

Project Title: Grass Lawn
Replacement Rebate Program
in Los Angeles

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Section: A02

ABSTRACT

California is in dire need of finding viable options that will help save water. Artificial turf replacements can greatly reduce the amount of water American households use for outdoor maintenance. Historically, Southern California experiences very low precipitation, which has lead to the implementation of a lawn replacement rebate program. This program helps subsidize people who decide to replace their lawns with artificial turf. Our objective was to calculate the amount of water and money that can be saved with turf and artificial turf lawns. Our calculations showed that people who opted to use this program would not only save water, but they would also save money in the long run. We compared these calculations by making a cost-benefit analysis over the course of 15 years. Though the installation fees are expensive, Americans can actually save up to \$9000 over the 15-year span by opting to use this program. Though our results favor switching to artificial turf, if California experiences heavier rainfall in the future, then water costs will go down and possibly reduce the benefits of the program. Based on our results, water and money can be saved for homeowners and the state, and we recommend implementing this rebate program in other California cities.

Introduction

Our project is focusing on residential urban water use. Urban water use can be broken down into two main components: indoor and outdoor use. Large indoor uses include laundry machine, dishwashers, faucets, showers and toilets. Outdoor uses mainly include watering the landscape. According to the EPA, the average American household uses 320 gallons of water per day, above 30 percent of which is devoted to outdoor uses. Urban water use makes up 10% of California's total water use, with 49% going towards environmental uses and 41% going towards agricultural uses.

Objective

The objective of our project is to determine how much water can be saved by replacing grass lawns with artificial turf. We will also be seeing if this replacement is economically effective for homeowners in Los Angeles with their current rebate price of \$3.75/square foot. The first task is to gather all relevant data regarding the amount of water used in Los Angeles grass lawns. The second task is to collect data regarding much it would cost to replace the lawn with turf and how much money would be made through the rebate program and saved through lower water bills. The third task will be to analyze the data and see if it proves our hypothesis correct.

Hypothesis

Switching to artificial turf will reduce the gallons of water used per person, and in the long run, homeowners will save money through lower water bill charges and rebates.

If drought conditions continue, it is likely that more rebates and incentives will exist, making lawn replacement more viable.

Data Sources

- 1) "Turf Renewal: Program Overview" (2015). SoCal WaterSmart, <<http://socalwatersmart.com/qualifyingproducts/turfremoval>> (May 22, 2015).

This website laid out the foundation of our project and why artificial grass is the more viable option. It explains the rebate program being offered in Southern California for those who opt to replace their lawns with artificial turf. It goes into detail about how to apply for the program and how to measure one's lawn.

- 2) Chapman, Erin (2015). "Lawn Size." *Grounds Maintenance For Golf & Green Industry Professionals*, <http://www.grounds-mag.com/mag/grounds_maintenance_lawn_size/> (May 22, 2015).

We used this site as our source for the average lawn size in the U.S. (in square-foot) and the average amount of money Americans spend on lawn treatment. This number was used in our equation, which will be explained later on, to calculate how much water can be saved by switching to artificial turf.

- 3) "Making Watering Easier (2015). Lowe's, <<http://www.lowes.com/projects/gardening-and-outdoor/make-watering-easier/project>> (May 20, 2015).

This site goes into detail about how to properly measure the amount of water needed for a lawn. We used these numbers and proportions to calculate how many gallons of water are necessary to water the average lawn size (found in the previous source) of turf grass in the U.S. We used these results to compare the amount of water saved between turf grass lawns and artificial turf lawns.

- 4) Hanak, Ellen, and Davis, Matthew (2006). "Lawns and Water Demand in California." *PPIC Research Reports*, <http://www.ppic.org/content/pubs/cep/ep_706ehep.pdf> (May 26 2015).

We drew information from this study to show that replacing lawns with artificial turf saves both water and money.

Methods and Assumption

To begin calculating the water usage for lawns in the City of Los Angeles we needed to determine the average size of a single-family law. After extensive research, we found that the average lawn size for single-family detached homes is 7,000 square feet. We determined the water use per year by using the function of .58 gallons per square foot per watering and multiplied this by the average number of days a lawn is watered in California. The average number of days a lawn is watered in California is 200

days per year. This value is then multiplied by the days numbered and the square footage and the gallon per square foot factor to get yearly water use.

For the artificial turf it is recommended that it be rinsed off once a week. We multiplied the 0.52 factor by 30 because on average 30 weeks out of the year it is not raining and the artificial turf must be rinsed. We then multiplied this value by the average area of the lawn. We obtained the figure for single family homes in the city of LA by multiplying the percentage of detached single family homes by the total number of housing units in the city as provided by the US Census. We then multiplied the number of single-family homes by the water usage per lawn per year and converted that to million acre-feet (MAF). We then found the percent difference between the two figures. The City of Los Angeles now has residents pay 700 dollars for every acre-foot of water; we multiplied this number by the number of acre-feet used per year for each individual lawn to determine water costs for lawn owners and artificial turf owners. Because artificial turf lawns are designed to last 15 years the cost of watering a lawn per year is then multiplied by fifteen, the lifetime of the artificial turf lawn, to determine lifetime water cost differences. The cost to install artificial turf per square foot is 6.25 dollars. We multiplied this figure by the number of square feet of artificial turf. The total cost of installation and materials for the averaged size lawn is 43,750 dollars.

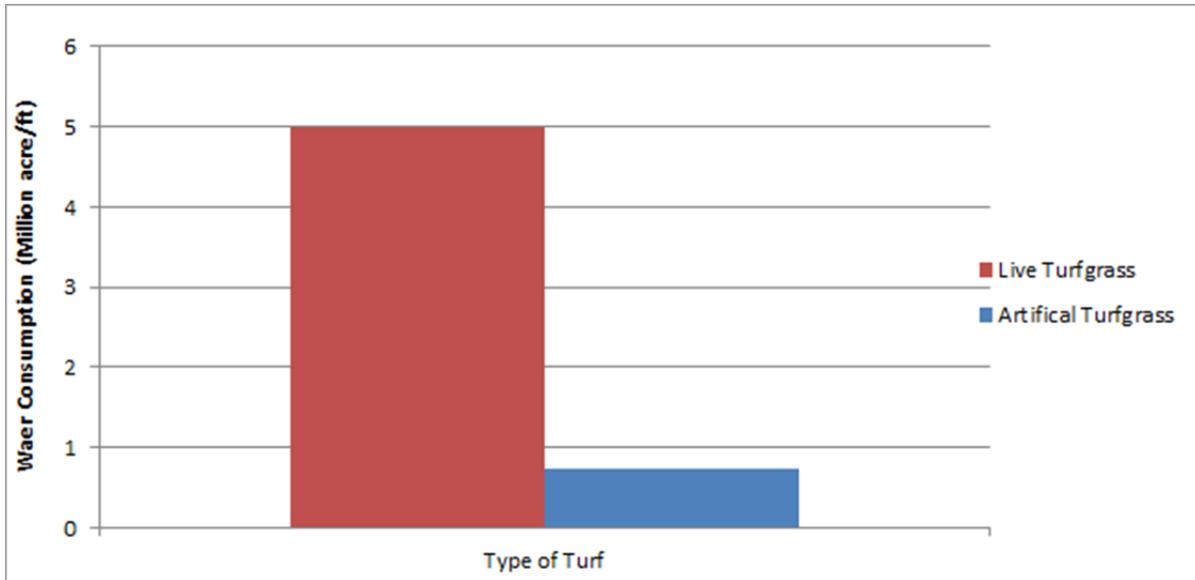
Live turf costs 0.42 dollars per square foot; the total cost for installation and materials of a 7,000 square foot lawn would be approximately 2,940 dollars. Artificial grass requires no mowing or uptake tools, no herbicides, and no nutrients, which means that over the fifteen-year lifespan these costs can be subtracted from artificial turf ownership as well. An entry-level lawn mower costs approximately 375 dollars and lasts

ten years; an entry-level edger costs approximately 275 dollars. Multiply the 650 dollar cost for tools by 1.5 to cover the 15 year span to come up with 975 dollars saved. To account for money saved per year in herbicides, seeds, nutrients, gasoline, and oil multiply the yearly cost of the sum for these products by 15. It appears that without incentives the artificial turf lawn will cost 16,660 dollars more than traditional grass over the 15 year period. Because of Los Angeles' 3.75 dollar rebate for artificial grass installation and materials costs the homeowner will now save 9,590 dollars over a 15 year period. This equates to a 640 dollar a year savings and using 690,000 gallons less water every year.

Calculation/Results:

In Los Angeles all live turf lawns will end up using approximately 5 million acre-feet of water per year. If all the lawns in Los Angeles were made of artificial turf they would only use approximately .75 million acre-feet per year. This equates to an approximate 4.25 million acre-feet savings each year. In graph 1 below, it can be seen the difference in amount of water that would be used each year.

Graph 1: Amount of Water Used per Year for Live and Artificial Turf

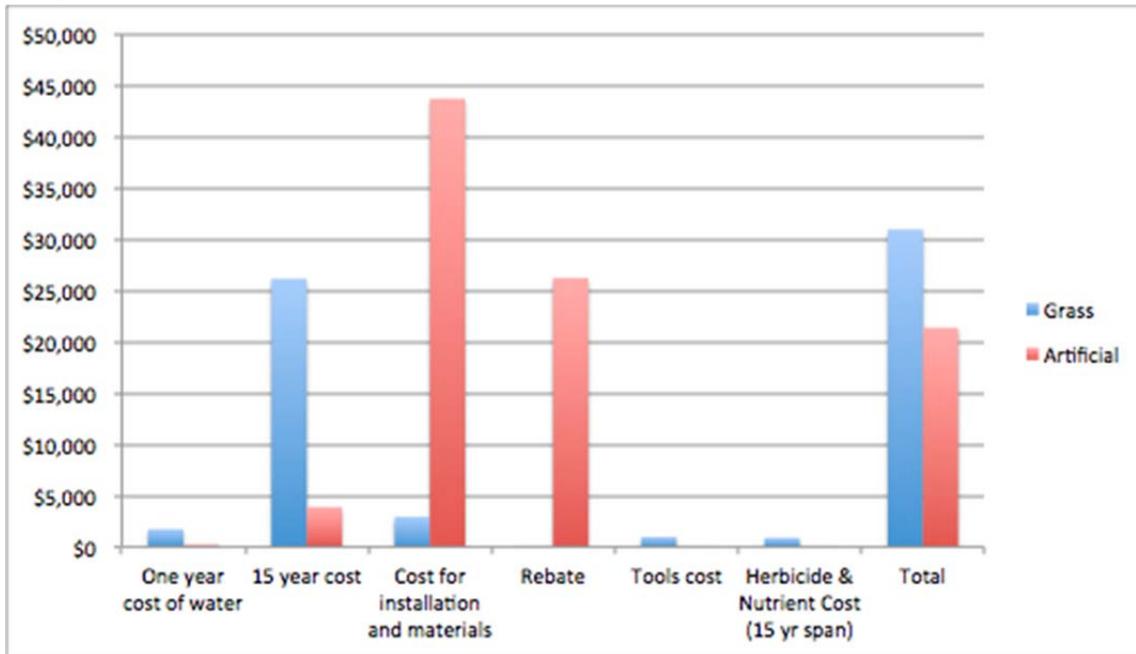


In graph 2 below, a comparison between the yearly costs of a live grass lawn and a artificial turf lawn is shown. The total cost of installation and materials for live turf is \$2,940, while its \$43,750 for an artificial turf lawn. However, the LA Rebate program that offers \$3.75 per square feet will give a household \$26,50 for a 7000 square foot lawn. This incentive helps offset the large installation cost and makes the lawn more affordable.

At current prices over a fifteen-year period, a household with a 7000 square foot live grass lawn will end up spending \$26,175. The household with the equal sized artificial turf lawn will only spend \$3,900 dollars on water over that fifteen-year period. This difference on water spent will ultimately save the household \$22,275 over those fifteen years. Including the cost of water for fifteen years, the cost for installation and materials, the cost of tools, the cost of herbicides and nutrients for fifteen year, and the LA rebate incentive, the total cost of a live turf lawn comes to \$30,990 and the total cost

of the artificial lawn comes to \$21,400. This provides a total savings of \$9590 for a household to switch to an artificial lawn from a live turf lawn.

Graph 2: Cost of Live and Artificial Turf



Conclusions

Our hypothesis was, in fact, correct by utilizing the rebate program and replacing live grass with turf, homeowners can save money and reduce water consumption.

Monetary savings can be had in three ways. First, the rebate program will offset the cost of installing a turf lawn at a rate of \$3.75 per square foot. Secondly, savings can also be had in the way of lawn maintenance. Lawn mowers, edgers, and other tools along with fertilizer and other nutrients can be a significant cost in the 15-year period we are estimating, and an artificial turf lawn requires no continual maintenance. Lastly, saving water is also a significant cost factor to be considered. Drought conditions will

only act to increase the cost of water, so our projected savings may be an underestimate as we continue to experience drought through the state.

The scope of this project is applicable to any city that is enacting a rebate program for lawn replacement. However, without a rebate similar to the \$3.75 program, lawn replacement is not economically viable. While it will conserve water, the expense could be difficult to justify for a typical homeowner.

Recommendation/Limitations

Unforeseen future conditions will influence the projected savings we have previously calculated. Many wet years in a row may lower the price of water, which would reduce savings by making the switch to artificial turf. This may also reduce rebate program funding, or the amount the rebate provides per square foot. It may result in the rebate program being canceled entirely. Also, the cost of artificial turf may change due to the nature of supply and demand. All of these together serve as the limitations of our project.

References

- Chapman, Erin (2015). "Lawn Size." *Grounds Maintenance For Golf & Green Industry Professionals*, <http://www.groundsmag.com/mag/grounds_maintenance_lawn_size/> (May 22, 2015).
- Hanak, Ellen, and Davis, Matthew (2006). "Lawns and Water Demand in California." *PPIC Research Reports*, <http://www.ppic.org/content/pubs/cep/ep_706ehp.pdf> (May 26 2015).
- "Making Watering Easier (2015). Lowe's, <<http://www.lowes.com/projects/gardening-and-outdoor/make-watering-easier/project>> (May 20, 2015).
- "Turf Renewal: Program Overview" (2015). *SoCal WaterSmart*, <<http://socalwatersmart.com/qualifyingproducts/turfremoval>> (May 22, 2015).