

CLIMATE ACTION PLAN for Boulder Campus



PRESENTED BY:



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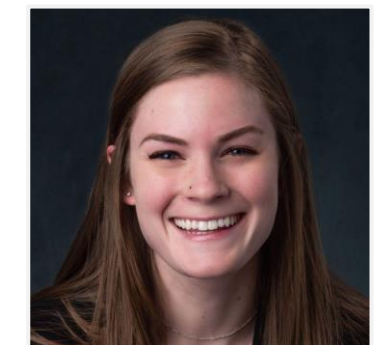
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AGENDA

2:00 - 2:40

Climate Action Plan overview

2:40 - 3:00

Q&A

3:00 - 3:50

Breakout Session

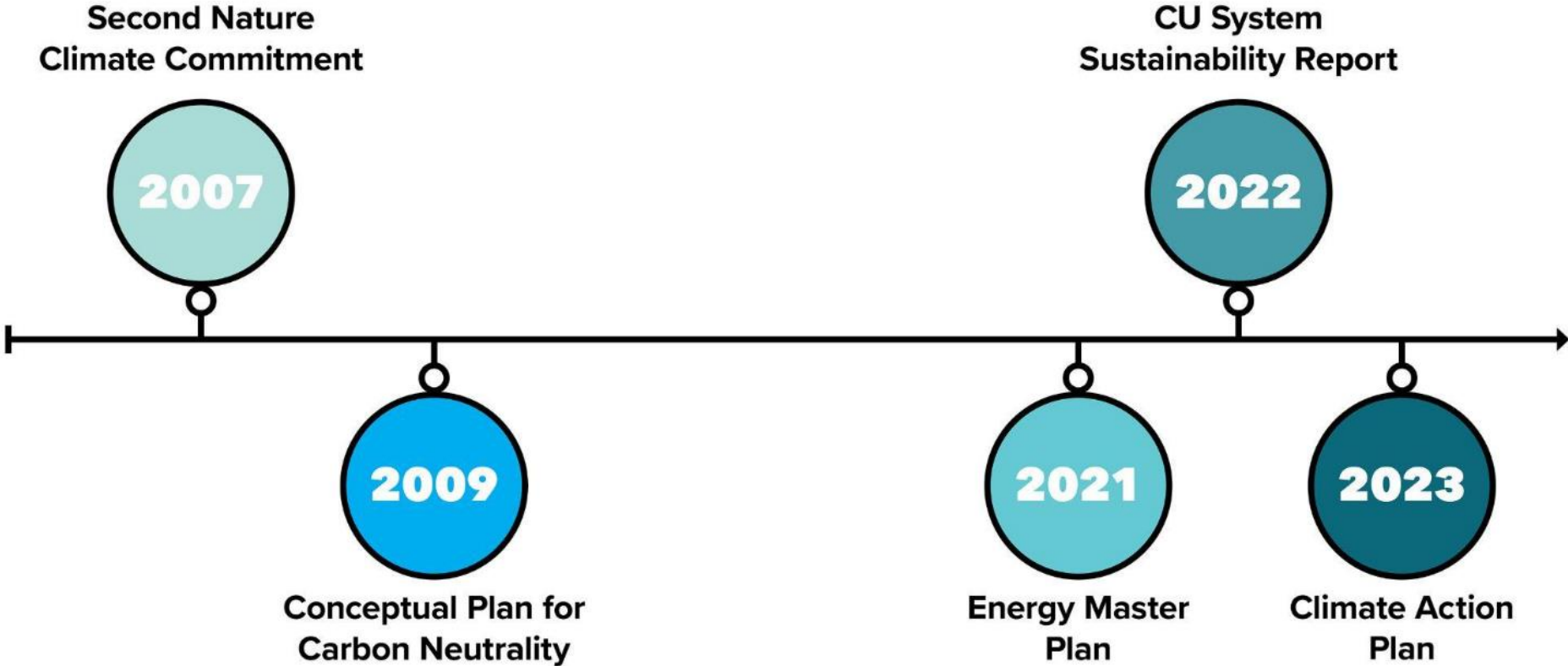
- Approach to transitioning fleet to all electric and reducing vehicle miles traveled (VMT)
- Approach to renewable energy and building optimization

3:50 - 4:00

Wrap up and Next Steps



TIMELINE



PLANNING PROCESS

OCTOBER



Review and
Information
Gathering

JANUARY



Analysis and
Recommendations

APRIL



Plan
Development

MAY



Plan Review and
Outreach

JULY



Final
Presentation



PURPOSE OF TODAY

- Receive feedback on the Climate Action Plan process
- Discuss how the plan might address just and equitable climate solutions as well as resilience and financial feasibility
- Present a roadmap of draft strategies and actions that are being considered for the Climate Action Plan
- Understand the short, mid and long term approach to Scope 1, 2 and 3 emissions



CLIMATE TARGETS

Original Targets (2007)

20% GHG reductions by 2020 from a 2005 baseline

- Scope 1 & 2 only
- Reduction of 15.6% achieved by 2020

50% GHG reductions by 2030

80% GHG reductions by 2050

New Target established (2023)

50% reduction in Scopes 1 and 2 by 2030,

a similar 50% reduction in **certain** Scope 3 emissions by 2030,

a clear path to a zero emissions target for **all categories** by no later than 2050

Iterative process to align our goals with the Science Based Target initiative.



5 CORE GOALS

1. Achieve 50% reduction in Scopes 1 and 2 by 2030 and create a clear path to a zero emissions target by no later than 2050.
2. Achieve a 50% reduction in certain Scope 3 emissions by 2030 and all categories by 2050.
3. Build a Community Engagement Strategy to integrate communication and reporting protocols across campus and the Boulder community.
4. Strengthen internal and external management and accountability structures to ensure the campus achieves the goals outlined in the plan.
5. Integrate climate equity and campus resilience measures across all strategies within the plan.

EQUITY STATEMENTS



University of Colorado Boulder

CAP >>> FIRST PHASE OF DESIGN

SUBGOAL 1.5

Establish iterative steps for achieving zero waste by 2030



Subgoal 1.5 Description

STRATEGY

ACTION

EQUITY STATEMENT

1.5.1 Continue to reduce package-related plastic waste by sourcing products with sustainable packaging

- > Identify 1-2 products per year to find alternative products or work with vendors to find alternative packaging solutions
- > Consider bulk purchasing where applicable

Reduction in plastic waste is broadly beneficial but has potential to decrease waste pollution in marginalized communities. There are potential tradeoffs if costs of shifting from plastic increases costs to consumers on campus.

SOCIAL EQUITY INDEX: 1
CO-BENEFITS:

1.5.2 Create a baseline assessment for leftover edible food and food waste ending in the landfill

- > Expand food recovery collection on campus beginning with CU Athletics
- > Expand composting to grad housing
- > Research and consider implementing BioCo-Tech's enclosed heated churner technology to convert food waste into high-quality compost, potentially

Improved data on food waste enables identification of strategies for food waste reduction and pathways to increase access to food at lower costs.

SOCIAL EQUITY INDEX: 1
CO-BENEFITS:

1.5.3 Reduce paper usage 25% from 2019 baseline by 2030 per Governor's Executive Order

- > Track annual purchasing

Decrease paper waste in impacted communities and across campus. Student researchers will gain applied and marketable skills related to sustainability

SOCIAL EQUITY INDEX:
CO-BENEFITS:

CO-BENEFITS KEY



COST EFFECTIVE



POLICY ALIGNMENT



COMMUNITY BENEFIT



EQUITY IMPACT



ECONOMIC IMPACT

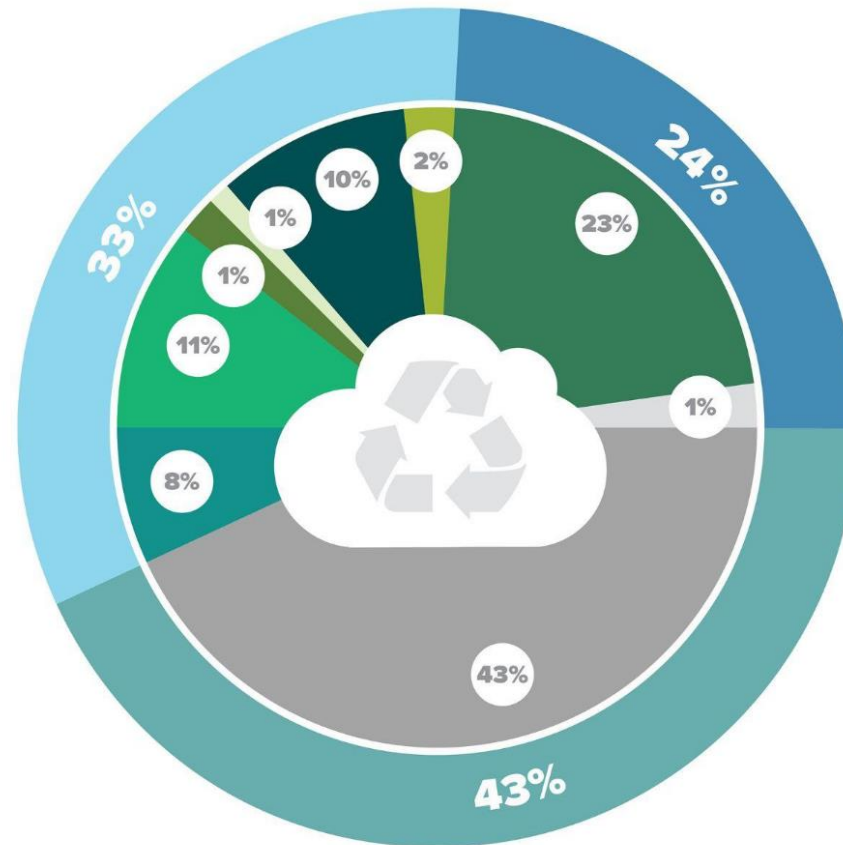


BIODIVERSITY BENEFIT

2019 GHG EMISSIONS BASELINE

	2021	2019
SCOPE 1	56,144	48,778
Natural gas	52,442	45,097
Total Fleet	1,851	1,841
Fleet gasoline	838	876
Fleet diesel	367	322
Fleet biodiesel	646	643
SCOPE 2	70,778	85,706
Purchased electricity	70,778	85,706
SCOPE 3 (PARTIAL ACCOUNTING)	41,035	67,157
Commuting	9,624	16,407
Financed Campus paid air travel	5,154	28,484
Waste	1,631	2,594
Fugitive gas emissions	1,325	1,127
Embodied carbon - buildings	20,923	20,923
Embodied carbon - vehicles	188	188
T&D losses	3,264	3,370

EMISSION PERCENTAGES



EMISSION PERCENTAGES BY CATEGORY (2019)

- NATURAL GAS
- TOTAL FLEET
- PURCHASED ELECTRICITY
- COMMUTING
- FINANCED CAMPUS PAID AIR TRAVEL
- WASTE
- FUGITIVE GAS EMISSIONS
- EMBODIED CARBON-BUILDINGS
- T&D LOSSES

2019 EMISSION PERCENTAGES BY SCOPE

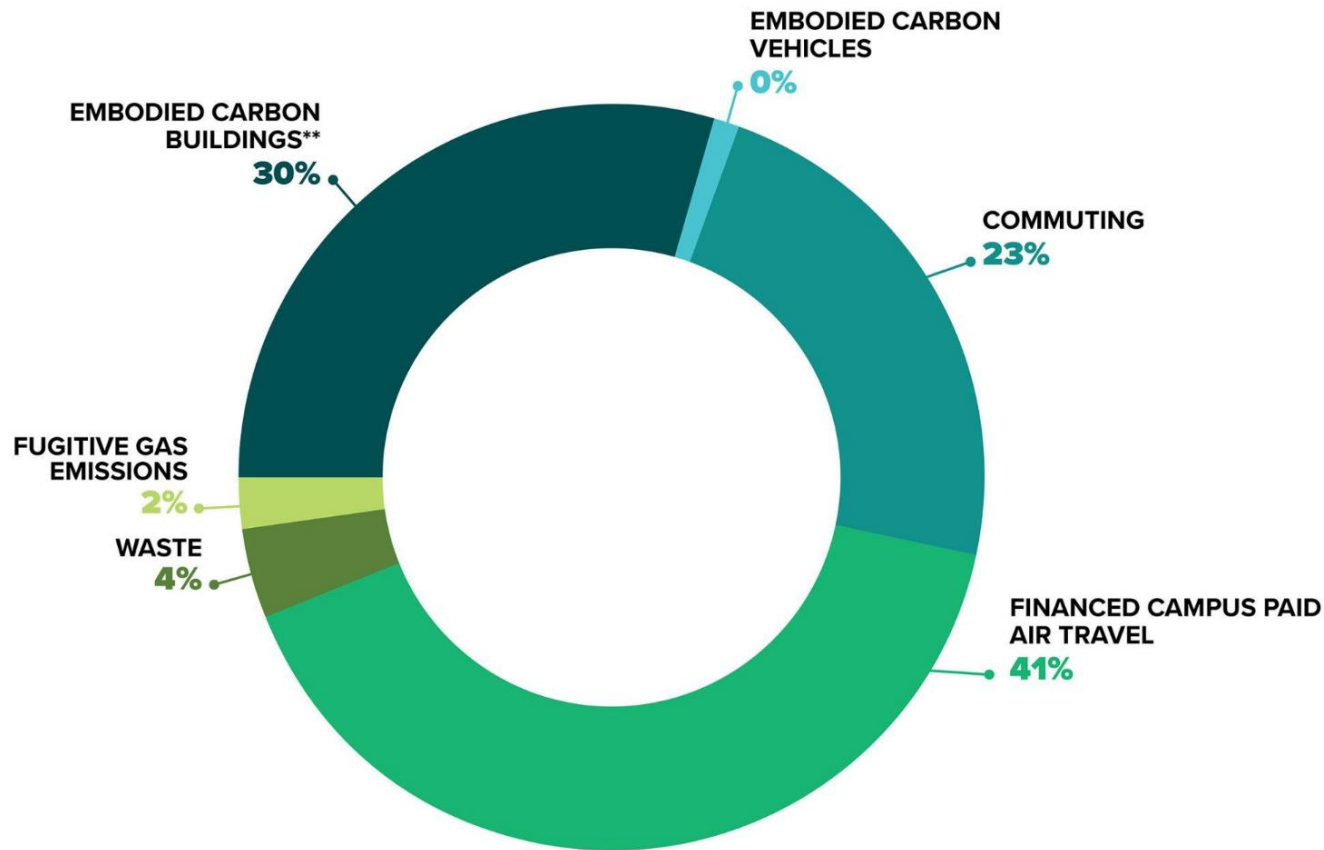
- SCOPE 1
- SCOPE 2
- PARTIAL SCOPE 3

TRACKING SCOPE 3

ID	CATEGORY	INCLUDED	BENCHMARK	NOTES
UPSTREAM				
1	Purchased goods and services		X	Will include steps for future data gathering and calculations
2	Capital goods	X	X	Construction growth, ICE and E-vehicles
3	Fuel and energy related activities (not incl. in 1,2)	X	X	Fugitive Gas & Electricity
4	Upstream transportation and distribution		X	Will include steps for future data gathering and calculations
5	Waste generated in operations	X	X	Collected
6	Business travel	X	X	Collected
7	Faculty, staff and student commuting	X	X	Collected
8	Upstream leased assets			
DOWNSTREAM				
9	Downstream transportation and distribution	X	X	Optional under the GHG Protocol
10	Processing of sold products			
11	Use of goods and services sold			
12	End-of-life treatment of sold products			
13	Downstream leased assets			
14	Franchises			
15	Investments			

2019 GHG EMISSIONS BASELINE

2019 SCOPE 3 BY CATEGORY



SCOPE 3 CATEGORY (PARTIAL ACCOUNTING)	MT CO ₂ e
Commuting	16,407
Financed Campus paid air travel	28,481
Waste	2,594
Fugitive gas emissions	1,127
Embodied carbon - buildings	20,923
Embodied carbon - vehicles	188
T&D losses	3,370

ADDITIONAL CATEGORY	MTCO ₂ e
Required student travel	34,441
Non-required student and parent travel	51,661

**Based on historical square foot additions over 17 years

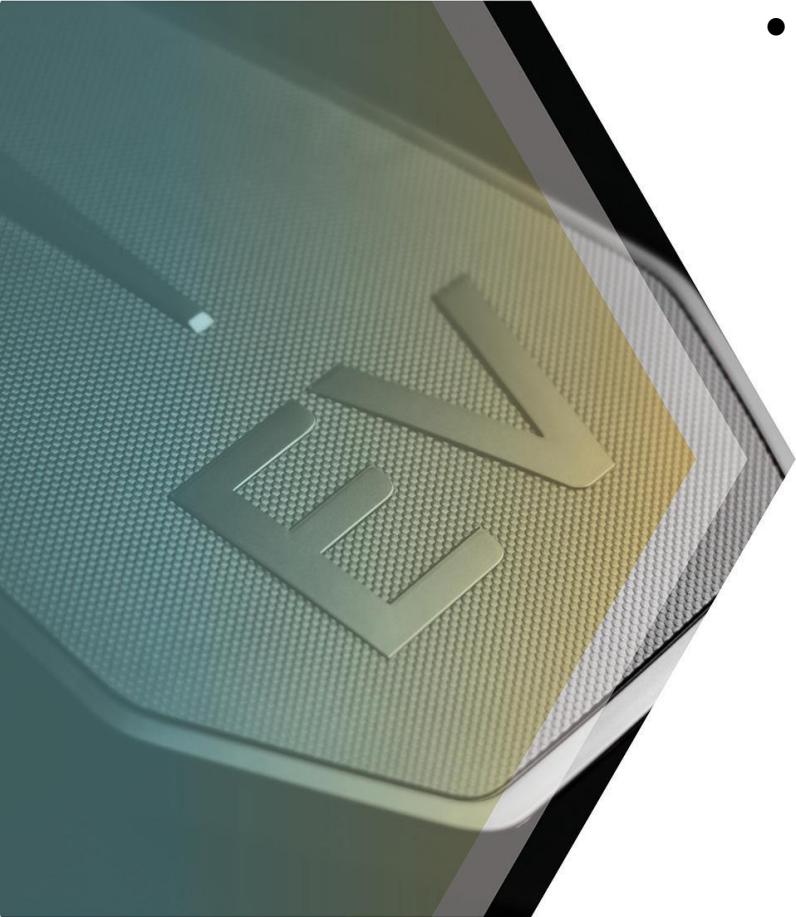
FLEET ELECTRIFICATION & CHARGING



- Create a procurement policy that prioritizes electric and other zero-emission vehicles for the fleet of 454 road vehicles, which currently contains 16 ZEVs.
 - a. 136 EVs in the fleet by 2030 - \$13.5M marginal costs
 - b. 271 EVs in the fleet by 2040 - \$6.5M marginal costs
 - c. 432 EVs in the fleet by 2050 - \$11M marginal costs
- Centralize parking for vehicles to just 8 sites campuswide

CUMULATIVE VEHICLES BY FACILITY AND YEAR	2030	2040	2050
HFOC/HSSC (3500 Marine St)	28	47	77
Regent Garage (Lot 436)/PDPS	13	44	72
Folsom Garage (Lot 391)	4	10	23
Stadium	53	94	142
SEEC Lot	22	32	49
Macky Lot	1	2	4
Lot 306/Lot 319	5	16	25
UMC Dock / Service Lot N (1045 18th Street)	4	12	16
Various Lots	6	14	24
Total Vehicles	136	271	432
Annual emissions reduction achieved (MTCO _{2e})	173	366	439

FLEET ELECTRIFICATION & CHARGING



- Install dedicated fleet EV chargers at centralized parking locations

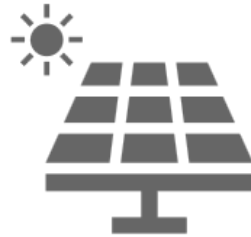
- a. By 2030 - \$3.3M
 - i. 19 L2 6.6 kW
 - ii. 26 L2 11.5 kW
 - iii. 8 L3 25 kW
 - iv. 6 high power 200 kW
- b. By 2040 - \$630,000
 - i. 21 L2 6.6 kW
 - ii. 34 L2 11.5 kW
 - iii. 9 L3 25 kW
 - iv. 7 high power 200 kW
- c. By 2050 - \$2.5M
 - i. 23 L2 6.6 kW
 - ii. 40 L2 11.5 kW
 - iii. 16 L3 25 kW
 - iv. 14 high power 200 kW
- d. TOTAL INVESTMENT BY 2050: \$6.5M

Charge Level	Appropriate GVWR
6.6 kW Level 2	LD PHEV vehicles, LD hatchback (Nissan Leaf)
11.5 kW Level 2	LD pickup (F-150 Lightning), LD cargo van (Brightdrop EV600), LD SUV (Chevy Bolt EUV)
25 kW DC Fast	MD/HD pickup/chassis cab (SEA-Drive 120/180), step vans (Lightning Electric F-53 Van)
200 kW Freewire Boost	HD truck (Volvo FE Electric), 40-60 passenger bus (New Flyer XE40 and XE60)

DECARBONIZATION APPROACH



**REDUCE
LOAD**



**CLEAN
POWER**

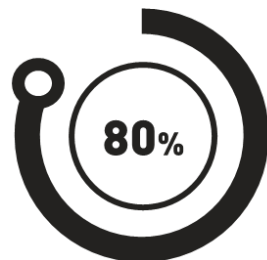


**PLAUSIBLE
ELECTRIFICATION
ON CAMPUS**



UTILITY ELECTRICITY

Xcel Energy's Clean Energy Plan



renewable sources by 2030



carbon-free energy by 2050

EXISTING BUILDING DECARBONIZATION

Impacts if all Energy Master Plan Projects are implemented:

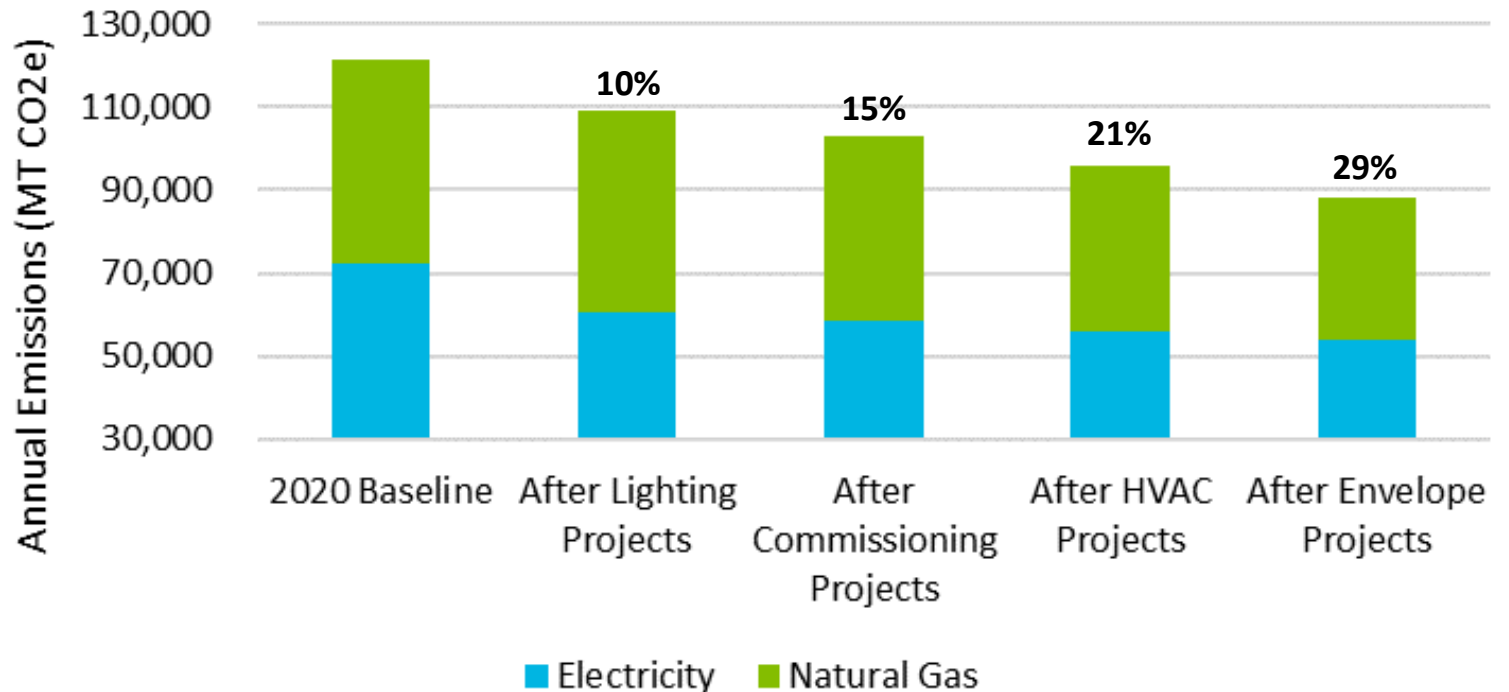
- Energy Master Plan
 - LED Lighting Retrofit (\$25 M)
 - HVAC upgrades (\$24 M)
 - Commissioning (\$3 M)
 - Envelope Improvements (\$48M)
- Energy Performance Contracting
 - Ongoing effort (15+ buildings)

29%

Reduction in Energy
vs. 2020 Baseline

33,479

GHG Emission Reduction
MT



EXISTING BUILDING DECARBONIZATION

- Prioritize Space Optimization
- Green Labs program expansion
- Expand funding for the Deferred Maintenance program
- Establish Building Retro-Commissioning (RCx) program



NEW BUILDING DECARBONIZATION

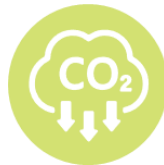
Update building design standards



Electrified building systems



Low temperature hot water



Embodied carbon reduction goals



Enhanced building commissioning



Building performance targets



Responsible material sourcing





RENEWABLE ENERGY

Approach to renewable energy and building optimization

- Campus resilience as an added value
- Intersection of electric fleet with building microgrid technologies
- Recommended renewable energy projects and campus as a living lab

RENEWABLE ENERGY



Solar PV Opportunities

- Campus solar PV siting and financial assessment
- Various distributed solar PV opportunities identified
- Battery storage (BESS) not cost effective with utility rates

Location	kW	Production	Offset
Main	1,800	2,200 MWh	1.5%
East	1,000	1,090 MWh	0.7%
Williams Village	4,000	3,960 MWh	2.6%
Total	6,800	7,315 MWh	5%

Solar PV + Thermal (PVT) Opportunities

- Generate electricity and hot water to supplement heating systems
- Pilot project opportunities at residential buildings

CENTRAL PLANT DECARBONIZATION

Campus Heating Decarbonization Study (ongoing)



Low temp hot water conversion



Natural gas to electricity conversion



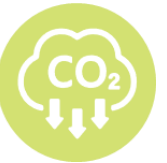
Implement energy recovery



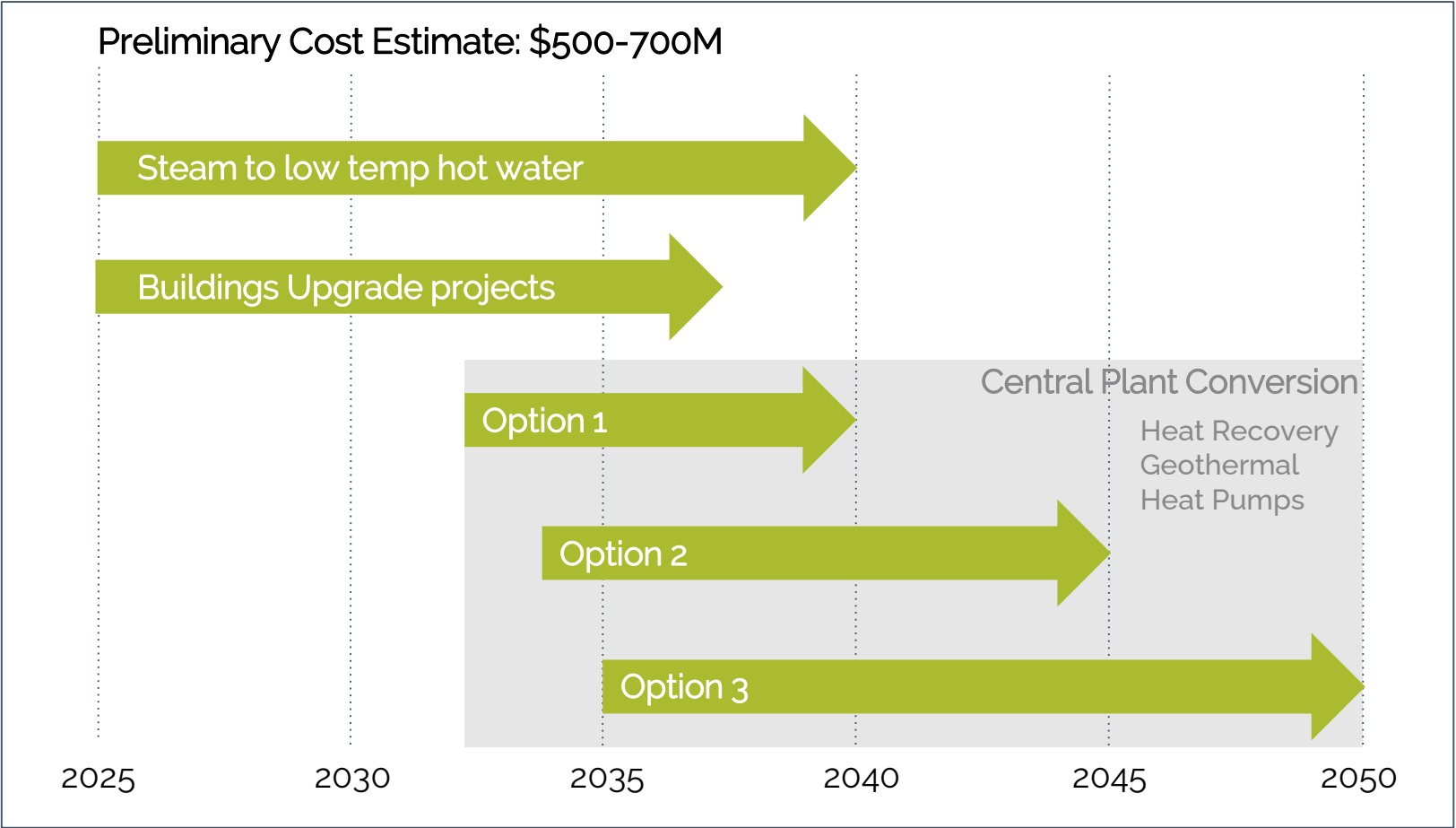
Lower energy consumption



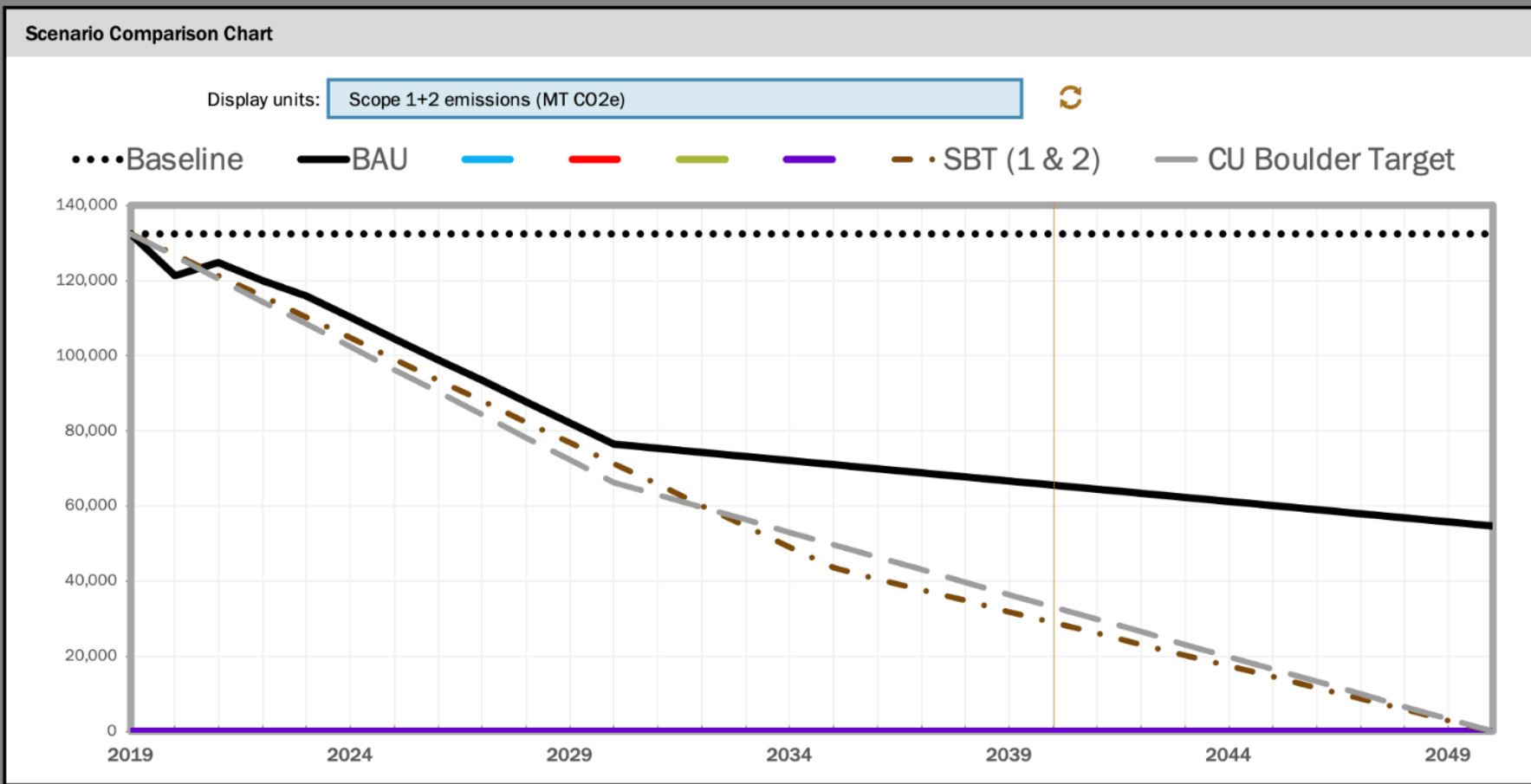
Cleaner energy



Lower emissions



EMISSION BENCHMARKS



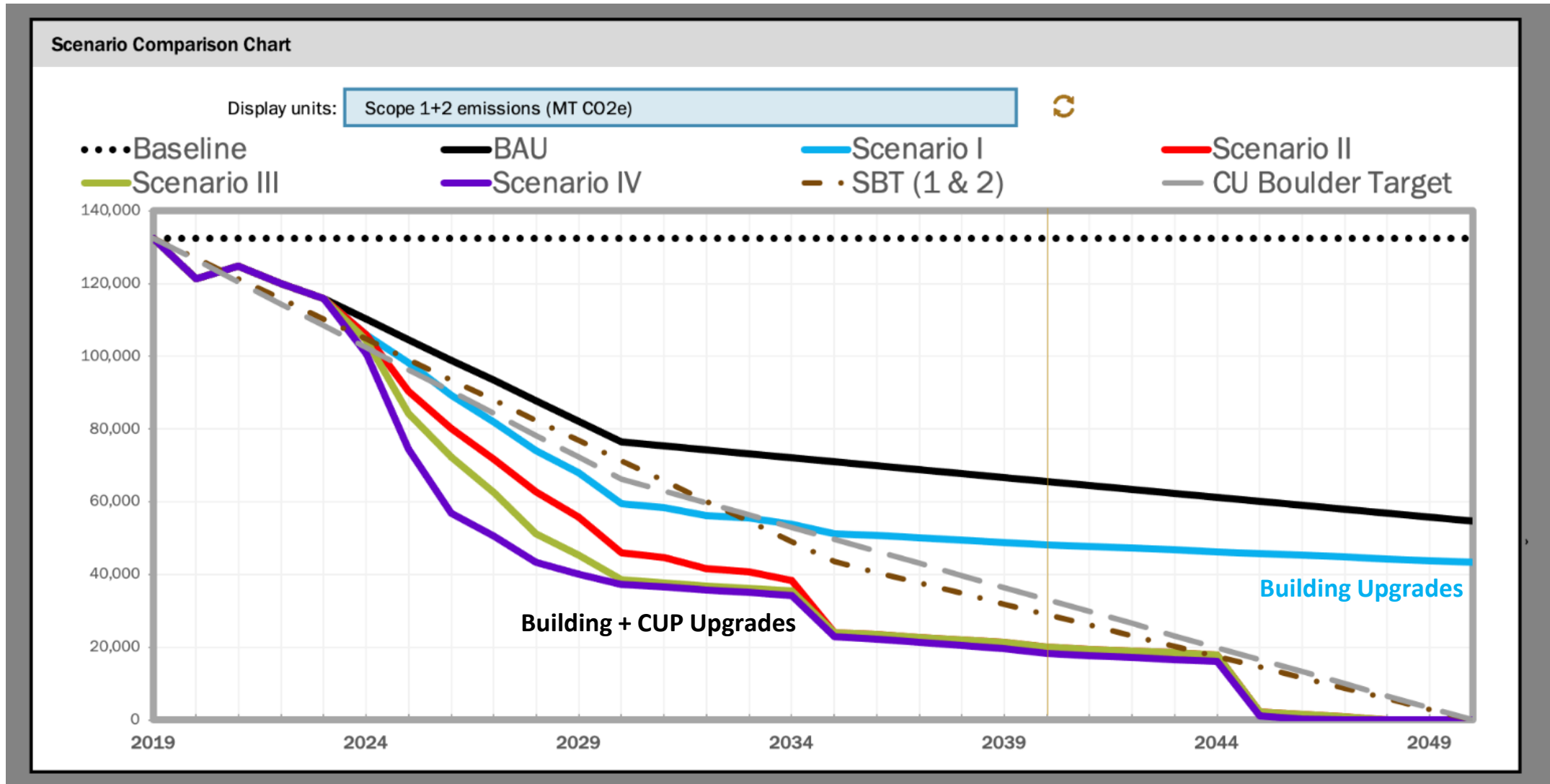
Benchmark	Description
Baseline	Emissions in 2019 (MTCO2e)
BAU	Business as usual - Baseline reduced by RE savings from Xcel Energy
CU Target	50% reduction in Scopes 1 and 2 by 2030; a clear path to zero emissions no later than 2050
Science Based Target	Calculated SBT Scope 1 & 2 emission target to 2035, then extrapolated (straight-line) to net zero

EMISSION SCENARIOS

SCENARIO	CAPITAL COSTS	ENERGY EFFICIENCY	CENTRAL HEATING	RENEWABLE ENERGY	VEHICLE FLEET
Business as Usual					
Scenario 1	\$150-200 m	Baseline Implementation \$6-8M / yr*	No Upgrades	PVT + Solar PV	136 EVs by 2030, 271 EVs by 2040, 432 EVs in the fleet by 2050
Scenario 2	\$650-900 m	Baseline Implementation \$6-8M / yr*	CUP Decarbonization by 2050 <i>Study in Progress</i>		
Scenario 3	\$650-900 m	EMP Implementation \$8-11M / yr*			
Scenario 4	\$700-900 m	Accelerated Implementation \$11-13M / yr*			

*Average capital expenditures between 2024-2030, with tapering capital expenses through 2040

EMISSION SCENARIOS





NEXT STEPS

- Continue to refine scenario analysis
- Consider operational and financial feasibility
- Conduct a prioritization process that will weigh specific criteria such as equity and potential GHG emission reduction impacts.
- Translate into an actionable timeline for implementation
- Establish a pathway for the collection of additional Scope 3 emissions and setting binding targets

EMISSION SCENARIOS

