Guiding Principles for City Climate Action Planning

Mitigation and Adaptation Strategies for Climate Change in Lemon Grove, CA, USA

August 2017

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San Diego State University

THE sage PROJECT

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Mitigation and Adaptation Strategies for
Climate Change in LEMON GROVE, CA, USA

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ABOUT THE SAGE PROJECT

The Sage Project is a partnership between San Diego State University (SDSU) and a local government in the San Diego region. Students, through their course work, engage in meaningful real-world projects and contribute to pressing social needs in a community in SDSU's service area. Students from across the University assist local governments with partner-directed projects that address their livability and sustainability goals. SDSU students and faculty connect with high-priority, high-need, and highly interdisciplinary community projects, thereby generating interest and fresh ideas that create momentum and provide real service to the community. Each year, the Sage Project at SDSU engages hundreds of students from diverse disciplines who invest thousands of hours assisting communities in our region as they seek to build a more equitable and sustainable future. The Sage Project is part of the Educational Partnerships for Innovation in Communities(EPIC) Network and is based on the highly successful and award winning Sustainable City Year Program at the University of Oregon.

ABOUT LEMON GROVE

The City of Lemon Grove is an intimate community of about 26,000 residents in south-east San Diego County. As a small municipality nested within an expansive metropolis, Lemon Grove faces the unique challenge of preserving its history and small town charm amidst a largely urban landscape. The city's small town attributes are not only attractive to residents and visitors, but they also allow for more feasible implementation of rapid and widespread sustainable practices. The City of Lemon Grove continues to gain momentum as a model of sustainability as it seeks innovative ways to address both community and globalneeds.

EXECUTIVE SUMMARY

Recent satellite and ground-based data have indicated that Earth's climate is changing at an alarmingly fast rate as the mean global temperature continues to rise. This effect is visible around the world and is already beginning to threaten both society and the environment (Kitchen, 2014). Our failure to limit the emissions of heat-trapping green- house gases (GHGs) today will lead to damaging and irreversible changes in climate tomorrow. For this reason, Lemon Grove has collaborated with the Sage Project at San Diego State University to generate possibilities for climate change mitigation andadaptation.

This detailed report identifies the main objectives and aims of our initiative, which are intended to help Lemon Grove build a more equitable and sustainable future. These ideas have been developed specifically to reduce GHG emissions across many sectors, including: electricity, transportation, natural gas, solid waste, water, and wastewater. However, equally important are our adaptation policies, which will be just as critical in protecting Lemon Grove from the long-term impacts of climate change, such as cool zones, increased green space, and publiceducation.

This report also includes a chapter dedicated to the United Nations Toolkit. The United Nations Human Settlements Programme, or UN-Habitat, recognized that many cities were in the initial stages of combating climate change and reducing GHG emissions. Most cities do not have any kind of climate action plan (CAP) that would raise awareness in their communities regarding mitigation and adaptation strategies. In response, the United Nations developed the "Guiding Principles for City Climate Action Planning." This toolkit includes eight guiding principles that provide a resource for evaluating cities with current CAPs; these principles and resources can also be used to formulate a climate plan in cities that have little or no current plan. These principles address the following descriptors to be considered and addressed when formulating or evaluating a CAP: ambitious,inclusive,fair,comprehensiveandintegrated,actionable,evidence-based,and transparent and verifiable. In our case, Lemon Grove currently has not yet completed their CAP; thus, we are utilizing these principles to collaborate with city officialsand provide recommendations that will set them up for success with the development of their CAP. The goals of these field tests are to identify how the principles can be applied to cities of different socioeconomic statuses, help cities with their planning process, spread awareness of climate change, and receive feedback on the project.

Keywords: *climate change, city planning, energy conservation, greenhouse gas reduction, mitigation, adaptation*

1 INTRODUCTION

Cities are always looking for ways to improve. Yet, at a local level, change can be challenging to achieve because city leaders often lack the capacity, resources, time, and knowledge necessary to respond to increasing demands. The Sage Project at San Diego State University (SDSU) responds to this challenge by connecting students and faculty with high-priority, high-need community projects in local communities, such as its current partner, Lemon Grove. This partnership then generates fresh and creative ideas that may have the potential to provide real service to the city. Through this partnership, Dr. Zohir Chowdhury and upper-division students in Public Health 452 at SDSU have collaborated with the City of Lemon Grove to utilize the United Nations Toolkit and develop mitigation and adaptation strategies to assist the city in developing its Climate Action Plan(CAP).

A particular issue that the city seeks to address is that of anthropogenic, or man-made, greenhouse gas (GHG) emissions within their city. Many communities plan to reduce their local GHG emissions by creating a CAP, which ultimately allows them to identifymeasures that are both acceptable and feasible at the community level (Energy and Climate Change, n.d.). Although many jurisdictions within the San Diego region have already adopted a CAP, a plan for the City of Lemon Grove is still in its developing stages.

There are four key statewide climate legislations and policies that influence Lemon Grove's GHG regulatory background. Executive Order S-3-05, the "Greenhouse Gas Initiative" was implemented by the California Air and Resources Board (ARB) in 2005. This initiative aims to achieve statewide GHG emissions levels of 2000 by 2010, 1990 levels by 2020, and 80% below 1990 levels by 2050. Assembly Bill (AB) 32, the "Global Warming Solutions Act" was implemented by the ARB in 2006. This bill states that California must reduce GHG emissions to 1990 levels by 2020. A third bill, AB 1493, or "Pavely," was enacted in 2002 by the California ARB. Pavely proclaims that GHG emis-sions must be reduced from passenger vehicles, and all non-commercial vehicles utilized for personal transportation. Similarly, Senate Bill (SB) 375, the "Sustainable Communities and Climate Protection Act" was implemented by the Metropolitan Planning Organizations (MPO) in 2008. This bill requires GHG emissions attributed to passenger vehicles to be reduced to set targets from ARB by 2020 and 2035. It furthermore requires that planning organizations must prepare sustainable communities strategies. Each of these legislations are pivotal towards the history of Lemon Grove's GHG emissions framework, as they are all statewide regulations. Likewise, these legislations are of fundamental consideration when addressing the future of Lemon Grove's climate policies.

In 2014, Lemon Grove received a grant from San Diego Gas & Electric's (SDG&E) Emerging Cities Program, enabling them to generate GHG Emissions Inventory for years 2010, 2011, 2012, and 2013. Prepared by the University of San Diego Energy Policy Initiatives Center and ATKINS, this inventory uses U.S. Community Protocol Standards to divide community-scale emissions into six sectors: electricity, natural gas, solid waste, transportation, water, and wastewater—with electricity being Lemon Grove's largest contributor, followed closely by transportation. Natural gas was Lemon Grove's third largest contributor, while solid waste, water, and wastewater combined contributed less than 15%. The primary gases emitted from communities, and used in the analysis of this inventory are: carbondioxide(CO_2),methane(CH_4), and nitrousoxide(N_2O). More detailed information about Lemon Grove's GHG Emissions Inventory can be found in Appendix A.

Two methods of responding to climate change are mitigation and adaptation. Mitigation strategies are measures taken to reduce or eliminate GHGs from the atmosphere, while adaptation strategies are those measures taken to moderate the continuous factors and stresses associated with climate change (UNFCCC, 2014). In addition to the mitigation and adaptation strategies discussed in this report, a third category of "cross-cutting" strategies—those which address aspects of both mitigation and adaptation—is also explored.

We will begin by introducing our recommendations for approaching mitigation and adap- tation in Lemon Grove. We will then describe various cross-cutting strategies applicable to the city. Finally, we will close with our recommendations for application of the United Nation's Toolkit to Lemon Grove's developing CAP. In the compilation of this research, a short survey was collected from 50 Lemon Grove residents inquiring their opinions about climate change. This survey and the resultant data are available in Appendices II and III.

2 MITIGATION STRATEGIES

Mitigation is defined by the United Nations Framework Convention on Climate Change (UNFCCC, 2009) as the human interventions aimed at reducing and removing GHGs from the atmosphere.Itisimportant to approach the mitigation of climate change from various angles. The following strategies are recommendations for reducing the amount and impact of GHGs in Lemon Grove.

ELECTRICITY

Lighting

The use of more efficient lighting can reduce energy consumption and thereby reduce the use of fossil fuels. Together, these actions may be responsible for mitigating the production of GHGs. We intend to lower the amount of pollution associated with city lighting by recommending the implementation of more efficient light fixtures throughout Lemon Grove.

Switching from conventional incandescent to solid-state lighting would allow Lemon Grove's lighting systems to become more energy efficient. Solid-state lighting is amongst the most energy efficient and environmentally friendly lighting technologies. The principal difference between conventional incandescent lighting and solid-state lighting is that conventional incandescent lighting uses filaments, plasma, and gas. Solid-state lighting uses light-emitting diodes which reduce GHG emissions. Solid-state lighting converts electrical energy to light energy. Incandescent lights emit light and a large amount of heat from a heat filament. The total energy saving from switching to solid-state lighting is estimated at about 46% by 2030 (Hastbacka, Dieckmann, & Bouza, 2013). This form of lighting could be installed in homes, schools, churches, and a variety of other buildings throughout Lemon Grove.

Lemon Grove could also mitigate GHG emissions by using sensor lighting, LED lighting, and lighting through kinetic energy. Sensor lighting for bus stops could be used to improve the safety and security of Lemon Grove, helping to increase the sense of safety by providing better visibility at night, and potentially lower crime. We would like to specify that specific crime rates within Lemon Grove were not examined in the compilation of this research, and thus should be looked at moreclosely.

The introduction of sensor lighting would offer an energy-efficient solution and give residents the opportunity to better utilize the multiple bus routes, trolley stops, and walking paths in Lemon Grove. Sensors on light posts would allow for the lighting to becoming brighter or dimmer, according to how busy the stop is at a given time. Additionally, sensor lighting would be beneficial to pedestrian crossings, fluorescent road markings, and festival lighting. For pedestrian crossings, the light intensity would be controlled by motion sensors. This would allow for lights to become brighter as the crosswalks become heavily populated. Fluorescent road markings would charge during the day to provide light at night, improving visibility at night and reducing motor vehicle collisions. Moreover, festival lighting could improve public safety as well as neighborhood aesthetic. Sensored festival lights can be intelligently programed to dim automatically, so that they do not expend energy all night (EngoPlanet Info, 2016).

Furthermore, Lemon Grove could decrease GHG emissions by using kinetic energy. This mitigation strategy would require kinetic energy pads placed along heavily populated sidewalks. As pedestrians step on the pads, kinetic energy is stored in an underground generator. This energy is combined with solar energy collected from solar panels on light post panels to power LED lights. When solar energy is no longer being collected, the LED lights automatically turn on, using a portion of the stored energy (Eandis cvba, 2014). LED lights could substantially increase street lighting in Lemon Grove, providing increased visibility and an improved aesthetic throughout the community. The City of San Diego is an exemplary model of street light retrofit programs, replacing 90% of the city's signaled intersections with LED lamps. In total, this has reduced GHG emissions by7,437tonsandsavedthecityanadditional$1.3million. Thisprojectwasfundedbyan SDG&E rebate program, providing the city with $1.4 million towards thecompletion of this project since 1997 (City of San Diego, 2016). In 2014, the City of San Diego also installed 3,000 LED downtown street lights with assistance from CleanTech San Diego. This project totaled approximately $2.7 million, sponsored in part by CleanTech. CleanTech also contributed to street light renovations for the County of San Diego, City of Oceanside, City of San Marcos, and Port of San Diego, eliminating 12,700 metric tons of carbon dioxide and

saving a total of $30 million (CleanTech San Diego, 2014). These lighting mitigation techniques would directly reduce electricity use, Lemon Grove's biggest contributor to GHG emissions. Though installation of this technology would require an initial investment, it could provide a long-term sustainable solution to street lighting that would reduce spending on energy use and reduce GHG emissions.

Solar Panels

Solar energy is an increasingly cost-effective, sustainable energy source. Lemon Grove could benefit from installing solar panels throughout the city that would, in turn, lower energy usage and costs. Solar energy is carbon-neutral and creates little net contribution to the production of GHGs. Increased investment in solar energy would also reduce the city's dependence on fossil fuels (Kitchen, 2014). Looking back at Lemon Grove's GHG Emissions Inventory, 99% of electricity emissions from 2013 are attributed to residential and commercial electricity usage. Solar panels are our primary recommendation towards reducing resident and commercial pollution, which account for the largest sum of total emissions. According to the American Planning Association, The US receives the same amount of sunlight, if not more, as Germany, the leading nation in solar energy use (Solar Community Engagement Strategies for Planners, 2012). Considering Lemon Grove's nearly year-round sunny climate, solar panels could provide an effective energy source for the city. Solar panels could be placed on the rooftops of homes, buildings, stores, parking lots, waiting areas, and even on sidewalks. Shade structures could be repurposed as solar shades, and installation of solar-powered lamp posts would provide a safer environment, encouraging people to walk and take public transportation. Picnic areas with solar-powered canopies and gazebos would also stimulate community engagement. In a 2011 study, solar panels on parking lots, roofs of buildings, and other vacant areas were shown to exceed California's mandate for 33% by 2020 (Weinrub, 2011). Weinrub argues that decentralized, local generation of renewable energy offers the greatest potential benefits in reducing emissions attributed toelectricity.

The City of San Diego currently has 16 city buildings that utilize solar power technology. One of these, the Scripps Ranch Community Recreation Center, is a "stand-alone" power source during emergencies that can act independently from a power grid. This project cost a total of $545,000, with $200,000 from the U.S. Department of Energy and the remaining $345,000 from a California Public Utilities Commission grant (City of San Diego Environmental Services Department, 2012). The City of San Diego also links residents with many resources for

Figure 1: Solar-panel-shaded parking lot.

residential installation of solar panels. Solar panels provide alternative electricity for residents and businesses that can simultaneously serve as a heating source, eliminating natural gas. The City of San Diego encourages residents to install residential photovoltaic systems by providing them with step-by-step installation guidelines and linking them with information about SDG&E rebate programs. According to researcher Carol Olson at the Energy Research Center of the Netherlands, photovoltaic electricity contributes up to 98% less GHG emissions than electricity generated by 100% coal-powered electricity (Powers, 2013). Olson stresses that solar panels over the course of their lifetime use approximately 89% less water, occupy up to 80% less land, and contribute about 98% less to marine life intoxication. Solar panels have an incredible potential to reduce not only carbon dioxide emissions, but also minimize human impact.

TRANSPORTATION

Transportation is a major source of GHG emissions in the City of Lemon Grove (City of Lemon Grove, 2015). To address this issue, we recommend several transportation-related mitigation strategies. Trolleys use electricity and emit less GHG than privately-owned cars. They also rely on natural gas, which is considered more environmentally friendly than oil or petroleum. Per the Federal Transit Administration, light rails (trolleys) produce 62% less GHG emissions, and bus transit produces 33% less than private vehicles. In addition, trolleys minimize further emissions from cars stopped or slowed in traffic because they decrease congestion (Federal Transit Administration, n.d.). A study in 2004 calculated that using public transit would save 947 million gallons of fuel (Bai- ley, Mokhtarian, & Little, 2008). Expansion of trolley usage could be accomplished through public outreach and education; incorporating local attractions near the stops to entice people to utilize the trolley; and increasing safety measures near trolley stops so that residents feel at ease while using public transportation. Some of these suggestions will be further discussed in the adaptation section of thereport.

Vehicle Sharing

Vehicle sharing is the growing movement of not owning a car individually, but rather sharing a car with multiple users. As opposed to carpooling, which aims to reduce the number of vehicles on the road, vehicle sharing may maintain the same amount ofvehicle trips on the road. Thus, it is important to emphasize that vehicle sharing trans- portation should utilize clean energy, limiting GHG emissions.

Building a sense of trust and safety in Lemon Grove would facilitate the development of a vehicle sharing program that has been successful in other cities. Vehicle sharing is being introduced to the US and is quickly becoming popular through shared vehicle mobile apps in more than half of the fifty states. Companies, such as I-Go, Zipcar, Car2Go, and Community Car, offer a variety of vehicles parked in a "car-share" parking space. Residents register with the vehicle-sharing company and download an access card that allows them to access all car-share vehicles registered with the company. The resident simply taps the access card on the vehicle and can then use it from anywhere between one hour and seven days (T.W.L.P.A.O.S.P., 2008). The vehicle can be returned to any car-share parking space. This system eliminates many vehicle-related incon- veniences, including owning a parking space and having car insurance. Vehicle sharing can save money because users are only charged for time the car is in use. If the car is driven only one hour each day, it would only cost about $5 to use, including the cost of gas and insurance (Enterprise,n.d.).

In the future, Lemon Grove could benefit from policy changes, such as incentives for businesses whose employees use vehicle sharing for travel to meetings, events, or even to and from work. Businesses might opt to subsidize vehicle sharing for those who choose to use it or replace parking spaces with "carshare-only" spaces. These policychangeswouldhelpshapeLemonGroveintoam orefuel-efficientenvironmentby encouraging alternative transportation options. Vehicle sharing has been proven to be effective as a mitigation and adaptation technique. In a recent study, Baptista, Melo, and Rolim (2015) compared the impact of those who used vehicle sharing as their mode of transportation and those who owned their own vehicle. Researchers found a positive impact on both society and the environment. Specifically, vehicle sharing caught on quickly, lowering the number of people who own cars, CO2 emissions, street traffic, and demand for parking spaces. Car-sharers reported they were delighted by the low cost and ease of car sharing.

Bus Pass Subsidization

Subsidizing bus passes would provide residents a cheap, efficient, and safe way of navigating the community. Schools could offer free bus rides to students who do not own a parking space. Lemon Grove could also explore options, such as cheaper bus passprices for locals and the elderly. The bus pass subsidization program has been shown to be successful in other Southern California cities. For instance, the "Orange County bus fare policy adjustment" offers reduced cost for day passes from $5 to $4. It also elimi-nates underutilized bus passes, re-categorizes and increases fare on express services, like extended bus routes, and enforces reduced fare eligibility requirements at the time of purchase. The program was widely accepted by the community, and GHG emissions dropped significantly (Orange County Transportation Authority, 2015). We believe Lemon Grove could benefit from a similar program that incentivizes residents to use the bus and trolley systems as a source of dailytransportation.

Biking Expansion

There are currently numerous bike lanes throughout the City of Lemon Grove. Class II and III bike routes provide over 8.8 miles of bike travel across the city (Alta Planningand Design, 2006). Because several of these bike segments are not continuous in length, we recommend that bike lanes throughout the city should be expanded to facilitate a connected city network. Expanding the utilization of biking within Lemon Grove isa low-tech way to combat climate change that also encourages healthy outdoor activity. To encourage biking, the city might choose to improve infrastructure by upgrading existing bike lanes and creating bike paths and sidewalks that connect to all parts of the city. Furthermore, installing bicycle rental kiosks in accessible locations, providing an incentive program for people who choose to ride a bike or other alternative transportation, andeducating Lemon Grove residents about a healthier, environmentally friendly lifestyle can encourage their use of new biking infrastructure.

To improve cycling infrastructure across Lemon Grove, the city could repave sidewalksand install additional bike lanes with high visibility. The visibility and separation of bike lanes could be enhanced by painting bike lines with a uniform color, such as green, paving barriers between bike lanes and motor lanes, and adding a layer of lumino- phores that would allow the lanes to glow in the dark, as shown in Figure 2. These improvements would promote biking by making it a more visible activity and allowing motorists and cyclists to coexist safely. These aesthetically pleasing infrastructure enhancements could also attract cyclists living outside of Lemon Grove, which would positively impact tourism and spending at local businesses.

Figure 2: Glow-in-the-dark bike lane.

Alta Planning and Design describes three types of bike paths that currently exist in Lemon Grove: Bikeway Classes I, II, and III. A Class I bike path allocates a separate path for pedestrians and bikers, at least 5′ from the nearest road; a Class II bike path is a separated bike path on the main pavement where vehicles are driving but not sharing the space designated for cyclists, and Class III is a bike path shared by both bikes and vehicles. In Lemon Grove, we recommend Class IV: protected bike lanes. These bike lanes would have a barrier between the bike lane and the vehicle lanes to further protect cyclists, as shown in Figure 3.

We have observed that the existing Class II bike paths in Lemon Grove are not highlighted in many areas outside of Lemon Grove Avenue going towards Massachusetts Avenue. In addition, within these bike lanes, there is no barrier that separates vehicles from bicyclists, which may cause cyclists to feel unsafe. Installing cement or fence barriers would increase safety and may encourage more residents to use existing bike lanes.

Figure 3: Class IV protected bike lane.

According to Alta Planning and Design (2006), only about 0.1% of Lemon Grove residents use a bike as their main method of transportation. The average for San Diego County is slightly higher at 0.6%. The problem is that alternative methods of transportation are simply not accessible, not safe, and not convenient enough to supersede automobiles. Many of Lemon Grove's residents may not own usable bikes or even consider biking as a valid transportation option. To provide greater access to biking for Lemon Grove residents and visitors, we recommend introducing bike rental kiosks. These kiosks could be installed in central locations of larger neighborhoods, within walking distance of smaller neighborhoods, shopping centers, trolley stops, and at major parks in Lemon Grove.

These rental bike kiosks would provide access to bikes for residents who do not currently own one of their own. We also suggest that as the number of bikers increases, the city provide additional safe and secure bicycle parking locations in schools, parks, employment centers, and transitstops. Biking as a means of transportation could also be incentivized and promoted by the city. Events that encourage cycling, such as Lemon Grove Bike Day, could be promoted, and incentives could be provided for residents to use alternative methods of transportations. Lemon Grove could partner with a supplier of bike rentals, such as DecoBike. This company offers a free one-week trial for new bikers. Providing free bike rentals during Lemon Grove Bike Day could encourage more residents to try biking or motivate them to rent and bike more often. The city might also choose to offer community bike-riding classes or create a biking club. These promotions encourage residents to be active in the community and feel comfortable using their bikes as a form of transportation. Tax incentives could also be provided for those who bike to work and school. These incentives could offset the cost of purchasing a bicycle in exchange for helping lower GHG emissions.

Bike lockers could improve public safety in Lemon Grove by diminishing the fear of bike theft and vandalism. Secure bike lockers could be installed in centralized parts of the community, outside grocery stores, and at trolley stops to alleviate fear of theft whileusing energy-efficient transportation. Bike lockers are very simple to use; individuals park their bike in a vacant space of a bike

box and lock it free of charge. Every locker canhold two bikes, each with an individual lock. There are currently two bike lockers at the Lemon Grove Depot trolley station, but more would be needed if bicycle use were to increase. Bike lockers can be painted and decorated by local artists to get the community involved while improving public safety and promoting energy-efficient transportation.

Maizlish and colleagues (2013) examined the health benefits of transportation strategies to reduce GHG emissions in the San Francisco Bay Area. Explanatory factors included physical activity, particulate matter, GHG emissions, and travel patterns and injuries. Disease burden was measured in disability-adjusted life years based on exposure-re- sponse relationships and distributions. They found that increasing active transport, like bicycling and walking, for 4 to 22 minutes reduced cardiovascular disease and diabetes by 14%, decreased GHG emissions by 14%, and reduced GHG by 33.5% with low-carbon driving. However, the model showed that active transport increased traffic injury burden by 39%. The researchers concluded that active transport could not only generate an improvement in population health, but also reduce GHG emissions sufficient for California to meet GHG reduction targets. However, measures need to be taken to minimize walking and bicyclinginjuries.

Milwaukee, Wisconsin is one of many cities that has successfully implemented bike share kiosks for its community and visiting tourists. In 2014, nearly $13 million was approved by the Wisconsin Department of Transportation to fund the TransportationAlternatives Program. Nearly $1.2 million of the $13 million was given to the City of Milwaukee for interactive bicycle mapping applications, city-wide bicycle parking programs, bicycle facilities planning, and road and bridge infrastructure modifications (Wisconsin Department of Transportation, 2014). Milwaukee's initial bike share project cost $1.6 million. The vast majority, 80% ($1,280,00), came from the federal Congestion Mitigation/Air Quality (CMAQ) program (Milwaukee Independent, 2016). The CMAQ program provides funding for transportation projects that seek to alleviate traffic con- gestion and enhance air quality. The remaining 20% ($ 320,000) of the $1.6 million came from city funds, as the grant required the city to match this amount (MilwaukeeIndependent, 2016). With these funds, the city installed 30 Bublr bike share kiosk stations. Businesses in the Milwaukee area can choose to be a sponsor the citywide bike share program. Businesses that choose to sponsor the program receive publicity, advertisement, and Bublr bikes. Bublr bikes and the City of Milwaukee continuously look to find new partners and continue existing partnerships to raise private funds for more bike stations.

NATURAL GAS

Natural gas is the third largest contributor to Lemon Grove's GHG emissions, at 22% (EPIC & Atkins, 2013). 79% of this natural gas usage in Lemon Grove is residential, with only 21% attributable to commercial and industrial usage. Solar panels can significantly reduce residential natural gas usage. As a free and renewable source of electricity, solar panels provide an alternative heating source and eliminate the need for natural gas and stove-top burners. Many gas-powered appliances, including resistance or electric heat- ers and water heaters, tankless water heaters, and electric stoves, can be replaced with electrical appliances. As solar energy continues to replace non-renewable fuel sources, electricity will become a more sustainable power source than natural gas. Taking into consideration past and present electricity costs, installing solar panels will help residents maximize energy savings as well as obtain full benefits from solar roofs or panels, primarily due to the usage of new electric appliances that replace the use of gas-powered appliances.

Additional home improvements could also lower natural gas usage. ENERGY STAR reports that water heaters are the second highest source of natural gas usage in thehome (ENERGY STAR, 2017), and installation of ENERGY STAR-certified water heaters could significantly reduce residential energy usage. The Planning Division of the Devel- opmental Services Department of Lemon Grove links residents with ENERGY STAR as a resource for home improvement programs. As a US Environmental Protection Agency (EPA) voluntary program, ENERGY STAR offers energy-efficient alternatives to appliances, lighting, office equipment, and electronics, while encouraging homeowners to take the ENERGY STAR pledge, reducing GHG emissions and saving money. Since its formation

in 1992, ENERGY STAR programs across the US have reduced GHG by 2.5 billion tons, saving homeowners over $362 billion on utility bills (ENERGY STAR, 2017). Upgrading to an ENERGY STAR-certified water heater would not only reduce the usage of natural gas, but it would benefit the home owner by helping them save on their utility bill. Other home improvements that could reduce reliance on natural gas include installation of low-flow faucets, shower heads, and toilets and washing clothes and other laundry items in cool water and hanging them to dry.

SOLID WASTE
Recycling and Composting

Table 1: Current recycling mandates in Lemon Grove.

Name	Description
Assembly Bill 341	No less than 75% of solid waste generated by the state of California will be source reduced, recycled, or composted by the year2020.
Construction and Demolition Debris (C&D) Recycling	Lemon Grove's construction and demolition ordinance has a minimum 75% recycling rate for construction debris and a 100% recycling rate for land-clearing debris.
Hazardous Waste HomePickupProgram	Lemon Grove offers a free hazardous waste home pickup program for seniors and disabled residents.

Table 1 displays the recycling mandates currently in place for the City of Lemon Grove. Taking these directives into consideration, we recommend that Lemon Grove expand upon their recycling and composting programs. This would limit the production of GHGs, including methane, carbon dioxide, and water vapor. Recycling reduces the amount of waste sent to landfills and combustion facilities and lessens the need to collect new raw materials—both of which combat climate change by preventing the further release of methane and carbon dioxide into the atmosphere (Kitchen, 2014). According to the US EPA, 20–30% of trash Americans dispose of is compostable (EPA, 2016).

The imple- mentation of these programs would require relatively minimal effort by the city yet would provide considerable environmental benefits. Implementation of composting would cause an estimated reduction of 5,192 tons of waste, eliminating 2,000 metric tons of carbon dioxide per year (GHG Equivalencies Calculator, 2016). Incorporating composting and recycling systems throughout Lemon Grove is a straightforward and effective way for the community to mitigate climatechange.

WATER AND WASTEWATER
Xeriscaping

Xeriscaping is a type of landscaping that makes use of creative designs to reduce or eliminate water usage. When planning and designing a xeriscape yard, an initial outline of the property is established to provide a general idea of where to establish zones. For instance, it would be beneficial to note areas that include both sun and shade so that plants with similar watering needs can be grown together (Eartheasy, 2012). Soil alsoplays a significant role in xeriscaping because it drains and stores water at the same time. For this to occur, there should be an exceptionally high amount of organic material, such as compost, in the soil to keep it aerated (Eartheasy, 2012).

In planning a xeriscape design, turf is reduced as much as possible. Seasonal grasses and drought-resistant plants that require less water usage are recommended. Any greenery is, ideally, surrounded with a water-retaining mulch, such as bark or compost. Xeriscape landscapes also require efficient irrigation, such as soaker hoses and drip irrigation systems, that waters the base of the plant and reduces moisture loss from evaporation (Eartheasy,2012).

There are many benefits to xeriscaping. A xeriscape design can reduce landscape water use by 50–75%. Although some maintenance is still required, it is often less than with traditional landscapes. The use of native plants can eliminate the need for chemical sup- plements, such as fertilizers and pesticides, and replacement of grass can eliminate the need for a lawn mower.

3 ADAPTATION STRATEGIES

Adaptation is defined by the United Nations Framework Convention on Climate Change (UNFC) as the "adjustments in ecological, social, and economic systems in response to actual or expected climatic stimuli and their effects or impacts" (UNFCCC, 2014). Suc- cessful adaptation measures not only require the cooperation of local, national, and even global government institutions, but also the cooperation from an engaged civil society. The following adaptation strategies include recommendations to reduce the impact of GHG emissions in Lemon Grove.

TRANSPORTATION

Cool Pavements

One potential adaptation to climate change is increasing the ability for community mem- bers to spend more time outside by facilitating walking on the city's pavements and sidewalks. Due to climate change, the weather has been changing and becoming warmer. The United States has experienced an average of 400 extreme-heat-related deaths, and heat-related deaths are likely underreported (Basu, 2014). Implementing cool pavements and sidewalks, which include the addition of materials to reflect sunlight, allows a signif- icant amount of cooling and water evaporation in these areas (Heat Island Cooling Strategies, 2016). Solar-reflective pavements are also safer for drivers at night because they increase visibility (Cool Pavements, n.d.). This implementation could reduce health costs by decreasing heatexposure.

Cool Zones

Cool Zones are designated air-conditioned buildings where seniors, individuals with disabilities, and other members of the community can go to escape extreme heat (Cool Zones, 2016). Currently there are three Cool Zones located in the city—the LemonGrove Senior Center, Christian Church of Lemon Grove, and the Lemon Grove library (Cool Zones, 2016). These Cool Zones are in place for those who may not have an air-condi- tionedhome,allowingresidentstosta ycoolandpreventingtheoccurrenceofheat-relat- ed illness. To make the best use of this resource, we recommend increasing awareness of the Cool Zones, especially among populations at risk for heat-related injuries, and establishing additional locations so that they are accessible to everyone. Awareness of Cool Zones could be disseminated through flyers posted in coffee shops, grocery stores, and schools or online via the Lemon Grove website and other social media sites for communities. To ensure that the city's Cool Zones are energy efficient, we recommend that the facilities being utilized as Cool Zones update, service, and modify their heating, ventilation and air conditioning (HVAC) equipment and system as needed. ENERGY STAR's "A Guide to Energy-Efficient Heating and Cooling" can be utilized to ensure ener- gy efficiency for the city's Cool Zones (US EPA, 2009).

WATER AND WASTEWATER

Water Conservation

Water conservation is another potential adaptation effort suitable for climate action planning in Lemon Grove. Greywater is defined as the relatively clean wastewater frombaths, sinks, washing machines, and other kitchen appliances (Greywater, n.d.). This water holds the potential to reduce Lemon Grove's dependence on municipal water sources to irrigate residential landscaping. Greywater reclamation can also be used in commercial and municipal buildings to irrigate city parks and other greenscaping. In an article published by the University of California, Los Angeles, Cohen (2009) states that urban residential use accounts for 54% of all nonagricultural water use in the state, a dis- turbing figure considering the long-term drought in California. Simple in construction and easy to install and maintain, a greywater system (shown in Figure 4) could be an important source of water to sustain increased green spaces and residential landscaping. With an environmentally friendly water supply to sustain more trees and greenery, CO2-filtering vegetation could further reduce the amount of GHG present in the atmosphere.

Lemon Grove could also consider rainwater recapture for water conservation. The semi-arid climate of San Diego County makes Lemon Grove a suitable location for water harvesting, Lemon Grove could collect enough rainfall to reduce its dependence on imported water. Rainwater recapture systems could be placed at the elementary schools in Lemon Grove, and the collected rainwater could then be used as a secondary source of irrigation to water gardens and trees. Locating these systems at schools would also make water-conservation practices visible to youngpeople. A similarly important component of water conservation is education outreach. Lemon Grove could collaborate with their local water district to educate residents on

water conservation practices and increase awareness of how drinking water is treated and transported in the community. Helix Water District is already an excellent example of community outreach via school education programs, "water talks," and its water policy watch that keeps residents informed and invested in water policies. The City of Lemon Grove could further contribute to these community programs by extending access tomore residents and highlighting the importance of water conservation and wastewater management (Helix Water District, 2017).

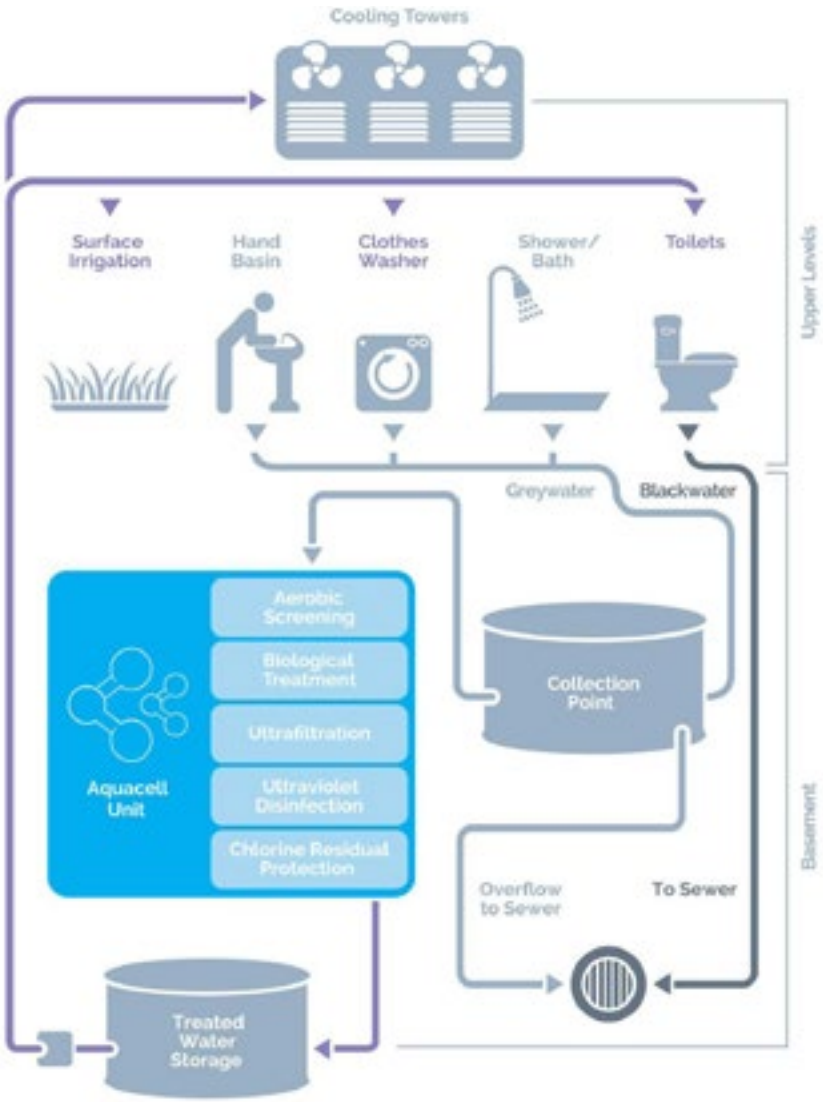

Figure 4: Greywater system.

City of Lemon Grove Marker on the corner of Broadway & Lemon Grove Ave.

4 CROSS-CUTTING STRATEGIES

The following cross-cutting strategies are applicable as both mitigation and adaptation measures in response to climate change. Table 2 displays all the recommended mitigation, adaptation, and cross-cutting strategies discussed in this report.

Table 2: Cross-cutting strategies.

Strategy	Mitigation	Adaptation
Biking Expansion	X	
Bus Pass Subsidization	X	
Climate Change Education	X	X
Cool Pavements		X
Cool Zones		X
Establishment of Attractions	X	X
Green Building Standards	X	X
Incentives	X	X
Increasing Green Space and Parks	X	X
Infrastructure Renovation	X	X
LED Street Lighting	X	
Recycling and Composting	X	
Solar Panel Installation	X	
Vehicle Sharing	X	
Water Conservation		X
Xeriscaping	X	

INCREASING GREEN SPACE AND PARKS

In order to adapt to climate change, the City of Lemon Grove could further enhance some of the policies that are already in place and adopt new ones. We recommend that the City of Lemon Grove adopt the strategy of increasing the amount of "green space" within the city. This could be accomplished by planting additional trees and creating more parks. In Lemon Grove, there are multiple undeveloped parcels of land. The city could purchase these vacant land spaces and develop them into parks to improve Lemon Grove's aesthetic appeal and lower its GHG emissions. We do recommend, how- ever, the city that focus on the idea of "green streets," rather than on pavements and trees, because an increase in trees naturally accompanies an increase in water.

The optimal plant types for this purpose are drought-resistant varieties and those that absorb carbon dioxide at high rates. Crassulacean acid metabolism (CAM) species are succulent plants appropriate for the climate conditions in Lemon Grove. CAM species have an adaptive advantage in minimizing water loss, and they are very useful in hot, dry environments. Examples of this species include cacti, succulents, orchid family, stonecrop family, and jade plants; they require low maintenance because their waterand carbon dioxide absorption rates are very high (Dimmitt, n.d.).

The existence of problematic "heat islands" in Lemon Grove could be addressed by increasing the amount of green space in the city. A heat island, which is commonly found in urban areas, is significantly warmer than nearby rural areas due to increased human activity, mainly through surface modifications. The elevated daytime tempera- tures, reduced cooling, and higher pollution levels of heat islands can affect human health by causing discomfort, heat cramps, heat exhaustion, heat stroke, or mortality (US EPA, n.d.). Adding trees throughout the city would help minimize these heat island impacts. It would also help lower surface and air temperatures, providing shade and cooling through evapotranspiration (Heat Island Cooling Strategies, 2016). The US EPA quantifies that shaded surfaces can be up to 20–45 degrees Fahrenheit cooler than pinnacle temperatures of unshaded surfaces (US EPA, 2016). The EPA also states that evapotranspiration associated with trees and vegetation can help reduce peak temperatures further by an additional 2–9 degrees Fahrenheit. Increased placement of trees and otherfoliage outdoors can lower surface and air temperatures in addition to storing 110 metric tons of carbon with only 21% tree coverage (Nowak, 1993; Heat Island Cooling Strategies, 2016). By simply increasing the tree coverage to 28%, it is estimated that carbon storage would reach between 350–750 metric tons over the next fifty years (Nowak, 1993). Increased shading from planting trees in communities may also reduce energy costs related to air conditioning usage. Not only would immediate shading be increased with this simple adaptation, but a large amount of carbon would be absorbed, mitigating carbon sinks. Three trees placed strategically around a single-family home can cut summer air conditioning needs by up to 50%. By reducing the energy demand for cooling homes, we also reduce carbon dioxide and other pollution emissions from power plants. During the winter season, trees can act as windbreakers, softening cold, harsh winds. Water savings can also be substantial—shade from trees slows

water evapo- ration from thirsty lawns. Most newly planted trees need only fifteen gallons of water per week, and they transpire, increasing atmospheric moisture. Trees also contribute positively to surrounding property values. Business districts with more trees and landscaping have been shown to have better outcomes than those with less greenery (Top 22 Benefits of Trees, 2015). A tree-lined street may also slow traffic enough to allow drivers to look at local store fronts. It is also important to recognize, however, that discharges from some trees can clog storm drains, and even generate stormwater pollution. Additional tree species and information on each type of tree can be found in a table format in Appendix IV.

The Albizia Julibrissin, also known as the Silk Tree (Figure 5), is not native to San Diego, but it is drought-friendly. This tree also performs best when exposed to high heat. The Lyonothamnus floribundus, also known as Catalina Ironwood (Figure 6), is native to San Diego. This tree is an evergreen tree that grows white flowers in early summer. These two trees are small canopy trees that can grow up to 25 feet high and have a spread of about 15 feet (Evergreen Nursery, 2016). These trees could be planted insmall neighborhoods where the sidewalks are smaller than the main roads of the city. These trees may help motivate residents to walk around their neighborhood, even during hot days, because of the increased shade they provide.

The Chilopsis linearis, commonly known as the Desert Willow (Figure 7), is also drought-friendly, and their flowering season is from spring through fall. It is deciduous, which means that there is a lot of shedding of the leaves and flowers (Fikes, 2015). The Quercus engelmannii, also known as the Mesa Oak (Figure 8), is an evergreen tree that also flowers during the spring (Floyd et al., 2000). These two trees are large canopy trees that can grow up to 50 feet high and have a spread of 30 feet. These trees could be planted on the main streets of Lemon Grove Avenue to provide shade for pedestrians around businesses and public transportation stops.The city would not need to plant many of these large canopy trees because of the large amount of shade that they provide, which would leave room for pedestrians on sidewalks and be less likely to distract from local businesses.

Figure 5: Albizia Julibrissin (Silk Tree).

Figure 6: Lyonothamnus floribundus (Catalina Ironwood).

Figure 7: Chilopsis linearis (Desert Willow).

Figure 8: Quercus engelmannii (Mesa Oak).

ESTABLISHMENT OF ATTRACTIONS

To encourage walking and biking in the community, we recommend establishing attrac- tions near trolley stations, residential areas, schools, and parks—places where children and adults gather—so that people can easily walk or bike to those sites. More features, such as trendy shopping venues, farmer's markets, restaurants, and small cafes, could be added as well as parking spaces with solar-powered meters to limit car use. By providing access to attractions within walking or biking distance, residents may be more likely to choose non-motor forms of transportation.

We identified several unused lots in Lemon Grove, including a vacant lot near Berry Park (shown on the map in Figure 9) and several lots on Lemon Grove Avenue and in residential areas. Areas with empty lots could be replaced by farmer's markets, trees, or parking lots (mostly near trolley stations). These establishments would promote

walking because they would provide desirable locations within walking distance of many residents' homes. Farmer's markets help establish a sense of community by providing a venue where neighborhood residents can walk to purchase their groceries. Farmer's markets promote healthy behaviors and can help develop a level of trust and familiarity in the community. Lemon Grove previously held a weekly farmer's market on Broadway,but it only lasted a short amount of time before its closure. The city could benefit from re-introducing a centralized, Saturday-morning farmer's market that would encourage green behaviors in thecommunity.

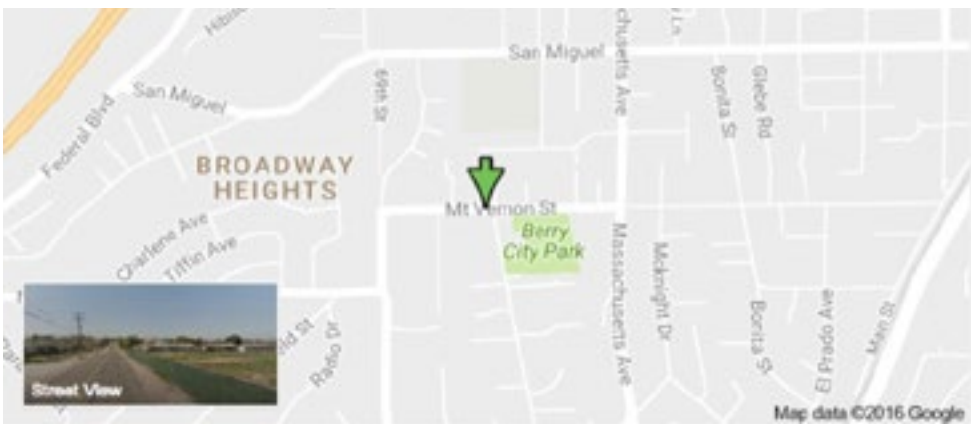

Figure 9: Vacant lot near Berry Park.

EDUCATION

Another climate adaption plan that we propose is a user-friendly website similar to the prototype that we have created (please visit http://nicoleba11.wixsite.com/lemongrove).There are several tabs to navigate, including "Home," "About," "Education," "Neighbor- hood Watch," "Community Activities," "Rideshare," and "Gallery". In the "Education" tab, residents of Lemon Grove can learn ways to stay cool in the hot weather. These include coolest and hottest times of the day, locations of public drinking fountains, and access to bike maps that display the most shaded routes. The "Neighborhood Watch" tab allows residents to report and be informed of suspicious activity occurring in their neighborhood. In the "Community Activities" tab, residents of Lemon Grove can learn when and where to attend events happening in the community. This will create opportunities for neighbors to get to know each other and allow residents to see familiar faces when out and about in Lemon Grove. Both the "Neighborhood Watch" and "Community Activities" tabs support a safe, close-knit community that can indirectly lower GHG emissions by creating a comfortable environment for bike-riding orwalking.

Environmental agencies, such as the San Diego Air Pollution District, are available towork with the residents of Lemon Grove (Air Pollution Control District, n.d.). This agency offers community outreach programs to educate the public about the impacts of air pollution and ways to improve air quality. We believe that combatting climate change is best accomplished as a team effort, involving education and outreach to all residents of Lemon Grove.

Educating the community, especially vulnerable populations, can benefit at-risk groups. The elderly population and those with chronic illnesses may have a more difficult time recognizing that environmental changes can personally affect them in negative ways (Cambridge, 2013). These at-risk groups, in particular, stand to benefit from education that enhances their understanding of their susceptibility to heat-related illnesses.

Public service announcements, such as door hangers, seminars, or television broadcasts, which have been shown to significantly reduce mortality rates (Carter et al., 2009), can spread awareness and teach preventative measures to the elderly or other vulnerable populations. Classes hosted in Cool Zone locations during the spring could inform the elderly of the negative health related effects that climate change poses on their age group.

Communities in Lemon Grove with a large elderly population could also be made aware of upcoming heat waves that are expected to hit San Diego County. At-risk residents can reduce their risk of heat-related injury by using their air conditioners and electric fans; keeping their shades down and blinds closed but windows slightly open; wearing light, loose-fit clothing; and drinking fluids and avoiding caffeine and alcohol. If one takes diuretics, they should ask their doctor about lower dosages during hot temperatures and call a doctor immediately if suffering from any heat-related illnesses(Cambridge, 2013).

INCENTIVES

The mitigation and adaptation strategies discussed above are not contingent on the success or failure of any single improvement to Lemon Grove; instead, they divide multiple tasks and responsibilities between the city and its residents in the hopes that small community changes will add up to larger, city-wide improvement. These sug- gested projects are unlikely to survive long-term without residents taking an active role and interest in their development.

We recommend that the planners and implementers of these improvements ensure that those involved are justly rewarded for their efforts toward a more environmentally friendly LemonGrove.

To encourage adaptation of the proposed mitigation and adaptation strategies, we suggest offering select incentives and rebates to those that decide to participate. Incentives could come in several forms. For instance, monetary incentives can be offered to help residents with transition costs related to implementation of these strategies. Informational outreach devoted specifically to these projects could be set up at community functions, schools, churches, grocery stores, and other local gathering points in Lemon Grove. At these places of outreach, pamphlets containing information about the city's CAP could be made readily available to residents.

Figure 10: Outdoor exercise equipment.

Additionally, other incentives, such as gift cards for the bike share, discount cards for local bikeshops, and special deals from landscaping and remodeling businesses, could encourage residents to participate in these projects. Other incentives might come in the form of rebates already offered by the City of San Diego and SDG&E. Currently, San Diego County residents can earn between $1 and $1.50 per square foot of lawn converted into drought-resistant landscape (Grass Replacement Rebates, n.d.).

We propose that the City of Lemon Grove add an additional 75¢ to this figure for residents who are willing to xeriscape their yards. San Diegans can earn a rebate of up to $300 per kW (Rebates Guide, n.d.) for various energy-saving improvements around the home. We are suggesting an additional $60 per kW from the City of Lemon Grove for the first 12 months after a full inspection of the developments. It is our hope that by promoting the benefits of these proposed changes, including incentives, the city will see a large, rapid response from residents.

INFRASTRUCTURE RENOVATION

Sustainable renovation of currently existing infrastructure is crucial to combating climate change. This can be further developed with the establishment of newer and "greener" buildings. Developing safer sidewalks, bike lanes, and crosswalks, widening streets, and installing solar-powered lamp posts would provide a safer environment, which, in turn, encourages people to walk and use public transportation. Incorporating simple outdoor fitness equipment (shown in Figure 10), reflexology foot paths that are good for blood circulation (shown in Figure 11), playgrounds, skate ramps, sport areas, and rental bikes can encourage residents to exercise and go to their local park. Picnic areas equipped with solar-powered canopies and gazebos can also stimulate commu- nity engagement, in addition to the energy savings they provide.

Figure 11: Reflexology foot path.

5 UNITED NATIONS TOOLKIT

The Guiding Principles for the City Climate Action Planning Toolkit was launched at the Paris Climate Change Conference in December of 2015 (United Nations Habitat Toolkit, 2016, p. 4). In accordance with their endorsing partners, the United Nations Human Settlements Programme developed this Toolkit to discern how closely global climate action planning would adhere to the structured guidelines outlined within the Toolkit.

These eight principles are intended to strengthen communication between cities concerning climate policies and, in so doing, empower cities by sparking climate change awareness (United Nations Habitat Toolkit, 2016, p. 7–9). A table summarizing each principle with our recommendation can be found in Appendix VI.

Principle 1: ***Ambitious*** evaluates the city's long-term emission reduction targets in comparison to the country's nationally set targets. In addition, it asks that the city understand their root causes of poverty and seeks to attenuate these causes throughadaptation programs. Finally, it asks for the city to set dates to review their plan (United Nations Habitat Toolkit, 2016, p. 13–14).

Since its establishment in December 2015 and implementation in May 2016, the Guiding Principles Toolkit has been utilized in the evaluation of two cities: Vilankulo, Mozambique and Glasgow, Scotland. In evaluation of these guidelines under Principle 1: Ambitious, Glasgow received the highest rating of full compliance (Guiding Principles for City Climate Action Planning Glasgow, Scotland [UK] Assessment Report, 2016, p. 9). This report states that the Scottish Government plans to reduce emissions to 80% below 1990 levels by 2050, which is overall more ambitious than targets set by the European Union. Glasgow has also published two highly informative documents, the Energy and Carbon Masterplan as well as the Resilient Strategy, which are updated yearly and outline the city's goals for reducing GHG emissions (Guiding Principles for City Climate Action Planning Glasgow, Scotland [UK] Assessment Report, 2016, p. 12–13).

It is thus within our recommendation that Lemon Grove focus on California 2020 targets in comparison to national targets, as California plans to reduce emissions to 80% below 1990 levels by 2050, overall more ambitious than nationally set targets (City of San Diego, 2016). Lemon Grove could also focus on reaching out to lower income communities by collaborating with SDG&E. SDG&E can identify residents with low income plans and further reduce energy costs for these families by providing education and supplies. These plans are defined by SDG&E as "Bill-Assistance Programs" and are available to those with annual income less than $31,500. SDG&E states that it is their goal to enroll as many households as possible in order to save on energy bills and energyusage (San Diego Gas and Electric, 2016). Finally, we recommend that Lemon Grove produce two plans, similar to those created by Glasgow: one outlining the city's emissions targets (to be updated biannually) and a second discussing the adaptation plans for the city, protecting vulnerable populations and criticalinfrastructure.

Principle 2: ***Inclusive*** emphasizes the need for the city's CAP to document discourse between one or more marginalized stakeholders (women's groups, low-income neighborhoods, e.g.,) in addition to non-marginalized stakeholders, such as potential economic partners (UN Habitat Toolkit, 2016, p. 14–15). In this category, both Vilanku- lo and Glasgow demonstrated a very inclusive planning process. (Guiding Principles for City Climate Action Planning Glasgow, Scotland [UK] Assessment Report, 2016, p.15; Guiding Principles for City Climate Action Planning Vilankulo Mozambique,2016, p. 8). Thus, drawing from these plans, we recommend that Lemon Grove work with community members during their initial drafting process of their CAP. These workshops can include city council meetings or informational sessions, and also events, such as the annual Lemon Grove Bonfire or "Coffee with the Council."

Workshops should pro- vide an open information forum between community members and the drafters of Lemon Grove's CAP. We believe it is vital that among these community members are marginalized group members, such as women and low-income individuals. We also recommend that the city collaborate with economic stakeholders for assistance in effectively executing Lemon Grove's CAP. These stakeholders can include: San Diego State University, EDCO, Helix Water District, SDG&E, Lemon Grove Thrive, Environmental Health Coalition, and various Public Health Organizations, such as Lemon Grove HEAL Zone. Lemon Grove residents and city departments can seek col- laboration with community organizations, such as

Lemon Grove HEAL Zone, by working together to redesign policies that support healthy and active lifestyles, and also by working to increase awareness, motivation, and knowledge of these healthy behav- iors. Lemon Grove is already a good example of this cooperation, having been rec- ognized with the "Healthy Community Award" in 2015, for the second consecutive year (HEAL Zones, 2015).

Principle 3: ***Fair*** requires policies within the plan to seek solutions that equally address the risks of climate change, sharing the costs and benefits of action across the entire City of Lemon Grove—both in mitigation and adaptation efforts. Some cities have even taxed heavy GHG emitters in order to subsidize industrious, low GHG emitters. It is important to decide how responsibility will be divided among the community, as well as ensuring that the adaptation measures aim to help one or multiple marginalized groups in Lemon Grove (UN Habitat Toolkit, 2016, p. 16-17).

Glasgow's plan under this principle prioritized individuals living in "fuel poverty" as well as community members suffering from health inequities and high unemployment rates (Guiding Principles for City Climate Action Planning Glasgow, Scotland [UK] Assessment Report, 2016, p. 16). It is important for Lemon Grove to ensure that the entire community can implement climate strategies. These initial low-cost strategies could be considered the lowest threshold, or bare-min- imum participation. Furthermore, the city could then provide incentives for others who go above and beyond this threshold. This way, lower income individuals are not bur- dened financially, and higher income individuals will be compensated for their mitigation efforts. Through these efforts, we recommend that the City of Lemon Grove prioritize the lower income households—as well as possibly collaborate with SDG&E, as men- tioned above—to lower energy bills in cost effective ways that benefit both individual residents and the city.

Principle 4.1: ***Comprehensive*** describes the need for effective communication and collaboration with local governments that meet once a year. The city's CAP must address adaptation and mitigation strategies in two or more sectors. (UN Habitat Toolkit,2016, p. 18-19). Although there is no clear indication of which city departments will collaborate for Lemon Grove's CAP, we propose that those involved should include the Public Works, Developmental Services, Finance, and City Manager's Departments. We would also recommend that the city establish a cross-departmental working group onclimate change, instilling the cooperation of multiple departments, as opposed to assigning it to a single one.

Principle 4.2: ***Integrated Horizontally and Vertically*** states that the city's CAP should coordinate with local/metropolitan areas, intermediate levels of government, as well as national levels of government regarding climate action or resilience planning (UN Habitat Toolkit Guiding Principles for City Climate Action Planning, 2016, p. 19-21). Our recom- mendation is that, as the CAP for Lemon Grove develops, the city seek partnership with other municipalities, networks, and organizations. For example, Lemon Grove could seek partnerships with San Diego Association of Governments (SANDAG) or other highly influential community organizations, such as the Environmental Health Coalition and Lemon Grove HEAL Zone. It is also recommended that, throughout this process, Lemon Grove seek collaboration with the State of California as well as the federal government as needed.

Accordingly, we recommend that Lemon Grove collaborate with SANDAG's technical working groups from the 18 cities in San Diego County that discuss climateplanning.

Principle 5: ***Relevant*** proclaims that the city's CAP should reference local development plans. It also states that the CAP should be able to support the priorities of city devel- opments, as well as economic and social developments (UN Habitat Toolkit Guiding Principles for City Climate Action Planning, 2016, p. 22). Glasgow outlined in its Energy and Carbon Masterplan the strategies that will be implemented to meet Glasgow's set energy targets. These include gradually replacing fossil fuels as a source of heat, installation of LED lighting, the establishment of coordinated district heating systems, and the expansion of waste to energy—among many others (Energy and Carbon Masterplan: Sustainable Glasgow, 2010). Further expanding on these ideas, we recommend that Lemon Grove plant trees—which have the dual benefit of reducing city-wide GHG emissions and providing shade—or Cool Zones throughout the city. In mitigating potential flooding areas, we recommend that the City of Lemon Grove incor- porate "green" infrastructure. Green infrastructure practices, such

as rain gardens and floodplain management, absorb rainfall and reduce the amount of water flowing into rivers and streams. This can decrease occurrences of residential flooding and redirect runoff from the environment to a contained area where it can then be recycled and effectively utilized.

Principle6: ***Actionable*** declares that city finances must be utilized in a most-cost-effective manner towards implementing actions, with identified funding sources. Italsorequires that the CAP's actions are sequential over time (UN Habitat Toolkit, 2016, p. 22–23). We recommend identifying "quick wins" that can be easily accomplished upon implementa- tion of the city's CAP, such as the adaptation plan from Ho Chi MinhCity.

We recommend that Lemon Grove obtain grants and create a budget plan for their CAP. The City of San Diego plans to have $130 million in new funding to execute five strategies within the CAP in 2017 (City of San Diego, 2016). These strategies include clean and renewable energy, energy and water efficient buildings, transit and land use, zero waste, and climate resiliency. We believe it is crucial that enough departments and staff are assigned to help with mitigation and adaptation efforts throughout this process. Focusing departmental efforts towards GHG reduction and energy conservation can prove cost effective and can progress the city towards reaching the reduction goals stat- ed in itsCAP.

Principle 7: ***Evidence Based*** requires that the city's CAP include a GHG emission inven- tory and vulnerability assessment that influenced mitigation and adaptation efforts of the plan. It also requires that these data reflect socioeconomic status within the city as well as local and scientifically gathered emission statistics (UN Habitat Toolkit Guiding Princi- ples for Climate Action Planning, 2016, p. 23-24). Glasgow published two documents: The Energy and Carbon Masterplan and the Resilient Strategy (Energy and Carbon Masterplan: Sustainable Glasgow, 2014; Resilient Strategy, 2016). GHG emissions data mustalsobebrokendownbysectorandupdatedbiannually.

Principle 8.1: ***Transparent*** outlines that the city will follow an open decision-making process when developing their CAP. The plan will also allow for open public reporting on the progress toward achieving these set goals (UN Habitat Toolkit, 2016, p. 25). It is within our recommendations that Lemon Grove continue to update community information on their website and that it remain available in the two most widely spoken languages in Lemon Grove: English and Spanish. Through this website, it may be beneficial to send out timely newsletters with community updates and make hard copies of these flyers available at schools, libraries, churches, community events, local stores, and bus shelters. These flyers could be posted outside of each location on a stand, displayed proudly. We provide sample flyers in Appendix V. Lastly, it is recommended that the progress of city meetings be well documented when discussing the creation of Lemon Grove's CAP.

Principle 8.2: ***Verifiable*** requires periodic measurement of progress towards achieving goals set by the city's CAP. This principle also requires that these goals and/or actions be representative of big-picture climate change targets (UN Habitat Toolkit Guiding Principles for Climate Action Planning, 2016, p. 26). One method to this aim would be to develop indicators for the plan's strategies. Similar to Principle 7, in order for a CAP to be verifiable, the GHG emissions data must be updated periodically—recommend biannually. We recommend that Lemon Grove representatives evaluate actions and goals periodically as well to determine if they have been successfully achieved. This will promote constant improvement because goals will need to be re-evaluated if they areunsuccessful. Lemon Grove will be able to formulate new ideas based upon other cit- ies' successes and thus constantly evolve and improve. We further recommend that Lemon Grove institute a plan to review and evaluate strategies in the CAP.

On December 2, 2016 members from the UN Toolkit Group in Chowdhury's PH452 course had the opportunity to host a table at the annual Lemon Grove community bonfire in an effort to raise awareness for beneficial climate conservation behaviors. At this tabling event, valuable feedback was collected from community members about their knowledge of climate change via a short five-question survey and flyers composed by research students working on this project. The survey was offered in both English and Spanish. This survey is available in Appendix II; a description of key results is available in Appendix III. Approximately 50 surveys were collected; however many additional community members conversed with group members about climate awareness and conservation in LemonGrove.

CONCLUSION

It will require a great deal of creativity and resourcefulness to tackle the many challenges presented by climate change, and this applies also to implementation of the strategies presented in this report. External funding sources, such as grants, bonds, charitable foundations, leasing agreements, power purchase agreements, and rebate programs (Borgeson & Zimring, 2013) may be able to offset some of the financial burden inherent in implementing some of these proposed strategies. Some of these funding mechanisms have already successfully supported energy-efficiency improvements for Lemon Grove in the past and might continue to support implementation of strategies outlined in this report. If adopted, we hope that many of these adaptive and mitigating climate planning strategies would lead to a reduction in GHG emissions that would help the City of Lemon Grove achieve future emission reduction targets. If we are to be successful in this battle against rising global temperatures, we must raise environmentally friendly residents who both "think green and teach green."

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APPENDICES

APPENDIX I: LEMON GROVE'S GHG EMISSIONS INVENTORY

For the year 2013, Lemon Grove's GHG emissions totaled 79,430 MT CO2e (metric tonsof carbon dioxide emissions). Of this amount, 79,430 MT CO2e electricity accounted for the largest sum of GHG emissions (36%), followed by transportation (28%) and natural gas (22%). The lowest contributors to community-wide GHG emissions were solid waste (9%), water (4%), and, lastly, wastewater (1%). From 2010 to 2013, there was an increase in city population of 1.2%. However, even with this increase, emissions over the course of these four years have varied less than 2% and have increased per capita emissions less than 1%. See Figure 12 for a visual representation of the GHG emission inventory in LemonGrove.

Electricity emissions in Lemon Grove are, overall, a result of residential electricity usage, more so than commercial and industrial usage. Transportation emissions are mainly a result of daily commuting, single-passenger vehicles. For a detailed breakdown of each sector, please refer to the City of Lemon Grove GHG Emissions Inventory and Forecast (City of Lemon Grove, 2015).

If Lemon Grove were to operate without any further climate interventions, the city would achieve a 6% increase in GHG emissions from the 2010 baseline by 2020. All sectorsexcept transportation are expected to increase in emissions quantity. According to AB 32, California's goals are to reduce GHG emissions to 1990 levels by 2020. This goal projects California to be below the business as usual levels by 15%. To fulfill California target goals, Lemon Grove would need to gradually reduce GHG emissions.

APPENDIX II: LEMON GROVE COMMUNITY SURVEY

SAN DIEGO STATE UNIVERSITY
SCHOOL OF PUBLIC HEALTH

THE sage PROJECT

Climate Change Survey
English Version

Surveyor: _____ Survey Number: _____

Please take a few minutes to fill out this survey. SDSU and the Sage Project appreciate your feedback and your answers will be kept confidential. Thank you for your participation!

1. How important is the issue of climate change to you?

☐ Very important ☐ Important ☐ Somewhat important ☐ Not important ☐ Don't know

2. Do you think climate change is an issue that is affecting you or will affect you personally?

☐ Very likely ☐ Likely ☐ Somewhat likely ☐ Not likely ☐ Very unlikely ☐ Don't know

3. Rank from 1 to 5 the following modes of transportation by the ones you use most frequently to get around (1 being the least)

- Driving alone motorized vehicles (car, motorcycle) ☐
- Carpooling ☐
- Public Transportation ☐
- Walk or Ride non-motorized vehicles (bike, skateboard) ☐

4. Do you see yourself participating in climate change prevention strategies? (Ex. Improving energy efficiency in your home, recycling and composting, low-water landscaping methods)

☐ Very likely ☐ Likely ☐ Somewhat likely ☐ Not likely ☐ Very unlikely ☐ Don't know

5. What would you need in order to use the prevention strategies mentioned in the above question? Check all that apply

☐ Incentives and rebates
☐ Community support
☐ Personal motivation
☐ Educational information

APPENDIX III: COMMUNITY SURVEY RESULTS

Figure 13: Importance and impact of climate change.

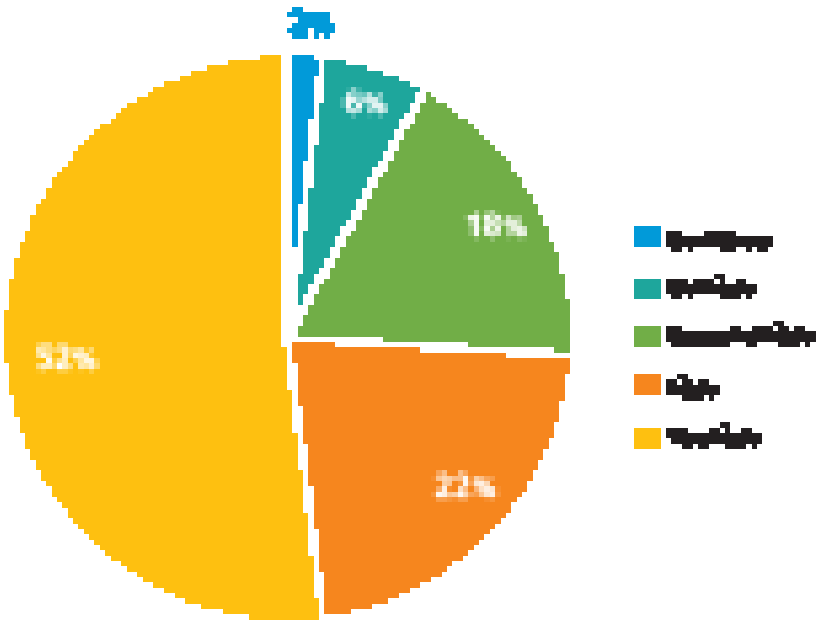


Figure 14: Participation in climate change prevention.

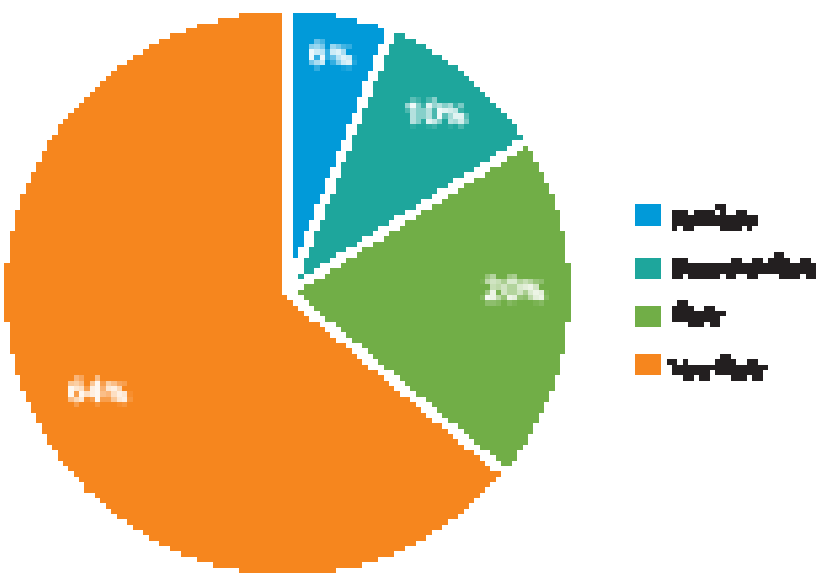


Figure 15: Most frequently used transportation methods.

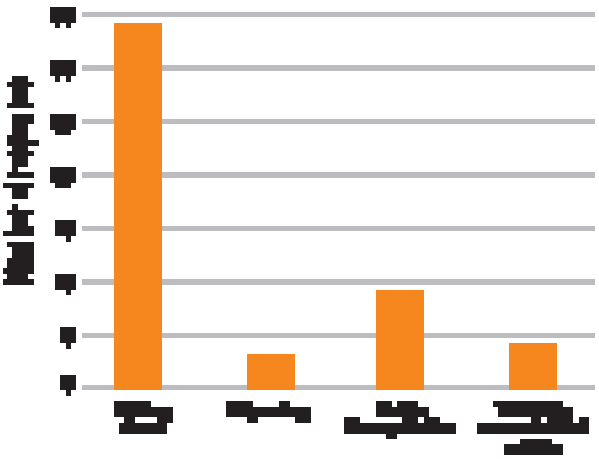
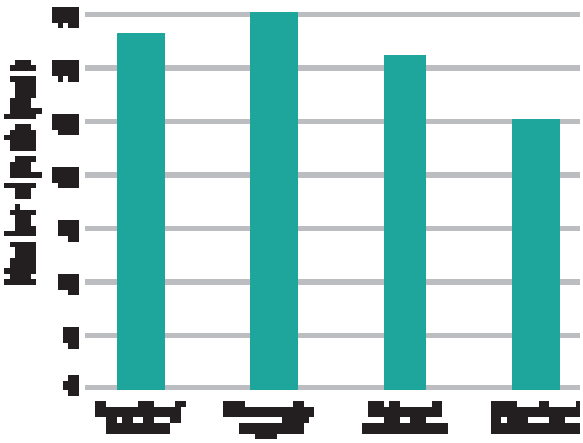


Figure 16: Reported needs for implementation of climate change prevention strategies.



This information suggests that many residents of Lemon Grove felt that climate change is an important issue to them that affects them on a personal level. In addition, a majority of community members surveyed indicated that they would participate in city actions supporting the reduction of GHG emissions. This information can be used to guide development of a CAP for Lemon Grove that acknowledges community support from those wishing to implement climate conservation behaviors.

These survey results highlight the importance of implementing adaptation and mitigation strategies that strengthen community involvement and interdepartmental government communication in Lemon Grove; this could also include incentive and rebate programs. Lastly, based on these results, community members were less interested in educational information; however, we maintain that education is crucial to the development of the city's CAP.

APPENDIX IV: TREE OPTIONS

Name	Pros	Cons	Requires	Source
Afrocarpus gracilior	– Clean tree (less than average litter) – Adapted to most of all climate zones in Western U.S	Pests: Spider mites Litter Issue is Dry Fruit.	*Full shade to full sun *Appropriate Location (north exposure, north side of buildings)	(Arizona State University,2017)
Albizia julibrissin	Fast growing Shade tree tolerant of various conditions	*Sensitive to pests/diseases (caterpillars, fusarium, mimosa webworm) *messy tree (fruit and flower litter) *Trunks and ranches:susceptible to breaking	*Full Sun to partial shade	– (Edward & Dennis,2015) – (SelecTree,2017)
Chilopsis linearis	– Low maintenance – Tolerates drought very well – Produces fragrant showy flowers – Desirable wildlife plant	– Susceptible to root rot if drainage is poor – Litter Issue is Dry Fruit.	Full sun (ideal)	– (SelecTree,2017) – (National Arbor Day Foundation, 2017)
Cinnamomum camphora	– Good drainage in clay soil. Smog tolerant – Fast growth – Dense shade from leaves	Susceptible to Anthracnose, Oak Root Rot, Phytophthora, Root Rot and Verticillium.	– Exposure Full Sun to Partial Shade. – Moist soil (prefer)	– (SelecTree,2017) – (Edward & Dennis,2015)
Hymenosporum flavum	– Low water needs – Biogenic Emissions low – Moderate shade capacity by leafs – Fragrant leafs	Branch strained is weak Litter Issue is Dry Fruit.	– Moist soil – Needs well drained soil – Full sun to partial shade	– (SelecTree,2017) – (SMGrowers, n.d.)
Lyonothamnus floribundus	– Drought tolerant – Shade capacity moderate to dense (on leafs) – Branch rate is strong – Very low water needs – Tolerant variety of soil – Fast growth	– Produces leaf litter (useful as mulch, but can bury other plants) – Susceptible to Aphids.	Prefers full sun or partial shade	– (SelecTree,2017) – (CalScape,2014)
Magnolia grandiflora	– Mostly pest free – Shade is dense to very dense by leaf – Fast growing – Flowers are ornamental – Planted in warm regions and subtropical areas	Litter Issue is Flowers, Dry Fruit and Leaves (messy, not easy to decompose)	Exposure to full sun to partial shade	– (SelecTree,2017) – (TWC Staff,2016)
Quercus engelmannii	– Moderate – Desirable wildlife plant Branches are strong	– Litter issue is dry fruit – Need plenty of room to grow	Prefer full sun	– (SelecTree,2017) – (CalScape,2014)
Acacia stynophellia	– Moderate litter of phyllode and fruit pod litter – Not invasive (good for narrow spaces) – Good for light shade and silhouette effect (moderate low)	Litter Issue is Dry Fruit.	Exposure to full sun	– (Arizona State University,2017) – (SelecTree,2017)

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Albizia julibrissin	– Edward,G & Dennis,W.(2015).Albizia julibrissin:Mimosa. Retrieved March 27, 2017, from http://edis.ifas.ufl.edu/st068 – SelecTree.(1995-2017).Albizia julibrissin Tree Record.Retrieved March 27, 2017, from https://selectree.calpoly.edu/tree-detail/albizia-julibrissin
Chilopsis linearis	– SelecTree.(1995-2017).Chilopsis linearisTree Record.Retrieved March 27, 2017, from https://selectree.calpoly.edu/tree-detail/chilopsis-linearis – National Arbor Day Foundation. (2017). Desert-Willow, Chilopsis linearis. Retrieved March 24, 2017, from https://www.arborday.org/trees/treeguide/ TreeDetail.cfm?ItemID=1077
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Acacia stynophellia	– SelecTree. (1995-2017). Acacia stenophylla tree record. Retrieved Mar 24, 2017 from https://selectree.calpoly.edu/tree-detail/acacia-stenophylla. – Arizona State University.(2017,02). Acacia stenophylla. Retrieved March 27, 2017,from http://www.public.asu.edu/~camartin/plants/ Plant%20html%20files/acaciastenophylla.html

Definitions:

*mulch | A material (such as decaying leaves, bark, or compost) spread around or over a plant to enrich or insulate the soil.
*screen | A tree that is left standing in a woodlot(area to provide shade

Tree Recommendations

Name		Height	Width	Flowering/ Fragrance/ Fruiting	Water Needs	Drought Tolerance	Root Damage	Growth Rate per Year	Evergreen	Source
Afrocarpus gracilior	African Fern Pine	50- 65 ft	10-20 ft	Yes/ Yes/ Seeds	Medium	No	Low	12-36 in	Yes	– (Shultz, 2014) – (SelecTree, 2017)
Albizia julibrissin	Silk Tree	20-40 ft	20-50 ft	Yes/ Yes/ Pods	Medium	Yes	No	24-36 in	No	– (Missouri Bo- tanical Garden, n.d.)
Chilopsis linearis	Silk Tree	15-30 ft	10 ft	Yes/ Yes/ Yes	Low	Yes	No	13-24 in	No	– (Melton, 1997) – (National Arbor Day Founda- tion, 2017)
Cinnamo- mum camphora	Camphor Tree	50-100 ft	50- 60 ft	Yes/ Yes/ Pods	Low	Yes	High	24 in	Yes	– (BioNET-EAF- RINET, 2011) – (SelecTree, 2017)
Hymeno- sporum flavum	Sweet- shade	20-35 ft	15-20 ft	Yes/ Yes/ Dry Fruit	Low	Yes	Low	12-24 in	Yes	– (SMGrowers, n.d.) – (SelecTree, 2017)
Lyonotham- nus flori- bundus	Catalina Ironwood	50- 60 ft	20-40 ft	Yes/ Yes/ No	Low	Yes	Low	24 in	Yes	– (California Invasive Plant Council, n.d.) – (University of Texas at Aus- tin, 2016)
Magnolia grandiflora	Southern Magnolia	60-80 ft	50-70 ft	Yes/ Yes/ Seeds	Medium	Yes	High	24 in	Yes	– (SelecTree, 2017)
Quercus engelmannii	Engel- mann Oak	50- 65 ft	80-120 ft	Yes/ Yes/ Yes	Low	Yes	Medium	12-24 in	Yes	– (SelecTree, 2017)
Acacia stynophellia	Shoe- string Acacia	20-30 ft	10-20 ft	Yes/ Yes/ Yes	Low	Yes	Low	36 in	Yes	– (SelecTree, 2017)

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APPENDIX V: SAMPLE COMMUNITY OUTREACH FLYERS

Sample flyer (English)

SAN DIEGO STATE UNIVERSITY
SCHOOL OF PUBLIC HEALTH

THE sage PROJECT
Community Engagement for Sustainable Cities

EARTH'S CLIMATE CHANGE

WHAT IS GLOBAL WARMING?

Earth's average temperature is rising. This increase in temperature melts ice over the land resulting in sea level rise. Humans have contributed to global warming through increase in carbon dioxide and other greenhouse gases in the atmosphere.

CLIMATE ACTION NOW

WHAT IS CLIMATE ACTION?

A strategic plan to decrease the amount of greenhouse gases emitted by a city over a period of time.

HOW CAN YOU GET INVOLVED?

- Walk, bike, carpool or use public transportation
- Recycle and compost
- Use low-water landscaping methods
- Drive alternative fuel vehicles
- Install solar or wind power devices to supply your house with electricity
- Incorporate high efficiency appliances in your home

Sample flyer (Somali)

SAN DIEGO STATE UNIVERSITY
SCHOOL OF PUBLIC HEALTH

THE sage PROJECT
Community Engagement for Sustainable Cities

ISEDELKA CIMILADA ADUUNKA

WAA MAXAY KUKULAANEYSIGA EE CAALAMKA?

Kuleeka adunka kor ayuu u kacayaa. Tani waxay kordhinesaa kuleelka iyo dhalaalinta barafka dulka. Taasoo keeneso in ey badda kor u kacdo. Aadamuhu ayaa qeyb ka kululaaneysiga ee caalamka iyada oo la kordhiyo in carbon dioxide iyo gaasaska kale lagu koriyo ee jawiga.

WAA MAXAY FICIL CIMILADA?

Qorshaha istiraatijiga sidaa loo yareeyo gaasaska guud oo ka baxo magaalada.

SIDEE BAAD UGA QAYB GELI KARTAA?

- Socda, baaskiil wata, is wadaaga baabuurta, ama isticmaala gaadiidka dadweynaha.
- Ka qeyb qaado dib u warshadayn ama loo yaqaana recaykilin (recycle).
- Isticmaala hababka muuqaalka dhirta guryaha oo biyo istic maalka yar.
- Isticmaala babuurta shidaalka kala duwan
- Ku rakib gurigaaga qalabka qoraxda ama dabaysha ku badasho koronto.
- Isticmaala qalab yada guryaha oo korontada yar ku shaqeeso.

Sample flyer (Spanish)

SAN DIEGO STATE UNIVERSITY
SCHOOL OF PUBLIC HEALTH

THE sage PROJECT
Community Engagement for Sustainable Cities

EL CAMBIO CLIMÁTICO

¿QUÉ ES EL CALENTAMIENTO GLOBAL?

La temperatura de la tierra está aumentando. Este aumento en la temperatura derrite el hielo sobre la tierra y ocasiona que el nivel del agua del mar se eleve. Los humanos hemos contribuido al calentamiento global mediante el incremento de emisiones a la atmósfera de dióxido de carbono y de otros gases de efecto invernadero.

¿QUÉ ES LA ACCIÓN CLIMÁTICA?

Es un plan estratégico para disminuir en un tiempo determinado la cantidad de gases de efecto invernadero emitidos en la ciudad.

¿CÓMO PUEDE USTED AYUDAR PARA PREVENIR EL CAMBIO CLIMÁTICO?

- Camine, use la bicicleta, comparta el automóvil o utilice el transporte público cuando le sea posible
- Recicle y composte
- Utilice métodos de reducción de gasto de agua
- Opte por vehículos que utilicen combustible alternativo
- Utilice electrodomésticos de alto rendimiento en su hogar

APPENDIX VI: UNITED NATIONS TOOLKIT GUIDING PRINCIPLES

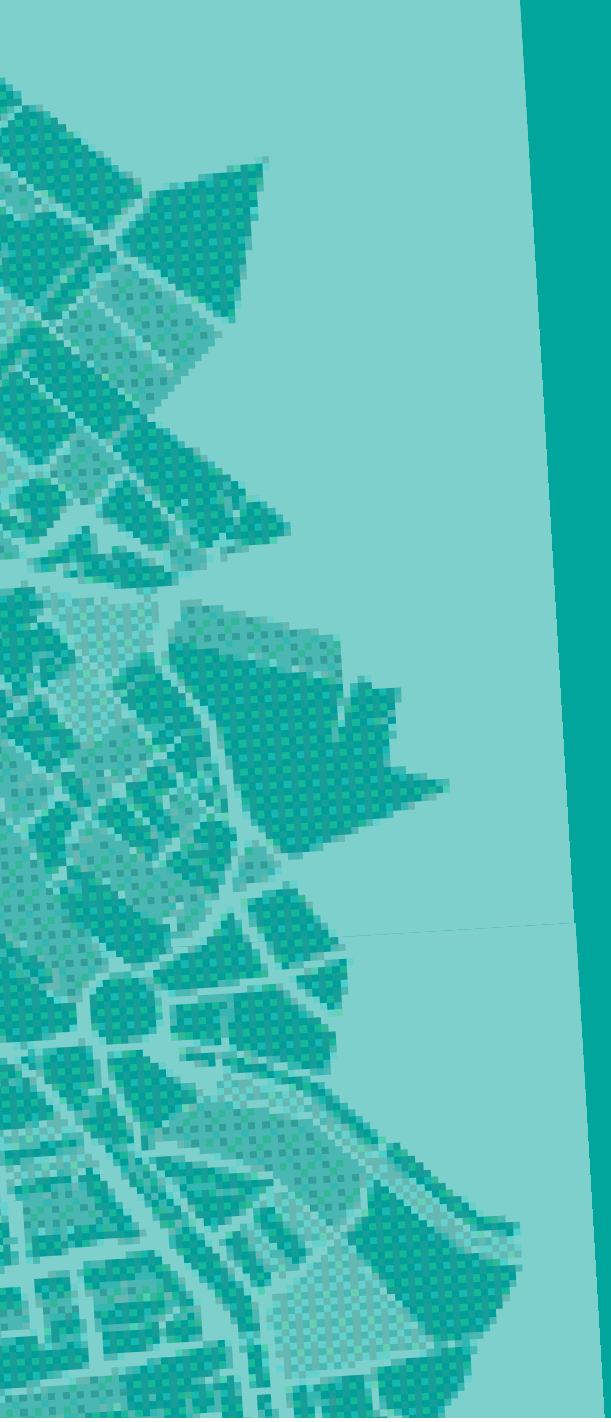
Principle 1: Ambitious		Principle 2: Inclusive	
Indicator 1A	City's long term emission reduction targets meet or exceed those set by the country.	Indicator 2A	City has a documented process of consulting with members of marginalized groups (womens groups, low income neighborhoods, neighborhoods vulnerable to climate hazards) throughout their climate planning.
Indicator 1B	City's plan strives to include and improve resiliency of vulnerable populations and city infrastructure.	Indicator 2B	City has evidence of ongiong engagement with active and potentially active economic partners.
Indicator 1C	City specifies plans to update and strengthen their current plan.		
Recommendations for Lemon Grove	- Lemon Grove (LG) should focus on reaching the more ambitious California GHG emission targets as opposed to nationally set targets. - LG should reach out to lower income communities by collaborating with SDG&E for outreach and education. - LG should set dates to review, update and strengthen targets set in place by the CAP. We recommend this should occur biannually.	Recommendations for Lemon Grove	- LG should workshop with community members and marginalized groups throughout their CAP development process. - LG should involve implementation partners and stakeholders for assistance with implementing their CAP.

Principle 3: Fair		Principle 4.1: Comprehensive	
Indicator 3A	Policy goals within the plan do not unfairly burden or negatively impact poor individuals and communities.	Indicator 4.1A	City's government collaborates on implementing the CAP through a cross-departmental working group, at least once a year.
Indicator 3B	Actions within the plan must target to help one or more marginalized groups.	Indicator 4.2B	City's CAP addresses both adaptation and mitigations efforts in two or more sectors.
Recommendations for Lemon Grove	- Lemon Grove (LG) should establish an incentive program ensuring that the entire community is capable of implementing climate actions. - LG should priortize low-income residents through collaborating with SDG&E to reduce energy usage and energy costs within these households.	Recommendations for Lemon Grove	- LG should continue collaboration with SANDAG's technical working groups, which include the 18 cities of San Diego County that discuss climate planning.

Principle 4.2: Integrated		Principle 5: Relevant	
Indicator 4.2A	City's plan documents collaboration in resilience planning with one or more adjacent local governments.	Indicator 5A	City's plan provides statement that the decision-making process integrated support of local progress with future climate benefits. City's plan clearly states that delivery of climate benefits and local development influenced the plan's actions.
Indicator 4.2B	City's plan documents collaboration in resilience planning with an intermediate level of government- i.e. the state.		
Indicator 4.2C	National Climate Action Plan of the city's corresponding country includes regulations that allow for local empowerment, and local creation of a CAP.		
Recommendations for Lemon Grove	- Lemon Grove (LG) should seek partnerships with other local municipalities, networks and organizations- SANDAG, Environmental Health Coalition, and Lemon Grove Heal. - LG should seek collaboration from the state of CA and the national government as needed.	Recommendations for Lemon Grove	- LG should plant more trees, which would dual in attracting more economic interest to the city as well as create more shade and cool zones. - LG should openly dicuss the impact that new adaptation measures will have on community members and the community itself.

Principle 6: Actionable		Principle 7: Evidence-Based	
Indicator 6A	City's plan proposes profitable actions that can be practically implemented by the involved stakeholders given the capacity of the government, finances, and local mandates.	Indicator 7A	City's plan provides GHG emissions inventory segregated by sector. City's plan provides a statement that this inventory aided in prioritizing mitigation and adaptation measures.
		Indicator 7B	City's plan includes summary of a vulnerability assessment reflecting upon local and scientific knowledge. City's plan provides a statement that this assessment aided in prioritizing mitigation and adaptation measures.
Recommendations for Lemon Grove	• Lemon Grove (LG) should obtain grants and devise a clear budget for implementation of the city's CAP. • LG should establish departments and staff to regulate and evaluate mitigation efforts.	Recommendations for Lemon Grove	• LG should generate a GHG emissions inventory that is broken down according to sector. • LG should update this plan biannually.

Principle 8.1: Transparent		Principle 8.2: Verifiable	
Indicator 8.1A	City's plan provides opportunities for civil engagement, that are well documented. City's plan is available online, in a language understood by all.	Indicator 8.2A	City's plan provides for well documented, periodic measurements of progress toward achieving key climate goals set by CAP.
Recommendations for Lemon Grove	• Lemon Grove (LG) should generate timely newsletters in most spoken languages and post them at schools, libraries, bus stops, churches, and community events. • LG must keep well-documented progress of city meetings when discussing the progress and creation of the CAP.	Recommendations for Lemon Grove	• LG should review GHG emissions data biannually. • LG representatives should evaluate climate actions to determine success rate. • Upon evaluation, LG must continually formulate new ideas to maintain the credibility of their CAP.



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