1 BENEFIT COST ANALYSIS

The complete results of the Benefit Analysis for the Acadia Clean Bus Initiative project are available in Appendix A below, which includes the methodology and assumptions enumerating the benefits summarized in the table below. Excel spreadsheets are also attached to this submission (see BCA Calculations).

Table 5. Summary of Benefits Analyzed

Summary of Benefits Analyzed	
Current Status/ Baseline & Problem to Be Addressed	Aging transit fleet and entrance road infrastructure, a fleet with combustible vehicles requiring increasing maintenance needs with aftermarket parts, reliability, and congestion.
Changes to Baseline	Replacement of bus fleet with zero-emission buses.
Types of Impacts	Continued access and improved recreational experience; reduced noise and emissions.
Population Affected by Impacts	Residents of Downeast Maine and visitors.
Economic Benefit	Monetized value of reduced lifecycle costs, enhanced environmental outcomes, and avoided lost recreation trips

The net present value of the project, expressed in 2023 dollars, with the baseline assumptions used for calculations, is as follows:

At a 3 percent discount rate: **Net Benefits = $89,753,728**

Benefit-Cost Ratio = 4.1

The contribution per benefit is summarized below:

Table 6. Summary of Cost Benefit Analysis Results

Summary of Cost Benefit Analysis Results	
Discount Rate	**3%**
TOTAL CAPITAL COSTS	$29,411,250
1. Bus Maintenance Savings	$114,384,026
2. Fuel Savings	$3,653,011
3. Emissions Reductions	$1,127,942
Total Benefits	$119,164,978
Net Benefits	**$89,753,728**
BENEFIT-COST RATIO	**4.1**

APPENDIX A: BENEFIT-COST ANALYSIS CALCULATIONS NARRATIVE

The Acadia Clean Bus Initiative project will provide several benefits. Three of the main benefits are: 1) lower maintenance and fuel costs, and 2) increased reliability, and c) additional buses and routes. The no-build base case is continuing to service the existing buses, despite the increased maintenance of combustible engines and lack of available replacement parts. Ending the bus operation altogether is not a realistic base case, given that the system is central to access to jobs, services, education, recreation, and general connectivity throughout the region.

This BCA uses a 30-year forecast period, with impacts accruing in future years discounted to present value using a 3 percent discount rate. This analysis and this description are broken down by the categories of benefits calculated:

- Maintenance savings
- Fuel savings
- Emissions reductions

Maintenance savings: The 2023-year cost to maintain the current fleet of buses is approximately $22,000 per bus based on the bus operator's current costs. In contrast, the 2023-year expected cost to maintain larger electric bus is approximately $17,000.

The bulk of the difference between the build case and the no-build case is the expected long-term increases in maintenance costs. The BCA cost model assumes a 2 percent increase in annual maintenance cost for the new buses, consistent with overall inflation. The expected lifetime of these buses is approximately 15 years. After 15 years the electric vehicles would be rehabilitated at a cost of approximately $85,000 per vehicle.

The current propane buses require more maintenance than electric buses because they have more moving parts with their internal combustion engines. Furthermore, some parts are no longer readily available and must be purchased in an aftermarket. Even with an 8-year rehabilitation assumed in 2028 (prices reflect actual bids), new parts will need to be custom-made or used parts procured on the aftermarket. Thus, the annual increase in maintenance costs for the propane buses is calculated to be 8 percent after the initial rehabilitation, and 10 percent after the second rehabilitation seven years later since the vehicles will be long past their useful life and parts are expected to be particularly scarce.

Fuel Savings: The expected fuel savings from purchasing the new buses is primarily based on the cost per mile of operating the existing propane buses compared to the proposed new vehicles. There will also be ten diesel buses that the operator will swap out with propane buses in the purchase scenario. The key inputs are the fuel costs of the two energy types to the operator as well as the relative efficiency of the two vehicle types. The efficiency of the propane vehicles is (3.8 mpg), based on historical usage at DTI. The cost of propane per gallon ($1.72) and electricity per kWh ($0.17) also reflects actual costs to the operator for fueling the existing propane vehicles. However, miles per kWh efficiency of the electric buses (1.61) is

estimated from the reported kWh efficiency of similar electric bus fleets in service. This is a conservative estimate since those estimates are from 2017 and technologies for electric vehicle engines have advanced. Furthermore, the proxy estimates are for vehicles that are larger, 40 feet long, and the build scenario for this project will be using smaller, 35 feet, buses. Future cost increases for both types of fuel are from the U.S. Energy Information Administration's 35-year predictions for future fuel increases.

Emissions reductions: Emissions savings from switching to electric buses is another benefit quantified in this BCA. Because propane is already a relatively clean technology and the system will continue to take cars off the road, the overall quantified value of the emissions reductions is relatively small. However, switching to electric vehicles means that there will be no local emissions.

The amount of emissions for propane and electricity are taken from the EPA's 2023 Vehicle Emissions Factors tables. These tables provide electricity emissions specific to the grid that includes New England. To monetize the social cost of emissions, the BCA uses the values specified in the 2024 USDOT BCA guidance. For CO2 emissions, the BCA uses the former social cost of carbon (SCC) calculated by the EPA since most private-sector calculations appear to be based on this now-rescinded value as at least a starting point. To be conservative, this BCA uses the 2007 values escalated to 2023 dollars rather than the larger social cost escalations recommended in former discretionary program guidance.

Summary: Results for all the categories described above are described in the following in terms of a 3 percent real discount rates.

Table A1. Summary of Cost Benefit Analysis Results

Summary of Cost Benefit Analysis Results	
Discount Rate	**3%**
TOTAL CAPITAL COSTS	$29,411,250
4. Bus Maintenance Savings	$114,384,026
5. Fuel Savings	$3,653,011
6. Emissions Reductions	$1,127,942
Total Benefits	$119,164,978
Net Benefits	**$89,753,728**
BENEFIT-COST RATIO	**4.1**