HILLCREST

CARBON-FREE COST ANALYSIS

April 20, 2021

Energy Scenarios

CODE

Built to code using typical HVAC systems (gas and electric)

BUSINESS-AS-USUAL

Built 10% better than code using typical HVAC systems (gas and electric)

BUNDLE 1A

High-efficiency buildings with distributed geothermal (all electric)

BUNDLE 1B – ATES

High-efficiency buildings with district aquifer thermal energy storage (all electric)

BUNDLE 1B – GEOTHERMAL

High-efficiency buildings with district geothermal (all electric)

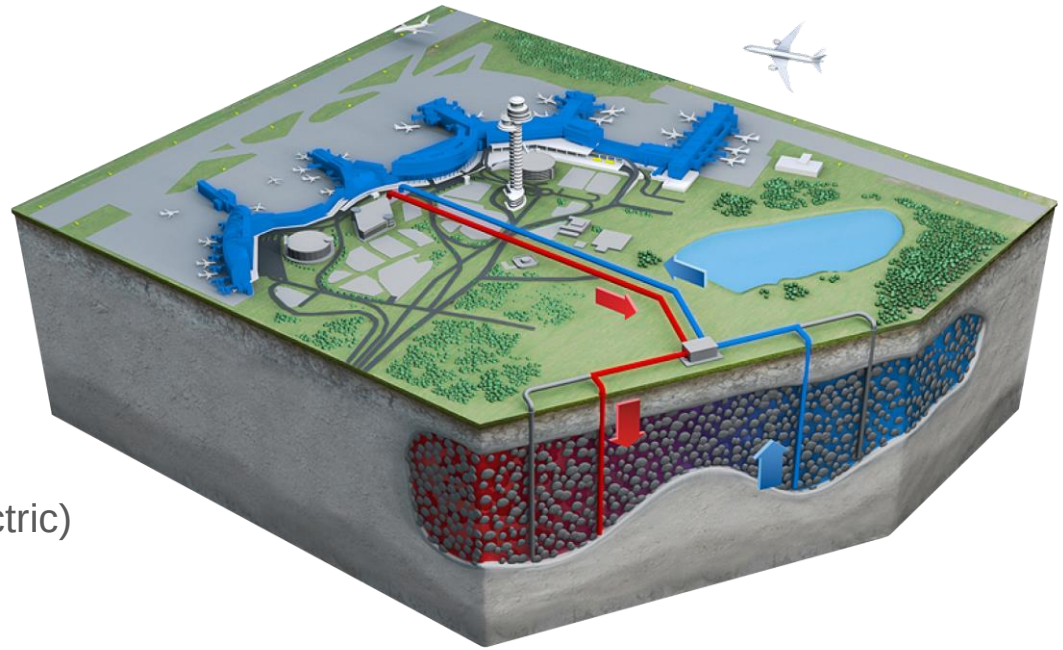
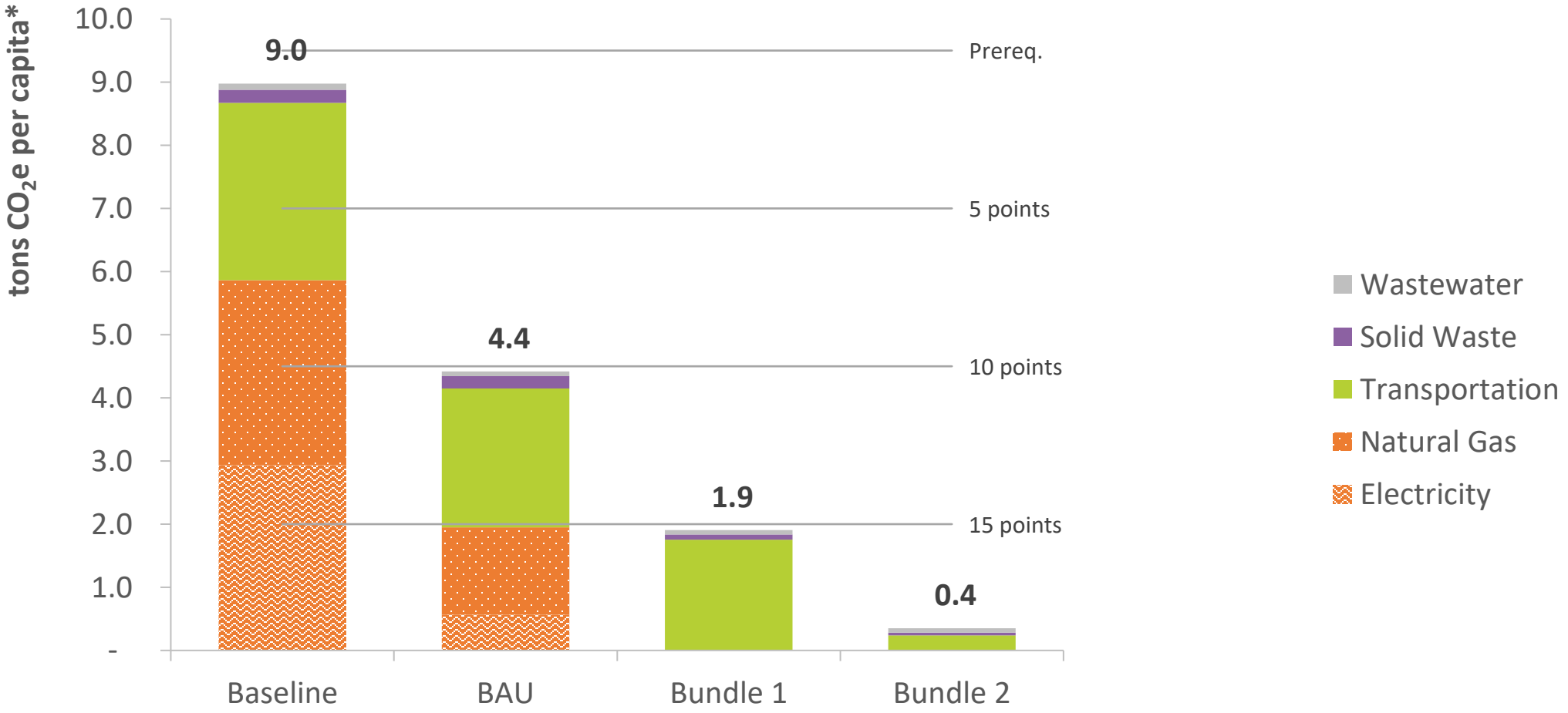


Image Source: Underground Energy, “ATES Summer Operation – Cooling”

Hillcrest GHG Emissions Scenarios



*LEED's definition of per capita includes both resident and working population

Key Findings

- A high-efficiency, all-electric community can be cost competitive over its life cycle.
- District solutions are viable and should continue to be developed.
- There is no “clear winner” among the evaluated scenarios. Their relative cost-effectiveness will vary based on how incremental costs are distributed over time.

Disclaimers

The following variables are not currently accounted for:

- Cost of Xcel infrastructure/savings from not installing natural gas infrastructure
- Operational savings from EV fueling and maintenance
- Rate structure for on-site solar
- Energy storage costs/savings

Incremental Costs

Incremental Costs vs. Saint Paul Port Authority Business-As-Usual		
	Bundle 1A	**Bundle 1B**
Residential Energy Efficiency	$24-30M	$17-$26M
Industrial Energy Efficiency	$13-16M	$9-$14M
District Energy System	n/a	$15-21M
Solar	$27M	$27M
EV Charging	$1M	$1M
Total	**$65-74M**	**$69-89M**

Incremental costs to achieve 19 LEED points are in the 10s of millions of dollars.

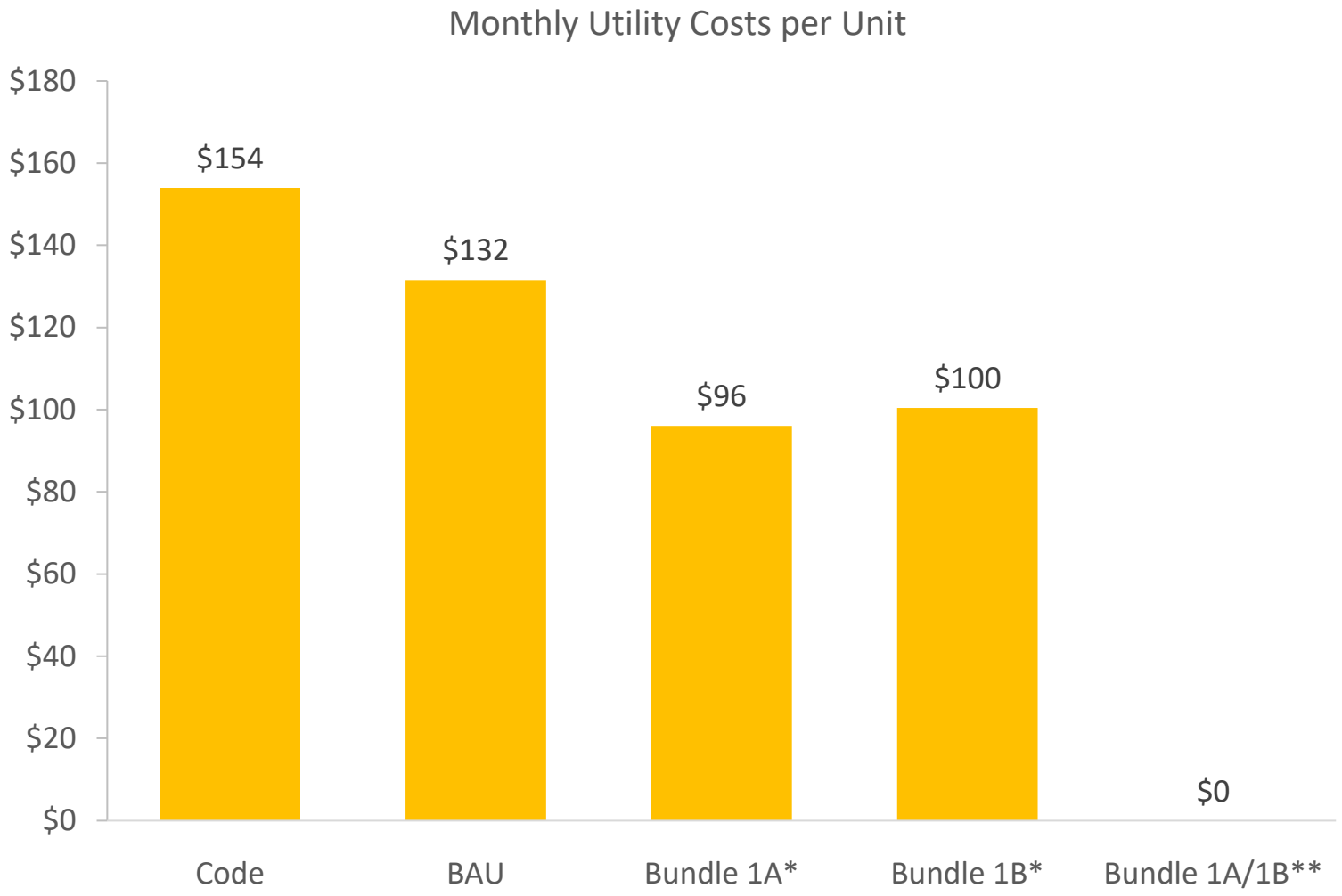
The incremental cost of a district system may be comparable to a non-district system.

Operational Savings

Operational Savings vs. Saint Paul Port Authority BAU		
	Bundle 1A	**Bundle 1B**
Residential Energy Efficiency	$17-$30M	$14-29M
Industrial Energy Efficiency	$11-$20M	$10-19M
District Energy System	n/a	n/a
Solar	$36M	$36M
EV Charging	not quantified	not quantified
Total	**$64-$86M**	**$60-$84M**

Operational savings on utility bills, O&M, and equipment replacement over a 25-year period could offset incremental costs.

Utility Costs – Low-Rise Residential Building (Xcel)

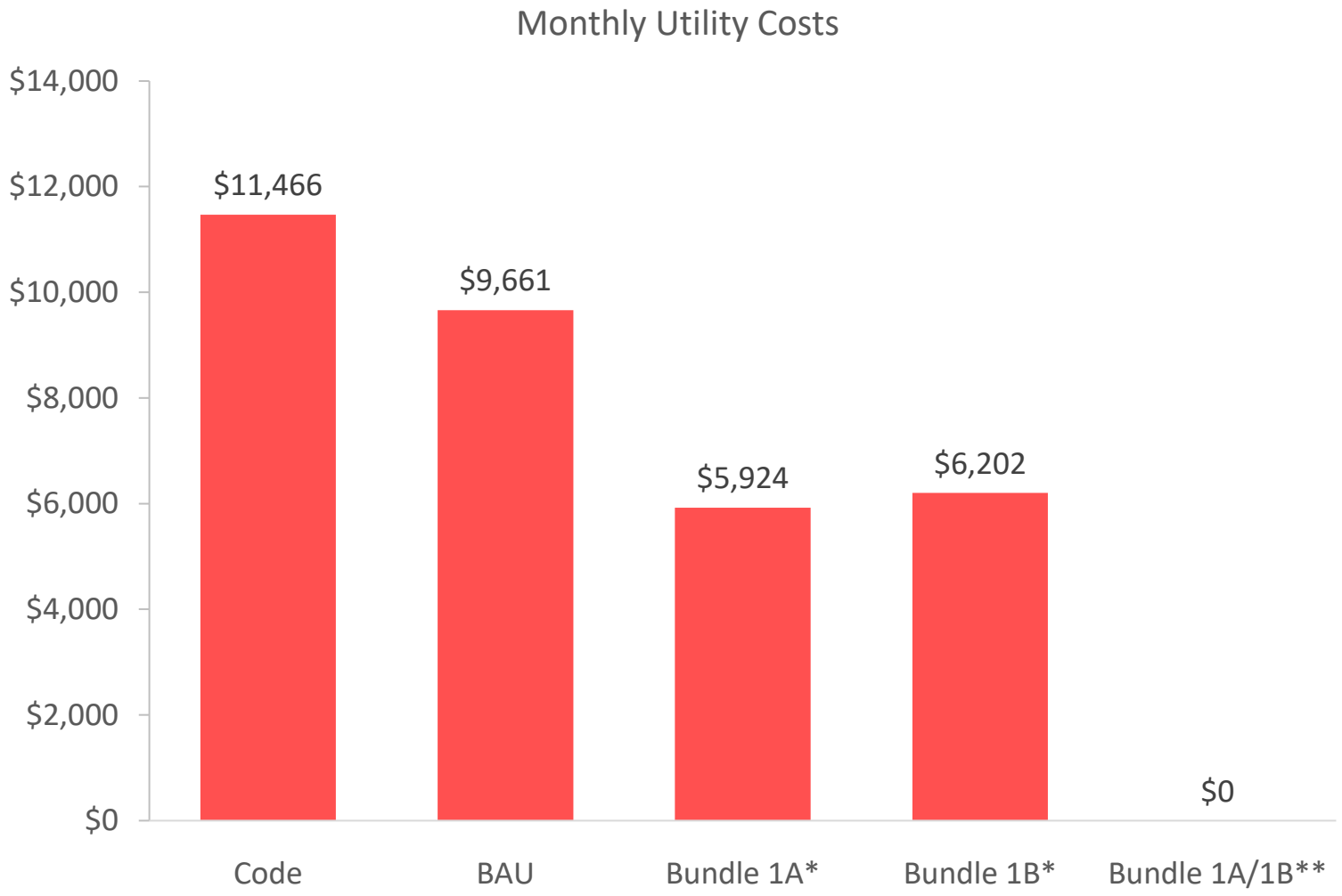


The monthly utility costs for low-rise residential buildings are significantly lower than the business-as-usual scenario.

* Assumes all savings from efficiency are passed to residents

** Assumes all savings from efficiency and solar are passed to residents (doesn't account for service fees, etc.)

Utility Costs – Industrial Building (Xcel)

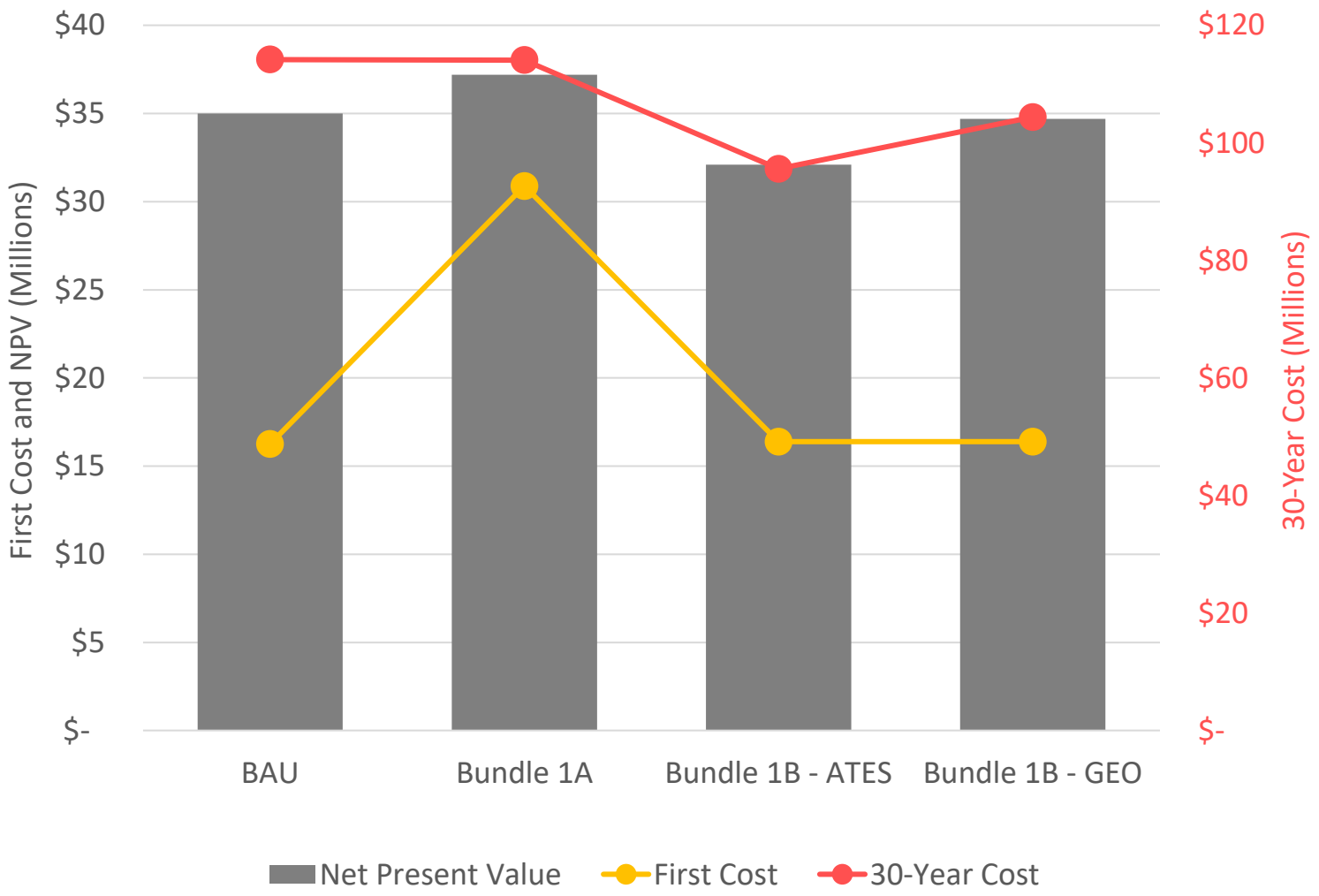


The monthly utility costs for industrial buildings are significantly lower than the business-as-usual scenario.

* Assumes all savings from efficiency are passed to residents

** Assumes all savings from efficiency and solar are passed to residents (doesn't account for service fees, etc.)

Life Cycle Costs – Entire Site (Ever-Green Energy)



Life cycle cost analysis can be used to compare cost-effectiveness.

Key variables:

- cost of capital
- geothermal well costs

Next steps?

- Port to define key questions to answer and timeline for decision-making.
- Investigate sources to fund incremental costs. Kick-off meeting with Xcel, Ever-Green, and IPS?
- Further develop on-site solar concept. Discuss rate structures with Xcel. Evaluate energy storage options.
- Explore business plan for district system options. Conduct on-site testing to confirm assumptions and refine pricing estimates.