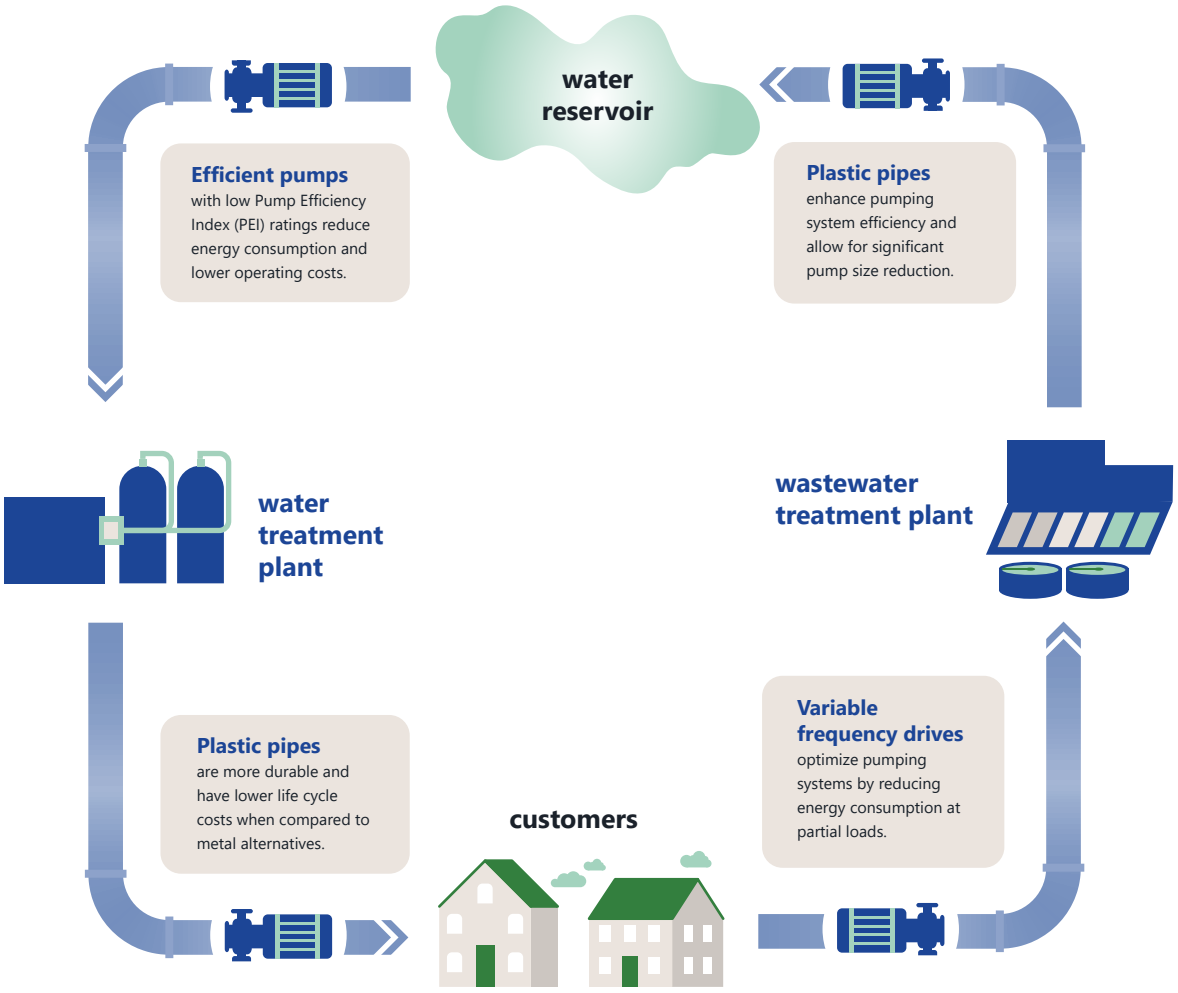
UNLOCKING SAVINGS WITH EFFICIENT PUMPS AND PLASTIC WATER PIPES

Public drinking water and wastewater systems are responsible for around 2% of the United States' total energy consumption, resulting in the emission of over 45 million tons of greenhouse gases every year. Pumps are responsible for most of the energy consumption in the municipal water sector.



Optimized pumping systems with plastic piping in the United States could[1]

Save 1.4 trillion gallons of water per year

Reduce electricity consumption at a level equal to 1.7 million homes

Save $2.2 billion in energy costs

Offset carbon emissions comparable to those of 1.6 million gas-powered cars

Assess systems to optimize pump and piping by:

- Integrating variable speed control on pumps.
- Replacing old and worn out pumps.
- Minimizing pipe failures and leakage with plastic pipes.
- Decreasing frictional losses with plastic pipes.

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1 These calculations rely on Cadeo's assessment of publicly available data and reports. For details of the underlying research and computations, please refer to the associated Excel workbook found here: www.pumps.org/efficientwater

Unlocking savings with efficient drinking water system pumps

Various types of pumps are used in drinking water systems, including centrifugal pumps, submersible pumps, and vertical turbine pumps. These pumps are designed to move water efficiently and can handle large volumes of water.

Savings opportunities for an optimized drinking water pumping system[1]

Energy savings per year

Equal to 460,000 American homes

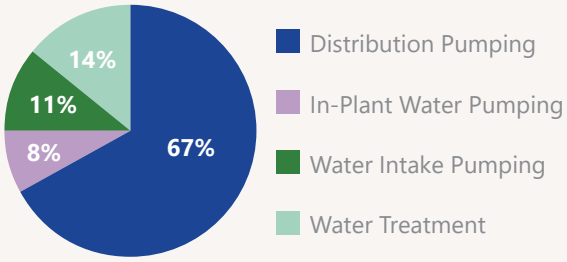
Cost savings per year

$421 Million

Carbon savings per year

Equal to 430,000 gas-powered cars

Pumps account for 86% of all drinking water electricity consumption



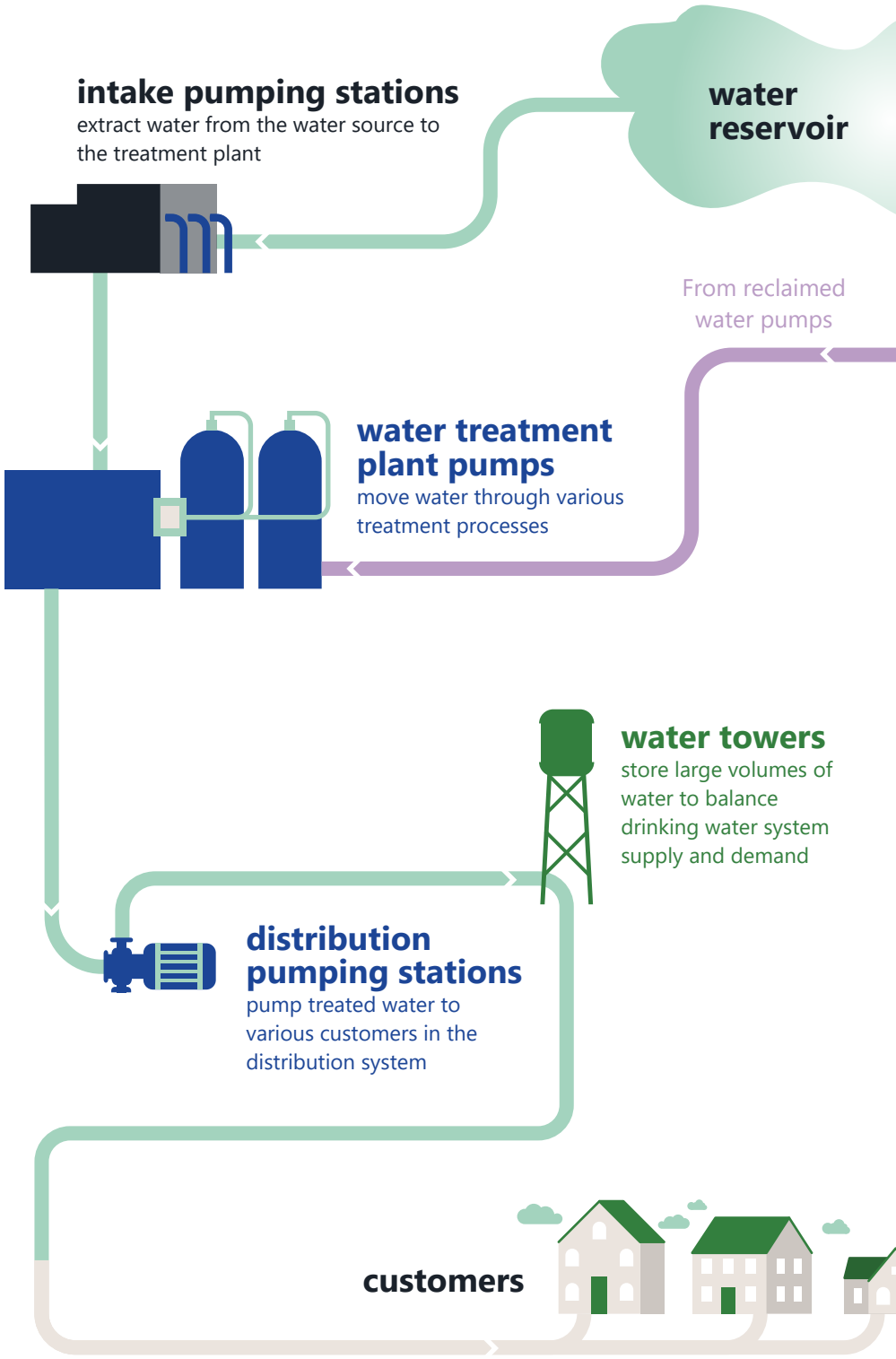
Drinking water energy consumption, by application[4]

148,000
Water Treatment Plants in the United States[2]

14,235 Billion gallons
Annual Drinking Water Consumed in the United States[2]

35,349 GWh
National Drinking Water **Pumping** Energy Consumption[2]

2.2 Million miles
Nationwide Length of Installed Water Mains[2]



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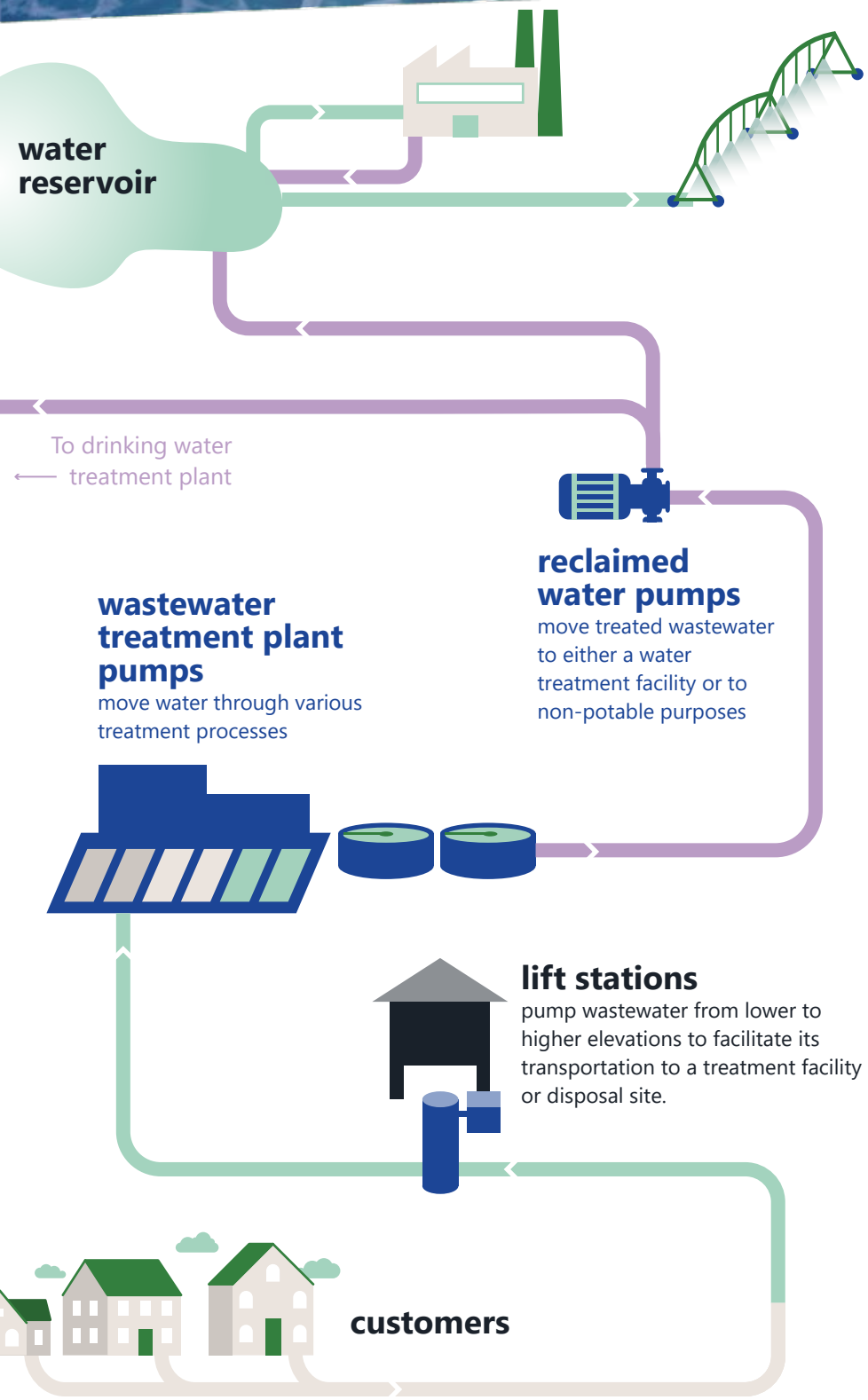
1 These calculations rely on Cadeo's assessment of publicly available data and reports. For details of the underlying research and computations, please refer to the associated Excel workbook found here: www.pumps.org/efficientwater
2 ASCE Drinking Water Infrastructure Report Card, https://infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-2021.pdf. (2021)
3 Cadeo calculated nation-wide pumping energy consumption based on scaling values found in EPRI's Electricity Use and Management in the Municipal Water Supply and Wastewater Industries report to the year 2022, https://www.epri.com/research/products/000000003002001433. (2013).
4 EPRI: Electricity Use and Management in the Municipal Water Supply and Wastewater Industries, https://www.epri.com/research/products/000000003002001433. (2013).

Unlocking savings with efficient wastewater system pumps

Various types of pumps are used in wastewater systems, including centrifugal pumps, submersible pumps, or vertical turbine pumps. These pumps are designed to move water efficiently and can handle large volumes of sewer water.



Savings opportunities for an optimized wastewater pumping system[1]

Energy savings per year

Equal to 430,000 American homes

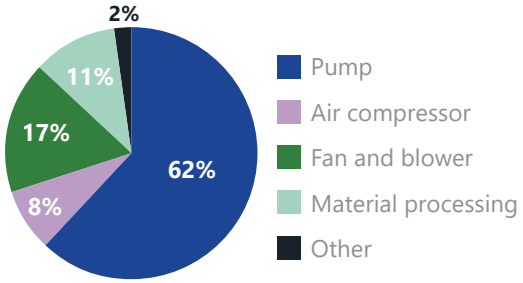
Cost savings per year

$393 Million

Carbon savings per year

Equal to 400,000 gas-powered cars

Pumps account for 62% of all wastewater motor-driven electricity consumption.



Wastewater motor-driven energy consumption, by application[3]

16,000
Public* Wastewater Treatment Plants in the United States[2]

22,813 Billion gallons
Annual Wastewater Processed in the United States[2]

21,250 GWh
National Wastewater **Pumping** Energy Consumption[2]

800,000 miles
Nationwide Length of Wastewater Pipes[2]

**This excludes the 23,000 privately owned treatment facilities*

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1 These calculations rely on Cadeo's assessment of publicly available data and reports. For details of the underlying research and computations, please refer to the associated Excel workbook found here: www.pumps.org/efficientwater
2 ASCE Wastewater Infrastructure Report Card, https://infrastructurereportcard.org/wp-content/uploads/2020/12/Wastewater-2021.pdf. (2021)
3 Cadeo calculated nation-wide pumping energy consumption based Cadeo calculated nation-wide pumping energy consumption based on scaling values from DOE's 2018 Motor System Market Assessment. https://motors.lbl.gov (2021)

Unlocking savings with plastic water pipes

Burst Failures

Over 58 million gallons of drinking water are lost due to burst failures each year in the U.S.[2]

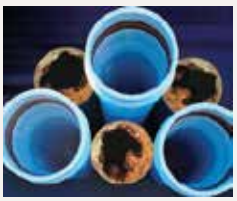
Plastic pipes have break rates 2x lower than ductile iron and 10x lower than cast iron alternatives.[2]

Earthquake Resiliency

Plastic pipes can provide earthquake resistance, important for many Western regions.

Corrosion and Chemical Resistance

Plastic pipes are corrosion and chemical resistant, eliminating the need for additional protective coatings in corrosive soils.



Proven Safe

PVC and HDPE are listed to NSF Standard 61, ensuring their safety for installation in a potable water system intended for public use or consumption.

Background Leakage

Over 1.4 billion gallons of drinking water are lost due to small leaks at joints each year in the U.S.[2,4]

Plastic pipes are designed and tested to provide leak-tight service for the life of the pipe.[5]

Frictional Losses

Plastic pipes are immune to internal corrosion, so no liners are needed to maintain water quality and flow characteristics.

Pumping energy requirements for plastic pipes are 40% less than ductile iron pipes after 30 years in service.[3]

Cradle-to-installation savings

Plastic pipes have reduced cradle-to-installation costs, energy demands, and greenhouse gas emissions linked to their manufacturing, transportation, and installation in contrast to alternative metal pipe options. Savings are based on comparing plastic pipe life-cycle values to ductile iron pipe life-cycle values.[1]

Embodied carbon savings: **20 – 40%**

Cost savings: **30 – 50%**

Operational savings

Plastic pipes have reduced operational costs, energy and water demands, and greenhouse gas emissions from burst failures, background leakage, and frictional losses.

The values below assume all non-plastic drinking water piping in the US is replaced with plastic pipe infrastructure.[1]

Water savings per year: **1,481 Billion gallons**

Energy savings per year: **Equal to 880,000 American homes**

Carbon savings per year: **Equal to 814,000 gas-powered cars**

Cost savings per year: **$1.4 Billion**

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1 These calculations rely on Cadeo's assessment of publicly available data and reports. For details of the underlying research and computations, please refer to the associated Excel workbook found here: www.pumps.org/efficientwater

2 Utah State University, Water Main Break Rates In the USA and Canada: A Comprehensive Study. (2018).
3 Sustainable Solutions Corporation, Life Cycle Assessment of PVC Water and Sewer Pipe and Comparative Sustainability Analysis of Pipe Materials. (2017).
4 ASCE Drinking Water Infrastructure Report Card, https://infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-2021.pdf. (2021)
5 Uni-bell PVC Pipe Association Technical Brief, https://www.uni-bell.org/Portals/0/ResourceFile/there-is-no-leakage-allowed-for-gasketed-pvc-pipe.pdf