CLIMATE ACTION PLAYBOOK

Sunnyvale

July 2019

Sunnyvale's Climate Action Playbook created by and for the Community

City Manager's Note

The Playbook is available at the following link:

bit.ly/sunnyvaleplaybook

We look forward to working with you all to take bold climate action and help Sunnyvale achieve its 2050 target.

Kent Steffens
City Manager

The City of Sunnyvale is pleased to release the Draft Climate Action Playbook – a plan for how our community can reduce greenhouse gas emissions and address climate change.

In 2017, the City and community began work to update Sunnyvale's Climate Action Plan (adopted 2014). The Draft Climate Action Playbook is the result of this effort to identify how Sunnyvale will reach the state's ambitious 2050 climate target. Just as a sports playbook identifies a team's winning strategies for achieving success on the field, our Playbook contains winning strategies for how to cut back our carbon emissions.

And just as a sports team relies on the support of its fans, this Playbook represents a collaborative effort between the City and our community. We owe a huge thanks to all who contributed to the process – your creativity and enthusiasm generated a wealth of climate action solutions for our community. Many of your ideas have been incorporated into the Playbook to ensure that it reflects our community's needs and aspirations. Ideas that were not incorporated this time around have been preserved (see *Appendix A: Ideas Roster*), so that we can continue to draw on them for inspiration as we implement the Playbook in the coming years.

Sunnyvale has demonstrated its leadership in climate action through progressive City policies and active community engagement. Yet much remains to be done to reduce our emissions and enhance our resilience to the threats of climate change. The Playbook is the next step to help us take bolder climate actions.

Contents

Executive Summary

Executive Summary

The Climate Action Playbook sets a vision for the City of Sunnyvale to reduce carbon emissions by 2050. As a sustainability leader, Sunnyvale adopted its first Climate Action Plan (CAP 1.0) in 2014 and has already achieved its 2020 greenhouse gas (GHG) emissions target. Now, the State of California has set new targets that move the ball further down the field for deeper emissions reductions of 40% below 1990 levels by 2030 ("40x30") and 80% below 1990 levels by 2050 ("80x50").

This Sunnyvale Climate Action Playbook (hereafter "Playbook") builds upon our past success and integrates new, bold, breakthrough ideas generated by our community. It paves the path for meeting or exceeding the state's emissions targets of 40x30 and 80x50. To develop the Playbook, we sourced more than 120 ideas from our community (see *Appendix A: Ideas Roster*), worked closely with the CAP 2.0 citizens' advisory committee, and engaged a consultant team for technical analysis.

Our most recent emissions numbers are from the 2016 season, adjusted to reflect the impact of carbon-free electricity. **With our current line of scrimmage at 28% below 1990 levels, we are well-positioned to meet the state's 2030 target. However, the path to 2050 calls for steeper reductions in emissions**, even as Sunnyvale's emissions are forecasted to increase with anticipated growth. State policies on energy, transportation, and GHG mitigation, many of which continue through 2030, will offset these emissions significantly. However, state policies alone are not enough.

Effective local policies and programs are needed to complement state regulations and dramatically shift the trajectory to start decreasing carbon emissions. **To reach 80x50, the City must achieve an interim target of a 55% reduction below 1990 levels by 2030, exceeding the state's 40x30 target.** This calls for a continued focus on addressing the two largest emissions sources – transportation (54%) and energy (37%) – and for putting in place today the policies that will affect our infrastructure in the coming decades. Local policies are also needed to improve our preparedness for and response to climate impacts and to recover from extreme climate events quickly.

The Playbook lays out six **Strategies** that outline the overarching approach for bold climate action to achieve the end game of 80x50. Within each Strategy, there are several **Plays** that identify areas for action and measurable targets to define progress (see At-A-Glance on next page). These Strategies and Plays foster innovation to transform the way we power our buildings, travel around the Bay Area, consume goods and services, and empower our community to take individual actions. The Strategies and Plays also identify how we can better adapt to increasing local climate change impacts.

The Playbook also includes **Game Plan 2022, which contains "Next Moves,"** or specific actions, that the City and community can collectively take in the short-term to reduce carbon emissions and improve resilience to climate impacts. Game Plan 2022 is intended to be dynamic and will map out the next moves for three years initially. It will be revised every five years thereafter to account for the changing regulatory context, evolving technologies, behavior trends, and community needs.

Our initial next moves (Game Plan 2022) are planned for implementation over three years between 2019-2022 (see page 34). Some of the next moves will be absorbed and integrated into existing departmental operating or projects budgets. Additional resources needed over the next three years total $1.39 million in one-time costs, which includes consultant services, temporary staffing, and infrastructure needs, and $1.47 million in ongoing costs (approximately $500,000 each year), which includes three additional staff positions and augmenting the City's ongoing budget for CAP implementation. Resources allocated to implementing the Climate Action Playbook will be refined and finalized as part of the annual process for budget development and approval by the City Council.

Moving forward, the City will evaluate a variety of strategies to fund the implementation of the Playbook (e.g., differential utility use taxes, carbon impact fees) and will establish funding mechanisms customized to our community's needs.

The issue of global climate change has become increasingly urgent, and **we need action today to create the highest GHG reductions by 2030 so that we can achieve 80x50.** This Playbook provides a path for transforming our community into a resilient and sustainable Sunnyvale through our collective commitment to individual and community-wide action.

At-a-Glance: Pathway to 2050

Strategy 1: Promoting Clean Electricity

Play 1.1	Promote 100% clean electricity	2030 Target: 100% participation in clean electricity 2050 Target: 100% participation in clean electricity
Play 1.2	Increase local solar photovoltaics	2030 Target: 3% of load from local solar 2050 Target: 5% of load from local solar
Play 1.3	Increase distributed electricity storage	2030 Target: 1% of electricity demand stored in batteries locally 2050 Target: 5% of electricity demand stored in batteries locally

Strategy 2: Decarbonizing Buildings

Play 2.1	Reduce energy consumption in existing buildings	2030 Target: 5% of existing homes and businesses receive deep energy retrofit 2050 Target: 30% of existing homes and businesses receive deep energy retrofit
Play 2.2	Support electrification of existing buildings	2030 Target: 20% of homes and businesses completely electrified 2050 Target: 50% of homes and businesses completely electrified
Play 2.3	Achieve all-electric new construction	2030 Target: 100% all-electric new buildings 2050 Target: 100% all-electric new buildings

Strategy 3: Decarbonizing Transportation & Sustainable Land Use

Play 3.1	Balance land use supply and enhance urban form	2030 Target: 13% reduction in vehicle miles per person 2050 Target: 25% reduction in vehicle miles per person
Play 3.2	Increase transportation options and support shared mobility	
Play 3.3	Increase zero-emission vehicles	2030 Target: 20% of all vehicles on road are zero-emission vehicles 2050 Target: 75% of all vehicles on road are zero-emission vehicles

Strategy 4: Managing Resources Sustainably

Play 4.1	Achieve Zero Waste goals for solid waste	2030 Target: Reduce landfilled garbage to 1 lb per person per day 2050 Target: Reduce landfilled garbage to 1 lb per person per day
Play 4.2	Ensure resilience of water supply	Targets will be defined as per state requirement
Play 4.3	Enhance natural carbon sequestration capacity	Supports broader net carbon reductions
Play 4.4	Promote sustainable food choices	Supports broader emissions reductions

Strategy 5: Empowering Our Community

Play 5.1	Enhance community awareness and engagement	Supports all other Plays
Play 5.2	Track and share data and tools	Supports all other Plays

Strategy 6: Adapting to a Changing Climate

Play 6.1	Assess climate vulnerabilities for Sunnyvale	
Play 6.2	Protect shoreline area from sea level rise and coastal flooding	
Play 6.3	Strengthen community resiliency	

Top Climate Actions You Can Take Today

Drive less – walk and ride more. It's good for the air and your health! Use the new Sunnyvale Bike Map[1] to find your best route. And if you need a car, take advantage of State incentives for electric vehicles!

Opt-up to 100% renewable electricity. Take advantage of Silicon Valley Clean Energy's GreenPrime[2] program.

Separate your food scraps. Collect your food scraps for curbside collection or drop-off at the SMaRT station (residents only) and help meet our community's Zero Waste goal by 2020.

Shop local, eat healthier, waste less. Support local farmers so that food travels shorter distances. Buy food in bulk to reduce packaging trash.

Understand your carbon impact. Download the free IGreenSunnyvale app on your smart phone and track the environmental impact of your sustainable actions.

Get the latest sustainability news and event information. Follow Sunnyvale Environmental Services on Facebook or subscribe to the Sustainable Sunnyvale e-newsletter (email green@sunnyvale.ca.gov).

The Playing Field

A Vision for a Sustainable Sunnyvale

Climate change is a global phenomenon that is affecting the social, environmental, and economic health of communities worldwide. The latest scientific reports demonstrate conclusively that greenhouse gas (GHG) emissions from human activities contribute to a progressively warming climate. The most recent Intergovernmental Panel on Climate Change (IPCC) report (2018) shows that if the current trajectory of GHG emissions continues, even a 1.5-degree Celsius (2.7 degrees Fahrenheit) increase in global temperatures above pre-industrial levels by 2040 could lead to significant threats, including sea level rise, increased wildfires, intensifying droughts, food shortages, and ecosystem damage.

In 2015, the Paris Climate Agreement became the world's first comprehensive climate agreement with the goal of holding the increase in global average temperature to well below 2 degrees Celsius (3.6 degrees Fahrenheit). California's emissions reduction goals for 2030 and 2050 are aligned with the scale of emissions reductions necessary to achieve this goal of the Paris Agreement.

The time to act is now. And local governments, like Sunnyvale, can make bold policy decisions, leverage emerging technologies, and actively engage their communities to mitigate climate impacts. Located in the heart of Silicon Valley, the City of Sunnyvale embodies the spirit of being a socially aware, technologically savvy, ethnically diverse, and actively engaged community. As we witness climate impacts in our community, our City recognizes the need for leadership and action to address the stressors that threaten quality of life across Sunnyvale.

Sunnyvale's planning effort to accelerate climate action is designed to reimagine our community and create opportunities for sustainable growth while moving aggressively toward a fossil-free future.

A Vision for 80x50

- **Sustainable and healthy community that preserves natural resources and runs on clean energy**
- **Mobile and well-connected city, supported by "smart" infrastructure and services**
- **Robust economy that prioritizes community equity and wellbeing**
- **Resilient and prepared community that can adapt to a changing climate**

In setting the course to achieve the state's emissions targets, Sunnyvale will need to balance economic and population growth and an increased demand for City services, all while still meeting our climate goals. This means making a fundamental shift in current patterns of urban development, mobility, building construction, and consumption towards more sustainable, holistic systems. It means initiating high-impact sustainability practices and scaling them across both private and public sectors. It means engaging government leadership, local businesses, schools, community groups, and neighborhoods in coordinated action. Most importantly, it means creating a safe, healthy, and liveable Sunnyvale for all in our community.

We know that evolving conditions mean that we will need to identify new moves in the coming years to continue to reduce emissions. This Playbook provides a framework for us to do so. It clearly defines the end game of reducing emissions by 80% by 2050, identifies key strategies and plays, and sets the ball rolling towards the goal posts.

Together, we can create a sustainable, equitable, and prosperous community by enabling next-generation mobility solutions, enhancing our built environments, investing in cleaner technologies, and minimizing our impact on the natural environment.

Background

Climate Action at the State Level

As a climate action leader, California has continued to demonstrate its commitment to early and aggressive action on climate change. The State Legislature and Governor have adopted ambitious targets to encourage bolder climate action, including statewide GHG emissions reduction targets of reaching:

- 1990 levels by 2020 (Assembly Bill 32, 2006)

- 40% below 1990 levels by 2030 (Senate Bill 32, 2016)

- 80% below 1990 levels by 2050 (Executive Order S-3-05, 2005)

Additionally, in September 2018, Governor Brown signed Senate Bill 100 into law, setting a state target of 100% carbon-free electricity by 2045. SB 100 also sets interim requirements for 50% renewable electricity by 2026 and 60% by 2030, superseding the less ambitious renewable portfolio standards (RPS) previously established.

Building Upon Sunnyvale's CAP 1.0

When the City of Sunnyvale's first Climate Action Plan (CAP 1.0) was adopted in 2014, it set the City on a path toward creating a more sustainable, healthy, and livable community. Since then, the City achieved the state's target GHG reductions by reaching 1990 levels ahead of the 2020 schedule, through both local actions and state policies. Notably, Sunnyvale has been a driving force for the launch of Silicon Valley Clean Energy (SVCE), a community choice aggregator that provides carbon-free electricity to most of our community.

Although CAP 1.0 helped the City exceed the state's 2020 GHG emissions reduction target, it was not designed to identify how more ambitious, long-term targets for 2030 and 2050 could be achieved.

To drive progress towards the aggressive emissions reduction targets by 2030 and 2050, City Council adopted Accelerating Climate Action as a Council Policy Priority in January 2017 and directed the development of an updated plan to reflect this Policy Priority.

Staff worked with consultants to build upon the foundation laid by CAP 1.0 and developed this

Playbook to guide the City and community in achieving or exceeding the state's 2030 and 2050 GHG emissions reduction targets.

Setting a New Bar for Leadership

Climate change is a global threat with local impacts. While communities around the world will be affected differently, we all share a collective responsibility to act.

As the heart of the Silicon Valley, what is created in Sunnyvale has influence far beyond its borders. Along with hundreds of cities worldwide, Sunnyvale has signed and endorsed national commitments and charters, such as:

- **U.S. Climate Mayors,** to uphold the commitments enshrined in the Paris Climate Agreement to meet the 1.5 degrees Celsius target; and

- **#WeAreStillIn,** to set a goal for emissions reductions equal to or greater than the U.S. goal under the Paris Climate Agreement.

While one city alone cannot solve the problem of climate change, we can demonstrate that reaching 80x50 is possible. This Playbook reveals how we plan to do our part to sustain future generations. In this way we join leading cities across the globe to realize the ambition of the Paris Climate Agreement.

Our Accomplishments

City Reaches 2020 Target Ahead of Schedule

Since 2008 – when Sunnyvale's first GHG inventory was developed – the City has experienced significant growth in population, jobs and construction of new buildings. Despite these trends, which historically resulted in emissions growth, the City of Sunnyvale's overall emissions decreased 12% below 1990 levels in 2016, surpassing the CAP 1.0 goal of reaching 1990 levels of emissions by 2020.
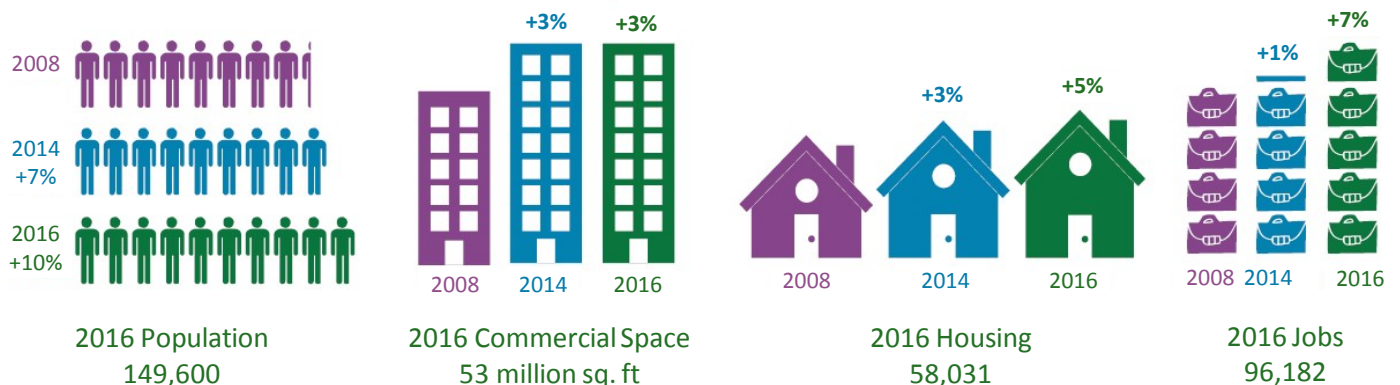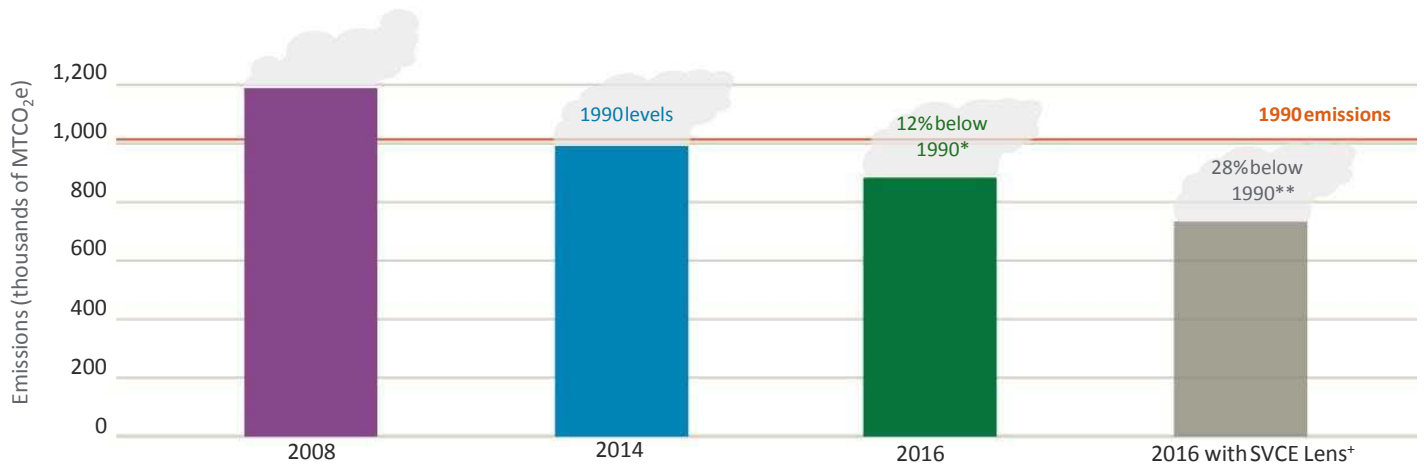
Additionally, SVCE was launched in 2017 and has had an immediate impact. SVCE is the community choice aggregator for Sunnyvale and 12 neighboring communities; they purchase clean electricity on our behalf. Creating such an agency was the action from

CAP 1.0 with the greatest GHG reduction potential. Since SVCE launched, it has provided clean electricity to 97% of Sunnyvale residents and businesses.

If SVCE had been supplying its 100% GHG-free electricity to Sunnyvale in 2016, we estimate that 2016 emissions would have been 28% below 1990 levels – putting our City on its way to achieving the State's climate target of 40% below 1990 levels by 2030.

The clean energy provided by SVCE is the foundation for the city-wide energy transition Sunnyvale will need across all sectors. The use of carbon free electricity is essential as we shift away from the use of fossil fuels in buildings and transportation through electrification strategies. This is why SVCE is not only an accomplishment to be celebrated from our CAP 1.0, but also one that will continue to be the foundation for actions in this Playbook.

Sunnyvale's 2016 Accomplishments

Bar chart: Emissions (thousands of MTCO$_2$e)

- 2008: ~1,160
- 2014: ~980 (1990 levels)
- 2016: ~860 (12% below 1990*)
- 2016 with SVCE Lens⁺: ~710 (28% below 1990**)

1990 emissions line at ~980

2016 Population 149,600
- 2008
- 2014 +7%
- 2016 +10%

2016 Commercial Space 53 million sq. ft
- 2008
- 2014 +3%
- 2016 +3%

2016 Housing 58,031
- 2008
- 2014 +3%
- 2016 +5%

2016 Jobs 96,182
- 2008
- 2014 +1%
- 2016 +7%

*25% below 2008.

**39% below 2008.

⁺ Estimated impact of SVCE by applying 2017 SVCE enrollment data to the City's 2016 emissions.

Current Emissions

2016 GHG Emissions in Sunnyvale

In 2016, Sunnyvale emitted 880,000 metric tons of carbon dioxide equivalent (MTCO$_2$e), representing a 12% decrease in emissions below 1990 levels. Prior to the implementation of SVCE, electricity and natural gas consumption in buildings were the largest source of emissions (48%), followed by on-road transportation (44%) and other sources.
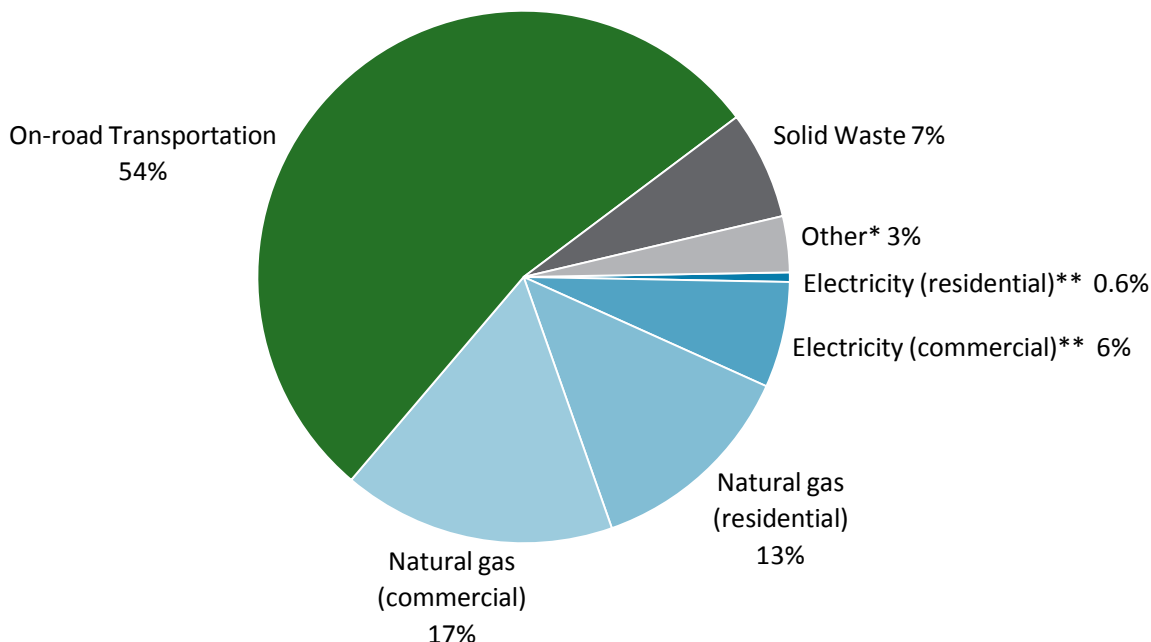
By the end of 2017, however, 98% of Sunnyvale's residents and businesses were purchasing carbon-free electricity from SVCE. Applying these 2017 SVCE participation levels to the 2016 GHG Inventory decreases total emissions to 721,000 MTCO$_2$e – an additional 16% drop (total 28% below to 1990 emissions) resulting from switching to clean electricity.

The Impact of Clean Electricity

With SVCE, electricity use in residential and commercial buildings now makes up a much smaller portion of total emissions, with transportation now the largest emissions source (54%), followed by natural gas in buildings (30%) and other sources.

As electricity continues to be supplied by clean, renewable sources, the importance of addressing natural gas and transportation emissions increases. The pathway to zero-emission buildings and transportation, therefore, will largely depend on electrification strategies and growing clean electricity supplies, to move the City away from petroleum and other fossil fuel emissions.

City of Sunnyvale Greenhouse Gas Emissions Sources
Estimated 2016 Emissions (with SVCE)

On-road Transportation 54%

Solid Waste 7%

Other* 3%

Electricity (residential)** 0.6%

Electricity (commercial)** 6%

Natural gas (residential) 13%

Natural gas (commercial) 17%

*"Other" represents emissions associated with water, wastewater, off-road motorized equipment and Caltrain.
**In 2016, prior to the launch of SVCE, residential electricity made up 4% of total emissions and commercial electricity made up 20% of total emissions.

Future Scenarios: 2030 and 2050

Projecting Future Emissions

To understand the level of action the City must undertake to achieve 2030 and 2050 emissions reduction targets, it is necessary to consider how projected growth, state policies and existing efforts will impact future emissions.

As shown below, City of Sunnyvale's GHG emissions are forecasted to increase over time by 2050. This is despite key initiatives at the state and local levels to make electricity, buildings and cars less carbon intensive.

Key state policies and programs include:

- Renewable Portfolio Standard (Senate Bill 350, 2015)
- Title 24 of California Building Standards Code
- Advanced Clean Cars Program (offered by California Air Resources Board, 2012)

These state policies generally address emissions through 2030, after which without further state and local action, emissions are forecast to increase through 2050 due to anticipated growth.

CAP 1.0 measures currently being implemented by Sunnyvale are also included in the analysis, including the full implementation of SVCE. The grey shaded area indicates additional emissions reductions needed from City action to achieve its end game of 80x50.

Early action is critical to setting Sunnyvale on a path to achieving 80x50, especially considering the projected growth in population and jobs. **For this reason, it is important that Sunnyvale achieve a reduction of 55% below 1990 level emissions by 2030 – surpassing the State's goal of 40% reduction by 2030.** The programs and infrastructure critical to achieving the 2050 goal must be in place and well underway by 2030 to put the City on the 80x50 trajectory.

Historical & Forecasted GHG Emissions: 2005-2050
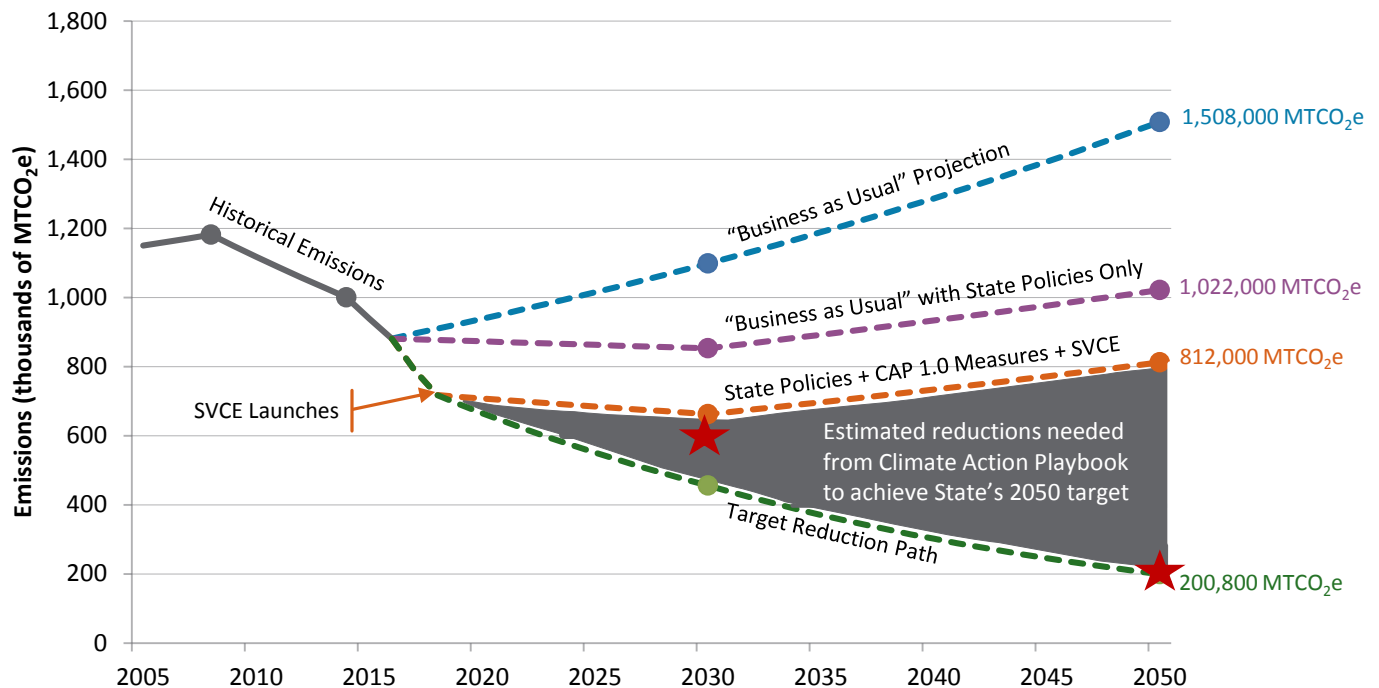
The business-as-usual (BAU) forecast utilizes Sunnyvale-specific growth projections from the City's Land Use and Transportation Element (LUTE), adopted in 2017. These growth projections are available through 2035 when the City is projected to achieve complete buildout. This BAU forecast, however, assumes continued growth in the absence of future projections between 2035-2050.

★ = State Targets: 40% by 2030; 80% by 2050

Future Scenarios: 2030 and 2050

A Path to 80x50

The City must take action to reduce emissions from four key sources – natural gas, electricity, transportation fuels and waste – in order to achieve its goal of carbon neutrality by 2050. While action is needed across sectors, some sectors may need more than others. Evaluating different scenarios for reducing emissions is valuable for understanding how actions result in GHG reductions and for guiding the selection of strategies to focus on in the coming decades.

To develop Sunnyvale's Playbook, we explored the emissions reduction potential for each sector (shown below; see *Appendix B:Technical Background*). This scenario analysis incorporates the many existing City initiatives, including CAP 1.0 implementation of SVCE and the new FoodCycle (food scraps collection) program. The upper bound represents the adjusted business-as-usual scenario, where anticipated emissions are offset until 2030 by state policies and programs. Each "wedge" in

the chart, identified by a different color, represents the reductions needed from different sectors. The largest emissions reductions needed are in the transportation sector, followed by natural gas use in buildings.

The Playbook identifies strategies, plays, and measurable targets to achieve the emissions reductions related to each emissions source.

The scenario presented below shows the City exceeding the State's 2030 target of 40% below 1990 levels on the path to achieving the State's 2050 target. Aiming for emissions well beyond the 2030 State target is essential to being able to achieve the 2050 State target. Early actions help avoid higher cost approaches to retrofit and rebuild, and can have lasting impacts. Early action also has the greatest potential to inspire actions in other communities, amplifying the positive impact of Sunnyvale's commitment to accelerating climate action.
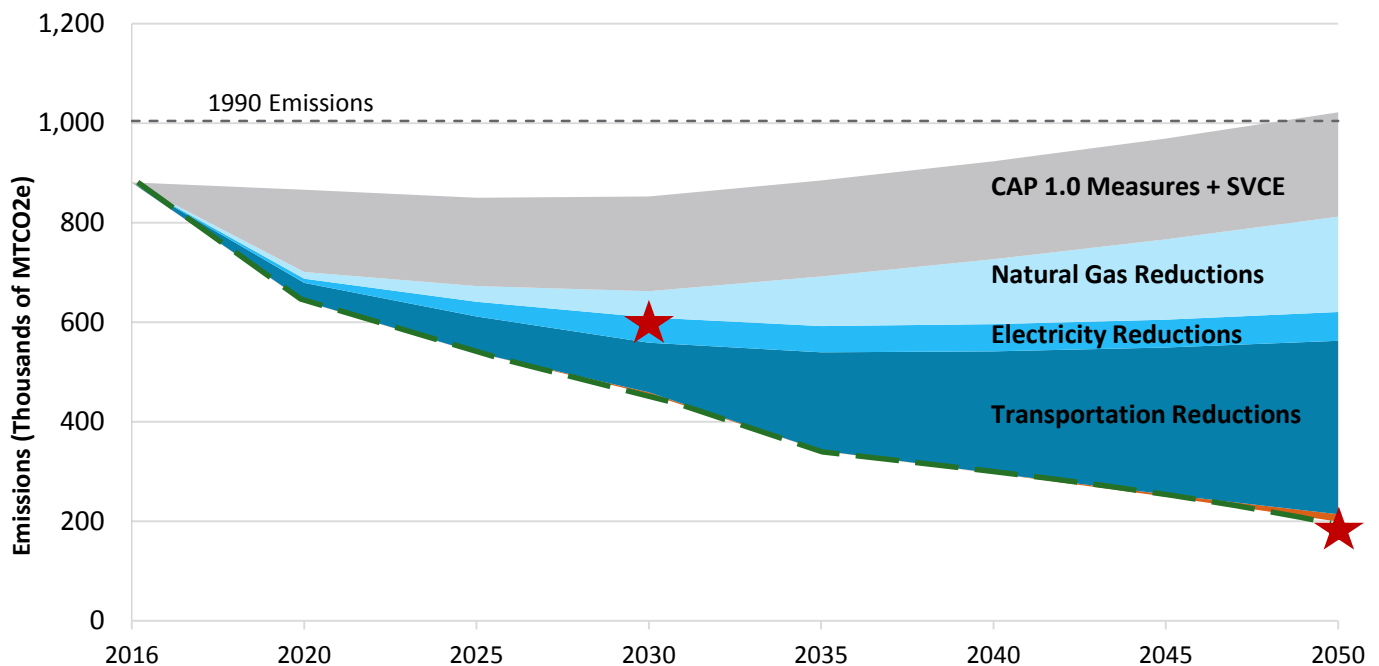
★ = State Targets; 40% by 2030; 80% by 2050

GHG reductions in the waste sector (orange sliver below Transportation) constitute <3% of total emissions reductions needed to achieve 80x50.

Photo credit: Manish Mohapatra

Six Climate Strategies for the Win

Introduction to the Playbook

Sunnyvale's Playbook engages the enthusiasm of Sunnyvale's community, innovation of local technology companies, and creative can-do Silicon Valley spirit to create an aspirational, achievable and adaptable plan. It lays out a framework of overarching key strategies designed to be used by the City and the community to plan and implement long-term climate actions. This framework readies the field for Sunnyvale's long-term GHG emissions reduction targets to meet or exceed the state goals of 40% by 2030 and 80% by 2050 ("80x50").

Reaching 80x50 – or carbon neutrality – is our *"end game."* In the context of reducing emissions, the target of 80x50 is generally considered to be aligned with carbon neutrality, with the potential for remaining emissions to be addressed through sequestration.

The Playbook lays out the pathway that can be followed to achieve our *end game*, hereafter referred to as "80x50":

- **Six key Strategies** for Sunnyvale to reduce fossil fuel consumption and greenhouse-gas emissions, as well as enhance resilience and adapt to climate change.

- **Eighteen Plays** associated with key strategies, that specify a plan of action. Where possible, Plays are associated with *measurable targets,* which will be tracked and reported in progress reports.

Following the Plays is our "*Game Plan 2022,*" a compilation of the **Next Moves** to be taken by the City in the next three years. The Game Plan of Next Moves will be revised every five years thereafter to be sure we stay on track with the Plays and reach the end game.

Our Team

- **Sunnyvale's local government,** including all City departments.

- **Community members** who live or work in Sunnyvale.

- **Regional Agencies and Organizations,** such as Silicon Valley Clean Energy (SVCE), Valley Transportation Authority (VTA), County of Santa Clara, and Valley Water, among others.

- **Private Sector,** including large corporations, small businesses, technical consultants, contractors, manufacturers of clean technologies, start-ups, funders, and technology incubators.

- **Non-Profit Organizations** that provide support for grassroots community engagement initiatives.

End Game in 2050

- **80x50:** We are seeking to reduce emissions 80% by 2050. Remaining emissions could be sequestered within the city or nearby through projects such as urban forestry, marsh management, or applying compost to our soils.

Strategy 1:
Promoting Clean Electricity

Path to 2050

Community-wide electricity can be supplied by different providers, including investor-owned utilities (like PG&E), wholesale electricity markets (used by some businesses), and by local building-scale projects, such as rooftop solar photovoltaic (PV). Sunnyvale has made tremendous progress in reducing emissions in this key sector by launching a community choice energy program, which combines the collective buying power of a community to procure power directly from electricity suppliers. With the launch of SVCE in 2017, 98% of Sunnyvale's residential and commercial accounts receive carbon-free electricity.

Our success with SVCE will help us move the ball down the field faster than state requirements, as outlined in:

- Senate Bill 350, requiring all utilities in the state to source 50% of their electricity from renewable energy by 2030, and

- Senate Bill 100, committing California to 100% carbon-free electricity by 2045.

Moving forward, the City will seek to encourage and promote the use of carbon-free electricity sources from all energy providers. Electricity-related emissions have already reduced approximately 76% by moving from conventional PG&E electricity (left bar) to SVCE's carbon-free electricity. The remaining emissions are associated with electricity procured from other electricity providers and from conventional (not carbon-free) sources. The City will continue to work on shifting these remaining emissions to carbon-free sources by working with large purchasers of electricity that buy electricity from wholesale markets (i.e., direct access customers).

In addition to grid-supplied electricity, the City of Sunnyvale has the opportunity to leverage the falling cost of GHG-free distributed energy resources, such as solar photovoltaic (PV). Currently, approximately 1% of Sunnyvale's electricity comes from locally generated solar PV. Increasing local investments in distributed energy resources, such as solar PV, particularly when combined with on-site energy storage, may enable buildings to be self-sufficient during power outages, thereby enhancing resilience to climate-induced extreme

	Targets	
Play 1.1: Promote 100% clean electricity	2030:	100% participation in clean electricity
	2050:	100% participation in clean electricity
Play 1.2: Increase local solar photovoltaics	2030:	3% of load from local solar
	2050:	5% of load from local solar
Play 1.3: Increase distributed electricity storage	2030:	1% of electricity demand stored in batteries locally
	2050:	5% of electricity demand stored in batteries locally

weather events. In addition, increased solar installations May also support the local solar industry and, therefore, jobs growth.

Supply of clean electricity is a critical foundation for Strategies 2 (Decarbonizing Buildings) and 3 (Decarbonizing Transportation & Sustainable Land Use). As such, the City plans to continue supporting and expanding Sunnyvale's participation to transition all electricity accounts to SVCE's clean electricity by 2030. Further, the City will encourage expansion of local solar to provide 5% of total electricity by 2050, as storage options increase. Further, the City will continue to explore opportunities to increase distributed battery electricity storage at homes and businesses.

Sunnyvale Electricity Emissions

Projected 76% reduction in electricity emissions with SVCE
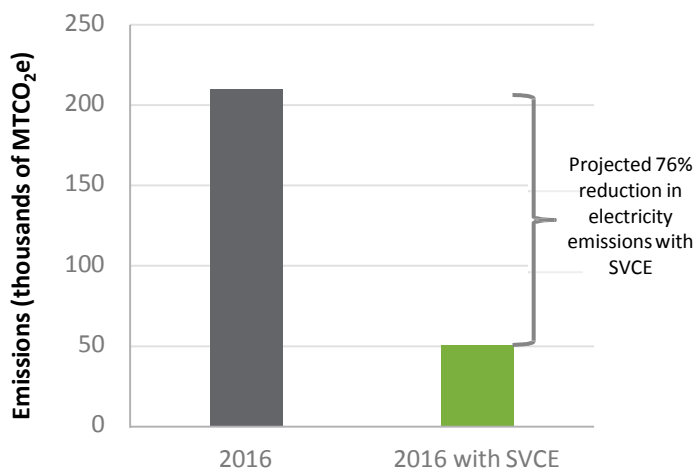
Strategy 1:
Promoting Clean Electricity

Plays for the Win

Play 1.1: Promote 100% clean electricity. The City is committed to working with SVCE to expand 100% clean energy services to 100% of our community. Supporting and protecting this clean electricity supply is critical to other Strategies from this Playbook that rely on decarbonization (namely, Strategies 2 and 3).

Play 1.2: Increase local solar photovoltaics (PV). Targeted incentives, regulations and educational resources will be essential to increasing adoption of distributed solar resources in Sunnyvale. These will help ensure local supply but also help to offset demands on the electricity grid during peak demand periods.

Play 1.3: Increase distributed electricity storage. The City will work with Silicon Valley Clean Energy to pursue opportunities for electricity storage at the building scale, separate from the utility-scale storage that SVCE plans to invest in as a part of its Decarbonization Roadmap. Estimated local storage in Sunnyvale as of 2019 is less than 0.5 MW (Source: California Solar Initiative). Battery technologies are typically rated by the maximum amount of power (kilowatts) they can continuously provide over a 4-hour period. Accordingly, battery installations may be sized to meet specific power and duration requirements. As battery technologies improve, the City will promote and encourage the use of distributed (or behind-the-meter) electricity storage at commercial and residential buildings in Sunnyvale. Local electricity storage provides opportunities to lower peak electricity demand periods and improve grid resilience; improve cost-effectiveness of electricity for the consumer as time-of-use rates go into effect (anticipated in 2020); and supply emergency backup power for limited periods during power outages.

Strategy 2:
Decarbonizing Buildings

Path to 2050

While Sunnyvale has experienced significant growth in recent years, emissions from the building sector have decreased by 40% compared to 2008 levels. These reductions can be attributed to many efforts, including the City's incentive-based Green Building Program; a cleaner electricity grid; and financial incentives offered to businesses and residents for efficiency upgrades.

As the electricity supply has become GHG-free, key challenges and opportunities remain for further reductions in emissions associated with the buildings sector. We must continue to pursue all energy efficiency opportunities to reduce overall energy demand and help our citizens and businesses save money. Secondly, we must identify technical and financial innovations to move buildings away from natural gas, which is used to heat our homes, offices and other buildings, as well as to heat water.

The State of California is moving towards Zero Net Energy (ZNE) new buildings. The upcoming Uniform Building Code cycle (in effect January 2020) is expected to include a requirement for all new residential buildings to be ZNE by 2020 and all new commercial buildings to be ZNE by 2030. However, these requirements do not fully address natural gas consumption as the ZNE approach offsets electricity consumption with onsite generation. For this reason, the City has chosen to focus on all-electric buildings that contain no natural gas infrastructure.

To transition away from fossil fuel usage in buildings, partnerships with SVCE, other cities, utilities and the private sector will be essential to effectively target electrification strategies for implementation and to also advocate for building electrification at the State level. These partnerships can also lend themselves to scaling-up the deployment of clean electric appliances to heat our homes, buildings and water.

The City of Sunnyvale will focus on improving building energy efficiency, reducing natural gas use through building electrification, and continuing to source electricity from renewable sources in order to pave the way to a decarbonized building sector by 2050.

	Targets	
Play 2.1: Reduce energy consumption in existing buildings	2030:	5% of existing homes and businesses receive deep energy retrofit
	2050:	30% of existing homes and businesses receive deep energy retrofit
Play 2.2: Support electrification of existing buildings	2030:	20% of homes and businesses completely electrified
	2050:	50% of homes and businesses completely electrified
Play 2.3: Achieve all-electric new construction	2030:	100% all-electric new buildings
	2050:	100% all-electric new buildings

Decarbonizing buildings requires that we address new construction and also seek to retrofit buildings, since not all buildings will be rebuilt before 2050. Play 2.3 seeks to maximize electrification implementation on new buildings, and the target is to get to 100% quickly. Plays 2.1 and 2.2 seek to improve efficiency and then switch fuel uses to electricity. The modest target for efficiency in the early years reflects the relatively low participation seen in efficiency programs. While efficiency is still essential, the Playbook aims for steeper progress on encouraging electrification through appliance retrofits with clean technologies like heat pump technology. The Playbook envisions that by 2050, at least half of the buildings are fully electrified.

Plays for the Win

Play 2.1: Reduce energy consumption in existing buildings. Increasing efficiency will mean continued program outreach and incentives to residents and businesses to encourage efficient designs for new construction and retrofits in existing buildings. System efficiencies such as insulation and upgrades to electric heat pump technologies are top priorities.

Strategy 2:
Decarbonizing Buildings

Play 2.2: Support electrification of existing buildings. Building energy optimization includes an innovative focus on installing efficient, electric systems to heat water and heat/cool interiors. Space and heat pump water heaters are high-efficiency alternatives to natural gas systems and have the added benefit of being powered by clean electricity.

Play 2.3: Achieve all-electric new construction. While the state requires moving toward Zero Net Energy (ZNE) for new construction, the City will work towards incentivizing and promoting all-electric new construction options for deep decarbonization.

Strategy 3: Decarbonizing Transportation & Sustainable Land Use

Path to 2050

The transportation sector is the largest source of GHG emissions in Sunnyvale, mostly attributed to personal driving. Congestion from daily traffic creates pressure on the city's transportation infrastructure, reduces mobility and safety and increases emissions.

The City of Sunnyvale is committed to a vision of a complete community, which represents a place to live that is less dependent on automobiles. This includes:

- Comfortable, safe, convenient, and complete pedestrian and bicycle networks
- Transit access on arterial streets within a 10-minute walk from home or work
- Diverse housing choices with a range of affordability
- Village Centers with enhanced neighborhood services

As Sunnyvale's population and jobs continue to increase, providing realistic options for reducing single-occupancy vehicles is key. With this in mind, Sunnyvale is focusing job growth and housing in specific plan areas including Downtown, along El Camino Real, and in the Transit and Village Center areas. The vision is to allow for economic growth and revenue that supports local businesses, while providing housing that ensures that residents have places to live, work and play without having to travel long distances.

The City's plans and policies call for an integrated transportation approach that supports pedestrian-, bike- and transit-friendly neighborhoods. Vehicle electrification augments these mobility strategies to support further emissions reductions and achieve the state's climate goals.

Furthermore, Sunnyvale will continue to explore innovative first- and last-mile solutions to encourage greater use of public transit, including accommodating on-demand ridesharing, piloting shared bicycle and scooter programs and assessing the potential for shuttle service in targeted areas.

	Targets	
Play 3.1: Balance land use supply and enhance urban form	2030:	13% reduction in vehicle miles per person
Play 3.2: Increase transportation options and support shared mobility	2050:	25% reduction in vehicle miles per person
Play 3.3: Increase zero-emission vehicles	2030:	20% of all vehicles on road are zero-emission vehicles
	2050:	75% of all vehicles on road are zero-emission vehicles

There are two elements to understanding emissions from the transportation sector. One is how much driving occurs, typically expressed as vehicle miles traveled, and the other is how much GHG emissions come from a typical vehicle. The Playbook targets use both of these metrics to achieve the overall reductions needed from the transportation sector. The Playbook targets envision big changes by 2050 – that we are in general driving in single occupancy vehicles half as much as we do today, and that three out of every four vehicles are zero-emission vehicles. To the extent that one of these targets is lowered or not achieved, stronger performance in the other will be needed to achieve the overall emission reduction targets for the transportation sector.

Plays for the Win

Play 3.1: Balance land use supply and enhance urban form. The City is committed to creating places to live that are less dependent on automobiles, through ensuring access to nearby services and activity centers. Furthermore, Sunnyvale seeks to provide housing options for all incomes and lifestyles, particularly near transit corridors and Caltrain stations, to support alternative modes of transportation.

Strategy 3:
Decarbonizing Transportation & Sustainable Land Use

Play 3.2: Increase transportation options and support shared mobility. Multimodal transportation choices need to be enhanced to offer a variety of travel options in and around the city that are connected to regional transportation systems and destinations. Advocating for and increasing transportation options and shared mobility will create safer, healthier and more convenient movement throughout Sunnyvale.

Play 3.3: Increase zero-emission vehicles. Shifting to electric or alternatively fueled (e.g., hydrogen) vehicles has significant potential to reduce GHG emissions related to transportation. Since SVCE provides 100% carbon-free electricity, promoting a shift to electric vehicles away from fossil fuels would significantly reduce emissions. Other priorities include electrification of public transportation, car sharing, and electric bikes and scooters, and also improving availability of alternative fueling stations (e.g., EV charging facilities, hydrogen fueling stations). Currently (as of October 1, 2018) 2.4% of vehicles registered in Sunnyvale are battery-electric vehicles and 1.3% are plug-in hybrid electric vehicles.[3]

Strategy 4:
Managing Resources Sustainably

Path to 2050

Emissions from waste sent to landfills, transporting water and treating wastewater make up about 7% of total community-wide GHG emissions in Sunnyvale. The City will continue to find alternative methods to divert 90% of its waste away from landfills by 2030, in alignment with the Zero Waste Strategic Plan.

Although emissions from solid waste make up a small portion of Sunnyvale's GHG footprint, the conventional methodology only accounts for emissions released from organic material decomposing in landfills. Substantially more emissions are generated during the production and shipping of goods (furniture, food, cars, etc.) that are eventually used in Sunnyvale. Therefore, emissions associated with goods purchased and food consumed, called embedded emissions, are often dramatically underestimated. As a result, conserving these valuable resources still remains a top priority for the City. Additionally, finding innovative ways to decrease the embedded emissions in food that Sunnyvale residents consume and to capture carbon in our trees and soil can help make our community more sustainable.

Plays for the Win

Play 4.1: Achieve Zero Waste goals for solid waste.
Diverting waste away from landfills, either to recycling, energy recovery or composting facilities, is critical for the City to realize its Zero Waste goals as outlined in its Zero Waste Strategic Plan. This can be accomplished by waste prevention – consuming and throwing away less – and being smarter about the items that must be thrown away. Expanding Sunnyvale's food scraps collection program (FoodCycle) will help to increase the amount of organic material diverted away from the landfill.

However, state laws and policies limit access to diversion technologies so that 75% diversion is the current limit. Increasing diversion to 90% will require changes at the state level to allow use of technologies that recover energy from unrecyclable resident waste, primarily plastic and paper.

	Targets	
Play 4.1: Achieve Zero Waste goals for solid waste	2030:	Reduce landfilled garbage to 1 lb per person per day
	2050:	Reduce landfilled garbage to 1 lb per person per day
Play 4.2: Ensure resilience of water supply	Targets will be determined as per state requirement	
Play 4.3: Enhance natural carbon sequestration capacity	Supports broader net carbon reductions	
Play 4.4: Promote sustainable food choices	Supports broader emissions reduction	

Play 4.2: Ensure resilience of water supply.
As the region faces water supply challenges driven by recurring droughts and population growth, it will be critical to find ways to reduce the amount of water consumed and increase the sustainability of water supplies. Water conservation and water reuse, in the form of recycled and purified water, will help Sunnyvale reduce the stress placed on Northern California's water resources.

Play 4.3: Enhance natural carbon sequestration capacity.
The natural environment, including plants and soil, have an immense capacity to store carbon dioxide that would otherwise be released into the atmosphere. Through implementation of the City's Urban Forest Management Plan[4] and Green Stormwater Infrastructure Plan, Sunnyvale can continue to capture carbon by expanding its urban tree canopy and designing landscape features to address stormwater pollution and flood risk.

Play 4.4: Promote sustainable food choices.
The process of raising livestock, particularly methane emissions from cattle, are a major source of GHG emissions. Reducing consumption of carbon-intensive foods, such as meat or dairy, is a way for community members to directly lower their personal carbon footprints. Additionally, encouraging the production of food in local gardens can help reduce the emissions associated with transporting foods over long distances.

Strategy 5:
Empowering Our Community

Path to 2050

Addressing climate change requires action by all members of our community. The City of Sunnyvale recognizes its role in supporting and empowering individuals throughout Sunnyvale to realize a common vision of achieving our 80x50 target. Together with the diverse sectors of our community, the City will continue to build inclusive and innovative solutions to one of the most difficult challenges of our time.

Through the Playbook planning process, we sourced bold, breakthrough and practical ideas that would pave the way toward more engaged climate action across the community. The engagement process featured a large community workshop, where more than 160 people came together with enthusiastic contributions for the Playbook, and an online portal to collect ideas and encourage stakeholder feedback to hone the ideas. These ideas form the basis of this Playbook (see *Appendix A: Ideas Roster*) and we will continue to draw upon them in the years to come.

The Sunnyvale community has shown a strong commitment to climate action, and much remains to be done to accomplish our 80x50 end game.
More ongoing marketing, outreach and behavior change campaigns will be necessary to inspire an 80x50 lifestyle, leverage the benefits of new technologies and empower the people that want to help. Our Plays in this area are focused on sharing necessary information, resources and tools to enable residents and businesses to take continued climate action and build our community. These Plays support other Plays within the Playbook.

Plays for the Win

Play 5.1: Enhance community awareness and engagement.
The City is committed to collaborating with the community for immediate and effective climate action through outreach and engagement programs. The City will provide tools, education, and resources (e.g., programs) to enable residents, businesses, corporations, and other stakeholders to work towards mitigating emissions across the Strategies in this Playbook.

	Targets
Play 5.1: Enhance community awareness and engagement	Supports all Plays
Play 5.2: Track and share data and tools	Supports all Plays

Play 5.2: Track and share data and tools. The City will develop regular and effective data collection and communication tools to report progress on climate action. We will continue to partner with innovators in the community to maintain and enhance information and tools to keep our community informed.

Strategy 6:
Adapting to a Changing Climate

Path to 2050

Adaptation strategies enable local communities to limit damage and improve recovery from the effects of climate change. This is often referred to as "community resiliency." In our area, anticipated effects from climate change include rising sea levels, more extreme rain events, and more extreme heat events. Other effects may not occur locally but still affect our community, such as increased susceptibility to drought and increased occurrence and severity of wildfires.

Unlike Strategies 1 through 5 of the Playbook, adaptation strategies do not typically reduce greenhouse gas emissions. Rather, they are an essential complement to emissions reductions to provide a holistic response to climate change.

Adapting to a changing climate may be done effectively by:
- Reducing our exposure to climate stressors, such as sea-level rise, through effective management and improved infrastructure;
- Reducing sensitivity, or the reaction to climate stressors, which is greatest in sensitive populations, including minority or low-income groups, seniors, and children. This can be managed through improved local services to such populations; and
- Enhancing adaptive capacity or resilience, through better emergency preparedness, stronger social systems, and effective communication tools.

The City recognizes that adaptation requires a regional approach to ensure that proactive actions are implemented efficiently and do not have adverse impacts in other communities. For instance, sea-level rise may be addressed through a levee system in one city, which could have the unintended effect of diverting water to a neighboring, lower lying city. We need extensive collaboration and partnerships with neighboring cities, counties, regional agencies, corporations and businesses, and community groups to design, promote, and implement effective strategies that can benefit the Bay Area as a whole.

Play 6.1: Assess climate vulnerabilities for Sunnyvale
Play 6.2: Protect shoreline area from sea level rise and coastal flooding
Play 6.3: Strengthen community resiliency

Plays for the Win

Play 6.1: Assess climate vulnerabilities for Sunnyvale. The first step in addressing climate impacts is to assess our community's vulnerability to climate change. The City will continue to work with partners to develop tools and resources that enable a better understanding of the vulnerability of our social, environmental, economic, and physical resources to varied climate stressors.

Play 6.2: Protect shoreline area from sea level rise and coastal flooding. The City will continue to plan for and protect the shoreline area under its control against sea-level rise, working with Valley Water (formerly Santa Clara Valley Water District) and other regional partners to do so. Sunnyvale will explore the possible use of traditional levees as well as natural mitigation efforts to protect both its coastal infrastructure, including the City's Water Pollution Control Plant and closed landfill, as well as the natural and built land area along the Bay.

Play 6.3: Strengthen community resiliency. City departments will continue to collaborate with local volunteer and community groups to develop stronger social support systems to improve communication during emergencies and peer-to-peer education of preparedness and response. Pre-emptive rather than reactive strategies are needed to minimize exposure and improve resilience, particularly among the most vulnerable populations in Sunnyvale.

Photo credit: Alfred Leung

Game Plan 2022: Our Next Moves

Game Plan 2022: Our Next Moves

Focusing Our Efforts

Strategies and Plays are critical to guiding Sunnyvale towards our 80x50 end game. But what actions do we need to take today to ensure success tomorrow?

This chapter identifies "Next Moves," which are specific, tactical actions to execute in the next three years to ensure the right incentives, technologies and infrastructure are in place to set us up for success in the long-term. Each Move corresponds to a specific Play and Strategy.

The Moves in Game Plan 2022 are not intended to achieve the 2030 targets, but rather to help catapult action and progress towards those targets. The Moves will be updated in alignment with department work plans every five years thereafter, to ensure that climate action priorities are consistently and continually woven throughout City operations.

Moves consist of one or more of the following types of actions:

- Researching the viability of new ideas;

- Implementing and expanding existing plans or programs; and

- Building partnerships with external entities to achieve common goals.

A detailed description of the Next Moves in Game Plan 2022 are provided in the pages that follow. A summary view of the Next Moves is provided on page 34.

Determining Carbon Savings Potential

The Next Moves were prioritized from our list of community ideas (see *Appendix A: Ideas Roster*) based on carbon savings potential and co-benefits to the community. Implementation will be led by specific City departments, in collaboration with other City departments or appropriate external partners.

Each Next Move includes an assessment of its carbon savings potential, which is determined by the following two principles:

- **Maximum Carbon Savings Potential.** Each Next Move is evaluated by its maximum potential impact to reduce carbon emissions, regardless of specific levels of implementation in the current 3-year planning horizon. This approach is used to ensure that the implementation can be measured relative to the target for the associated Play. Therefore, the carbon reduction potential for Moves related to initial feasibility studies or planning activities is assessed assuming implementation of the activity.

  For example, for *Move 3.I: Develop a Community Electric Vehicle Readiness and Infrastructure Plan*, the carbon savings potential assumes implementation of a plan resulting in an electric vehicle adoption rate consistent with the measurable target associated with the Play (i.e., 20% of all vehicles are zero-emission by 2030). In the current 3-year time frame, the City will work with SVCE to develop the Plan itself for implementation in future years.

- **City-scale Carbon Savings Impact.** Each Next Move is assessed by its potential to reduce emissions at the local-scale. Such emissions are accounted for within the City's GHG inventory, in accordance with community-wide GHG inventory protocol boundaries. These emissions are currently tracked and will continue to be tracked on a regular cycle to assess CAP implementation progress and ensure Sunnyvale is on track to 80x50. Lifecycle- or consumption-based emissions are not accounted for.

  For example, for Move 4.G: Promote consumer awareness of low carbon foods, the carbon savings potential is low because emissions reductions from its implementation occur upstream and are not included in the City's GHG inventory. Only a consumption-based inventory, which evaluates the upstream impacts of all goods and services consumed by a community, would reflect the true carbon savings potential of such a move.

The carbon savings potential for the Next Moves is qualitatively described as follows:

Minimal potential
Uncertain impact. Move is primarily informational or educational (e.g., to develop support for other moves).

Some potential
Move affects a small subset of GHG emissions within a sector (e.g., municipal operations).

Significant potential
Move affects a large portion of GHG emissions within a sector (e.g., incentives, programs and services).

Maximum potential
Move affects GHG emissions in an entire sector (e.g., all buildings, VMTs, etc.).

Co-benefits
Each Move also provides co-benefits as follows:

Local Environmental Quality
Move improves air quality, water quality, and/or open space amenities.

Health & Livability
Move improves physical, mental and emotional health or wellbeing and quality of life for residents, employees, and visitors.

Community Savings
Move provides long-term savings for residents, businesses, or the City.

Partnerships
Move entails assistance from and coordination with partner organizations or agencies, such as SVCE and Valley Water.

City Departments

CDD	Community Development Department
DPW	Department of Public Works
ESD	Environmental Services Department
DPS	Department of Public Safety
FIN	Finance Department
OCM	Office of City Manager

Game Plan 2022 At-a-Glance

Strategy 1: Promoting Clean Electricity

1.A	Continue to support and steer Silicon Valley Clean Energy (SVCE) in providing clean power and decarbonization programs.
1.B	Collaborate with SVCE to target direct access customers to shift to 100% clean electricity.
1.C	Research a mandatory solar roof ordinance for new commercial developments.
1.D	Collaborate with SVCE to evaluate opportunities for energy storage to maximize utilization of local solar supply and to enhance resiliency.

Strategy 2: Decarbonizing Buildings

2.A	Research energy disclosure and energy benchmarking requirements for commercial and multi-family residential buildings to encourage property owners and managers to invest in energy efficiency upgrades and building information systems.
2.B	Advocate to regional providers of energy efficiency programs (such as Bay Area Regional Energy Network or BayREN, Silicon Valley Energy Watch or SVEW) that their offerings are more aggressively promoted to Sunnyvale residents and businesses.
2.C	Develop a program to accelerate the adoption of heat pump water heaters and space heaters.
2.D	Electrify municipal buildings upon rebuild or significant remodel, including the Civic Center.
2.E	Evaluate code and permitting processes to streamline building electrification.
2.F	Investigate the potential for implementing a differential Utility Use Tax that is at least revenue neutral, such that local taxes on electricity are lower than on natural gas, to incentivize electrification.
2.G	Continue to incentivize energy efficient and high performance buildings through the Green Building Program updates.

Strategy 3: Decarbonizing Transportation & Sustainable Land Use

3.A	Plan for additional housing, with the goal of diverse housing, to reduce long-distance commutes.
3.B	Identify areas that are most appropriate for parking strategies that discourage vehicle use, such as pricing, time limits and supply reductions.
3.C	Enhance City Transportation Demand Management (TDM) program implementation and monitoring to facilitate further reductions in single-occupant automobile trips, citywide.
3.D	Advocate that regional service providers implement high quality transit service and a robust set of first- and last-mile strategies in over two-thirds of the cross-city corridors.
3.E	Update and implement the Integrated Bicycle, Pedestrian and Safe Routes to School Plan to achieve a connected, safe and active network.
3.F	Pilot and evaluate shared bicycle and scooter programs.
3.G	Pilot shuttle service in Peery Park and consider options for expansion of a similar service in other areas undergoing redevelopment.
3.H	Develop design standards for streets and parking lots to accommodate increased pick-up and drop-off for rideshare passengers and apply as appropriate.
3.I	Monitor autonomous vehicle testing and deployment to inform proactive policy.
3.J	Develop a Community Electric Vehicle Readiness and Infrastructure Plan.
3.K	Promote and seek incentives for community adoption of electric vehicles.
3.L	Electrify Municipal Fleet as vehicles are replaced and continue to seek incentives for electric vehicles and charging infrastructure.

Game Plan 2022 At-a-Glance

Strategy 4: Managing Resources Sustainably

4.A	Implement and expand food scraps diversion programs to include additional businesses and multi-family residences.
4.B	Consider solid waste collection and processing improvements to increase waste diversion away from landfills as a part of service provider and facility transition planning.
4.C	Implement campaign for waste prevention.
4.D	Promote and seek incentives for making water conservation a way of life and set a water reduction target consistent with new statewide requirements.
4.E	Partner with Valley Water to evaluate opportunities to expand water reuse.
4.F	Implement the City's Urban Forest Management Plan and continue to protect and expand tree canopy.
4.G	Implement the City's Green Stormwater Infrastructure Plan.
4.H	Promote consumer awareness of sustainable food choices.
4.I	Work with large businesses to identify best practices for implementing local food gardens.

Strategy 5: Empowering Our Community

5.A	Pilot a targeted grassroots community engagement strategy (e.g., Cool Blocks Program) to create stronger connections between neighbors to advance climate action and emergency preparedness.
5.B	Evaluate opportunities for the City to provide online resources and tools for community and small business climate action (e.g., resource center for retrofit electrification, online tool or app to track individual carbon emissions).
5.C	Create a stronger social media and web presence for Sunnyvale climate action.
5.D	Implement the Sustainability Speaker Series.
5.E	Pilot and evaluate a program for youth engagement on climate, building on current engagement with school classrooms and green teams.
5.F	Build relationships with largest employers to collaborate on climate action, such as: (a) engaging employees to participate in sustainability initiatives; (b) encouraging and facilitating investment in climate action programs or projects.
5.G	Implement improvements for climate action data performance tracking and reporting progress to the public (e.g., community dashboard).
5.H	Publish annual greenhouse gas (GHG) inventory.

Strategy 6: Adapting to a Changing Climate

6.A	Review and summarize assessment products developed by the County's Silicon Valley 2.0 project and by the State.
6.B	Participate in regional forums on climate vulnerabilities.
6.C	Collaborate with Valley Water to advance a shoreline protection project with the US Army Corps of Engineers or other partners.
6.D	Identify shoreline protection solutions as part of Moffett Park Specific Plan update.
6.E	Updating existing emergency preparedness and response plans to address climate-related impacts such as heat events, air quality issues and flooding.
6.F	Develop a community resiliency plan.

Next Moves for Strategy 1: Promoting Clean Electricity

The City's Next Moves will focus on promoting programs to increase the adoption rate of 100% carbon-free and renewable electricity. In the Game Plan 2022, this Strategy will focus on collaboration with SVCE on expanding participation, continuing the shift towards 100% renewable electricity, and launching programs that support Sunnyvale's customers in decarbonizing their homes and businesses. Further, we will also work with our larger local companies to develop encourage commitments that direct access procurements focus on carbon free electricity.

Finally, as electric loads increase due to the electrification of transportation and buildings, the City will support distributed energy resources, such as rooftop solar (PV) combined with energy storage. Integrating electrified aspects of buildings, such as electric vehicle chargers, heat pump technologies, and PV will provide opportunities for faster, easier, and more cost-effective conversion away from fossil fuels. A cleaner, smarter electric grid will therefore enable implementation of Strategies 2 and 3, and will more rapidly catalyze movement towards our 80x50 end game.

Strategy 1:
Promoting Clean Electricity

Play 1.1: Promote 100% Clean Electricity

Move 1.A: Continue to support and steer Silicon Valley Clean Energy (SVCE) in providing clean power and decarbonization programs. With the launch of SVCE, Sunnyvale residents and businesses have access to clean electricity, sourced primarily from renewable sources. Further, as a part of its mission, SVCE is committed to supporting further actions and investments in its member communities to further reduce carbon emissions, particularly from energy use in buildings and from fuel consumption in vehicles. As a part of its adoption of a Decarbonization Strategy and Programs Roadmap[5] (December 2018), SVCE has pledged nearly $6.02 million to offering customer programs to promote decarbonization and energy efficiency improvements to the 13 cities in its service territory. As the municipality with the largest SVCE customer base, the City of Sunnyvale will advocate for programs that incentivize high-impact behaviors (such as installing electric heat pump water heaters) and are responsive to the needs of Sunnyvale residents and businesses.

Move 1.B: Collaborate with SVCE to target direct access customers to shift to 100% clean electricity. While most Sunnyvale residents and businesses have traditionally purchased electricity from an investor-owned utility, some large businesses have contracts to purchase electricity directly from Electric Service Providers. This allows these large businesses, that typically have high energy needs, to purchase electricity at lower prices. While some of these large companies have expressed a strong commitment to ensure significant portions of their electricity is generated from renewable sources, others purchase electricity generated from conventional sources, like coal, which generates GHG emissions. The City has limited opportunities to identify and encourage these companies, called "Direct Access" (DA) customers, to switch to cleaner sources of electricity.

With nearly 97% of residential customers opting in to clean electricity provided by Silicon Valley Clean Energy (SVCE), the electricity sourced to DA customers is now the largest source of electricity-related GHG emissions. With its status as Sunnyvale's clean electricity provider, SVCE and City staff can encourage DA customers to switch to SVCE's 100-percent carbon-free offering, or even opt up to 100-percent renewable electricity, which would substantially lower GHG emissions from electricity use in Sunnyvale.

Play 1.2: Increase Local Solar Photovoltaics

Move 1.C: Research a mandatory solar roof ordinance for new commercial developments. A local ordinance requiring solar installations on new commercial buildings leverages and complements the anticipated 2019 California Building Standards Code requirement of mandatory solar installations for all new residential buildings starting in 2020. Local solar installations would also help to comply with the anticipated requirement for all new non-residential buildings to be Zero Net Energy (ZNE) by 2030. By evaluating the feasibility of a local ordinance, the implementation rate of localized solar may be accelerated on all building types.

Play 1.3: Increase Distributed Electricity Storage

Move 1.D: Collaborate with SVCE to evaluate opportunities for energy storage to maximize utilization of local solar supply and to enhance resiliency. Energy storage plays a growing role in ensuring a resilient power grid, especially as dependence on renewable energy increases. Community-scale energy storage could maximize utilization of local solar supply, smooth out electricity supply and demand discrepancies and provide other benefits.

Strategy 1:
Promoting Clean Electricity

Play 1.1: Promote 100% clean electricity
TARGET:
- **2030: 100% participation in clean electricity**
- **2050: 100% participation in clean electricity**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
1.A	Continue to support and steer Silicon Valley Clean Energy (SVCE) in providing clean power and decarbonization programs.	ESD	CO_2 CO_2 CO_2 CO_2 tree heart $+ handshake	●	●	●
1.B	Collaborate with SVCE to target direct access customers to shift to 100% clean electricity.	ESD	CO_2 CO_2 CO_2 CO_2 tree heart $+ handshake	●	●	

Play 1.2: Increase local solar photovoltaics
TARGET:
- **2030: 3% of load from local solar**
- **2050: 5% of load from local solar**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
1.C	Research a mandatory solar roof ordinance for new commercial developments.	CDD	CO_2 CO_2 CO_2 CO_2 tree heart $+ handshake	●		

Play 1.3: Increase distributed electricity storage.
TARGET:
- **2030: 1% of electricity demand stored in batteries locally**
- **2050: 5% of electricity demand stored in batteries locally**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
1.D	Collaborate with SVCE to evaluate opportunities for energy storage and to maximize utilization of local solar supply and to enhance resiliency.	ESD	CO_2 CO_2 CO_2 CO_2 tree heart $+ handshake	●	●	●

CO_2 GHG Avoided   🌳 Local Environmental Quality   ❤ Health & Livability $+ Community Savings   🤝 Partnerships

Next Moves for Strategy 2: Decarbonizing Buildings

Buildings are long lasting infrastructure, and development occurring in Sunnyvale today will likely still be in use in 2050. As the City anticipates most of its land area will be developed by 2035, infrastructure put in place today will be critical in addressing both our 2030 and 2050 targets.

As such, the City's Next Moves focus on both new construction and existing buildings with programs and policies designed for the future climate and energy realities. This includes increasing building efficiency for extreme temperatures and scaling up adoption of technologies in buildings powered by clean electricity.

The City will focus on moves that emphasize and enhance energy conservation, establish policies or programs to support electrification, and facilitate adoption of new building decarbonization technologies for the largest uses, such as electric heat pumps for water and space heating.

Sunnyvale will continue to enhance and update its award-winning Green Building Program, using incentives and codes to achieve greater gains in efficiency and better building performance.

Strategy 2:
Decarbonizing Buildings

Play 2.1: Reduce energy consumption in existing buildings

Move 2.A: Research energy disclosure and energy benchmarking requirements for commercial and multi-family residential buildings to encourage property owners and managers to invest in energy efficiency upgrades and building information systems. Energy benchmarking collects data about a building's energy usage during a specific time period. With AB 802 (2015)[6], energy benchmarking is already required for large commercial and residential buildings above a certain square footage, but a local ordinance (e.g., City of San José's Energy and Water Building Performance Ordinance[7]; City of Berkeley's Building Energy Saving Ordinance[8]) would extend the requirement to smaller buildings. Energy benchmarking empowers commercial and multi-family residential building managers and property owners with meaningful data depicting energy consumption, allows comparison of energy usage among similar buildings, and helps the City potentially incentivize energy conservation by customizing programs that target areas of greatest need. Energy benchmarking also informs and motivates consumer demand for efficient buildings.

Move 2.B: Advocate to regional providers of energy efficiency programs (such as Bay Area Regional Energy Network or BayREN, Silicon Valley Energy Watch or SVEW) that their offerings are more aggressively promoted to Sunnyvale residents and businesses. Many existing regional energy efficiency programs are available to Sunnyvale residents and businesses through entities such as Bay Area Regional Energy Network (BayREN) and Silicon Valley Energy Watch (SVEW). Greater promotion of existing programs ensures that Sunnyvale residents and businesses are aware of and encouraged to take advantage of these opportunities for assistance to further decarbonize their buildings.

Play 2.2: Support electrification of existing buildings

Move 2.C: Develop a program to accelerate the adoption of heat pump water heaters and space heaters. Heating space and water in buildings is the single largest use of natural gas. Installing electric heat pump water heaters and space heaters is one of the most effective ways to transition away from natural gas towards clean electricity, as provided by SVCE. The technology has progressed for electric equivalents to be as economically competitive and capable of maintaining the same level of comfort as their conventional natural gas counterparts. Partnering with SVCE to teach the public about the benefits of heat pump water heaters and space heaters, while simultaneously offering incentives to conduct these upgrades, will accelerate adoption of heat pump technology.

Move 2.D: Electrify municipal buildings upon rebuild or significant remodel, including the Civic Center. Natural gas use is the largest source of GHG emissions in the building sector, now that SVCE provides clean electricity. Transitioning towards all-electric buildings far outweighs GHG reductions achieved through simply improving building efficiency. Thus, when feasible, existing buildings must transition to all-electric while simultaneously ensuring that newly-constructed buildings are all-electric to begin with. The City of Sunnyvale has an opportunity to lead the local all-electric movement when updating municipal buildings and facilities.

Play 2.3: Achieve all-electric new construction

Move 2.E: Evaluate code and permitting processes to streamline building electrification. All-electric building is increasing in popularity and feasibility and innovative building codes are important to facilitate this transition in building design. Sunnyvale will explore opportunities to accelerate and specifically incentivize all-electric new construction. The City will investigate the possibility of a reach code to encourage all-electric new construction in collaboration with SVCE and its other member agencies. Such collaboration can amplify the impact and simplify

implementation for project applicants with similar programs across jurisdictions.

Move 2.F: Investigate the potential for implementing a differential Utility Use Tax that is at least revenue neutral, such that local taxes on electricity are lower than on natural gas, to incentivize electrification. Utility User Taxes (UUTs) are fees leveraged by local jurisdictions to consumers of certain utility services. In Sunnyvale, the existing UUT charges a 2% rate on telephone, electricity, and natural gas use. A differential Utility User Tax where the rates on electricity are lower than on natural gas is a possible approach to incentivize all-electric buildings.

Move 2.G: Continue to incentivize energy efficient and high performance buildings through the Green Building Program updates. Sunnyvale's award-winning Green Building Program has successfully facilitated sustainable building design by offering compelling voluntary incentives for developers, allowing more units or increased square footage if the building sufficiently exceeds the California Building Code's minimum environmental requirements. Continuing to update the Green Building Program with more rigorous pathways to qualify for incentives will drive building developers to even further decarbonize to all-electric designs. This will increase the number of new buildings in Sunnyvale that eliminate GHG emissions, particularly since the buildings built today will continue to be in operation well beyond 2030.
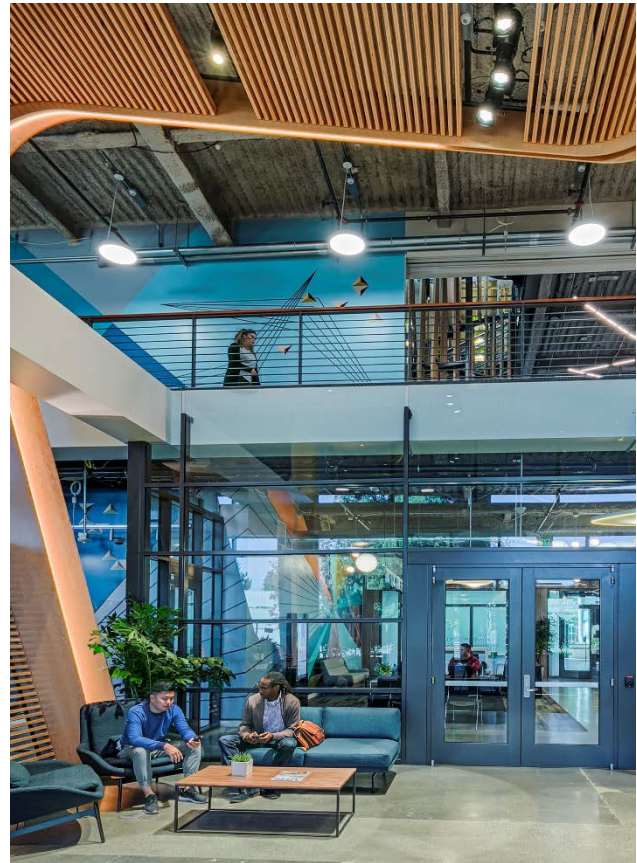
Strategy 2:
Decarbonizing Buildings

Play 2.1: Reduce energy consumption in existing buildings
TARGET:
- **2030: 5% of existing homes and businesses receive deep energy retrofit**
- **2050: 30% of existing homes and businesses receive deep energy retrofit**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
2.A	Research energy disclosure and energy benchmarking requirements for commercial and multi-family residential buildings to encourage property owners and managers to invest in energy efficiency upgrades and building information systems.	CDD	CO_2 CO_2 CO_2 CO_2 / Local Env. Quality, Health & Livability, $\$+$, Partnerships			●
2.B	Advocate to regional providers of energy efficiency programs (such as Bay Area Regional Energy Network or BayREN, Silicon Valley Energy Watch or SVEW) that their offerings are more aggressively promoted to Sunnyvale residents and businesses.	ESD	CO_2 CO_2 CO_2 CO_2 / Local Env. Quality, Health & Livability, $\$+$, Partnerships	●	●	●

Play 2.2: Support electrification of existing buildings
TARGET:
- **2030: 20% of homes and businesses completely electrified**
- **2050: 50% of homes and businesses completely electrified**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
2.C	Develop a program to accelerate the adoption of heat pump water heaters and space heaters.	ESD	CO_2 CO_2 CO_2 CO_2 / Local Env. Quality, Health & Livability, $\$+$, Partnerships	●	●	●
2.D	Electrify municipal buildings upon rebuild or significant remodel, including the Civic Center.	DPW	CO_2 CO_2 CO_2 CO_2 / Local Env. Quality, Health & Livability, $\$+$, Partnerships	●	●	●

CO_2 GHG Avoided	🌳 Local Environmental Quality	❤ Health & Livability	$\$+$ Community Savings	🤝 Partnerships

Strategy 2:
Decarbonizing Buildings

Play 2.3: Achieve all-electric new construction
TARGET:
- **2030: 100% all-electric new buildings**
- **2050: 100% all-electric new buildings**

	Next Moves	Lead	Impacts			FY20	FY21	FY22
2.E	Evaluate code and permitting processes to streamline building electrification.	CDD	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝					●
2.F	Investigate the potential for implementing a differential Utility Use Tax that is at least revenue neutral, such that local taxes on electricity are lower than on natural gas, to incentivize electrification.	FIN	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝				●	
2.G	Continue to incentivize energy efficient and high performance buildings through the Green Building Program updates.	CDD	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝					●

CO_2 GHG Avoided   🌳 Local Environmental Quality   ❤️ Health & Livability $+ Community Savings   🤝 Partnerships

Next Moves for Strategy 3: Decarbonizing Transportation & Sustainable Land Use
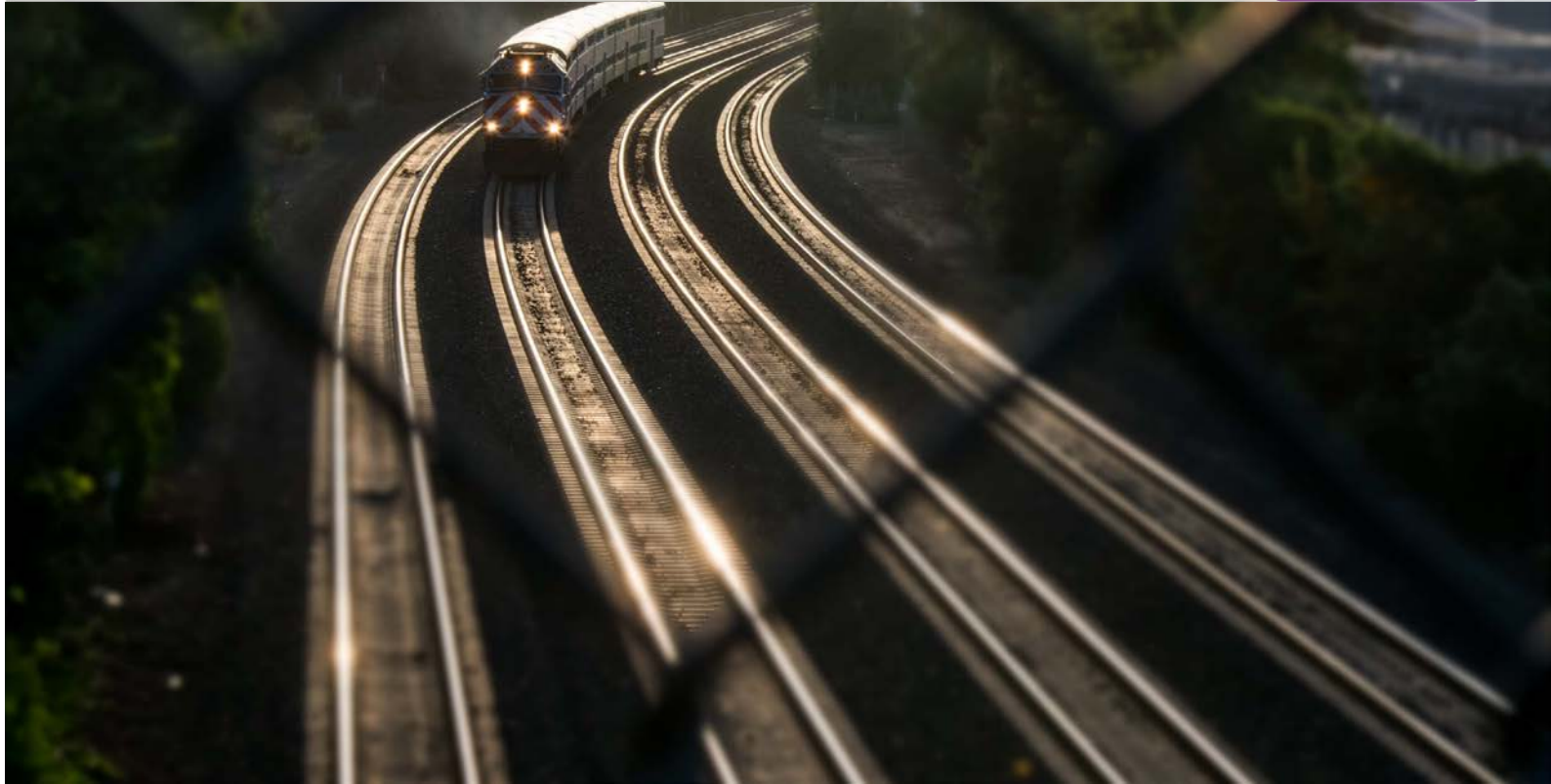
Our Next Moves are focused on setting Sunnyvale on the path to becoming a community that is less dependent on vehicles. This includes encouraging new development, including housing, in areas near transit and managing parking supply to support multi-modal transportation options that connect to regional systems and destinations.

To achieve a meaningful shift away from single-occupancy fossil-fueled vehicles, we need stronger partnerships with regional agencies and must continue to support increased funding for regional transit service providers to expand mobility options. Action in these areas can help simultaneously plan for transit-oriented land use while reducing vehicle miles traveled, and can thereby reduce carbon emissions. Locally, more first- and last-mile options (like bikeshare programs) are needed to encourage transit ridership. Additionally, the City will continue to improve and expand access to live and work spaces, retail, and services by focusing on balanced mixed uses in new or redevelopment areas.

Sunnyvale's current development, while serviced by existing public transit, still largely reflects a car-dependent lifestyle. Dramatic changes to driving habits and accelerated adoption of alternative fuel vehicles will need to work in tandem to achieve steep reductions in transportation emissions.

Strategy 3:
Decarbonizing Transportation & Sustainable Land Use

Play 3.1: Balance Land Use Supply and Enhance Urban Form

Move 3.A: Plan for additional housing, with the goal of diverse housing, to reduce long-distance commutes. The high cost and shortage of housing across the Bay Area has led a rising number of commuters to live in more affordable areas in distant suburbs. The resulting hefty car commute to Silicon Valley employment centers contributes to worsening congestion. By increasing the availability of affordable housing in Sunnyvale, more workers may be able to live closer to their jobs, commute shorter distances or via alternative modes, and thereby lower GHG emissions.

Move 3.B: Identify areas that are most appropriate for parking strategies that discourage vehicle use, such as pricing, time limits and supply reductions. (E.g., goBerkeley[9], Downtown Redwood City[10]) In a car-dependent community, it is critical to promote alternative transportation while simultaneously disincentivizing single occupant car trips. Limiting parking is a common disincentive to decrease car trips and increase alternative trips, thereby lowering GHG emissions. This Move will inform appropriate types and locations of parking options to limit and optimize parking opportunities while ensuring that, when implemented, they do not create unintended disruptions.

Play 3.2: Increase Transportation Options and Support Shared Mobility

Move 3.C: Enhance City Transportation Demand Management (TDM) program implementation and monitoring to facilitate further reductions in single-occupant automobile trips, citywide. A significant part of Sunnyvale traffic comes from long-distance commuters. Transportation Demand Management (TDM) describes the holistic approach by which workplaces encourage their employees to commute via alternative means, counterbalancing the default inclination to drive. Existing TDM programs in Sunnyvale have mixed results. Better monitoring is needed to understand the effectiveness of current TDM programs, to monitor compliance and enforce TDM requirements, to implement regular data collection procedures, and to

use data in developing new TDM programs for residential and business developments.

Move 3.D: Advocate that regional service providers implement high quality transit service and a robust set of first- and last-mile strategies in over two-thirds of the cross-city corridors. Improved frequency, route offerings and quality of local public transportation is expected to increase ridership and reduce the number of cars on the road. Public transit will seem more attractive and viable in conjunction with first- and last-mile options that help residents and employees travel to and from transit stops. Though the City does not directly control public transportation offerings within City limits, the City can advocate to agencies like VTA and Caltrans for improved service. Further, the City can augment alternatives for first- and last-mile mobility.

Move 3.E: Update and implement the Integrated Bicycle, Pedestrian and Safe Routes to School Plan to achieve a connected, safe and active network. Transitioning away from car dependency requires easy and safe travel via other modes such as walking and biking. Thus, improving the existing bicycle and pedestrian network will make walking and biking to work, school, and other local destinations more palatable and lower VMT and GHG emissions. A complete bicycle and pedestrian network will also assist with first/last mile and TDM efforts.

Move 3.F: Pilot and evaluate shared bicycle and scooter programs. Increased access to bicycles and scooters without having to purchase, maintain or store them may increase the likelihood of residents not using a car for short trips. Bicycle and scooter shares additionally help remedy first- and last-mile challenges. This pilot will inform the feasibility of a bike or scooter share program in select areas of Sunnyvale.

Move 3.G: Pilot shuttle service in Peery Park and consider options for expansion of a similar service in other areas undergoing redevelopment. Shuttle service in frequently visited and/or major employment areas will supplement and extend the reach of existing public transportation offerings. The shuttle(s) would allow more commuters and travelers to get around Sunnyvale without a car, thereby reducing VMT and GHG emissions.

Move 3.H: Develop design standards for streets and parking lots to accommodate increased pick-up and drop-off for rideshare passengers and apply as appropriate. As transportation network companies (TNCs), like Uber and Lyft, continue to become more prevalent, they will continue to impact traffic and safety at pick-up and drop-off points. Accommodating the needs of TNCs in the streetscape will minimize disruptions and increase the ease of using these services. Although increased use of TNCs does not directly lower GHG emissions or vehicle miles traveled (VMT), TNCs may provide services that make car-free or car-light lifestyles more viable. Further, as TNCs electrify their fleets, GHG emissions would continue to decrease.

Move 3.I: Monitor autonomous vehicle testing and deployment to inform proactive policy. When autonomous vehicles enter the mainstream market, they could dramatically alter the existing transportation landscape. Keeping track of new developments and proactively formulating policy will ensure that such a transportation transition will happen smoothly.

Play 3.3: Increase Zero-Emission Vehicles

Move 3.J – Develop a Community Electric Vehicle Readiness and Infrastructure Plan. (E.g., City of Santa Monica's Electric Vehicle Action Plan, 2017[11])
As electric vehicles (EVs) make up a greater proportion of cars on Sunnyvale streets, so too will demand rise for charging stations and electricity from the grid. To support the transition to EVs, the City of Sunnyvale must prepare and plan for infrastructure accordingly. Developing this Plan will help define the specific changes that are most needed from an infrastructure readiness and from permitting processes and incentives perspectives. In partnership with SVCE, the City will develop a Plan to accelerate our transition to an EV-ready community.

Move 3.K: Promote and seek incentives for community adoption of electric vehicles. Electric vehicles (EVs) charged at residential, office or public locations in Sunnyvale run on carbon-free electricity, which drastically lowers transportation-related emissions. The City will work with community groups to create an EV awareness and education program, such as Acterra's proposed "Sunnyvale Goes EV! Program" to accelerate EV adoption. Such a program would include activities such as EV ride-and-drive events and workshops to educate prospective buyers on benefits, convenience, and incentives.

Move 3.L: Electrify Municipal Fleet as vehicles are replaced and continue to seek incentives for electric vehicles and charging infrastructure. The City of Sunnyvale has an opportunity to be a local leader in transportation decarbonization by updating its municipal fleet to electric vehicles (EVs). The City is committed to electrifying its vehicle fleet as old fleet vehicles are phased out, where a suitable EV replacement is available Based on the current replacement schedule, the target is to add 16 EVs by 2022. The City will partner with SVCE to obtain funding and technical support for enhancing public EV chargers throughout the city. In addition, the City will leverage resources and information from sustainability networks, such as Climate Mayors EV Purchasing Collaborative[12], to continue fleet electrification. The City will also monitor future potential for EVs to replace more specialized fleet vehicles, such as trash trucks or police cars.

Strategy 3:
Decarbonizing Transportation & Sustainable Land Use

Play 3.1: Balance land use supply and enhance urban form
TARGET:
- **2030: 13% reduction in vehicle miles per person**
- **2050: 25% reduction in vehicle miles per person**

	Next Moves	Lead	Benefits	FY20	FY21	FY22
3.A	Plan for additional housing, with the goal of diverse housing, to reduce long-distance commutes.	CDD		●	●	●
3.B	Identify areas that are most appropriate for parking strategies that discourage vehicle use, such as pricing, time limits and supply reductions.	CDD DPW				●

Play 3.2: Increase transportation options and support shared mobility
TARGET:
- **2030: 13% reduction in vehicle miles per person**
- **2050: 25% reduction in vehicle miles per person**

	Next Moves	Lead	Benefits	FY20	FY21	FY22
3.C	Enhance City Transportation Demand Management (TDM) program implementation and monitoring to facilitate further reductions in single-occupant automobile trips, citywide.	DPW		●	●	●
3.D	Advocate that regional service providers implement high quality transit service and a robust set of first- and last-mile strategies in over two-thirds of the cross-city corridors.	DPW		●		
3.E	Update and implement the Integrated Bicycle, Pedestrian and Safe Routes to School Plan to achieve a connected, safe and active network.	DPW		●	●	●
3.F	Pilot and evaluate shared bicycle and scooter programs.	DPW		●		
3.G	Pilot shuttle service in Peery Park and consider options for expansion of a similar service in other areas undergoing redevelopment.	CDD		●	●	●
3.H	Develop design standards for streets and parking lots to accommodate increased pick-up and drop-off for rideshare passengers and apply as appropriate.	DPW, CDD				●
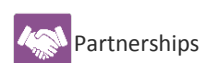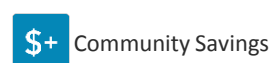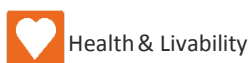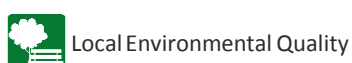
CO_2 GHG Avoided   🌳 Local Environmental Quality   ❤️ Health & Livability $+ Community Savings   🤝 Partnerships

Strategy 3:
Decarbonizing Transportation & Sustainable Land Use

Play 3.2: Increase transportation options and support shared mobility
TARGET:
- **2030: 13% reduction in vehicle miles per person**
- **2050: 25% reduction in vehicle miles per person**

	Next Moves	Lead	Benefits	FY20	FY21	FY22
3.I	Monitor autonomous vehicle testing and deployment to inform proactive policy	DPW	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝	●		

Play 3.3: Increase zero-emission vehicles
TARGET:
- **2030: 20% of all vehicles on road are zero-emission vehicles**
- **2050: 75% of all vehicles on road are zero-emission vehicles**

	Next Moves	Lead	Benefits	FY20	FY21	FY22
3.J	Develop a Community Electric Vehicle Readiness and Infrastructure Plan.	DPW	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝	●	●	
3.K	Promote and seek incentives for community adoption of electric vehicles.	ESD	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝	●	●	●
3.L	Electrify Municipal Fleet as vehicles are replaced and continue to seek incentives for electric vehicles and charging infrastructure.	DPW	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝	●	●	●

CO_2 GHG Avoided   🌳 Local Environmental Quality   ❤️ Health & Livability $+ Community Savings   🤝 Partnerships

Next Moves for Strategy 4: Managing Resources Sustainably

Photo credit: Emmanuel Piuze

Reducing landfilled waste, using water efficiently, capturing carbon in the natural environment and lowering the emissions intensity of food consumed are all essential to Sunnyvale becoming a sustainability leader. The City's Next Moves will focus on expanding and improving waste diversion services, adopting water conservation as a way of life, expanding natural landscape areas in the community, and promoting the importance of sustainable food choices.

Implementation of the City's Urban Forest Management Plan will not only help to sequester carbon, but will also result in a more robust urban tree canopy that can alleviate the urban heat island effect.

Strategy 4:
Managing Resources Sustainably

Play 4.1: Achieve Zero Waste Goals for Solid Waste

Move 4.A: Implement and expand food scraps diversion programs to include additional businesses and multi-family residences. Currently, food scraps are only collected from single-family residences, schools, and larger businesses in Sunnyvale. With food scraps as the largest component of Sunnyvale garbage, expanding food scraps collection to additional businesses and multi-family residents will further reduce food waste going to the landfill and associated GHG emissions.

Move 4.B: Consider solid waste collection and processing improvements to increase waste diversion away from landfills as a part of service provider and facility transition planning. In addition to Sunnyvale residents and businesses reducing their waste, there may be opportunities to increase waste diversion away from landfills by modifying waste collection and processing practices. Additionally, as processing facilities (e.g., SMaRT Station®) are slated for renovation or replacement, more efficient technology or practices may be employed to improve waste diversion.

Move 4.C: Implement campaigns for waste prevention. Consumer goods require energy to be manufactured, packaged, and transported from where they are produced to where they are consumed. These upstream consumption-based emissions are typically not represented in the standard communitywide GHG inventory. When less waste is generated and sent to the landfill, fewer GHG emissions are released. This campaign to reduce the production of waste may include efforts to encourage the public to reduce waste generation, reuse or upcycle everyday items, spur producer responsibility for less packaging, advocate for legislative and regulatory actions at the local and regional level, and develop incentives and/or disincentives to guide particularly impactful consumer actions.

Play 4.2: Ensure Resilience of Water Supply

Move 4.D: Promote and seek incentives for making water conservation a way of life and set a water reduction target consistent with new statewide requirements. Given Sunnyvale's location in a drought-prone area with heavy reliance on drinking water sources outside the City's boundaries, water conservation needs to be a way of life. Reduced water use and wastewater production may reduce GHGs emitted during the extraction, purification, and distribution of water, in addition to ensuring the sustainability of our water supply for the future.

Move 4.E: Partner with Valley Water to evaluate opportunities to expand water reuse. Expanding the existing use of recycled water (e.g., to Apple Campus in Cupertino) and exploring opportunities for indirect and direct potable reuse of treated wastewater at a regional level are critical to long term water sustainability. Water reuse options provide a sustainable supply source and also have a lower carbon footprint than other alternative water supply options like desalination.

Play 4.3: Enhance Natural Carbon Sequestration Capacity

Move 4.F: Implement the City's Urban Forest Management Plan and continue to protect and expand tree canopy. Urban trees sequester carbon, provide shade that can lower heating- and cooling-related energy consumption in buildings, serve as green features that can reduce flooding, and provide an outlet to connect to nature in a city environment. Continuing to protect and expand the tree canopy by implementing the Urban Forest Management Plan[3] will improve both environmental quality and quality of life.

Move 4.G: Implement the City's Green Stormwater Infrastructure Plan. Stormwater runoff from an urban area like Sunnyvale contains trash, debris and pollutants that are carried into the Bay. Green infrastructure involves natural and physical treatments, such as permeable pavement, rain gardens and bioswales, that reduce and treat stormwater at its source. The City's Municipal Regional Stormwater Permit requires the City to develop and implement a

long-term Green Stormwater Infrastructure Plan to reduce watershed pollution. Beyond reducing water pollution and flood risk, many of the vegetative features also increase carbon sequestration, thereby reducing net carbon emissions.

Play 4.4: Promote Sustainable Food Choices

Move 4.H: Promote consumer awareness of low carbon foods. Our food habits have significant GHG emission consequences as food eaten in Sunnyvale may be produced through energy-intensive processing and may travel long distances to reach our tables. Educating the public and the local food industry about the benefits, environmental and otherwise, of eating food that is locally grown, organic and more plant-based may shift our collective food ethic. The City can lead by example by considering the carbon footprint of food served at City-sponsored events.

Move 4.I: Work with large businesses to identify best practices for implementing local food gardens. Large businesses with corporate cafeterias that serve food to thousands of employees everyday have an opportunity to make a big impact in their carbon footprint. The distance traveled by food served in our local communities has associated energy and transportation emissions. By cultivating a portion of the food served locally onsite at large businesses, such businesses can lower their corporate carbon emissions while also inspiring their workforce to consider low carbon foods. Though currently uncommon, a few businesses in Sunnyvale that are committed to innovative environmental stewardship are piloting local food gardens. The City will work with these businesses to identify, hone and share best practices to empower other businesses to follow suit.

Strategy 4:
Managing Resources Sustainably

Play 4.1: Achieve Zero Waste goals for solid waste
TARGET:
- **2030: Reduce landfilled garbage to 1 lb per person per day**
- **2050: Reduce landfilled garbage to 1 lb per person per day**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
4.A	Implement and expand food scraps diversion programs to include additional businesses and multi-family residences.	ESD		●	●	●
4.B	Consider solid waste collection and processing improvements to increase waste diversion away from landfills as a part of service provider and facility transition planning.	ESD		●	●	●
4.C	Implement campaigns for waste prevention.	ESD		●	●	●

Play 4.2: Ensure resilience of water supply
TARGET:
- **Targets will be determined as per state requirement**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
4.D	Promote and seek incentives for making water conservation a way of life and set a water reduction target consistent with new statewide requirements.	ESD		●	●	●
4.E	Partner with Valley Water to evaluate opportunities to expand water reuse.	ESD		●	●	●

CO_2 GHG Avoided　　Local Environmental Quality　　Health & Livability　　$+ Community Savings　　Partnerships

Strategy 4:
Managing Resources Sustainably

Play 4.3: Enhance natural carbon sequestration capacity
TARGET:
- **Supports broader net carbon reductions**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
4.F	Implement the City's Urban Forest Management Plan and continue to protect and expand tree canopy.	DPW	CO_2 🌳 ❤ $+ 🤝	●	●	●
4.G	Implement the City's Green Stormwater Infrastructure Plan.	ESD	CO_2 🌳 ❤ $+ 🤝	●	●	●

Play 4.4: Promote sustainable food choices
TARGET:
- **Supports broader emissions reductions**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
4.H	Promote consumer awareness of low carbon foods.	ESD	CO_2 ❤ $+			●
4.I	Work with large businesses to identify best practices for implementing local food gardens.	ESD OCM	CO_2 🌳 ❤ $+ 🤝		●	●

CO_2 GHG Avoided   🌳 Local Environmental Quality   ❤ Health & Livability $+ Community Savings   🤝 Partnerships

Next Moves for Strategy 5: Empowering Our Community

Achieving Sunnyvale's climate objectives will require active participation from the whole community including businesses, residents, community-based organizations and all city departments. The City will continue to empower the community with the necessary information, incentives and tools to advance climate action. Through partnership with our community organizations and diverse leaders, we can transform the buildings we live and work in, the way we get around and the way we consume goods and services. Effective engagement and outreach go hand-in-hand with progressive policies and programs that facilitate the decarbonization of our City. Our Next Moves focus on working with neighborhoods, home owners, corporations and their employees. The City will also harness the aspirational power of our youth to expand awareness to our next generation.

Strategy 5:
Empowering Our Community

Play 5.1: Enhance Community Awareness and Engagement

Move 5.A: Pilot a targeted grassroots community engagement strategy (e.g., Cool Blocks Program[13]) to create stronger connections between neighbors to advance climate action and emergency preparedness. This initiative aims to bring neighbors together at a very localized level to strengthen community, advance climate action and prepare for natural disasters. Participants in other Bay Area communities with this type of program cut their household carbon emissions by 30% on average. Neighbors learn about climate action behaviors together and collectively shape a local ethic of environmental conscientiousness and preparedness.

Move 5.B: Evaluate opportunities for the City to provide online resources and tools for community and small business climate action (e.g., resource center for retrofit electrification, online tool or app to track individual carbon emissions). There are online resources available to help residents and businesses reduce their carbon footprints, but finding the right information can be overwhelming. Curating an online resource center, tool, or app with user-friendly climate action resources will make it easier for community members to access and understand their carbon impact and to take actions to reduce it.

Move 5.C: Create a stronger social media and web presence for Sunnyvale climate action. Sunnyvale's website and social media channels are effective avenues to reach and communicate with many Sunnyvale residents. Discussing climate action on social media can educate and frequently remind followers in an approachable way about pro-environmental behavior. By expanding existing efforts, Sunnyvale's social media audience will grow, information will be updated more often and posts can be better catered to our audience with more interactive media like videos, polls and livestreams.

Move 5.D: Implement the Sustainability Speaker Series[14]. This event series brings renowned experts in sustainability research and policy development to share their ideas and innovations with our community. Implemented in partnership with the Sustainability Commission, each event fosters discussion, brings the community together and inspires individuals to take climate action into their own hands.

Move 5.E: Pilot and evaluate a program for youth engagement on climate, building on current engagement with school classrooms and green teams. Youth are among the most receptive populations to respond positively to calls for climate action and influence their households' environmental behaviors. Educating the next generation of our community to be sustainability advocates is important to continue climate action going forward. To build on current engagement with school classroom and green teams on environmental topics, this program will expand the conversation to climate action.

Move 5.F: Build relationships with largest employers to collaborate on climate action, such as: (a) engaging employees to participate in sustainability initiatives; (b) encouraging and facilitating investment in climate action programs or projects. Carbon emissions in the business sector can be reduced by changing employee behaviors, from turning off lights and computers at night to commuting to work via alternative modes. The City of Sunnyvale will partner with large employers to encourage employee participation in sustainability initiatives and to seek investment in climate action programs or projects with local benefits.

Play 5.2: Track and Share Data and Tools

Move 5.G: Implement improvements for climate action data performance tracking and reporting progress to the public (e.g., community dashboard). It is important to identify and share our climate action victories and accomplishments with the community. The City will develop a resource such as a community dashboard (e.g., City of Encinitas Climate Action Dashboard[15], City of Richmond Climate Action Open Data[16]) to track project progress, improve transparency, and make climate data available and digestible to the public. A list of metrics that will be tracked to monitor Playbook progress is available on page 102 of the Technical Appendix.

Move 5.H: Publish annual greenhouse gas (GHG) inventory. Updating our community about our local GHG emissions on an annual basis keeps the public informed, builds motivation to expand on current progress and conveys the City's commitment to climate action. Regular updates that parse out the GHG emissions associated with each sector also helps inform policy and programming decisions.

Play 5.1: Enhance community awareness and engagement
TARGET:
- **Supports all other Plays**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
5.A	Pilot a targeted grassroots community engagement strategy (e.g., Cool Blocks Program) to create stronger connections between neighbors to advance climate action and emergency preparedness.	ESD	GHG Avoided, Health & Livability, Community Savings, Partnerships	●	●	●
5.B	Evaluate opportunities for the City to provide online resources and tools for community and small business climate action (e.g., resource center for retrofit electrification, online tool or app to track individual carbon emissions).	ESD	GHG Avoided, Local Environmental Quality, Health & Livability, Community Savings, Partnerships	●	●	
5.C	Create a stronger social media and web presence for Sunnyvale climate action.	ESD OCM	GHG Avoided, Local Environmental Quality, Health & Livability, Community Savings, Partnerships	●	●	●
5.D	Implement the Sustainability Speaker Series.	ESD	GHG Avoided, Local Environmental Quality, Health & Livability, Partnerships	●	●	●
5.E	Pilot and evaluate a program for youth engagement on climate, building on current engagement with school classrooms and green teams.	ESD	GHG Avoided, Local Environmental Quality, Health & Livability, Partnerships		●	
5.F	Build relationships with largest employers to collaborate on climate action, such as: (a) engaging employees to participate in sustainability initiatives; (b) encouraging and facilitating investment in climate action programs or projects.	ESD OCM	GHG Avoided, Local Environmental Quality, Health & Livability, Community Savings, Partnerships	●	●	●

Play 5.2: Track and share data and tools
TARGET:
- **Supports all other Plays**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
5.G	Implement improvements for climate action data performance tracking and reporting progress to the public (e.g., community dashboard).	ESD	GHG Avoided, Community Savings, Partnerships	●	●	●
5.H	Publish annual greenhouse gas (GHG) inventory.	ESD	GHG Avoided, Community Savings, Partnerships	●	●	●

Legend:
- GHG Avoided
- Local Environmental Quality
- Health & Livability
- Community Savings
- Partnerships

Next Moves for Strategy 6: Adapting to a Changing Climate

Photo credit: Ryan Ferrin

As we continue to experience climate change impacts in the Bay Area and worldwide, Sunnyvale will take steps to better ensure our local community is both prepared for climate disasters and, more importantly, resilient to them.

Recognizing that climate adaptation cannot be addressed single-handedly by one local government, the City will focus on cultivating partnerships with regional entities that are addressing adaptation and on enhancing its participation in regional actions.

In addition, the City will focus on short-term preparedness measures our community can take to resist climate impacts, while simultaneously identifying key future vulnerabilities and strategies to address them in the coming years.

Play 6.1: Assess Climate Vulnerabilities for Sunnyvale

Move 6.A: Review and summarize assessment products developed by the County's Silicon Valley 2.0 project and by the State. In 2015, Santa Clara County brought Sunnyvale and other cities together to develop a Countywide vulnerability assessment tool to assess the potential impact of sea level rise on infrastructure and assets in the County, known as Silicon Valley 2.0. The City will continue to participate in this effort and other emerging efforts like it.

Move 6.B: Participate in regional forums on climate vulnerability and adaptation. Climate adaptation efforts necessitate regional discussion to ensure actions effectively and efficiently address risks and don't place adjacent communities in greater harm. Organized regional conversations on climate adaptation are emerging, such as Bay Area Climate Adaptation Network (BayCAN), and various projects facilitated by the Association of Bay Area Governments (ABAG), such as Silicon Valley 2.0. This Move positions the City to participate in these discussions, maintain partnerships with key entities leading adaptation efforts, and stay informed about latest climate adaptation innovations.

Play 6.2: Protect Shoreline Area from Sea Level Rise and Coastal Flooding

Move 6.C: Collaborate with Valley Water to advance a shoreline protection project with the US Army Corps of Engineers or other partners.
Valley Water (formerly Santa Clara Valley Water District) began the Shoreline Project in 2005, to provide sea level rise protection in Santa Clara County in partnership with the United States Army Corps of Engineers (USACE) and the State Coastal Conservancy (Conservancy). The first phase of the Shoreline Protection Project[17], located in north San Jose, has been progressing and recently received federal funding for design and construction. In parallel, Valley Water prepared a Preliminary Feasibility Study for the remaining shoreline areas, including those adjacent to Sunnyvale. This study was completed in March 2017, and USACE has received $500,000 in their FY 2019 work plan to continue the work to determine

the next phase for project implementation. Sunnyvale staff has remained engaged as a stakeholder in the project and will continue to participate to advocate for a project to protect Sunnyvale's shoreline.

Move 6.D – Identify shoreline protection solutions as part of Moffett Park Specific Plan[18] update. The Moffett Park Specific Plan was adopted in 2004 to provide direction on land use, infrastructure, and design in the northernmost portion of the City, which is mainly commercial and industrial. This part of the City is located right along the Bay and is vulnerable to sea level rise. The Moffett Park Specific Plan is currently being updated to include, among other things, considerations to address future sea level rise.

Play 6.3: Strengthen Community Resiliency

Move 6.E: Update existing emergency preparedness and response plans to address climate-related impacts such as heat events, air quality issues and flooding. While the City has emergency response plans for some events like fire or earthquake, there are no community-specific plans to address response to extreme weather events, which may increase in frequency and severity due to climate change. These include heat waves, intense rain storms, and flooding from sea level rise. This Move calls for cross-departmental collaboration to expand current community-oriented emergency preparedness plans to respond to such events, with particular attention to vulnerable populations during natural disasters.

Move 6.F: Develop a community resilience plan.
Climate resiliency means that residents and businesses have proactively prepared for extreme weather events such that they can withstand the duration and after-effects of the event. For the community to be more resilient to extreme heat, rain, and flooding events, the City will develop a community resilience plan to help even the most vulnerable populations be prepared to weather the storms of climate change.

Strategy 6:
Adapting to a Changing Climate

Play 6.1: Assess climate vulnerabilities for Sunnyvale
TARGET:
- **No quantifiable targets**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
6.A	Review and summarize assessment products developed by the County's Silicon Valley 2.0 project and by the State.	ESD	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝	●		
6.B	Participate in regional forums on climate vulnerability and adaptation.	ESD	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝	●	●	●

Play 6.2: Protect shoreline area from sea level rise and coastal flooding
TARGET
- **No quantifiable targets**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
6.C	Collaborate with Valley Water to advance a shoreline protection project with the US Army Corps of Engineers or other partners.	ESD	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝	●	●	●
6.D	Identify shoreline protection solutions as part of Moffett Park Specific Plan update.	CDD	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝	●	●	

Play 6.3: Strengthen community resiliency
TARGET
- **No quantifiable targets**

	Next Moves	Lead	Impacts	FY20	FY21	FY22
6.E	Update existing emergency preparedness and response plans to address climate-related impacts such as heat events, air quality issues and flooding.	DPS	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝		●	
6.F	Develop a community resiliency plan.	DPS	CO_2 CO_2 CO_2 CO_2 🌳 ❤️ $+ 🤝		●	●

CO_2 GHG Avoided   🌳 Local Environmental Quality   ❤️ Health & Livability $+ Community Savings   🤝 Partnerships

Future Work Planning & Resources

Future Work Planning & Resources

This Playbook provides an overarching, strategic framework for the City of Sunnyvale to achieve its end game of 80x50. The City envisions that the core elements of the Playbook – the Strategies and Plays – will not change as we progress towards our end game. The Strategies and Plays will continue to be the foundation for Sunnyvale's ambitious march down the field towards our long-term targets.

As we live in an age and place of abundant technological innovation, we acknowledge that there will be future technologies and creative innovations that we don't see today but that will drive drive our society in the decades to come. With uncertainty in our political climate, inevitable changes in the City as an organization, our evolving culture, and future policy changes from the state and federal governments, it is impractical to forecast the specific Moves to achieve all the strategies over a very long time-frame. Our detailed Next Moves, therefore, are deliberately intended to focus on a shorter time horizon so they can be meaningfully integrated into the business of the City and updated dynamically.

The implementation of this Playbook will occur in 5-year cycles. The first cycle is aimed for just three years to take advantage of the dynamic landscape for climate actions among local communities and to give greatest consideration to funding opportunities and partnerships. Subsequent cycles will be every five years. At the close of each cycle, the City will review progress on implementation of the Moves and on the future projections for community emissions in order to determine the best Next Moves for the subsequent cycle. New Moves will represent local conditions of the time, build on progress to date, and continue to advance assertively toward climate neutrality. An update on current emissions and on implementation progress of the current Moves will also be reported to the City Council, Sustainability Commission, and the community each year as part of a Playbook Scorecard.

The Next Moves chapter presented in this Playbook is our first short-term game plan that we're calling "Game Plan 2022." In order to align to the City's annual budget cycle, Game Plan 2022 addresses implementation through fiscal year 2021-22. An update to the emissions inventory, based on community performance through 2020, and a proposal for the next Game Plan will be

presented to the City Council in early 2022 to inform the budget cycle for the next implementation timeframe, commencing with fiscal year 2022-23.

For Game Plan 2022, staff has evaluated the resource impacts across City departments and identified resources needed for implementation.
Some of the next moves will be absorbed and integrated into existing departmental operating or projects budgets. Additional resources needed over the next three years total $1.39 million in one-time costs, which includes consultant services, temporary staffing, and infrastructure needs, and $1.47 million in ongoing costs (approximately $500,000 each year), which includes three additional staff positions and augmenting the City's ongoing budget for CAP implementation. Resources allocated to implementing the Climate Action Playbook will be refined and finalized as part of the annual process for budget development and approval by the City Council.

The City's strategy to finance the implementation of the current and future game plans will evolve over time. Strategies that the City may consider could include:

- Leveraging partnerships and collaborative projects, particularly through Silicon Valley Clean Energy
- Developing a differential utility use tax (UUT) to incentivize electrification
- Charging carbon impact fees for development projects
- User fees for selected activities and services
- Paid parking in selected locations
- Transportation impact fees

Game Plan 2022

- Game Plan 2022 implemented through fiscal year 2021-2022
- Annual Playbook Scorecard to report progress
- Game Plan 2027 proposed in early 2022

Terms and Acronyms

40x30	40% greenhouse gas reductions by 2030
80x50	80% greenhouse gas reductions by 2050; equivalent to "carbon neutral"
BAU	Business-as-usual
CAC	Community Advisory Committee
CAP	Climate action plan
CAP 1.0	Sunnyvale's Climate Action Plan (2014)
CAP 2.0	Initiative to Update Climate Action Plan 1.0; Playbook is the product of the CAP 2.0 Initiative
Carbon neutral	GHG emissions reduced by 80% from 1990 levels by 2050, with potential for remaining emissions to be addressed by carbon sequestration
DA	Direct Access
EV	Electric vehicle
EVCI	Electric vehicle charging infrastructure
GHG	Greenhouse gas
$MTCO_2e$	Metric tons of carbon dioxide equivalent
PV	Photovoltaic (solar energy)
SVCE	Silicon Valley Clean Energy
TNC	Transportation Network Company (e.g., Uber, Lyft)
VMT	Vehicle miles traveled

References

[1]City of Sunnyvale (2018). "Sunnyvale Bike Map." (https://sunnyvale.ca.gov/civicax/filebank/blobdload.aspx?BlobID=24003).

[2]Silicon Valley Clean Energy (2018). "Upgrade to GreenPrime." (https://www.svcleanenergy.org/greenprime/).

[3]California Department of Motor Vehicles (2018). "Fuel Type by City as of 10/1/2018." Retrieved May 31, 2019. (https://www.dmv.ca.gov/portal/wcm/connect/1949a1b2-be57-4024-a921-5eb00babea68/MotorVehicleFuelTypes_City_102018.pdf?MOD=AJPERES&CVID)

[4]City of Sunnyvale (2014). "City of Sunnyvale Urban Forest Management Plan." (https://sunnyvale.ca.gov/civicax/filebank/blobdload.aspx?blobid=25128).

[5]Silicon Valley Clean Energy (2018). "Decarbonization Strategy & Programs Roadmap." (https://www.svcleanenergy.org/wp-content/uploads/2018/12/Decarbonization-Strategy-Programs-Roadmap_Dec-2018.pdf).

[6]California Energy Commission (2018). "Building Energy Benchmarking Program." (https://www.energy.ca.gov/benchmarking/).

[7]City of San José (2018). "City of San José Adopts Building Performance Ordinance." (https://files.constantcontact.com/7a210436601/6c7ac067-bd80-48a2-a865-0204f5fd79b8.pdf).

[8]City of Berkeley (2018). "Building Energy Saving Ordinance (BESO)." (https://www.cityofberkeley.info/BESO/).

[9]City of Berkeley (2012). "goBerkeley." (http://www.goberkeley.info/about.php).

[10]City of Redwood City (2019). Downtown Parking (https://www.redwoodcity.org/departments/community-development-department/engineering-transportation/transportation-parking/downtown-parking).

[11]City of Santa Monica (2017). "Santa Monica Electric Vehicle Action Plan." (https://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Energy/EVAP_Final_Draft_WEB.pdf).

[12]Climate Mayors (2017). "Climate Mayors Electric Vehicle Purchasing Collaborative." (https://driveevfleets.org/).

[13]Cool Block (2019). "Cool Block." (https://coolblock.org/).

[14]City of Sunnyvale (2019). "Sustainability Speaker Series." (https://sunnyvale.ca.gov/people/sustainability/speaker.htm).

[15]City of Encinitas (2018). "Climate Action Dashboard." (https://www.encinitasenvironment.org/dashboard/).

[16]City of Richmond, California (2019). "City of Richmond Climate Action Plan Open Data." (https://opendata.ci.richmond.ca.us/stories/s/hjje-nwzy).

[17]Valley Water (2019). "E7: San Francisco Bay Shoreline Protection*." (https://www.valleywater.org/project-updates/creek-river-projects/san-francisco-bay-shoreline-protection).

[18]City of Sunnyvale (2013). "City of Sunnyvale Moffett Park Specific Plan." (https://sunnyvale.ca.gov/civicax/filebank/blobdload.aspx?blobid=22831).

All resources retrieved March 6, 2019 unless otherwise indicated.

Acknowledgements

City of Sunnyvale
456 West Olive Avenue, Sunnyvale, CA 94086
green@sunnyvale.ca.gov
408-730-7717

Appendix A: Ideas Roster

Ideas Roster

The CAP 2.0 Framework draws on more than 240 ideas, the majority of which were sourced from our community through the OpenIDEO on-line challenge and the large in-person community workshop. Ideas also originated from City staff, leading City best practices, as well as CAP 1.0 actions that were identified for ongoing implementation. This appendix contains the complete list of ideas evaluated for the Climate Action Playbook. Each idea is identified by a randomly assigned, unique Idea ID#. The Next Moves (presented in Game Plan 2022: Our Next Moves) were developed by staff drawing inspiration from chosen elements of these ideas, and based on their feasibility, cost, and alignment with the City's overall goals and departmental programmatic priorities. The Next Move ID# is indicated where selected ideas from this list contributed to the development of the Next Moves for implementation by year 2020.

Strategy 1: Promoting Clean Energy		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
1	Continue to support and steer Silicon Valley Clean Energy (Sunnyvale's community choice energy provider) in providing clean power for Sunnyvale's residents and businesses.	1.A
2	Target direct access shift to 100% RE	1.B
3	Solar roofs: We need to require developers to install solar panels on all new office buildings, just like San Francisco, Santa Monica and Lancaster.	1.C
4	Require solar for new construction	1.C
5	Incentivize local solar, efficiency, and storage	1.C, 1.D
6	Partner with SVCE to boost 100% RE participation	
7	Pilot new technologies (e.g., microgrids)	
8	Improve the Electric Power Mix	

Strategy 2: Decarbonizing Buildings		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
9	Benchmarking Requirement: Require commercial properties to benchmark their energy consumption annually and require energy audits every five year with implementation.	2.A
10	Energy Benchmarking and Retrofit Policy/Programs for Energy Benchmarking: Characterize building stock and analyze feasibility for various energy efficiency programs per building type. Draft Energy Benchmarking Ordinance to improve overall system performance in the existing building stock and contribute to city-wide energy use reductions. Include stakeholder outreach, trades training and education, and prepare financing and incentive options. Establish energy score program and performance standards. Public awareness campaign and incentives for building performance.	2.A
11	Establish a residential energy conservation program that encourages or incentivizes homeowners to perform energy and water audits, with an emphasis on leveraging homeowner decision-making during home sale, purchase, and remodel.	2.B

Strategy 2: Decarbonizing Buildings		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
12	Outreach and Incentives for Electrification program (Heat pump water and space heaters): Build atop city's free energy audit program: launch a Score card program for single-family residents to track and reduce energy use; and include electrification incentives and options at time of audit. STAFF NOTE: City does not currently offer a free energy audit program. An online energy audit program (Green@Home) was offered for 12 months between 2017-2018.	2.C
13	Pay for the Panel Program: Remove financial obstacles for the adoption of clean energy technologies.	2.C
14	Kick Out Carbon: Develop and Publicize electrification Incentives.	2.C
15	ZNE + All-Electric Incentives and Recognition program: While ZNE is mandatory for new construction in 2020, existing building stock will also need to be addressed to achieve GHG goals. incentivize and tell the success stories.	2.C
16	Municipal facility leadership by example: Upgrade muni. facilities as ZNE demonstration projects using win-win financing strategy.	2.D
17	Improve permit process and ordinance requirements: Maximize GHG reductions and coordinate improvement of permit process in accordance with new ordinance requirements such as Green Building Program Update or others. For example, expand the streamlined solar permitting process to include all rooftop solar project in the city (residential multi-family, commercial and industrial).	2.E, 2.G
18	No New Fossil Infrastructure: City would not purchase new capital eqpt., permit new comm. or res. development, or implement infrastructure that directly uses fossil fuels.	2.E
19	Differential Utility Tax Rate: Work with other cities and PG&E to enable Sunnyvale to implement a lower Utility User Tax on electricity and to raise the tax on natural gas.	2.F
20	Evaluate and update the 2009 Zoning Code for Green Buildings for single-family, multi-family, and non-residential building construction and major remodels every three to five years.	2.G
21	Connect businesses and residents with rebate programs that give priority to appliances with smart grid technology.	
22	Sunnyvale residents can get paid to save energy: OhmConnect is a free service in Sunnyvale that rewards you for saving energy when it matters most to the grid and the environment.	
23	Identify businesses that are likely to be the largest consumers of energy within the city and target City outreach to these businesses.	
24	Home Smart Track: A piece of hardware that monitors a user's energy usage for smarter consumption through visualization of aggregated user data.	
25	Home Energy Clock: A display, like a clock on the kitchen wall, that shows real time use of electricity, gas and water in kw, therms and cft plus dollars.	
26	Free energy audit for home and building owners: Building and home owners will be offered free-of-charge energy audit to identify best efficiency opportunities.	
27	Incentive-based policy for carbon capture and sequestration in building materials: Sunnyvale should create an incentive-based approach to encouraging construction using building materials that sequester carbon.	

	Strategy 2: Decarbonizing Buildings	
Idea ID #	Idea Description	Next Move(s) ID#
28	Eco Housing: Convert the Sunken Garden golf course into a farm and eco housing condos.	
29	GHG>15%! Replace risky, toxic, inefficient (10%Eff!) Fireplaces and BBQ with 80%Eff. NG sealed-safe FP-Inserts & 90%Eff. hot water heaters.: GHG>15% Replace smoggy 10%Efficient Fireplaces & BBQs with 80%E NG(Without Solar-PVC) fireplace Inserts and >90%E hot water heaters.	
30	Reducing Air Conditioner Use in Sunnyvale.: This proposal will consider strategies to reduce air conditioner use in existing buildings and new construction in Sunnyvale, including tree planting and shading of buildings.	
31	One Stop Trusted Energy Shop: City energy consultants for residents and businesses for one on one help on implementation of solutions	
32	Turn Lights Off: I turn my lights off as I use them, maybe the many office buildings who leave their lights on 24/7 could do the same.	
33	Green Certification for businesses in Sunnyvale: Businesses can receive certifications that they are conserving energy to provide them incentives to do so.	
34	Green lease program: City provides recognition program for commercial developers or building managers who offer green leases. Green leases allow developers/property managers to invest in energy efficiency features and pass on a portion of the cost to the tenants. Tenants, in turn, pay for the energy use and are motivated to save energy.	
35	Revenue Neutral Carbon Tax on Natural Gas: Add carbon tax per therm to every SV user of Natural Gas which is used to provide rebates for switching to electric for space heating, etc.	
36	Streamline Permitting for Carbon Neutral Building: Accelerate the update of carbon-neutral building.	
37	Solar Hot Water: Make free non Co2 energy from the Sun.	
38	Fast install solar: Modular, possibly prefabricated, standardized approach to solar installation.	
39	Tours and Demos of Decarbonized homes/businesses: Once a year set a day where folks can tour homes + businesses that have innovated in reducing energy use & promoted low or no carbon tech.	
40	ZNE New Construction Policy: Enforce compliance with ZNE New Residential Construction goals of 15% above Title 24 standards for single-family residences and 10% above for high-rise properties with accompanying solar mandates. Incentivize and recognize commercial ZNE.	
41	Updated Green Building Code and Developer's Carbon Impact Fee: Utilize city's Green Building Code & impose Carbon Impact fee to encourage green building feat. that go beyond state's standards.	
42	Require all new and resurfaced parking lots, sidewalks, and crosswalks to be made of materials with high reflectivity, such as concrete or reflective aggregate in paving materials.	
43	Commit to using a warm aggregate mix for all asphalt patching, overlay, and reconstruction.	
44	Adoption of CALGreen Tier 1 or Tier 2 reach codes	

Strategy 3: Decarbonizing Transportation & Sustainable Land Use		
Idea ID #	Idea Description	Next Move(s) ID#
45	Promote Medium Density Housing Options in Existing Neighborhoods to Help Reduce Vehicle Miles Traveled: Enact policies to promote infill develpmnt @ modestly higher dens. than existing neighborhoods, house more people in SV to reduce VMT.	3.A
46	Facilitate the development of affordable housing near transit.	3.A
47	Sunnyvale Employees live here: Sunnyvale Employees become residents to reduce mobile traffic. This will also maximize their community involvement and cohesion.	3.A
48	Reform Residential Minimum Parking Requirements to Reduce VMT by Allowing More People to Live in Sunnyvale Near Jobs: Update Municipal Code to relax reqs. for dwellings to provide min. number of parking spaces, to support car-light lifestyles & reduce VMT.	3.B
49	Create maximum parking requirements and reduce minimum parking requirements for mixed-use development. Require parking lot sharing for mixed-use or commercial development with complementary hours of operation	3.B
50	Support car light lifestyles with limited parking supply lower vehicle ownership. Actively manage parking supply with parking pricing and unbundled parking	3.B
51	Let's get serious about Transportation Demand Management & Fair Value Commuting: Reduce SOV trips in commuting by strengthening TDM policies, "carrot/stick" commute clubs & community shuttles.	3.C
52	Transportation Demand Management strategies are implemented, mandated, enforced, and promoted actively, and used widely by everyone in Sunnyvale	3.C
53	Promote telecommuting to decrease solo drivers during commute time periods. Leverage technology to decrease need for driving and increase public/ride-sharing travel options	3.C
54	Require trip reduction programs in new residential, commercial, and mixed use development.	3.C
55	Require existing and future major employers to utilize a variety of transportation demand management (TDM) measures such as flexible work schedules, telecommuting, guaranteed rides home, low- or no-cost transit passes, parking "cash-out" incentives, and other programs that provide employees with alternatives to single-occupant commutes	3.C
56	Implement high quality transit service and a robust set of first/last mile strategies for at least two-thirds of the cross-city corridors	3.D
57	Advocate for transit service improvements by area transit providers consistent with established performance standards, with an emphasis on coordinating public transit schedules and connections and for subsidies for a higher level of transit service and/or more transit passes for residents and/or employees	3.D
58	Coordinate Connections to Mass Transit: Create a simple way for employers to coordinate getting employees to and from mass transit, to reduce car commutes to and from Sunnyvale.	3.D
59	Fully fund the City's bicycle and pedestrian improvement plans for completion by 2035.	3.E
60	Improve bicycle facilities and perceptions of comfort through pavement marking/coloring, physical separation specialized signs and markings, and other design elements	3.E

Strategy 3: Decarbonizing Transportation & Sustainable Land Use		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
61	Implement projects and programs to improve the safety of cyclists and pedestrians through increased enforcement of pedestrian right-of-way laws, removing crossing impediments, improving crossing time at signalized intersections for pedestrians and cyclists, requiring drive-through food establishments to serve bicyclists, and providing center refuge areas for pedestrians and bicyclists to pause when crossingarterials	3.E
62	Support the creation of walking school bus programs in coordination with schools and parent organizations.	3.E
63	Continue to implement a Safe Routes to School program for increased bicycle and pedestrian safety to and from schools	3.E
64	Improve pedestrian safety and comfort through design elements such as landscaped medians, pedestrian level amenities, sidewalk improvements, and compliance with Americans with Disabilities Act (ADA) design standards, particularly for areas serving high volumes of traffic	3.E
65	Complete and connect low stress bicycle network in Sunnyvale: Best way to get people out of cars is to create easily accessed bike lanes and separate routes in a comprehensive cross-city network.	3.E
66	Fully implement bicycle and pedestrian projects throughout Sunnyvale to achieve a connected safe active network	3.E
67	Dockless Bicycle System For Better Transit Access: Provide means for citizens to travel to transit stops using city sponsored dockless bicycle system, for boarding transit instead of driving.	3.F
68	Support business efforts to plan and implement a bike-sharing program for major commercial and industrial areas	3.F
69	E-shuttle (electric) bus to move staff and employees around City: A free shuttle bus that moved people to major work hubs like Moffet Park would cut down on vehicles moving in directions where public transportation modes currently don't exist. Providing free or cheap transportation, WIFI, bike racks and regularly scheduled buses could reduce some of the traffic impacts. A mobile app showing the bus schedule could be created as well.	3.G
70	Free or Reduced Cost Green Shuttle: A shuttle (electric) bus from specific locations (City Hall, downtown) to Moffett Park or other business heavyareas!	3.G
71	Design streets and parking lots to accommodate increased pick-up and drop-off passenger and commercial demand	3.H
72	Create separate facilities and/or road pricing or priority schemes for autonomous vehicles and/or HOV, or Paid ExpressLane	3.I
73	Determine if a cap on number of lanes or areas available to autonomous vehicles is appropriate	3.I
74	Sunnyvale Spice and Slice: Food festival and expo featuring locally grown food where Sunnyvale cooks and gardeners show off their skills and compete forfun.	3.I
75	Local food promotion	3.I
76	Rooftop gardens in Sunnyvale: We can plant rooftop gardens on some public or private buildings in Sunnyvale.	3.I

Strategy 3: Decarbonizing Transportation & Sustainable Land Use		
Idea ID #	Idea Description	Next Move(s) ID#
77	Support the conversion to a clean vehicle fleet with supporting infrastructure and incentives for individuals	3.J
78	Implement Policies to Accelerate EV Charging Infrastructure Installation Throughout Sunnyvale: Implement required strategies for accelerating EV Charging Infrastructure (EVCI) install. based on Palo Alto & related recommendations from PAEC.	3.J, 3.K
79	Secure funding to install electric vehicle recharging stations or other alternative fuel vehicle support infrastructure in existing public and private parking lots.	3.J
80	Sunnyvale Goes EV!: Educate and support Sunnyvale residents in the biggest action they can take to reduce their carbon emissions: driving electric!.	3.K
81	Sunnyvale EV mobility or Zero-Emission Fleet: Convert city vehicles to EV and install proper infrastructure.	3.L
82	Increase the number of efficient or alternatively fueled vehicles in the City fleet as vehicles are turned over	3.L
83	Solar on DPS covered parking and EVs/plug-in hybrid vehicles for DPS	3.L
84	Integrated housing at job centers: Require job centers (business parks, corporate campuses) to provide on-site housing for employees.	
85	Create walkable and bikeable neighborhoods with a diversity of services and entertainment options, and a diverse mix of residential and office development types.	
86	Require new development to reduce the need for external trips by providing useful services/facilities on-site such as an ATM, vehicle refueling, shopping	
87	Continue to plan for most new residential, commercial and industrial developments to be developed in specific plan areas, near transit, and close to employment and activity centers.	
88	Encourage the establishment and even distribution of neighborhood-serving facilities such as day care providers, banking/ATM locations, markets and drug stores in existing residential, commercial, and industrial areas in order to reduce the need for vehicle trips	
89	The Urban Village: Live without driving (except maybe work).	
90	Support on-demand ridesharing services that provide point-to-point access for all community members, especially the elderly, children, and the disabled	
91	Prepare for what is now parking to become available and design any future urban parking facility for eventual conversion	
92	High Density Housing near transit corridors to achieve housing and job parity by 2050: Sunnyvale adopts a high density housing near transit ordinance with a goal of achieving a one to one job / housing balance by 2050.	
93	Anti-Idling: My objective is to reduce the amount of GHG's and air pollution in Sunnyvale through reducing unnecessary vehicle idling.	
94	Achieve a jobs to housing ratio consistent with the regional average of less than 0.5 jobs per resident	
95	Continue to provide density and other zoning incentives or procedural or financial incentives to developments for establishment of alternative transportation infrastructure within the private as well as adjacent public right-of-way, such as increased bicycle parking, separated sidewalks, bike lanes and signage, and change and shower facilities	

Idea ID #	Idea Description	Next Move(s) ID#
	Strategy 3: Decarbonizing Transportation & Sustainable Land Use	
96	Ensure that every village core has opportunities for growing produce locally	
97	Retain a residential parking permit program for residential areas adjacent to commercial areas of the City where parking is in higher demand	
98	Designate street parking stalls in the vicinity of key commercial and multi-family residential locations for efficient or alternatively fueled vehicles.	
99	Increase signal coordination as warranted to facilitate traffic flow along arterials and major collectors	
100	Deploy intelligent transportation systems measures for managing traffic of large-scale construction projects and at major City and private events	
101	Support, streamline, and incentivize the retention and expansion of local anchor and growth industries.	
102	Long-term rental homes: Convert short-term (<6months) rentals and empty investment homes into affordable long-term housing without costly construction and GHG.	
103	Address numbers: Require address numbers be clearly visible and legible from the street.	
104	Sunnyvale Bicycle Highway: As part of the Western Channel redevelopment, build a continuous bicycle highway from the bay, through downtown, past El Camino.	
105	Flexible work schedules: More flexibility in work schedules to allow employees to lessen the burden and stress of commuting and reduce emissions from congestion.	
106	Lunch Delivery Service: City can have contract with restaurants and fast food places to deliver work day lunches based on preorders (made by individual staff on a daily basis) to different locations of the City offices. This will reduce the number of vehicles on road during lunch time. City can also solicit restaurants incentives for bulk order.	
107	48/96 DPS Fire Schedule: Implement a 48-96 work schedule consists of a 6-day rotation period where each platoon works two consecutive 24-hour shifts, followed by four days off. For any given day of the week, an employee would work that day two weeks in a row, then have the next 4 off. Creates 50% reduction in commuting for all Sunnyvale Fire Service personnel and the resulting economic and environmental benefits this would create.	
108	Implement Congestion Management pricing in business parks: Convince fewer people to drive solo by charging a fee for each personal automobile entering business parks.	
109	Encourage More Ridership by Helping Change Public Perception of Public Bus System by Merging VTA Bus System with Corporate Bus System: Bring together Santa Clara VTA, large businesses & institutions to create efficient, clean electrical bus transportation system.	
110	City Mobility Strategy: A mobility strategy for the city would identify in clear and easy to understand language, the variety and volume of major commute routes to and from the city. As one example if a sizeable portion of the city's work force commutes from the East Bay, what are the current and future alternatives for commuters to get to and from Sunnyvale. Does the city have a workable strategy to help relieve highway congestion to and from that area? If not, what alternatives can the city contemplate in cooperation with other cities in the region, as well as regional transportation agencies to identify and address current gaps.	

Strategy 3: Decarbonizing Transportation & Sustainable Land Use		
Idea ID #	Idea Description	Next Move(s) ID#
111	Encourage and subsidize shared mobility autonomous vehicles	
112	Car-free lifestyle & Mobility as a Service: Promote the benefits of a car-free lifestyle and support 'mobility as a service' for city residents and businesses.	
113	Create a TDM program for City staff to promote alternative transportation modes and carpooling to the greatest extent possible	
114	Continue sponsoring projects to provide transit rider amenities at bus stops and rail stations.	
115	Work with the Valley Transportation Authority and neighboring jurisdictions to provide transit priority signal timing in order to decrease travel time	
116	Encourage schools to link employees and guardians of students with an online system such as 511.org that provides carpool matching	
117	Require sidewalks to be a minimum of six feet wide in order to allow side by side walking at identified locations that currently serve high pedestrian traffic volumes, or locations planned to serve high pedestrian traffic.	
118	Require secure bicycle parking at public and large private events	
119	Increase awareness of the city's bicycle facilities by updating the city bicycle map to show locations of public and private bicycle parking, creating a web-based application for members of the public to identify locations of private parking, and establishing information kiosks at key city locations to provide maps and highlight alternative modes of transportation	
120	Improve bike lanes, bike racks, and bike security: Making bike lanes safer and providing better resources to people who bike will incentivize bike transportation.	
121	Modernize Residential streets' speed limits and parking to increase capacity, improve mobile safety and reduce GHG: Prohibit speeding and parking on bike path streets. Prohibit visually impairing vehicles' parking risks to cars, cyclists & pedestrians.	
122	Green light for bikes/Idaho stop: Create more bike corridors where cyclists (almost) never have to stop at intersections.	
123	Increase Green Mobile and shrink carbon footprint: New home/buildings donate permanent green space property to connect safe bike/pedestrian paths, remove GHG inefficient, same-size structures.	
124	Metrics for Non-car travel within Sunnyvale: Create data for non-car travel comparable to that currently maintained by the City for car-based travel.	
125	WayWatchers: Mobile application that tracks how people move around the city and gives points towards tokens for rewards.	
126	Creative Parking Permits for all Street Parking and Per Use Fees for Public Parking Facilities: Require parking permits for all parking on streets and public parking facilities on; use modern technology for easy fee collection.	
127	Vehicle Tax on mileage, weight, and wheels: Tax vehicles based on mileage, weight, and number of wheels (while driven with audible/visible reminders).	

Idea ID #	Idea Description	Next Move(s) ID#
	Strategy 3: Decarbonizing Transportation & Sustainable Land Use	
128	Replace 4-way stops with mini-roundabouts when possible: Mini-roundabouts reduce emissions when compared to stop-and-go traffic pattern of 4-way stops, and are more friendly on bike traffic.	
129	Flashing Yellow Left Turn Arrows: Replace red left turn arrows with flashing yellow left turn arrows to allow drivers to turn when their direction of traffic has the green.	
130	Sustainable Commuter Punchcard: This idea uses incentives to motivate commuters to carpool, use public transit, bike, or walk to work or school.	
131	New Civic Center: Re-design the future civic center to reduce planned parking in Option 1 (which is designed for today's transportation).	
132	Making Biking (More) Attractive/Fun: Community activities that encourage biking.	
133	Financing Better Mobility: A universal pass (daily, monthly, and/or yearly) paid for by all residents, for local, multi-modal, carbon-free public transportation.	
134	Improve walkability to Fair Oaks park: Make it easy to walk to Fair Oaks park for people living between Fair Oaks, Arques and Taylor.	
135	Affordable 100% solar power for EV mobility solutions (cars, shuttles, buses): Fuel all future electric vehicles (cars, shuttles, buses) with 100% clean, local, and affordable renewable energy.	
136	48/96 DPS Fire Schedule: City should consider discounting the electricity charging rates or providing free electric vehicle charging for a certain number of hours per employee per year. Incentivizing cleaner vehicles will help reduce the impact of the carbon emissions produced from employee commutes.	
137	Establish Electric Car Sharing Programs as Supplement to City Fleet: Partner with private car-sharing networks, like Envoy, to bring more EVs and EV infrastructure to City properties. Envoy provides a private, car-sharing network dedicated to a location where people live (e.g., apartment building) or work. Envoy will install chargers, supply and maintain EVs, and provide insurance for monthly subscription fees.	
138	Designate preferred parking stalls for electric, hybrid, and other alternative fuel vehicles in all public and private parking lots consistent with the California Green Building Code	
139	Facilitate new fueling stations that offer alternative fuels	
140	Incentivize gas stations to offer E85: Offer incentives for gas stations to offer more alternative fuels like ethanol (E85), hydrogen, or charging stations for electric vehicles.	
141	[Regulate] Gas powered garden equipment: Regulate and enforce rules that reduce the amount of particles that pollute our air from gas powered garden equipment.	
142	Car pool lanes for all-electric vehicles: A 24-hour express lane for all-electric vehicles on all major roads.	
143	Sustainable electric school buses for Sunnyvale's children and environment: We will help Sunnyvale's schools and community to adopt electric buses and innovative, affordable charging solutions.	

Idea ID #	Idea Description	Next Move(s) ID#
	Strategy 4: Managing Resources Sustainably	
144	Suggestions on how to implement the FoodCycle program into schools: The Sunnyvale FoodCycle program is moving into public schools and businesses, here are some thoughts on how we can better incorporate it.	4.A
145	Select materials to be targeted for diversion and diversion methods, services, or technologies based on the results of the Zero Waste Strategic Plan.	4.B
146	Waste Audits, education and outreach	4.C
147	Stop Wasting Water & Reduce GHG!: Enact new water efficiency methodologies and policies that combine to greatly reduce Sunnyvale's consumption and lead California by example.	4.D
148	Water conservation: Get the best use out of every drop of water.	4.D
149	Promote existing SCVWD efficiency/conservation rebates	4.D
150	Promote "purple pipe" (reclaimed water) infrastructure in new construction or major renovation in preparation for a growing, usable network.	4.E
151	Create a purple pipe network for citywide use of recycled water for irrigation and other outdoor purposes.	4.E
152	Continue to implement the City's Tree Preservation requirements.	4.F
153	Clarify codes and policies to maximize the preservation of the largest longest-living trees, and ensure the expansion of the urban forest over time as appropriate for the site.	4.F
154	Increase Tree Coverage: Increase tree coverage in Sunnyvale to sequester carbon, regulate temperature, manage water runoff.	4.F
155	Implement City's Green Infrastructure Plan	4.G
156	Carbon Cost Food Labeling: Encourage consumers to make choices that min. environ. impact, req. restaurants & grocers to label food & menu items w/ assoc. carbon emissions.	4.H
157	Business: In the mood for food: Encourage businesses to grow food at their corporate sites.	4.I
158	Tower Garden- a vertical, aeroponic growing system- 90% less water and space, 30% greater yield and 3x faster: I am a mom on a mission to promote education regarding healthy living and how to use urban farming that is productive and sustainable.	
159	Urban Agricultural Internships & Design Program: A system of academic credit for students to design and run urban farms/food stands with paid internships.	
160	Develop and implement a purchasing policy that requires food and other appropriate materials purchased by the City to be purchased from as local a supply as possible.	
161	CityTree Moss Wall: CityTree is a company that installs self-sustaining moss units that can have the equivalent of up to 275 trees per year for air cleaning.	
162	Tree Lined Street: Trees are efficient and aesthetic sequesters of CO2; trees add beauty while removing CO2 and replenishing O2.	
163	GHG>15%! Reduce Factory-Farm-Animals!: Discourage Farm-Animals' products to reduce global GHG>15% Redirect wasted resources to increase credible organic plant food supply.	

Strategy 4: Managing Resources Sustainably		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
164	Expand existing park, open space, and boulevard tree inventory through the replacement of trees with a greater number of trees when trees are removed due to disease, park development, or other reasons.	
165	Develop and implement canopy coverage requirements for City-owned parking lots, with exceptions for solar installations.	
166	Construction & demolition debris diversion	
167	Pricing increases/penalties for not recycling/composting	
168	Single-use plastics ban	
169	Straws Suck!: Ban plastic straws in eating and drinking establishments in Sunnyvale.	
170	Environmentally Preferable Purchasing Policy ('Default to Green'): Create a comprehensive Environmentally Preferable Purchasing policy for the city.	
171	3D printed homes: Bring affordable 3D printed homes to Sunnyvale.	
172	Ban the sale or dispersal of disposable, single use plastic water bottles at public events permitted by the City.	
173	Green city procurement: Use modern data science tools (ProductBIO.com or other) to evaluate and strategically reduce the impacts of the city's procurement spending.	
174	Reduce take-out plastics: Sunnyvale restaurants only give straws, plastic cup lids, and plastic utensils upon request from patrons for in-store or to go orders.	
175	CJF [Disposables Fee on Plastic Cups and Straws]: Would like to have local business be taxed on single use plastic cups and straws like shopping bag tax to incentivize individuals BYO cup.	
176	Sunnyvale The Green Shopping capital of the world!: List and patronize stores and businesses that decrease packaging and enable Bring Your Own Packaging when shopping.	
177	Require bottle water fillers at all drinking fountains.: Place water fillers at all drinking fountains and stand alone to encourage people to not use plastic bottles and to drink right amount.	
178	Bring your own produce bags: Reduce grocery store plastic bag use for fruits and vegetables by consumers brining in their own containers.	
179	Trash to Cash: Composting for cash.	
180	Stop the wasted paper mailings: I would like help from the Sunnyvale community to get "Retail me not everyday" to d/c the paper mailings they send out that get trashed.	
181	Fewer Trash Cans, Less Litter?: Make trash cans as we know them non-existent.	
182	Multi-family program for composting, gardens	
183	Promote Reuse/repair and circular economy	
184	Water neutrality ordinance for new construction	
185	repurposing golf courses: convert City golf courses into agrihoods.	

Strategy 4: Managing Resources Sustainably		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
186	Provide supplemental funding to existing rebates	
187	Require new development to reduce potable indoor water consumption by 30% (Tier 1 CALGreen) and outdoor landscaping water use by 40%.	
188	Realtime Home Water Metering: A prototype water meter with iOS app showing instant usage.	
189	Discourage Use of Bottled Water: Plastic bottle disposal is a huge problem in the ocean and bottled water an economic problem. See Maude Barlow's book "Blue Future.".	
190	Dollars for Natives: incentivize homeowners to plant California native landscapes.	
191	Control Water Usage: A Timer operated shower will reduce water usage.	
192	Implement the City's Urban Water Management Plan to facilitate a 20% reduction in per capita water use by 2020.	
193	Create flexible provisions and encourage residents and businesses to collect rainwater to use for irrigation purposes.	
194	Revise development standards to ensure the use of greywater, recycled water, and rainwater catchment systems is allowed in all zones.	
195	Sustainable Landscaping Program: Encourage sustainable landscaping through integrated program including electric landscape equipment & lead by example with city operations.	
196	The Sunnyvale Urban Forest: Host community tree planting events around Sunnyvale until trees outnumber residents.	

Strategy 5: Empowering Our Community		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
197	The Cool Block: Reinvent the world. The journey begins on the block where you live.	5.A
198	Develop and encourage a mechanism for neighborhoods to share equipment and resources to improve sustainability.	5.A
199	Create a structure or partner with other groups for volunteers, residents, and other organizations to help achieve Sunnyvale's sustainability goals.	5.A
200	Sunnyvale Strong Blocks: Create a program similar to the City of Palo Alto's Cool Blocks to engage neighbors in taking action together on climate and disaster preparedness.	5.A
201	Use the City's Sustainability Commission and outreach staff as a structure to coordinate with other groups for volunteers, residents, and other organizations to help achieve Sunnyvale's sustainability goals.	5.A, 5.D
202	Accelerating Clean Electrification for Sunnyvale Residents: YellowTin educates & empowers homeowners to make informed decisions on clean energy choices such as Solar, Battery, EV, Space & Water Heater.	5.B
203	BE Ready to Electrify (Residential SF & MF): Increase readiness for planned, economic migration from fossil-fuel use to efficient, clean electricity use in residential homes.	5.B
204	Provide a toolkit of resources, including web based efficiency calculators, for residents and businesses to analyze their greenhouse gas emissions in comparison to their neighborhood, the city, and the region.	5.B
205	[Online Neighbor Forum for] Energy Outreach and Education: Ways to involve more people in adopting clean energy technologies.	5.B

Strategy 5: Empowering Our Community		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
206	Raising Awareness for CAP and Environmentalism: Create data-driven, specialized campaigns and programs that generate awareness and support for fighting climate change and being environment.	5.B
207	Inform the community of metering options, such as online applications and in-home monitors.	5.B
208	Sunnyvale Green@Home: Free SmartMeter analysis and personalized recommendations for how to reduce home energy waste and lower energy bills.	5.B
209	Dedicate a page of the City's website to climate change and climate change adaptation.	5.C
210	Green Warriors in Training: Teach them while they're young, so they can become eco leaders.	5.E
211	Recommend and advocate for schools to use the Air District curriculum or other programs for local school teachers to teach children about climate change, greenhouse gas emissions, and local actions.	5.E
212	Actively engage with Sunnyvale businesses to identify areas for GHG reduction and financial savings.	5.F
213	Visualizing Community Progress: Visual graphics that show progress towards sustainability goals.	5.G, 5.H
214	Climate Action - Project Tracking: Treat city greenhouse gas emissions & projects designed to reduce them w/ same rigor (planning, improv., controls, metrics) as city finances.	5.G, 5.H
215	Use sustainability initiatives within City operations to educate the community of ways to achieve sustainability by example.	
216	Next Door App for Community Utility Data: Share data and conservation success through an online forum.	
217	Dry your clothes for Free - Use a Clothesline!: All you need is enough space in your backyard to string a clothesline. You'd be amazed how much energy is saved.	
218	GHG Reduction Planning: Develop action road maps for individual households.	
219	Provide regular communication with schools, business, faith groups, community members and neighborhood groups to increase participation in the City's progress toward sustainability.	
220	Develop and implement a competitive greenhouse gas reduction program between groups of citizens in the City with an award component.	
221	Actively promote use of alternative modes of transportation as safe modes of travel. When applicable, promote on the City's web site and publications about viable programs sponsored by 511, the Air District and other recognized agencies.	
222	Through selected projects and efforts to improve City operations, demonstrate how sustainability efforts are possible and successful.	
223	Make comparison an intrinsic part of consumption. Bring awareness of how our consumption compares to other communities, regions, and others in our neighborhood.	
224	Manage Your Metrics, Manage Your Money: This concept would help Sunnyvale residents understand and use their data to manage their energy.	
225	SustainTimes.net - Sustainable Actions Made Easy!: Educate and Implement Sustainability Actions for the Mainstream Community.	
226	Environmental Fair: Provide idea for City of Sunnyvale CAP 2.0 plan. Volunteer during the fair with own booth.	

Strategy 5: Empowering Our Community		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
227	Kid's Workshop: Treasuring Our Resources: Events that includes livecam to a farm and workshops for kids to encourage behavior change in sustainability.	
228	Art for the Climate: Emphasize Climate and the natural world in the City's "1% for Art" program and build on the successful Earth Day Poster and Film contest.	
229	Consolidate single function devices into multifunction: Evaluate usage and spending on single function devices and determine if consolidation into multifunction devices is cost efficient. Determine if follow me printing, authenticated printing, print management, and/or scan to email/folder are beneficial and cost effective.	
230	Planning and Building staff will work with project applicants to limit GHG emissions from construction equipment by selecting one of the following measures, at a minimum, as appropriate to the construction project: a. Substitute electrified or hybrid equipment for diesel- and gasoline-powered equipment where practical. b. Use alternatively fueled construction equipment on-site, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, or biodiesel. c. Avoid the use on on-site generators by connecting to grid electricity or utilizing solar-powered equipment. d. Limit heavy-duty equipment idling time to a period of 3 minutes or less, exceeding CARB regulation minimum requirements of 5 minutes.	
231	Deep Time Walk: The Deep Time Walk is a walking audio book where one meter walked represents one million years of Earth history.	

Strategy 6: Adapting to a Changing Climate		
Idea ID #	**Idea Description**	**Next Move(s) ID#**
232	Regularly train and inform the Department of Public Safety Office of Emergency Services (OES) on potential climate change risks and hazards.	6.A
233	On a regular basis, assess adaptation efforts of the City, region, and state and identify goals or gaps to be addressed.	6.A, 6.B
234	Appoint a staff liaison to attend and participate in regional meetings focusing on adaptation and resilience and to report back to staff on a regular basis	6.B
235	Analyze and disclose possible impacts of climate change on the project or plan area with an emphasis on sea level rise.	6.C, 6.D
236	Integrate climate change adaptation into future updates of the Zoning Code, Building Code, General Plan, and other related documents.	6.D, 6.E
237	Update the City Emergency Plan and Emergency Preparedness Workbook to address climate change impacts.	6.E
238	Require buildings, homes and properties achieve the best Fire prevention methods to reduce fire accident caused GHG	
239	Underground residential power, cable and gray water ecology to reduce GHG	
240	Regenerate the tidal marshlands	

Appendix B: Technical Background

Contents

Overview

The Climate Action Playbook (Playbook) identifies how the City will meet or exceed the State of California's climate goals. The State has adopted ambitious targets to encourage greater climate action, including statewide GHG emissions reductions of:

- 1990 levels by 2020 (Assembly Bill 32, 2006)

- 40% below 1990 levels by 2030 (Senate Bill 32, 2016)

- 80% below 1990 levels by 2050 (Executive Order S-3-05, 2005)

To develop appropriate GHG emissions reduction strategies and actions, the City analyzed its baseline GHG emissions, forecasted future emissions while accounting for moderating impacts of existing policies and programs and determined future scenarios for emissions to estimate how emissions can be reduced through climate action. This analysis was used to guide the development of the Strategies, Plays and Next Moves documented in the Climate Action Playbook.

This appendix provides technical supporting information related to the abovementioned analyses, including a description of the overall methodology, key assumptions, calculations and supporting materials used for the analyses performed.

The work described herein was performed by consultants DNV GL and Fehr & Peers and utilized DNV GL's Climate Scenario Analysis Tool in combination with Fehr & Peers' TrendLab+ Tool for transportation emissions. These tools enabled City staff and community stakeholders to explore the trade-offs between different GHG reduction strategies and emissions reductions between sectors.

GHG Emissions Inventory and Forecast

Greenhouse gas (GHG) emissions inventories estimate the GHG emissions produced within a city's jurisdictional boundaries. They provide a quantifiable means for measuring progress toward reducing GHG emissions over time. The GHG inventory used to guide the development of the Playbook represents community-wide emissions from all entities (residential, commercial, industrial and municipal) within the City of Sunnyvale's jurisdictional boundaries.
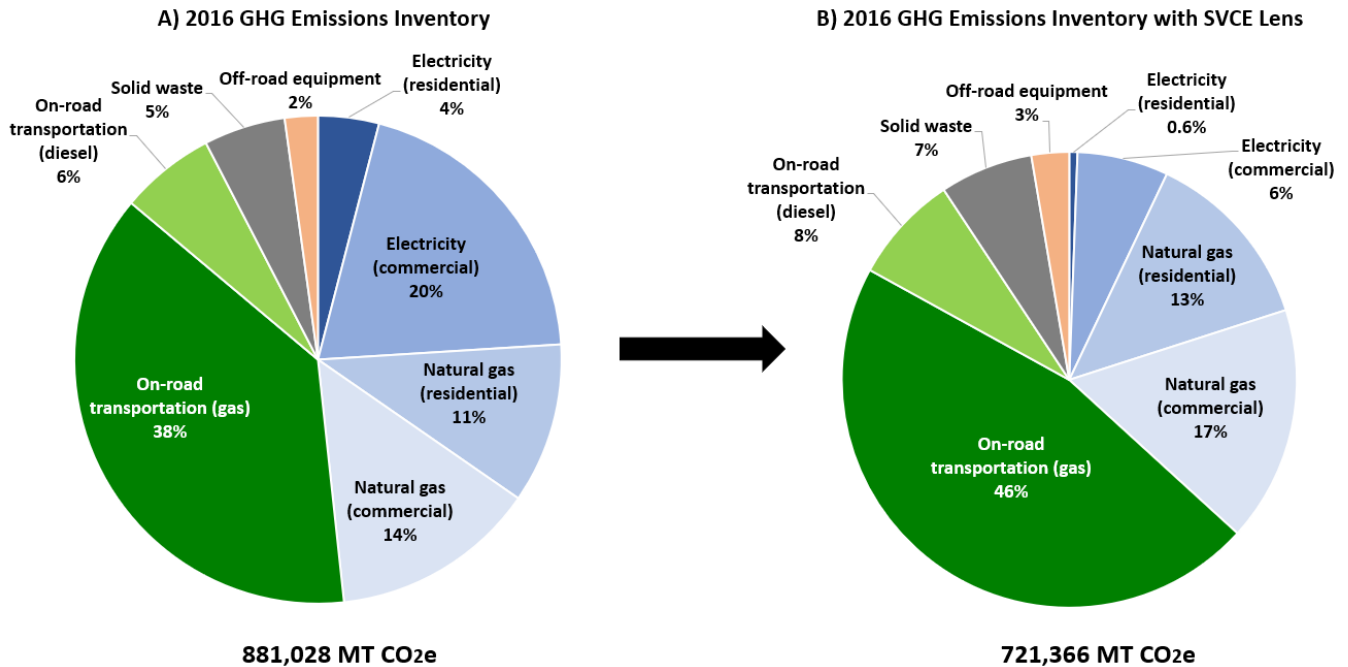
A. GHG Emissions Inventory

As a part of its original Climate Action Plan (CAP 1.0, adopted in May 2014), a baseline GHG emissions inventory was completed for calendar year 2008 to identify the major sources of GHG emissions within Sunnyvale. This inventory provides a baseline against which future progress can be measured. The City's GHG inventory was guided by the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (U.S. Community Protocol), developed by International Council for Local Environmental Initiatives (now called ICLEI-Local Governments for Sustainability, hereafter ICLEI) and industry stakeholders.

Following the 2008 baseline inventory, the City completed subsequent GHG emissions inventories for calendar years 2014 and 2016, in accordance with the two-year reporting cycle committed to in the CAP 1.0 Implementation Work Plan (adopted November 2014). These inventories followed the same methodology as the 2008 baseline inventory to provide an "apples-to-apples" comparison across years. The 2016 GHG inventory by sector is shown in Figure 1 (a).

With the launch of Silicon Valley Clean Energy (SVCE) in 2017, which provides carbon-free electricity throughout the community, the City anticipated a drastic drop in electricity sector emissions. To reflect the impact of SVCE's clean electricity, a modified 2016 GHG emissions inventory was created (Table 1) to estimate the GHG emissions impact as if the complete launch of SVCE had occurred in 2016. This serves as a proxy for understanding the magnitude of SVCE's impact and is called the "2016 GHG Emissions Inventory with SVCE Lens," shown in Figure 1(B). With the SVCE Lens, Sunnyvale's community-wide emissions are anticipated to decrease by 18% (from the original 2016 community-wide emissions), as demonstrated by the shrinking pie chart.

Figure 1: Sunnyvale's 2016 GHG Emissions Inventory by Sector

A) 2016 GHG Emissions Inventory

881,028 MT CO2e

B) 2016 GHG Emissions Inventory with SVCE Lens

721,366 MT CO2e

*Emissions from Caltrain, water and wastewater account for less than 1% of total emissions and are not shown in the above charts.

An updated 2018 GHG inventory will be utilized to track progress against City's climate targets adopted as a part of the Playbook.

Table 1: 2016 GHG Emissions Inventory with SVCE Lens

Emissions Sector	2016 Emissions (MTCO$_2$e)	Percent of 2016 Emissions
Electricity (residential)	4,165	0.6%
Electricity (commercial)	46,385	6%
Natural gas (residential)	92,999	13%
Natural gas (commercial)	119,659	17%
On-road transportation (gasoline)	331,074	46%
On-road transportation (diesel)	55,154	8%
Water & wastewater	3,202	0.5%
Solid waste	47,409	7%
Off-road equipment	19,173	3%
Caltrain	1,197	0.2%
Total (all sectors)	720,418	100%

Note: Data shown may not add up to the total due to rounding.

B. Forecast Methodology and Assumptions

A GHG emissions forecast estimates how emissions will grow or decrease in the future based on anticipated growth projections, impact of local and state policies and programs, anticipated changes in technologies and community

behavior trends. To estimate the GHG reductions needed to reach the state's targets, Sunnyvale's GHG emissions were forecasted based on anticipated growth in population, housing units, jobs, commercial and industrial space, and vehicle miles traveled or VMT (Table 2).

All data on growth variables was pulled from the City's Land Use and Transportation Element (LUTE), adopted in 2017. The LUTE provides values of growth variables for the year 2014 and projects them for year 2035. For the Playbook, 2016, 2030 and 2050 values were calculated by either interpolating or extrapolating using the growth rate projected between the 2014 and 2035 values. The estimated 2016 values presented in Table 2 differ by less than 2% from the actual 2016 values published in the City's Climate Action Plan Biennial Progress Report 2018 and cited in *The Playing Field* chapter of the Playbook (page 14). This difference does not have a significant impact on the scenario analysis described in the subsequent section of this appendix.

**Table 2: Business-as-usual Growth Variable Forecast Assumptions based on 2035 LUTE Projections**

Growth Variable	2016 Estimated (LUTE*)	2030 (CAP)	2035 (LUTE)	2050 (CAP)
Population	149,471	167,533	174,500	197,187
Housing Units	58,318	68,436	72,460	86,009
Jobs	85,321	112,655	124,410	167,560
Non-residential million square feet	48.3	56.1	59.2	69.5
Vehicle miles travelled	869,828,540	1,126,403,395	1,235,341,167	1,629,542,923

*2016 values for growth variables were estimated based on 2014 values from the LUTE.

The growth variables in Table 2 were utilized to project business-as-usual growth on a sector-by-sector basis as described below.

- **Residential energy consumption:** Projected based on an average of the compound annual growth rate of population and compound annual growth rate of housing units.

- **Commercial energy consumption:** Projected based on an average of the compound annual growth rate of jobs and compound annual growth rate of non-residential built environment square footage.

- **On-road transportation:** Projected based on the compound annual growth rate of vehicle miles traveled (VMT) growth.

- **Solid waste, water and wastewater, off-road equipment, and Caltrain**: Projected based on an average of the compound annual growth rate of population, housing units, jobs, and non-residential built environment square footage.

Figure 2: Historical & Forecasted GHG Emissions: 2005 - 2050
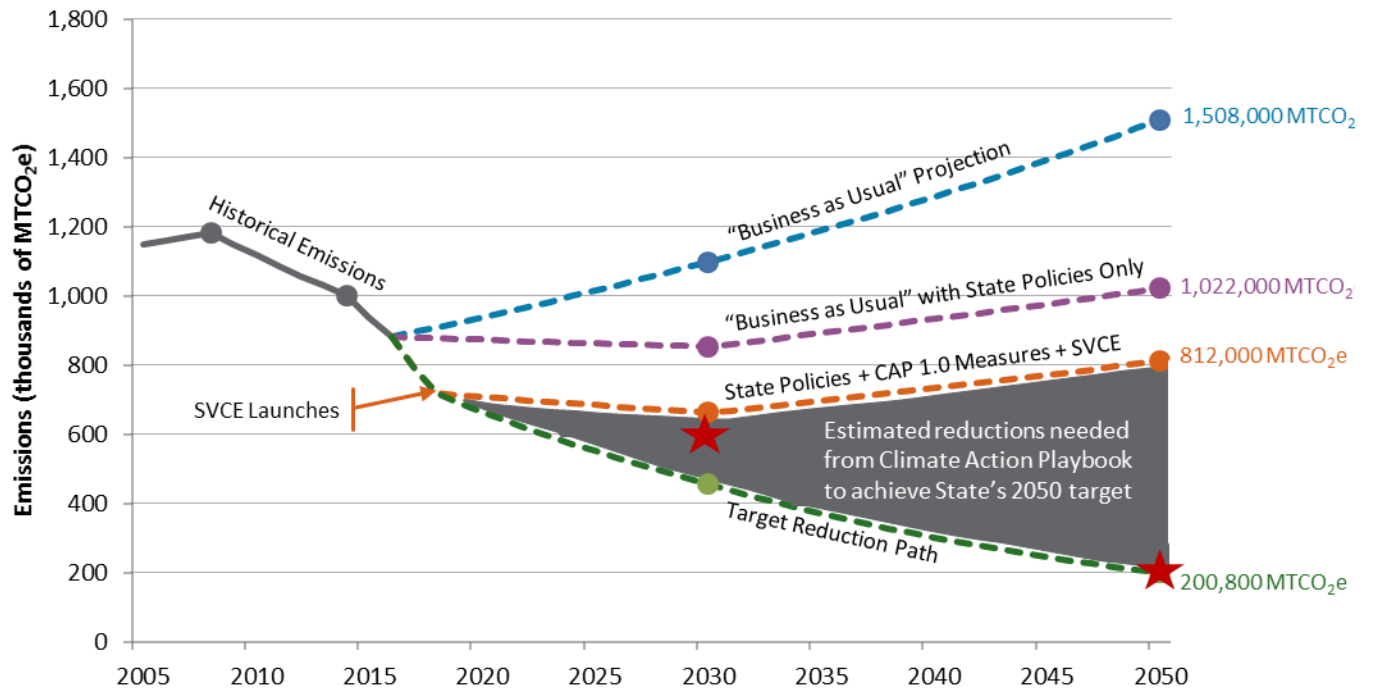
$\bigstar$ = State Targets: 40% by 2030; 80% by 2050

The business-as-usual (BAU) forecast utilizes Sunnyvale-specific growth projections from the City's Land Use and Transportation Element (LUTE), adopted in 2017. These growth projections are available through 2035 when the City is projected to achieve complete buildout. This BAU forecast, however, assumes continued growth in the absence of future projections between 2035-2050.

The following four forecasts were developed to support the Playbook:

(1) **Business-as-usual (BAU) forecast** analyzes how emissions will grow if per capita consumption trends and efficiencies remain at their 2016 level, while the number of people, jobs, and housing units, VMT, and square footage of commercial/industrial space in Sunnyvale continues to grow. In other words, the BAU is the status quo scenario before State, regional and local GHG emissions reduction efforts are taken into consideration.

The BAU projection utilizes the demographic projections for population, households, jobs and traffic (measured by vehicle miles travelled or VMT) as specified in the Land Use and Transportation Element (LUTE, adopted in 2017) of the City's General Plan. The LUTE includes projections out to year 2035, when the City is assumed to have reached complete buildout. As such, the 2017 LUTE does not contain projections for these growth variables for years 2030 and 2050, which define the interim and final planning horizons for climate action planning in the Playbook.

To estimate population, households, jobs and VMT for 2030 and 2050, a compound annual growth rate was calculated for each variable based on the baseline year of data available (2014) and the farthest future year of data available (2035). This compound annual growth rate was applied to the base year (2014) data to interpolate values of these variables annually through 2030 and to extrapolate these variables annually through year 2050.

The above methodology is based on two key assumptions that:

- growth will continue between 2035 and 2050, even though the LUTE assumes complete buildout by 2035; and

- the compound annual growth rate remains constant over the period between 2014 and 2050.

Based on these assumptions, the BAU forecast predicts a continued increase in emissions through 2050, driven by local growth. In reality, growth after 2035 may be higher or lower than assumed. However, in the absence of growth projections beyond 2035, this forecast is conservative as it estimates higher GHG emissions in the future than may actually occur if growth slows down based on the premise of complete buildout by 2035. See Table 4 for the projected 2030 and 2050 emissions under this forecast scenario.

(2) **Business-as-usual with State policies forecast** analyzes how emissions will change under the moderating impact of state and federal policies currently in place that are expected to significantly reduce GHG emissions in Sunnyvale. Specifically, the impact of the following policies was accounted for:

   o California Renewable Portfolio Standard (RPS) to achieve 50% renewable energy by 2030[1]

   o California Energy Code, Title 24, Part 6[2] which contains energy conservation standards applicable to most residential and non-residential buildings throughout California, including goals related to zero net energy for residential new construction by 2020 and non-residential construction by 2030[3]

   o Caltrain electrification, which will fully convert Caltrain to an electric fleet from the current diesel engines[4]

   o Advanced Clean Cars Program[5] adopted by California Air Resources Board in 2012 to enact low emission vehicle and zero emission vehicle regulations and more stringent fuel economy standards for model years 2017 – 2025.

See Table 4 for the projected 2030 and 2050 emissions under this forecast scenario.

(3) **Business-as-usual with State policies and CAP 1.0 measures** represents the most likely emissions trajectory for Sunnyvale in the absence of new climate action. This forecast considers ongoing implementation of the City's CAP 1.0, including the launch of SVCE. Only CAP 1.0 measures where the City has made significant progress on implementation were attributed to CAP 1.0 emissions avoided. Table 3 shows emissions avoided from the following CAP 1.0 measures were attributed to the Playbook.

---

[1] Note: Since the completion of the City of Sunnyvale GHG forecast and technical analysis for the Playbook, the State of California passed SB 100 in September 2018, increasing the overall RPS requirement from 50% to 60% by 2030. The legislation also adopted an additional goal of 100% of all retail sales by 2045 to come from renewable energy resources and zero-carbon resources. These additional emissions reductions are accounted for in the current analysis but attributed to SVCE since the community choice aggregation (CCA) program is already providing zero-carbon electricity.
[2] California Energy Commission, 2016 Building Energy Efficiency Standards. https://www.energy.ca.gov/title24/2016standards/index.html
[3] California Public Utilities Commission, Energy Efficiency Strategic Plan. http://www.cpuc.ca.gov/general.aspx?id=4125
[4] Caltrain, Peninsula Corridor Electrification Project. http://www.caltrain.com/projectsplans/CaltrainModernization/Modernization/PeninsulaCorridorElectrificationProject
[5] California Air Resources Board, Advanced Clean Cars Program. ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program

Table 3: CAP 1.0 Measures Included in Emissions Forecast

CAP 1.0 Measure	2030 Emissions Avoided (MT CO2e)	2050 Emissions Avoided (MT CO2e)
Community Choice Aggregation	152,267	170,845
Commercial Outdoor Lighting Efficiency	184	200
Recycling and Composting	37,619	37,619
Water Conservation	286	477
Water Sources & Efficiency	140	345

The forecasts attribute emissions reductions in descending order as follows:

- emissions reductions resulting from statewide and federal policies.

- emissions reductions resulting from the implementation of local measures in Sunnyvale's CAP 1.0.

For example, the BAU forecast assumes that (non-direct access) electricity will be 33% renewable in 2030, because PG&E electricity in 2016 was 33% renewable. The BAU forecast with State measures assumes that electricity will be 50% renewable in 2030, because the State's RPS commits to 50% renewable electricity by 2030. The BAU forecast with CAP 1.0 measures included assumes that electricity will be 100% carbon free by 2030, because it factors in the impact of SVCE. The avoided emissions impact of moving from 33% to 50% renewable electricity in 2030 is attributed to the State RPS policy. The avoided emissions impact of moving from 50% renewable to 100% carbon free electricity in 2030 is attributed to the CAP 1.0 community choice aggregation measure. See Table 4 for the projected 2030 and 2050 emissions under this forecast scenario.

(4) **Target Reduction Path** is the path the City must be on to best ensure meeting the state's 2050 target (green dotted line in Figure 2). This target path is represented by a curved line interpolated between the current emissions and the 2050 target of 80% below 1990 levels. As such, this interpolated target path assumes a GHG reduction greater than 40% must be achieved by 2030. This is reflective of the fact that buildings and other infrastructure that are put into place now will likely still be in place in 2050. Emissions reductions achieved in the short-term (i.e., through 2030) will better position the City to meet its longer term 80x50 target. Therefore, it is very important that the City exceed the state's interim target by meeting a 55% reduction by 2030 to stay on the pathway to 2050. See Table 4 for the projected 2030 and 2050 emissions under this forecast scenario.

Table 4: Emissions Forecast by Scenario and CAP 2.0 Emissions Reduction Targets

Description	2030 Remaining Emissions (MT CO2e)	2050 Remaining Emissions (MT CO2e)
Business-as-usual emissions	1,097,846	1,507,877
BAU with State policies	852,550	1,021,498
BAU with State policies + CAP 1.0	699,741	849,870
CAP 2.0 target	456,023	199,458

The Playbook contains Strategies and Plays that are designed to address the gap between the target reduction path and the business-as-usual emissions forecast that accounts for State policies and CAP 1.0 measure implementation (grey wedge in Figure 2).

C. Implications for the Future

Emissions forecasts represent a future view based on current technological, market and behavioral trends at the time of the analysis. The forecasts make assumptions about population, jobs and growth patterns as identified in the 2017 LUTE. However, growth may happen at a different pace than planned for, and new State and federal policies will influence expected GHG emissions. Therefore, regular GHG communitywide inventories are necessary to account for unforeseen exogenous factors to better ensure that the City remains on track to meeting State climate goals and the commitments of the Paris Agreement.

Scenario Analysis: Estimating Reductions

When it comes to issues as complex and uncertain as climate change, scenario development is a valuable tool for stimulating debate, and inspiring action and innovation. The Playbook relies on two scenario analyses for the target years 2030 and 2050. DNV GL's Climate Scenario Analysis Tool was customized based on Sunnyvale's 2008 baseline GHG emissions inventory, subsequent inventories for 2014 and 2016, anticipated SVCE impact and future projections. The tool also integrates Fehr & Peers' TrendLab+ tool outputs related to transportation to explore different emissions scenarios for 2030 and 2050. These scenarios were analyzed using stakeholder input to explore different options and pathways for emissions reductions. Stakeholder input included feedback from the community, CAP 2.0 Advisory Committee (CAC), and City staff.

A. Scenario Analysis for 2030 and 2050

The DNV GL Climate Scenario Analysis Tool (Climate Tool) is an Excel-based workbook that integrates Sunnyvale's GHG emissions for 2008, 2014 and 2016. The DNV GL Climate Tool utilizes the BAU forecast with the impact of State policies and CAP 1.0 implementation as the base scenario for attributing further emissions reductions associated with specific strategies and targets.

The Climate Tool lays out a possible scenario to achieve each of the targets on Sunnyvale's aforementioned target reduction path:

- 55% below 1990 levels by 2030 (exceeding the State's 40x30 target), in order to reach

- 80% below 1990 levels by 2050 (equal to the State's target)

In each scenario, the Climate Tool analyzes possible GHG reduction strategies and the targets that need to be achieved in each of the following four sectors:

- Natural gas

- Electricity

- Transportation

- Waste

These four sectors are largely aligned with the City's GHG inventory sectors and contribute most significantly to total community-wide GHG emissions.

B. Setting Targets for Energy and Waste

Within each sector, the Climate Tool identifies a set of strategies related to conservation and efficiency (e.g., source reduction) as well as shifting to cleaner sources (e.g., electrification and renewable resources). Each strategy is associated with an implementation target level that may be adjusted by users – that is, the target may be dialed up or dialed down. Table 5, parts (a) through (c), provide examples of the strategies and targets that may be adjusted for these sectors.

Targets are set separately for 2030 and 2050. The City's focus is to achieve the 2050 emissions reduction target. Simultaneously running the analysis for 2030 helps to develop a better understanding of the emissions reductions that are achievable by 2030 and the trade-off between strategy-level targets that will be necessary to achieve the

2050 target. As targets for each sector are dialed up or down based on user input, the total projected GHG emissions for each scenario will be altered.

Table 5. DNV GL Climate Scenario Analysis Tool – Example Natural Gas Strategies and Target Level Inputs by Sector

(a) Natural Gas Sector Targets

Strategy	Target Level Description	2030 Target Level (User Input)	2050 Target Level (User Input)
Improve efficiency of residential natural gas use	% reduction in natural gas before electrification	5%	30%
Improve efficiency of non-residential natural gas use	% reduction in natural gas before electrification	5%	30%
Electrify residential water heating equipment	% equipment electrified after energy efficiency	20%	50%
Electrify residential space heating equipment	% equipment electrified after energy efficiency	20%	50%
Electrify non-residential water heating equipment	% equipment electrified after energy efficiency	20%	50%
Electrify non-residential space heating equipment	% equipment electrified after energy efficiency	20%	50%
Electrify non-residential cooking equipment	% equipment electrified after energy efficiency	20%	50%

(b) Electricity Sector Targets

Strategy	Target Level Description	2030 Target Level (User Input)	2050 Target Level (User Input)
Improve efficiency of residential electricity use	% reduction in electricity	5%	10%
Improve efficiency of non-residential electricity use	% reduction in electricity	5%	10%
Expand rooftop solar	% remaining electricity emissions eliminated with Photovoltaics (PV)	3%	5%
Increased participation in SVCE's carbon free electricity offering	% of electricity carbon free	100%	100%

(c) Waste Sector Targets

Strategy	Target Level Description	2030 Target Level (User Input)	2050 Target Level (User Input)
Decrease amount of waste sent to landfill	% waste diverted from landfills	90%	90%

C. Setting Targets for Transportation

Transportation emissions are typically estimated based on vehicle miles traveled (VMT), which is the total miles driven by private or public vehicles. VMT is calculated using the origin-destination (OD) VMT method. An OD VMT estimate tracks all the vehicle trips generated within a geographic area across the entire network to their ultimate destinations and isolates the VMT as follows:

- Internal-internal (II): All trips made entirely within the study jurisdiction.

- One-half of internal-external (IX): One-half of trips with an origin within the study jurisdiction and a destination outside of this jurisdiction. This assumes that the study jurisdiction shares half the responsibility for trips traveling from other jurisdictions.

- One-half of external-internal (XI): One-half of trips with an origin outside the study jurisdiction and a destination within this jurisdiction. Similar to the IX trips, this assumes that the study jurisdiction shares the responsibility of trips traveling to other jurisdictions.

- External-external (XX): Trips through the study jurisdiction are not included because the study jurisdiction cannot implement policies that influence the trip-making behavior. Rather, through trips are assigned to other jurisdictions that can influence either the origin or destination side of the trip-making behavior.

As population and jobs in Sunnyvale grow, total annual VMT will naturally increase. Therefore, a more reliable assessment of changes in VMT is the VMT per service population[6]. VMT per service population is defined as the annual VMT divided by the service population.

To determine VMT per service population targets for the Playbook, the City used Fehr & Peers' TrendLab+ tool. The Fehr & Peers TrendLab+ tool is a scenario tool that tests how changes from the business-as-usual trends could influence VMT per service population. Fehr & Peers first developed TrendLab+ in 2016 to evaluate the effects of evolving trends on 2040 national average VMT per service population under different future scenarios, such as economic recovery and millennial preferences. The tool (Figure 3) documents the historical annual VMT per service population from 1970 to 2015 in the United States and estimates future year VMT per service population based on the user's input on how they believe the trends might change in the future. Each trend has three possible changes that users can select from: up, level and down. Each scenario estimates future VMT per service population based on the combined effect of each trend. Since user preferences on the future trends might differ, the VMT per service population estimate varies within a range. The tool also includes VMT per service population forecasts published by U.S. Department of Transportation and other public interest research groups for comparison.

Fehr & Peers adapted TrendLab+ for Sunnyvale to estimate VMT per service population in the target years of 2030 and 2050. Fifteen trends that have the greatest influence on Sunnyvale's VMT per service population were identified and used for the Sunnyvale TrendLab+ tool. Because some of trends are anticipated to continue to grow (e.g., clean-fuel vehicles) rather than fall, these trends have the possible changes of staying level, going up and or going "double up." The Sunnyvale TrendLab+ tool separates the citywide annual VMT into "clean" (i.e., miles traveled by vehicles that have zero emissions) and "non-clean" VMT (i.e., miles traveled for fossil fuel powered vehicles) to account for the decarbonization benefits of adopting a cleaner community-wide vehicle fleet. DNV GL's Climate Tool integrates a separate module based on TrendLab+ Tool to account for VMT impacts.

The VMT per service population used in Sunnyvale TrendLab+ tool is based on VMT and service population estimates from Sunnyvale's LUTE, adopted in 2017. See Table 2 for details on population, jobs and VMT projections incorporated into TrendLab+.

---

[6] The service population is the sum of resident population and employment.

Figure 3: National TrendLab+ Tool
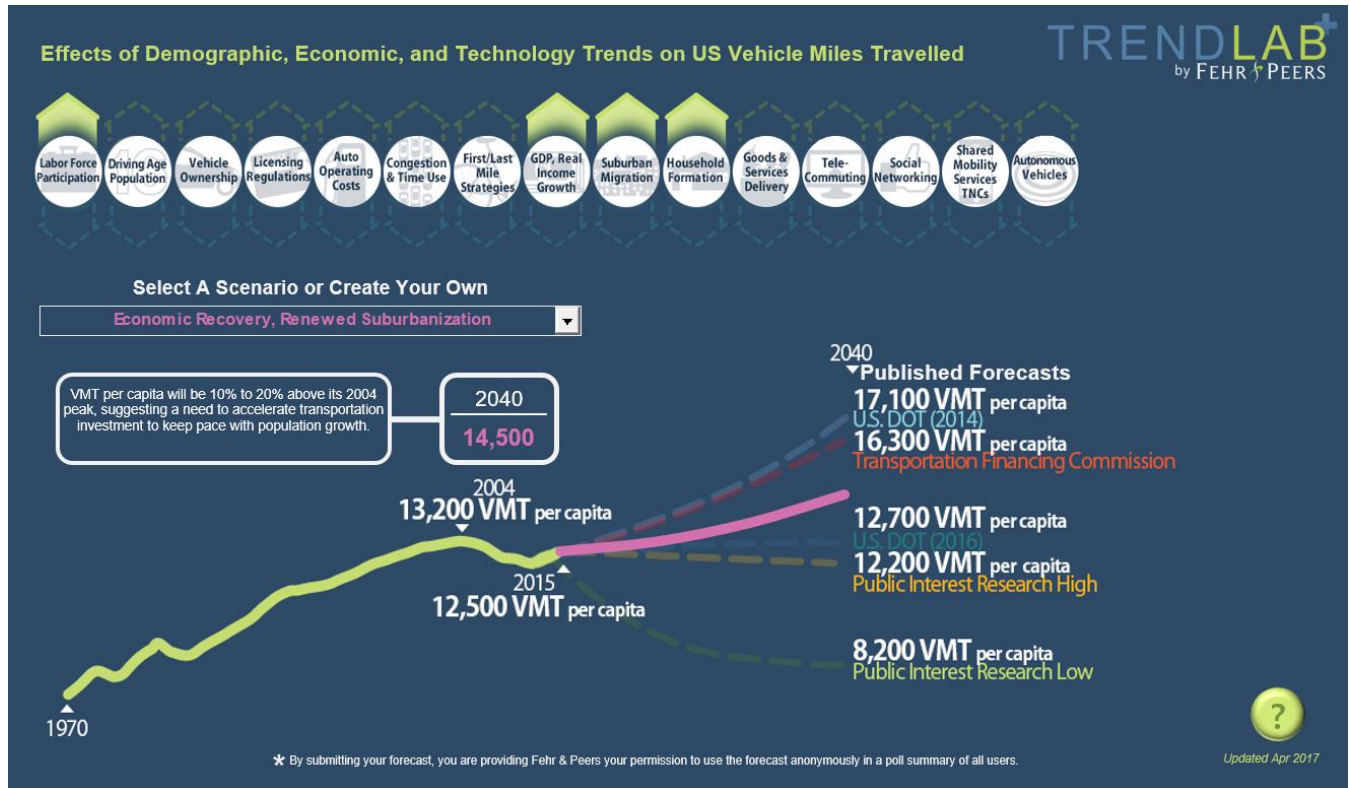
Trends for Sunnyvale

The fifteen trends included in Sunnyvale TrendLab+ fall into five categories (Table 6): demographic trends, economic trends, land use trends, transportation infrastructure trends, and technology trends.

Table 6. Trends in TrendLab+ Tool

Demographic	Infrastructure
Local Labor Force Participation	Low-Stress Bicycle/ Pedestrian Network
Driver Population	Transit Corridors Enhancement
Economic	**Technology**
Vehicle Ownership	Goods & Service Delivery
Auto Operating Cost	Social Networking
Transportation Demand Management (TDM) Strategies	Clean-Fuel Vehicles
Telecommuting	Ride Hailing/Shared Mobility
Land Use	Autonomous Vehicles
Housing Affordability	
Densification/Mixed Use	

Table 7 lists each trend, its magnitude of impact, and its direction of influence (direct vs. inverse) on VMT per service population. The magnitude of impact is categorized as high, medium or low, which provides insights for prioritizing transportation policies.

Table 7: Magnitude of Impact for Trends on VMT Per Service Population

	Magnitude of Impact	Direction of Influence	Category
Local Labor Force Participation	High	Direct	Demographic
Auto Operating Cost	High	Inverse	Economic
Housing Affordability	High	Inverse	Land Use
Ride Hailing/Shared Mobility	High	Direct	Technology
Driver Population	Medium	Direct	Demographic
Low Stress Bicycle/Pedestrian Network	Medium	Inverse	Infrastructure
TDM Strategies	Medium	Inverse	Economic
Transit Corridors Enhancement	Medium	Inverse	Infrastructure
Densification/Mixed-Use	Medium	Inverse	Land Use
Goods & Services Delivery	Medium	Direct	Technology
Autonomous Vehicles	Medium	Direct	Technology
Vehicle Ownership	Low	Direct	Economic
Telecommuting	Low	Inverse	Economic
Social Networking	Low	Inverse	Technology
Clean-Fuel Vehicles	Low	Direct	Technology

## *Sunnyvale TrendLab+ Scenario Summary*

As a part of the community and staff outreach, community members, the City's staff, and the Climate Action Committee (CAC) members were asked to vote on what trends (shown in Table 7) they wished to see in Sunnyvale in the future for each of the variables. The following six scenarios were generated using the Sunnyvale TrendLab+ tool during the community and staff outreach phase of the project:

- **Scenario #0: Business-as-Usual** – This scenario summarizes the citywide annual VMT per service population for business-as-usual conditions under 2008, 2016, 2030, 2035, and 2050 conditions. This scenario represents a scenario similar to the 2035 Land Use and Transportation Element (LUTE).

- **Scenario #1: Ideas Workshop** – This scenario summarizes the citywide annual VMT per service population based on the most common trends voted on at the March 3, 2018 *Innovate Climate Action in Sunnyvale* Workshop.

- **Scenario #2: Transportation Focus Meeting** – This scenario summarizes the citywide annual VMT per service population for the most common trends voted on at the City staff workshop focused on transportation.

- **Scenario #3: CAP 2.0 Advisory Committee (CAC) Meeting** – This scenario summarizes the citywide annual VMT per service population for the most common trends voted on at the April 5, 2018 CAC meeting.

- **Scenario #4: CAP 2.0 (Composite Results)** – This scenario summarizes the citywide annual VMT per service population from the composite of the trends from Scenarios 1, 2 and 3, as noted above.

- **Scenario #5: CAP 2.0 (Alternate Results)** – This scenario summarizes the citywide annual VMT per service population from moderating the composite results of Scenario #4 for TDM strategies, transit corridor enhancements, housing affordability and densification/mixed-use.

For each scenario, service population forecasts and the citywide annual VMT (including clean and non-clean VMT) were estimated using the TrendLab+ tool. The output VMT per service population from these scenarios were used as input into the DNV GL Climate Tool to estimate citywide GHG emissions.

City staff selected a modified version of Scenario #5 that relies more heavily on a clean vehicle fleet and sets ambiitous yet attainable VMT targets. Scenario #5 projects a target of reducing VMT per service population by 13% by 2030 and by 11% by 2050, both measured relative to 2016 levels. For 2030, staff adopted the projected target of reducing VMT per service population by 13% from Scenario #5. For 2050, however, staff accelerated the target beyond that projected by the TrendLab+ model to achieve a 25% reduction in VMT per service population to ensure that the City continues on a path of progressively reducing vehicle miles and encouraging mode shift to alternative transportation.

Figure 4. Sunnyvale TrendLab+ VMT Projections for 2030 and 2050 for Scenario #5 with High Clean Fuel Fleet Adoption
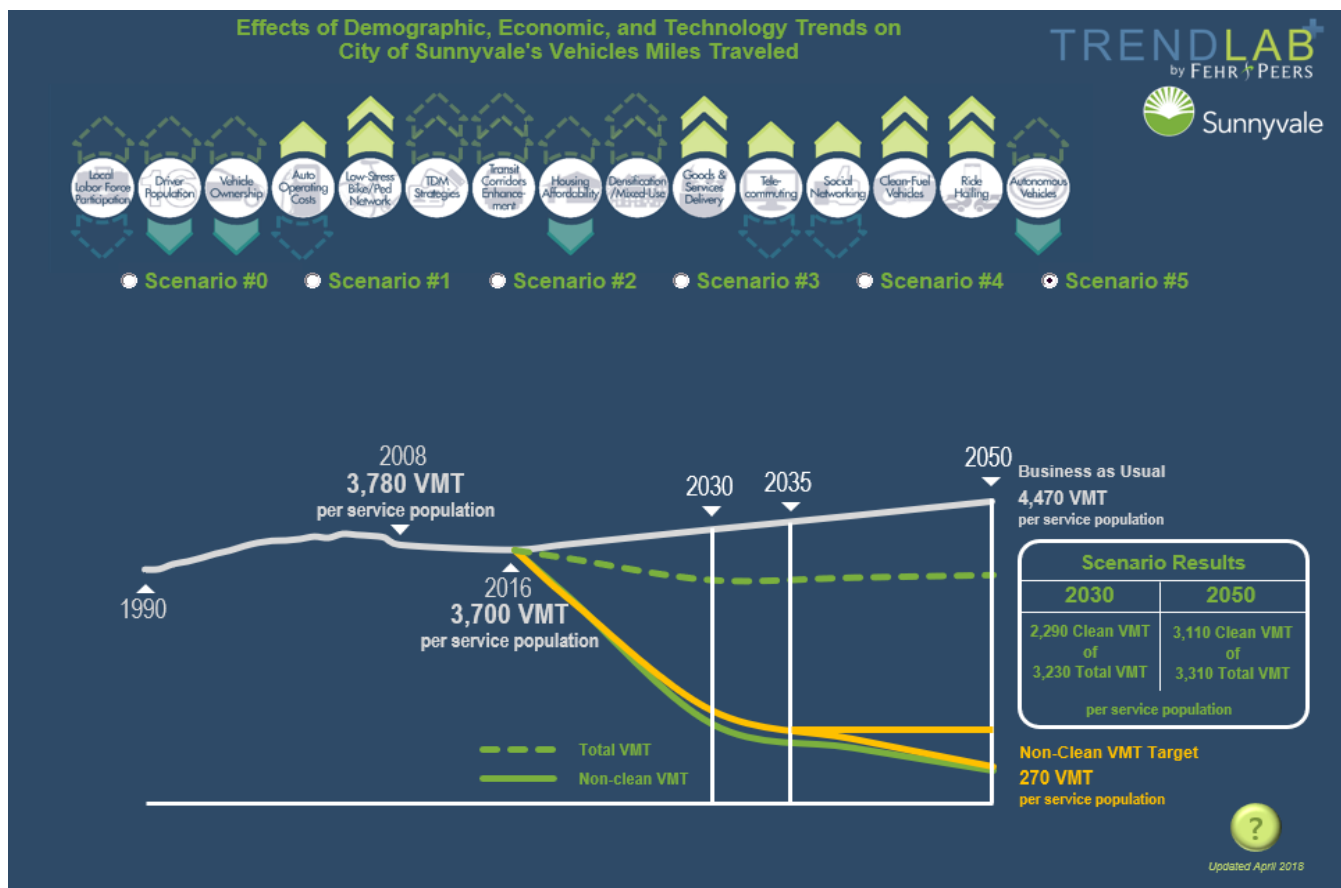
The final selected transportation sector targets (modified Scenario #5) reflect:

- A high rate of clean fuel fleet adoption, reaching 20% by 2030 and 75% by 2050;

- Aggressive growth in investment in active transportation and transit projects, given a progressively shrinking driver population;

- A Transportation Demand Management (TDM) program that is mandatory and enforced actively by the City. This attribute is not reflected in the modeled Scenario #5 (**Figure 4**), but is reflected in the higher target used for 2050 as TDM forms a core component of the City's transportation strategy moving forward.

- Increased reliance on goods and services delivery, telecommuting, social networking and ride hailing; and

- Increased use of ride sharing options and reduced vehicle ownership.

Table 8 summarizes the citywide annual VMT per service population for modified Scenario #5, which is a composite of the meeting scenario trends..

Table 8: Transportation targets with Modified Scenario #5

Metric	2016	2030	2050
Citywide Annual VMT	869,904,400	650,036,200	718,551,600
Percent Change in Annual VMT	0%	4%	16%
Citywide Annual VMT per Service Population	3,705	3,230*	2,775**
Percent Change in Citywide Annual VMT per Service Population (relative to 2016)	0%	-13%	-25%
Clean Fuel Vehicle Fleet Adoption Portion	0.5%	20%	75%
Clean Citywide Annual VMT per Service Population	17	646	2,081
Non-Clean Citywide Annual VMT per Service Population	3,688	2,584	694

Note: All VMT is citywide annual shared VMT per service population. Citywide annual shared VMT per service population: citywide daily shared VMT (100 % internal + 50% internal-external, and 50% external-internal) x 347 days/year.
*VMT per service population for 2030 is equal to that used in Scenario #5 modeled in the TrendLab+ tool and reflected in Figure 4.
**VMT per service population for 2050 is not equal to that used in Scenario #5 modeled in the TrendLab+ tool, as the modeled value of 11% reduction in VMT per capita relative to 2016 allowed the City to relax VMT reduction targets. Instead, City staff increased the 2050 target to achieve a 25% reduction in VMT per capita relative to 2016 to ensure that this target reflects continued emphasis on reducing VMT and shifting to alternative transportation modes.

DNV GL's Climate Tool used the citywide VMT estimates from the TrendLab+ tool to calculate citywide GHG emissions from the transportation sector. The clean vehicle adoption rate and reduction in total VMT work in tandem to impact overall citywide GHG emissions. If other sectors are more effective at reducing GHG emissions, then the clean vehicle adoption rate can be lower. Table 8 summarizes the clean VMT as 20% of Sunnyvale's total VMT by 2030 and 75% of Sunnyvale's total VMT by 2050. If the targeted percent of total VMT accounted for by clean vehicles is reduced, then a greater reduction in VMT per service population will be required to achieve the 2050 emissions reduction target. The opposite is also true. If the targeted percent of total VMT accounted for by clean vehicles is higher, a lower reduction in VMT will be required to achieve the 2050 emissions reduction target.

As of 2016, Sunnyvale's total VMT is 3,705 per service population. The results of Scenario #5 with modifications is a target VMT per service population of 3,230 in 2030 (i.e., 13% reduction in VMT per service population relative to 2016) and a target VMT per service population of 2,775 VMT per service population (i.e., 25% reduction in VMT per service population relative to 2016).

D. Estimating Emissions Reductions Across Sectors

The Playbook strategies are applied to the current emissions by first prioritizing efficiency and conservation measures (e.g., strategies that reduce energy, transportation and waste) and then strategies that shift to cleaner sources are applied to the remaining emissions (e.g., strategies related to solar PV, electric vehicles, etc.). This general approach to climate action planning is in accordance with the CPUC's Energy Efficiency Strategic Plan, which acknowledges the State's "loading order" and identifies energy efficiency as California's top priority resource.[7]

---

[7] California Public Utilities Commission, 2008. "Energy Efficiency Strategic Plan."

The Climate Tool considers interactive factors between sectors e.g., increases in electricity consumption from electrification of buildings and transportation are taken into account. Furthermore, "dialing down" targets in one sector (e.g., transportation targets related to VMT) enables the user to see the overall impact on potential emissions reductions for 2030 and 2050 and allows for "dialing up" targets in other sectors (e.g., buildings) to meet State climate goals.

E. Selecting Final Scenario Targets

The DNV GL Climate Scenario Analysis Tool provides a summary output table for each target year (Table 9) that shows the overall GHG reduction target being achieved across sectors by the suite of emissions reduction strategies and targets selected.

Table 9. DNV GL Climate Scenario Analysis Tool Summary Table for 2030

Metric	2030	2050
Remaining emissions in target year	456,023	199,458
1990 baseline emissions	1,004,194	1,004,194
Sunnyvale projected % emissions reduction below 1990 levels by target year	55%	80%
State target % emissions reduction below 1990 levels by target year	40%	80%

F. Metrics to Measure Progress

To ensure the success of implementing the Plays in the Playbook, the City will integrate the Plays and Next Moves into its other local and regional plans, programs and activities. Playbook implementation requires tracking progress to ensure the City is on track to meeting the State's climate goals.

The City will continue update its GHG communitywide emissions inventory every year with support from regional agencies including SVCE, Metropolitan Transportation Commission (MTC) and Valley Transportation Authority (VTA). In addition, the City will track key metrics as listed in Table 10; these key metrics directly influence community-wide GHG emissions and are, therefore, indicators of progress made towards implementing the Plays and achieving their associated targets.

Table 10. Key Metrics and Data Sources for Tracking Progress Towards CAP 2.0 Play Targets

Play	Target	Metric	Metric Data Source
Strategy 1: Promoting Clean Electricity			
Play 1.1: Promote 100% clean electricity	2030: 100% participation in clean electricity 2050: 100% participation in clean electricity	Remaining direct access electricity consumption	SVCE, PG&E
Play 1.2: Increase solar photovoltaics (PV)	2030: 3% of load from local solar 2050: 5% of load from local solar	Distributed solar photovoltaics (PV) capacity	California Distributed Generation Statistics

http://www.cpuc.ca.gov/general.aspx?id=4125

Play	Target	Metric	Metric Data Source
Play 1.3: Increase distributed electricity storage	2030 Target: 1% of electricity demand stored in batteries locally 2050 Target: 5% of electricity demand stored in batteries locally	Cumulative communitywide battery storage capacity	CPUC Self-Generation Incentive Program (SGIP) data on battery storage installed capacity
Strategy 2: Decarbonizing Buildings			
Play 2.1: Reduce energy consumption in existing buildings	2030: 5% of existing homes and businesses receive deep energy retrofit 2050: 30% of existing homes and businesses receive deep energy retrofit	Energy efficiency program participation rates	PG&E, BayREN and SVCE
Play 2.2: Support electrification of existing buildings	2030: 20% of homes and businesses completely electrified 2050: 50% of homes and businesses completely electrified	Number of customers on all-electric rates or without associated gas account.	SVCE
Play 2.3: Achieve all-electric new construction	2030: 100% all-electric new buildings 2050: 100% all-electric new buildings	Number of new buildings that are all-electric Total area (sq. ft.) of buildings that are all-electric	City Community Development Department (CDD)
Strategy 3: Decarbonizing Transportation & Sustainable Land Use			
Play 3.1: Balance land use supply and enhance urban form **Play 3.2: Increase transportation options and support shared mobility**	2030: 13% reduction in vehicle miles per person 2050: 25% reduction in vehicle miles per person	Modeled per service population VMT	Metropolitan Transportation Commission (MTC) or City DPW's Travel Demand Model
Play 3.3: Increase zero-emission vehicles	2030: 20% of all vehicles on road are zero-emissions 2050: 75% of all vehicles on road are zero-emissions	Vehicle registrations by fuel type	Department of Motor Vehicles (DMV)
Strategy 4: Managing Resources Sustainably			
Play 4.1: Achieve Zero Waste goals for solid waste	2030: Reduce landfilled garbage to 1 lb per person per day 2050: Reduce landfilled garbage to 1 lb per person per day	Waste diversion rate	California Department of Resources, Recycling and Recovery (CalRecycle)
Play 4.2: Ensure resilience of water supply	Targets will be defined as per state requirement	Annual water consumption per capita relative to 2016 baseline	City of Sunnyvale Environmental Services Department (ESD)
Play 4.3: Enhance natural carbon sequestration capacity	Supports broader net carbon reductions	Net number of new trees added on public lands Acreage of land area treated by green stormwater infrastructure features	City of Sunnyvale Department of Public Works (DPW), CDD, and ESD

Play	Target	Metric	Metric Data Source
Play 4.4: Promote sustainable food choices	Supports broader emissions reductions	No defined metric	Not applicable
Strategy 5: Empowering Our Community			
Play 5.1: Enhance community awareness and engagement	Supports all other Plays	Social media engagement analytics Number of people participating in community engagement programs each year (e.g., CERT, Cool Blocks, etc.) Number of businesses engaged in CAP programs	City of Sunnyvale various departments and Office of City Manager (OCM)
Play 5.2: Track and share data and tools	Supports all other Plays	Annual GHG Inventory Number of people using online or mobile phone community engagement platforms (e.g., IGreenSunnvale)	City of Sunnyvale ESD

The City can also track additional secondary metrics as listed in Table 11; while these metrics are not directly used to estimate GHG emissions, they indicate the performance of key programs that would be integral to the CAP.

Table 11. Secondary Metrics to Assess Progress

Metric	Data Source
Distributed local solar (kW) on all building types	Center for Sustainable Energy – California Solar Statistics
Number of residential units approved for voluntary Green Building Program incentives	City of Sunnyvale CDD
Total floor area (sqft) of commercial building space approved for voluntary Green Building Program incentives	City of Sunnyvale CDD
Electric vehicle charging infrastructure	DOE Alternative Fuels Data Center + direct communication with large businesses
Public transportation ridership	Caltrain + VTA ridership data
Bike or scooter share ridership	Lime ridership data
Percent of students using non-motorized transportation to school	City of Sunnyvale Department of Public Safety (DPS) – Safe Routes to School Program
Percent of commuters riding bicycles to work	American Community Survey 5-year estimates
Miles of bicycle lanes by class	City of Sunnyvale DPW
Train ridership	Caltrain annual ridership estimates
Percent of local water needs met by recycled water	City of Sunnyvale ESD
Waste disposed per capita	California Disposal Reporting System