August 19, 2021

Ann Bailey, Director
ENERGY STAR Product Labelling
U.S. Environmental Protection Agency
1201 Constitution Ave NW
Washington, DC 20004
Submitted via email to MostEfficient@energystar.gov

RE: Comments on Proposed Recognition Criteria for ENERGY STAR Most Efficient 2022

Dear Director Bailey,

Thank you for the opportunity to comment on the proposed recognition criteria for the 2022 ENERGY STAR Most Efficient designation.[1] RMI, the Natural Resources Defense Council, Rewiring America, Earthjustice, BlocPower, and Sierra Club are strong supporters of the ENERGY STAR program and its use of the Most Efficient designation to drive market developments that make efficient, pollution-reducing products available to all consumers. Widespread adoption of efficient products with zero direct emissions will be essential to achieving the Biden Administration's energy, climate, and health goals, including cutting greenhouse gas emissions 50-52 percent by 2030 and reaching net zero emissions by 2050.[2] We wholeheartedly support the proposed Most Efficient criteria that advance these goals, especially the criteria for air source and geothermal heat pumps.

However, to fully align the Most Efficient designation with an efficient clean energy future, **we urge you to withdraw the proposed criteria for gas-fired products** including furnaces, boilers, and dryers. Starting in 2022, the Most Efficient designation should be reserved for the efficient electric products that truly represent the "best of the best."[3]

Recognizing gas-fired products as Most Efficient is inconsistent with the program's goals

The ENERGY STAR program's statutory mandate is to "reduce energy consumption, improve energy security, and reduce pollution."[4] The stated goals of the Most Efficient designation are to inform consumers concerned with their communities' environment and health about the "best of

[1] U.S. Environmental Protection Agency, *Memo: Proposed ENERGY STAR Most Efficient 2022 Criteria* (July 8, 2021) [hereinafter Proposed Criteria Memo], https://www.energystar.gov/sites/default/files/EPA%20Memo%20ENERGY%20STAR%20Most%20Efficient%202022.pdf.
[2] White House Fact Sheet: *President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies* (April 22, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/.
[3] *See, e.g.*, ENERGY STAR Most Efficient 2021 Update and 2022 Proposed Criteria Stakeholder Webinar, slide 3 (July 29, 2021) [hereinafter Proposed Criteria Webinar], https://www.energystar.gov/sites/default/files/ENERGY%20STAR%20Most%20Efficient%202022%20Stakeholder%20Webinar_FINAL.pdf.
[4] 49 U.S.C. § 6294a(a); *see also id.* § 6294a(c)(1) (describing EPA and DOE's duties to promote technologies to achieve energy efficiency and reduce pollution).

the best" in efficient, pollution-reducing products.[5] It is inconsistent with these goals to grant ENERGY STAR's highest recognition to polluting gas-fired appliances when significantly more efficient and less polluting electric alternatives are available. For example, the most efficient air source heat pump currently on the market is over four times more efficient than the most efficient condensing gas furnace.[6]

Gas-fired appliances are a major contributor to climate-destabilizing and health-harming pollution. Nationwide, residential and commercial gas combustion directly emitted 460 million metric tons of CO_2e climate pollution in 2018; including the associated upstream methane leakage could double this figure.[7] Gas appliances emitted over 320,000 tons of nitrogen oxide pollution in 2017—more than twice as much as gas power plants, despite consuming less gas overall.[8] This pollution contributes to the formation of ozone and particle pollution, and led to an estimated 4,639 premature deaths in 2017.[9]

More efficient gas appliances may incrementally reduce this pollution, but they cannot eliminate the inherent climate and health impacts of burning fossil fuels in our homes and buildings.[10] As

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[5] *See, e.g.*, ENERGY STAR, Proposed Criteria Webinar, *supra* note 3, at slide 3; EPA, Proposed Criteria Memo, *supra* note 1, at 2.

[6] The most efficient furnaces recognized in 2021 achieved an Annual Fuel Utilization Efficiency (AFUE) of 98.7%. *See* ENERGY STAR Most Efficient 2021 — Furnaces, https://www.energystar.gov/products/most_efficient/furnaces. The most efficient air source heat pump recognized in 2021 achieved a Heating Seasonal Performance Factor (HSPF) of 14.2. *See* ENERGY STAR Most Efficient 2021— Central Air Conditioners and Air Source Heat Pumps, https://www.energystar.gov/products/most_efficient/central_air_conditioners_and_air_source_heat_pumps. HSPF is expressed in units of Btu of heat output per Watt hour of energy consumption, and can be converted to a unitless average heating season Coefficient of Performance (COP) by dividing by 3.412. This gives a heating season COP of 4.16 for the best air source heat pumps, which is 4.2 times more efficient than a 98.7% AFUE furnace.

[7] RMI, *The Impact of Fossil Fuels in Buildings: A Fact Base* 7 (Dec. 2019), https://rmi.org/insight/the-impact-of-fossil-fuels-in-buildings/.

[8] RMI & Sierra Club, *Fact Sheet: Why EPA Must Address Appliance Pollution* 1-2 (June 24, 2021), https://rmi.org/wp-content/uploads/2021/04/rmi_factsheet_appliance_pollution.pdf (based on emission information from EPA, *2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document*, at 2-11, https://www.epa.gov/sites/default/files/2021-02/documents/nei2017_tsd_full_jan2021.pdf).

[9] Based on RMI analysis using median estimates from the results of three reduced complexity models used in: Jonathan J. Buonocore (Harvard T.H. Chan School of Public Health) et al., *A Decade of the U.S. Energy Mix Transitioning Away from Coal: Historical Reconstruction of the Reductions in the Public Health Burden of Energy*, 2021 Environ. Res. Lett. 16 054030 (May 5, 2021), https://doi.org/10.1088/1748-9326/abe74c, as well as additional analysis from Jonathan Buonocore, Sc.D, the study's lead author.

[10] To be part of an emissions-free future, gas appliances must be converted to run on zero-emitting fuels like green hydrogen. Claims that zero-emitting pipeline fuels will ever be widely available for use in buildings are highly speculative, and many analyses indicate this approach will be prohibitively expensive. *See, e.g.*, California Energy Commission, *The Challenge of Retail Gas in California's Low-Carbon Future* iii (Apr. 2020) (finding that "building electrification is likely to be a lower-cost, lower-risk long-term strategy compared to renewable natural gas (RNG, defined as biomethane, hydrogen and synthetic natural gas, methane produced by combining hydrogen and carbon)"), https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-055-F.pdf; David Roberts, *The False Promise of "Renewable Natural Gas"*, Vox (Feb. 20, 2020) (collecting sources), https://www.vox.com/energy-and-environment/2020/2/14/21131109/california-natural-gas-renewable-socalgas. Moreover, the proposed Most Efficient criteria for gas appliances do not require that they be hydrogen-ready, making it even more unlikely that these appliances will be compatible with decarbonization goals.

such, they cannot meet the standard of "truly exceptional, inspirational, or leading edge" technology that the Most Efficient designation has always demanded.[11]

Most Efficient should be reserved for truly "best of the best" electric appliances

Fortunately, a range of extremely efficient electric alternatives are available, including air source and geothermal heat pumps, heat pump water heaters, and heat pump clothes dryers. Indeed, dozens of air source heat pump models in a range of configurations received the 2021 Most Efficient designation, as well as hundreds of geothermal heat pumps produced by ten ENERGY STAR Partners and 19 electric clothes dryer base models from eight brands.[12]

As discussed further below, these electric models are significantly more efficient. The proposed Most Efficient criteria for electric heat pumps require roughly 2.5 to 4 times higher efficiency than the criteria for comparable gas-fired appliances.[13] Efficient electrification also advances ENERGY STAR's goal of reducing health and climate pollution.[14] Since they produce zero direct emissions, electric appliances eliminate dangerous sources of pollution in and around the homes and buildings where Americans spend 90 percent of their time, and put us on a path to complete decarbonization by drawing power from a rapidly decarbonizing electric grid.[15] Replacing gas furnaces and water heaters with electric heat pump alternatives significantly reduces lifetime climate emissions in every U.S. region, even after accounting for upstream emissions from electricity generation.[16]

These emission reduction benefits will continue growing as the electric grid gets cleaner and long-range marginal emission rates decrease over appliance lifetimes, while the impacts of burning gas piped through aging distribution grids have much more limited potential for

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[11] EPA, *Letter to ENERGY STAR Stakeholders* 1 (May 5, 2011), [hereinafter 2011 Stakeholder Letter], https://www.energystar.gov/sites/default/files/asset/document/Most_Efficient_Cover_LetterMay11.pdf.
[12] *See* ENERGY STAR, Proposed Criteria Webinar, *supra* note 3, at slides 5, 18, 45-47, 51, 54, 57.
[13] *See infra*, text accompanying notes 27 & 32; *see also supra* note 6 (describing the method of comparing efficiencies).
[14] *See* 49 U.S.C. § 6294a(a).
[15] *See* RMI & Sierra Club, *Fact Sheet: Why EPA Must Address Appliance Pollution* 3 (June 24, 2021) (discussing how building electrification could avoid approximately 500,000 tons of nitrogen oxide emissions and 3,750 premature deaths per year by 2045), https://rmi.org/wp-content/uploads/2021/04/rmi_factsheet_appliance_pollution.pdf; Brady Seals & Andee Krasner, *Gas Stoves: Health and Air Quality Impacts and Solutions*, RMI, Physicians for Social Responsibility, Mothers Out Front & Sierra Club (2020) (discussing the health risks of indoor air pollution from gas stoves), https://rmi.org/insight/gas-stoves-pollution-health/.
[16] Theresa Pistochini, *Greenhouse Gas Emission Forecasts for Electrification of Space Heating in Residential Homes in the United States*, UC Davis Western Cooling Efficiency Center, slides 21-24 (Apr. 20, 2021) (finding that electrifying residential space heating will produce "[s]ignificant emissions reductions … in all regions," whether or not methane and refrigerant leakage are included and regardless of the global warming potential used), https://ucdavis.app.box.com/s/dqja4itdlh1wwicyjh6wag5yswwf97tc; *see also* Claire McKenna, Amar Shah & Mark Silberg, *It's Time to Incentivize Residential Heat Pumps*, RMI (June 8, 2020) ("As of 2020, replacing a gas furnace with a heat pump will reduce carbon emissions in 46 of 48 states (99 percent of US households)."), https://rmi.org/its-time-to-incentivize-residential-heat-pumps/; Rachel Golden & Cara Bottorff, *New Analysis: Heat Pumps Slow Climate Change in Every Corner of the Country*, Sierra Club (Apr. 23, 2020), https://www.sierraclub.org/articles/2020/04/new-analysis-heat-pumps-slow-climate-change-every-corner-country.

decarbonization.[17] Indeed, the Biden Administration is committed to achieving a carbon-free electricity sector by 2035, which will eliminate upstream emissions and make efficient electric appliances completely pollution-free, when the majority of appliances installed in 2022 will still be in use.[18] It is clear that a range of efficient electric appliances, paired with clean electricity generation, will play a key role in achieving the target of net-zero economywide emissions by 2050. These appliances have earned their place on the "leading edge" that the forward-looking Most Efficient program seeks to advance into the market.[19] This is not the case for gas appliances, which have no clear role in a fully decarbonized energy future.[20]

Aligning Most Efficient with electrification meets the target audience's interests, and will expand access to better, more efficient products for all consumers

In light of gas appliances' harmful impacts and the availability of more efficient electric alternatives, it is unsurprising that environmentally-conscious consumers—the Most Efficient program's target audience—support electrification policy. A recent survey by Climate Nexus, the Yale Program on Climate Change Communication, and the George Mason University Center for Climate Change Communication found that 67% of registered voters support tax incentives or rebates to support switching from natural gas to electric appliances, compared to just 18% who opposed these incentives.[21] Similarly, a Morning Consult survey recently showed that a majority of climate-concerned individuals support municipal legislation to prohibit gas connections in new construction.[22] These consumers were also more likely to consider buying an electric range than a gas range.[23] Reserving the Most Efficient designation for electric

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[17] *See, e.g.*, Pistochini, *supra* note 16, slides 12-13 (showing that the National Renewable Energy Lab's projected long-range marginal electricity emission rates decrease significantly over time under policies adopted as of June 2020, especially in states with the highest current emission rates); Golden & Bottorff, *supra* note 16.

[18] Exec. Order 14,008, *Tackling the Climate Crisis at Home and Abroad* § 205(b)(i) (Jan. 27, 2021), https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad. The average lifetime of a heat pump or gas furnace is 18 years, and the average lifetime of a clothes dryer is 13 years. Energy and Environmental Economics, Inc., *Residential Building Electrification in California* 41 (Apr. 2019) (citing assumed equipment lifetimes from data supporting the U.S. Energy Information Administration's National Energy Modeling System), https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf.

[19] *See* EPA, 2011 Stakeholder Letter, *supra* note 11, at 1.

[20] *See supra* note 10 and accompanying text.

[21] Climate Nexus et al., *PR2016 National Poll Toplines* 7 (Sept. 30-Oct. 1, 2020), https://climatenexus.org/wp-content/uploads/2015/09/Public-Gas-Poll-Climate-Change.pdf. Sixty-four percent of respondents were more aligned with the view that the United States should transition to clean electricity and away from gas use in heating and cooking, compared to just 36% who were more aligned with the view that gas should be embraced as a foundational fuel for heating, cooking, and electricity generation. *Id.* at 11.

[22] Morning Consult, National Tracking Poll #2101101, at 96 (Jan. 28-30, 2021) (finding that 55% of climate-concerned respondents would definitely or probably support this legislation, compared to just 26% who would definitely or probably not support it), https://assets.morningconsult.com/wp-uploads/2021/02/12184654/2101101_crosstabs_MC_ENERGY_Adults_v1-1.pdf. In the Climate Nexus survey, 59% of respondents strongly support or somewhat support local governments requiring new homes and buildings to run entirely on electricity instead of gas, compared to just 27% who strongly oppose or somewhat oppose these requirements. Climate Nexus et al., *supra* note 21, at 12.

[23] Morning Consult, *supra* note 22, at 24, 32 (finding that 69% of climate-concerned respondents were very likely or somewhat likely to consider buying or leasing an electric range, compared to 57% for gas ranges). Fewer climate-concerned respondents were likely to consider an induction range (35%), *id.* at 28, but their leading reason for not

technologies will align with the interests of these environmentally-conscious consumers, and help them make informed decisions to purchase truly sustainable products.

An all-electric Most Efficient designation will also advance the program's goal of promoting the market development needed to make these highly efficient technologies available and affordable for all consumers.[24] Utility programs across the nation use the Energy Star Most Efficient designation as a key product eligibility criterion for efficiency incentive programs.[25] This includes programs that provide higher incentives for income-qualified customers. Diluting the Most Efficient brand by including inefficient and polluting gas appliances risks misdirecting those valuable equity funds towards appliances that will deliver reduced efficiency, health, and pollution reduction benefits and risk leaving income-constrained families stranded on a shrinking gas system.

Market development is already well underway for many advanced electric technologies, making them an ideal focus of Most Efficient recognition. Indeed, air source and geothermal heat pumps have advanced much further than gas technologies like gas heat pump boilers. However, updating the Most Efficient criteria to include only electric appliances does *not* require that every gas-fired appliance type and configuration have an exact electric analogue. Most Efficient has always been a select recognition available for only the highest-performing products, and this means that many product categories, sizes, and configurations are unable to achieve it.[26] Reserving the recognition for electric appliances would still allow the agencies to differentiate more efficient from less efficient gas-fired appliances using the regular ENERGY STAR label.

For all these reasons, the agencies' policy should be to recognize only electric appliances as Most Efficient. There are additional reasons, discussed below, to withdraw the proposed 2022 criteria for specific gas-fired products (furnaces, boilers, and clothes dryers).

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considering induction ranges was not knowing enough about them. *Id.* at 86. This suggests that consumer education—ENERGY STAR's area of core expertise—will be key to helping these consumers make informed choices that align with their interests.

[24] *See* EPA, 2011 Stakeholder Letter, *supra* note 11, at 1 ("The goal of [Most Efficient] is to drive more energy efficient products into the market more quickly.").

[25] *See, e.g.*, Consortium for Energy Efficiency Comments on proposed 2021 Most Efficient criteria, at 1-3 (Sept. 9, 2020) (discussing CEE's use of the Most Efficient designation as a benchmark for its recognition tiers, and it's the use of Most Efficient by CEE members, industry partners, and utilities), https://www.energystar.gov/sites/default/files/CEE_ENERGYSTAR_MostEfficientLetter_Sep2020.pdf; Northwest Energy Efficiency Alliance & Sacramento Municipal Utility District Comments on proposed 2021 Most Efficient criteria (Aug. 7, 2020) (expressing utility support for and use of the Most Efficient program), https://www.energystar.gov/sites/default/files/NEEA%20%26%20SMUD%20Comments.pdf; *see generally* ENERGY STAR, *Energy Star Impacts* ("More than 840 utilities, state and local governments, and nonprofits leverage ENERGY STAR in their efficiency programs, reaching roughly 97% of households in all 50 states."), https://www.energystar.gov/about/origins_mission/impacts.

[26] *See, e.g.*, EPA, 2011 Stakeholder Letter, *supra* note 11, at 1 ("[I]t is not the goal of the [Most Efficient] program to ensure that there are qualifying models in all configurations or sizes. As such, the recognition criteria may be established at levels where extra-large products or those with energy-intensive configurations are unable to achieve recognition.").

Appliance-specific considerations

Gas Furnaces

The agencies have proposed to maintain the 2021 Annual Fuel Utilization Efficiency (AFUE) requirement of 97% for gas furnaces in 2022. This proposal cannot be justified when significantly more efficient electric heat pumps are available and recognized as Most Efficient.

The proposed 2022 criteria include a Heating Seasonal Performance Factor (HSPF) of 9.6 for split heat pumps, which translates to an average heating season Coefficient of Performance (COP) of 2.8, and an HSPF of 8.5 for packaged heat pumps (a heating season COP of 2.5).[27] These heating season COPs are roughly 2.9 and 2.6 times as efficient as the proposed 97% AFUE gas furnace criteria, respectively. The heat pumps will use less fuel and produce roughly 43-50% less overall CO_2 emissions than a gas furnace that achieves the proposed Most Efficient criteria.[28] While this illustrative comparison between heat pump and furnace efficiencies does not give a precise, comprehensive picture of their different energy consumption and emission profiles, it does suggest that heat pumps outperform gas furnaces by a wide margin.

Moreover, the 2022 heat pump Most Efficient criteria have been updated to align with the new ENERGY STAR Version 6.0 standards, which shows that technological and standard-setting progress is continuing for these products.[29] By contrast, the 97% AFUE requirement for gas furnaces has not changed since the Most Efficient designation was launched in 2011.[30]

Gas Boilers

The agencies have proposed Most Efficient 2022 criteria for boilers at 120% AFUE, after suspending the recognition for 2021. Gas boiler criteria should face a high bar before being reintroduced, and the proposed standards fail to clear this bar. As discussed above, even

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[27] EPA, Proposed Criteria Memo, *supra* note 1, at 5. Note 6 above describes the method of comparing heat pump and furnace efficiencies.

[28] To produce 10 MMBtu of heat output, a 97% AFUE furnace must burn 10.3 MMBtu of gas, which produces 547.1 kg of CO_2. *See* Pistochini, *supra* note 16, at 14 (reporting the EIA value of 5.03×10^{-8} kg CO_2/J natural gas burned, which equals 53.069 kg CO_2/MMBtu). To produce the same amount of heat output, a Most Efficient split heat pump with a heating season COP of 2.81 uses 1041.6 kWh of electricity. Assuming EIA's estimated average transmission and distribution loss of 5 percent, 1096.5 kWh must be generated to power the heat pump. EIA, *Frequently Asked Questions*, https://www.eia.gov/tools/faqs/faq.php?id=105&t=3. The average lifetime of a heat pump or gas furnace is 18 years, so a heat pump or furnace installed in 2022 is expected to be in use through 2040. E3, *supra* note 18, at 41. The nationwide average annual long-range marginal emission rate for electricity generation over this period is 250.8 kg/MWh, as projected in the NREL Cambium low-cost renewable scenario. *See* National Renewable Energy Lab, Cambium Scenario Viewer, https://cambium.nrel.gov/?project=579698fe-5a38-4d7c-8611-d0c5969b2e54. This is the forecast scenario used in Pistochini, *supra* note 16, at 12. Multiplying the 1096.5 kWh generated to power the heat pump by the 250.8 kg CO_2/kWh emission rate yields 274.99 kg CO_2, 50 percent less than the 547.1 kg CO_2 generated by the furnace. A similar calculation yields 310.6 kg CO_2 for a Most Efficient packaged heat pump, which is 43% less than the furnace. These estimates do not account for methane and refrigerant leakage, which would likely increase the heat pumps' pollution reduction benefits. *Compare* Pistochini, *supra* note 16, slides 21-22, *with id.* slide 23 (showing greater emission reductions from electrification when leakage is considered).

[29] EPA, Proposed Criteria Memo, *supra* note 1, at 3.

[30] EPA, 2011 Stakeholder Letter, *supra* note 11, at 2.

efficiency improvements from new technologies like heat pump gas boilers cannot eliminate the inherent pollution from burning fossil fuels.

And like gas furnaces, commercially available gas boilers cannot compete with more efficient electric alternatives. Of the product types for which Most Efficient criteria have been proposed, geothermal water-to-water and direct geothermal exchange (DGX)-to-water heat pumps are most comparable to gas boilers, since both can be used to heat water for hydronic space heating and other uses.[31] To receive Most Efficient recognition, these geothermal heat pumps must achieve COPs between 3.1 (for DGX-to-water and closed loop water-to-water configurations) and 3.5 (for open loop water-to-water), which is 2.6 to 2.9 times more efficient than the proposed gas boiler standard.[32] These geothermal heat pumps will produce roughly 44-50% less CO_2 emissions than a gas boiler that meets the proposed criteria.[33]

Gas Dryers

The agencies have proposed to maintain the 2021 dryer standards in 2022, including the gas dryer Combined Energy Factor requirement of 3.8 lbs/kWh.[34] Every standard electric dryer that meets the 2021 Most Efficient criteria has a normal cycle Combined Energy Factor of at least 4.3 lbs/kWh, and some achieve efficiencies as high as 9 to 10 lbs/kWh.[35] Although the standard for gas dryers is weaker than for electric dryers, not a single gas model achieved it in 2021.[36] And while a theoretical gas dryer achieving the Most Efficient criteria would produce about 27 percent less CO_2 than an electric dryer achieving the proposed standards, many electric models exceed the standards by a wide margin.[37] The most efficient electric dryer on the market would emit about 40 percent less CO_2 than a gas dryer meeting a proposed standards, and 44 percent

[31] Other efficient electric technologies can perform many or all of a gas boiler's functions. Air-to-water heat pumps heat water for use in hydronic space heating and other applications. Air source heat pumps can replace boilers used for space heating (although packaged systems may require installation of ductwork in many cases, so split systems may be used more frequently for this type of replacement).

[32] EPA, Proposed Criteria Memo, *supra* note 1, at 3.

[33] This comparison is calculated using the method described in note 28. A Most Efficient split air source heat pump would produce 38% less CO_2 per unit of heat output than a 120% AFUE gas boiler, and a Most Efficient packaged air source heat pump would produce 30% less CO_2 per unit of heat output.

[34] EPA, Proposed Criteria Memo, *supra* note 1, at 6.

[35] ENERGY STAR, Proposed Criteria Webinar, *supra* note 3, at slide 19. The criteria for compact ventless 240 V electric dryers require 3.7 lbs/kWh on the normal cycle setting, but there are no compact gas dryer models available, and several electric compact ventless 240 V electric models achieve Combined Energy Factors approaching 7 lbs/kWh. *Id.*

[36] EPA, 2011 Stakeholder Letter, *supra* note 11, at 2.

[37] For electric dryers, emissions per pound of clothes dried are calculated by taking the inverse of the CEF, adjusting for 5 percent average transmission and distribution losses, and multiplying by the NREL nationwide average annual long-range marginal emission rate. The average lifetime of a dryer is 13 years, so calculations are based on the average long-range marginal emission rate for 2022-2034 of 267.0 kg CO_2/MWh (no value is given for 2035 in the NREL dataset). *See* E3, *supra* note 18, at 41; *supra* note 28. This yields 0.065 kg CO_2 per pound of clothes dried by an electric dryer meeting the 4.3 CEF Most Efficient standard. Emissions per pound of clothes dried are calculated for gas dryers by taking the inverse of the CEF and multiplying by 0.181, the emissions rate of gas combustion expressed in kg CO_2/kWh. *See supra* note 28. For a 3.8 CEF gas dryer, this yields 0.047 kg CO_2 per pound of clothes dried, which is 27% less than the 0.065 kg CO_2 produced by the electric dryer.

less gas than the most efficient gas dryers actually on the market.[38] If anything, this suggests that the agencies could strengthen the electric dryer standards. There is no reason to adopt 2022 Most Efficient criteria for gas dryers when the agencies have determined that no gas dryers can meet those criteria, let alone compete with the most efficient electric dryers.

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In conclusion, the 2022 Most Efficient designations should advance the program's forward-looking goals by recognizing only the highest-efficiency, leading edge products that are consistent with our country's energy, climate, and pollution-reduction objectives. ENERGY STAR should look ahead to a net-zero emissions future, where efficient electric appliances are powered by the clean electric grid envisioned by the Biden Administration. The Most Efficient recognition should no longer be used to promote less efficient gas appliances that have no place in this net-zero emissions future.

Thank you for considering these comments, and we hope you will take this important first step toward aligning ENERGY STAR with the efficient, zero-emitting future that our health and climate goals demand.

[38] The most efficient electric dryer achieves a CEF of 9.75. *See* ENERGY STAR Most Efficient 2021 Clothes Dryers, Miele PDR908 HP, https://www.energystar.gov/most-efficient/me-certified-clothes-dryers/details/2330881. The most efficient gas dryers achieve a CEF of 3.49. *See* ENERGY STAR Product Finder, Gas Clothes Dryers, https://www.energystar.gov/productfinder/product/certified-clothes-dryers/results?formId=4238314-73-4364-99-31950166&scrollTo=4458.66650390625&search_text=&low_price=&high_price=&type_filter=Gas+Clothes+Dryer&brand_name_isopen=0&other_features_and_characteristics_isopen=0&markets_filter=United+States&zip_code_filter=&product_types=Select+a+Product+Category&sort_by=combined_energy_factor_cef&sort_direction=desc&page_number=0&lastpage=2. Emission comparisons are calculated using the method described in note 37.

Sincerely,

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