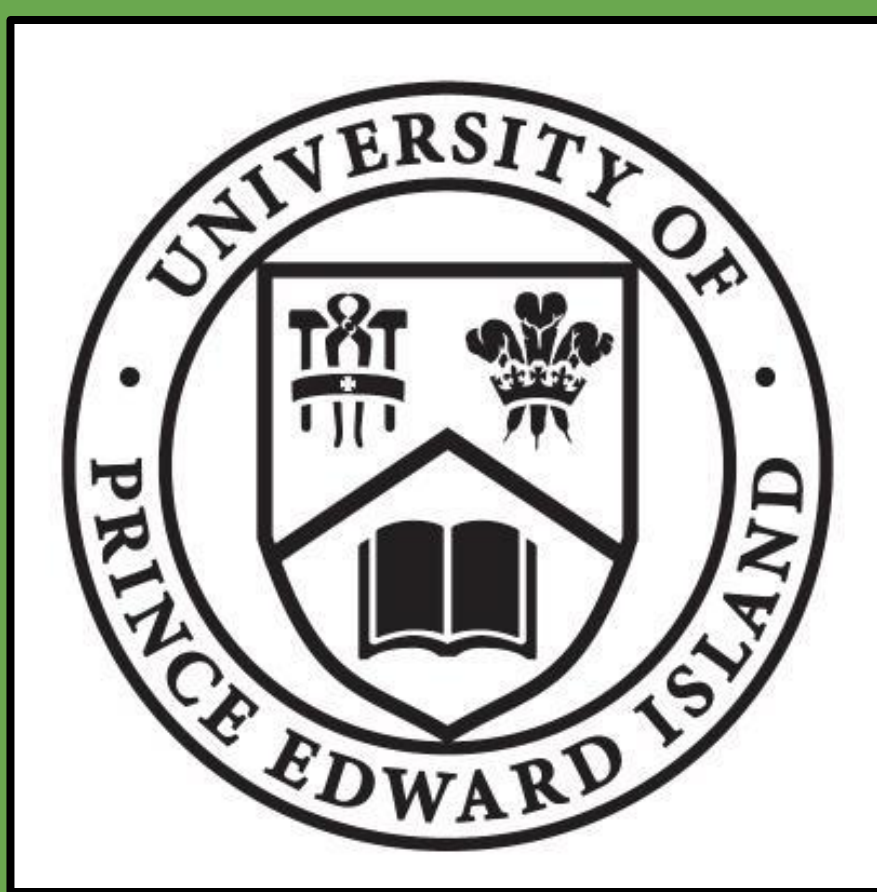




Habitat for Humanity Water Usage Audit and Analysis

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Problem Description

Habitat for Humanity is a non-profit organization that specializes in providing safe and affordable housing on Prince Edward Island. The non-profit organization wanted to explore methods to reduce water use in homes while utilizing any possible Efficiency PEI grants related to water reduction. Habitat was interested in completing a water usage audit and analysis on an existing Habitat home.

Requirements

- A water audit and Analysis is to be performed.
- The water used in the home should be reduced by 5%.
- Only commercially available products can be recommended.

Constraints

- The audit must be performed on only one home.
- The plumbing in the home cannot be altered.
- Commercially available products relating to applicable Efficiency PEI grants are encouraged.

Idea Refinement

Preliminary Design Ideas To Conduct Water Usage Audit:

1. Invasive Water Metering
2. Non-Invasive Water Metering
3. Survey Approximation



Fig 1: Invasive Meter



Fig 2: Non-Invasive Meter



Fig 3: Survey

Survey Approximation Method Was Chosen:

- Water usage questionnaire was developed.
- Questionnaire was approved by UPEI's Board of Research Ethics.
- Habitat home in Charlottetown was audited.
- The survey was used to approximate the fixture and appliance use throughout the entire home.

Analysis

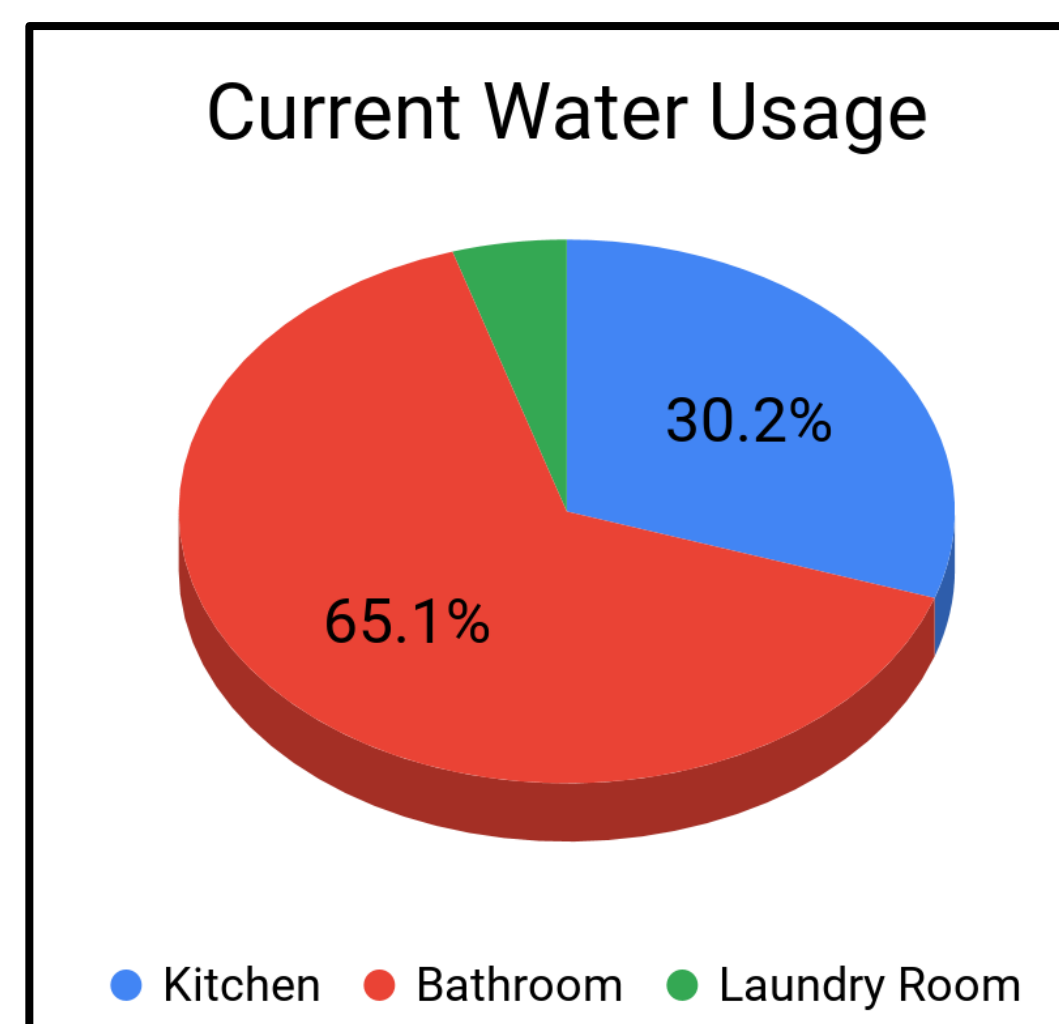


Fig 4: Total Home Water Usage

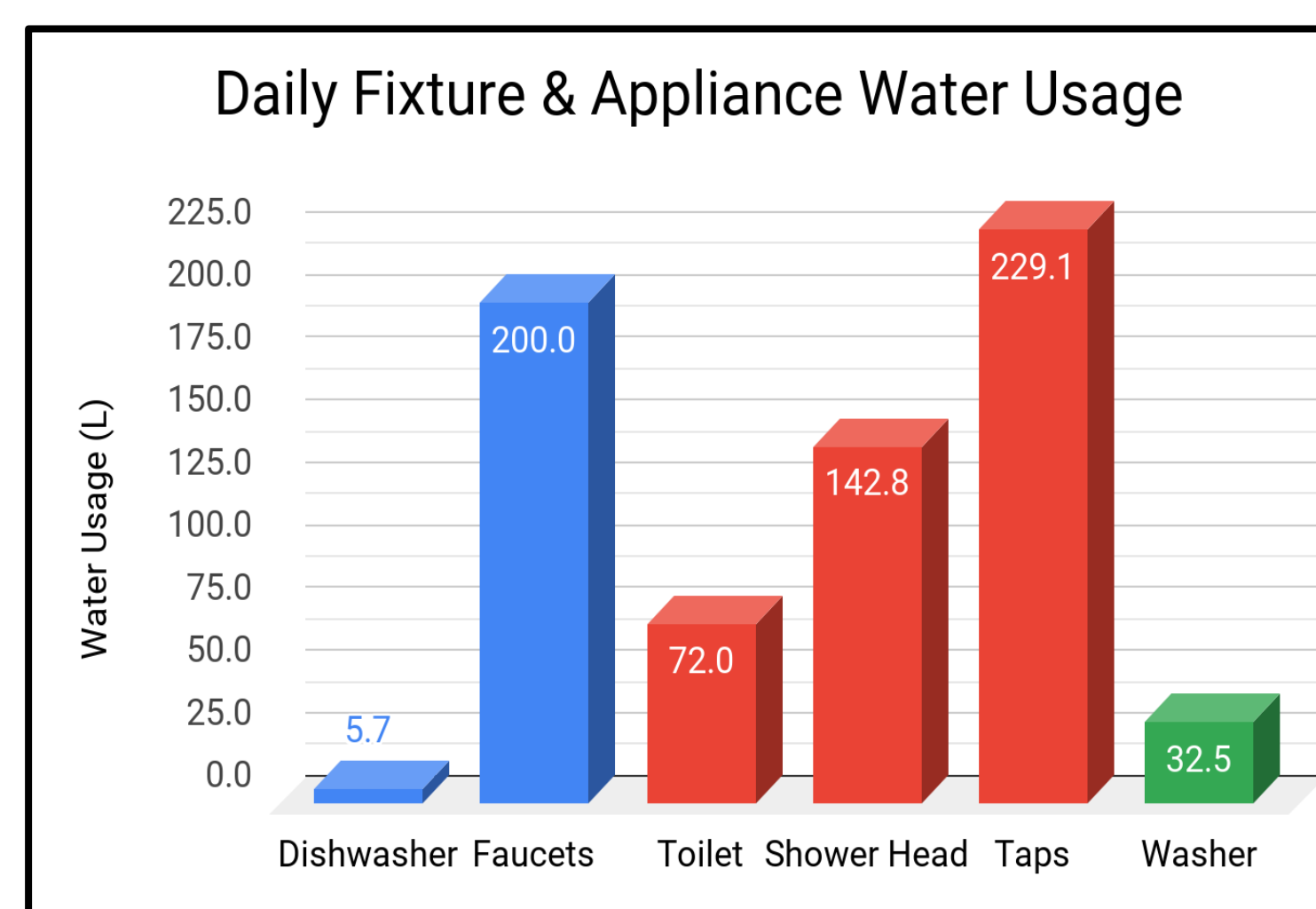


Fig 5: Fixture & Appliance Water Usage

Water Usage Questionnaire Results:

- The bathroom utilizes the largest percentage of water in a typical household with the home's overall usage of 65.1%.
- Within the bathroom the taps are the largest demand on water usage for the entire home using 229.1L per day.
- As the bathroom uses the most water per day, using more efficient fixtures would be most beneficial in this section of the house.

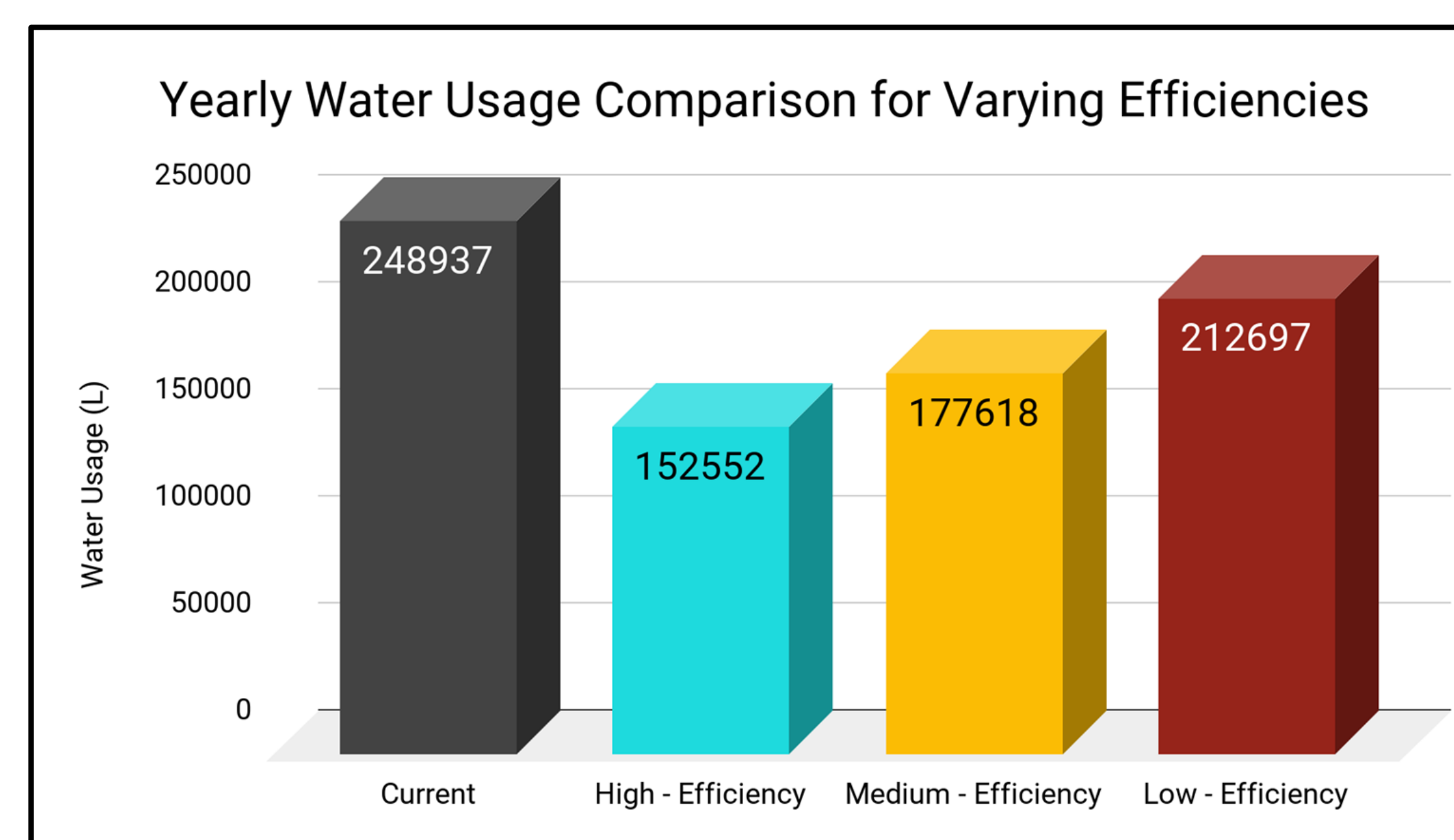


Fig 6: Water Usage Comparison

Water Usage Financial Analysis:

- By implementing more efficient water fixtures/appliances the homeowner would incur a significant drop in overall water usage.
- Lowering the overall water usage will lead to savings on water bills.
- Calculating the payback period for the replacement fixtures is necessary to help the client consider upgrading.

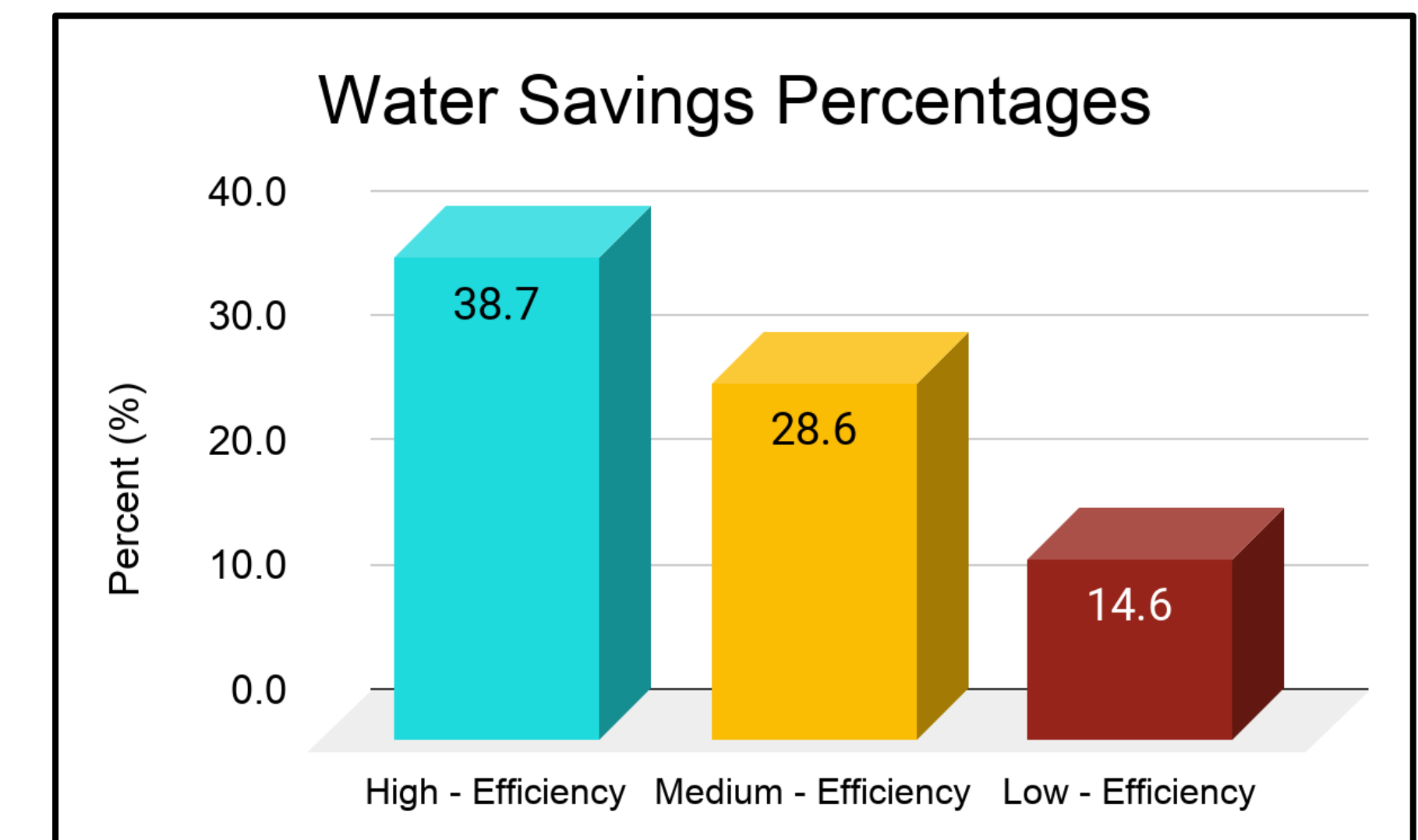


Fig 7: Water Savings Comparison

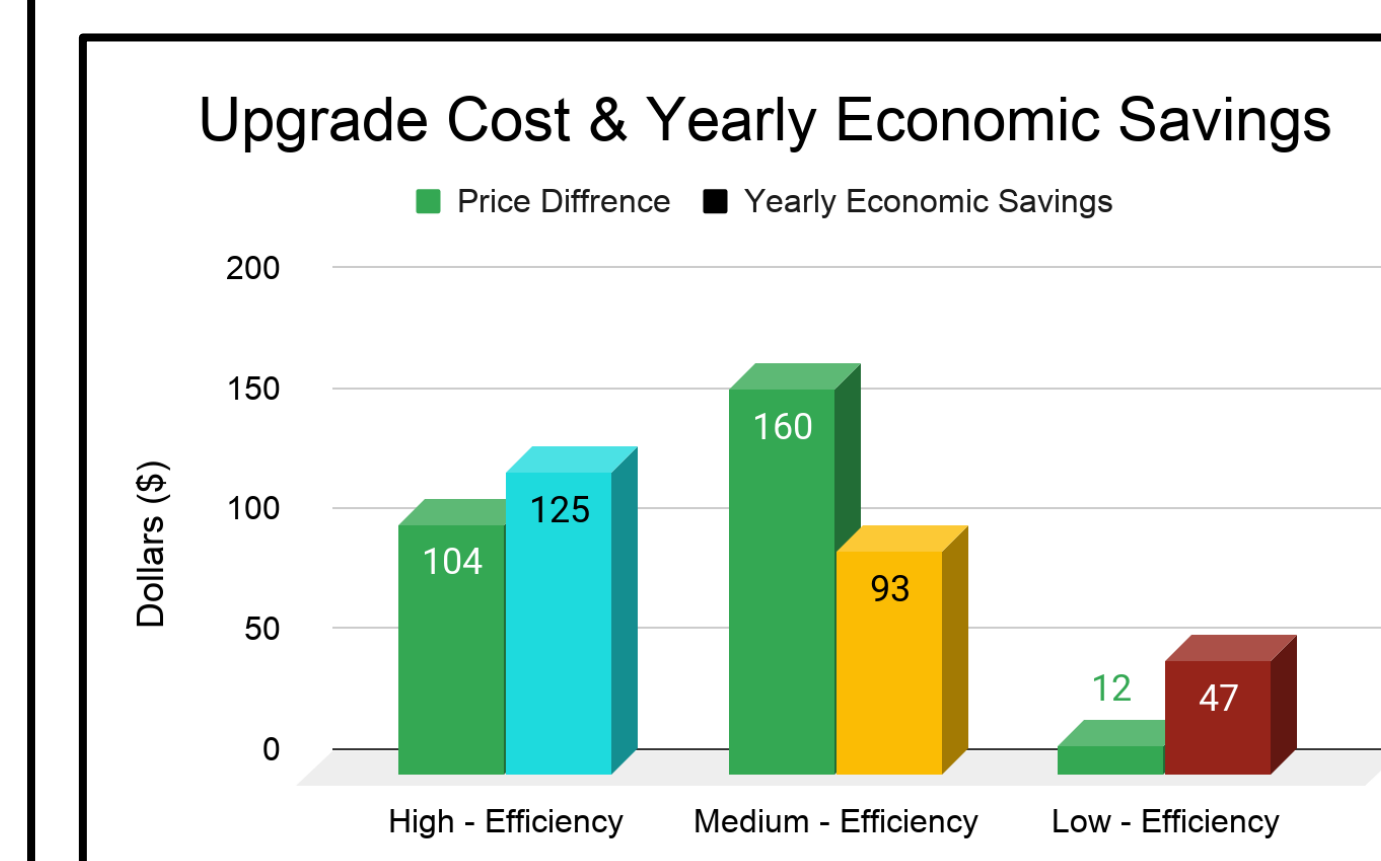


Fig 8: Cost & Savings Comparison

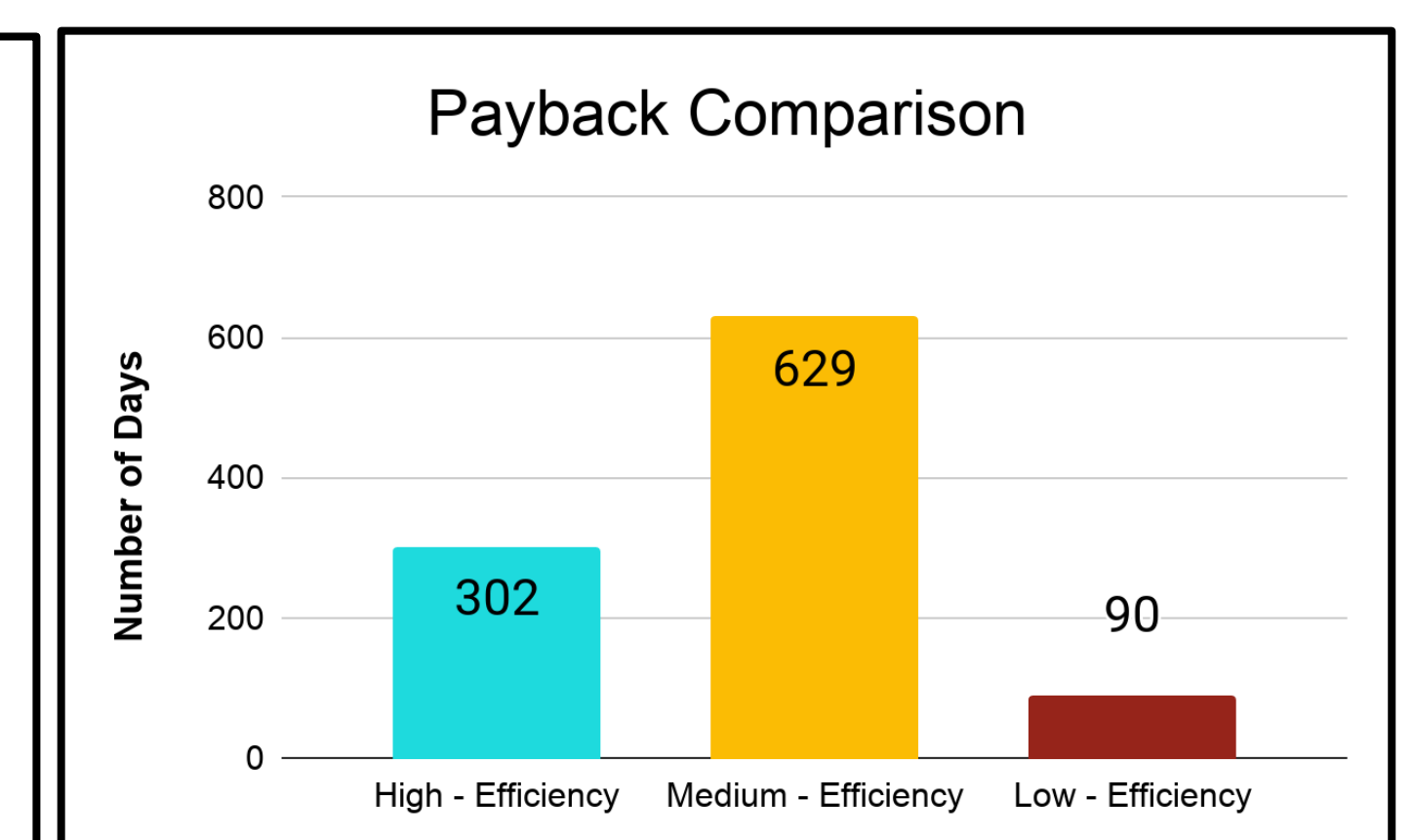


Fig 9: Payback Periods

Decision

Investing in high-efficiency fixtures and appliances will:

- Yield a payback period of 302 days.
- Result in a water usage reduction of 38.7%.
- Incur yearly savings of \$125.
- Incur water savings of 96,000 litres per year.
- Lead to a reduction of 960,000 litres of water and save a total of \$1125 in 10 years.

Implementing high-efficiency water fixtures and appliances would result in large water savings for a relatively small amount of money.

Implementation

Habitat for Humanity can make more informed decisions based on the water usage audit and analysis for future home designs. Efficiency PEI can consider future water fixture or appliance rebates based on the analysis results.

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