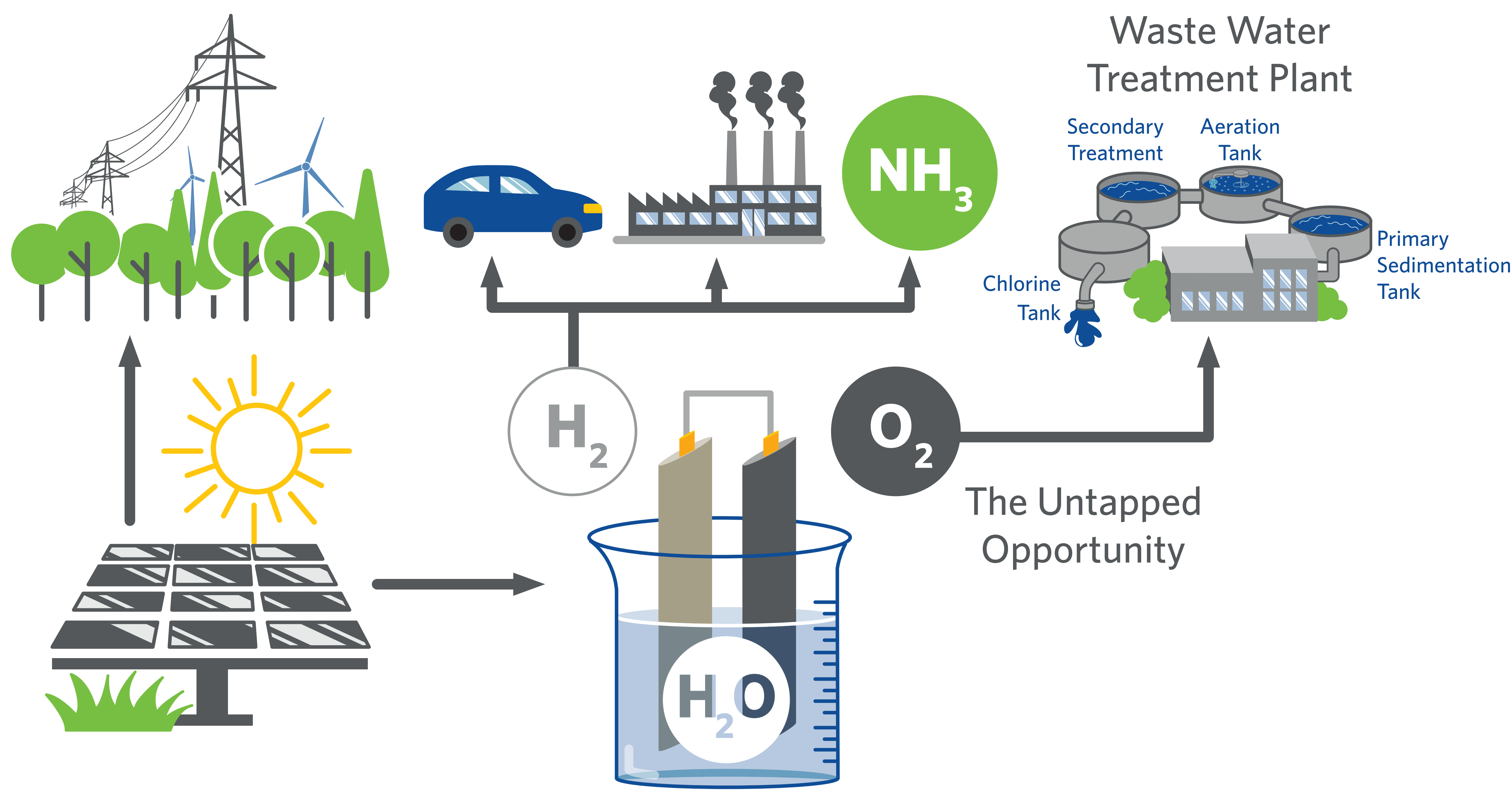


# Use of Green Hydrogen Electrolyzer Byproduct Oxygen for use in Wastewater Applications



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## The Economic Impact

- The annual energy consumption for this operation is 3300 MWh.
- Annual energy cost of this operation at an electricity rate of 10 cents per kWh is \$330,000.
- Oxygen Enrichment can decrease the energy demand and cost of this operation by as much as 80%.

## Introduction

- US Dept of Energy hydrogen energy earshot goal: cost of clean hydrogen to \$1 per 1 kilogram in 1 decade ("111").
- Water electrolysis using electricity generated from renewable energy technologies is the cleanest way to produce hydrogen resulting in zero greenhouse gas emissions.

## The Opportunity

- Oxygen is generated as a by-product from hydrogen production via water electrolysis.
- Wastewater Treatment Plants (WWTPs) consume a large amount of oxygen in the aeration step. The energy cost for aeration can be 15% - 49% of the annual operational cost of a WWTP.
- Blending the by-product O<sub>2</sub> from electrolysis can reduce the air demand for WWTPs, save energy and cost, and lower scope 2 emissions.

## A Case Study

- Consider a 10 MGD WWTP with 3 blowers of 150 hp each, delivering a combined airflow rate of 6534 scfm.

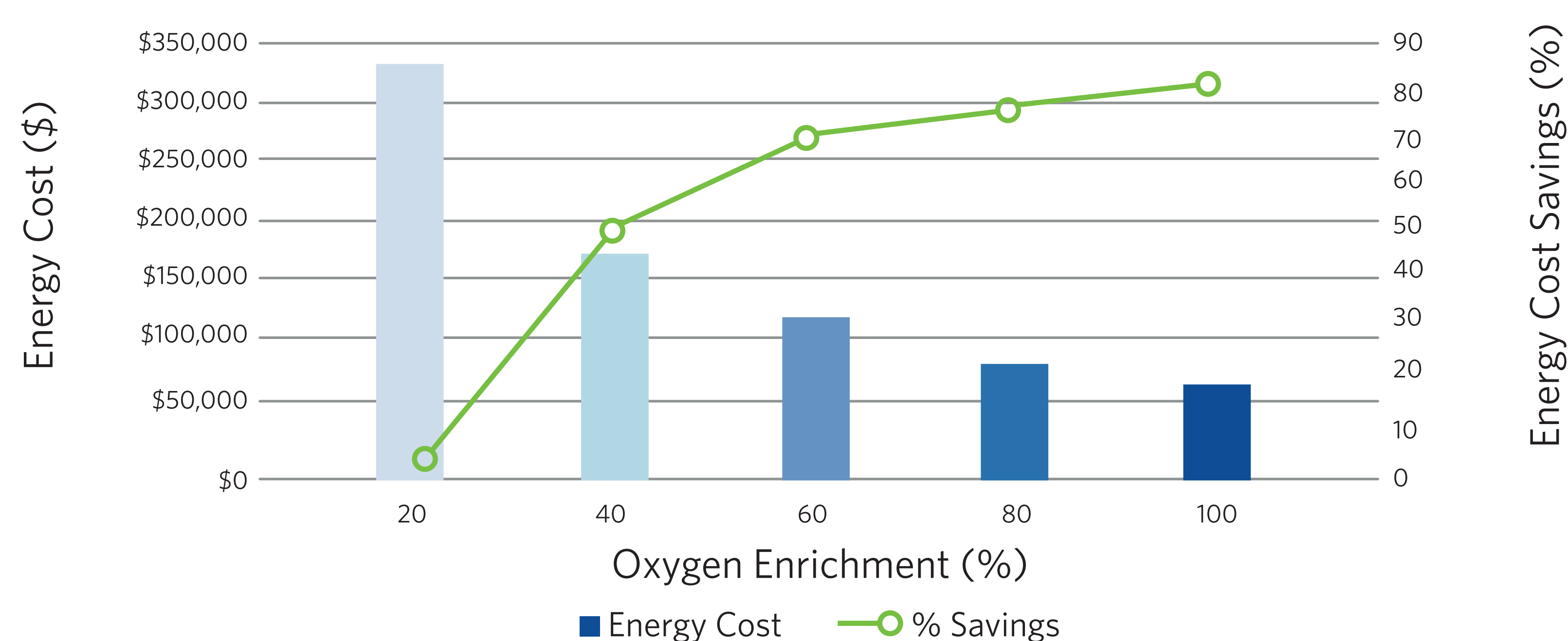
- Standard Oxygen Transfer Rate (SOTR)

$$SOTR = Flow_{air} \cdot CWTE(35\%) \cdot \frac{kg \text{ of } O_2}{m^3 \text{ of air}}$$

- SOTR of about 27,050 kg/day is required for a 10 MGD WWTP.

- To provide this SOTR 6,700 cfm of air (21% O<sub>2</sub> by volume) is required.

## Energy Cost (\$) vs Oxygen Enrichment (%)



## The Sustainability Impact

- As per GHG Protocol, Scope 2 emissions are indirect emissions associated with the purchase of electricity, steam, heat, or cooling from a utility provider.
- As per ERCOT data, 813.6 lb or 369 kg of CO<sub>2</sub> is produced per MW-hr of electricity

## Carbon Reduction vs. Oxygen Enrichment

