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PG&E Comments on IEPR Workshop on Quality Installation of Heating and Air Conditioning Equipment

Additional submitted attachment is included below.



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September 24, 2021

California Energy Commission
Commissioner Andrew McAllister
Docket Number 21-IEPR-06
1516 9th Street
Sacramento, CA 95814

RE: Pacific Gas and Electric Company Comments on the Integrated Energy Policy Report (IEPR) Commissioner Workshop on Quality Installation of Heating and Air Conditioning Equipment

Dear Commissioner McAllister,

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to comment in response to the California Energy Commission's (CEC) 2021 Integrated Energy Policy Report (IEPR) Commissioner Workshop on quality installation of heating and air conditioning equipment held on September 10, 2021.

PG&E applauds the CEC's continued efforts to advance heating, ventilation, and air conditioning (HVAC) energy codes and appliance standards and to improve compliance with the state's regulations. Additionally, we appreciate the CEC's future focus on refrigerants.

PG&E offers the following comments on the various ways in which the Codes and Standards Compliance Improvement Subprogram (Energy Code Ace) and Reach Codes Subprogram are poised to support implementation of ideas discussed during the workshop. We invite the CEC, California State License Board (CSLB) and other industry partners (such as California Energy Alliance, the Institute of Heating and Air Conditioning Industries (IHACI), sheet metal workers, etc.) to consider how we might work together to implement the following:

- 1- Begin requiring continuing education units (CEUs) for HVAC Contractors and Installers.** Energy Code Ace offers multiple courses geared toward quality installation of heating and air conditioning equipment. These courses are offered live in a virtual classroom, are free, and the timing of delivery can be customized. Certificates of completion are issued to students at the end of each course and students could submit their Energy Code Ace

certificates to the CSLB for CEUs. Some of the programs offered by Energy Code Ace include the following:

- 2019 Title 24, Part 6 Essentials – Residential Standards for HVAC Contractors: Designers and Estimators: This course addresses general principles and provides hands-on application for contractors designing and estimating HVAC installation projects to ensure compliance with California’s 2019 Energy Code. Its highly interactive format includes examples, demonstrations, and hands-on practice.
- 2019 Title 24, Part 6 Essentials – Residential Standards for HVAC Contractors: Installers: This course addresses general principles and hands-on application for contractors installing HVAC projects to ensure compliance with California’s 2019 Energy Code. Its highly interactive format includes examples, demonstrations and individual hands-on practice.
- 2019 Title 24, Part 6 Essentials – Nonresidential Standards for Small Commercial HVAC Contractors: This course focuses on helping HVAC contractors meet California’s 2019 Energy Code for small commercial HVAC changeouts. Attendees will learn about Energy Code requirements, how to complete applicable compliance documents, how to use a data collection worksheet to capture key information required on the nonresidential mechanical certificate of compliance form (NRCC) and how the Virtual Compliance Assistant can complete the NRCC for you.

Additionally, residential contractors have another option of taking an on-demand course at any time through the Energy Code Ace online self-study platform:

- 2019 Title 24, Part 6 Essentials on Demand – Residential Standards & Technology: This course focuses on heating, ventilation, and air conditioning, and gives a robust look at the requirements and considerations for recommending HVAC system features that will help a residential project meet or exceed the 2019 Energy Code requirements for new construction and alterations.

All these courses will be adapted to include the 2022 Title 24, Part 6 code changes as appropriate.

2- Empower contractors and building departments with the following existing job aides from Energy Code Ace that make compliance faster and easier:

- Trigger Sheets: These table-format quick references offer component-by-component summaries of sections of Title 24, Part 6 “triggered” based on the project scope. Contractors have found the trigger sheets easy to use. These sheets are a key part of the

Energy Code Ace's courses.¹ Below is an example of a trigger sheet for HVAC alterations in residential projects:

2019 ENERGY CODE
 **Triggers** Title 24, Part 6

Residential
HVAC – Alterations

Split Systems and Packaged Systems

	Mandatory Requirements							Prescriptive Requirements	
	Equipment Efficiency §110.1 §110.2(a)	Thermostat §110.2(c) §150.0(i) §150.2(b)1F Setback Thermostat or EMCS	Cooling & Heating Loads §150.0(h) §150.2(a) exception 4-5	HERS Verified Duct Leakage ² §150.2(b)1	Air Filter §§150.0(m)12-13 §150.2(b)1C-D	HERS Verified Airflow Rate ³ §150.0(m)13 §150.2(b)1C-F	HERS Verified Fan Efficacy §150.0(m)13 §150.2(b)1	Duct Insulation §150.2(b)1D R-8 for CZ 11, 14-16 R-6 for CZ 1-10, 12-13	HERS Verified Refrigerant §150.1(c)7 §150.2(b)1F In CZ 2, 8-15
Change This (and nothing else)									
Replace belts, blower wheel fan and/or electrical components	no	no	no	no	no	no	no	no	no
Tap into existing HVAC and add ≤40 ft new ducting	no	no	YES to verify existing HVAC meets heating load if for an addition	YES if ducting in garage	no	no	no	YES	no
Tap into existing HVAC and add >40 ft new ducting	no	no	YES to verify existing HVAC meets heating load if for an addition	YES	no	no	no	YES	no
Replace all the ducting for existing HVAC	no	no	no	YES	YES	YES	YES	YES	no
Replace air handling unit and furnace	YES	no	no	YES	no	no	no	no	no
Replace any refrigerant containing system components ⁴	no	YES	no	YES ⁵	no	Yes if HERS Refrigerant Charge required	no	no	YES
Replace a room heating / AC unit	YES	no ¹	no	no	no	no	no	no	no
Replace all HVAC equipment but no new ductwork	YES	YES	no	YES	no	YES if HERS Refrigerant Charge required	no	no	YES if AC
Add/Replace HVAC equipment and ≥75% of ducting	YES	YES	YES	YES	YES	YES if AC	YES if AC	YES	YES if AC

• Replacing the blower wheel fan is considered a repair and does NOT trigger the Energy Code.
 • All new HVAC equipment must meet minimum federal efficiency requirements
 • Cooling line insulation is triggered if the line set (cooling system, suction line) is replaced or repaired. Line sets ≤1.5" in diameter must have 0.75" thick insulation.

¹ Links to Trigger Sheets: [Trigger Sheet: Nonresidential New HVAC: Simple and Complex Systems 2019](#); [Trigger Sheet: Residential HVAC Alterations 2019](#); and [Trigger Sheet: Nonresidential Small Commercial HVAC Alterations 2019](#)

- Building Inspector Checklist: This is an example of the checklists that Energy Code Ace teaches building inspectors to use while inspecting HVAC projects. We also have a nonresidential version of this checklist.²

Permit Number: _____



2019 Nonresidential - Title 24, Part 6
Building Inspector
Energy Inspection Checklist



Project Address: _____
Contacts: _____

OVERALL REQUIREMENT					YES	NO	
All compliance documents completed, signed and registered, if required (HERS verification triggers registration.)					<input type="checkbox"/>	<input type="checkbox"/>	
CF1R (Certificate of Compliance - most current, if revised from plan review)					<input type="checkbox"/>	<input type="checkbox"/>	
CF2R (Certificates of Installation)					<input type="checkbox"/>	<input type="checkbox"/>	
CF3R (Certificates of Verification- HERS)					<input type="checkbox"/>	<input type="checkbox"/>	
A copy of the construction documents, or a comparable document confirming compliance, has been provided to the owner.					<input type="checkbox"/>	<input type="checkbox"/>	
Does installed measure and/or HERS-verified data match CF1R and meet all mandatory requirements?							
Measure	Required Forms			Notes:	YES	NO	
	CF2R	CF3R	Form Name				
ADDITIONS & ALTERATIONS WITH NO HERS MEASURES							
Additions: All building features are in one report				ADD-02	HERS registration not required	<input type="checkbox"/>	<input type="checkbox"/>
Alterations: All building features are in one report				ALT-05	HERS registration not required	<input type="checkbox"/>	<input type="checkbox"/>
ENVELOPE							
Fenestration				ENV-01		<input type="checkbox"/>	<input type="checkbox"/>
Insulation				ENV-03		<input type="checkbox"/>	<input type="checkbox"/>
Roofing (cool roof, radiant barrier)				ENV-04		<input type="checkbox"/>	<input type="checkbox"/>
HERS Measures (if required)				ENV-20 & MCH-24 ENV-21, 22		<input type="checkbox"/>	<input type="checkbox"/>
Envelope Air Leakage						<input type="checkbox"/>	<input type="checkbox"/>
Quality Insulation Installation (QII)						<input type="checkbox"/>	<input type="checkbox"/>
HVAC							
Equipment				MCH-01		<input type="checkbox"/>	<input type="checkbox"/>
Evaporative Coolers				MCH-04		<input type="checkbox"/>	<input type="checkbox"/>
HERS Measures						<input type="checkbox"/>	<input type="checkbox"/>
Duct leakage				MCH-20 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Duct location				MCH-21 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Fan Efficacy				MCH-22 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Airflow Rate				MCH-23 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Refrigerant Charge				MCH-25 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
High SEER or EER or HSPF				MCH-26 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
IAQ Ventilation				MCH-27 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Return Duct and Filter Grille				MCH-28 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Buried Ducts				MCH-29 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Ventilation Cooling (central fan VCS)				MCH-30 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Whole House Fan				MCH-31 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
Local Mechanical Exhaust (including kitchen hood)				MCH-32 & MCH-24		<input type="checkbox"/>	<input type="checkbox"/>
PLUMBING							
Distribution						<input type="checkbox"/>	<input type="checkbox"/>
Non-HERS: Centralized system (multifamily)				PLB-01		<input type="checkbox"/>	<input type="checkbox"/>
Individual system				PLB-02		<input type="checkbox"/>	<input type="checkbox"/>
HERS: Centralized system (multifamily)				PLB-21		<input type="checkbox"/>	<input type="checkbox"/>
Individual system				PLB-22		<input type="checkbox"/>	<input type="checkbox"/>
Pools and Spas				PLB-03		<input type="checkbox"/>	<input type="checkbox"/>
Solar Hot Water				STH-01		<input type="checkbox"/>	<input type="checkbox"/>
ELECTRICAL							
PV Systems				PVB-01		<input type="checkbox"/>	<input type="checkbox"/>
Battery Storage				PVB-02		<input type="checkbox"/>	<input type="checkbox"/>
Solar Ready				SRA-01		<input type="checkbox"/>	<input type="checkbox"/>
Lighting: Single Family				LTG-01		<input type="checkbox"/>	<input type="checkbox"/>
Multifamily				LTG-02		<input type="checkbox"/>	<input type="checkbox"/>






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- Permit Technician Checklists: Energy Code Ace surveyed permit technicians across the state and learned how they could help installers perform their jobs faster and easier. The survey resulted in a series of checklists for the five project types that permit

² Residential Building Inspector: [Checklist: Residential - Building Inspector – 2019](#)
 And Nonresidential Building Inspector: [Checklist: Nonresidential – Building Inspector – 2019](#)

technicians said they handle most frequently including HVAC alterations. Checklists are now available for each of the 16 climate zones along with supporting instructional videos.³

2019 ENERGY CODE **Climate Zone 12**
Ace Resources **Residential**
Title 24, Part 6 **Permit Technician**
Energy Code Checklist **HVAC System Alterations***

Use this checklist when the project is for an **existing** building and either:

- Involves an **entirely new** or complete replacement HVAC system (indoor/outdoor units **and** ≥75% of ducting; for either packaged or split-system)
- Replaces just **part** of an HVAC system (ducts, furnace, air handler, heat exchanger, condensing unit or any refrigerant-containing component)

* This checklist is not intended to support projects in which the enforcement agency requires building design plans and specifications to be submitted with the application for a building permit.

ESSENTIALS

1. Does the project trigger California's Building Energy Efficiency Standards (Title 24, Part 6)? YES NO

- The project triggers Title 24, Part 6 (the Energy Code) if it replaces or adds to the existing HVAC system.
- Exceptions that do NOT trigger Energy Code include:
 - Adding ≤ 40 ft of ducting anywhere in home (except for garage). This ducting is not associated with an Addition and uses minimum R-6 insulation in unconditioned spaces.
 - Fixing or changing anything not included in the table below, including anything that is a "refrigerant-containing device." (For example, fixing or replacing fans, motors, belts and electrical components will NOT trigger the Energy Code)

2. Does it meet the Energy Code's Requirements under the Prescriptive Approach? YES NO

If project changes this – and nothing else...	Equipment Efficiency	Thermostat (Setback or EMCS) ¹	Mandatory Requirements				Prescriptive Requirements		
			Cooling & Heating Loads ²	Air Filter 2" MERV-13 ³	HERS: Duct Leakage ⁴	HERS: Airflow Rate ⁵	HERS: Fan Efficacy ⁶	Duct Insulation ⁷	HERS: Refrigerant Charge ⁸
• New HVAC and ≥75% New Ducts	yes	yes	yes	yes	yes	yes if AC	yes if AC	yes	yes if AC
• Add ≤ 40 ft ducting to existing HVAC	no	no	yes if Addition	no	no	no	no	yes	no
• Add/replace AC to ducted system	yes	yes	no	no	yes	yes	no	no	yes if AC
• Replace furnace only	yes	no	no	no	yes	no	no	no	no
• Replace room heating/AC unit using existing fuel type	yes	no	no	no	no	no	no	no	no
• Replace < 75% ducting only	no	no	no	no	yes	no	no	yes	no
• Replace ≥ 75% ducting only ⁹	no	no	no	yes	yes	yes if AC	yes if AC	yes	no
• Replace heating and cooling equipment only (no altered ducting)	yes	yes if AC	no	no	yes if ducted	yes if AC	no	no	yes if AC
• Replace gas with electric heat pump	yes	yes	no	no	yes if ducted	no	no	no	yes if AC
• Replace gas with electric resistance	Not allowed per §150.2(b)G								

3. Are the necessary Prescriptive forms included with the permit application? YES NO

If the project...	Include this form:
Involves a ducted system, or adds/replaces AC, in an existing building	CFIR-ALT-02-E: Certificate of Compliance for Alterations (with HERS)**
Involves a non-ducted system and does NOT add/replace AC in an existing building	CFIR-ALT-05-E: Certificate of Compliance for Residential Alterations (Non-HERS)

Note: If the project involves an Addition onto a home along with an HVAC Alteration, alternative CFIR-ADD paperwork will be required.
 ** This is an electronic form that **must** be registered with a HERS Provider prior to permit application. It can be used with any climate zone.

A-I See page 3 for notes.



- Virtual Compliance Assistant (VCA): This web-based tool responds to the compliance improvement advisory group's first paper in which they recommended Energy Code Ace "Turbo Tax" the compliance process. Contractors can now use the VCA to navigate their small to mid-size nonresidential HVAC projects, verify compliance along the way and get the completed forms they need. The VCA can be accessed here: <https://www.energycodeace.com/content/project-tool>

³ Checklist: Permit Technician – CZ 12 – 2019

- Forms Ace: Homeowners and contractors can use this tool before permit submittal to determine which forms will be required for their residential project - and whether their project requires Home Energy Rating System (HERS) verification. A sample of this tool can be found at: <https://www.energycodeace.com/2019-forms-ace-tool>

3- Help contractors educate customers using the following existing reference materials:

- Residential HVAC Alterations Factsheet: Recent needs assessment results indicate that contractors, energy consultants, building departments and other market actors often use Energy Code Ace factsheets to educate others about code requirements.⁴ Energy Code Ace teaches contractors to use the following factsheet to educate customers about HVAC change outs:

2019 ENERGY CODE



Title 24, Part 6
Fact Sheet

Residential
HVAC Alterations

←

What is a Residential HVAC Alteration?

A residential HVAC alteration is any change to a home's space-conditioning system that is regulated by the 2019 California's Building Energy Efficiency Standards (Energy Code), Title 24, Part 6 which include systems that provide heating or cooling within or associated with conditioned spaces in a home. Title 24, Part 6 includes requirements for alterations affecting residential space-conditioning systems, which are generally categorized in the following three groups:

- Altered or Replaced Duct Systems
- Altered Space-Conditioning System
- Entirely New or Complete Replacement Space-Conditioning System

Why?
As much as half of the energy used in a typical home goes to heating and cooling. Ensuring that HVAC systems are as efficient as possible can result in significant energy savings.

Relevant Code Sections

2019 California Building Energy Efficiency Standards, Title 24, Part 6:

- Section 110.2 – Mandatory Requirements for Space-Conditioning Equipment
- Section 150.0 – Mandatory Features and Devices
 - 150.0(h) – Space-Conditioning Equipment
 - 150.0(i) – Thermostats
 - 150.0(m) – Air-Distribution and Ventilation System Ducts, Plenums, and Fans
 - 150.0(j) – Suction Line Insulation
- Section 150.1 – Performance and Prescriptive Compliance Approaches for Newly Constructed Residential Buildings
- Section 150.2 – Energy Efficiency Standards for Additions and Alterations to Existing Low-Rise Residential Buildings
 - 150.2(b)1C – New or Complete Replacement Space-Conditioning System
 - 150.2(b)1D – Altered Duct Systems - Duct Sealing
 - 150.2(b)1E – Altered Space-Conditioning System - Duct Sealing
 - 150.2(b)1F – Altered Space-Conditioning System - Mechanical Cooling
 - 150.2(b)1G – Water-Heating System
- Residential Compliance Manual, Chapter 4 – HVAC Building Requirements

What is an Altered Duct System?

- Extension of Existing Ducts
 - >40 ft of extended duct system
 - any altered ducts in garage spaces
- Entirely New or Replacement Ducts
 - ≥75% of new duct system
 - Up to 25% existing duct system components may be reused, if accessible and can be sealed

Note: ≤40 ft of altered or extended duct does not trigger compliance documentation or duct leakage testing, unless it is in the garage. If ≤40 ft and not in garage, it must meet mandatory R-6 insulation only.

Table 150.2-A Duct Insulation R-Value

Climate Zone	1 through 10, 12 & 13	11, 14 through 16
Duct R-Value	R-6	R-8

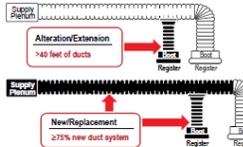


Figure 1: Altered or Replaced Duct Systems (Duct Sealing): §150.2(b)1D

⁴ [Fact Sheet: Residential HVAC Alterations 2019](#)

- Residential and Nonresidential HVAC and Plumbing Application Guides: These manuals include the code compliance requirements and provide examples and recommendations for different project types. They are found in these links:
[Application Guide: Residential HVAC and Plumbing 2019](#)
[Application Guide: Nonresidential HVAC and Plumbing 2019](#)

4- Continue delivering training to building inspectors that includes content that is consistent with the HVAC contractor courses and teaches use of inspection checklist.

5- Measure contractor performance and reward or penalize accordingly. PG&E agrees that equipment tracking of some sort is essential and that the following recommendations made by the Compliance Improvement Advisory Group (CIAG) in their tracking sales and permit volume paper should be revisited and refined with industry partners. Here is an excerpt:

- a) *Manufacturers must report to the Commission, data on equipment sales to local distributors who sell equipment in California.*
- b) *Distributors who sell equipment in California must report to the Commission, data on equipment sales to contractors who work in California, as well as non-contractors who take delivery of equipment (e.g., retail stores, unlicensed contractors).*
- c) *Initially, these sales data could be reported at the zip code level where the equipment is delivered, instead of reporting the contractor or other buyer's identity.*
- d) *Eventually, contractors must report to the Commission, data on sales of residential replacement equipment. These data need only be reported at a level aggregated by zip code; no customer names or addresses would be required.*
- e) *At a later time, the same process would apply to commercial replacement sales.*

Second, the Commission would receive data from HERS Providers on all replacement work verified by their Raters. The Commission would compare these data at the zip code or building department jurisdictional level, identify the jurisdictions where the ratio of unpermitted to permitted work is low, and work with the IOUs to determine what practices from those jurisdictions contribute to that success, so that the lessons can be shared with other jurisdictions. The Commission could establish the HERS Repository it plans to develop with the capability of automatically aggregating data by building department jurisdiction.

The data on sales of equipment should then be compared with the HERS or CEC repository data by serial number and location (zip code level). If equipment is found to be sold to a contractor, and there is no corresponding entry in the HERS registry, the contractor should be asked to provide evidence of where the equipment was installed.

Third, using these comparisons, the Commission and the IOUs could identify those jurisdictions that need the most help, and work with them to increase the percentage of permitted projects.

All of these steps should be taken with the goal of increasing collaboration and cooperation, and expressly voiding the specter of punitive outcomes.

- 6- Assist local jurisdictions with adopting local time of sale ordinances through the Codes and Standards Reach Code Subprogram.** A requirement to conduct building energy use audits at time of listing, sale, or remodel can incentivize owners to invest in retrofits and to comply with code requirements. The investor owned utilities can equip jurisdictions with the tools and information they need to pursue such ordinances. Please see: www.LocalEnergyCodes.com for more information.

PG&E appreciates the CEC for its close coordination with stakeholders and tenacious pursuit of HVAC savings. We understand that these comments may be outside the CEC's authority to implement but request the CEC advocate for these recommendations with the appropriate parties. We look forward to continued dialogue with the CEC and other stakeholders on this important topic.

Sincerely,

/s/

Licha Lopez

State Agency Relations Representative