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2019 Residential and Nonresidential New Construction Turning Cost-effectiveness Studies into Reach Codes

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Misti Bruceri

Misti Bruceri & Associates, LLC

(for LocalEnergyCodes.com)



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2019 Title 24, Part 6 Building Energy Efficiency Standards

Standards design is a performance-based structure

- Sets the minimum requirement and project designers have many different options to meet it.

2019 low-rise residential standards have two paths for compliance

- Mixed fuel and all-electric designs

Local energy ordinances (reach codes) must show at least one cost-effective option for each path

- Documented via cost-effectiveness studies

The cost-effectiveness study is NOT:

- An example of best design practices,
- A list of measures required to meet the ordinance.

2019 Residential New Construction – Single Family Cost-Effectiveness Results

Climate Zone 3		Delta EDR	PV Size Change (kW)	CO ₂ -equivalent Emissions (lbs/sf) ¹		Incremental Cost (\$)	Benefit to Cost Ratio (B/C)	
				Total	Reduction		On-Bill	TDV
Mixed Fuel	Eff Only-NonPreempted	2.5	0	1.6	0.3	1,459	1.4	1.4
	Eff Only-Preempted	2.5	0	1.5	0.4	1,367	2.1	2.1
	Eff plus PV plus Battery	10	0.1	1.5	0.4	4,589	0.6	1.6
All-Electric	Eff Only-NonPreempted	4	0	0.8	0.2	1,417	2.4	2.6
	Eff Only-Preempted	4	0	0.9	0.1	1,996	1.5	1.7
	Eff plus PV (90% offset)	18.5	1.8	0.5	0.5	7,347	2.2	1.9
	Eff plus PV plus Battery	29.5	2.4	0.2	0.8	12,163	1.5	1.9
Mixed Fuel to All-electric	Comply Only	0	0	1	0.9	(4,905)	0.8	1.4
	Eff plus PV	18.5	1.8	0.5	1.4	2,442	4.0	>1

1. Base case CO₂-equivalent emissions: Mixed Fuel: 1.9 lbs/sf, All-electric: 1.0 lbs/sf

Beneficial Electrification

- “For electrification to be considered beneficial, it must meet one or more of the following conditions without adversely affecting the other two:
 - Saves consumers money over the long run;
 - Enables better grid management; and
 - Reduces negative environmental impacts.”

Farnsworth, D., Shipley, J., Lazar, J., and Seidman, N. (2018, June). Beneficial electrification: Ensuring electrification in the public interest. Montpelier, VT: Regulatory Assistance Project.

Cost-effective Target Performance Levels – Climate Zone 3

Study results indicate the maximum stringency (based on the Delta EDR) for each occupancy, climate zone, and design type.

Single Family – Climate Zone 3		Delta EDR Target
Mixed Fuel Designs		
	Efficiency Only	2.5
	Efficiency plus PV plus Battery	10
All-Electric Designs		
	Efficiency Only	4
	Efficiency plus PV	18.5
	Efficiency plus PV plus Battery	29.5

2019 Nonresidential New Construction – Medium Office Cost-Effectiveness Results

Climate Zone 6		Compliance Margin (%)	PV System Capacity (kW)	GHG Emissions Reduction (%)	Incremental Cost (\$)	Benefit to Cost Ratio (B/C)	
						On-Bill	TDV
Mixed Fuel	Efficiency Only	20%	0	17%	66,649	1.4	1.5
	Efficiency plus PV plus Battery	20%	135	59%	373,142	1.4	1.7
All-Electric	Efficiency Only	18%	0	19%	-76,153	>1	>1
	Efficiency plus PV plus Battery	18%	135	61%	230,340	2.4	2.6
Climate Zone 12		Compliance Margin (%)	PV System Capacity (kW)	GHG Emissions Reduction (%)	Incremental Cost (\$)	Benefit to Cost Ratio (B/C)	
						On-Bill	TDV
Mixed Fuel	Efficiency Only	14%	0	15%	66,649	2.6	1.5
	Efficiency plus PV plus Battery	14%	135	49%	373,142	2.4	1.6
All-Electric	Efficiency Only	9%	0	19%	-68,343	>1	>1
	Efficiency plus PV plus Battery	9%	135	53%	238,150	3.3	2.4

Nonresidential Medium Office: Potential Target Performance Levels

Study results indicate the maximum stringency (based on the compliance margin) for each occupancy, climate zone, and design type.

Design Package	Compliance Margin
Climate Zone 6	
Mixed Fuel	20%
All-Electric	18%

Climate Zone 6

Study supports reach code adoption at:

- Compliance margins as shown
- Reduced compliance margin, such as CALGreen Tier 1 (10%) or CALGreen Tier 2 (15%) for both design types.

Reach code may include efficiency only, or efficiency plus PV.

Resources and Studies on the Horizon

- New Construction Studies
 - Public Draft: Friday March 15, 2019
 - Webinar: Cost-effectiveness Studies: Week of March 25, 2019
 - Final version (dependent on infrastructure timing): June 30, 2019.
- Other Cost-effectiveness Studies
 - Residential and Nonresidential Alterations / Retrofits
 - Multifamily Buildings
 - PV on Parking Garages
- Additional Resources
 - Model Language
 - Communications templates and model presentations
 - Implementation tools, checklists, handouts, others

Interested in other studies or resources?

- Contact us at info@localenergycodes.com