

City of Irvine

STRATEGIC ENERGY PLAN OCTOBER 2020



The Mission of the City of Irvine is to create and maintain a community where people can live, work and play in an environment that is safe, vibrant and aesthetically pleasing. In 2020 we are experiencing the impacts of the global crises of the health pandemic and climate change in our community, and we recognize the bold responses from our residents and businesses to protect public health and the environment. We understand the connection between our energy consumption, greenhouse gas emissions, and air pollution, and commissioned the development of this Strategic Energy Plan to prepare for a resilient energy future in Irvine. The purpose of this plan is to create a sustainable, economically feasible, and actionable road map for the City to better manage its operations, and recommend effective measures the Irvine community can implement to reduce its energy consumption and emissions.

The Irvine community has a history of leadership and actions taken to support energy resilience. Some key highlights of past and current successes include:

- In partnership with the Irvine Company, developed seven LEED certified community centers, each equipped with energy-efficiency features and solar energy totaling more than 244 kilowatts.
- The City is preparing to pilot a battery back-up energy storage project at the Woollett Aquatic Center.
- The City's bikeways provide more than 360 miles of on-street and off-street bicycle access for alternative and recreational transportation.
- Electric vehicles were 7% of new registrations in Irvine in 2017, higher than the State average of 5%.
- The City installed eight Level II EV chargers at the Irvine Station, the busiest train station in Orange County, and is preparing to install 20 EV chargers at the Civic Center.

This Strategic Energy Plan updates the City's approach to managing energy and aligns with the five values of the City of Irvine. Our key values reflect the interests and needs of the community, and the level of service constituents expect and deserve.



This plan was developed in consultation with the Irvine community: our City staff, residents, businesses, and stakeholder groups, including our local utilities, UCI and the Green Ribbon Environmental Committee. The City's Green Ribbon Environmental Committee, composed of two City Council members and appointed residents, seeks to increase public participation in energy conservation and sustainable practices, and advises the City Council on matters related to climate protection, green infrastructure, pollution prevention, and transportation.

Building upon the City's energy leadership and strong civic engagement, this Strategic Energy Plan will help the City meet the State's ambitious climate and energy goals, and guide the City's efforts to reduce energy costs, improve air quality, and increase the quality of life for Irvine residents and businesses.

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EXECUTIVE SUMMARY

INTRODUCTION

The City of Irvine has historically taken a proactive approach to energy planning, recognizing the value of looking forward, and aligning operations, infrastructure, policy, and planning to accommodate and take advantage of changes. Technological innovation and new approaches to energy supply, transmission and management are changing the energy landscape. Proactive energy planning positions the City of Irvine to maximize return on investment, demonstrate leadership and innovation, and ensure residents and businesses realize efficiencies, cost savings and continue to enjoy a high quality of life that supports their prosperity and resiliency.

This Strategic Energy Plan (SEP) makes recommendations that can help the City of Irvine and the broader Irvine community reduce energy use and related emissions while also helping the local economy, reducing cost, and adapting to future climate conditions. This SEP was developed by first reviewing Irvine's existing energy and emissions profile, and then projecting future impacts of growth, policy, and technology adoption. Actions to align with statewide energy and emissions goals were created in consultation with community stakeholders. Finally, this SEP includes a section on microgrids and their applicability in Irvine. In the last five years, the landscape of distributed energy resources has changed dramatically. Solar PV adoption continues to expand at the building scale and the utility scale. More recently, advances in battery technology and reductions in cost have created substantial interest in microgrid technology to optimize energy costs, reduce carbon, and provide resilience to power outages. While the technology that makes up microgrids is not new, microgrids have not been deployed widely and are still unfamiliar to many stakeholders.

Key Findings:

- Without further action, Irvine is not aligned with statewide goals for energy and emissions
- Buildings represent the largest component of Irvine's energy and emissions
- Powering buildings on clean electricity is one of the most cost-effective ways to reduce emissions
- Adopting clean vehicle technology is an effective way to reduce transportation emissions
- Microgrids have the potential to improve resilience, reduce energy costs, and reduce emissions

Compared to a 2006 baseline, the recommended actions in this plan, together with State goals and mandates can reduce energy use 10.1% and emissions 57.3% by 2030. By 2050, they can reduce energy use 37% and emissions 77.8%.



IRVINE'S ENERGY VISION

A goal within the City of Irvine's General Plan Energy Element is to "promote energy conservation and the use of renewable energy sources throughout the city in a cost-effective way." This Plan will guide the City toward achieving this General Plan objective.

In order to further define the City's priorities in developing this Plan, an internal steering committee met to discuss the Plan objectives and to develop a vision for Irvine's energy future. The result of this workshop was Irvine's Energy Vision Statement, below.

IRVINE'S ENERGY VISION

⁴⁴The City of Irvine will demonstrate its commitment to leadership and innovation, supporting businesses and residents in adopting affordable, efficient, and resilient energy solutions.⁷⁷

GUIDING PRINCIPLES

- Innovation: Focused on leading-edge technologies and strategies
- Resilience: Supporting livability, sustainability, and self-reliance

Practicality: Affordability and efficiency for a prosperous future

The City of Irvine has historically taken a proactive approach to energy planning, recognizing the value of looking forward, and aligning operations, infrastructure, policy, and planning to accommodate and take advantage of changes. Technological innovation and new approaches to energy supply, transmission and management are changing the energy landscape. Proactive energy planning positions the City of Irvine to maximize return on investment, demonstrate leadership and innovation, and ensure residents and businesses realize efficiencies, cost savings and continue to enjoy a high quality of life that supports their prosperity and resiliency.

The objectives of the Plan are to analyze the City's baseline energy usage and forecast future consumption, evaluate priorities to meet reduction targets, and recommend funding opportunities and strategies to implement the plan.

EXISTING CONTEXT

This Plan builds upon the City's 2008 Energy Plan and subsequent successes in improving efficiency and performance of City facilities, fleet, infrastructure, and operations across the community. This Plan also aligns with State goals and mandates that commit to energy efficiency and clean energy supply, detailed further on Page 10. Energy and emissions in Irvine are directly influenced by many other plans and policies, especially those dealing with transportation and land use. This Plan intersects with the concurrent development of other related City plans and programs as referenced on Page 07.

PLAN DEVELOPMENT

This Plan was developed collaboratively with City staff, Irvine residents and businesses, expert consultants, and other community stakeholder groups. The project team reviewed existing state and local policies, past programs and lessons learned, current energy and emissions profiles, and other data to understand the current context. Energy and emissions models were developed to project a "Business As Usual" estimate of future energy and emissions profiles in Irvine based on existing policies and regulations. Then various potential actions were evaluated for further energy and emissions reductions in Irvine. These actions were further refined in conversation with City Staff and with community stakeholder groups so that they would align with concurrent efforts by the City and would reflect input and priorities from community stakeholder groups. Energy and emissions reductions from this refined set of actions were modeled to estimate their impact over time. This refined set of actions was reviewed in the context of stakeholder input that was provided throughout the Plan's development, and actions were modified to reflect and align with community-identified priorities. Lastly, the Plan identifies implementation resources that can assist City staff, residents, and businesses to achieve energy and emissions goals together.

The Imperative for Local Action

The State of California has set targets to **reduce GHG emissions by 40% by 2030 and 80% by 2050**. To meet these targets, the State has introduced a series of mandates, bills and regulations that will significantly increase the proportion of clean energy consumed and produced statewide and improve energy efficiency, thereby reducing energy consumption and emissions. In addition to these mandates, the State has also set a number of goals that support renewable energy and energy efficiency. To meet the State's 80% GHG emissions reduction target, the City needs to take action to reduce emissions by an additional 24.3%.

35.8% compared to 2006, and the Energy Plan recommendations will reduce emissions a further 21.5%, exceeding the State goal and resulting in a total emissions reduction of 57.3%. These reductions are in large part due to much cleaner electricity, which is also why emissions reductions are much greater than energy use reductions. In 2050, statewide policies are projected to reduce emissions 55.7%. The Energy Plan recommendations would produce a further 22.1% emissions reductions. While this would not meet the State target of 80% total reductions, recently issued State mandates will lead to further reductions in emissions, enabling Irvine to meet the projected State targets.

Year		State Mandates/ Goals & Other External Action	Energy Plan Recommendations	TOTAL
2070	Energy	9.6%	O.5%	10.1%
2030	Emissions	35.8%	21.5%	57.3%
2050	Energy	32.1%	4.9%	37.0%
2050	Emissions	55.7%	22.1%	77.8%



In 2030, statewide policies will reduce emissions

Percentage Reductions compared to 2006

RECOMMENDED ACTIONS

This Plan includes a series of recommendations for how the City can reduce its energy use and GHG emissions. Below is a summary of the actions and strategies recommended in this Plan.

	Number	Action	Co-Benefits
ERGY	ES-1	Join a CCE Electricity Supplier	×
EN SU	ES-2	Portfolio-wide Procurement for City Facilities	🔹 🛓

	Number	Action	Co-Benefits
Ñ	B-1	Develop a Community-Facing Energy Upgrade Program	🏶 ё 🔂 🔬
BNIG	B-2	Reduce or Remove Administrative Obstacles to Energy Storage, Electric Vehicles, and Building Electrification	
BUIL	B-3	Decarbonize City Facilities	🔂 🖓 🔬 🏶
	B-4	Develop Decarbonization Roadmap	er 😵 🏶

Ζ	Number	Action	Co-Benefits
D USE	TLU-1	Reduce emissions from City Fleet Vehicles and Employee Commute	
ISPOR D LAN	TLU-2	Incentivize Sustainable Transportation Modes for Residents and Businesses	ė s %
TRAN ANI	TLU-3	Develop a Comprehensive Electric Vehicle Action Plan	to fr 📽 🏭



Resiliency & Climate Preparedness



Cost Savings



Health, Wellbeing, & Livability



Support Local Economy



Reduce Traffic & Congestion

Community Priority

CURRENT OUTLOOK

This section reviews the current state of energy and emissions in Irvine, including inventories, existing programs, past successes, and concurrent planning efforts. This information provides the foundation for the recommendations developed later in the plan.

BUILDING ON SUCCESS

This Plan builds upon the City's ongoing leadership in energy innovation and planning, including the City's previous 2008 Energy Plan. The City has taken several actions to address energy efficiency and encourage renewable energy in its own facilities and operations, and throughout the community. These include:

- Green Purchasing Policy 2006, Revised 2010
- Energy Audits for 15 City Facilities
- Solar PV installations at seven City facilities
- Energy Storage Pilot Project
- Orange County Cities Energy Leader Partnership
- Southern California Regional Energy Network
- ENERGY STAR Portfolio Manager Benchmarking
- Energy Outreach Utility programs for residents and businesses
- City of Irvine Green Building Resolution
- LEED Certifications
- Community Choice Energy (CCE) Feasibility Study

For a complete list of Irvine's past and ongoing energy initiatives as well as State-level initiatives that impact Irvine's energy use, see Appendix A.

RELATIONSHIP WITH OTHER PLANS

Concurrent with the development of this Plan, the City is undertaking the following related efforts that align with and are complementary to the objectives of the Strategic Energy Plan.

General Plan Update

The City of Irvine is in the process of updating its General Plan, with a focus on the Housing Element due to the state mandated deadline. City Council also directed the creation of a new "Environmental Protection and Climate Action" element in the General Plan. This element will highlight existing efforts related to environmental protection and climate change, incorporate relevant findings and strategies from related work efforts such as this Strategic Energy Plan and the Climate Plan. This effort will also consolidate and update other environmental-related goals and policies into this new element, and serve to link the General Plan to the Climate Plan at a highlevel.

Community Choice Energy Feasibility

Recommendations in the Plan are informed by the Community Choice Energy (CCE) Feasibility Study analysis showing the favorable potential for Irvine to participate in a CCE. A peer review of the Feasibility Study was completed in 2020 affirming the financial viability of a CCE in Irvine. The City Council directed staff to begin the process to form a Joint Power Authority with interested cities, with the intent to file an Implementation Plan with the California Public Utilities Commission by the end of 2020 in order to launch a CCE in 2022.

Strategic Active Transportation Plan

The Irvine Strategic Active Transportation Plan is a planning document, serving as a city-wide blueprint for creating multi-modal mobility options especially for bicycle and pedestrian transportation and enhancing the non-motorized travel experience within the city. It was developed based on a comprehensive outreach program and analysis of existing conditions and potential barriers to active transportation in Irvine. The plan provides improvement recommendations at network, corridor, and focused spot levels. This plan will be used to guide future projects and programs to promote walking and bicycling activities in the City.

Climate Action and Adaptation Plan

This Plan, including its greenhouse gas emission inventory and forecasts precipitates the development of a Climate Action Plan for the City that will evaluate Irvine's vulnerability to climate-related impacts and provide adaptation measures that build resilience to current and future climate threats. Many of the strategies in this Plan support Climate Action objectives, and strategies were modeled to meet the 80% GHG reduction by 2050 target set by the State. These targets will be re-examined in the climate plan as new state mandates to address the global climate emergency are likely forthcoming.

ENERGY AND EMISSIONS

CURRENT STATE

City Operations

Based on a 2018 inventory for City of Irvine operations, facilities are responsible for 41% of energy use, followed by 35% for transportation, and 24% for services (primarily streetlights and traffic controls). However, when looking at emissions from City operations, transportation is the largest contributor, accounting for 46% of overall GHG emissions and predominantly driven by gasoline consumption from the City's fleet. This difference between energy and emissions is created in part by a substantial increase in clean electricity sources on the grid. This trend is likely to continue as California utilities strive to meet State mandates for clean power, and as the costs of renewables and storage continue to decrease below comparable fossil fuel generation.

Community-Scale

Community-wide emissions in Irvine have a slightly different profile. Buildings represent the largest component of both energy and emissions (74% and 56%), followed by transportation (26% and 33%). In the Buildings sector, emissions are split somewhat evenly among residential, commercial, and industrial sectors. The charts below summarize the City's community-wide energy consumption and associated GHG emissions. In Irvine, the built environment is responsible for the majority of energy consumption and GHG emissions. This means the biggest opportunity to reduce energy use and emissions will likely come from upgrading existing buildings and ensuring future development is efficient and powered by renewable energy.

FUTURE PROJECTIONS

Population and Development Growth

Irvine's future energy and emissions are influenced by several factors: population growth, development growth, State policy, utility emissions intensity, and more. These factors are discussed in this section. Irvine's future energy and emissions will also be





influenced by the recommended actions in this Plan, which are discussed in the Recommendations section.

Irvine's total built square footage is projected to grow by 88.6 million square feet by 2050, based on the existing General Plan. While State policy is pushing future building codes to require net zero energy buildings, until that time, even highly efficient new buildings will increase the overall emissions and energy use in Irvine. Between 2020 and 2050, Irvine's population is expected to grow by approximately 50,000 people. Higher population will result in more energy use in buildings but will also result in additional vehicles on the roads. This will result in more energy use and emissions from transportation. Furthermore, Gov. Newsom's mandate for transition to EVs in 2035 will lead to cleaner City fleet for new vehicles, and for community transportation emissions.

STATE POLICY

Through Assembly Bill 32 (2006) and Senate Bill 32 (2016), the State of California has set legislative targets to reduce GHG emissions 40% below 1990 levels by 2030. Executive Order S-3-05 (2005) set a goal to further reduce GHG emissions 80% by 2050. Executive Order B-55-18 established a more aggressive goal of being carbon neutral statewide by 2045. To meet these targets, the State has introduced a series of regulations that will substantially increase the proportion of clean energy consumed and produced statewide while improving energy efficiency. In addition to regulations, the State has also introduced several related goals that are likely to become mandatory in the near future.

A summary of these goals and mandates is provided in the Appendix A. The energy and emissions reductions resulting from these policies were modeled into a Business As Usual scenario for the purposes of this Plan. Taken together, these policies are projected to reduce GHG emissions 35.8% by 2030 and 55.7% by 2050 and reduce energy use by 9.6% by 2030 and 32.1% by 2050, compared to a 2006 baseline. The Recommendations Section includes actions that Irvine can take to further reduce energy and emissions.



California Greenhouse Gas Emissions by Sector (1990-2015) and Targets Through 2050 Source: U.S. Energy Information Association

STATE GOALS AND MANDATES				
BUILDINGS	ENERGY & TRANSPORTATION			
MANI	DATES			
Mandate: New Construction Title 24 - Building Energy Efficiency Standards • 100% ZNE new residential construction by 2020 • 100% ZNE new commercial construction by 2030	Mandate: Electricity SB100 - California Renewable Portfolio Standard Program • 50% renewables by 2026, • 60% renewables by 2030, • 100% carbon free by 2045			
Mandate: Existing Buildings AB 802 – Building Energy Benchmarking Program • Benchmarking and reporting for buildings >50,000 ft ²	Mandate: Fuels AB-32 - California Global Warming Solutions Act. Low Carbon Fuel Standard • Reduce carbon intensity of transportation fuels by minimum 20% by 2030			
	Mandate: Transit Clean Transit Regulation. Public transit to have 100% zero-emission bus fleets by 2040. • Phase in ZE bus purchases starting in 2023 • 100% of new purchases must be zero- emission by 2029			
	Mandate: Passenger Vehicles Zero-Emission Vehicles. Phase out sale of gasoline- powered cars and passenger trucks by 2035. • 100% in-state sale of new passenger cars and trucks must be zero-emission by 2035			
GO	ALS			
Goal: Existing Buildings California Energy Efficiency Strategic Plan • 50% of commercial buildings retrofit to ZNE by 2030	Goal: Natural Gas SoCal Gas Renewable Natural Gas Targets: • 5% renewable natural gas by 2022 • 20% renewable natural gas by 2030			
	 Goal: Passenger Vehicles 1.5M passenger EVs by 2025, 5M by 2030 (per Executive Order B-16-12) CARB Electric Truck Rule: increasing required %sales of EV's to 100% by 2045 			

IRVINE'S COMMUNITY-WIDE ENERGY AND EMISSIONS FORECAST

This chart reflects the predicted energy use in Irvine accounting for the state goals and mandates. Irvine does not have its own energy reduction targets. Compared to 2006, energy use will increase until 2025 due to development and population growth, at which point state policy and mandates will begin to reduce total energy use compared to 2006. Emissions are decreasing each year through 2050, driven mainly by clean electricity sources, however, **without local action, Irvine is not on track to meet State goals for emissions reduction.**



Irvine's Energy Consumption Projections

Given the current State mandates and goals for energy and emissions reduction, and the City's energy consumption patterns, this report highlights recommendations in three key areas: Energy Supply, Buildings, and Transportation and Land Use. Implementing measures in these areas can assist the City in complying with Statewide initiatives, and lead to innovation and energy resilience in Irvine.

MICROGRIDS

This section includes an overview of microgrids and their applicability in Irvine. While the individual components of microgrids are mature technologies, improvements and cost reductions have substantially changed the business case for using them on buildings in the last five years. Microgrids can help reduce energy costs, reduce emissions, and provide backup power in cases of emergency. More detail on City facilities where microgrids could be deployed is included in the recommendations and the Appendix.

The term "microgrid" is generally used to describe a combination of energy generation, energy storage, and controls that are used at a building or campus to supplement or replace the utility energy grid. While it is possible to create a thermal microgrid using district energy systems, the microgrids discussed in this plan refer to electricity. Microgrids can be used to provide temporary backup power or to reduce energy costs and carbon emissions by changing when electricity is consumed from the utility grid. In some cases, a microgrid can be designed so that a building or campus can disconnect from the utility electric grid and operate self-sufficiently, also known as "islanding."

UC Irvine has an extensive and innovative microgrid, including Solar PV, thermal energy storage, hydrogren fueling, electric vehicles, district energy and more. It is a test lab for new technologies and approaches.

Below is a list of typical components of an electricity microgrid:

- Energy Generation
- Energy Storage
- Interconnected Systems
- Monitoring & Controls
- Buildings



Buildings

In Irvine, microgrids can provide three main benefit streams:

Energy Cost Savings

Microgrids can reduce energy costs by producing low-cost onsite electricity from PV or batteries during times when grid electricity is expensive.

Emissions Reductions

They can also reduce carbon by producing low-carbon electricity during times of the day when the marginal CO2 emissions from grid electricity are high.

Resilience

Finally, microgrids can provide resilience and reduced downtime by giving buildings access to electricity when the utility's electric grid goes down. While Irvine faces very few grid outages in a typical year, recent wildfire disasters have made pre-emptive Public Safety Power Shutdowns (PSPS) more likely and unpredictable in the future. Batteries installed at the City Hall can reduce air quality impacts from diesel backup during outages.

Microgrids can also provide benefits to the larger utility grid by improving reliability and smoothing out fluctuations. Utility regulations impact how microgrids can be used. For example, in Irvine and across California, microgrids cannot be developed across multiple properties with different owners and different utility account holders. If regulations change in the future, different microgrid applications may become available community-wide in Irvine, but given the current regulatory environment, this Plan focuses on microgrid applications at city-owned facilities. The general characteristics of microgrids described below may also be useful for microgrids at privately-owned facilities and the City can use its sphere of influence to work with key developers, property managers, large employers, and the school district to increase energy resilience in Irvine.

The Irvine Company installed a 13MW fleet of batteries across 24 buildings that reduce power usage by 25%.

MICROGRID DESIGN CONSIDERATIONS

Energy Supply

Microgrids can use several different sources of energy, each of which is more or less appropriate for specific applications. The most common energy supply options are listed below along with some key factors related to their use. For Irvine's purposes, it is likely that Solar PV will be the most appropriate and economically viable source of energy.



Solar PV

PV is inexpensive, low-carbon, and generally produces power at times of the year when there is excess demand on the grid and high marginal emissions rates. PV is highly scalable and can be installed in either small or large capacity systems. PV is a variable resource which changes based on weather, season, and time of day. It is a well-known technology with a long track record. This report provides some illustrative examples of Solar PV at several City facilities in Appendix B.

Fuel Cell

Fuel cell technology converts fuel to electricity by using an electrochemical reaction instead of combustion. The most common fuel is methane since natural gas is readily available. Fuel cells can be run on hydrogen, but hydrogen is more expensive, less readily available, and requires additional infrastructure to be safely stored. Power output can be controlled more closely by regulated fuel supply, and the systems can run consistently any time as long as there is fuel. Fuel cells usually require larger loads, with the smallest system being around 200 kW. Methane-powered fuel cells still produce GHG emissions that are higher than SCE's average grid emissions. Emissions can be reduced by using renewable natural gas or biogas as a feedstock, although those are not widely available and often used for vehicle fuels. Fuel cells also are more expensive per unit of energy produced than solar PV.

Gas Turbines

Natural gas-powered turbines can provide electricity and heat. Small gas turbines produce over 1 MW of electricity, which is too large for City of Irvine applications. Smaller turbines are often used in campus central plant settings, where steam can be produced for building heating along with electricity. However, plants often have very low electrical conversion efficiency. In order for efficient use of fuel, heating loads need to consistently be twice as high as electrical loads.







Energy Storage

Lithium Ion

Lithium ion battery technology is the dominant technology in the market today. Costs have come down substantially in recent years due to increased demand from the electric vehicle market. Lithium ion is appropriate for energy storage up to 8 hours but cannot be used for medium of long-term energy storage (days or weeks). At the grid scale, other technologies are being explored and developed that have longer term application: compressed air, flow batteries, pumped hydro, molten salts, and others. These technologies are not appropriate nor cost competitive at the microgrid scale, and have a shorter track record than lithium ion batteries.

MICROGRID EXAMPLES

Numerous different microgrid examples have been pursued throughout the United States. The following is a brief summary of important microgrid projects:

Brooklyn Microgrid

The Brooklyn Microgrid is a community based microgrid that consists of different residents and businesses located in the Brooklyn borough of New York City. In addition to backup for critical loads during grid outages, this microgrid allows any participant with on-site energy generation to sell electricity into the microgrid. Other participants can then select bids, paying energy producers for electrical energy. This process is enabled by the local utility allowing for transfer of electricity across the utility distribution system, which is not currently allowed across SCE infrastructure.

Avocado Heights/Bassett Advanced Energy Community

This microgrid project is currently being developed in Los Angeles County. The California Energy Commission-funded project will integrate energy generation and storage at different locations throughout the city. The project has partnered with the Clean Power Alliance, the local CCE to provide access to capital for investment in low income communities and enable a blockchain-based energy trading system between project participants.

City of Fremont Fire Station Microgrids

This project outfitted three fire stations, which already have diesel backup generation, with solar and storage systems. During normal operation, these microgrids are used to reduce grid electricity use. In the event of an outage, the systems operate to offset diesel generation when possible. During one test, the solar and storage system allowed for islanding to occur for 13 hours.

Humboldt County Blue Lake Rancheria Microgrid

This microgrid system spans multiple buildings, showing microgrid design and operation across multiple different load points. The community is saving approximately \$160,000 per year in energy costs.







Oakland Clean Energy Initiative

In this project the local CCE replaced an old power plant that ran on jet fuel with over 500 kW of solar and storage installed at multifamily affordable housing projects. The residents save money from the PV generation, the batteries power critical loads in the buildings during outages, and the overall system provides value to the CCE and grid by improving reliability and resource adequacy. If Irvine were to join a CCE, this might become a more attractive option than having individual building owners finance and purchase solar PV storage.

Oakland Clean Energy Initiative. Source: Grid Alternatives

EVALUATING MICROGRID FEASIBILITY IN IRVINE

Given that utility regulations do not currently allow for sharing energy across buildings with different owners, and given the limitations in fuel cell and gas turbine energy supply technologies, the most likely feasible application of microgrids in Irvine is for a single building using PV and Lithium Ion battery storage. Even with these assumptions, microgrids should be designed to optimize a specific purpose considering the three main value streams: cost reductions, emissions reductions, and resilience. All three of these value streams can be achieved more cost effectively by first pursuing aggressive energy efficiency upgrades. Doing the efficiency upgrades also reduces the ultimate cost and size of a microgrid, since critical loads will be smaller. By evaluating efficiency improvements, solar, and storage together across a portfolio of buildings, cost efficiencies of scale can be achieved that may not be possible when evaluating a single buildings. Recently, the cities of Brea and Fullerton have used this portfolio approach for similar projects.

Irvine residents and businesses face fewer and shorter electric service disruptions than the typical SCE customer. The grid is incredibly reliable, and despite the threat of more frequent PSPS events, community-wide electrical resilience is not a core risk in Irvine. There may be specific targeted applications of energy storage that provide outsized community or economic benefits, and **Irvine should consider optimizing for resilience in buildings that provide critical operational continuity for City services.** Given this generally low risk of grid outage, optimizing for energy cost and emissions reductions is likely the best application for microgrids in Irvine. Microgrid applicability is described below for small (< 20kW peak demand), medium (20-500kW peak demand), and large (>500kW peak demand) buildings in Irvine.

Small Buildings

According to energy data, 100 of the City's 600 small buildings have an average load greater than 1 kW. Of these, 5 have an average load greater than 5 kW. Small scale battery storage is typically available in 10 kWh increments or higher. A Tesla Powerwall provides 13.5kWh of storage, which would be more than a day's needs for the majority of small buildings. Among small buildings, PV may still be cost effective, but storage may be most appropriate for sites that are critical to maintaining City services. For example, The Trabuco Senior Center has existing solar PV that reduce its energy costs. Adding battery storage may not be cost effective to achieve further energy reductions alone, but this building can play a critical role for the community during a heat wave, power outage, or both. Adding energy storage would extend the functional operations of the building during a disruptive event.

Medium Buildings

Although they account for nearly 40% of total City electrical energy use, the highest average demand among medium buildings in Irvine does not exceed 132 kW. At this size building, both energy cost reductions and resilience benefits may be possible, in addition to emissions reductions. However, it is highly dependent on the use patterns and critical functions for each individual building. For example, a pilot energy storage project is being developed at the Woollett Aquatics Center, which is owned by Irvine Unified School District and managed by the City. This microgrid may save up to \$20,000 per year in energy costs based on existing usage patterns and utility rates. However, savings do not scale when increasing to the 4-hour duration system, resulting in a net cost increase for all buildings. Note that these reduced costs come at the cost of a depleted battery at 9pm, resulting in minimal ability to recover from an adverse event until the morning, assuming solar PV is also adopted. See Appendix B for other examples of microgrid costs and potential at City facilities.

Large Buildings

Large buildings are defined as having a peak demand of at least 500 kW or being on a TOU-8 electricity rate structure. Civic Center is a large City-owned building that has this utility rate structure and is continuously used throughout the year. At the Civic Center, a two-hour storage system with daily cycling can produce up to \$25,000 in energy savings per year, savings which can be amplified by adding PV and implementing efficiency measures. Our initial assessment indicates that 2,700k kWh per year can be produced at the Civic Center and the City has an interconnection application in place with SCE for a solar carport project.

PROCUREMENT

Solar PV is an established and mature technology with many different financial mechanisms for procurement: direct purchase, leasing, Power Purchase Agreement (PPA), community solar, and others. More recently battery storage has been offered with these financing arrangements as well. While direct purchase often creates the highest net financial value to a buyer, access to capital can be a barrier to many purchasers. In the case of public entities like the City of Irvine, tax credits that reduce the cost of microgrid systems to private purchasers are not available. PPA arrangements, where a third party installs and maintains a system in exchange for a long-term agreement to purchase power from the system, become more cost effective because





the third-party financers can take advantage of the tax credits. Even among private sector purchasers, PPAs have become more popular because they shift performance risk to a third party so that the purchaser does not have to maintain the system. They also create a fixed, predictable energy cost that escalates at a slower rate than historic SCE escalation.

Because PPA procurements require little to no upfront capital, and because they shift performance and maintenance risk to a third-party, they are likely to be the best option for the City of Irvine to procure renewables and storage. Like the Oakland Clean Energy Initiative mentioned above, additional procurement options might be available if Irvine joins a CCE.

RECOMMENDATIONS

This section includes actions that support the City of Irvine's objective to reduce energy use and emissions. The recommendations are grouped in three categories, corresponding to the largest sectors of energy and emissions in Irvine: **Energy Supply; Buildings; and Transportation and Land Use**. These recommendations draw from best practices in nearby communities and were developed with stakeholder input from City staff, Irvine residents and businesses, and the Green Ribbon Environmental Committee.

Each action was evaluated for feasibility, implementation cost, return-on-investment, energy and emissions reduction, and additional community co-benefits. As potential actions were evaluated and drafted, they were also reviewed in the context of stakeholder input and priorities.

SPHERE OF INTEREST, INFLUENCE, AND CONTROL

Some actions in this Plan are within the City's direct sphere of control. For example, the City can install solar and storage on buildings that it owns. Other actions may not be in the City's control but are related to areas the City can influence through incentives, education, and outreach. As an example, if Irvine joined a Community Choice Energy (CCE), it would not directly control the CCE's actions, but would have influence as a member agency.

These enabling actions can inspire broader community behavior change. Some actions have direct energy and emissions reductions. Other actions do not have direct reductions but are still valuable because of the potential to unlock further action in the future or demonstrate leadership. For example, removing administrative obstacles for homeowners to add energy storage would not directly reduce energy or emissions, but would enable Irvine residents to do so through their actions.

In addition to energy and emissions reductions, implementing these actions will result in broader community 'co-benefits' which are described in more detail in the next section. These are: resiliency and climate preparedness; support local economy; cost savings; reduce traffic and congestion; health, wellbeing and livability; and Community Priority.



CO-BENEFITS: HOW THE SEP SUPPORTS BROADER CITY POLICIES

In addition to energy and emissions reductions, the City and stakeholders identified the following set of co-benefits that are important to consider. Co-benefits are important for resiliency and sustainability planning especially as communities prepare for recovery from the pandemic. Recommended actions in this Strategic Energy Plan (SEP) support one or more of these broader City priorities.



Resiliency and Climate Preparedness

The SEP can position the City to be prepared to withstand and recover rapidly from potential impacts of climate change, extreme weather, and other events such as earthquakes and power outages. Developing local energy assets and storage capacity will enable crucial infrastructure to remain online so the City can continue to serve its residents.



Support Local Economy

The SEP can be a vehicle to help ensure the Irvine community continues to prosper and grow, supporting a high standard of living for residents. In transitioning to renewable energy and improving energy efficiency, there are opportunities to create new industries and jobs for Irvine residents and others across the region.



Cost Savings

The transition to renewable energy and more efficient energy consumption should result in reduced costs and improved return on investment for Irvine's residents and businesses. Stakeholders emphasized the need to ensure recommended actions support the needs of, and do not exclude low-income and vulnerable communities.



Reduce Traffic and Congestion

A potential positive outcome of the transportation-related strategies would be to reduce the volume of single occupancy vehicles on Irvine's streets. Improving the public transportation system and extending safe rights-of way for bikes and pedestrians can reduce traffic and congestion and associated air pollution.



Health, Wellbeing, and Livability

Certain strategies that reduce energy use have positive health benefits to Irvine residents. This includes reduction in air pollution and increase in physical activity.



Community Priority

These actions were identified through stakeholder engagement as priorities for the Irvine community.

SUMMARY OF RECOMMENDATIONS

	Number	Action	Co-Benefits
ERGY	ES-1	Join a CCE Electricity Supplier	A Contraction of the second se
SU	ES-2	Portfolio-wide Procurement for City Facilities	🔹 👸 🕼

	Number	Action	Co-Benefits
Ñ	B-1	Develop a Community-Facing Energy Upgrade Program	🐝 🖄 🔂 🔬
DING	B-2	Reduce or Remove Administrative Obstacles to Energy Storage, Electric Vehicles, and Building Electrification	40 5 5
BUIL	B-3	Decarbonize City Facilities	🔂 🖓 🔬 🏶
	B-4	Develop Decarbonization Roadmap	

Ζ	Number	Action	Co-E	Benefi	ts	
TATIC D USE	TLU-1	Reduce emissions from City Fleet Vehicles and Employee Commute	= ©}	ā	Ŷ	
ISPOR D LAN	TLU-2	Incentivize Sustainable Transportation Modes for Residents and Businesses	<u>+</u> ©}		Ŷ	
TRAN ANI	TLU-3	Develop a Comprehensive Electric Vehicle Action Plan	Ê	ā	Ŷ	



Resiliency & Climate Preparedness



Cost Savings



Health, Wellbeing, & Livability



Support Local Economy



Reduce Traffic & Congestion



Community Priority

ENERGY SUPPLY

Source: Unsplash, @draufsicht

Energy supply recommendations are focused on changes to the type of energy consumed in Irvine and the source of energy. While Irvine does not have its own energy utility, there are steps the City can take to influence a transition to procurement of renewable energy and increase local production of renewable energy that may provide economic and resiliency benefits over the long term.

The majority of Irvine's citywide energy supply is purchased from Southern California Edison (SCE) and SoCal Gas, with a small, but growing proportion being generated locally by solar PV installed on City facilities and privately-owned commercial buildings and residences. As such, State and utility action will continue to influence Irvine's energy supply mix.

To support a transition to a cleaner energy supply, the City can encourage local production and, through participation in a Community Choice Energy (CCE) program, can provide clean energy, increase the stability of electricity prices and deliver higher percentages of electricity produced by renewable resources.

STATE POLICY

Utility-Scale Electricity: SB-100 requires California's Renewable Portfolio Standard (RPS) to increase its minimum requirements to 50% renewable by 2026; 60% renewables by 2030; and 100% renewables by 2045. As such, by 2050, all electricity purchased from SCE will be carbon neutral. The RPS will reduce Irvine's emissions by 23% by 2050 compared to 2006 levels. Local actions recommended in this section will reduce 2030 emissions by 7.8% compared to 2006.

STAKEHOLDER INPUT

Stakeholders consulted in developing this Plan indicated interest in a CCE, noting it supported a breadth of city priorities including supporting local economic development, demonstrating leadership, affording resiliency and climate preparedness, adding education and awareness, and having the potential of cost-savings and lower energy bills. Stakeholders also expressed support for increased solar investment throughout the city, for individual buildings and through community solar projects.

	Number	Action	Co-Benefits
ERGY	ES-1	Join a CCE Electricity Supplier	A C C C C C C C C C C C C C C C C C C C
SU SU	ES-2	Portfolio-wide Procurement for City Facilities	*



Resiliency & Climate Preparedness



Cost Savings



Health, Wellbeing, & Livability



Support Local Economy



Reduce Traffic & Congestion



Community Priority

EST JOIN A CCE ELECTRICITY SUPPLIER

More than 10 million California residents are currently served by CCE electricity suppliers. These CCE entities are Joint Powers Authorities that procure energy supply. California communities that have joined CCEs have experienced both lower energy prices and lower GHG emissions from electricity. As the price of renewables continues to decrease, some CCEs can offer carbon-free electricity options at prices competitive with existing So Cal Edison prices. When initially joining a CCE, Irvine has the option to automatically opt-in some or all utility customers to carbon-free power. Customers always have the option of reverting back to the regular power offering, but having opt-in be the default avoids the need for costly and time-consuming marketing and education campaigns to persuade customers to do so in the future. Opting customers in to zero-carbon electricity will directly help Irvine meet state GHG emissions targets. As of July 2020, 12 of the 32 member jurisdictions in the Clean Power Alliance chose to opt customers in to 100% renewable energy. Participating in a CCE will also give Irvine more influence and leverage in energy-related programs than it currently has with SCE, as well as greater access to usage data and analytics. As an example, several Bay Area CCEs are providing battery storage to homes that have recently been threatened by wildfirerelated power shutoffs. The battery storage systems improve residents' resilience during emergencies but also provide utility energy resources during normal operations.

On December 10, 2019, following review of a <u>CCE feasibility study</u>, Irvine City Council voted unanimously to consider formation of a CCE program in partnership with other Orange County cities. The City is reviewing options to develop a Joint Power Authority with interested cities and plans to launch a CCE program in Orange County in 2022. While the Feasibility Study shows that the 100% renewable energy option comes with a cost-premium, the CCE can setup the program so that low/fixed-income customers do not have to pay more, as was done by the Clean Power Alliance CCE.

RECOMMENDATIONS:		Feasibility	Priority	Cost
1. The City of Irvine should	form or join a CCE entity.			~
2. The City should opt electricity product by de	all customers into a zer efault.	o-carbon	≈	☆
		High	Medium	Low
so	delivery	customer		



PORTFOLIO-WIDE PROCUREMENT FOR CITY FACILITIES

Renewables, energy storage, and energy efficiency all work together to improve resilience, reduce cost, and reduce emissions. Irvine has experience with energy efficiency upgrades at many City facilities, and should continue to pursue efficiency across its portfolio. In addition, solar and storage should be considered for all City facilities, either for energy and cost reductions or resilience purposes. The Microgrid section of this plan explores the feasibility of using microgrids on City facilities, using energy-related data such as costs, usage, intensity, and demand. Instead of assessing the potential for solar, storage, or energy efficiency projects at each individual facility, the City should leverage market competition to do a portfoliowide procurement for energy services. Pursuing solar, storage, and efficiency opportunities can create substantial cost savings for the City. Analysis shows that battery storage at the Civic Center alone could produce up to \$25,000 in cost savings. The City can

leverage these savings to offset capital expenditure costs. By bundling many projects together, service providers may be able to achieve greater economies of scale. For solar and storage, power purchase agreements are likely the best option for municipal facilities because they will allow third parties to realize tax credit savings and provide for long-term maintenance of equipment, while minimizing capital expenses and reducing operating expenses and future energy costs. These agreements are typically cashflow positive to the purchaser from day one, and the performance risks are transferred to the vendor. The City can establish key performance criteria related to efficiency, cost, resilience, and other factors to ensure the procurement meets City priorities. Nearby cities such as Brea and Fullerton have used this procurement strategy and may provide some precedents and lessons learned for Irvine to draw from.





The buildings sector presents the largest opportunity for the City of Irvine to reduce energy use and greenhouse gas emissions. 74% of energy consumed by the City of Irvine in 2018 was used to operate buildings. Improvements to existing buildings and a commitment to high performance new construction can result in cost savings, job creation, and healthier, more comfortable indoor environments.

California's Title 24, Part 6 Building Energy Efficiency Standards is recognized across the country as a leadingedge building energy code. The City of Irvine can build on this State-level leadership by acting locally. As recommended in the previous section, the City should invest in efficiency, solar, and storage at its facilities and explore incentives and programs to encourage community members to upgrade buildings. Building upgrades can directly support the local economy, by increasing demand for workers in construction, design, commissioning, manufacturing, and inspection.

To address greenhouse gas emissions, the City should also explore strategies to decarbonize the building stock. 2019 was a monumental year for swift action on decarbonization of buildings in California. This movement was led by municipalities. Between July 2019 and January 2020, more than 25 municipalities in California passed reach codes, many including ordinances requiring all electric new construction. Further, a roadmap to decarbonize Irvine's building stock will significantly reduce GHG emissions generated by buildings and prepare the City to meet forthcoming State-level commitments to a decarbonized built environment, a key strategy to achieving the 2050 80% greenhouse gas emissions reduction target. According to a recent UCLA study, building electrification could support between 64,000 – 104,000 jobs annually in California. Irvine can be at the forefront of this job training and education process. Through these actions, Irvine can demonstrate climate leadership, prioritize community health and support its local economy.

STATE POLICY

Title 24 building code aims to have all new buildings be zero net energy by 2030. The CA Energy Efficiency Strategic Plan sets a goal of 50% of commercial buildings to be retrofit to zero net energy by 2030. AB 802 requires energy benchmarking and disclosure for buildings over 50,000 square feet. Local actions recommended in this section will reduce 2030 emissions by 12.5% compared to 2006.

STAKEHOLDER INPUT

Stakeholders consulted in developing this Plan identified upgrades to existing buildings and building decarbonization as high priority actions, suggesting these actions delivered co-benefits including supporting the local economy, demonstrate leadership, resiliency and climate preparedness, education and awareness, cost-saving and lower energy bills. Furthermore, it was recognized that economic recovery could be tied to green recovery incentives that encourage electrification of buildings and promote co-benefits.



	Number	Action	Co-Benefits
Ñ	B-1	Develop a Community-Facing Energy Upgrade Program	🍪 🗟 🖏
DING	B-2	Reduce or Remove Administrative Obstacles to Energy Storage, Electric Vehicles, and Building Electrification	
BUIL	B-3	Decarbonize City Facilities	🔂 📽 🟯 🏶
	B-4	Develop Decarbonization Roadmap	to 💱



Resiliency & Climate Preparedness



Cost Savings



Health, Wellbeing, & Livability



Support Local Economy



Reduce Traffic & Congestion



Community Priority



B DEVELOP A COMMUNITY-FACING ENERGY UPGRADE PROGRAM

There are many existing energy upgrade programs available through SoCal Regional Energy Network and other agencies. The City should not replicate these programs and often cannot influence or control existing program offerings. However, the City can play a key outreach role in targeting sectors that are difficult to reach and sectors that might disproportionately benefit from energy cost reductions, such as small businesses or low-income households. Community stakeholders identified these underserved groups as priorities for City outreach. Connecting these groups to existing resources can reduce energy costs for some of Irvine's most vulnerable residents and businesses while also contributing to GHG reductions citywide.

The City of Irvine is proud to work with the <u>California</u> <u>Green Business Network</u> to offer the Green Business Program to help businesses incorporate sustainability measures into their operations and realize cost savings. This program is offered to all businesses in Irvine, but targets small businesses, and is something that should continue to be supported citywide. This program recognizes businesses that utilize strategies aimed at improving employee wellness and productivity, energy savings, water efficiency, resource stewardship and reducing CO_2 emissions. Participating businesses can receive up to \$500 to help incorporate energy and water savings measures, and are also eligible to receive tools to implement energy and water saving measures from the City's utility and property management partners. Certified businesses receive a seal that shows their commitment to sustainable practices at every level of operations. Staff works with these businesses to continue reducing impacts on the environment through sustainability and source reduction initiatives.

> **GREEN** CALIFORNIA GREEN BUSINESS NETWORK CITY OF IRVINE

> > High

Medium

RECOMMENDATIONS:	Feasibility	Priority	Cost
1. Identify underserved sectors of existing energy upgrade programs.		*	^
2. Develop community outreach programs targeted to underserved sectors that help connect them to existing programs and resources.	≈	*	~



Low



REMOVE OR REDUCE ADMINISTRATIVE OBSTACLES TO ENERGY STORAGE, ELECTRIC VEHICLES, AND BUILDING ELECTRIFICATION

California has a long track record of incentivizing and supporting renewable energy. Irvine offered solar permit waivers for years, and now offers streamlined permitting for solar, battery storage, and EV charging stations. The cost of solar PV energy has reduced dramatically, and its adoption has become more mainstream at both building scale and grid scale. While incentives for solar PV energy may be less needed now than previously, other components of Irvine's clean energy future are still earlier in their adoption curves. Irvine can encourage and accelerate private adoption of energy storage, electric vehicles, and building electrification by removing or reducing obstacles in existing City policies. For example, the Zoning Code may include screening requirements for rooftop equipment, which would

affect PV output. Side yard setbacks may prevent homeowners from installing condensing units for efficient heat pump technology. Even though Irvine implements fast-tracked permitting, permit fees and inspection timelines may discourage building owners from retrofits. While regulatory obstacles should be addressed, any incentive program has tradeoffs. Offering financial incentives or streamlined permitting adds expense to City budgets and puts pressure on staffing resources and capacity. The City should engage with developers, equipment installers, residents, and community groups to help identify and prioritize obstacles that should be addressed and identify ways to minimize overall impact to City budget and staffing levels.

Hiah

Medium

RI	ECOMMENDATIONS:	Feasibility	Priority	Cost
1.	The City should continue to offer a streamlined application process and links to financing resources on the City's website.	≈	~	^
2.	Instead of incentivizing solar PV or other mature technologies, the City should consider administrative mechanisms to encourage energy storage and building electrification, such as fast tracked or discounted permitting.	*	^	^
3.	The City should identify obstacles in existing City codes and requirements and propose revisions to mitigate them.	≈	*	^
				•

Low

B3 DECARBONIZE CITY FACILITIES

As California's electricity supply gets cleaner, shifting buildings away from natural gas use is becoming a key part of many cities' climate strategy. Burning natural gas for space heating, water heating, and cooking creates indoor health hazards and is less efficient than using electric heat pump or induction technology. Eliminating natural gas piping and infrastructure can reduce capital costs for new buildings. To realize these benefits and to prepare for potential regulatory requirements, Irvine should assess feasibility and cost impacts of electrification of City buildings by piloting both an all-electric new construction project and an all-electric retrofit of an existing City facility. Studies by E3 and others show that for new construction, all-electric buildings are cost effective in most project types across California, partially because any additional costs are offset by not connecting to natural gas infrastructure. Retrofits may be more challenging, and the City should consider piloting a retrofit at a facility with relatively simple gas infrastructure. For example, a small community center may only have a small furnace, hot water heater, and a few kitchen appliances. While this will not be representative of electrification retrofit challenges for all city facilities, it may help build familiarity with the strategies, challenges, and service providers that are relevant for other projects.

R	ECOMMENDATIONS:	Feasibility	Priority	Cost
1.	Identify and pilot an all-electric new construction project. Document costs and challenges and evaluate using all-electric as basis of design for future City buildings.	*	≈	~
2.	Conduct a feasibility study of existing City buildings to identify candidates for electrification.	∧	☆	☆
3.	Pilot a retrofit of a City building to convert to all-electric operations.	^	~	≈
				•



B4 DEVELOP DECARBONIZATION ROADMAP

In addition to Renewable Portfolio Standards that California and other states have requiring renewables, cost improvements have made renewables cheaper to build than new natural gas plants. Furthermore, Bloomberg New Energy Finance estimates that building new renewable electricity projects will be cheaper than continuing to run existing gas plants in the US by 2030. As the cost of renewables drops below fossil fuel power plants, and as California's electricity grid continues to get cleaner, removing natural gas combustion from buildings will reduce costs, improve health, and reduce greenhouse gas emissions. As of early 2020, over 50 jurisdictions in California have introduced legislation or are considering some form of restriction on natural gas use in buildings. The Building Decarbonization Coalition is a non-profit collaborative group that provides information and

resources related to electrification for cities. This group can help Irvine be prepared for regulatory changes and understand local opportunities for decarbonization. California bill SB 1477 (2018) introduced two new large incentive programs, BUILD and TECH, which are focused on removing natural gas emissions from residential buildings and appliances. The CA Public Utilities Commission began a proceeding in early 2020 to plan for a transition away from the natural gas energy system statewide. While all-electric buildings are status guo in many parts of the US, they are not as common in Irvine. The City of Irvine should explore ways to incentivize a private sector shift to this cleaner, more cost-effective approach to building design. Building electrification is a key pillar in SCE's 2030 Decarbonization pathway.

High

Medium

Low

R	ECOMMENDATIONS:	Feasibility	Priority	Cost
1.	Participate in the Building Decarbonization Coalition to monitor regulatory impacts, identify funding opportunities, and learn best practices from other California communities related to building decarbonization.	≪	*	^
2.	Identify ways to incentivize and encourage private sector shift away from natural gas infrastructure.	*	~	^





TRANSPORTATION AND LAND USE

Source: Unsplash, Sergio Sou

As of 2018, transportation in Irvine comprised 26% of community-wide energy consumption and generated 33% of GHG emissions. While California's vehicle fuel efficiency requirements are projected to reduce GHG emissions in Irvine by 10% by 2050, the City and residents can take action to address energy consumption by reducing vehicle miles traveled (VMT) and reduce emissions by shifting to cleaner fuels and zero emissions vehicles.

Transportation and land use policies are central to how people live and move around Irvine and have an inherent energy and GHG impact. The topics are fundamentally interconnected, for example: if housing is built close to transit and basic services, residents are more likely to drive less, decreasing fuel use and associated GHG emissions. If there is not enough affordable housing near jobs, people must commute from further away to work in Irvine.

Irvine is already a leader within California in adoption of electric vehicles, but there is opportunity to maintain momentum in the transition away from fossil-fuel emitting vehicles by increasing access to charging infrastructure. To further reduce the use of single occupancy vehicles, Irvine should advocate for improvement and expansion of public transportation infrastructure, focus on local transit circulator-type service, and continue investing in bicycle and pedestrian connections throughout the city.

Irvine can build upon its history of master planning and incorporating the <u>"village" concept</u> by refining land use policies where feasible to increase housing capacity near transit – especially affordable housing – and encouraging mixed-use communities where residential units, employment opportunities, and amenities are within walking distance.

While land use policies are not directly addressed in this Plan, Irvine is in the process of updating its General Plan. This update should incorporate where feasible land use and mobility policies that will reduce energy use and emissions by reducing the number of vehicle trips that are necessary for residents and businesses throughout Irvine.

The City of Irvine provides a network of on-street and off-street bikeways to encourage the use of bicycles as a safe and convenient means of transportation for both commuting and recreational purposes. This is evident by 301 lane miles of on-street and 63.3 miles of off-street bikeways provided in the City today.



STATE POLICY

Executive Order B-16-12 aims to have 5 million EVs by 2030. In 2020, Governor Newsom announced that no new fossil fuel powered cars would be sold in the State after 2035. The CA Air Resources Board increases the proportion of electric trucks sold to 100% in 2045. Clean Transit regulation phases in zero emission bus fleets between 2023 and 2040. Local actions recommended in this section will reduce 2030 emissions by 1.2% compared to 2006.

STAKEHOLDER INPUT

Stakeholders consulted in the development of this plan emphasized an interest in compact, mixed use development, safe bike and pedestrian thoroughfares, and increased and equitable access to electric vehicle charging infrastructure. Health, resiliency and reduction in congestion were the most commonly cited co-benefits of transportation and land use strategies.

Z	Number	Action	Co-Benefits
TATIC D USE	TLU-1	Reduce emissions from City Fleet Vehicles and Employee Commute	ė s 4
ISPOR D LAN	TLU-2	Incentivize Sustainable Transportation Modes for Residents and Businesses	ė fr 42
TRAN ANI	TLU-3	Develop a Comprehensive Electric Vehicle Action Plan	to fr 📽 🔬



Resiliency & Climate Preparedness



Cost Savings



Health, Wellbeing, & Livability



Support Local Economy



Reduce Traffic & Congestion

Community Priority



REDUCE EMISSIONS FROM CITY FLEET VEHICLES AND EMPLOYEE COMMUTE

The City of Irvine operates a fleet of vehicles used for a wide variety of purposes. Transitioning this fleet to low and zero emissions vehicles can reduce operational and maintenance costs for the City while improving air quality, reducing noise pollution, and creating health benefits for residents and City staff. The City of New York recently found that electric vehicles are already less expensive to own and operate_for light-duty vehicles. Transitioning Irvine's fleet will also align with recent State policies requiring zero emissions vehicles be phased in by 2035 (cars) and 2045 (trucks). As fleet vehicles reach the end of their useful life, the City should look to replace them with zero emissions alternatives. Incentives are often available for this transition. For example, the California Clean Vehicle Rebate Project offers up to \$7000 rebate for up to 30 vehicles annually for public fleets. Battery electric vehicles are the most likely replacement for many of the City's lightduty vehicles, while other technologies may be more appropriate for heavy duty and specialty vehicles, like emergency response vehicles. While alternative vehicles options are increasing, transitioning the City fleet to alternative fuel vehicles may require additional training, different maintenance procedures and schedules, or other changes that may impact the City budget. As part of evaluating a transition to alternative fuel vehicles, the City should also evaluate its overall procedures for procurement, ownership, and maintenance of fleet vehicles to fully understand the impacts of a transition and identify opportunities for cost savings.

The City should consider incorporating non-traditional transportation modes as well for specific uses. For example, city staff may be able to complete certain tasks using bicycles, e-bikes, or other clean

transportation modes when traveling shorter distances. This can improve health and wellness, reduce emissions, and extend the useful life of the City's existing vehicle fleet. As an example, the Irvine Police Department already uses e-bikes on certain patrol routes.

In addition to City-operated fleet vehicles, Irvine can also influence energy and emissions from employee commute. Irvine currently supports sustainable transportation options through the programs offered by Spectrumotion, a local nonprofit rideshare association. In addition to these



options, telecommuting can substantially reduce transportation-related energy use. Like many cities around the world, Irvine has been impacted by COVID-19 workplace restrictions and has adapted to incorporate telework for many of its employees. This initiative resulted in the City not falling into the emission credit purchase requirement this year because the high number of employees telecommuting resulted in an Average Vehicle Ridership of 3.30, far exceeding the Air Quality Management District's target of 1.50 (the equivalent of 1.5 people per car). Even after COVID-19 restrictions are eased or lifted, the City can adopt a more robust telecommuting policy for its employees. This can not only reduce emissions and energy use from employee commute, but may reduce overall space needs and real estate expenses.

Global Workplace Analytics estimates that employers can save up to \$11,000 per half-time telecommuter per year, while employees can save between \$2,500 and \$4,000 per year.



R	ECOMMENDATIONS:	Feasibility	Priority	Cost
1.	By 2022, establish a plan to transition all City-owned light- duty fleet vehicles to be zero emission vehicles by 2032.		≈	≈
2.	By 2030, ensure that over 50% of the City's fleet uses alternative fuels, with 100% of all non-emergency response sedan purchases being zero emission vehicles.	*	*	≈
3.	Continue to support sustainable transportation options for employee commuting.	≈	☆	~
4.	Establish a telecommuting policy that reduces the overall need for employee commute transportation.	≈	≈	~





INCENTIVIZE SUSTAINABLE TRANSPORTATION MODES FOR RESIDENTS AND BUSINESSES

While the City cannot control transportation choices for residents and businesses, it can influence decisionmaking and promote alternatives that reduce traffic, improve air quality, and reduce overall energy usage and costs. Concurrently with the development of this Plan, the City is finalizing a Strategic Active Transportation Plan. The recommendations in that plan will help increase active transportation modes such as walking and biking throughout Irvine. Active transportation will play an important role in energy and emissions reduction, especially considering uncertainty in the future of public transportation that has arisen due to COVID-19.

Near-term funding, ridership patterns, and infrastructure needs for public transportation will be difficult to predict as a result of COVID-19 disruptions to travel, work, circulation and public health. Due to COVID-19, measures to maximize public transit passenger and driver safety have been implemented. However, all local circulators in Orange County, such as iShuttle, are currently not operating and other services that have continued to operate are experiencing low ridership. Despite these challenges, it is likely that over the life of the plan, public transportation will still play a key role in addressing energy use, emissions, and public health. As a regional destination for people to live, work, and play, understanding both local and regional circulation patterns is critical to planning effective transportation services. The City is currently studying local area transit circulation to understand how to better integrate intermodal connections across existing transit services and to solve first/last mile challenges for residents and businesses. The City can advocate for OCTA to provide increased service levels and to transition to zero-emissions vehicles.

Lastly, the City can promote and recognize best practices among local leaders who are working to increase sustainable modes of transportation. Spectrumotion provides resources and programs for commuters and also highlights case studies, such as electric vehicle car sharing and rideshare programs. The City can continue to support Spectrumotion's outreach and programs to highlight these successes.

RE	ECOMMENDATIONS:	Feasibility	Priority	Cost
1.	Advocate for increased public transportation service and a transition to zero-emission vehicles from OCTA.	≪	≈	~
2.	Implement recommendations of the Irvine Strategic Active Transportation Plan.	≪	≈	≈
3.	Recognize and promote best practices from local business leaders for sustainable transportation modes.	≪	~	~





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DEVELOP A COMPREHENSIVE ELECTRIC VEHICLE ACTION PLAN

California is a global leader in electric vehicle adoption. In 2017 approximately 10% of new vehicles in Irvine were electric vehicles, and both EV adoption and number of available models have been increasing year-over-year. EVs cost less to own and operate over their lifetime than comparable gas-powered vehicles, while also eliminating tailpipe air pollution emissions which improves local air quality. The City of Irvine can help incentivize and accelerate adoption of EV through policy and planning. EVs will also have an increasing impact on Irvine's electrical infrastructure needs that can be managed with careful planning. In the medium- and long-term, EVs may also provide valuable services to the electrical grid, with vehicle batteries providing distributed energy storage, powered by vehicle-to-grid management software. Pilot projects for this technology are already

underway for medium and heavy duty vehicles, and research and development continues for light duty vehicle applications. Planning for EV charging and transition of vehicles will also prepare the City to meet the Governor's policy of new EV purchases by 2035.

At its Orange County Great Park meeting on March 24, 2020, the Irvine City Council discussed the need to meet EV charging demands citywide, and directed a Request for Proposals be issued to develop a plan that assesses community needs, identifies locations for EV charging infrastructure, and considers potential opportunities for revenue generation. This section recommends goals for that plan that would align with the goals for this Strategic Energy Plan.

RECOMMENDATIONS:	Feasibility	Priority	Cost
 Develop a Comprehensive EV Action Plan that: Establishes the current baseline for EV adoption and projects future scenarios across vehicle types. Creates an infrastructure plan for public and private electric vehicle supply equipment (EVSE) needs citywide. Identifies policies and incentives to encourage EV adoption, such as parking policies and prices, streamlined permitting, fleet requirements, and zoning policies. Identifies partnerships to accelerate EV adoption with public and private agencies, such as vehicle manufacturers, ride hailing companies, fleet owners and operators, local government coalitions, and utilities. Considers impacts to equity and access, particularly for low-income communities, renters, and other Irvine residents and businesses with lower access to EVs 	*	*	*

Low

S FUNDING THE PLAN

SUMMARY OF FINANCING OPTIONS

One of the main challenges communities face when trying to implement energy and emissions reductions plans is how to pay for them. Many actions will reduce energy costs over time, but those reductions must be financed with upfront capital. Municipal finance is complex, highly regulated, and always evolving. It can be difficult not only to find enough funding for programs, but also to manage many different sources of funding and the various rules and administration that accompany them.

The actions recommended in this plan were developed to minimize implementation cost to the City while still producing benefits for energy and emissions reductions. For many actions, **no additional funding** beyond existing staff resources will be necessary. For example, instead of creating new energy education programs, B-1 recommends using existing City resources to connect targeted underserved community groups with existing utility programs. For others, grant funding and public private partnerships (such as a PPA) are the most likely source of funding. Funding has not been identified for some of the recommended actions, although it is likely that grant funds may become available for building decarbonization or for policies promoting electric vehicles. The following table notes where sources of funding have been identified for actions in this plan. A detailed table of specific funding opportunities for energy-related programs is included in Appendix D.

RECOM	IME	NDATIONS:	Funding
FC 1	1.	The City of Irvine should form or join a CCE entity.	Underway
E2-1	2.	The City should opt all customers into a zero-carbon electricity product by default.	N/A
ES-2	1.	The City should conduct a competitive energy procurement for solar, storage, and efficiency across the City's portfolio.	РРА
P_1	1.	Identify underserved sectors of existing energy upgrade programs.	Staff Resources
B-1	2.	Develop community outreach programs targeted to underserved sectors that help connect them to existing programs and resources.	Staff Resources
	1.	The City should continue to offer a streamlined application process and links to financing resources on the City's website.	Staff Resources
B-2	2.	Instead of incentivizing solar PV or other mature technologies, the City should consider administrative mechanisms to encourage energy storage and building electrification, such as fast tracked or discounted permitting.	General Fund
	3.	The City should identify obstacles in existing City codes and requirements and propose revisions to mitigate them.	Staff Resources
	1.	Identify and pilot an all-electric new construction project. Document costs and challenges and evaluate using all-electric as basis of design for future City buildings.	Not Identified
B-3	2.	Conduct a feasibility study of existing City buildings to identify candidates for electrification.	Not Identified
	3.	Pilot a retrofit of a City building to convert to all-electric operations.	Not Identified
B-4	1.	Participate in the Building Decarbonization Coalition to monitor regulatory impacts, identify funding opportunities, and learn best practices from other California communities related to building decarbonization.	Staff Resources
	2.	Identify ways to incentivize and encourage private sector shift away from natural gas infrastructure.	Staff Resources

	1.	By 2022, establish a plan to transition all City-owned light-duty fleet	Grants
TLU-1	2.	By 2030, ensure that over 50% of the City's fleet uses alternative fuels, with 100% of all non-emergency response sedan purchases being zero emission vehicles.	Grants
	3.	Continue to support sustainable transportation options for employee commuting.	N/A
	4.	Establish a telecommuting policy that reduces the overall need for employee commute transportation.	Staff Resources
	1.	Advocate for increased public transportation service and a transition to zero-emission vehicles from OCTA.	N/A
TLU-2	2.	Implement recommendations of the Irvine Strategic Active Transportation Plan.	Not Identified
	3.	Recognize and promote best practices from local business leaders for sustainable transportation modes.	N/A
TLU-3	1.	 Develop a Comprehensive EV Action Plan that: Establishes the current baseline for EV adoption and projects future scenarios across vehicle types. Creates an infrastructure plan for public and private electric vehicle supply equipment (EVSE) needs citywide. Identifies policies and incentives to encourage EV adoption, such as parking policies and prices, streamlined permitting, fleet requirements, and zoning policies. Identifies partnerships to accelerate EV adoption with public and private agencies, such as vehicle manufacturers, ride hailing companies, fleet owners and operators, local government coalitions, and utilities. Considers impacts to equity and access, particularly for low-income communities, renters, and other Irvine residents and businesses with lower access to EVs 	Not Identified



APPENDIX A: RELEVANT STATE & LOCAL POLICIES

Below is an inventory of the City of Irvine's existing energy-related activities, projects, programs, and policies, that have or will impact future energy use.

LOCAL INITIATIVES	DESCRIPTION
Green Purchasing Policy 2006/Revised 2010	This Policy supports the purchase of recycled and environmentally preferable products to minimize environmental impacts relating to our work.
Energy Audits	Historical energy audits performed on 15 City facilities.
Solar PV	255 kW PV installed at 7 facilities: Los Olivos Community Center, Portola Springs Community Center, Quail Hill Community Center, Trabuco Senior Center, University Community Center, Northwood Community Center, Cypress Community Center
Energy Storage Pilot	Pilot project to evaluate energy storage at Woollett Aquatic Center.
Orange County Cities <u>Energy</u> <u>Leader Partnership</u>	The City collaborates with Southern California Edison, Southern California Gas Company, and neighboring cities to identify projects to improve long term energy efficiency in municipal operations. Projects save 1.6 million kWh annually, and Irvine has achieved Gold Partner status.
Southern California Regional Energy Network	Collaboration with SoCalREN to identify, audit, and execute energy efficiency projects.
Energy Benchmarking	The City benchmarks facilities larger than 50,000 sq.ft., totaling 46 buildings.
Energy Outreach Utility programs for residents & businesses	Irvine coordinates with its Local Government Partnership and SCE and SoCalGas to provide energy education at outreach events such as Irvine Global Village and has prepared energy educational events for various city internal and community stakeholders.
City of Irvine Green Building Resolution	LEED Certification required for new City Buildings over 5000 square feet. To date, the City has 7 LEED buildings: 4 Gold; 1 Silver, 2 TBD (currently in process)
CCE Feasibility Study	In 2019 Irvine undertook a feasibility study to evaluate Community Choice Energy.

STATE INITIATIVES	DESCRIPTION
CA Public Utilities Code Section 8380	Prevents investor owned utilities from disclosing customers' energy consumption data without consent, unless part of a required program.
SB 782: Energy Data Transparency SB 1476	Requires utilities to provide aggregated energy usage info to owners of multiple buildings on a parcel. Prevents public utilities from disclosing customers' energy consumption data
	without consent, unless part of a required program.
Assembly Bill 32 (2006)	Mandates reduction of greenhouse gas (GHG) emissions in California to 1990 levels by 2020 and created a cap-and-trade program.
SB 32	Requires that statewide greenhouse gas emissions are reduced to 40% below the 1990 level by 2030.

STATE INITIATIVES (contd.)	DESCRIPTION
AB 758: Building Efficiency	Requires energy and water savings programs in existing buildings. The Energy Commission developed the Existing Buildings Energy Action Plan in August 2015.
California's Energy Efficiency Strategic Plan	 This Plan creates programs to implement the following state goals: All new residential construction will be zero net energy (ZNE) by 2020. All new commercial construction will be ZNE by 2030 50% of commercial buildings will be retrofit to ZNE by 2030 50% of new major renovations of state buildings will be ZNE by 2025.
SB 350 (2015)	Requires the amount of renewable electricity generated and sold to retail customers be increased by 50 percent by December 31, 2030.
SB 246: Climate Adaptation	Establishes an Integrated Climate Adaptation and Resiliency Program for California.
SB 379: Climate Adaptation	Requires inclusion of climate adaptation and resiliency strategies as part of the safety elements of General Plans.
AB 802 (2015)	Created a statewide building energy use benchmarking and public disclosure program for buildings larger than 50,000 square feet.
SB 375 (2008)	Requires regional targets for reducing greenhouse gas emissions, which must be included in local government planning documents.
SB 1477 (Stern)	Requires the CPUC to develop programs to promote building electrification.

APPENDIX B: EVALUATION OF SOLAR AND STORAGE SITES AT CITY FACILITIES

BACKGROUND

This Plan recommends that a comprehensive portfolio-wide procurement be conducted for efficiency, solar PV, and energy storage. Potential bidders in that procurement would do an extensive, investment-grade analysis of city facilities, hourly energy data, structural and electrical considerations, and other factors to determine optimal sites for these energy improvements. Below are several high-level illustrative examples of how these analyses would be conducted to evaluate the potential for solar and storage at City facilities.

Sites with high potential for solar PV:

Civic Center

Irvine Civic Center is the largest energy consumer of all buildings studied. This building, as the hub of civic government presents an opportunity for a highly visible commitment to clean energy. The Civic Center uses gas and electricity and has sufficient site area to accommodate solar PV to offset most of the building's annual electricity demand. If paired with storage, Civic Center could further reduce energy costs and also increase resilience by allowing continued provision of City Services during a power outage. The City is working on installing 20 EV chargers on-site, and has submitted an application with SCE to consider solar structures in the parking lots adjacent to the Civic Center. City should consider working with a Power Purchase Agreement to protect the City from rising utility rates.

Civic Center may be a good candidate for microgrid technology, which can help reduce peak energy demand costs and overall emissions from energy use. A microgrid can also help extend functionality of critical City operations in the event of a power disruption.

• Irvine Train Station

The train station is 100% electric and could be operationally zero carbon if powered by a combination of clean grid power, onsite renewables, and storage. The train station is highly visible, and a 'gateway' to Irvine, thus presenting the opportunity to engage the community and visitors. The rooftop of the parking structure offers a large area for potential PV system and shade structure.

• Sweet Shade Park

This site is 100% electric and could be operationally zero carbon if powered by a combination of clean grid power, onsite renewables, and storage. Sweet Shade Park is a local public amenity and thus offers the visibility and opportunity to engage Irvine residents around Irvine's commitment to sustainable energy management.

• Trabuco Senior Center

This site is 100% electric and could be operationally zero carbon if powered by a combination of clean grid power, onsite renewables, and storage. Trabuco Senior Center has an existing PV system, which the City should consider expanding and pairing with storage to provide resilience benefits and reduce overall energy costs.

• Heritage Park Group - Community Center and Fine Arts Center

These two sites grouped together have more than enough available area for solar PV to generate 100% of energy needs for both facilities. The City should consider pairing PV here with storage as a microgrid to serve as a community resilience center and gathering point in times of extreme events or power outages.

• Great Park

The large physical area of Great Park would allow for a large amount of PV generation using solar shade structures. There is also the potential to install solar canopies in the parking lots and sports fields that would provide much-needed shade to these areas. The City should incorporate solar onto shade structures where feasible.

	Annual Electricity (2018)		Estimated PV Site				Storage	EV Chargers	Microgrid Potential?
Site	Use (kWh)	Cost (\$)	Area (SF)	Power (kW)	Energy (kWh)	Est. Cost (\$)	Capacity (kWh)	#	
Irvine Train Station	785,579	\$94,964	42,000	672	898,464	\$2,352,000		12	
Sweet Shade Park	77,610	\$13,984	4,550	73	97,334	\$254,800		2	
Trabuco Senior Center	79,299	\$16,013	4,650	74	99,473	\$260,400		2	
Heritage Park Community Center	441,663	\$78,219	23,400	374	500,573	\$1,310,400		5	Yes
Heritage Park Fine Arts Center	199,531	\$41,188	24,600	394	526,243	\$1,377,600	268,953	5	Yes
Great Park	1,998,379	\$378,158	400,000	6,400	8,556,800	\$22,400,000	6,442,904	12	Yes
Civic Center	3,856,557			2,000	2,700,000	\$7,000,000		20	Yes

APPENDIX C: STAKEHOLDER ENGAGEMENT

Stakeholder engagement spanned the duration of developing Irvine's Strategic Energy Plan and was crucial to both building community support and shaping the strategies that make up the Plan. A Stakeholder Engagement Strategy was first drafted to outline the timeline and approach for engaging both internal and external stakeholders. The strategy guided how stakeholders would be reached out to, and how feedback would be collected, synthesized, and shared with the project team and community at-large.

An initial exercise helped identify all potential stakeholders, their respective levels of interest and influence, and the optimal channels of communication for each group. The Strategy detailed objectives of stakeholder workshops that would be hosted by the City and open to City staff and community members, affording the opportunity for all to be involved. Participant responses and outcomes from these workshops are addressed below.

This summary includes outcomes from the internal City staff meeting, two public community workshops, individualized stakeholder engagement, and an online survey.

Initial Internal Stakeholder Meeting with City Staff

An Internal Steering Committee was developed and met to discuss scope and planning prior to public outreach. The initial meeting included City internal staff in the discussion strategies to be included in the Plan. During this meeting, City internal staff were apprised of the current state of energy use and future energy forecasts and helped to develop the foundation for an energy vision to guide all strategies of the Plan. Overarching categories were presented to help organize strategies and included Energy Supply, Built Environment, Transportation, and Other. Based on the input, a preliminary list was prepared with options to be shared with stakeholders in Workshop 1.

Stakeholder Workshop 1: Ideas Generation and Voting

The Irvine Strategic Energy Plan Stakeholder Workshop 1 provided attendees background information and context regarding the Plan. This included explaining the key objectives of the Plan, sharing the vision statement, and reviewing the City's 2018 energy use and greenhouse gas emissions inventory. With this contextual information, workshop participants were asked to provide input and share their ideas and areas of interest.

Workshop activity participants reviewed the preliminary proposed strategies in four categories (Energy Supply, Buildings, Transportation and 'Other') and were asked to (a) brainstorm additional strategies that were not on this preliminary list, and (b) vote on topics viewed as most important.

Stakeholder Workshop 2: Discussion and Prioritization of Strategies

The purpose of the Irvine Strategic Energy Plan Stakeholder-Workshop #2 was to discuss and analyze the impacts of the strategies considered for the Plan. This began with a presentation of the measured projected impacts of each of the strategies, to provide stakeholders with information about each strategy's relative potential to reduce the city's energy use and/ or emissions. Other City priorities ("co-benefits") were also presented to stakeholders, to provide a frame to



consider the additional value of each strategy to the City and community members.

During the activity portion, stakeholders were asked to assign a level of priority and effort for each proposed strategy. Attendees were split into small groups to discuss co-benefits associated with each strategy, level of priority and amount of effort needed to implement. The Workshop participants reviewed strategies are described below.

Energy Supply: During this exercise, stakeholders concluded that Community Choice Energy (CCE) would have the greatest co-benefits. These included support for the local economy, demonstrating resiliency climate leadership, affording & preparedness, adding education & awareness, and having the effect of cost-savings and lower energy bills. It was also decided that CCE is of high priority and would require low to medium effort. Community Solar ranked second for total co-benefits. The co-benefits found were: support the local economy, demonstrating leadership, resiliency & climate preparedness, education & awareness, and costsaving & lower energy bills. Community solar was deemed a high priority that would require medium effort.

<u>Buildings</u>: During the discussion on building energy strategies, stakeholders agreed that pursuing energy retrofits and decarbonization was a high priority. Even though participants ranked retrofits as a high effort strategy, several co-benefits were still allocated including: support the local economy, demonstrate leadership, resiliency & climate preparedness, education & awareness, cost-saving & lower energy bills. For decarbonization, four of the six co-benefits were associated.

<u>Transportation</u>: During the discussion on transit strategies, stakeholders listed transit service electrification, local electric vehicle adoption, compact/mixed-use development, local carbon fuel standard, pedestrian/cycling infrastructure, and transit system expansion as the highest prioritized strategies to meet energy goals. Compact/mixeduse development was listed as the highest priority and the group decided to assign five out of the six co-benefits, those co-benefits being: support local economy, demonstrate leadership, resiliency and climate preparedness, and education and awareness. Compact/mixed-use development was also listed as being a low effort strategy. Local electric vehicle (EV) adoption and transit service electrification had the same level of high priority, although local electric vehicle adoption had four out of the six co-benefits while transit service electrification had three. Stakeholders also wanted two additional co-benefits added: health and environmental justice. The co-benefit of health was added to Low Carbon Fuel Standard, Transit Service Electrification, Local Electric Vehicle Adoption. Pedestrian/Cycling Infrastructure. Compact/Mixed-Use Development. and The co-benefit of environmental justice was added to Transit System Expansion.

Workshop participants provided personal feedback regarding the strategies they were most excited for which were Decarbonization, Energy efficiency retrofits, Community choice energy, Public transport extension and Electric vehicle infrastructure. For strategies they thought should be a high priority were Community choice energy, Decarbonization, Electric vehicle infrastructure, Energy efficiency, Environmental awareness and Financial support. Participants found the following as foreseen challenges when implementing the strategies: Spreading awareness to the public, Breaking habits, Speed of implementation, and Funding. Lastly, participants thought these challenges could be



addressed through education and outreach and in a cost-effective manner.

Online Survey

An online survey was conducted to further help inform the energy strategies that make up the Plan. It was completed by 55 participants who identified as the following participant categories: resident, business owner, non-governmental organization, educational institution and "other."

Energy management strategies ranked in order of which participants would want to see most explored: Community choice energy, More local use of renewable energy, Maintain current utility service, Use of local interconnected of grid-independence energy resources (i.e. microgrid, solar, energy storage), Sustainable landscape methods (reducing resource use by planting CA native plants and using efficient equipment).

Building use (existing and new construction) strategies ranked in order of which participants would most want to see explored in the Plan: Building zero net energy buildings (total amount of energy used is equal to the amount of energy created on site), Certify buildings according to LEED (higher performance/lower resource use buildings), Pursue decarbonized buildings (all electric), Identifying energy saving opportunities through auditing and retrofitting existing buildings.

Lastly, participants indicated the following transportation strategies that they would like to see explored in the Plan and that they would be willing to pursue themselves as part of commuting: More fuel cell (hydrogen to fuel) and electric vehicles, Use of car/bike share, Cleaner, more efficient and reliable transportation and Additional shuttle services.

Additional Stakeholder Engagement

Engagement meetings were conducted regarding the Plan with three community stakeholders individually; Irvine Company, Southern California Edison and SoCalGas. The meetings were intended to initiate a conversation on mutual topics related to planning and sustainable energy use as the City was shaping its energy strategies and gauging feasibility and fit. To provide context on the Plan's background the following topics were discussed: what is the Irvine Strategic Energy Plan, how it is being developed and its timeline, a review of the current state of energy and emissions as well as potential energy strategies and vision. Conversation topics included the following: feedback on proposed Plan strategies, potential impact of proposed Plan strategies, community choice energy, other potential opportunities (i.e. energy storage, renewable energy, electric vehicle infrastructure, utility programs), examples of success in the community and demo project potential, perception of greatest challenge, constraints to implementation, utility programs/pilots, resources, assistance, and outreach, EV and infrastructure planning as well as the Bowerman Landfill.

The Plan's next steps were addressed (feedback review and project phases) and feedback on on-going engagement efforts were discussed (general outreach and Stakeholder Engagement Workshops).





APPENDIX D: FUNDING AND FINANCING OPPORTUNITIES

Below is a summary of common sources of funding for municipal programs, along with various constraints and considerations related to them. At the bottom of this appendix is a table with specific sources of funding and financing that may be available for energy-related programs in Irvine.

General Purpose Fund

This is the primary source of funding for City operations and can be used for any public purpose. It is allocated as part of the overall City budget, approved by City Council every two years. General Fund money is more flexible than other sources in how it can be used, since it is allocated at the discretion of City Council. However, the total amount of funding is very limited, highly variable from year to year, and often already allocated to existing programs. The large number of competing priorities for General Purpose Fund dollars requires that the City seek out other sources of funding wherever possible to increase the likelihood of successful implementation for each action. General Purpose Fund monies may be used for staffing, physical infrastructure, or other implementation costs.

Bonds

Local governments can sell bonds to investors that raise capital for a specific objective. Unlike loans, bonds are often introduced along with an accompanying funding measure like a parcel tax, which typically allows bonds to be repaid at lower interest rates. Bonds must be repaid over time with interest, so the total cost of getting funding sooner with a bond is much higher than the actual funding the City would receive. Bonds also must be approved by the voters and may have additional oversight or administration requirements.

Taxes

Taxes generate revenue to support local, regional, and state operations. Some taxes, while generating local revenue, are limited in flexibility for use by cities like Irvine. Except where prohibited by state law, local governments can create local taxes, but must receive voter approval. Those taxes can be used either for general purposes (e.g. any city service, as needed) or specific purposes (e.g. dedicated to funding the specific energy programs), but specific taxes require a 2/3 approval from voters whereas general taxes require majority approval.

Some existing taxes may have a strong connection with this Plan's goals and objectives. One example is the Utility User Tax (UUT), which the City charges on utilities like electricity, natural gas, and telecommunications. Since shifting away from natural gas use is a critical part of achieving California's emissions goals, the UUT could be modified to increase taxes on fossil fuels like natural gas while using the proceeds to help reduce the cost of cleaner technologies or fund climate mitigation efforts. While this is possible, it would still require voter approval, partnership with the energy utilities, and a strong plan to address impacts to equity.

Loans

Somewhat like bonds, loans can fund projects by borrowing money from lenders for upfront costs and then paying the loan off over time. While bonds are typically used over longer terms, loans tend to have shorter repayment terms but also more limited funding amounts. Whereas bonds payments are often secured by corresponding revenue measures (e.g. a parcel tax), loans are often unsecured and may have higher interest rates for repayment. However, some loan programs like the On-Bill Financing Program allow for zero interest loans when used for a public purpose like energy efficiency retrofits for buildings. One other critical distinction is that cities need voter approval to issue bonds, but not to get a loan from a bank. There are several specific State, regional, and utility loan programs that are available specifically for the types of actions included in this Plan.

Grants

This category includes federal, state, utility, regional and local grant programs as well as philanthropic grant funding. Grants are usually given without expectation of repayment, but often still require either matching funds from the City, staff time to administer the grants, or both. Grants are often used to fund programs that are innovative, without a historical track record to evaluate effectiveness. However, grants are also competitive and are not guaranteed source of funding.

Fees

The City collects many types of fees: impact fees, user fees, regulatory fees, penalties, franchise fees, and others. For the purposes of this Plan, these fees have been grouped together into one source of funding. Fees often have a strong connection with a certain activity. For example, a fee for a building permit helps pay the cost of the city staff time to review drawings to ensure compliance with building code. For activities that are related to actions in this Plan, fees may help to recover some of the cost of implementing those actions.

The landscape for funding and financing energy programs is constantly changing at federal, state, and local levels. Successful implementation of the Plan will require continuous monitoring of new funding availability so that Irvine can maximize cost effectiveness of any City expenditures.

Туре	Strategy	Eligibility	Funding Category	Opportunity	Description
	Building Energy Benchmarking	City of Irvine; School District(s)	Partnership	<u>SoCalREN</u> <u>Public Agency</u> <u>Project</u> <u>Delivery</u> <u>Program</u>	The SoCalREN Public Agency Project Delivery Program (PDP) offers a suite of energy analysis and benchmarking services at no cost to public agencies. This includes a customized Comparative Energy Analysis report and Energy Star Portfolio Manager facility benchmarking assistance.
	New Construction Energy Efficiency Standards	City of Irvine; School District(s)	Incentive	<u>Savings</u> by Design Program	Savings By Design encourages energy- efficient building design and construction practices, promoting the efficient use of energy by offering up-front design assistance supported by financial incentives based on project performance.
	Energy Efficiency Retrofits	City of Irvine; School District(s)	Loan	CEC Energy Conservation Assistance Act Low Interest Loans	1% interest loans for public agency energy efficiency/distributed energy resource projects. Eligible projects include: lighting upgrades, HVAC equipment upgrades, energy management systems, building insulation, and load-shifting measures.
BUILDINGS	Energy Efficiency Retrofits	City of Irvine; School District(s)	Incentive	SCE Energy Efficiency Incentive Programs	SCE's Express, Custom, and Performance- Based Retrofit Programs provide incentives for qualifying energy efficiency upgrades to existing facilities. Incentives may be pursued in tandem with SCE's 0% interest on-bill financing. Through the City's enrollment in the SoCalREN Public Agency Programs, the City can receive assistance with applying for SCE energy efficiency incentives.
	Energy Efficiency Retrofits	City of Irvine; School District(s)	Incentive	SoCalGas Energy Efficiency Incentive Programs	SoCalGas offers incentive and rebate programs for qualifying energy efficiency upgrades to existing facilities. Incentives may be pursued in tandem with SCE's 0% interest on-bill financing. Through the City's enrollment in the SoCalREN Public Agency Programs, the City can receive assistance with applying for SoCalGas energy efficiency incentives.
	Energy Efficiency Retrofits	City of Irvine; School District(s)	On-Bill Financing	<u>SCE On-Bill</u> <u>Financing</u>	SCE offers 0% interest loans in conjunction with their energy-efficiency incentive programs to finance the purchase and installation of eligible energy-efficiency upgrades. These loans are paid through the City's monthly SCE utility bill, and loan payments are calculated to be roughly equal to the monthly cost savings associated with the energy efficiency upgrades. Through the City's enrollment in the SoCalREN Public Agency Programs, the City can receive assistance with applying for SCE On-Bill Financing.

Туре	Strategy	Eligibility	Funding Category	Opportunity	Description		
BUILDINGS	Energy Efficiency Retrofits	City of Irvine; School District(s)	On-Bill Financing	<u>SoCalGas</u> <u>On-Bill</u> <u>Financing</u>	SoCalGas offers 0% interest loans in conjunction with their energy-efficiency rebate and incentive programs to finance the purchase and installation of eligible energy-efficiency upgrades. These loans are paid through the City's monthly SoCalGas utility bill. Through the City's enrollment in the SoCalREN Public Agency Programs, the City can receive assistance with applying for SoCalGas On-Bill Financing.		
	Energy Efficiency Retrofits	City of Irvine; School District(s)	Loan	SoCalREN Revolving Loan Fund	SoCalREN's 0% interest Revolving Loan Fund (RLF) can provide short-term construction financing to bridge the delay between construction and On-Bill Financing (OBF) from the utility after project completion or during City budget allocation. RLF's up-front funding allows for quicker project implementation and mitigates the cost of delaying energy efficiency upgrades. Through the City's enrollment in the SoCalREN Public Agency Programs, the City can receive assistance with applying for a SoCalREN RLF Ioan.		
	Utility Demand-Side Management Programs	City of Irvine; Irvine Residents; Businesses	Incentive	SCE Demand Response Program	SCE offers a variety of demand response (DR) incentive programs for agencies to reduce electricity use when the demand for electricity is high, including: automated demand response, capacity bidding, critical peak pricing, and more.		
	Solar Generation	Irvine Residents; Businesses	Incentive	<u>SCE Self-</u> <u>Generation</u> <u>Incentive</u> <u>Program</u>	Program provides a variety of incentives for residential and commercial self-generation projects.		
	Solar Generation	Irvine Residents; Businesses	Tax Credit	<u>Solar</u> Investment Tax Credit	Program provides a tax credit of 26% of the total project cost for qualifying residential self-generation projects.		
ENERGY SUPPLY	Renewable Natural Gas in Local Supply	Irvine Businesses	Incentive	<u>SoCalGas</u> <u>Biomethane</u> <u>Monetary</u> <u>Incentive</u> <u>Program</u>	The objective of the program is to encourage the development of biomethane projects that are interconnected to the utilities' gas pipeline systems.		
	Renewable Natural Gas Tariffs	City of Irvine	Tariff	SoCalGas Biogas Conditioning/ Upgrading Services Tariff	The Biogas Conditioning/Upgrading Services Tariff is an optional tariff service for customers that allows SoCalGas to plan, design, procure, construct, own, operate and maintain biogas conditioning and upgrading equipment on customer premises.		
	Distributed Energy/ Generation Resources	City of Irvine; Irvine Residents; Businesses	Incentive	<u>Self-</u> <u>Generation</u> <u>Incentive</u> <u>Program</u>	The Self-Generation Incentive Program (SGIP) provides financial incentives for the installation of new qualifying technologies that are installed to meet all or a portion of the electric energy needs of a facility.		
	Distributed Energy/ Generation Resources	Irvine Residents	Discount	OC Goes Solar	The OC Goes Solar program has worked for the past two years to secure group solar discount rates for Irvine residents looking to purchase rooftop solar for their homes.		

Туре	Strategy	Eligibility	Funding Category	Opportunity	Description
9	Transit Service Electrification	City of Irvine; Irvine School District(s); Irvine Businesses	Incentive	<u>SCE Charge</u> <u>Ready</u> <u>Transport</u> <u>Program</u>	The Charge Ready Transport Program provides an opportunity for qualifying businesses/public agencies to have the electric infrastructure installed to support charging stations for an EV fleet at no cost to you. Certain agencies may also receive rebates covering part of the cost to buy charging stations.
	Promote Transition to Electric Vehicles	Irvine Residents; Businesses	Incentive	<u>Cal eVIP</u> <u>Southern</u> <u>California</u> <u>Incentive</u> <u>Project</u>	Program provides rebates for installation of DC Fast Chargers. Rebates can cover equipment, planning/design, installation, utility service orders and warranty. Energy storage and EMS systems added to the charging system are covered by rebates.
LANNIP	Promote Transition to Electric Vehicles	Irvine Residents	Incentive	South Coast AQMD_ Replace Your Ride Program	Program provides rebates for the replacement of older, high polluting vehicles with newer hybrid or electric vehicles. In lieu of a rebate, applicants can receive vouchers for car-sharing or public transit services.
ID USE P	Promote Transition to Electric Vehicles	Irvine Residents	Incentive	South Coast AQMD Residential EV Charging Incentive Pilot Program	Program provides incentives to reduce the costs of residential electric vehicle chargers.
N AND LAN	Promote Transition to Electric Vehicles	Irvine Residents	Incentive	CA Bureau of Automotive Repair Consumer Assistance Vehicle Retirement Program	Program provides rebates for residents to retire operational vehicles to help improve California's air quality.
ORTATIO	Promote Transition to Electric Vehicles	Irvine Businesses	Incentive	South Coast AQMD Voucher Incentive Program (VIP)	Program provides incentives for replacing old, high-polluting vehicles with lower- emission vehicles. Program is limited to owners/operators with fleets of 10 vehicles or fewer. Replacement trucks must be purchased from SCAQMD-approved participating dealerships.
TRANSF	Promote Transition to Electric Vehicles	City of Irvine; Irvine School District(s); Irvine Businesses	Public/ Private Partnership	HelpAnswers Solar PV and EV Charging Financing	Program provides multiple financing options for joint car canopy PV, battery storage, and electric vehicle charging station projects.
	Promote Transition to Electric Vehicles	City of Irvine; Irvine School District(s)	Grant	CEC Hydrogen Refueling Infrastructure Program	Program offers grant funds for hydrogen refueling infrastructure projects that will expand California's early commercial light duty hydrogen refueling and fuel cell electric vehicle (FCEV) markets. This solicitation encourages projects with fueling agreements with fleets of commercial vehicles and transit buses to increase station throughput and to aid in the transition of California's commercial vehicle and bus fleets to a zero- emission alternative.

Туре	Strategy	Eligibility	Funding Category	Opportunity	Description
	Promote Transition to Electric Vehicles	Irvine School District(s)	Incentive	South Coast AQMD Lower Emission School Bus Program	Program offers incentive funds for school districts to replace old public school buses with alternative fuel buses (propane, natural gas, and battery electric). Program also provides funding for compressed natural gas (CNG) tank replacement.
DNINN	Improve Alternative Transportation Options	City of Irvine; Irvine School District(s); Irvine Businesses	Public/ Private Partnership	Enterprise CarShare for Businesses	Program provides business/public agency staff with self-service access to a customizable virtual fleet of vehicles, allowing agencies to reduce fleet sizes and reduce their carbon footprints.
USE PLA	Improve Alternative Transportation Options	City of Irvine; Irvine School District(s)	Partnership	OCTA OC Rideshare Program	OC Rideshare offers several programs agencies can offer their employees to reduce commuter emissions and employee commute costs, including: OC Bus Perk Pass, OC Vanpool, Metrolink CPP, and Guaranteed Ride Home.
LAND	Improve Alternative Transportation Options	City of Irvine	Grant	<u>Caltrans</u> <u>Active</u> <u>Transportation</u> <u>Program</u>	Program provides funding for infrastructure, planning, and outreach projects that increase trips made by bicycling and walking.
TRANSPORTATION AND I	Promote Transit- Oriented, Compact Mixed-Use Development	City of Irvine	Grant/Loan	Affordable Housing and Sustainable Communities Program	Program provides funding and financing through projects that implement land-use, housing, transportation, and agricultural land preservation practices to support infill and compact development, and that support related and coordinated public policy objectives, including: improved connectivity to jobs and services, improved access to transit, and preserving and developing affordable housing.
	Promote Transition to Electric Vehicles	Irvine Residents	Incentive	<u>SCE Clean</u> Fuel Reward Program	Program provides rebates for the purchase or lease of an electric vehicle/plug-in hybrid vehicle. The rebate may apply to new and used vehicles. Rebate of \$1,000 for vehicles purchased/leased after January 1, 2019. Rebate of \$450 if the vehicle was acquired before this date.
	Promote Transition to Electric Vehicles	City of Irvine; Irvine Residents	Incentive	<u>California</u> <u>Clean Vehicle</u> <u>Rebate Project</u>	Program provides rebates of up to \$7,000 for the purchase or lease of zero emission vehicles (electric, plug-in hybrid, and fuel cell). Program is administered by the Center for Sustainable Energy for the California Air Resources Board.