



MEMORANDUM

DATE: October 28, 2021

SUBJECT: Palm Springs Existing Home Energy Sustainability Ordinance Proposal

TO: City Council
Patrick Tallarico, Manager, Office of Sustainability

FROM: David Freedman, Sustainability Commission Vice Chair and Solar and Green Building Committee member

Background: Homes in Palm Springs have been built over the years to meet the applicable energy-related building codes, which were first put in place in 1978. Since then, new homes have gotten healthier and more efficient while some existing homes, particularly those built before 2011 that represent most of the Palm Springs housing stock, have been left behind. To help address this situation, this proposal would require homes built before 2011 undergoing additions, alterations, or remodels to make certain targeted upgrades, where applicable and feasible, to bring them closer to 2022 California Energy Code provisions. As a result of the upgrades, these homes can expect lower energy bills, a more comfortable house that is better adapted to higher temperatures, and a lower carbon footprint. Community-wide greenhouse gas (GHG) emissions and energy consumption would also be reduced.

This proposal is based on and combines features from ordinances in Carlsbad and Chula Vista (San Diego County) and Piedmont (Alameda County) that have been approved by the California Energy Commission (CEC) as required by state law for local jurisdictions to adopt measures that exceed the California Energy Code, as well as a model ordinance prepared by the Codes and Standards Program under the auspices of the California Public Utilities Commission and in support of the CEC.¹ If an ordinance embodying this proposal is approved by City Council and then the CEC, it would be effective January 1, 2023, simultaneously with the 2022 California Energy Code.

Who Would Need to Comply: These energy saving improvements are something any home can benefit from, but because newer homes have already been built to meet more recent Energy Codes, the focus of this proposal is single-family homes (one-to-two-unit buildings) built in Palm Springs before 2011 that are doing additions, alterations or remodels that trigger the need for a building permit. Potential examples of what projects would need to comply are:

- Adding square footage
- Adding windows and doors
- Moving interior walls
- Reroofing

¹ The author would like to acknowledge the assistance of the Codes and Standards Program in developing this proposal. This assistance was provided at no cost to the City of Palm Springs.

- Electric panel upgrades
- Kitchen / bath / laundry room remodels
- HVAC modification or replacement
- Solar PV or thermal installation

These projects would NOT trigger this requirement:

- Projects in multifamily homes (buildings with three or more units)²
- Projects that are medically necessary
- Repairs to existing equipment
- Additions, alterations, or remodels to homes built after 2010
- Homeowners on the CARE / FERA utility discount programs or eligible for those programs
- Projects in mobile homes, manufactured housing, or factory-built housing

Based on the type and value of the building permit, different energy saving measures would be required. LED lighting and photosensors would be required (if not already installed) regardless of permit value. Qualifying projects having a permit value of at least \$10,000 would also be required to install the water heating package described below.

Further thresholds using a scoring system based on energy savings would be set for qualifying projects exceeding permit value thresholds of \$25,000, \$50,000, and \$100,000, as further described in the tables set out in Attachment 1. Homeowners must meet the applicable target score for their property established in Table 1A, based on building vintage. Table 1B shows the scores that homeowners earn for measures they select to install or have already installed. To comply, the sum of points earned from Table 1B must be equal or greater than the target score from Table 1A.

The table below provides details about each potential measure that may be required, or qualify as an alternative measure, when a home built before 2011 undertakes a qualifying project. However, all homes in Palm Springs should implement some level of the energy measures listed below to reduce their energy bill, improve home air quality, and lower their carbon footprint.

What Does Energy Efficiency Mean? Below is a table that reviews the home energy efficiency standards that the proposal is trying to ensure homes meet.

Name	Description	Benefit	Implementation Notes
LED Lighting	Replace screw-in halogen, incandescent or CFL light bulbs with LED light bulbs.	LED lights can use up to 75% less energy than incandescent bulbs and are 15% more efficient than average Compact Fluorescent Light (CFL) Bulbs.	Not applicable to lights plugged into outlets. Energy Star bulbs recommended. Historic fixtures exempt if not compatible with LED bulbs.
Exterior Lighting Controls	Install a screw-in photosensor control in outdoor lighting luminaires.	Photosensor controls reduce operating hours on average 20 percent each day. This helps Palm Springs achieve its dark sky objectives.	
Water Heating	A. Water Heater Blanket - Add R-6 insulation to	Water heating can account for up to 50% of an average	Tank insulation is not required for water heaters with storage

² The Codes and Standards Program is currently updating cost-effectiveness data for multifamily homes. This proposal can be extended to include multifamily homes using a similar framework once those data are available.

<p>Package</p>	<p>the exterior of existing natural gas or electric resistance storage tank storage water heaters.</p> <p>B. Hot Water Pipe Insulation - Insulate all accessible hot water pipes with R-3 pipe insulation.</p> <p>C. Low Flow Fixtures - Upgrade sink and shower fittings to maximum flow rates of 1.8 gallons per minute (gpm) for showerheads and kitchen faucets, and 1.2 gpm for bathroom faucets.</p>	<p>home's natural gas usage. By insulating the tank (if not already insulated) and exposed piping, homeowners can minimize the amount of heat that is lost on its way to homeowners. By utilizing low-flow faucets, aerators, and low-flow showerheads, homeowners not only save water but also save the energy used to heat up that water.</p>	<p>capacity of 20 gallon or less or for water heaters with factory installed insulation of R-24 or greater.</p> <p>Only accessible hot water pipes need to be insulated. Historic fixtures exempt if not compatible with water efficiency measures.</p>
<p>Attic Insulation</p>	<p>Add attic insulation in buildings with vented attic spaces to meet R-49.</p>	<p>Attic insulation helps homes maintain a stable temperature.</p>	<p>Homes with existing insulation greater than R-38 or without vented attics are exempt.</p>
<p>Duct Sealing</p>	<p>Air seal all accessible ductwork with a goal of reducing duct leakage to be equal to or less than 10% of system airflow.</p> <p>-or-</p> <p>Replace existing ductwork with entirely new ductwork to meet 2022 Energy Code requirements.</p>	<p>Duct leakage can be as high as 30% in average California homes. This means that up to 30% of the air homeowners are paying to heat or cool is being lost before it reaches its destination. Additionally, leaky ducts can allow a pathway for dust or other indoor air quality concerns to enter rooms.</p>	<p>The 2022 Energy Code will require duct sealing when more than 25 feet of new or replacement space-conditioning system ducts are installed. This measure would apply if not already required by Code.</p>
<p>Air Sealing</p>	<p>Apply air sealing practices throughout all accessible areas of the building. Homes with one or more vented combustion appliances MUST have a Building Performance Institute (BPI) Combustion Appliance Safety Inspection performed after air sealing.</p>	<p>Houses built over the past five years are over 20 percent tighter than those built a decade earlier. This means the air homeowners pay to heat or cool can escape, increasing energy bills and allowing outside pollutants to enter the home. By sealing homes, owners can make it safer and healthier.</p>	<p>Only accessible areas need to be sealed. Attics with crawl space are considered accessible. Combined with other building envelope measures to be cost effective.</p>

Wall Insulation	Install R-13 wall insulation in existing homes that currently have no insulation in the walls (pre-1978 vintages).	Without wall insulation, the air homeowners paid to heat or cool can escape.	
Cool Roof	Only applicable if project includes re-roofing or addition of steep-slope roofs. Install a roofing product rated by the Cool Roof Rating Council (CRRC) with an aged solar reflectance of 0.25 or higher and thermal emittance of 0.75 or higher.	Cool roofs help save energy by increasing the amount of solar energy that gets reflected away from homes and minimize the need for cooling on hot days.	Only for steep-slope roofs (shallow slope roofs already covered).
Windows	Replace existing single pane windows with a dual pane product (pre-1978 vintages).	Energy efficiency windows not only reduce heating and cooling costs they can also reduce the ability of moisture and noise to enter your home.	Look for U-factor equal to 0.30 Btu/hour-ft ² or lower and a Solar Heat Gain Coefficient (SHGC) equal to 0.23 or lower.
Water Heater Replacement	Replace natural gas or electric resistance storage water heater, with Heat Pump Water Heater or High Efficiency Heat Pump Water Heater.	About 18% of an average home's energy is used for heating water. Heat Pump Water heaters are on average 200% to 300% more efficient than traditional water heaters while tankless units are 8% to 34% more efficient. Additionally, because heat pump water heaters store their hot water, they can minimize energy usage during peak periods.	Heat Pump Water Heater or High Efficiency Heat Pump Water Heater with Uniform Energy Factor (UEF) of at least 3.1 (Northwest Energy Efficiency Alliance Tier 3).
Space Heating and Air Conditioner Replacement	Replace existing gas or electric resistance space heating and air conditioner with an electric HVAC Heat Pump or High Efficiency HVAC Heat Pump.	When running air conditioners can be the biggest energy user in a home so installing high efficiency units can prevent higher bills. It is also important to ensure ducting is sealed and installed and filters are regularly changed.	Install a Heat Pump or High Efficiency HVAC Heat Pump system with a SEER rating of 21 or greater and a HSPF rating of 11 or greater.
Inductive Stove Top	Replace existing gas or electric resistance stove top with an inductive stove top and cap the	Induction ranges deliver more of the energy to the cooking vessel and less to the surrounding air. The less heat wasted into the space, the less	

	gas line.	air conditioning energy required to cool the space down.	
PV + Panel Upgrade + Electric-Ready Measures	Upgrade electric panel and add electric-ready measures for future replacement of natural gas furnace and water heater with heat pumps and future installation of any one appliance (battery storage, clothes dryer, cooktop or EV), along with installation of an on-site PV system.	Enables buildings initially equipped with natural gas appliances to replace them with electric appliances later. Readies the building for future installation of battery and electric vehicle systems.	Electric-ready measures only required when already installing an on-site PV system. Includes an electric panel upgrade if needed. PV and electric-ready measures are aligned with requirements for new construction in 2022 Energy Code and 2022 CalGreen for EV-ready.
Electric Panel Upgrade /Kitchen / Laundry Room / + Electric-Ready Measures	Add electric-ready measures for future replacement of cooktop and clothes dryer with electric appliances, along with electric panel upgrade or kitchen / laundry room remodel.	Enables buildings initially equipped with natural gas appliances to replace them with electric appliances later.	Electric-ready measures only required when already doing an electric panel upgrade or kitchen / laundry room remodel. Electric-ready measures are aligned with requirements for new construction in 2022 Energy Code.

Benefits: As mentioned in the table above there are numerous benefits that these upgrades can provide depending on the home. Below is some more information about the main benefits.

- Energy Bill Reductions – Over the expected life of the products all the measures (except kitchen / laundry room + electric-ready) are expected to save energy and reduce the home’s energy bills by more than the cost of installing them. A summary of cost-effectiveness findings is provided in Attachment 2.
- Improved Indoor Air Quality – Leaky homes and ducts are one of the largest ways that outdoor pollutants like dust and pollen can enter a home. Properly sealing homes and ducts can help increase indoor air quality. But all homes need ventilation, especially homes using fuel-fired appliances – gas water heaters, heating systems and stoves need ventilation, but homes can be sealed up too tight to allow this. If homeowners seal homes beyond the recommended 15% of system airflow, the home may need mechanical ventilation to ensure it is still receiving fresh air. Residents can have a third party verify their home’s air leakage.
- Climate Change Adaptation – Palm Springs has just experienced its hottest summer on record, according to data from the National Weather Service. Optimal insulation and ventilation slow down heat transfer, maintain indoor temperatures longer and decrease vulnerability to extreme heat.
- Reduced Carbon Emissions – Home energy use is one of the largest contributors to climate change in Palm Springs. By saving energy residents will also reduce GHG emissions.

Compliance credits: If homeowners have already made these, or similar, upgrades, or the upgrades will be a part of the homeowner’s addition, alteration or remodel project, homeowners will be benefiting from a more energy efficient home and do not need to make any additional upgrades. Potential examples of compliance credits are:

- Similar measures have already been completed, including participation in a low-income weatherization program (a deferment will be provided to qualifying homes that have applied for weatherization programs but not received the work yet).
- Home achieves a Home Energy Score (HES) score of at least 8 out of 10 or a HERS whole-house rating score of 85 or lower. The Office of Sustainability offers a rebate of up to \$100 on the cost of a home energy assessment.
- An alternative, voluntary, set of energy measures is concurrently being completed that will achieve equivalent energy savings to the prescriptive packages.
- Homes on an eligible carbon-free electricity plan, such as Desert Community Energy's Carbon Free program or Southern California Edison's Green Rate at the 100% level, could receive compliance credit for the mandatory LED lighting measure.

What if These Upgrades Will Not Work for the Project: Because of unique characteristics of some homes, these upgrades may not work as intended for all residents. To help ensure that residents are not negatively impacted by this requirement, the following additional exemptions would also be allowed.

- A measure is beyond the authority of the homeowner because of an HOA covenant.
- Prescribed measures would be technically infeasible or not be cost-effective due to unique characteristics of the home or other special circumstances (e.g., historic preservation rules).

Palm Springs Existing Home Energy Sustainability Ordinance Proposal

Draft Flexible Compliance Tables¹

Single Family Dwelling Units (One-to-Two-Unit Buildings)

Table 1A: Target Score			
	Building Vintage		
	Pre 1978	1978 - 1991	1992 - 2010
Permit Value	Target Score		
All Projects	LED + Photosensors	LED + Photosensors	LED + Photosensors
\$10,000 - \$24,999	+ Water Heating	+ Water Heating	+ Water Heating
\$25,000 - \$49,999	+ Water Heating & 15	+ Water Heating & 11	+ Water Heating & 7
\$50,000 - \$99,999	+ Water Heating & 31	+ Water Heating & 24	+ Water Heating & 14
\$100,000 +	+ Water Heating & 46	+ Water Heating & 36	+ Water Heating & 22
Table 1B: Measure Menu			
	Building Vintage		
Measures	Pre 1978	1978 - 1991	1992 - 2010
LED lamp vs CFL	Mandatory	Mandatory	Mandatory
Exterior Photosensor	Mandatory	Mandatory	Mandatory
Water Heating Package	Mandatory	Mandatory	Mandatory
Cool Roof	Mandatory if reroofing	Mandatory if reroofing	Mandatory if reroofing
R-13 Wall Insulation	4	NA	NA
New Ducts	15	11	4
R-49 Attic Insulation	7	4	1
Duct Sealing	9	6	1
Windows	12	9	NA

¹ The flexible compliance tables are based on ongoing work by the Codes and Standards Program. The tables are presented as early drafts for information purposes only and are subject to further revision.

Air Sealing	1	1	1
Heat Pump HVAC	2	1	1
High Eff Heat Pump HVAC	7	6	4
Heat Pump Water Heater	11	11	11
High Eff HPWH	11	11	11
Inductive Cooktop	2	2	2
PV + Panel Upgrade + Electric Readiness for Heat Pump and Any One Other Appliance (Battery Storage, Clothes Dryer, Cooktop or EV)	24	24	24
Kitchen / Laundry / Panel Upgrade + Electric Readiness	Mandatory if remodeling kitchen / laundry or upgrading panel	Mandatory if remodeling kitchen / laundry or upgrading panel	Mandatory if remodeling kitchen / laundry or upgrading panel

Palm Springs Existing Home Energy Sustainability Ordinance Proposal

Summary Cost-Effectiveness Results

Background

The energy efficiency requirements in the proposed Palm Springs Existing Home Energy Sustainability Ordinance (EHESO) were derived from statewide cost-effectiveness studies produced by the Codes and Standards Program.¹ The studies evaluated a variety of measures for homes of various ages and each climate zone in the state, estimating the total installation cost and utility bill savings for each. These estimates were based on a prototype single family home considered typical of California's older housing stock and standard construction practices during the periods evaluated.² From these studies the measures that indicated a good payback have been selected.

Measuring Cost Effectiveness

There are two common measures of cost effectiveness.

Simple Payback divides the up-front installation cost of a measure by the expected utility bill savings each year.³ The result is a simple measure of the number of years it takes to "pay back" the initial investment. The lower the number, the quicker a measure pays back and the more cost effective it is. *Simple Payback* does not take into account financing costs.

Benefit-to-Cost Ratio divides the on-bill lifecycle benefits over the one-time costs. Lifecycle benefits are summed over the lifecycle (generally 30 years).⁴ *Benefit-to-cost ratios* above 1.0 are considered cost effective and the higher the ratio, the better.

Results

The table below shows the cost effectiveness for certain measures or packages of measures under the proposed ordinance.⁵

¹ The Codes and Standards Program under the auspices of the California Public Utilities Commission and in support of the California Energy Commission has issued cost-effectiveness studies to help local jurisdictions determine which measures save energy and are cost effective and support the cost-effectiveness finding required by state law for them to adopt measures that exceed the California Energy Code, known as reach codes. The most recent Codes and Standards Program cost-effectiveness study for single-family home upgrades (*2019 Cost-Effectiveness Study: Existing Low-rise Residential Building Efficiency Upgrades* (August 2021)) considered three unique building vintages: pre-1978, 1978-1991, and 1992-2010. The vintages were defined based on review of historic Energy Code requirements and selecting year ranges with distinguishing features. The full study can be accessed at <https://localenergycodes.com/content/resources>. The Codes and Standards Program is currently updating cost-effectiveness data for multifamily homes (buildings with three or more units). These results can be extended to include multifamily homes using a similar framework once those data are available.

² The Cost-Effectiveness Study prototype for existing single-family residential buildings is a 1,665 ft² three-bedroom single-family home.

³ The 2021 Cost-Effectiveness Study for single-family homes uses electricity rates from Southern California Edison (SCE) effective February 1, 2021, and gas rates from Southern California Gas (SoCalGas) for the 12-month period ending March 2021 (see pages 59-61). The 2020 Cost-Effectiveness Study for multifamily homes describes the SCE and SoCalGas rates it used on pages 24-26. Utility savings could potentially be higher for Desert Community Energy (DCE) customers on its Carbon Free product or SCE customers on its Green Rate at the 100% level and slightly lower for DCE customers on its Desert Saver product. Utility savings may also differ depending on the home occupancy level (e.g., full time, part-time, vacation rental). The on-bill benefit / cost data do not include either the social cost of higher greenhouse gas emissions leading to air and water pollution, droughts and wildfires or the non-energy benefits of improved public health and a sustainable economy.

⁴ The calculations generally assume an escalation of utility rates. Maintenance costs were not included for any measures because there are no incremental maintenance costs expected for any of the measures evaluated. Replacement costs were factored in for lighting measures.

⁵ The figures in the table are derived from the Codes and Standards Program's online Cost-Effectiveness Explorer (<https://explorer.localenergycodes.com>), which uses single-family study data from the August 2021 version of the study referred to in footnote 1. The Codes and Standards Program has developed the Cost-Effectiveness Explorer as an online tool using data from the cost-effectiveness studies that local jurisdiction staff and other stakeholders could use to simplify initial reach code research. The tool allows users to identify cost-effective reach code options as well as to better understand the impacts on their local communities of different possible scenarios.

EHESO Proposal Summary Cost Effectiveness Results

Measure	Year Built	Cost Effectiveness		Per Home Results		
		Benefit / Cost Ratio	Simple Payback (years)	Incremental Cost	Annual Bill Savings	Lifecycle Savings
Single Family (One-to-Two-Unit Buildings)						
LED Lighting ⁶	Before 2011	3.73	11.2	\$13.54	\$2.13	\$50.54
Water Heating Package	Before 2011	1.43	8.64	\$208	\$12.06	\$335
R-49 Attic Insulation	Before 1978	3.71	5.70	\$3,332	\$584	\$13,877
	1978-1991	2.35	8.98	\$2,874	\$320	\$7,596
	1992-2010	1.10	19.1	\$1,852	\$96.79	\$2,298
Duct Sealing	Before 1978	26.8	0.788	\$683	\$866	\$20,530
	1978-1991	17.5	1.21	\$683	\$566	\$13,412
	1992-2010	5.95	3.54	\$423	\$119	\$2,827
New Ducts	Before 1978	7.42	2.84	\$3,986	\$1,401	\$33,203
	1978-1991	5.78	3.65	\$3,986	\$1,093	\$25,888
	1992-2010	1.81	11.6	\$3,986	\$342	\$8,109
Cool Roof (when reroofing)	Before 1978	7.82	2.06	\$778	\$280	\$6,637
	1978-1991	5.96	2.70	\$778	\$214	\$5,058
	1992-2010	2.85	5.65	\$778	\$102	\$2,416
R-13 Wall Insulation	Before 1978	2.13	9.97	\$3,360	\$337	\$8,018
Windows	Before 1978	2.29	9.20	\$9,810	\$1,067	\$25,264
	1978-1991	1.86	11.4	\$9,810	\$864	\$20,468
Exterior Lighting Controls ⁷	Before 2011	1.11	4.97	\$85.17	\$4.01	\$94.86

⁶ Assumes six CFL bulbs are replaced with LED bulbs in a home.

⁷ For two devices.

EHESO Proposal Summary Cost Effectiveness Results

Measure	Year Built	Cost Effectiveness		Per Home Results		
		Benefit / Cost Ratio	Simple Payback (years)	Incremental Cost	Annual Bill Savings	Lifecycle Savings
PV + Electric-Ready Measures ⁸	Before 1978	2.14	8.93	\$15,683	\$1,705	\$40,370
	1978-1991	2.11	9.05	\$15,683	\$1,683	\$39,840
	1992-2010	1.92	9.93	\$15,683	\$1,533	\$36,297
R-49 Attic + Air Sealing ⁹	Before 1978	2.91	7.28	\$4,806	\$660	\$15,686
	1978-1991	1.77	11.9	\$4,348	\$365	\$8,660
R-49 Attic + Duct Sealing	Before 1978	7.37	2.87	\$4,015	\$1,401	\$33,221
	1978-1991	5.05	4.18	\$3,557	\$850	\$20,153
	1992-2010	1.96	10.8	\$2,275	\$211	\$5,005
R-49 Attic + Air Sealing + Duct Sealing ⁸	Before 1978	5.66	3.73	\$5,489	\$1,471	\$34,897
	1978-1991	3.75	5.63	\$5,031	\$894	\$21,186
	1992-2010	1.33	15.9	\$3,749	\$236	\$5,593
R-49 Attic + Air Sealing + New Ducts ⁸	Before 1978	4.86	4.35	\$8,792	\$2,023	\$47,970
	1978-1991	3.59	5.88	\$8,334	\$1,417	\$33,595
	1992-2010	1.30	16.2	\$7,312	\$450	\$10,675
Attic + Air + Duct Seal + Wall + Windows ⁸	Before 1978	2.81	7.52	\$18,659	\$2,482	\$58,889

⁸ Upgrade electric panel and add electric-ready measures for future replacement of natural gas furnace and water heater with heat pumps and future installation of any one appliance (battery storage, clothes dryer, cooktop, or EV), along with installation of an on-site PV system. Does not include an estimated cost of \$455 for prewiring this one additional appliance. The measure remains cost effective with this additional \$455 cost.

⁹ Does not include an estimated cost of \$350 for BPI Combustion Safety Testing. The measure remains cost effective with this additional \$350 cost.