CARB Technical Working Group Meeting:
Afternoon Session – Stationary Air Conditioning

Tuesday, August 6, 2019 –12:30 p.m. to 2:30 pm.
Sierra Hearing Room, CalEPA Headquarters
1001 I Street, Sacramento, CA 95814

Remote Attendance:
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REGULATORY PROPOSAL: CARB is proposing a global warming potential (GWP)[1] limit of 750 for new stationary air conditioning (AC) systems starting January 1, 2023. This proposed regulation would cover all types of AC equipment, from portable units to window and wall units to split and packaged systems used in residential and commercial settings.

CARB invites all interested parties to attend the technical working group meeting in person or remotely. Input from stakeholders aids in the development of the regulatory proposal and regulatory impact analyses. CARB also considers stakeholder input on a continual basis. Stakeholders wishing to provide input may request a separate meeting with CARB staff or request to present information at this meeting (time limits may apply) by contacting Kathryn Kynett at kathryn.kynett@arb.ca.gov.

MEETING PURPOSE:

- Provide an update on the regulatory process
- Provide an overview of the required Standard Regulatory Impact Assessment (SRIA)[2]
- Receive an update from industry on progress towards the commitments made in the joint industry-NRDC voluntary letter
- Discuss the following topics (details on pages 2 – 9):
    1. Economic impacts
    2. California AC market characterization
    3. Repairs to service existing equipment
    4. Definitions
    5. Seek input on regulatory alternatives

[1] 100-year global warming potential values as given in or calculated from IPCC's Fourth Assessment Report (AR4) values.
[2] More information: http://www.dof.ca.gov/Forecasting/Economics/Major_Regulations/

1. **Economic Impacts.** CARB assumes that, for this sector, the cost associated with transitioning to new technology as required under the proposed regulation would ultimately be passed on to end-users in California. CARB seeks feedback on estimated baseline costs and the incremental costs for the technologies that can meet the proposed GWP limit (see Table 1). Baseline costs included in this table are for R-410A equipment. CARB assumes a continued decrease in AC prices, based on a historical experience (learning) rate of 11%.[A,B] Data sources include consumer cost reports, stakeholder input and market research.

Table 1. Baseline Costs and Added Cost (%)

Equipment/Cost Category	Baseline Equipment $	Added Cost (%)	Baseline Installation $	Added Cost (%)	Baseline Maintenance and Repair $/yr[1]	Added Cost (%)[1]
Portable AC[2]	$300	0%	$0	0%	TBD	0%
Window/Wall[2]	$455	0%	$300	0%	TBD	0%
PTAC/PTHP	$1,000	TBD	$800	0%	TBD	0%
Dehumidifiers[3]	$225	TBD	$0	TBD	TBD	TBD
Residential Central AC/HP	$4,000	5-15%	$3,200	0-10%	TBD	0-10%
Commercial AC/HP (small- medium)[4]	$9,000	5-15%	$7,200	0-10%	TBD	0-10%
Commercial AC/HP (large)[4]	$25,000	5-15%	$20,000	0-10%	TBD	0-10%
VRF/VRV	$30,000	5-15%	$24,000	0-10%	TBD	0-10%

[1]This category currently includes routine maintenance costs and repairs. CARB is seeking information on the average cost an end-user may pay in repairs over a system's lifetime for each type of equipment.

[2]There is equipment available on the market today using a refrigerant that complies with the proposed GWP limit and are cost comparable with R-410A equipment.

[3]CARB seeks feedback on the refrigerant options manufactures are pursuing for dehumidifiers.

[4]Small to medium—charge size less than 50 lb.; large—charge size greater than or equal to 50 lb.

2. **California AC Market Characterization.** CARB seeks stakeholder input and data on AC shipments to California by product category and input on future trends.

3. **Repairs to Service Existing Equipment.** The intent of the proposed regulation is to require new equipment including systems first installed in a newly constructed building and whole system replacements (condenser/compressor and indoor coil) to adhere to the high-GWP prohibition. CARB seeks feedback on how the regulatory proposal can allow for component repairs for existing systems while preventing piecemeal whole system replacements.

4. **Definitions.** CARB requests input on the definitions to be included in the regulatory text (see the following pages). Definitions are from the Code of Federal Regulations (10 C.F.R. § 430.2 (2019)), the Air-Conditioning Heating and Refrigeration Institute (AHRI) website, UL-60335-2-40, and the U.S. Environmental Protection Agency (U.S. EPA).

5. **Alternatives to Current CARB Proposal.** CARB seeks stakeholder suggestions on any alternative regulatory mechanisms that will help achieve the State's mandated HFC reduction goal.

In addition, CARB welcomes comments on other issues relevant to this rulemaking that may not be specifically be identified in this document.

References:

[A]Desroches, et al. 2013. "Incorporating Experience Curves in Appliance Standards Analysis." Energy Policy, Special Section: Transition Pathways to a Low Carbon Economy, 52 (January): 402–16. https://doi.org/10.1016/j.enpol.2012.09.066.

[B]U.S. EPA. "Technical Support Information: Energy Efficiency Program for Consumer Products: Residential Central AC and Heat Pumps. December, 2016.

DRAFT DEFINITIONS

"air conditioner" or "air conditioning equipment" – means an encased assembly or assemblies designed as an appliance to provide delivery of conditioned air to an enclosed space, room or zone. It includes an electrically operated refrigerating system for cooling and possibly dehumidifying the air. It may have means for heating, circulating, cleaning and humidifying the air. An air conditioner can contain a combination of condensing unit or condenser unit and an evaporating unit or evaporator unit. (UL-60335-2-40)

"portable air conditioner" – means a portable encased assembly, other than a "packaged terminal air conditioner," "room air conditioner," or "dehumidifier," that delivers cooled, conditioned air to an enclosed space, and is powered by single-phase electric current. It includes a source of refrigeration and may include additional means for air circulation and heating. (CFR)

"window air conditioner" – means an air conditioner other than a "packaged terminal air conditioner," or "packaged terminal heat pump" which is powered by a single phase electric current and which is an encased assembly designed as a unit for mounting in a window providing delivery of conditioned air to an enclosed space. It includes a prime source of refrigeration and may include a means for ventilating and heating. (CFR)

"through-the-wall" or "wall air conditioner" – means an air conditioner or heat pump that is designed to be installed totally or partially within a fixed-size opening in an exterior wall, and:

(1) Is not weatherized;
(2) Is clearly and permanently marked for installation only through an exterior wall;
(3) Has a rated cooling capacity no greater than 30,000 Btu/hr;
(4) Exchanges all of its outdoor air across a single surface of the equipment cabinet; and
(5) Has a combined outdoor air exchange area of less than 800 square inches (split systems) or less than 1,210 square inches (single packaged systems) as measured on the surface described in paragraph (4) of this definition.

(adapted from CFR)

"packaged terminal air conditioner (PTAC)" – means a wall sleeve and a separate unencased combination of heating and cooling assemblies specified by the builder and

intended for mounting through the wall. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability energy. (CFR)

"packaged terminal heat pump (PTHP)" – means a packaged terminal air conditioner that utilizes reverse cycle refrigeration as its prime heat source and should have supplementary heating availability by builder's choice of energy. A packaged terminal heat pump is a separate encased refrigeration system installed in a cabinet of similar function and configuration to that of a packaged terminal air-conditioner. It utilizes reverse refrigeration as its prime heat source and should have another supplementary heat source which may be provided by hot water steam, or electric resistance heat. (adapted from CFR and AHRI)

"dehumidifiers" – means a product, other than a portable air conditioner, room air conditioner, or packaged terminal air conditioner, that is a self-contained, electrically operated, and mechanically encased assembly consisting of—

(1) A refrigerated surface (evaporator) that condenses moisture from the atmosphere;
(2) A refrigerating system, including an electric motor;
(3) An air-circulating fan; and
(4) A means for collecting or disposing of the condensate.

(CFR)

"residential central air conditioner" or "residential central heat pump" – means an air conditioner used in a residential setting other than window, through-the-wall or portable air conditioner, which is powered by an electric current, air cooled, and rated below 65,000 Btu per hour, and is a heat pump or a cooling unit. A central air conditioner or central air conditioning heat pump may consist of: a single-package unit; an outdoor unit and one or more indoor units; an indoor unit only; or an outdoor unit with no match. A central air conditioner includes split-system air conditioners or heat pumps (which may be ducted or ductless systems), single-package air conditioners or heat pumps, small-duct high-velocity system and space-constrained air conditioners and heat pumps. (adapted from CFR)

"commercial air conditioner"– means an air conditioner used in a commercial setting other than a packaged terminal air conditioner, packaged terminal heat pump, portable, window, or through-the-wall air conditioner. A commercial air conditioner has a capacity rated above 65,000 Btu per hour. Commercial air conditioner includes package systems that may be ducted or ductless and split systems that may be ducted or ductless. (new definition)

"variable refrigerant flow (VRF)" or "variable refrigerant volume (VRV)" – means a multi-split system with at least three compressor capacity stages, distributing refrigerant through a piping network to multiple indoor blower coil units each capable of individual zone temperature control, through proprietary zone temperature control devices and a common communications network. (adapted from CFR)