# Assessing a Cost Effective Path to Clean Water for Underserved Communities

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try our calculator!

## Context

- Neighborhoods like the South Bronx and LA face the challenge of providing safe, clean, reliable, and trusted water
- Most residents choose to use bottled water as their main source, inducing cost and taking efforts
- Tap water filtration, via RO or at the pitcher, may be a viable alternative, but installation costs and lack of awareness may be a barrier to adoption
- This report explores the benefits, drawbacks and cost effectiveness of filtration systems compared to bottled water and pitcher filters in these communities and their potential impact on the specific demographics

## Cost Models

**RO SYSTEM**

**TC = Cs + (Eu × cE × Y ) + (Nf × Cf) + (Wu × cW × Y)**

**Where:**

- **Eu = Energy usage per liters [kWh/L]**
- **cE = Cost of electricity [$/kWh]**
- **cW = Cost per liter of tap water [$/L]**

**PITCHER FILTER**

**TC = Cs+ (Nf × cF) + (Wu × Cw × Y)**

**BOTTLED WATER**

**TC = (Wu x Y) × cLB**

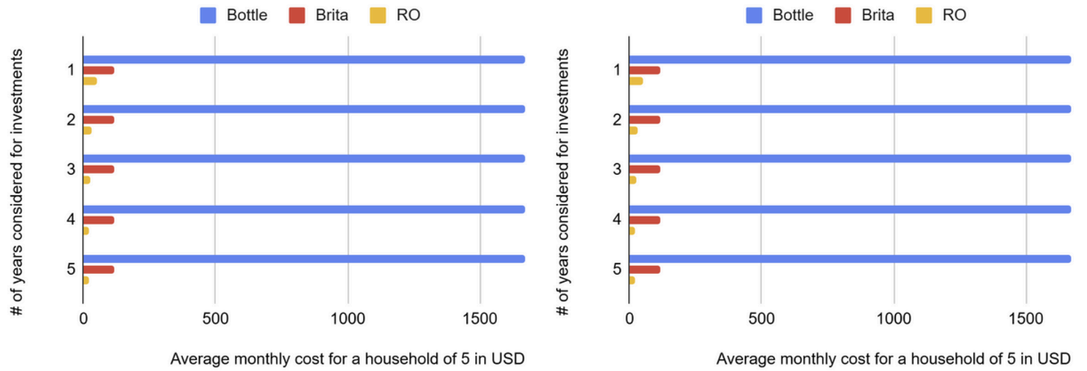
**Where:**

- **cLB = Cost per liter of bottled water**

Hs = household size
Y = Number of years
TC= Total Cost in USD
Wu= water usage per year [L/year]
Cs = Initial cost of investment
cF = Cost per filter [$/filter]
Nf = Number of Filters need it
cW = Cost per liter of tap water [$/L]

**Parameters:**

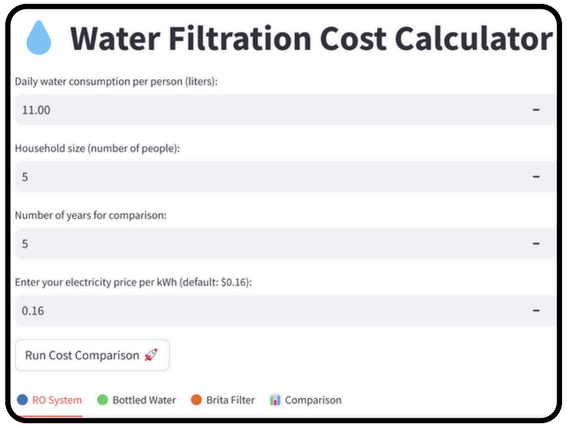
- Single person: 11L/day
- Household of 5: 55L/day
- Tap water: $0.0029/L
- Bottled water: $1/L (price based on U.S market)
- Electricity cost: $0.16 per kWh
- RO System: $500 initial cost, $25 per filter, E cost α Wu
- Pitcher filter: $20 initial cost, $10 per filter, new pitcher every 2 years




**RO is the most cost-effective long-term, being 2x cheaper than pitcher filters and 10x cheaper than bottled water over 5 years.**

**Our objective, as water engineers and scientists, is to provide data-driven solutions to humanity. Therefore, we developed this Python based calculator to help and assist people from underrepresented communities to put in context the cost of their water, whether it is through bottled water, pitcher filters, or reverse osmosis systems.**

**This is only meant to support broader advocacy initiatives, so that each individual and household can make informed, cost-effective, culturally mindful, and sustainable decisions.**




## Discusison and Next Steps

- Possible contaminants in tap water include lead, HAAs, arsenic and others.
- It is important to note that though RO systems can remove most contaminants, RO alongside, bottled water and pitcher filtration can have higher levels of nanoplastics than tap water.
- For this report, we focused the population to those who are economically disadvantaged - a majority of this demographic being minorities, with specific heritage and relationship to governments and trust in regulatory systems.

- A key goal is to be able to communicate the financial favorability of RO and education of water access in a meaningful way
- With their financial profile in mind, it is imperative to realize the struggles that these communities may face when it comes to time availability, health concerns, housing infrastructure, disability, ageism and more
- When it comes advocacy,
- Having subsidized programs could help to implement solutions that consider these benefits of RO systems
- Utilizing local environmental justice initiatives can effectively connect with the community

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