National Renewable Energy Laboratory. ResStock End Use Savings Shapes, 2022.1 Release. https://resstock.nrel.gov/datasets

- Ventless heat pump dryer (CEF=5.2) for all dwelling units with non-electric dryers or less efficient electric dryers.
- Electric oven and induction range for all dwelling units.

GHG Emissions Reductions

Methods and Assumptions

The metadata and annual results for the baseline and upgrade measure package 9 was obtained from the NREL ResStock End Use Savings Shapes (EUSS) AMY 2018 datasets for the state of Nevada. Both the baseline and measure package 9 datasets were filtered to Clark County, Nevada. Results were then filtered to only include single-family detached and single-family attached buildings with natural gas heating fuel and central AC, and to exclude buildings already equipped with ducted heat pump heating types. The annual electricity and natural gas usage under measure package 9 were subtracted from the baseline usage to determine energy use savings for each modeled household. Annual household electricity and natural gas use savings were averaged by federal poverty level (FPL) levels associated with each modeled home as shown in Table 1. Since this action is intended to primarily target low-income families, the average savings values for the 0-100% FPL were used as the basis for the following GHG emissions and co-pollutant reductions.

Table 1. Annual Energy Reduction Potential per Household

Federal Poverty Level (FPL)	Average Annual Electricity Savings (kWh) per Household	Average Annual Gas Savings (therms) per Household
0-100%	2,596	324
100-150%	2,878	390
150-200%	2,960	431
200-300%	2,506	405
300-400%	2,392	415
400%+	2,619	400

As the number of homes retrofitted and resulting energy savings steadily increase, the rate of emissions from electricity generation is expected to decline in response to a greater share of clean energy contributing to grid electricity generation. The NREL Cambium Model provided scenarios to incorporate this dynamic into the final GHG reduction estimates[41]. While Cambium provides a range of grid carbon intensity scenarios for this analysis, the "Mid-Case with 95% Decarbonization by 2050" was selected as the primary scenario to be modeled as it aligns best with the outcomes for economy wide GHG reductions sought by the Inflation Reduction Act. Cambium Model exports provide projected emissions factors for all future years through 2050, which were applied to estimated changes in electricity use to avoid overestimating GHG reduction potential.

The average annual 0-100% FPL electricity savings were multiplied by 115.5. kg CO2 per MWH – as is the projected carbon intensity of electricity in Nevada in 2030 under the NREL Cambium "Mid-Case 95% Decarbonization by 2050" scenario – to determine CO2 emissions savings per household from electricity use in 2030. The average annual 0-100% FPL natural gas savings were multiplied by standard EPA emission factors for CO2, CH4, and N20[42] to determine emissions savings per household

[41] Gagnon, Pieter, Maxwell Brown, Dan Steinberg, Patrick Brown, Sarah Awara, Vincent Carag, Stuart Cohen, Wesley Cole, Jonathan Ho, Sarah Inskeep, Nate Lee, Trieu Mai, Matthew Mowers, Caitlin Murphy, Brian Sergi (2022). 2022 Standard Scenarios Report: A U.S. Electricity Sector Outlook. National Renewable Energy Laboratory. NREL/TP-6A40-84327. https://www.nrel.gov/docs/fy23osti/84327.pdf

[42] U.S. Environmental Protection Agency (EPA). Emission Factors for Greenhouse Gas Inventories (2021). https://www.epa.gov/system/files/documents/2023-04/emission-factors_sept2021.pdf

from natural gas use in 2030. The Global Warming Potentials (GWP) from the IPCC Fifth Assessment Report (AR5)[43] were applied to CH4 and N20 to estimate total emissions savings in MTCO2e. The annual CO2e emissions savings for electricity and natural gas were summed to determine the total household emissions savings in 2030 (Table 2).

Table 2. 2030 Emissions Savings per Household by Source

Source	2030 MTCO2e Savings per Household
Electricity	0.2998
Natural Gas	1.7192
Total	**2.0190**

To estimate annual GHG reductions, the total 2030 household emissions savings rate was multiplied by the number of residential structures (73,341) expected to be updated by 2030 – resulting in over 148,074 MTCO2e. To determine cumulative GHG savings, it was assumed that 20% of the 2030 target savings would be reached each year starting in 2025 – resulting in over 444,222 MTCO2e by 2030.

Results

Utilizing savings estimates for the most cost-effective approaches to comprehensive decarbonization from the NREL ResStock End Use Savings Shapes dataset, it is estimated that by 2030, annual GHG reductions would total over 148,000 MTCO2e. Assuming 20% of the target was reached each year, the cumulative savings would total approximately 444,000 MTCO2e. Achieving this level of implementation would set the conditions for transformational change.

Co-Pollutant Reductions

Methods and Assumptions

The estimated annual household natural gas use savings (Table 1) was multiplied by the number of residential structures to be updated by 2030 to be updated by 2030 to estimate the total amount of natural gas saved through the All-In Home and Building Improvement Home measure. EPA emission factors for combustion sources[44] were applied to the total natural gas saved to determine annual reductions in criteria air pollutants – including particulate matter, SOx, and VOCs – and additional hazardous air pollutants.

Results

Modeled savings from eliminating natural gas use in over 73,000 residences would reduce over 23 million therms of natural gas. Applying those savings to criteria air pollutant and hazardous air pollutant emissions factors sourced from the AP 42 compendium of emissions factors would yield the following annual reductions, as outlined in Table 3.

Table 3. Modeled Criteria Air Pollutant Annual Reductions

	Criteria Air Pollutant Emissions Annual Reductions (metric tons)
Total Particulate Matter	7.9
SOx	0.63
VOCs	5.8

[43] Intergovernmental Panel on Climate Change (2014). IPCC Fifth Assessment Report (AR5).
[44] U.S. Environmental Protection Agency (EPA). AP-42: Compilation of Air Emissions Factors from Stationary Sources, Section 1.4 Natural Gas Combustion (1998). https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf

An additional 3.7 tons would be reduced across all hazardous air pollutants and the average reduction within each home would be approximately 0.35 pounds per year. [45]

Reduced Energy Burden

The NV Energy Southern Nevada standard electric rate for residential customers ($0.15167 per kWh)[46] and the Southwest Gas standard natural gas usage rate for residential customers ($1.92107 per therm)[47] were applied to the annual household electricity and natural gas savings – respectively – to determine the annual electricity cost savings per FPL. By summarizing data from the Low-Income Energy Data (LEAD) tool from the US Department of Energy,[48] the impact of reduced energy cost relative to total income and average energy spending by FPL was calculated (Table 4).

Table 8. Projected Reductions in Energy Burden

Federal Poverty Level	Average CO2e Savings (MTCO2e)	Average Annual Income	Current Average Energy Burden	Average Cost Savings	Improved Energy Burden	Savings as Share of Income
0-100%	2.6	$11,651	17%	$954	8%	8%
100-150%	3.1	$26,325	7%	$1,154	3%	4%
150-200%	3.4	$36,715	5%	$1,287	2%	4%
200-400%	3.0	$57,894	3%	$1,119	1%	2%
400%+	3.1	$114,557	2%	$1,138	1%	1%

Workforce Development

Implementing comprehensive home energy reduction retrofits across 73,000 homes by 2030 is expected to have a cumulative investment need of $3,387,232,097 – assuming an average of $46,183 per home retrofitted[49]. With retrofits expected to start in 2025, the total spend per year is $677,446,419. It is estimated that the program could sustain approximately 4,200 high skilled jobs annually by applying a rate of 6.21 jobs per $1 million in investment.[50] These jobs could have multipliers of up to an additional 3,700 jobs in upstream manufacturing industries supplying materials and equipment at a rate of 88 jobs per 100 primary jobs, and another 3,700 local jobs in services at a rate of 89.6 per 100 primary jobs.[51]

[45] Includes 2-Methylnapthalene, 3-Methylnapthalene, 12-Dimethylbenz(a)anthracene, Acenaphthene, Acenaphthylene, Anthracene, Benz(a)anthracene, Benzene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Butane, Chrysene, Dibenzo(a,h)anthracene, Dichlorobenzene, Ethane, Fluoranthene, Fluorene, Formaldehyde, Hexane, Indeno(1,2,3-cd)pyrene, Napthalene, Pentane, Phenanathrene, Propane, Pyrene, Toluene.
[46] NV Energy. Energy Pricing Plans: Standard Electric Rate. https://www.nvenergy.com/account-services/energy-pricing-plans
[47] Southwest Gas Coporation. Nevada Gas Tariff (2018). https://www.swgas.com/nvtariff.pdf
[48] U.S. Department of Energy, Low-Income Energy Affordability Data Tool. Retrieved from: https://www.energy.gov/scep/slsc/low-income-energy-affordability-data-lead-tool
[49] National Renewable Energy Laboratory Building Stock Analysis (2024). Accelerating Residential Building Decarbonization: Market Guidance to Scale Zero-Carbon-Aligned Buildings. https://public.tableau.com/app/profile/nrel.buildingstock/viz/ABCMarketGuidanceforZero-carbonAlignedResidentialBuildings_16759824008870/Introduction
[50] National Renewable Energy Laboratory (2022). State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030. https://www.nrel.gov/docs/fy22osti/81486.pdf
[51] Bivens, Josh (2019). Updated Employment Multipliers for the U.S. Economy. Retrieved from: https://www.epi.org/publication/updated-employment-multipliers-for-the-u-s-economy/

Carbon Free Shared Mobility

Measure Description

RTC intends to expand the hydrogen fuel fleet by 5 buses and provide a hydrogen fueling skid that allows use of liquid hydrogen. The project implements the RTC's Zero Emission Vehicle Plan, which establishes a strategy to reduce GHG emissions from the transit bus fleet. Additionally, RTC Bike Share is the valley's first and only public bike share system. To continue Bike Share's success in getting people out of cars and onto bikes, expansion is planned on the Maryland Parkway corridor and UNLV.

GHG Emissions Reductions: Hydrogen Fleet

Methods and Assumptions

The emissions benefits result from a mobile combustion fuel type shift; from CNG to liquid hydrogen. Average block length (miles) of transit routes – provided by RTC – were multiplied by the number of buses intended to be replaced to project the daily miles replaced. To determine annual miles replaced, weekday estimates were multiplied by 260 working days while Saturday and Sunday estimates were multiplied by 52 days. GHG emission factors for transit buses (Table 5) were applied to the projected annual miles replaced to estimate annual GHG emissions reductions (Table 6).

Table 9. On-Road Summertime (July) Emissions Factors for HA 212[52]

Vehicle Type	VOC (g/mile)	NOx (g/mile)	CO (g/mile)	CO2e (g/mile)
Passenger Car	0.254	0.121	4.338	351.5
Transit Bus	0.682	2.788	20.296	1,908.7

Table 10. Annual Emissions Based on Average Block Length and Number of Buses to Upgrade

	Transit Bus	Block Length (mile)	Number of Buses Replaced	Total VOC	Total NOx	Total CO	Total CO2e
Weekday	CNG 40'	223	5	0.20	0.81	5.89	553.49
Saturday	CNG 40'	230	5	0.04	0.17	1.21	114.17
Sunday	CNG 40'	230	5	0.04	0.17	1.21	114.17
Total				**0.28**	**1.14**	**8.31**	**781.83**
Weekday	CNG 60'	196	1	0.04	0.14	1.03	97.29
Saturday	CNG 60'	206	1	0.01	0.03	0.22	20.45
Sunday	CNG 60'	221	1	0.01	0.03	0.23	21.94
Total				**0.05**	**0.20**	**1.49**	**139.69**

Results

Transitioning five CNG'40 transit buses to hydrogen is estimated to reduce GHG emissions by 782 MTCO2e per year, or a 3,128 MTCO2e cumulative reduction by 2030.

GHG Emissions Reductions: Bicycle Share System

Methods and Assumptions

Bike share systems can have a positive impact on air quality by providing an alternative mode of transport to the automobile. The emissions benefits result from a transport mode shift; from

[52] Obtained from Clark County Department of Air Quality & Environmental Management

automobiles to public shared bicycles. This mode shift results in less automobile usage and lower emissions of criteria pollutants. Quantifying the level of emissions reductions requires a two step process; 1) quantifying the level of automobile VMT reduction, and 2) assigning emission factors to the VMT reduced to determine air quality benefits.

Proportion of Users that Formerly Commuted by Single Occupant Vehicle (PSOV)

There is limited data available on changes in mode of travel before and after the introduction of Bike Sharing. Data from Barcelona, Lyon, Montreal, and Paris suggests that there is an impact on reducing car use (Table 7). The percentage of automobile trips replaced by Bike Sharing in these cities ranges from 2% to 10%. However, the primary mode shift is from public transit to Bike Sharing. This analysis assumes a mean average of these reductions in Las Vegas to estimate the level of mode shift from automobile to bike sharing. The mean average reduction in automobile trips for these cities (10%, 2%, 8% and 7%) is 6.75%.

Table 11. Trip Type Replaced by Bicycle-Sharing in Selected Cities[53]

Type of Trip Replaced	Bicing Barcelona	BIXI Montreal	Vélib' Parus	Vélo'v Lyon
Bus or Metro	51%	33%	65%	50%
Car or motorcycle	10%	2%	8%	7%
Taxi		8%	5%	
Walk	26%	25%	20%	37%
Bicycle	6%	28%		4%
New Trip		4%		2%

Annual Benefit Days (Nd)

Favorable weather conditions enable Bike Sharing operations throughout the year. The assumed benefit days per year is 365.

Average Daily Miles Traveled on Shared Bicycles (D)

One method to estimate the total number of bike share trips is to apply the diversion rates, displayed in Table 8 to TAZ level trips in Las Vegas. However, this is not possible because the Travel Demand Model for the Las Vegas Urbanized Area does not include walk/bike trips, which contribute to a significant portion of bike share trips. Additionally, if this method were utilized, it may overestimate the number of bike share trips taken because it assumes no limitations on the number of bicycles or stations in the bike share system. In fact, this method is a good tool in determining how large of a bike share system should be implemented.

Table 12. Diversion Rates[54]

	Low	Medium	High
Car	0.06%	0.14%	0.18%
Bus	1.40%	3.80%	4.60%
Bike	1.80%	2.60%	3.40%
Walk	0.48%	0.56%	0.64%
New Trips	1.10%	2.20%	4.40%

[53] Midgley, Peter (2011). Bicycle-Sharing Schemes: Enhancing Sustainable Mobility in Urban Areas. Retrieved from: https://www.un.org/esa/dsd/resources/res_pdfs/csd-19/Background-Paper8-P.Midgley-Bicycle.pdf
[54] University of Washington (2011). Seattle Bicycle Share Feasibility Study. Retrieved from: https://www.urbanfreightlab.com/wp-content/uploads/2023/04/McCormack-et-al-Seattle-Bicycle-Share-Feasibility-Study.pdf

Conversely, Las Vegas' system is constrained by available funding. The system is limited to bikes and stations in the core downtown area of the City of Las Vegas. While this approach follows best implementation practices for a large metropolitan area with lower population densities,[55] it reduces the total number of bike share trips that are able to be taken according to existing travel demands.

Bicycle fleet sizes vary widely for bike sharing systems throughout the world – Paris 20,000; Barcelona 6,000; Denver 500; etc. Because of this, referencing the total number bike share trips of these systems is of little value for estimating bike share trips or miles in Las Vegas. However, research has shown that on average, a bike share bicycle is used 7.67 times/day.[56] This is a conservative estimate, as bicycles in the Barcelona system average 10-15 uses/day. However, in Las Vegas e-bikes in the bike share system average 3 trips per day. Using a 3 times/day average with a proposed system expansion of 275 bicycles at project opening 2026, results in approximately 825 daily bike share trips. Referencing the recent RTC's 2023 Household Travel Survey,[57] the average bicycle trip length is 2.7 miles. Using these assumptions, the proposed system expansion will produce approximately 2,228 daily miles traveled on shared bicycles in 2026.

Automobile Vehicle Miles Traveled Reduction (AVMTR)

Automobile vehicle miles traveled reduction (AVMTR) was calculated through the following equation based on findings from the Colorado Department of Transportation.[58]

- *AVMTR = PSOV * Nd * D*
- AVMTR = 0.0675 * 365 * 2,228
- AVMTR = 54,892 annually in 2026 at project opening

Annual Emission Reductions

The emission factors detailed in Table 9 were applied to AVMTR to estimate annual emissions reductions.

Table 13. Mobile Combustion Emission Factors[59]

Pollutant	Emission Factor (g/mile)	Annual Emissions Reductions (metric tons)
VOC	0.254	0.0139
NOx	0.121	0.0066
CO	4.338	0.2381
CO2e	351.5	19.2946

Results

The expansion of bike share stations and related e-bikes is expected to result in a GHG emissions reduction of 19.3 $MTCO_2e$ annually, or a 77.2 $MTCO_2e$ reduction by 2030.

[55] Midgley, Peter (2011). Bicycle-Sharing Schemes: Enhancing Sustainable Mobility in Urban Areas. Retrieved from: https://www.un.org/esa/dsd/resources/res_pdfs/csd-19/Background-Paper8-P.Midgley-Bicycle.pdf
[56] University of Washington (2011). Seattle Bicycle Share Feasibility Study. Retrieved from: https://www.urbanfreightlab.com/wp-content/uploads/2023/04/McCormack-et-al-Seattle-Bicycle-Share-Feasibility-Study.pdf
[57] Regional Transportation Commission of Southern Nevada (2023). Household Travel Survey
[58] Colorado Department of Transportation (2010). Congestion Mitigation & Air Quality Program 2007-2008 Report. Retrieved from: https://www.codot.gov/programs/innovativemobility/assets/commuterchoices/documents/CMAQ_2007_2008_AnnualReport.pdf
[59] Obtained from Clark County Department of Air Quality & Environmental Management

Appendix D. LIDAC Census Tracts

This Appendix D includes a list of census tracts identified as disadvantaged through CEJST.

- 32003000101
- 32003000103
- 32003000105
- 32003000106
- 32003000107
- 32003000108
- 32003000109
- 32003000201
- 32003000203
- 32003000301
- 32003000302
- 32003000401
- 32003000402
- 32003000403
- 32003000510
- 32003000513
- 32003000514
- 32003000515
- 32003000516
- 32003000517
- 32003000518
- 32003000519
- 32003000520
- 32003000521
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