

CREATIVENERGY  
YOUR DISTRICT ENERGY PARTNER



THOMPSON RIVERS UNIVERSITY

LCDES PHASE 1 – WORKSHOP 3

November 7, 2020



# AGENDA

 OVERVIEW

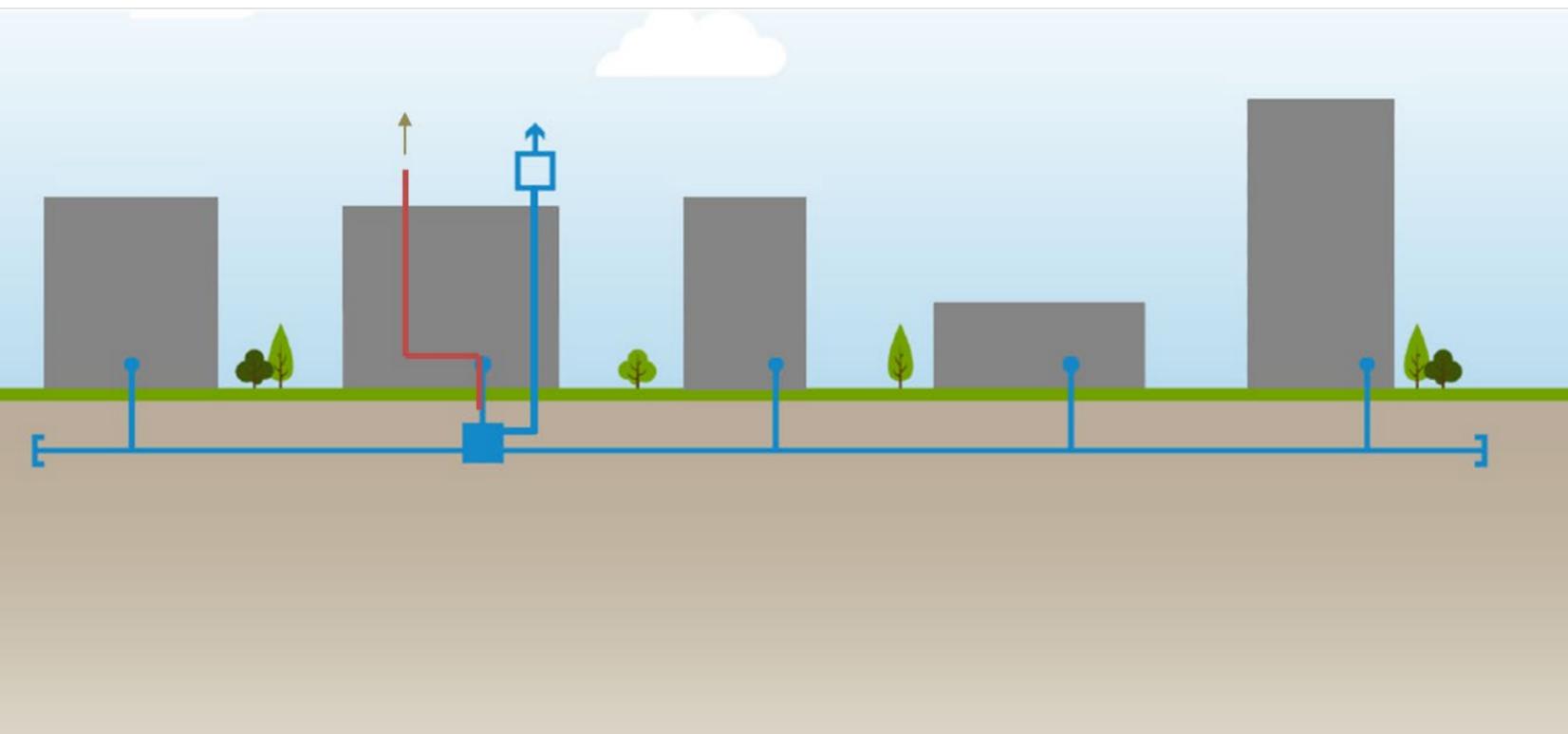
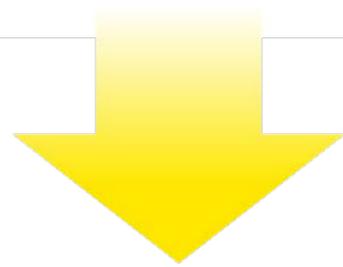
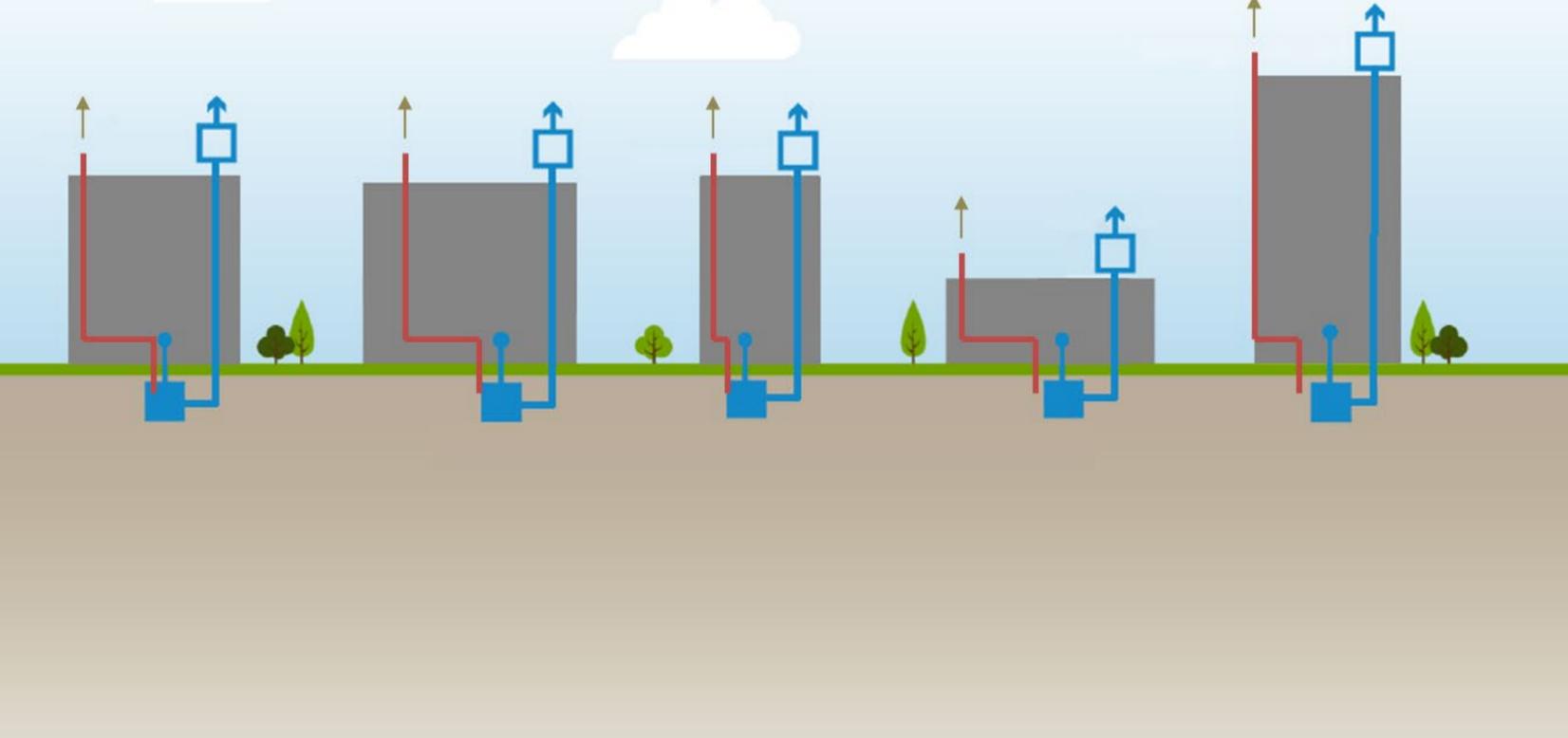
 SUSTAINABILITY OUTCOMES

 PROJECT ECONOMICS



CREATIVENERGY





# OVERVIEW

# OVERVIEW

## Phase 1 Scope

PHASE 1A

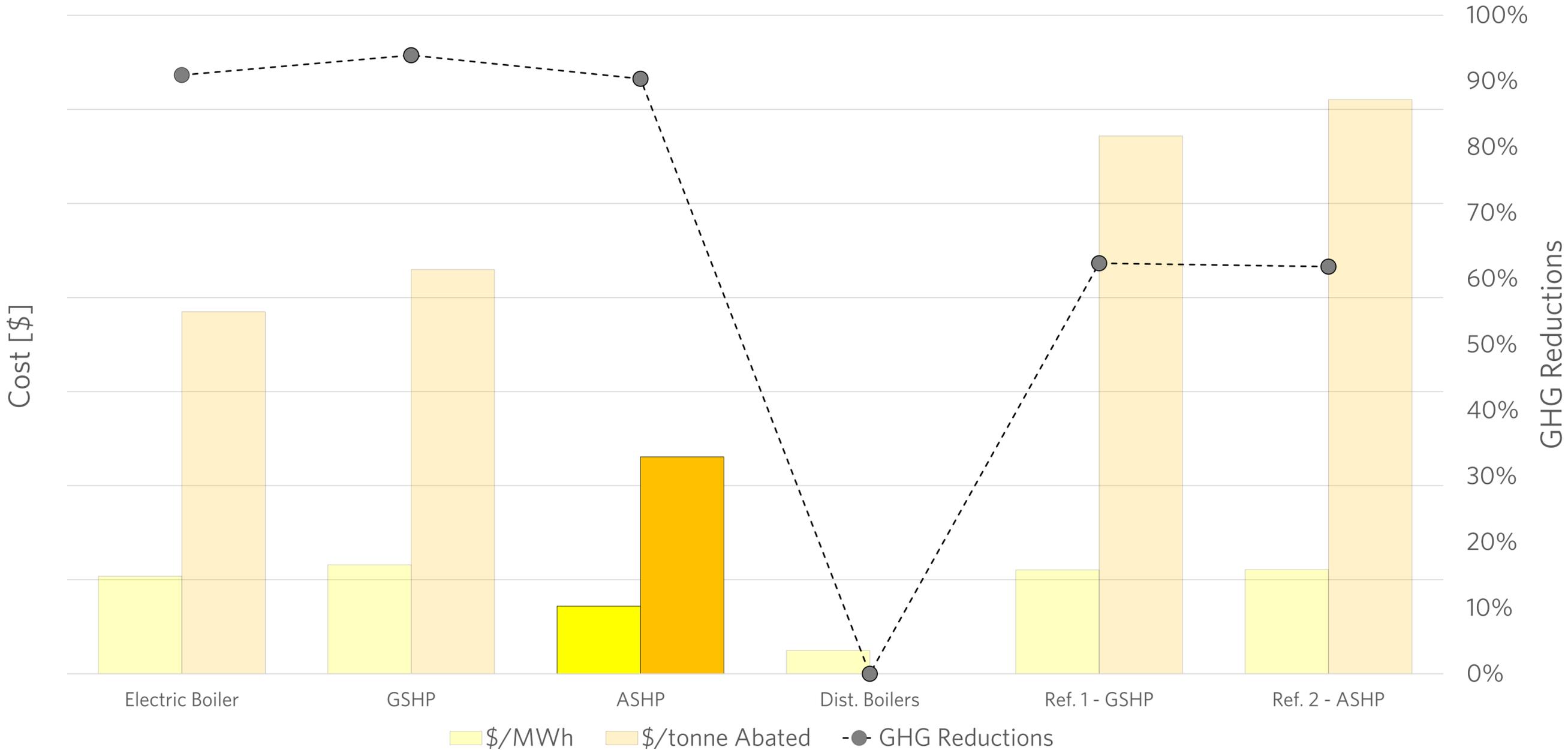
PHASE 1B





# OVERVIEW

## Technology Screening

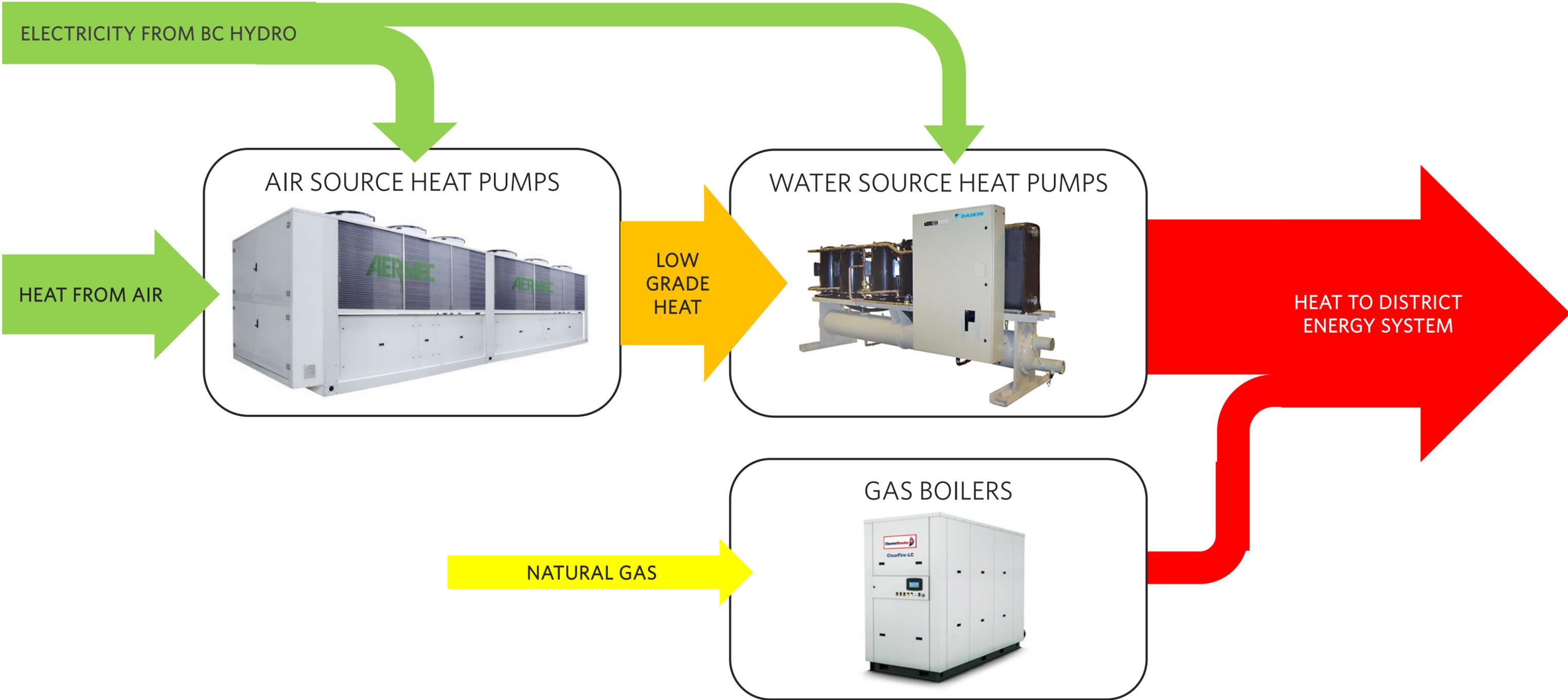


\*Biomass not considered for due to local air quality sensitivities and other non-financial reasons.

\*\*Screening analysis based on earlier load estimates from February 2020.

# OVERVIEW

*Preferred Solution - 2-Stage ASHP/WSHPs with NG Peaking and Back-up Boilers*

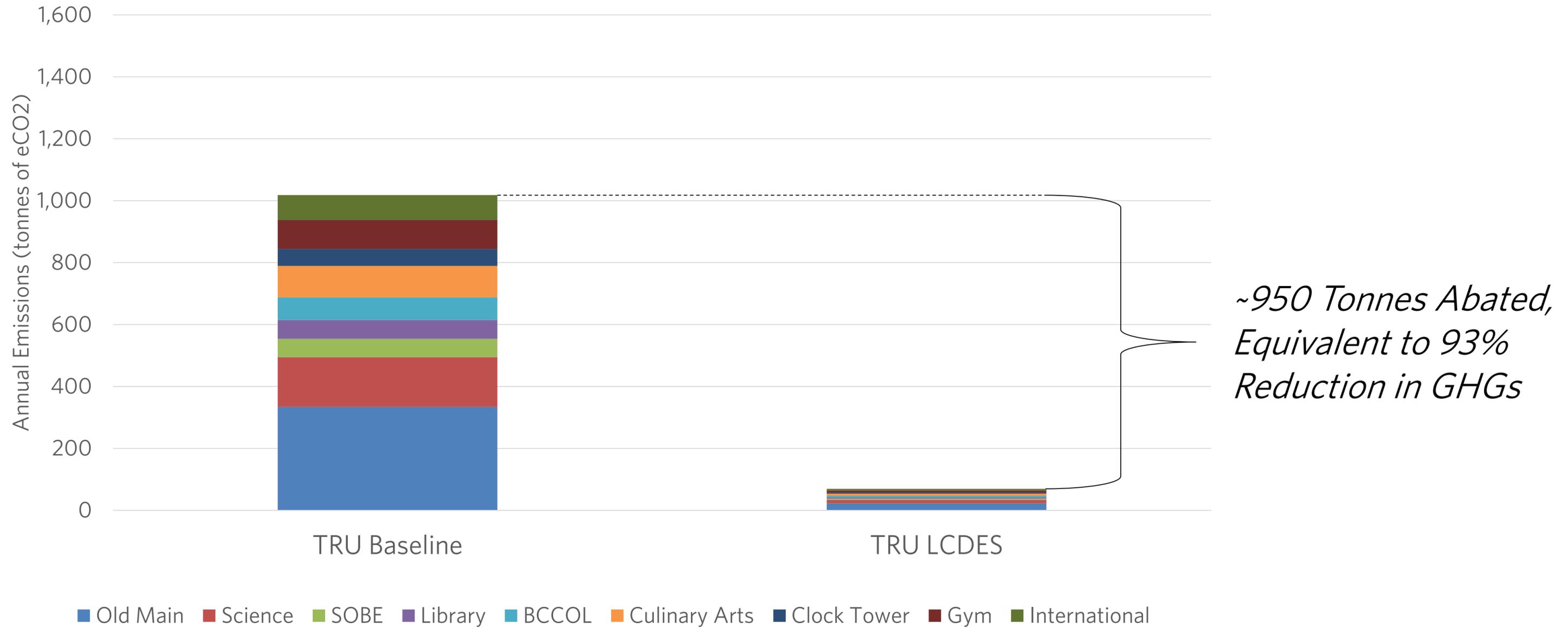




# SUSTAINABILITY OUTCOMES

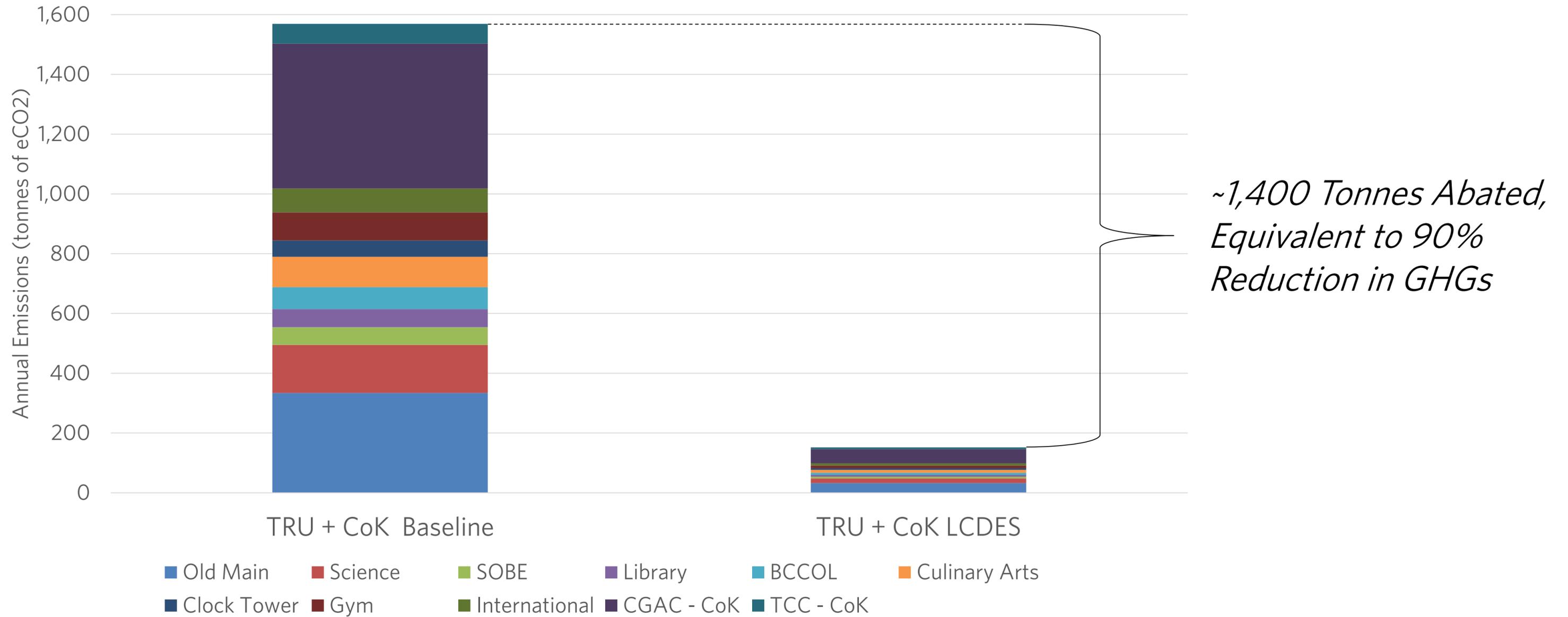
# SUSTAINABILITY OUTCOMES

## Phase 1 Decarbonization - TRU Only



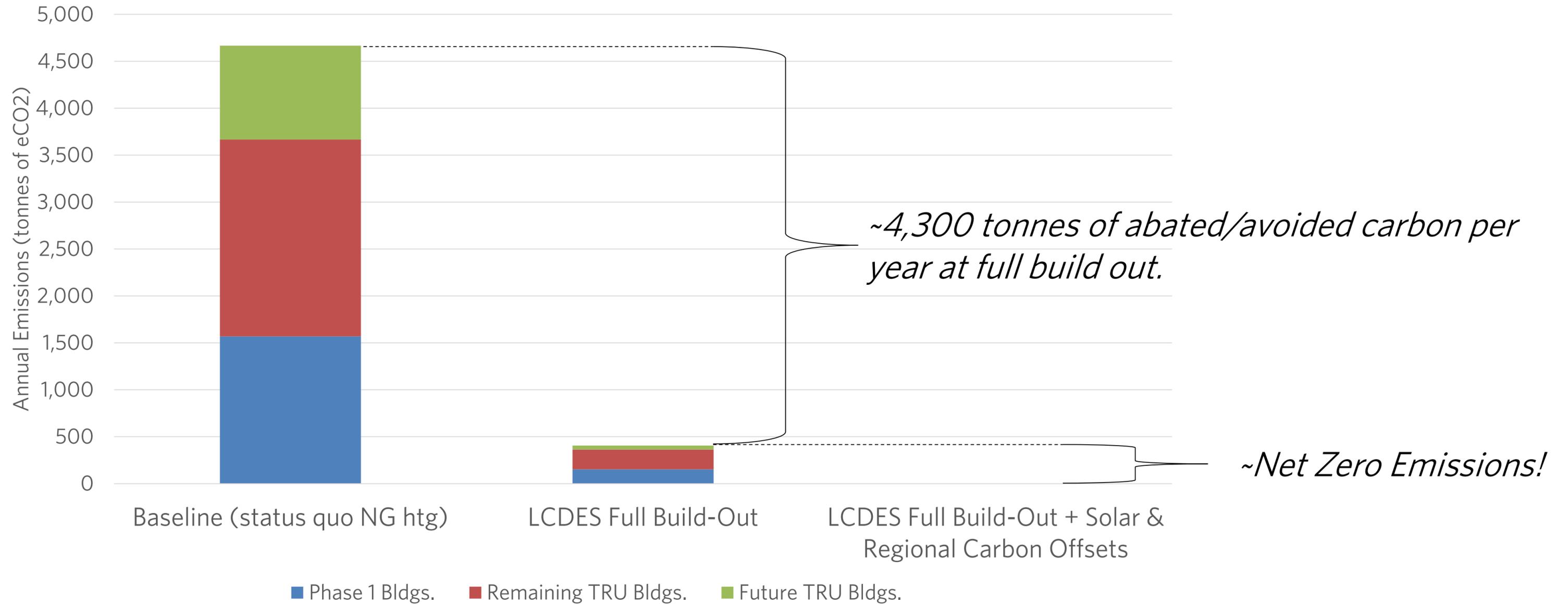
# SUSTAINABILITY OUTCOMES

## Phase 1 Decarbonization - TRU + CoK



# SUSTAINABILITY OUTCOMES

## *Future Expansion - Roadmap to Zero Emissions*



# SUSTAINABILITY OUTCOMES

## *Carbon Neutral by 2030?*

### **Natural Gas**

- Natural gas must be virtually eliminated from campus, with only modest amounts being used for heating peaking and resiliency functions, cooking, and classroom functions (i.e. HVAC lab at ITTC).

### **Residual Carbon**

- Greenhouse gases from the minor use of onsite natural gas and residual carbon from BC Hydro's electricity grid will need to be offset.

### **Onsite Solar**

- Onsite solar can provide resiliency, reduce campus energy use, and may have a positive business case if prices continue their downward pattern.
- Solar can support a carbon neutral future but will only play a modest role as it offsets BC Hydro's 97% carbon-neutral electricity.

### **Regional Carbon Offsets**

- Purchasing high quality, regional carbon offsets will help bridge the final gap to a carbon neutral future.
- Creative Energy can help....

# PROJECT ECONOMICS

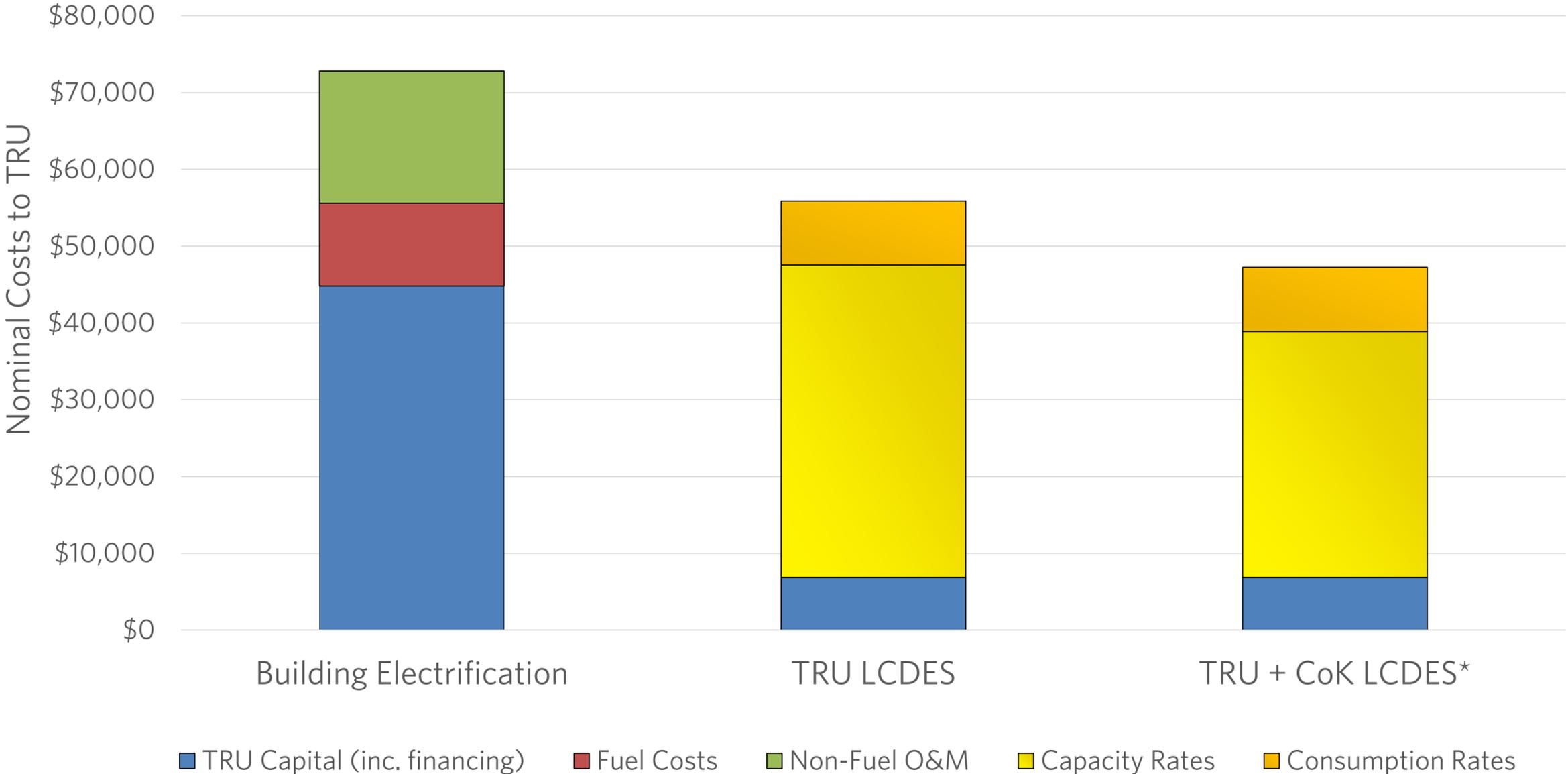
# PROJECT ECONOMICS

## *Working Assumptions*

	Value	Comments
Inflation	2%	<i>All costs are escalated with inflation. No additional escalation allowances have been made.</i>
Discount Rate	0%	<i>Undiscounted comparison (i.e. nominal comparison)</i>
Term Length	30	
Capital Cost Accuracy - Building Elect.	Class D+	<i>Opinion of probable cost from Stantec's electrification study, adjusted down to equalize for GHG abatement with LCDES.</i>
Capital Cost Accuracy - LCDES	Class C/D	<i>DPS is Class D and being refined, remaining estimates are Class C.</i>
LCDES Economic Life	30 years	
EC Core & Shell Economic Life	60 years	<i>A terminal value of 50% of the initial capital has been estimated for the remaining life of the building outside the 30-year analysis.</i>
Reference Case Economic Life	15/30 years	<i>ASHPs, pumps, and lifting HPs assumed to be 15 years, electrical infrastructure assumed to be 30. 60% of initial capital is assumed to need renewal at year 15.</i>
Assumed TRU Interest	3%	<i>Based on Province of BC 30-year Bond Yields and assuming a 30 year amortization.</i>
Creative Energy WACC	<i>As a regulated public utility, the revenue requirements are calculated on the BCUC approved methodology. Presently, the capital structure is at a debt/equity ratio of 57.5/42.5% with an equity RoR of 9.5%.</i>	
Electricity	BC Hydro Large General Service Rate	
Natural Gas	Fortis Rate 3	
Peak Demand Reduction	75%	<i>Reduction in added peak due to coincidental peak with TRU baseload. Will be updated if hourly electrical consumption from TRU becomes available.</i>
Total Connected Area	56,000/4,100 m <sup>2</sup>	<i>TRU/CoK</i>
Annual Thermal Energy Demand	4,600/2,500	
Peak Thermal Energy Demand	4.1/1.7 MW	

# PROJECT ECONOMICS

## 30-Year Comparison



\* Cost allocation to city dependent on BCUC approval of rate design. These costs do not include potential rental revenue for TRU.