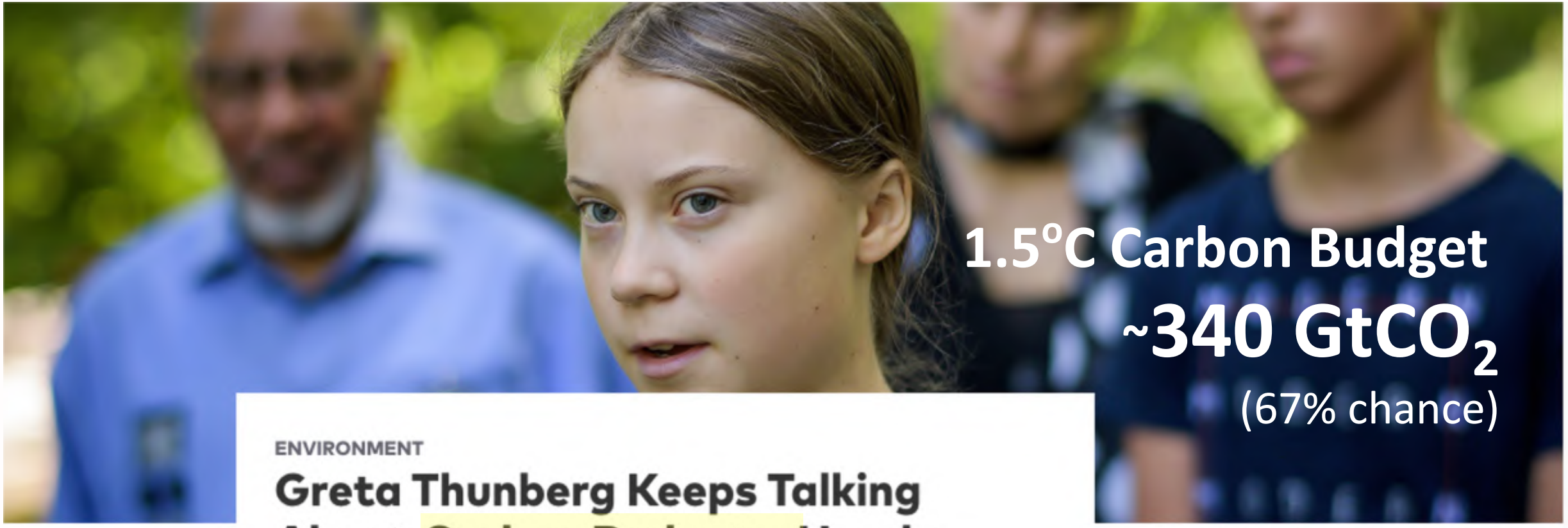
Vincent Martinez
Architecture 2030


CLIMATE EMERGENCY!

GLOBAL CITIZEN



1.5°C Carbon Budget

~340 $GtCO_2$

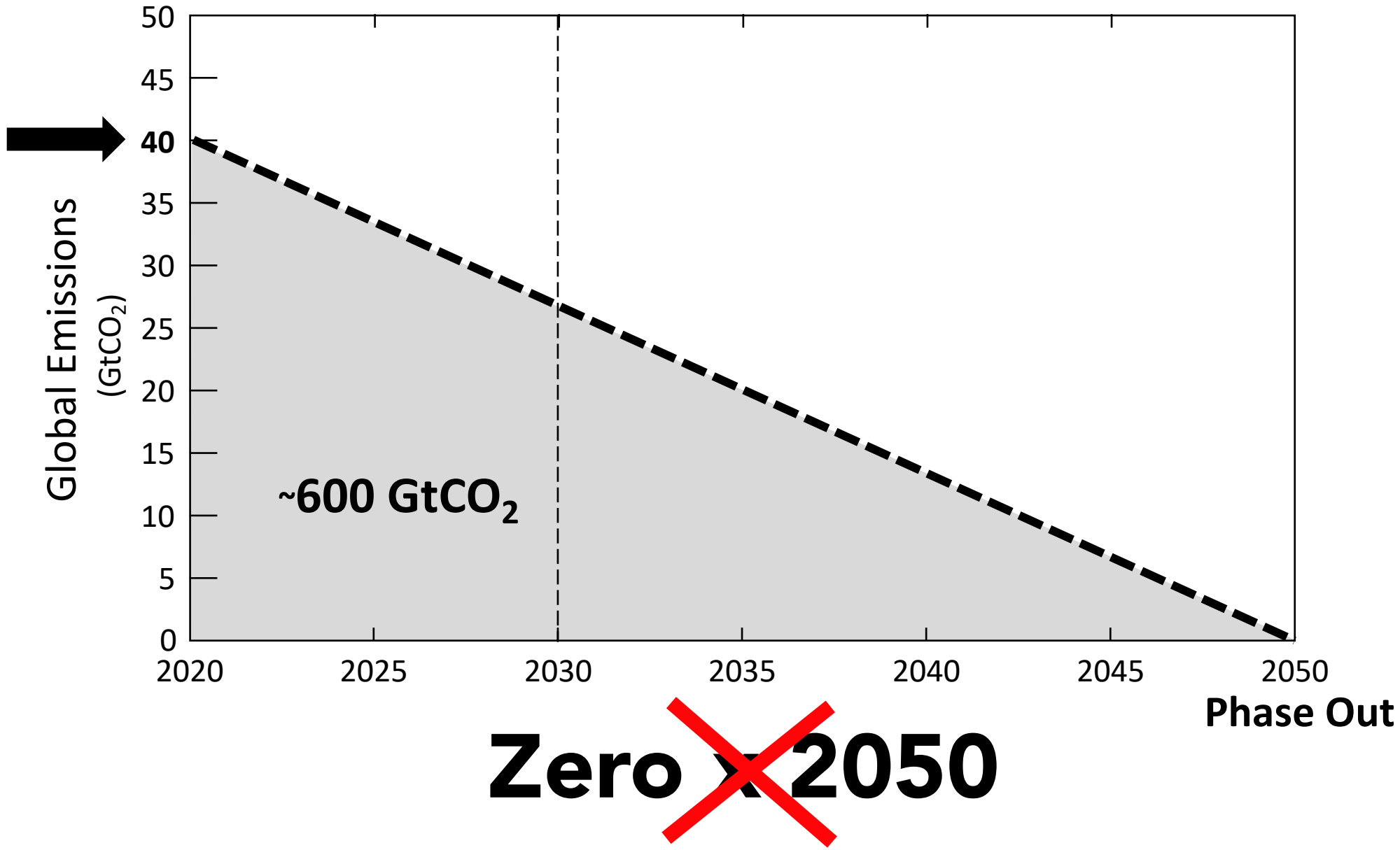
(67% chance)

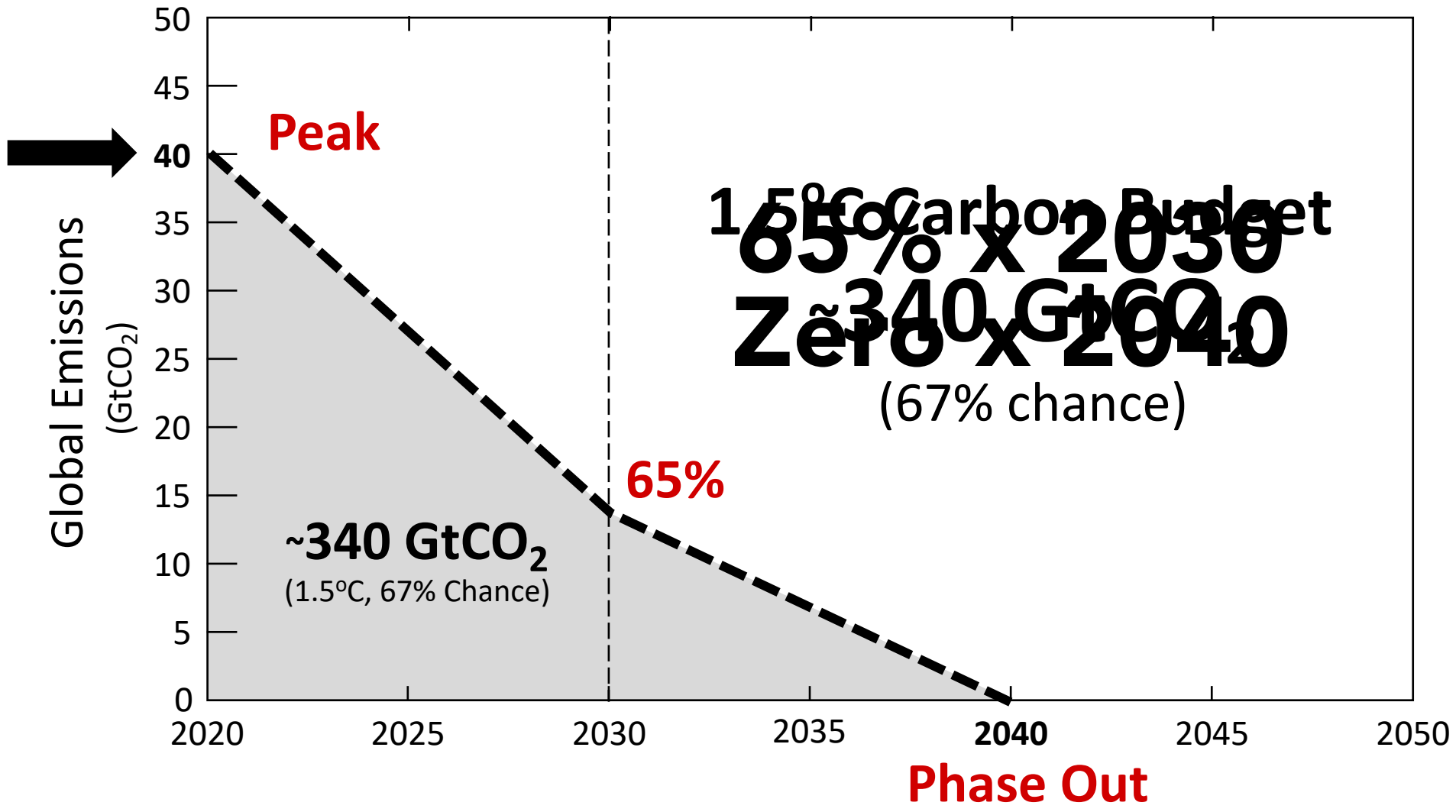
ENVIRONMENT

Greta Thunberg Keeps Talking About Carbon Budgets. Here's Everything You Need to Know.

Understanding the carbon budget is essential to dealing with the climate crisis.

By **Joe McCarthy**


Global Emissions
(GtCO2)
50
45
40
35
30
25
20
15
10
5
0
2020
2025
2030
2035
2040
2045
2050
~600 GtCO2
Phase Out
Zero 2050


Global Emissions
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50
45
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15
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0
2020
2025
2030
2035
2040
2045
2050
Peak
65%
Phase Out
~340 GtCO2
(1.5ºC, 67% Chance)
1.5ºC Carbon Budget
65% x 2030
340 GtCO2
Zero x 2040
(67% chance)

By 2060, global building floor area is expected to increase by

2.4 trillion ft^2

or ***double*** the current worldwide building stock.

Most of this construction is expected to take place in urban areas.

Source: Global Status Report, GABC

Zero Emissions for New Construction Will Require:

ENERGY-EFFICIENT NEW CONSTRUCTION + CARBON-FREE RENEWABLE ENERGY + ZERO ON-SITE EMISSIONS

Source: Architecture 2030
Graphic adaptations: Sefaira; DOE, Green Ideas

ZERO CODE™

HOME ABOUT ZERO CODE ENERGY CALCULATOR CONTACT

Introducing the **ZERO Code** standard for new commercial, institutional, and mid- to high-rise residential buildings.

ZERO CODE™

CARBON

architecture 2030

ZERO CODE™

Rationale

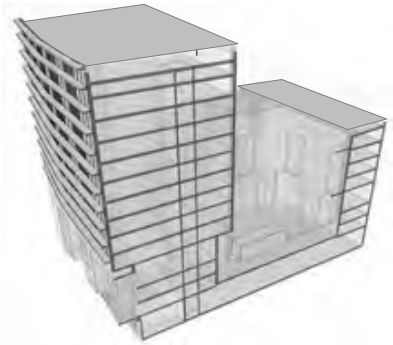
- New buildings place additional load on the electric grid
- The ZERO Code accelerates progress toward a clean grid by requiring that new buildings come with additional renewable energy that exceeds what utilities are already required to do
- The renewable energy requirements are fixed for the prescriptive path
- This encourages the performance approach and to go beyond code-level energy efficiency, e.g. the more efficient, the less renewable energy is needed

architecture 2030

How it works . . .

1

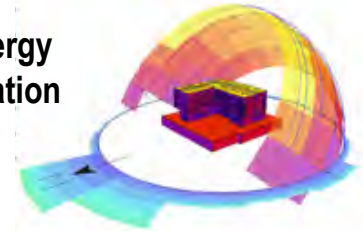
Design an energy efficient building in compliance with the 2021 IECC *or better*.



2

Establish the building's renewable energy requirement from:

an energy simulation



or

default renewable energy table

29

Climate Zone

Building Type

Building Area Type	0A/1A	3B/1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
kBtu/ft²-y																	
Multifamily (R-2)	43	45	41	41	43	42	36	45	43	41	47	46	41	53	48	53	59
Healthcare/hospital (I-2)	119	120	119	113	116	109	106	118	109	106	118	110	105	126	116	131	142
Hotel/motel (R-1)	73	76	73	68	70	67	64	69	66	65	71	68	65	77	72	81	89
Office (B)	31	32	30	29	29	28	25	28	27	25	29	28	25	33	30	32	36
Restaurant (A-2)	389	426	411	408	444	420	395	483	437	457	531	484	484	589	538	644	750
Retail (M)	46	50	45	46	44	44	37	48	44	44	52	50	46	60	52	64	77
School (E)	42	46	42	40	40	39	36	39	40	40	39	43	37	44	40	45	54
Warehouse (S)	9	12	9	11	12	11	10	17	13	14	23	17	15	32	23	32	32
All others	55	58	54	53	53	51	48	54	52	51	57	54	50	63	57	65	73

3

Meet the requirement by integrating onsite renewable energy when feasible.

4

If necessary, procure offsite renewable energy.

Source: Architecture 2030
Graphic adaptations: Sefaira; DOE, Green Ideas

ZERO CODE RENEWABLE ENERGY APPENDIX PASSED

2021 IECC

CE264-19 ZERO CODE RENEWABLE ENERGY STANDARD.

Implementing the ZERO CODE™

1. Efficient Building Energy Code Standard

a. Existing Code:
ASHRAE 90.1 2016 (minimum)
or Title 24-2019

b. Upgrade/Adopt Code:
ASHRAE 90.1 2016 (minimum)
or 2021 IECC

2. Renewable Energy

a. Establish and adopt Renewable Energy (RE) requirements by ordinance, legislation, or 2021 IECC Appendix to the code.

(Refer to the ZERO Code Renewable Energy Technical Support Document for guidelines on establishing on-site and off-site RE procurement requirements.)

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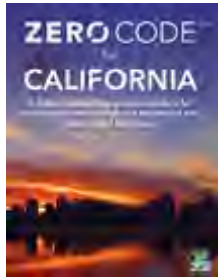


AIA Stakeholders & YOU!

ZERO Code Network

- Professional organizations
- Key cities

ZERO Code Supplement

- Implementation guide for jurisdictions (stakeholder's group)

Education & Training

- Workshops
- Webinars / train-the-trainers / conferences
- Code officials

Technical Support Team

- Implementing jurisdictions / Networks

ZERO Code

Zero-Net-Carbon

On-site renewable energy systems shall be installed or off-site renewable energy shall be procured to offset the building energy.

$$RE_{onsite} \text{ and/or } RE_{offsite} > E_{building}$$

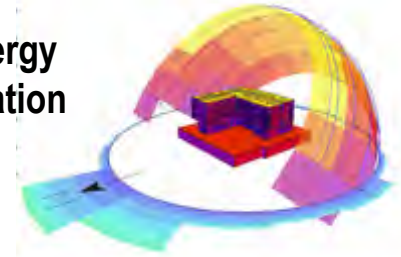
ZERO Code

Minimum Renewable Energy

On-site renewable energy systems shall be installed or off-site renewable energy shall be procured to offset the building energy.

$$RE_{onsite} + RE_{offsite} > E_{building} =$$

an energy simulation



or

default renewable energy table

29

Climate Zone

Building Type	Building Area Type	0A/ 1A	0B/ 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
	kBtu/ft²-y																	
	Multifamily (R-2)	43	45	41	41	43	42	36	45	43	41	47	46	41	53	48	53	59
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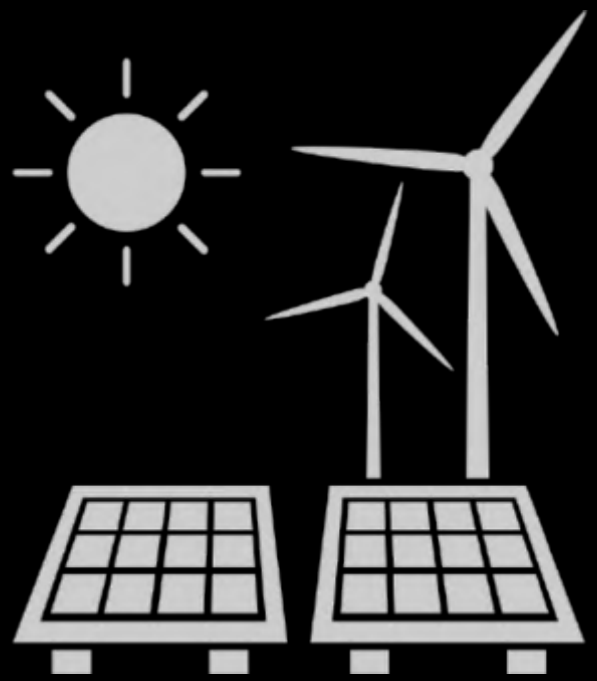
ZERO Code

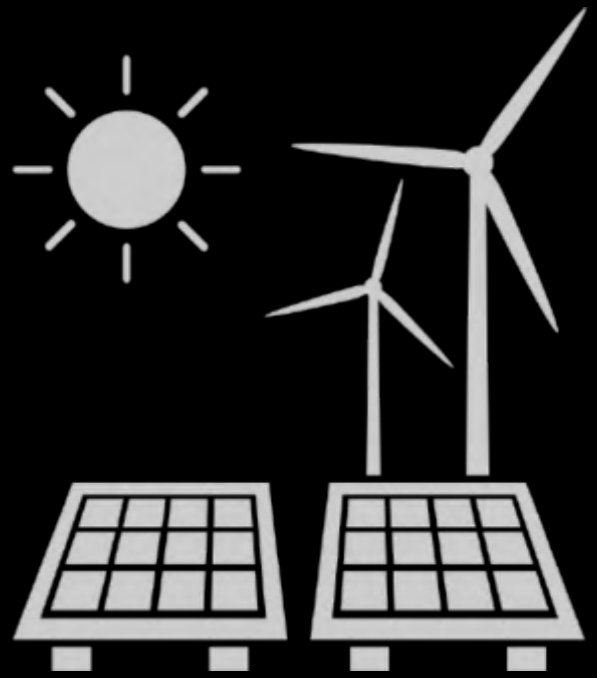


General Requirements

1. Legally binding contract.
2. Duration of not less than 15 years and shall survive transfer.
3. RECs and other environmental attributes shall be assigned to the building project for the duration of the contract.
4. Photovoltaic systems, solar thermal power plants, geothermal power plants, and/or wind turbines.
5. Located in the same ISO or RTO; or within integrated ISOs.
6. Transparent accounting that clearly assigns production to the ZNC building.

ZERO Code

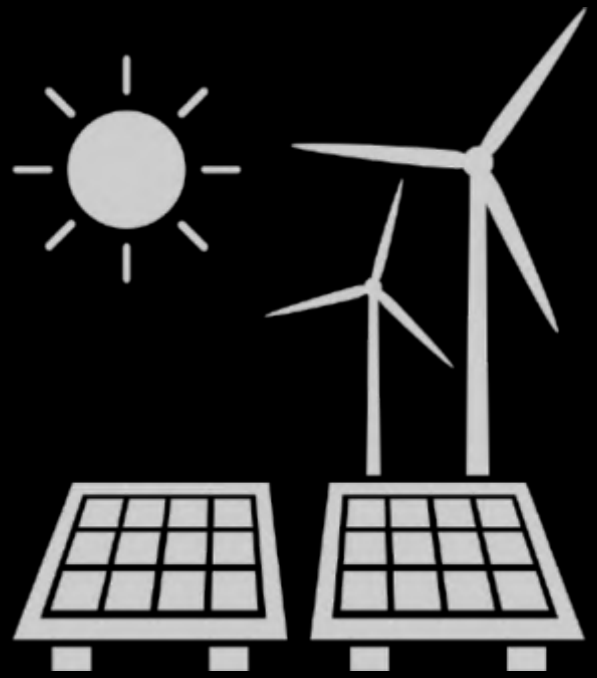
Accepted Off-Site Procurement Methods



- Direct Ownership (includes portfolios and campuses)
- Community Renewables
- Virtual Power Purchase Agreements (PPAs)
- Renewable Energy Investment Fund (REIF)
- Direct Access to Wholesale Markets (includes deals brokered by vertical utilities)
- Green Retail Tariffs
- Unbundled RECs

ZERO Code

Default Classes of Off-Site Procurement Methods



Class One

- Community Renewables
- Renewable Energy Investment Fund (REIF)
- Virtual Power Purchase Agreements (PPAs)
- Direct Ownership (includes portfolios and campuses)

Class Two

- Green Retail Tariffs
- Direct Access to Wholesale Markets (includes deals brokered by vertical utilities)

Class Three

- Unbundled RECs

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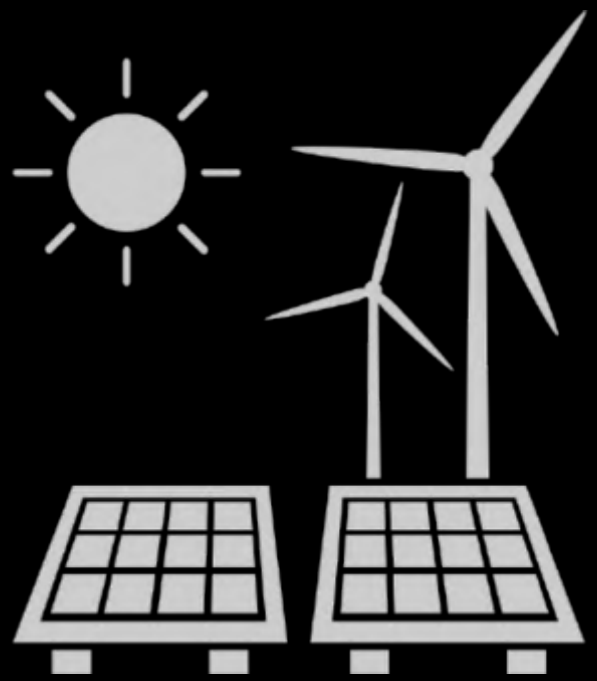


Default Classes of Off-Site Procurement Methods and Discount Factors

Class	Characteristics	Procurement Methods	Markdown
1	High probability of additionality Transaction involves capacity acquisition Generation sources are known	Virtual PPA Direct Ownership Community Renewables (capacity acquisition) Renewable Energy Investment Fund (REIF)	**0.75**
2	Medium probability of additionality Customer is purchasing green electricity not capacity	Community Renewables (subscription) Direct Access to Wholesale Markets Green Retail Tariffs	**0.55**
3	Low probability of additionality RECs are undervalued and misunderstood	Unbundled RECs	**0.20**

ZERO Code

Off-site Renewable Energy

Off-site renewable energy shall be determined with the following equation:

$$RE_{offsite} = \sum_{i=1}^{n} C_i \cdot RE_i = C_1 \cdot RE_1 + C_2 \cdot RE_2 + \cdots + C_n \cdot RE_n$$

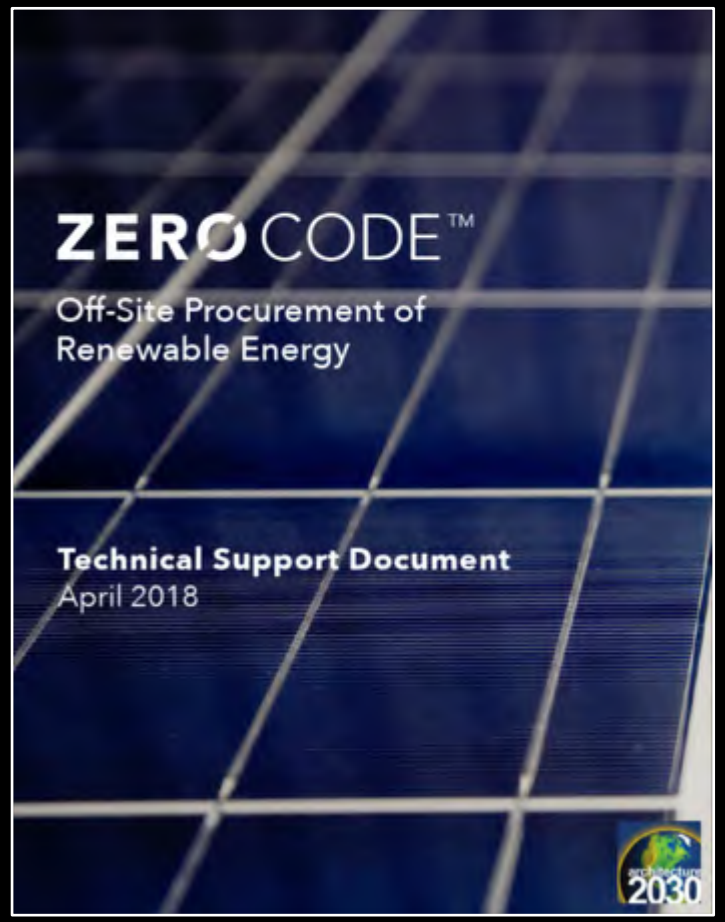
where

$RE_{offsite}$	Adjusted off-site renewable energy
RE_i	Annual energy production for each renewable energy class
C_i	Coefficients for renewable each renewable energy class
n	Number of off-site renewable energy options

2021 IECC Zero Code Renewable Energy Appendix

Key Points

- Optional for jurisdictions to adopt
- Compliance with 2021 IECC is required
- Sets a minimum renewable energy requirement based on energy simulations or default values
- Provides an incentive for buildings to be designed to be more energy efficiency than code requires
- Encourages onsite renewable energy when feasible
- Supports offsite renewable energy procurement when necessary
- 2021 IECC energy efficiency requirements cannot be traded with renewable energy
- Establishes a consistent framework that local governments can modify for their specific needs and conditions



A Technical Support Document: Off-site Procurement of Renewable Energy

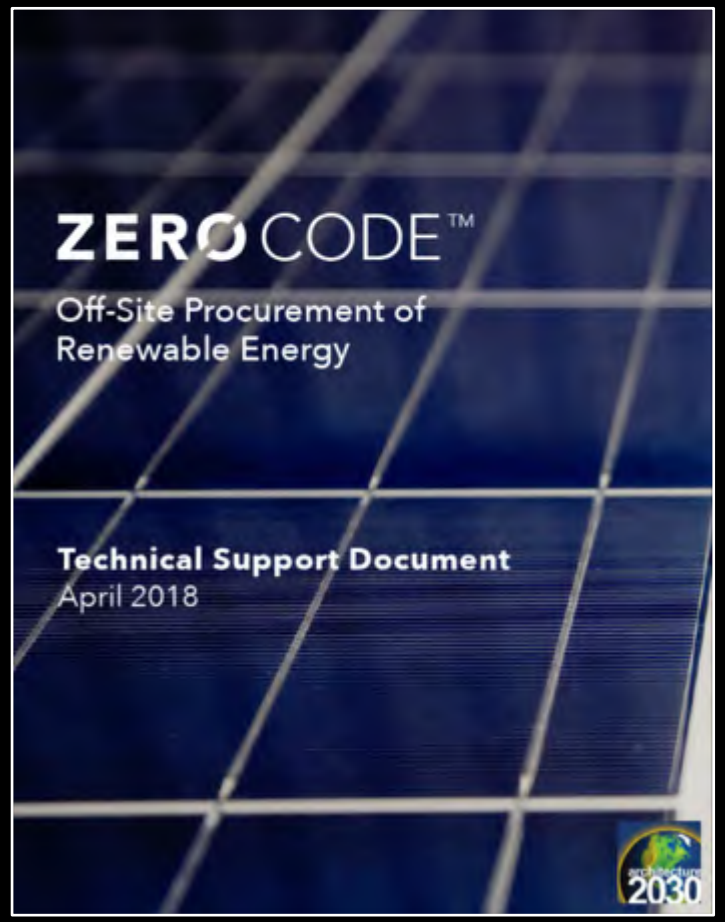
- Potential Off-Site Procurement Methods

- Comparison and Classification Methods
  - Set of criteria
  - Process for criteria weighting / prioritization

Outcomes

- Differential weighting assigned to different off-site renewable energy sources.

- Flexible approach with each jurisdiction that adopts the ZERO Code



Comparison and Classification Methods

Set of criteria for evaluating procurement methods:

- Additionality
- Long-Term Commitment (Durability)
- Assignment to ZNC Building
- Grid Management Capability
- Environmental Impact
- Inspirational/Educational Value
- Incremental Acquisition
- Permanent Financing