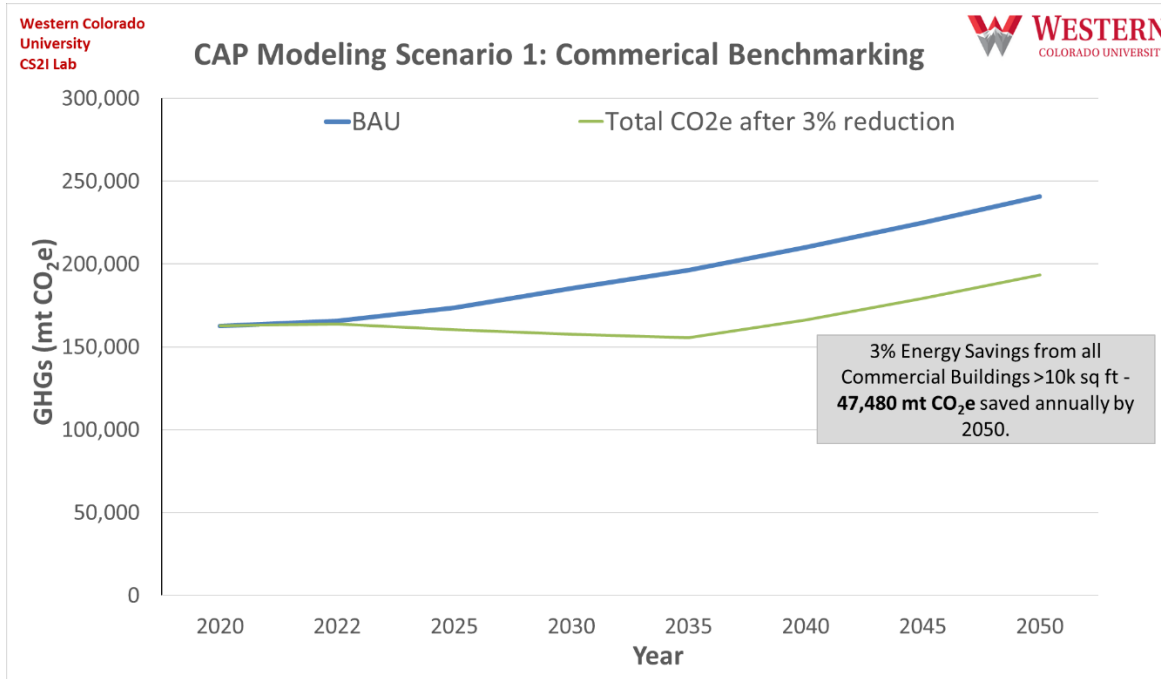


# Commercial Building Energy Modeling Scenario

(All units mt CO<sub>2</sub>e unless otherwise noted)

## Overarching Assumptions:

- HCE achieves 70% renewable electricity by 2022
- HCE achieves 100% renewable electricity by 2030
- Xcel Energy achieves 100% renewable electricity by 2050



## Scenario 1: For buildings 10,000 ft<sup>2</sup> and above

- Benchmarking for 50 largest buildings beginning in 2022
- Benchmarking for the remaining commercial building by 2023
- Assume a 3% year over year increase in efficiency

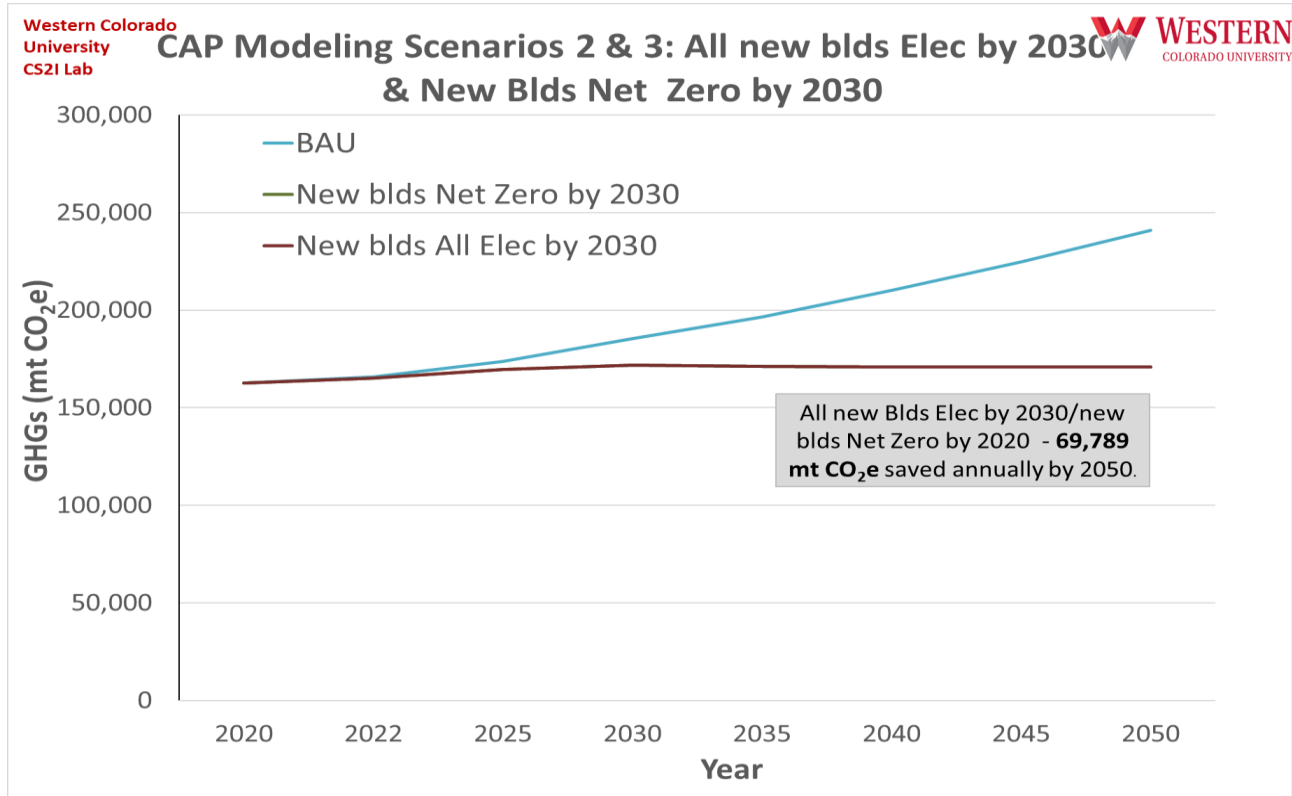
## Assumptions:

- Assumptions: 35% max efficiency of building:  
<https://www.energy.gov/sites/prod/files/2017/03/f34/qtr-2015-chapter5.pdf>
- No growth rate applied to top 50 buildings; growth rate applied to all remaining buildings over 10k ft<sup>2</sup>

## Quantitative Results:

	BAU	Top 50	Remaining (>10k Sq Ft)	Remaining (<10k sq ft)	>10k sq ft after 3% reduction	Total CO <sub>2</sub> e after 3% reduction	CO <sub>2</sub> e Saved annually	% Reduction from BAU
<b>2020</b>	162,726	62,399	43,602	56,724	162,726	162,726	0	0.00%
<b>2022</b>	165,734	59,977	44,408	59,493	104,385	163,878	1,855	1.12%
<b>2025</b>	173,573	54,609	42,490	63,419	97,098	160,517	13,056	7.52%
<b>2030</b>	185,368	46,779	39,048	71,942	85,827	157,769	27,599	14.89%

<b>2035</b>	196,445	40,043	35,603	79,997	75,646	155,643	40,802	20.77%
<b>2040</b>	210,065	39,844	36,586	89,705	76,430	166,136	43,929	20.91%
<b>2045</b>	224,884	39,839	39,167	100,235	79,006	179,242	45,642	20.30%
<b>2050</b>	240,772	39,838	41,935	111,518	81,773	193,291	47,480	19.72%



**Scenario 2: Require all construction be net-zero by 2030**

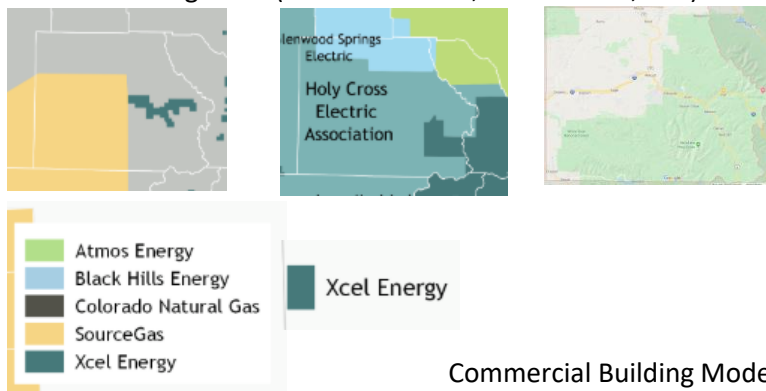
**Assumptions:**

- 10% more of new stock is Net Zero annually starting in 2021 (i.e. 10% in 2021, 20% in 2022, etc.)

**Scenario 3: No new Natural Gas after 2030**

**Assumptions:**

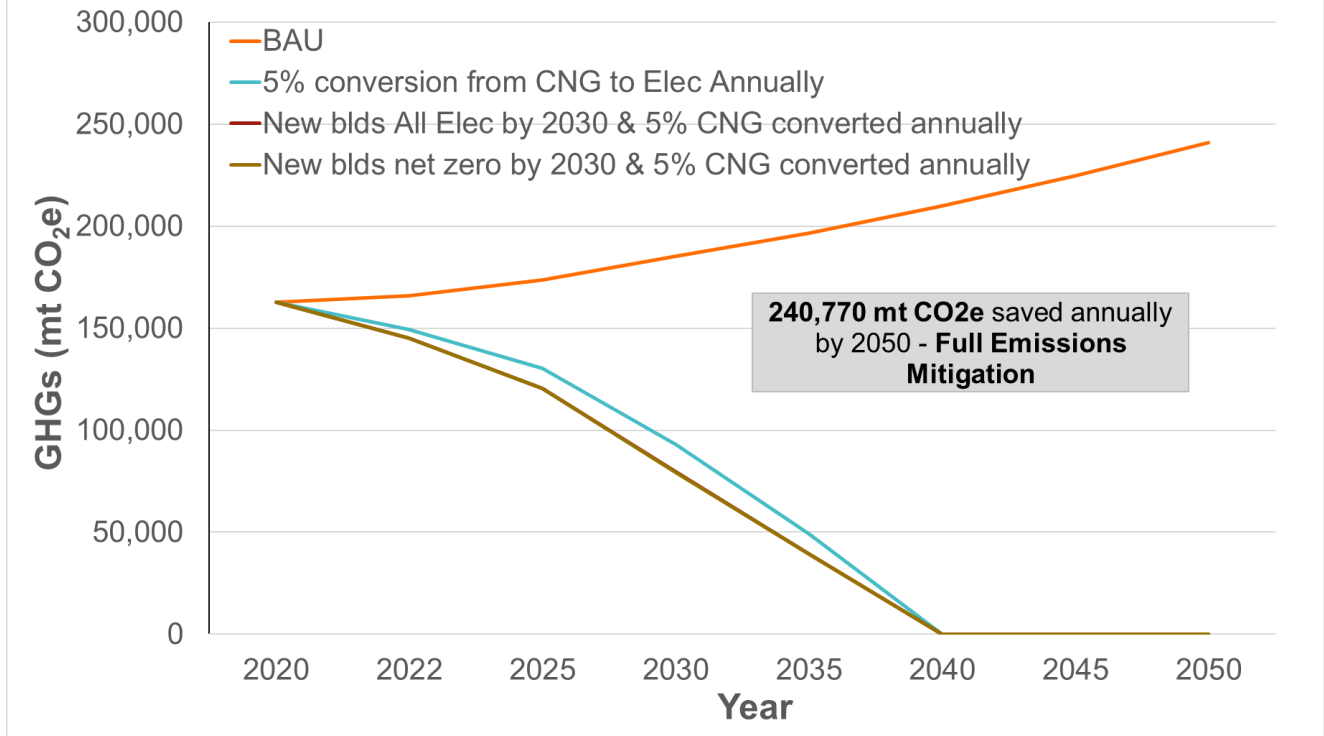
- Ban the use of natural gas in all new construction beginning in 2030
- All prior natural gas coverage area is accounted for by HCE
- Starting in 2021, 10% annual fuel switch from natural gas to electricity in new commercial building stock (i.e. 10% in 2021, 20% in 2022, etc.)



<https://energyoffice.colorado.gov/natural-gas>  
<https://energyoffice.colorado.gov/electric-utilities>

**Quantitative Results:**

	BAU	New blds Net Zero by 2030	CO <sub>2</sub> e Saved Annually	% Reduction from BAU	New blds All Elec by 2030	CO <sub>2</sub> e Saved Annually	% Reduction from BAU
<b>2020</b>	162,726	162,726	0	0.00%	162,726	0	0.00%
<b>2022</b>	165,734	165,034	699	0.42%	165,041	693	0.42%
<b>2025</b>	173,573	169,575	3,998	2.30%	169,601	3,972	2.29%
<b>2030</b>	185,368	171,659	13,709	7.40%	171,713	13,655	7.37%
<b>2035</b>	196,445	171,113	25,333	12.90%	171,132	25,313	12.89%
<b>2040</b>	210,065	171,007	39,058	18.59%	171,013	39,052	18.59%
<b>2045</b>	224,884	170,986	53,898	23.97%	170,988	53,896	23.97%
<b>2050</b>	240,772	170,982	69,789	28.99%	170,983	69,789	28.99%



**Scenario 4: Convert 5% of existing commercial properties every year beginning in 2021**

**Assumptions:**

- Conversion is 5% of existing building stock after growth rate applied annually
- 5% reduction starts in 2021
- All prior natural gas coverage area is accounted for by HCE

**Scenario 5: Convert 5% of existing commercial properties every year beginning in 2021 AND require all construction be net-zero by 2030 (2 & 4)**

**Assumptions:**

- All prior natural gas coverage area is accounted for by HCE
- Conversion is 5% of remaining building stock **as of 2020** annually
- 10% more of new stock is Net Zero annually starting in 2021 (i.e. 10% in 2021, 20% in 2022, etc.)

**Scenario 6: Assumption for 5% Natural Gas conversion to electricity starting in 2020 AND no new natural gas by 2030**

- All prior natural gas coverage area is accounted for by HCE
- Conversion is 5% of remaining building stock **as of 2020** annually
- 10% more of new stock is electricity instead of natural gas annually starting in 2021 (i.e. 10% in 2021, 20% in 2022, etc.)

**Quantitative Results:**

	BAU	5% conversion from CNG to Elec Annually	CO <sub>2</sub> e Saved Annually	% Reduction from BAU
<b>2020</b>	162,726	162,726	0	0.00%
<b>2022</b>	165,734	149,314	16,420	9.91%
<b>2025</b>	173,573	130,458	43,115	24.84%
<b>2030</b>	185,368	93,050	92,318	49.80%
<b>2035</b>	196,445	49,225	147,221	74.94%
<b>2040</b>	210,065	31	210,033	99.99%
<b>2045</b>	224,884	7	224,877	100.00%
<b>2050</b>	240,772	1	240,770	100.00%

	BAU	New blds All Elec by 2030 & 5% NG converted annually	CO <sub>2</sub> e Saved Annually	% Reduction from BAU	New blds net zero by 2030 & 5% CNG converted annually	CO <sub>2</sub> e Saved Annually	% Reduction from BAU
<b>2020</b>	162,726	162,726	0	0.00%	162,726	0	0.00%
<b>2022</b>	165,734	145,128	20,605	12.43%	145,122	20,612	12.44%
<b>2025</b>	173,573	120,544	53,029	30.55%	120,518	53,055	30.57%
<b>2030</b>	185,368	79,442	105,927	57.14%	79,387	105,981	57.17%
<b>2035</b>	196,445	39,506	156,940	79.89%	39,486	156,959	79.90%
<b>2040</b>	210,065	31	210,033	99.99%	25	210,039	99.99%
<b>2045</b>	224,884	7	224,877	100.00%	5	224,879	100.00%
<b>2050</b>	240,772	1	240,770	100.00%	1	240,771	100.00%

Note: CO<sub>2</sub>e emissions for scenarios 2 & 3 are almost identical given that new building energy originates entirely from electrical by 2030 in both scenarios and HCE has committed to zero emissions by 2030. The only difference is the slight emissions resulting from Xcel beyond 2030 in the CNG conversion to Electrical scenarios. The same applies to scenarios 5 & 6 which are also almost identical given that all building energy transitions to electricity by 2040.