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The Sponsors of Energize Connecticut, and in partnership with Connecticut Passive House, are pleased to offer *Passive House & All-Electric Homes Initiative* to support workforce development and help transform the energy efficiency and building construction industries in Connecticut.



For more information, please visit EnergizeCT.com/passive-house
or email PassiveHouseTrainingCT@icf.com

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Take energy efficiency to a new level

Residential New Construction Passive House Multi-family buildings with five units or more



PASSIVE HOUSE INCENTIVE STRUCTURE FOR MULTI-FAMILY (5 UNITS OR MORE)

Incentive Timing	Activity	Incentive Amount	Max Incentive (Per Unit)	Max Incentive (Per Project)
Pre-Construction	Feasibility Study ¹	Up to 100% of Feasibility Study Costs	N/A	\$5,000.00
	Energy Modeling ²	75% of Energy Modeling Costs (Before 90% Design Drawings)	\$500.00	\$30,000.00
		50% of Energy Modeling Costs (90% Design/50% Construction)	\$250.00	\$15,000.00
Post Construction	Certification ³	Up to 100% of Certification Costs	\$1,500.00	\$60,000.00

1. Feasibility Study will require documentation in the form of a Feasibility Study report and invoice from the Passive House Consultant

2. Incentives will only be awarded prior to 50% Construction Drawings for Passive House projects. No incentives will be granted after 50% Construction Drawing set.

3. Certification may be either through PHIUS, PHI, or EnerPHit certification offerings.

Next steps you can take...

Contact your Energy Efficiency Representative or

Go to [EnergizeCT.com](https://energizeCT.com) or call 1-877-WISE USE for more details.

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The future of high-performance,
all-electric homes starts here.



es
ntal Protection

	LEVEL 1		LEVEL 2	
	Single Family (Detached Dwellings)	Multifamily (Attached Dwellings)	Single Family (Detached Dwellings)	Multifamily (Attached Dwellings)
Total UA Alternative Compliance or HERS Index Score [†]	Total UA ≥ 7.5% better than 2021 IECC or HERS Index Score ≤ 55		Total UA ≥ 15% better than 2021 IECC or HERS Index Score ≤ 45	
Heat pump for space heating ^{††}	Required		Required	
Space Conditioning Connectivity & Controls ^{†††}	Optional		Required	
Heat pump for water heating	Required	Optional	Required ^{††††}	
Hot Water Distribution ^{†††††}	Required		Required	
Envelope Infiltration Rate (ACH)	ACH50 ≤ 2.5	CFA > 850ft ² : ACH50 ≤ 4.0 CFA < 850ft ² : ACH50 ≤ 5.0	ACH50 ≤ 2.0	CFA > 850ft ² : ACH50 ≤ 3.0 CFA < 850ft ² : ACH50 ≤ 4.0
Duct Leakage Rate (CFM)	2021 IECC code minimum requirements		All ductwork must be located in conditioned space	
Balanced Ventilation Systems	Optional		Required HRV/ERV (≥70% SRE / ≥40% TRE)	
Induction Cooking	Optional		Required ^{††††††}	Optional
Electric Vehicle Readiness ^{†††††††}	Required		Required	

ALL-ELECTRIC HOME INCENTIVE STRUCTURE		
	Level 1	Level 2
Single Family	\$7,500	\$10,000
Single Family Attached	\$3,000	\$5,000
Multifamily	\$1,500	\$2,500

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***Introducing ENERGY STAR NextGen
Certified Homes and Apartments***



Introduction

- Addressing the challenge of climate change will require commitment and action from every level of government and every sector of the economy.
- In the residential sector, this will require expanding beyond energy efficiency to make greater strides in the adoption of:
 - Strategic electrification
 - Connected equipment to aid in demand response
- While addressing new construction alone will not get us there, it is a critical component to success.
 - Lost opportunity cost
 - By 2050, 20% of homes have not yet been built

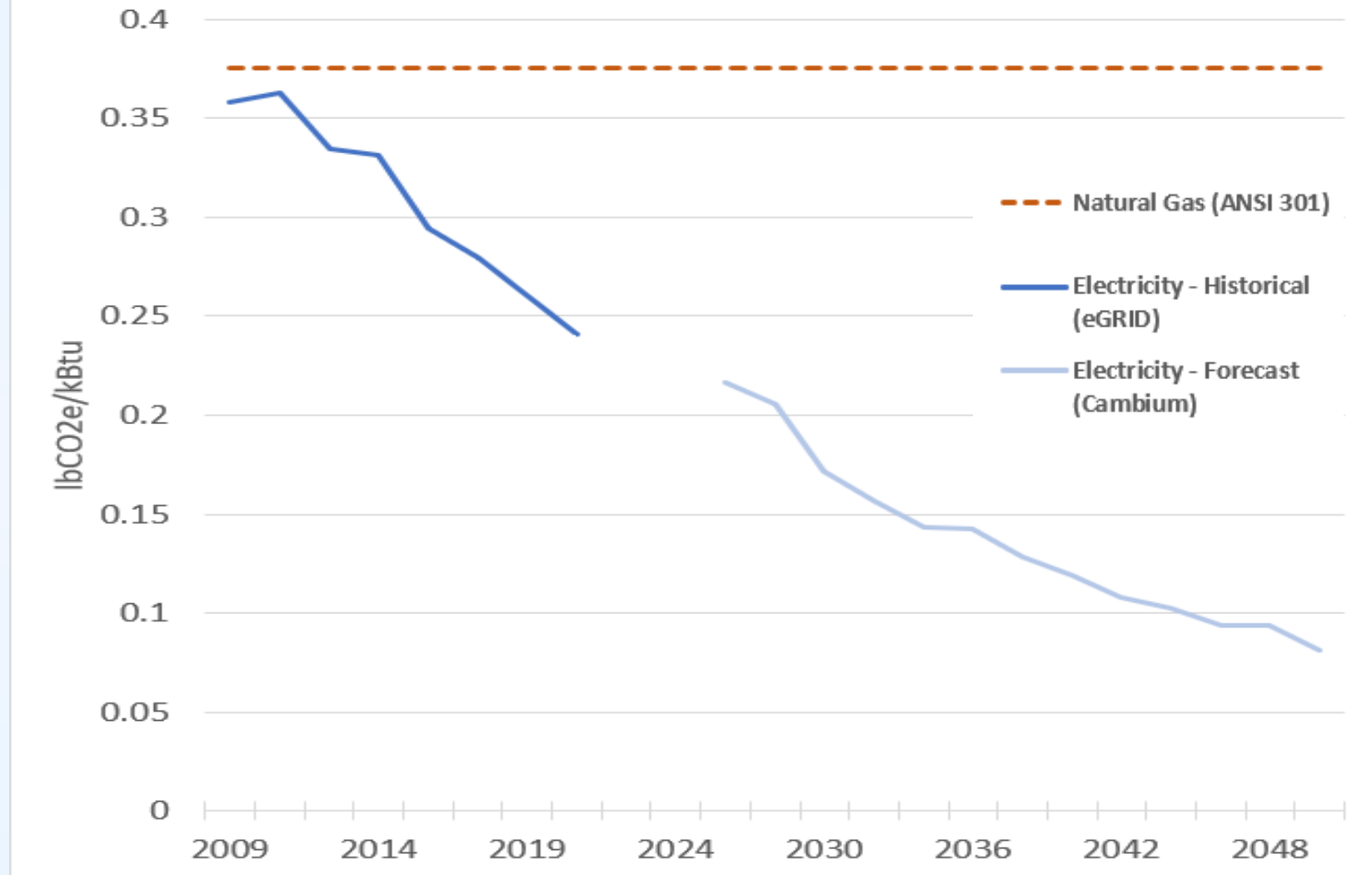


ENERGY STAR NextGen Certified Homes and Apartments

1. Highly energy-efficient construction
2. Multi-stage ENERGY STAR certified connected heat pump
3. ENERGY STAR certified connected heat pump water heater
4. Electric range (Induction cooktop recommended)
5. Electric vehicle charging capability



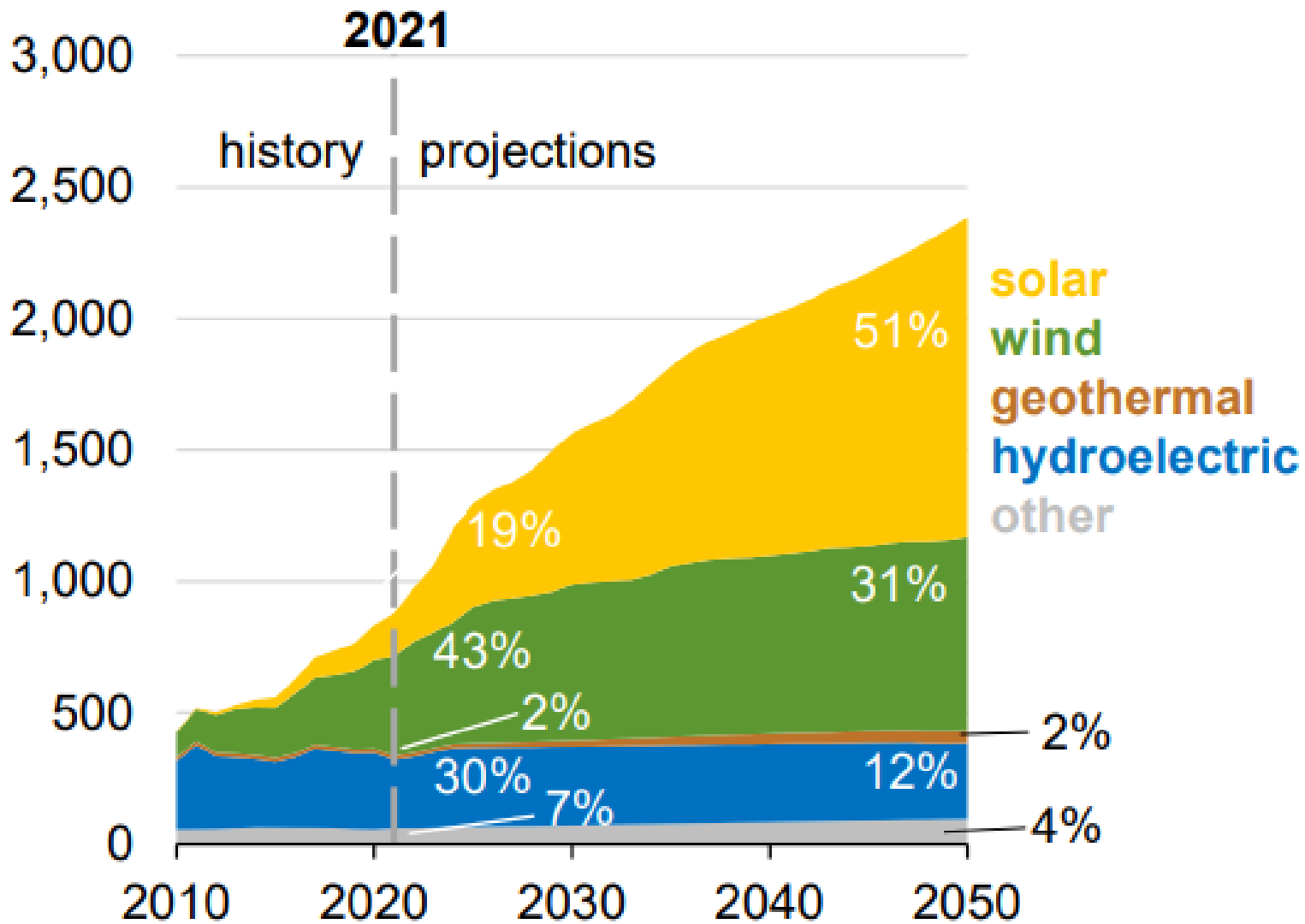
Comparing National Average CO₂e Emission Intensity: Onsite Natural Gas v. Electric Heat Pump



Sources: EPA eGRID; ANSI 301; Cambium AER Low RE. Assumptions: 98% AFUE furnace; 2.5 COP heat pump

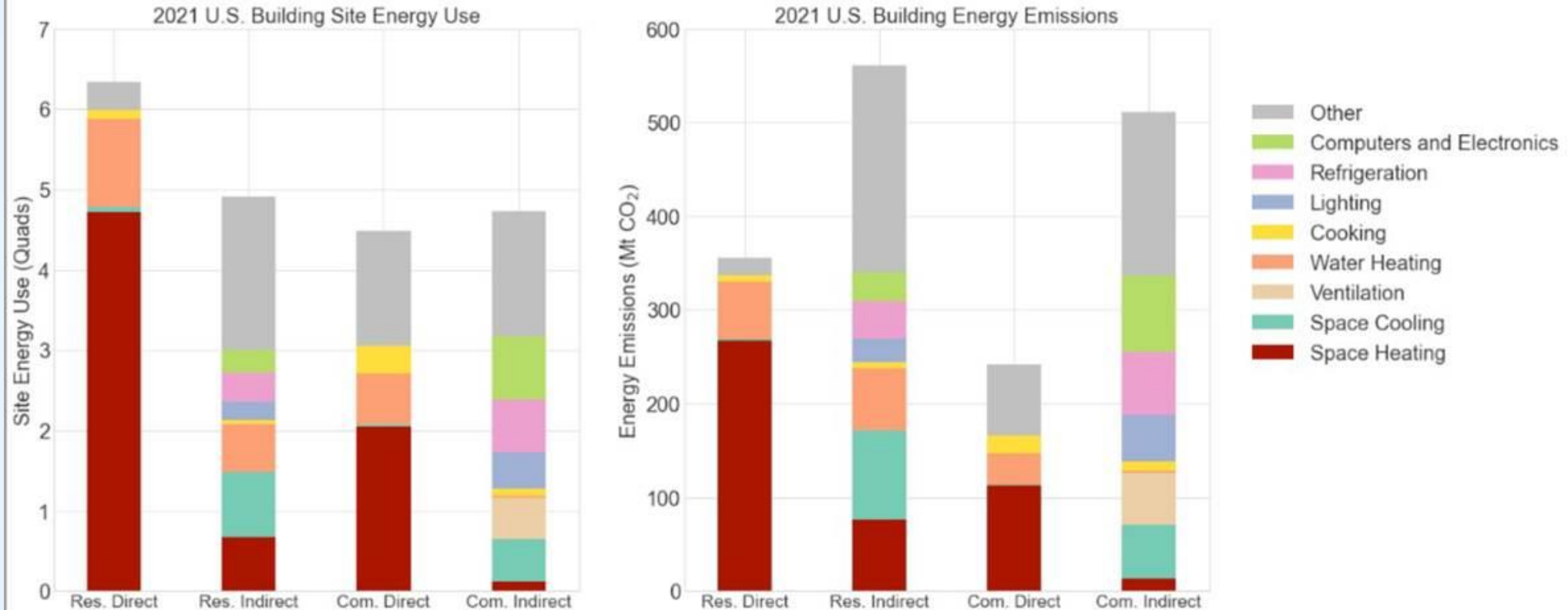
U.S. renewable electricity generation, including end use AEO2022 Reference case

billion kilowatthours



Why This Program Matters

Building energy CO₂ emissions are strongly driven by space conditioning and water heating – particularly in residences

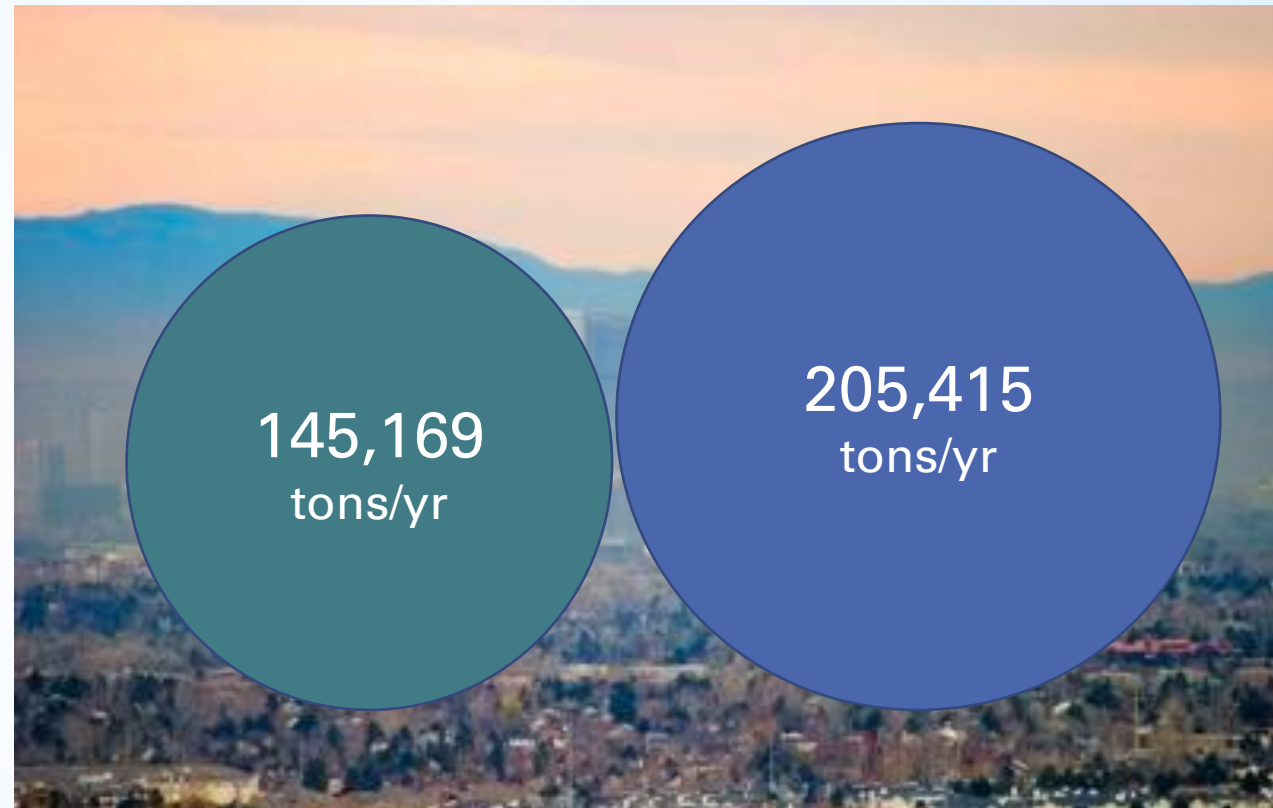


Notes: Data are from DOE's Scout modeling tool. Residential "Other" includes miscellaneous electric loads, backup generators, pool heaters, and outdoor grills. Commercial "Other" includes emergency generators, CHP in commercial buildings, manufacturing, and other commercial building loads classified by EIA as "non-building loads".

Why This Program Matters

Residential gas appliances emit more Nitrogen Oxides pollution than gas power plants, despite using less gas

Source: 2017 EPA [National Emissions Inventory](#)



Gas power plants

Residential gas appliances



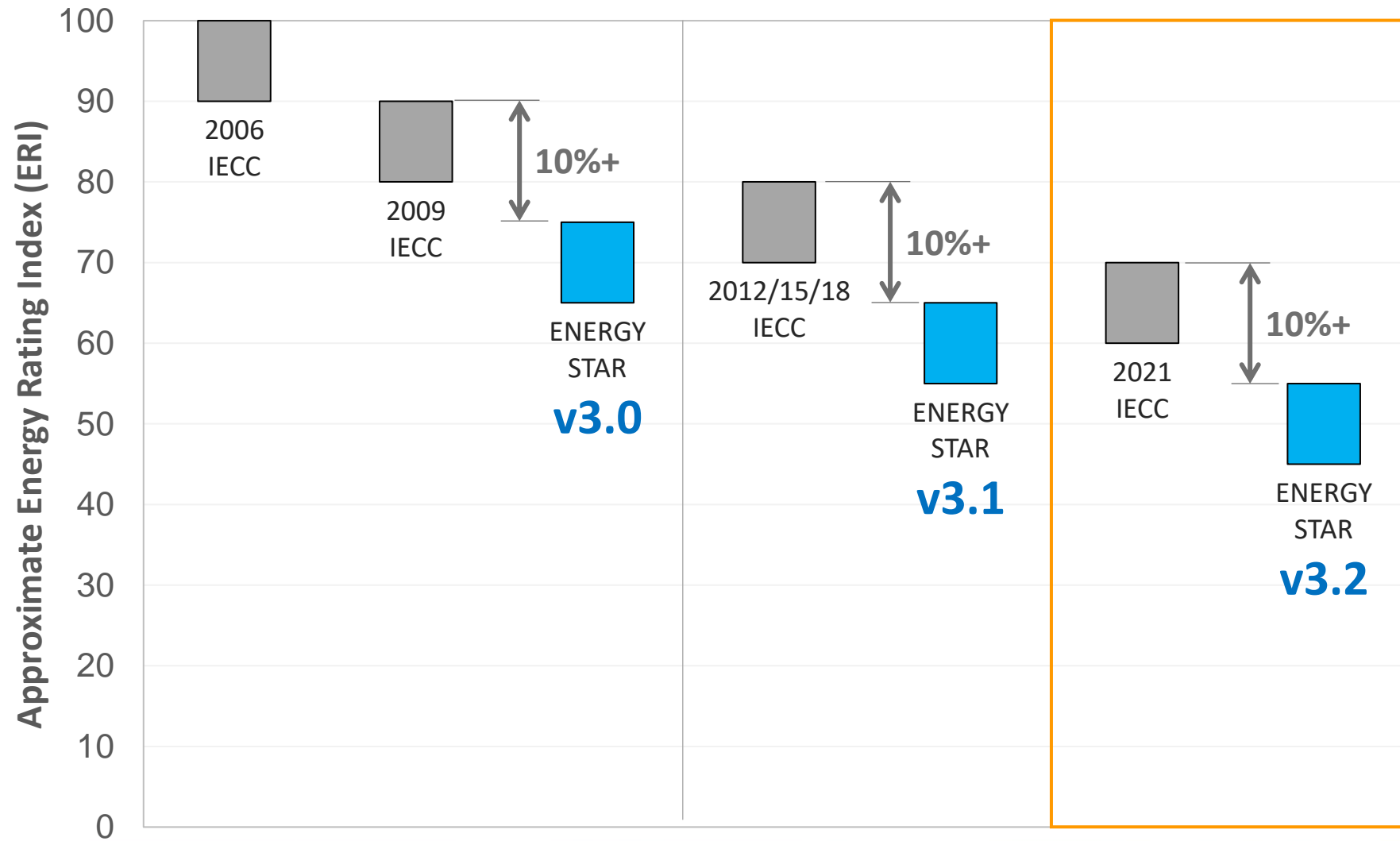
Overview of Program Requirements

1. Energy Efficiency Prerequisite

- Home or building certified to the most rigorous ENERGY STAR New Construction program requirements
 - National v3.2/Multifamily v1.2
 - This requirement would also apply in states that would not otherwise be subject to these versions of the program requirements due to code adoption



Modern code evolution





1. Energy Efficiency Prerequisite

ENERGY STAR is one of the most trusted brands in the US, and nearly 80% of homebuyers identify ENERGY STAR certification as a highly desirable feature.

ENERGY STAR NextGen homes and apartments meet EPA's most advanced ENERGY STAR program requirements for energy efficiency and performance. They are 20% more energy efficient than homes built to typical code levels (2018 IECC).

2. ENERGY STAR Certified Connected Heat Pumps

- ENERGY STAR certified two-speed or variable-speed heat pump installed that serves the design load of each heated zone
 - In Climate Zones 5-8, installed heat pumps are ENERGY STAR Cold Climate certified
 - Blower fan volumetric airflow, blower fan watt draw, and refrigerant charge are Grade I per ANSI / RESNET / ACCA Std. 310
- Each heat pump must also meet EPA's 'connected' criteria or be controlled by an ENERGY STAR certified smart thermostat





2. ENERGY STAR Certified Connected Heat Pumps

500,000 heat pumps installed in new homes and apartments in 2021

- | | | |
|--------------|-------------------|-----------------|
| • South: | 57% single family | 68% multifamily |
| • West: | 17% single family | 38% multifamily |
| • Midwest: | 8% single family | 23% multifamily |
| • Northeast: | 8% single family | 13% multifamily |

2. ENERGY STAR Certified Connected Heat Pumps

ENERGY STAR NextGen homes and apartments allow you to take control of your comfort with a quiet and responsive heating and cooling system



3. ENERGY STAR Certified Heat Pump Water Heaters

- ENERGY STAR certified heat pump water heater that meets EPA's 'connected' criteria
- Each heat pump water heater is 208/240 volts, with minimum tank capacity as follows:

Bedrooms	0-1	2	3	4+
Tank Capacity	36	45	59	72
- Each heat pump water heater located within occupiable space has a sound rating ≤ 55 dBA



3. ENERGY STAR Certified Heat Pump Water Heaters

A typical water heater uses more energy than a refrigerator, clothes washer, dishwasher, and dryer combined

Connected features allow for remote adjustments and alerts from anywhere, and enable residents to further lower electric bills through optional participation in utility demand-response programs (where available)



4. Electric/Induction Cooking

- Cooktops and ovens are electric. Induction range elements / burners are recommended, but not required.

Footnote:

- This requirement does not apply for sleeping units without kitchens but does apply to kitchens in common spaces. This requirement does not apply to cooking appliances located outside the building thermal envelope, (e.g. grills or outdoor kitchens).



4. Induction/Electric Cooking

Electric cooktops and ovens eliminate the emissions of indoor air pollutants associated with gas combustion, including carbon monoxide and nitrogen dioxide, and contribute to a healthier indoor living environment.

Children living in homes with gas stoves have a 42% increased risk of having asthma, according to a meta-analysis of 19 studies.¹

Optional induction cooktops have precise temperature control, boil water quickly, and have cooktop surfaces that remain cool to the touch, making them easier to clean.



5. Electric Vehicle Charging Capability

- For one- and two-family dwellings with dedicated parking:
 - EV-Ready: One parking space is provided per dwelling unit that includes all of the items below.
 - A powered 208/240 receptacle is installed in garage or within 3 feet of driveway or dedicated parking space
 - The electric service panel includes a 40-amp (**or greater**) breaker and panel directory identifies the branch circuit as “Electric vehicle charging”





- For all other dwellings, comply with either EV-Ready or both of the below:
 - EV Charger: Install (at a minimum) the following number of ENERGY STAR certified EV-Chargers that meet EPA's 'connected' criteria as follows:

Parking Spaces:	1-10	11-20	21-30	31-40	41+
EV Chargers:	1	2	3	4	5

- EV-Capable: Conduit is installed that runs continuously from the electrical panel to a junction box that terminates within 3 feet of at least 20% of the development's parking spaces

5. Electric Vehicle Charging Capability

5. Electric Vehicle Charging Capability

In homes with private parking, a heavy-duty power outlet is wired in and ready to charge an electric vehicle

Even if you don't have an EV today, having the necessary wiring installed or access to a charger will make it quicker, easier, and less expensive to go electric if you're ready to make the change in the future.





Initial Messaging & Marketing

Messaging

Smart Investment / Built on Trust	Energy-Efficient Construction	Advanced Technologies	Reduced Indoor Pollutants	Clean Energy Future
A smart investment that builds on the trusted foundation of EPA's ENERGY STAR program	Highly energy-efficient construction that delivers comfort and savings	Advanced efficient electric technologies that provide high performance and premium features	The advanced electric and hybrid equipment found in ENERGY STAR NextGen homes and apartments can reduce or eliminate emissions of indoor air pollutants associated with gas combustion, including carbon monoxide, nitrogen dioxide, and particulates, and contribute to a healthier indoor living environment.	An important choice that helps to create a clean energy future for everyone

Reduced Indoor Pollutants

Nitrogen Dioxide: Gas equipment is a source of nitrogen dioxide, which can cause or worsen respiratory health conditions, including asthma.

- Many studies have noted the importance of gas cooking appliances as sources of NO₂ emissions. Depending on geographical location, season, other sources of NO₂, and household characteristics, homes with gas cooking appliances have approximately 50% to over 400% higher NO₂ concentrations than homes with electric cooking appliances.

Carbon Monoxide: Gas-fueled equipment is a source of carbon monoxide, which at elevated levels, can cause fatigue, headaches, confusion, dizziness, and in some cases, death.

- People with cardiovascular disease, fetuses, infants, and the elderly may be especially sensitive to carbon monoxide.

Average carbon monoxide levels in homes without gas stoves vary from 0.5 to 5 parts per million (ppm). Levels near properly adjusted gas stoves are often 5 to 15 ppm and those near poorly adjusted stoves may be 30 ppm or higher.³

- EPA's NAAQS exposure limits for CO are 9 ppm averaged over an 8-hour period, or 35 ppm averaged over 1 hour, neither to be exceeded more than once per year.



A home for tomorrow, built today.



ENERGY STAR® NextGen certification offers an additional level of recognition for homes and apartments that go above and beyond the core ENERGY STAR Residential New Construction program requirements and incorporate advanced electric technologies that will help to build our clean energy future.

Advanced technologies, with high performance and premium features.

ENERGY STAR NextGen homes and apartments deliver all the comfort, quality, and durability that homeowners and residents have come to expect from the ENERGY STAR label—and so much more. These homes come with leading-edge equipment, such as:

- Multi-speed ENERGY STAR certified heat pumps: More efficient than furnaces or boilers, heat pumps serve double duty with heating and cooling, making them usable year-round.
- ENERGY STAR certified heat pump water heaters: Heat pump water heaters that earn the ENERGY STAR label are up to four times more efficient and use 70 percent less energy than standard models.
- Induction cooktops* and electric ovens: Up to 10 percent more efficient than conventional electric resistance units, and about three times more efficient than gas ranges.
- Electric vehicle (EV) charging capability: In homes with private parking, a heavy-duty power outlet is wired in and ready to charge an electric vehicle or have a Level 2 EV charger installed. And in apartment complexes with shared parking, up to five ENERGY STAR certified EV chargers are provided with additional capacity to add more.

*Some homes that receive government subsidies may provide conventional electric stoves instead of induction cooktops.

Creating a clean energy future for everyone.



Learn more about ENERGY STAR NextGen homes and apartments at energystar.gov/nextgenhomes.

ENERGY STAR NextGen homes and apartments are up to 20 percent more energy efficient than homes built to typical code levels and feature advanced efficient electric and hybrid technologies that provide premium performance and experiences, along with improved indoor air quality.

Built with energy-efficient construction.

ENERGY STAR NextGen homes and apartments meet the U.S. EPA's most advanced ENERGY STAR requirements for energy efficiency and performance, delivering comfort and savings you can count on.

Creating a healthier, safer indoor living environment.

The advanced electric and hybrid equipment found in ENERGY STAR NextGen homes and apartments can reduce or eliminate emissions associated with natural gas combustion and contribute to reduced indoor air pollutants.

Built on the trusted foundation of EPA's ENERGY STAR program.

ENERGY STAR NextGen homes and apartments are built on EPA's 25+ year history of delivering energy savings and environmental benefits through the ENERGY STAR program.

Using less fossil fuel to operate helps ENERGY STAR NextGen homes and apartments make a big impact, reducing greenhouse gas emissions by up to 80 percent when compared to homes built to the latest code.



Built for a clean energy future.

Choosing an ENERGY STAR NextGen home helps to create a clean energy future for everyone and provides an important step toward reducing carbon pollution while providing energy savings, greater comfort, and advanced features. Learn more at energystar.gov/nextgenhomes.

ESNextGen 09/13/23



The right choice, for
today and tomorrow.

ENERGY STAR® NextGen
certification offers an additional
level of recognition for homes and
apartments that go above and
beyond the core ENERGY STAR
Residential New Construction
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to create a clean energy future for everyone
and provides an important step toward reducing
carbon pollution while providing energy savings,
greater comfort, and advanced features.

Learn more at energystar.gov/nextgenhomes.



ESNextGen09/13/22



A home for
tomorrow,
built today.



Modern efficient electric and hybrid technologies, along with energy-efficient construction, provide the premium home features you want while delivering high performance, comfort, and enhanced health and safety benefits.

Multi-speed ENERGY STAR® certified connected heat pumps

- More efficient than furnaces or boilers, heat pumps serve double duty with heating and cooling, making them usable year-round.
- Multi-stage or variable speed technology is quieter and delivers more consistent temperatures for greater comfort.
- Newer cold-climate heat pumps can deliver 70 to 80 percent of their rated heating capacity at temperatures as low as 5° F.
- Connected features allow for remote adjustments and alerts from anywhere, and enable residents to further lower electric bills through optional utility demand-response programs.

ENERGY STAR certified connected heat pump water heaters

- A typical water heater uses more energy than a refrigerator, clothes washer, dishwasher, and dryer combined.
- A heat pump water heater that earns the ENERGY STAR label is up to four times more efficient, and uses 70 percent less energy, than a standard model, saving hundreds of dollars every year in energy costs.
- Connected features allow for remote adjustments and alerts from anywhere, and enable residents to further lower electric bills through optional utility demand-response programs.

Induction cooktops* and electric ovens

- Up to 10 percent more efficient than conventional electric resistance units, and about three times more efficient than gas ranges.
- Cook like a pro, with fast heating, precise control, easy cleaning, and surfaces that remain cool to the touch, making them safer to work with.
- Reduce health risks from indoor air pollution, emitting fewer airborne pollutants during cooking.**

Electric vehicle (EV) charging capability

- With the steady increase of EVs on the road, preparing for an electric transportation future is just smart.
- In homes with private parking, a heavy-duty power outlet is wired in and ready to charge an electric vehicle or have a Level 2 EV charger installed. And in apartment complexes with shared parking, up to five ENERGY STAR certified EV chargers are provided, with additional capacity to add more.
- Even if you don't have an EV today, having the necessary wiring installed or access to a charger will make it quicker, easier, and less expensive to go electric if you're ready to make the change in the future.

*Some homes that receive government subsidies may provide conventional electric stoves instead of induction cooktops.

** Children living in homes with gas stoves are at increased risk for developing respiratory diseases and illnesses compared to children living in homes without gas stoves (2008 Integrated Science Assessment of NO₂).

Highly energy efficient construction

- Meets the U.S. EPA's most advanced ENERGY STAR program requirements for energy efficiency and performance.
- At least 20 percent more energy efficient than homes built to typical code levels (2018 IECC).
- Savings, comfort, durability, and many lifestyle benefits compared to typical homes.

Learn more about ENERGY STAR
NextGen homes and apartments at
energystar.gov/nextgenhomes.

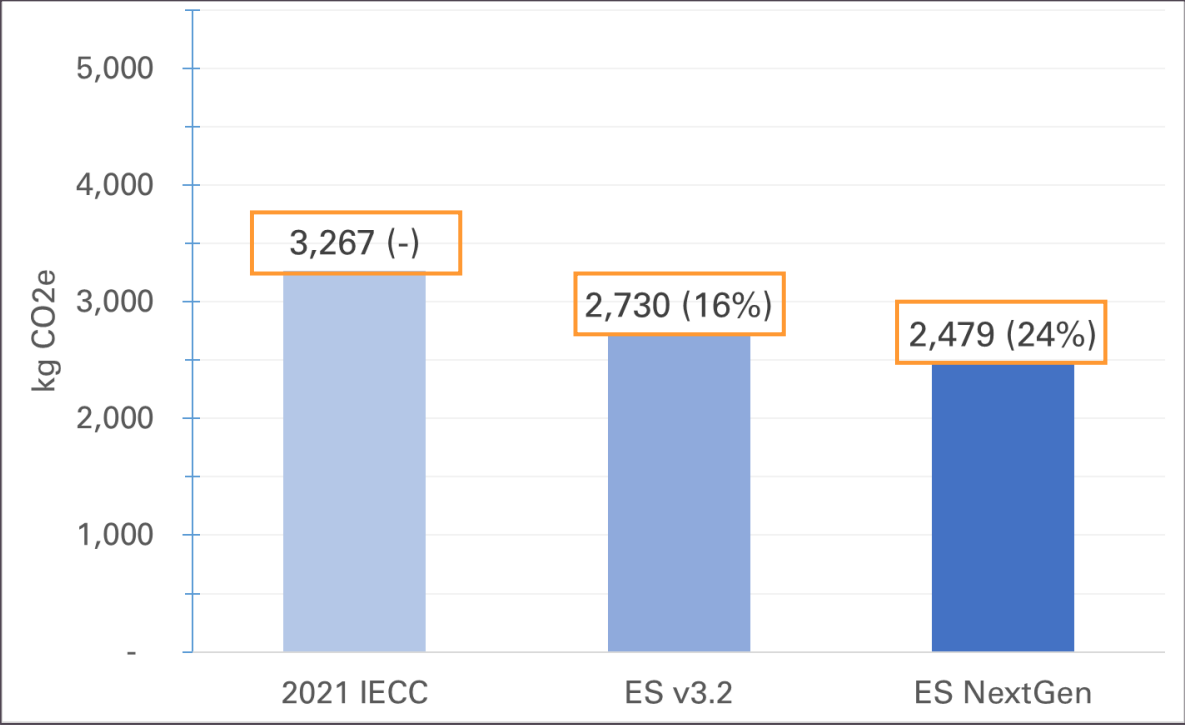




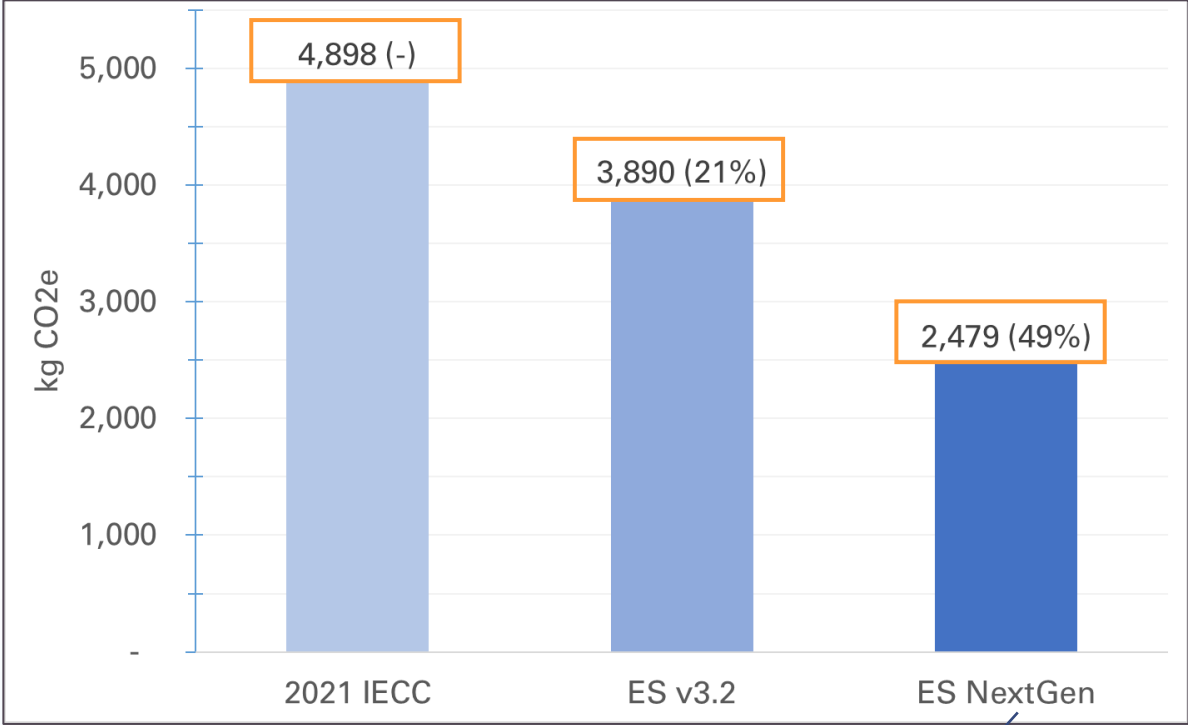
Potential Emissions Reductions

National Emissions Impact for ENERGY STAR NextGen Homes

National Average Emissions Per Home
For Electric Baseline New Homes



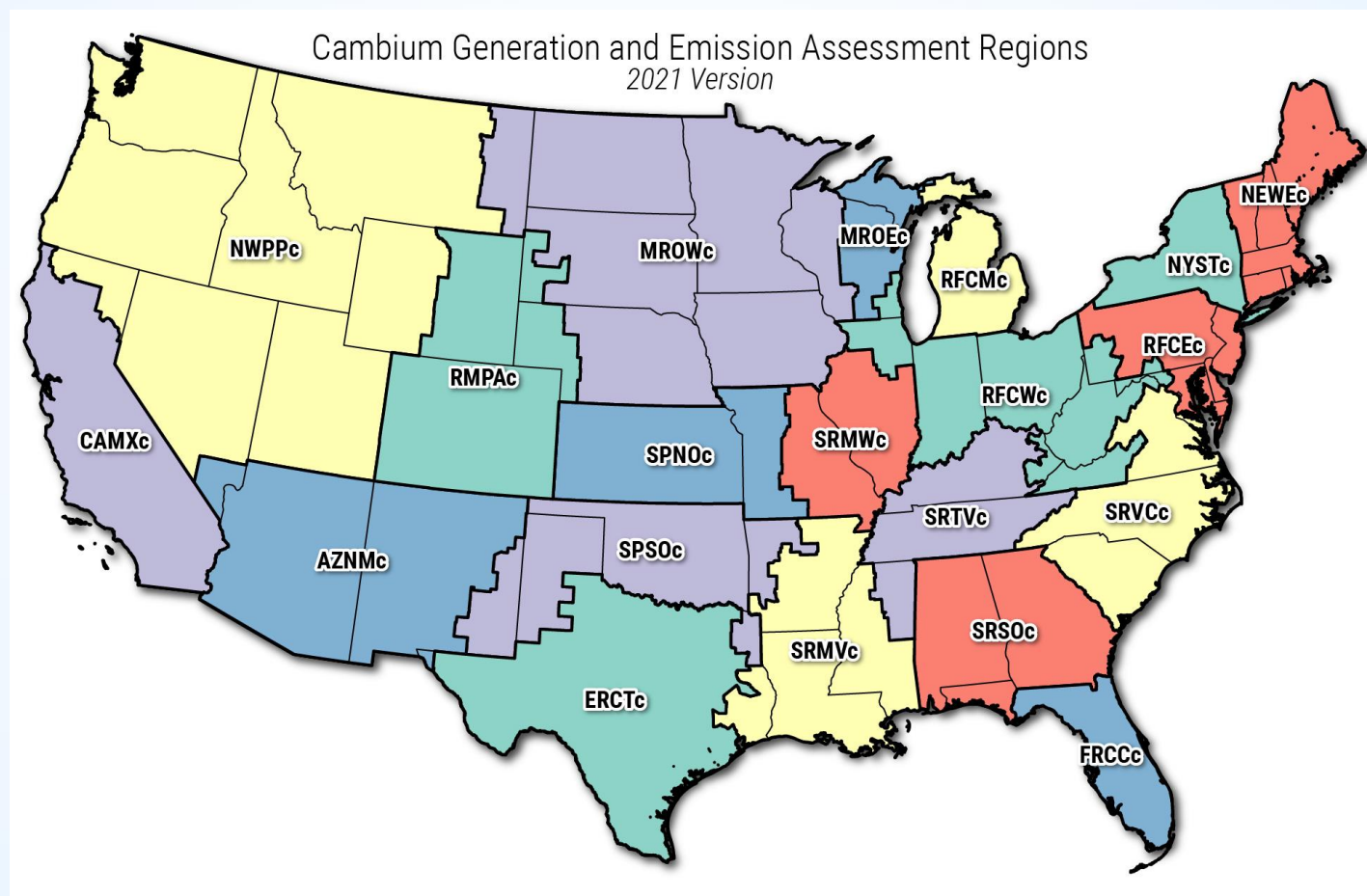
National Average Emissions Per Home
For Gas Baseline New Homes



Note that major end-uses are electrified with NextGen

Potential Emissions Reductions of ENERGY STAR NextGen

- Produced results for each Cambium Generation and Emission Assessment Region



Regional Emissions Impact for Electric Baseline New Homes




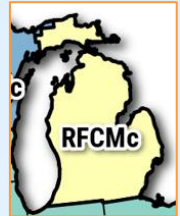
Regional Emissions Savings (2021 IECC to ES NextGen)

Climate Zone	Cambium GEA Regions (From Lowest to Highest Emissions Rates)																			
	CAMXc	NWPPc	MROWc	RMPAc	NYSTc	AZNMc	SPNOc	SPSOc	ERCTc	NEWEc	FRCCc	MROEc	SRVCc	SRMWc	SRMVc	SRSOc	RFCEc	RFCWc	SRTVc	RFCMc
	CZ1										15%									
	CZ2	18%				18%			18%		16%				20%	20%				
	CZ3	15%	22%			21%		24%	22%				22%		23%	22%			24%	
	CZ4	20%			24%	24%	21%	24%	22%				22%	25%	22%	21%	24%	24%	23%	
	CZ4C	23%	27%																	
	CZ5	27%	27%	29%	26%	30%	25%	27%			29%			28%	29%		30%	29%		30%
	CZ6	29%	28%	30%	28%	30%					30%		30%				31%			31%
	CZ7		29%	31%	28%						31%									31%

- Upgrading an **electric baseline new home** from 2021 IECC to ES NextGen produces:
 - Emissions savings in all Cambium regions and all climate zones (15-31%; avg is 24%)
 - Increased savings in colder climates
 - Fairly consistent savings across Cambium regions within a climate zone

Regional Emissions Impact for Gas Baseline New Homes

Regional Emissions Savings (2021 IECC to ES NextGen)

Climate Zone	Cambium GEA Regions (From Lowest to Highest Emissions Rates)																			
	CAMXc	NWPPc	MROWc	RMPAc	NYSTc	AZNMc	SPNOc	SPSOc	ERCTc	NEWEc	FRCCc	MROEc	SRVCc	SRMWc	SRMVc	SRSOc	RFCEc	RFCWc	SRTVc	RFCMc
CZ1											27%									
CZ2	66%					37%			40%		32%				39%	37%				
CZ3	71%	66%				53%		59%	47%				42%		42%	40%				36%
CZ4	72%			78%	64%	47%	36%	47%					38%	40%	35%	34%	42%	59%	64%	
CZ4C	48%	60%																		
CZ5	79%	76%	73%	72%	67%	67%	62%			58%			51%	51%			43%	41%		42%
CZ6	81%	78%	74%	74%	69%					59%		52%					46%			44%
CZ7		79%	76%	73%						60%										43%

- Upgrading a **gas baseline new home** from 2021 IECC to ES NextGen produces:
 - Greater emissions savings in all Cambium regions and all climate zones (27-81%; avg is 49%)
 - Key driver of savings is the emission rate of the Cambium region; the lower the emissions rate, the greater the savings.

Emissions Modeling Summary

- Just one way to estimate savings but promising initial results.
- National average emissions reduction of 24% compared to electric baseline new homes and 49% compared to gas baseline new homes.
- Combination of NextGen's efficiency plus strategic electrification is key to achieving favorable emissions results.



Why Builders Should Care

Tax Credits: 45L

- **Single-Family New Homes** - \$2,500 available for ENERGY STAR;
 - January 1, 2023 – December 21, 2024: ENERGY STAR Single-Family New Home National Version 3.1 (or the regional program requirements applicable to the home).
 - January 1, 2025 – December 31, 2032: ENERGY STAR Single-Family New Homes National Version 3.2 (or the regional program requirements applicable to the home).
- **Multifamily** - \$2,500 available for each ENERGY STAR multifamily units meeting the ENERGY STAR Multifamily New Construction National program requirements (or the regional program requirements) applicable to the dwelling unit.
 - If multifamily projects do not meet prevailing wage requirements, incentive is \$500 per dwelling unit.



Relationship to DOE's Zero Energy Ready Home (ZERH) Program

- DOE ZERH v2 doubles the 45L tax rebate to \$5,000 per dwelling unit
- EPA and DOE have been working closely as both Agencies consider the future of their residential new construction programs
- DOE recently released 'Version 2' of the ZERH single family program
 - Proposal is 20% more stringent than IECC 2021 (versus 10% for ES v3.2), with additional requirements
 - 15% more stringent for multifamily buildings
 - EV-Ready and higher efficiency targets make buildings doing ZERH v2 closer to meeting ENERGY STAR NextGen

Why Builders should pay attention to ENERGY STAR NextGen now

Leading states already require (e.g., California) or incentivize (e.g., Washington) heat pumps in energy codes

Utilities we've talked to have been interested



2023 Program Launch



Learn more at:
www.energystar.gov/NextGenHomes

Or contact me at: foss.asa@epa.gov

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