



FEASIBILITY STUDY OF RECYCLED GLASS AS AN ALTERNATIVE FOR BEACH NOURISHMENT

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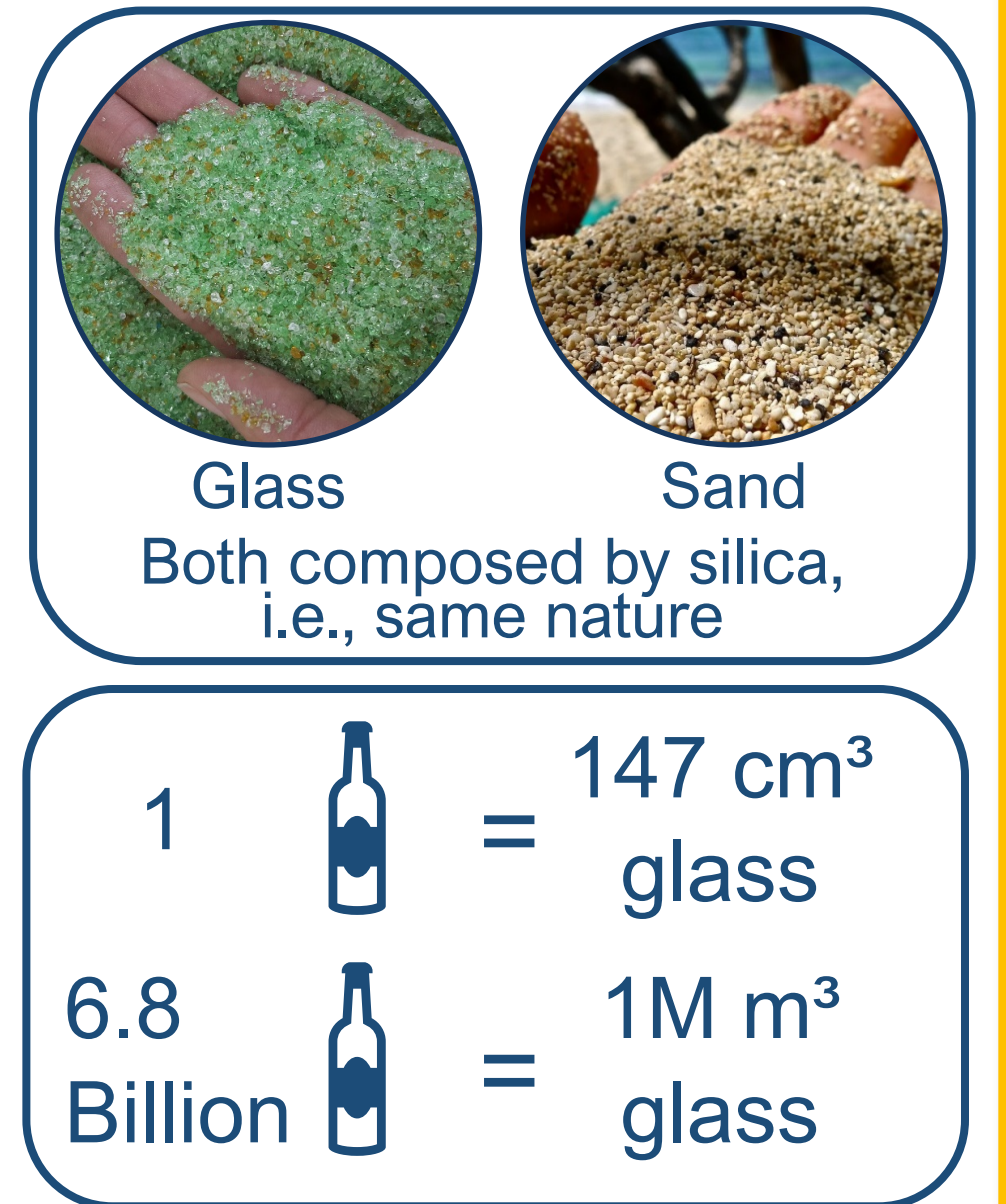
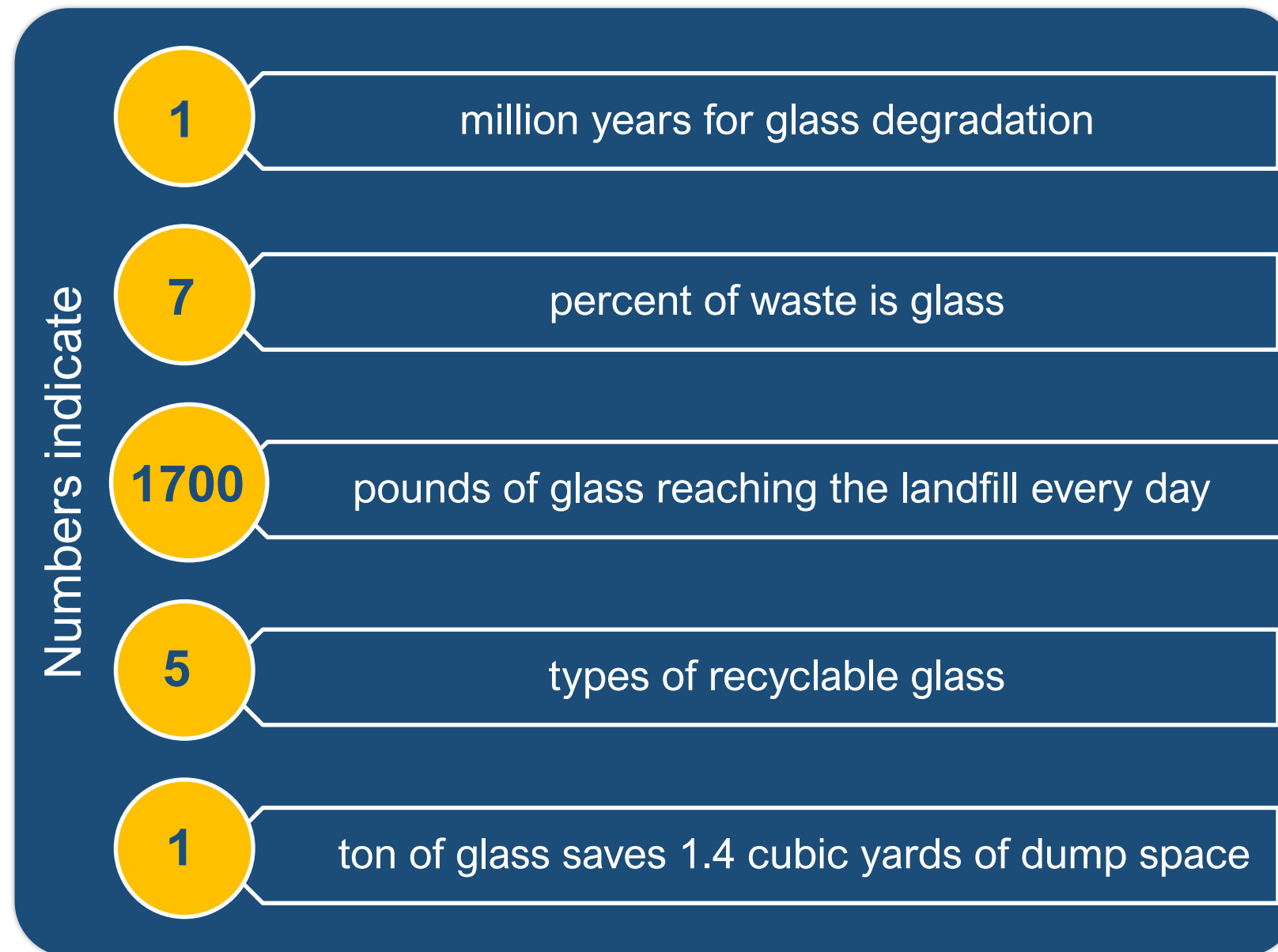
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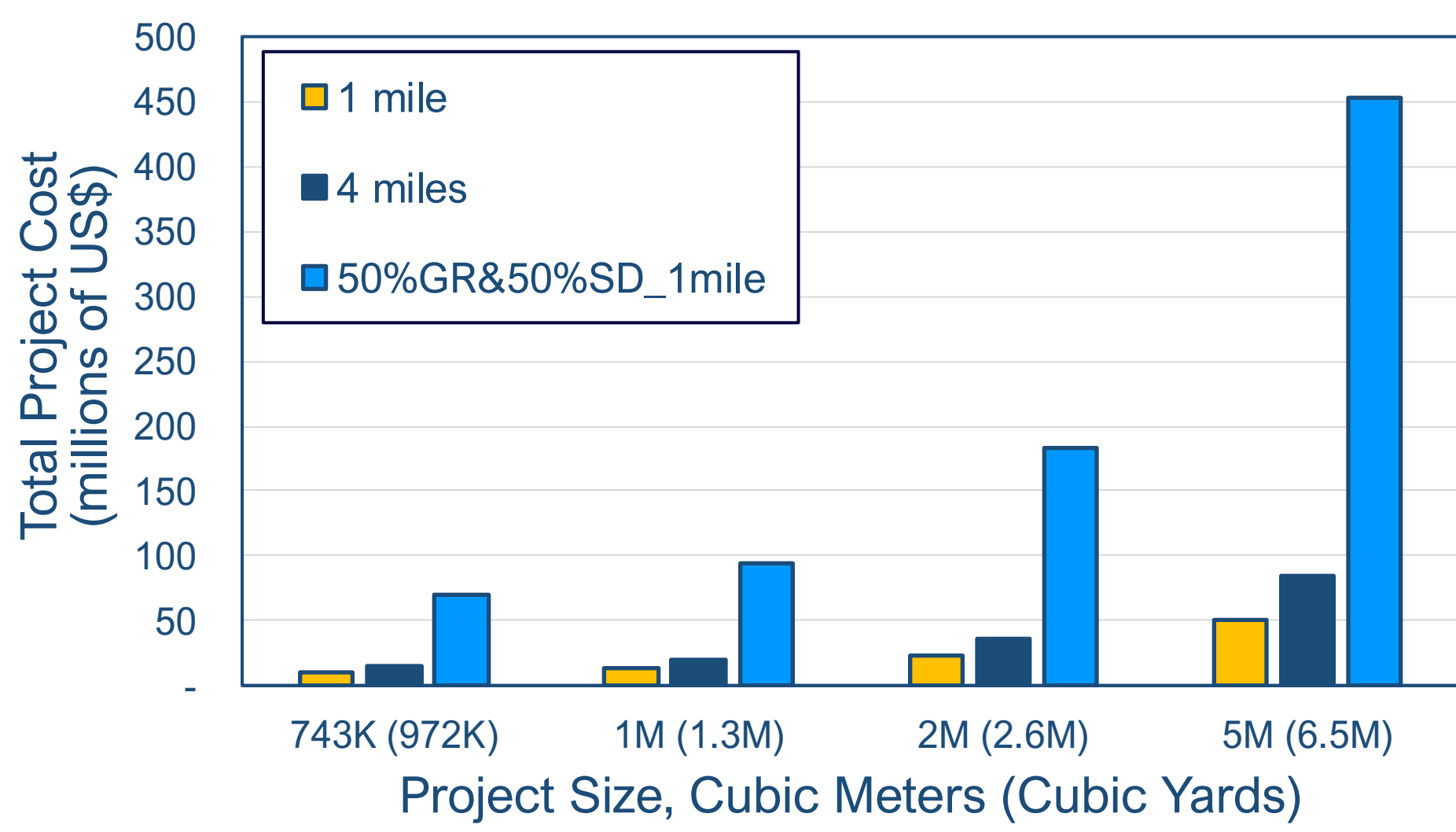
INTRODUCTION

Motivation: Erosion in Rincon, PR represents a significant problem, since receding shoreline rates have reached up to 1 m per year. Throughout history, several methods have been developed to prevent this problem, from building wave breakers to beach nourishment. Through this last one, beaches are restored by transferring sediment of equal or similar characteristics from sources of different locations to the affected region. However, on some occasions, the sand demand is not always satisfied, or the sediment properties do not obey the requirements of particle characteristics.

Alternative: In islands like Curaçao and New Zealand, beaches have been nourished with finely crushed glass. This idea is based on the fact that both types of particles have very similar composition, and crushing process can be controlled to obtain glass cullets of similar characteristics to the native sand. This also provides a solution for glass recycling, which is not implemented in Puerto Rico. This study proposes a 50/50 combination of sand and crushed glass to produce the required volume to perform Rincon's beach nourishment project.

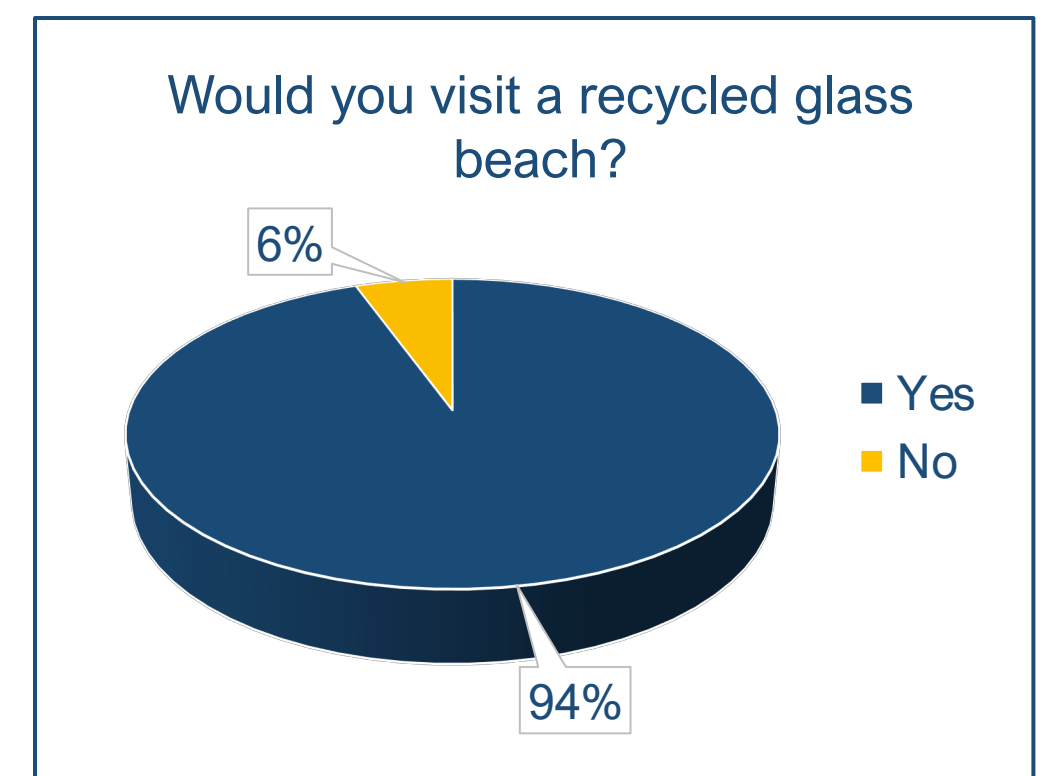
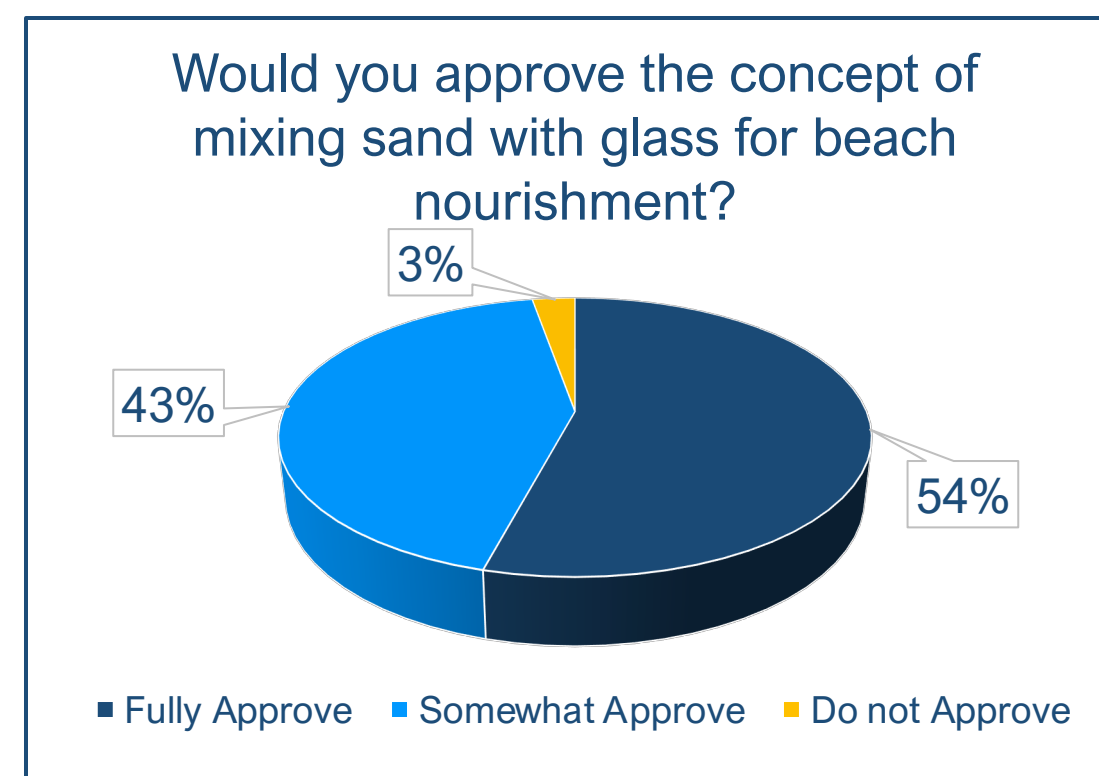
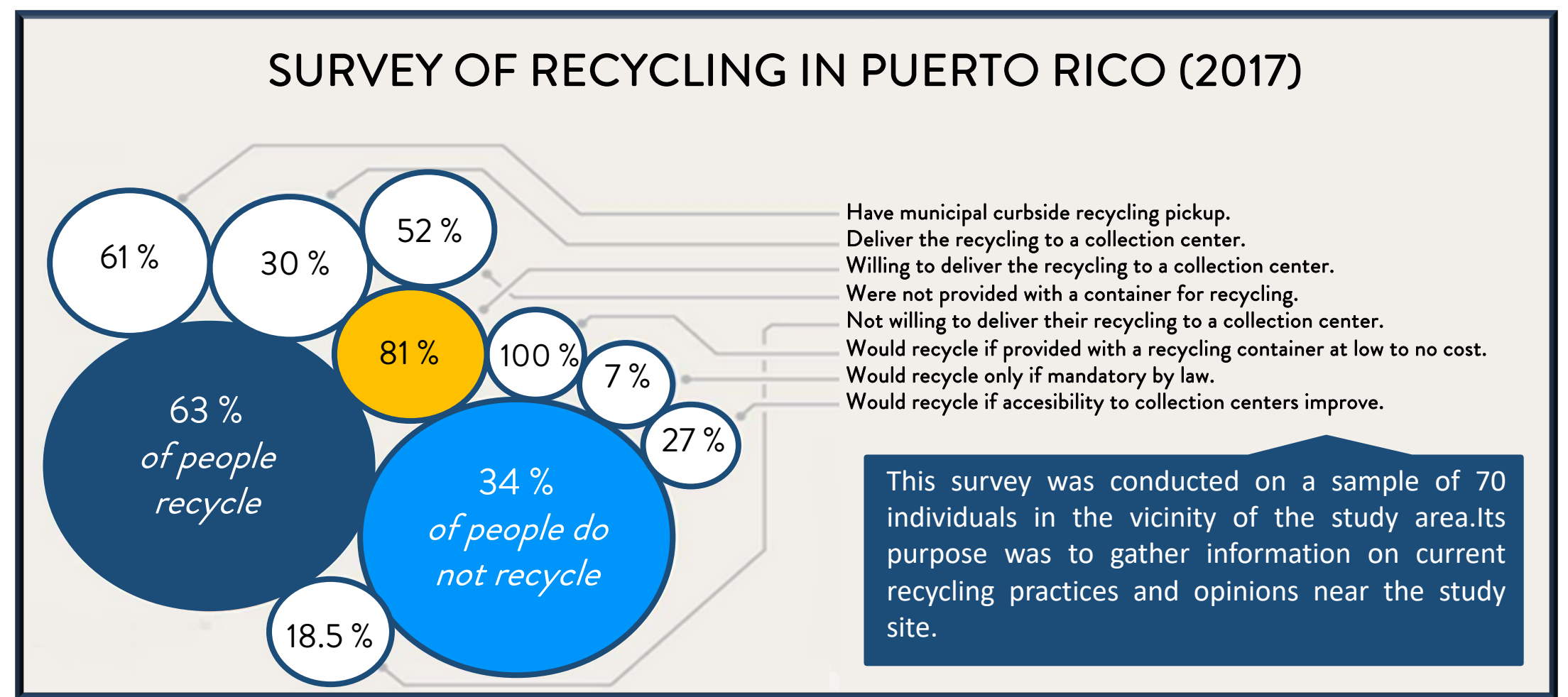


ECONOMICAL FEASIBILITY



- There is a proportional increment in cost as the size of nourishment project increases.
- Substituting 50% of the nourishment sand with glass increases costs by approx. 5 times, due to the cost of the crushing process.
- There is a big benefit though, since as much as **300 thousand cubic meters of solid waste would not be deposited in Puerto Rico's landfills.**

SOCIAL FEASIBILITY



- A Life Cycle Analysis (LCA) was performed to quantify the ecological and social health impacts of recycling glass for beach nourishment purposes.
- As a rule, the processing plants for the glass must be within a 45 miles radius of the work site to reduce the ecological impact caused by transportation.
- The analysis showed a great improvement with respect to disposing of these quantities of glass in landfills.
- Combining this with the economic analysis, it shows that there is a tradeoff. While the monetary cost is high, there is a great ecological and public health benefit.
- This project would increase awareness to the need of recycling, which is necessary as 1/3 of people surveyed do not recycle.

