Aladaco Consulting Inc.

Town of Goderich
GHG Reduction Pathway
Feasibility Study

Agenda

GHG REDUCTION PATHWAYS AND TARGETS

STUDY REVIEW PROCESS AND STAFF ENGAGEMENT

DECARBONIZATION MEASURES ANALYZED

PATHWAY SELECTIONS, KEY METRICS, AND RESULTS

GHG Reduction Pathways

A FCM Funded Study to identify a sequence of GHG reduction measures that reduce GHG emissions for municipally owned facilities. Funding requires that the pathways achieve the following targets from the 2019 baseline regardless of capital or operating cost constraints:

- **Minimum Performance**: 50% reduction in 10 years, 80% in 20 years
- **Aggressive Deep Retrofit**: 50% reduction in 5 years, 80% in 20 years
- **Business-As-Usual**: Like-for-like replacements with existing specs

GHG Reduction Pathways

Decarbonization Measures include efficiency improvements, air & water source heat pumps (ASHP/WSHP), Electrification of fossil fuel heating equipment, and renewable energy.

GHG Reduction Pathway Feasibility Study

Study Review Process

Site Investigation

- Review available documentation and reports
- Analyze utility data
- Conduct Site Visits
- Interview Facility Operators
- Identify current metering points and identify any additional metering required

Calibrated Energy Modelling

- eQuest energy model developed by Heffernan Energy Modelling
- Calibrated to utility data to ensure accuracy of simulations

Design Workshop

- Gather relevant stakeholders to review preliminary decarbonization measures and their feasibility
- Review asset management planning and equipment replacement needs
- Discuss budgetary considerations and implementation planning
- Select decarbonization measures for in-

Measure Level Analysis

- Develop detailed project metrics for all selected decarbonization measures
- Capital cost estimates, energy savings, implementation timelines, etc.

GHG Reduction Scenario Planning

- Compile the identified measures into GHG reduction pathway scenarios for each facility
- Scenario packages included relevant project metrics and alternative pathways to achieving required outcomes were discussed

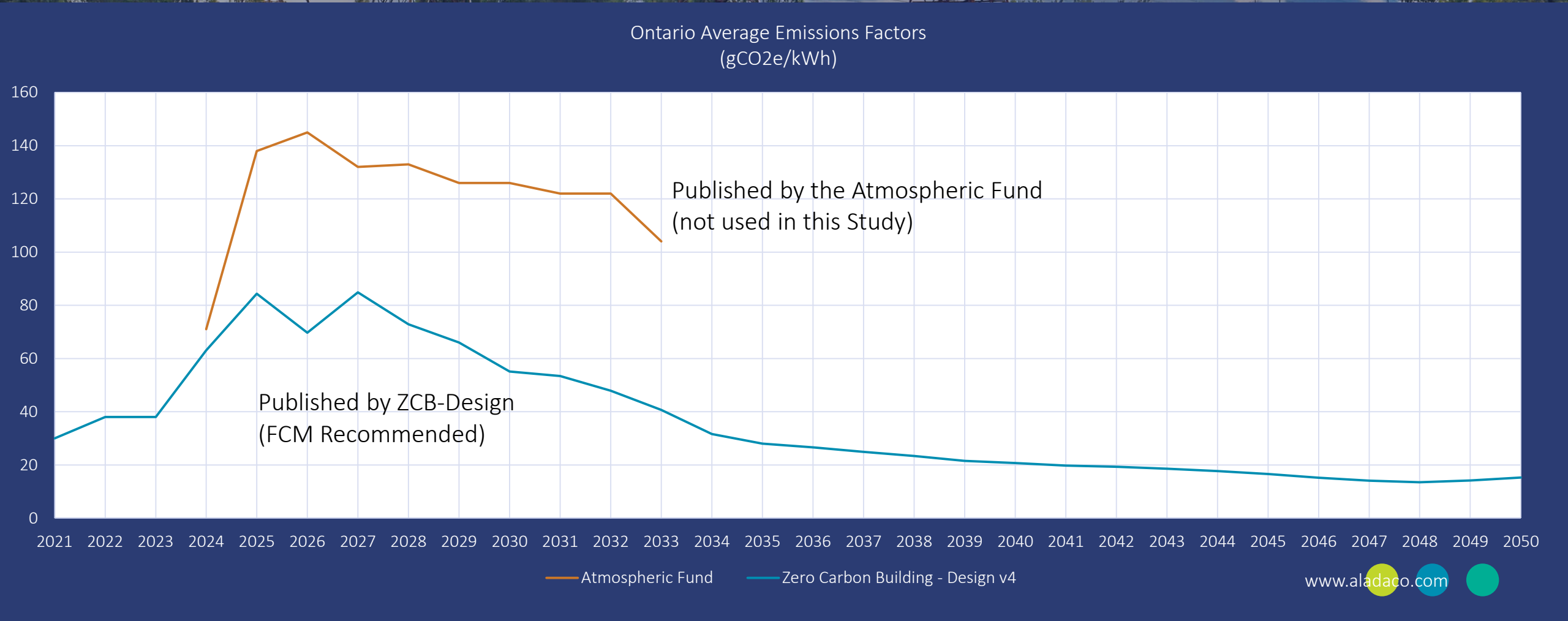
Decision Making Workshop

- Gather relevant stakeholders to examine GHG reduction pathways developed by Aladaco
- Engage stakeholders to find consensus on the preferred scenarios for inclusion the final report

Report and Presentation

- Develop draft Pathway Feasibility Study Report
- Facilitate stakeholder review and update accordingly
- Issue Final Pathway Feasibility Study Report
- Present summary of Pathway Feasibility Study to Town Council

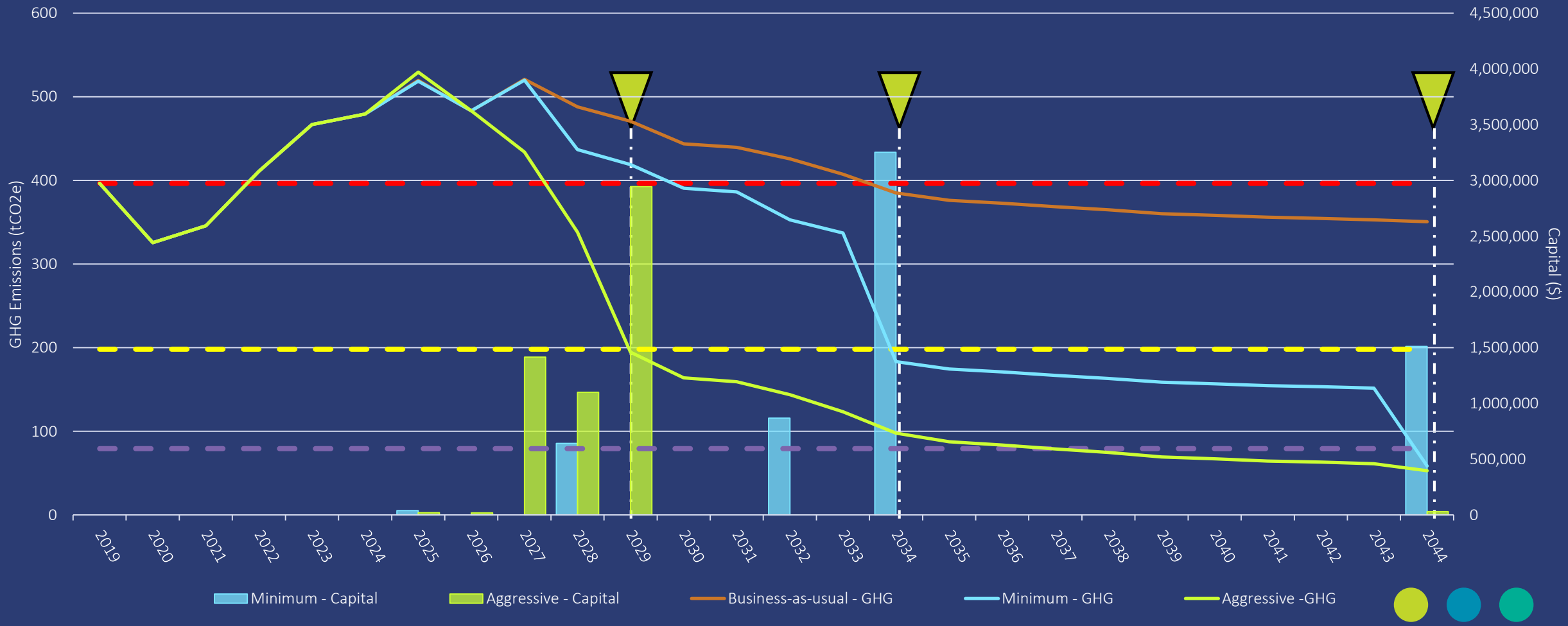
Grid Emissions Factor: A Key Assumption



MRC Decarbonization Measures

Measures	Annual Utility Savings	GHG Savings ($tCO2_e$)	Implementation Cost	Net-Present Value	Simple Payback
Geothermal System Recommissioning	$5,124	2.9	$21,500	$21,705	4.4
BAS Recommissioning	$7,016	10.8	$18,060	$47,264	2.9
ASHP HRUs & MUA	-$13,265	52.1	$603,909	-$746,191	-45.8
ASHP Dehumidifier (DH-3)	-$41,125	65.3	$1,037,910	-$1,593,429	-25.3
WSHP Boilers	-$32,464	121.2	$2,721,424	-$2,582,732	-84.0
Electrification of Unit Heaters	-$2,238	4.2	$20,996	-$48,470	-9.4
Solar PV Panels	$60,000	33.8	$756,225	$410,923	12.7

MRC GHG Reduction Pathways



MRC Pathway Metrics

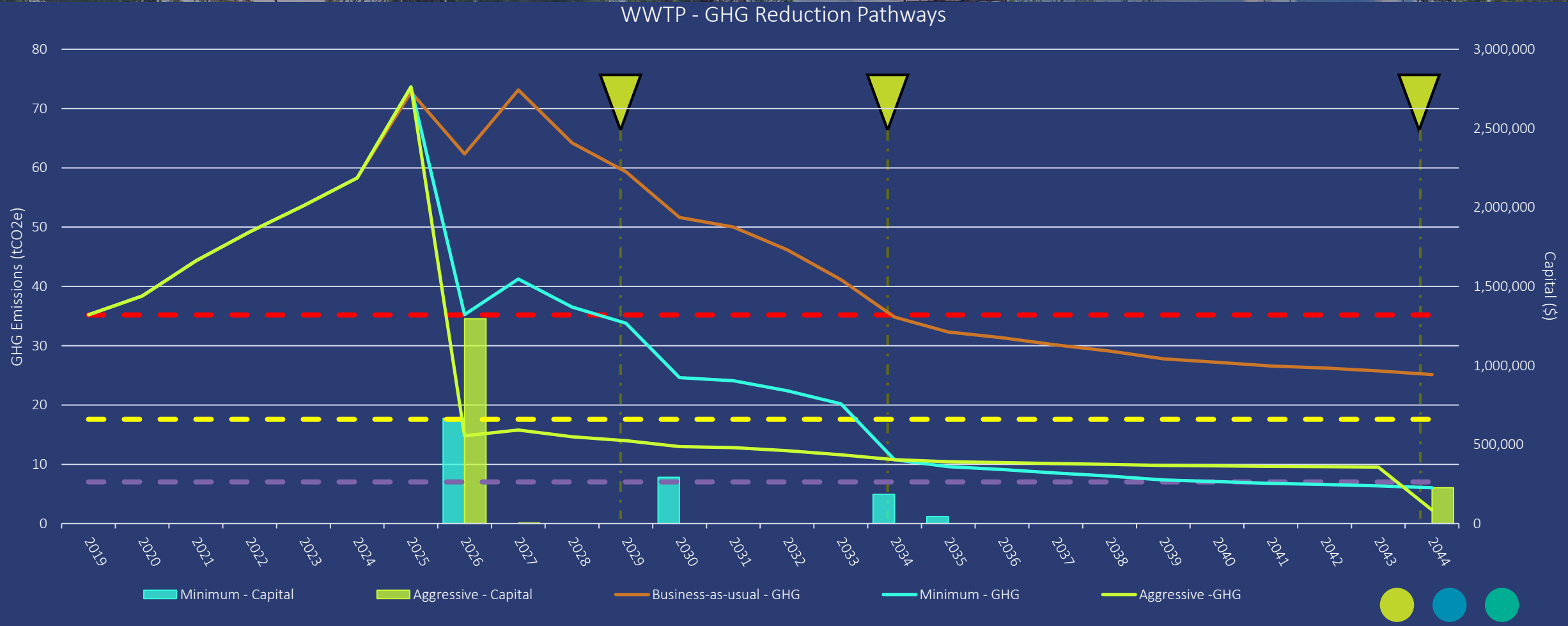
Metric	Minimum Performance	Aggressive Deep Retrofit	BAU (Baseline)
Capital Cost	$6,313,490	$5,532,788	$2,208,394
External Funding	$1,294,266	$1,383,197	-
BAU Avoided Costs	$2,208,394	$2,208,394	
Residual Value at Study End	$1,757,764	$707,148	$397,994
Incremental Costs	$2,810,831	$1,941,196	-
Operating Costs	$11,572,724	$11,725,763	$10,472,299
5-year GHG Reduction (tCO2e)	-23 (-5.7%)	**202 (50.9%)**	-
10-year GHG Reduction (tCO2e)	**203 (51.3%)**	299 (75.3%)	-
20-year GHG Reduction (tCO2e)	**330 (83.3%)**	**345 (86.9%)**	-
Incremental LC Cost (20-year)	$2,551,485	$2,885,506	-
Cost per tonne CO2e abated ($ILCC/tCO2e)	$386	$419	-

Measure Description	Min Performance Year	Aggressive Deep Retrofit Year
Geothermal Recommissioning	2025	2025
Water-Source Heat Pump Boilers	2034	2029
BAS Recommissioning	2025	2026
Air-source Heat Pump HRUs & MAU	2028	2027
Air-source Heat Pump DH3	2044	2028
Electrify UHs		2044
Solar PV Panels	2032	2027

WWTP Decarbonization Measures

Measures	Annual Utility Savings	GHG Savings ($tCO2_e$)	Implementation Cost	Net-Present Value	Simple Payback
Reduce Exhaust Area for Filter Press	$1,218	0.6	$2,668	$1,256	3.0
Replace Aerators with Aeration Blowers	$15,425	7.5	$265,936	-$49,307	17.5
Thermostat Upgrades	$5,119	6.7	$4,290	$97,464	0.9
Electrification of MUA	-$523	0.2	$36,681	-$69,316	-73.0
Electrification of Tube Heaters	-$3,254	9.2	$155,595	-$190,014	-47.8
Solar PV Panels 260 kW DC	$48,000	25.3	$645,725	$228,373	13.5
Solar PV Panels 510 kW DC	$96,000	50.6	$1,266,038	$485,131	13.3

WWTP GHG Reduction Pathways



WWTP Pathway Metrics

Metric	Minimum Performance	Aggressive Deep Retrofit	BAU (Baseline)
Capital Cost	$1,190,016	$1,525,183	-
External Funding	$297,504	$381,296	-
Residual Value at Study End	$162,161	$116,042	-
Operating Costs	$1,733,395	$679,080	$2,836,827
20-Year Operational Cost Savings	$1,103,432	$2,157,747	-
20-Year LCC	$2,463,747	$1,706,924	-
5-year GHG Reduction (tCO2e)	0 (0%)	**20 (55.5%)**	-
10-year GHG Reduction (tCO2e)	**24 (67.1%)**	24 (67.2%)	-
20-year GHG Reduction (tCO2e)	**29 (81.5%)**	**32 (91.3%)**	-

Measure Description	Min Performance Year	Aggressive Deep Retrofit Year
WWTP MUA Area Reduction	2026	2027
Solar PV 510 kW DC	-	2026
Aeration Blower	2030	-
Thermostat Upgrades	2026	2026
Electrification of MUA	2035	-
Electrification of Tube Heaters	2034	2044
Solar PV 260 kW DC	2026	-

RESULTS SUMMARY

Facility	Pathway Selected	Capital Cost	Operational Cost Change	Funding Available	20-Year GHG Reduction
Maitland Recreation Centre	Minimum Performance Scenario	$6,313,490	+$1,100,425	$1,294,266	330 tCO2e (83.3%)
Pollution Control Plant (WWTP)	Aggressive Deep Retrofit Scenario	$1,525,183	-$2,157,747	$381,296	32 tCO2e (91.3%)

Thank You

Questions?

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