

ECONOMICAL CLOSED LOOP ZLD (ZERO LIQUID DISCHARGE) FOR PRINTED CIRCUIT BOARD MANUFACTURING FACTORIES

VS. TRADITIONAL FACTORY DESIGN ANALYSIS

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BENEFITS OF ECONOMICAL CLOSED LOOP ZLD (ZERO LIQUID DISCHARGE) FOR PRINTED CIRCUIT BOARD MANUFACTURING FACTORIES

- Our 99%+ closed-loop recycling system for PCB Fabrication reduces the environmental impact of PCB Fabrication to **an insignificant level.**
- This is achieved by eliminating wastewater discharge and using less water than the bathrooms for the Whole PCB Shop.
- Join the growing list of Closed-Loop ZLD adopters and **Future-Proof your factory from regulatory pressures and negative publicity.**
- Earn a great score for environmental stewardship with OEM's, with the first economical chemical and wastewater ZLD (Zero Liquid Discharge) recycling system for Printed Circuit Board Manufacturing Factories. **It's the win-win solution for a sustainable future.**

- Our system **breaks the traditional “connected strategy”** of equipment and proprietary chemicals in waste treatment, returning all of the value to the PCB Fabricator.
- **No proprietary chemicals** are required.
- Smart Factory Design is a **public benefit corporation** focused on delivering smart, economical solutions to reduce industrial pollution from the PCB Fab industry.
- We are proudly in partnership with some of the most **innovative and reputable chemical recycling equipment companies** in the world.

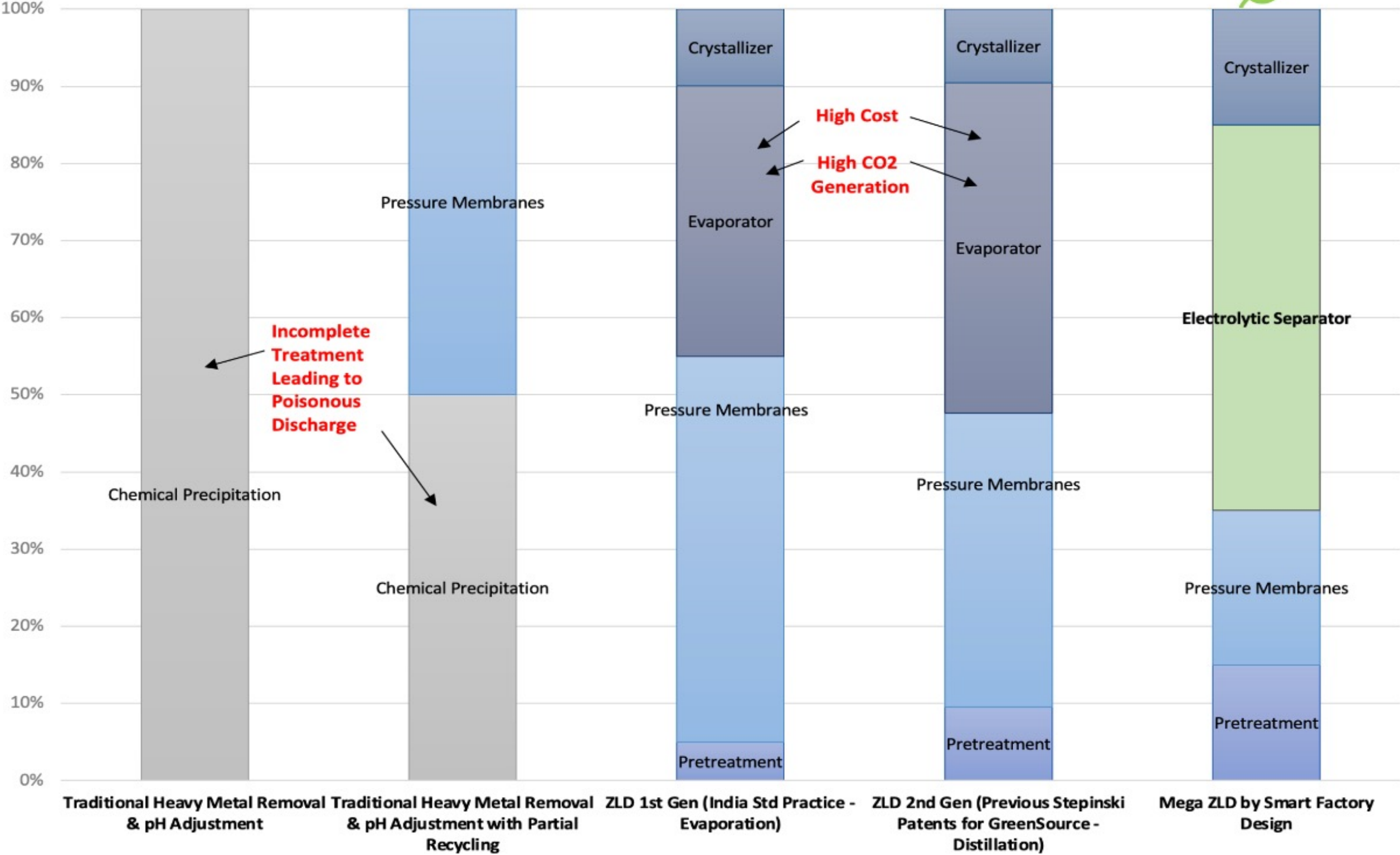
System Technology

Traditional Heavy Metal Removal & pH Adjustment
Traditional Heavy Metal Removal & pH Adjustment with Partial Recycling
ZLD 1st Gen (Evaporation)
ZLD 2nd Gen (Previous Stepinski Patents - Distillation)
Mega ZLD by Smart Factory Design

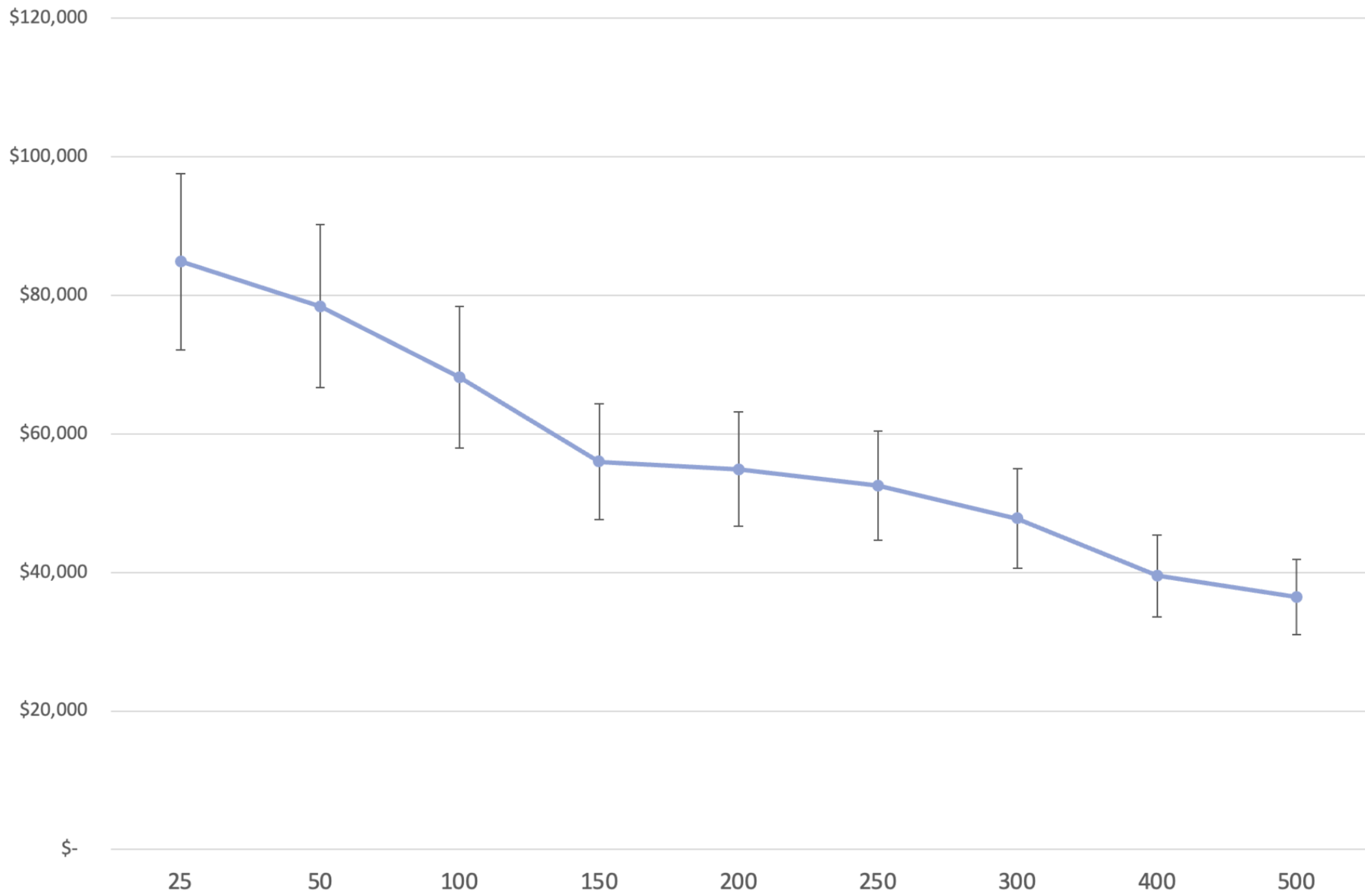
<u>Water Usage</u>	<u>Eco-Toxicity</u>	<u>CO2 Emissions</u>
High Water Usage	Dilute, Poisonous Discharge	High TOC Discharge w/ CO2 evolution
Significant Water Usage	Concentrated, Poisonous Discharge	High TOC Discharge w/ CO2 evolution
Significant Water Usage	Air Emissions from Evap	High Fossil Fuel Energy to Evap
		High Fossil Fuel Energy to Distill

- **Eliminating Greenhouse Gas Emissions (CO2):**
With our unique integration of AOP, specialized ion exchange processes, and closed-loop crystallization, organic compounds are oxidized and converted to solid carbonate salts, preventing the release of CO2 and volatile organics. Elimination of the evaporator reduces energy demand for heating water.
- **Water Usage and Eco-Toxicity:**
Smart Factory Design's ZLD systems use insignificant amounts of water. The bathrooms used by the employees in fact use more water than our system, and the amount needed is so small it can be generated from the factory HVAC system, by capturing rainwater, or directly from the air.
Since our systems do not have a discharge, and have no emissions, they do not pollute the water with microplastics and benzene compounds, or the air with solvents and CO2 like standard PCB Fab systems do.

PCB FAB Treatment Technology Strategy Comparison



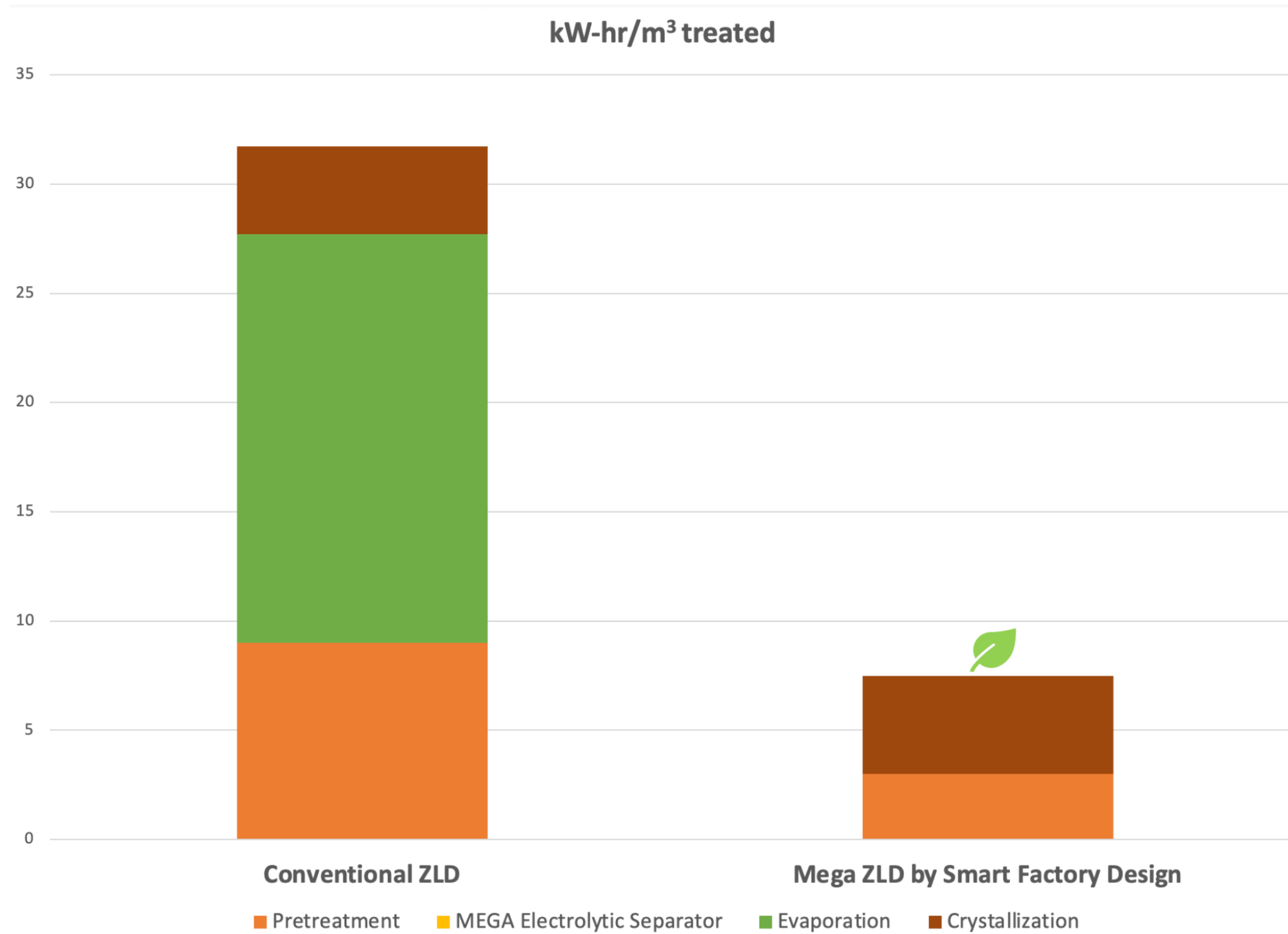
MEGA ZLD by Smart Factory Design Average CAPEX per m3/hr system capacity



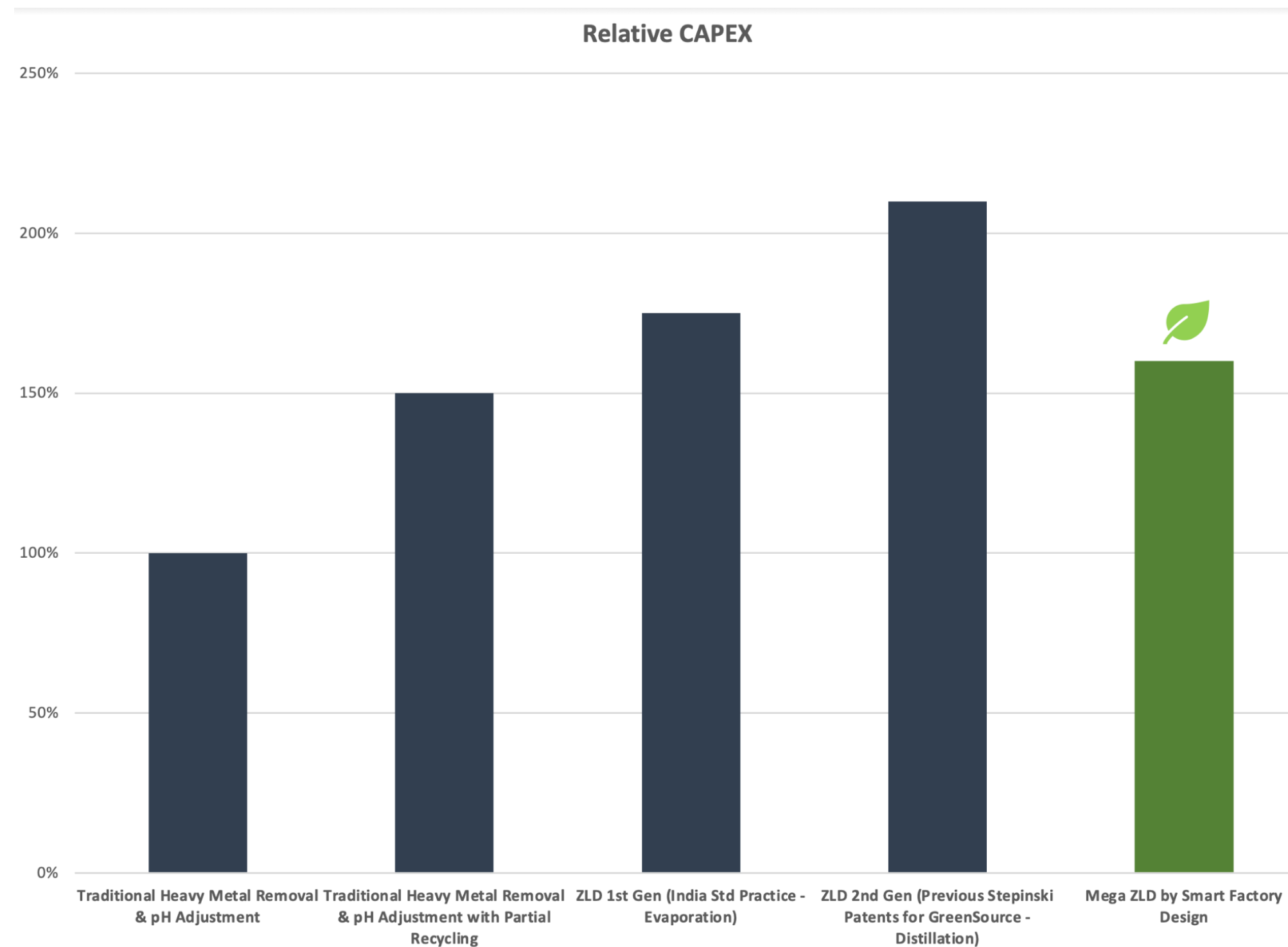
● FULL ZLD CAPEX/m3/hr capacity (Concentrates + Rinses = All Liquids)

* +/-15% depending on install location



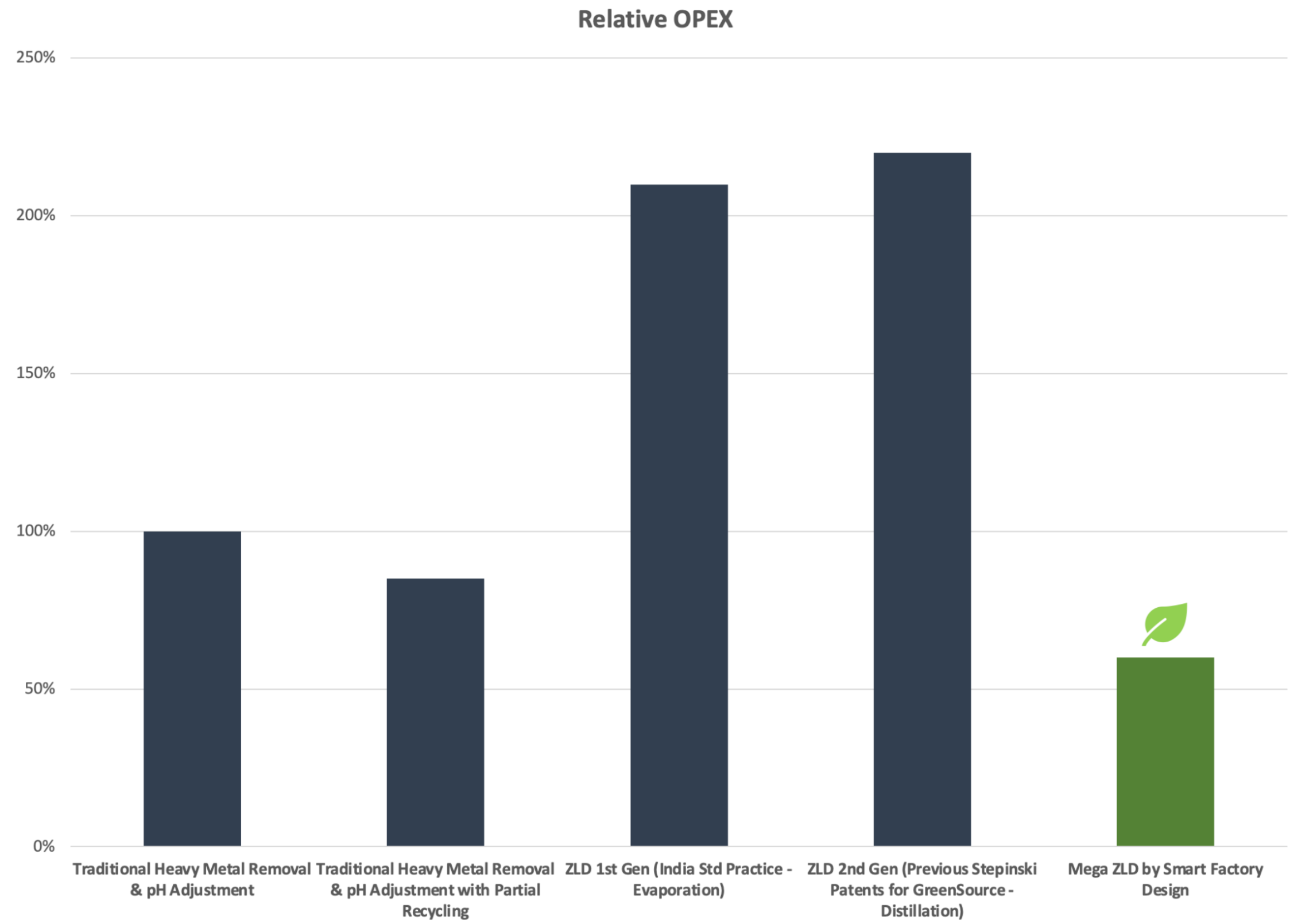


Replacement of the evaporator process with Mega's new electrolytic separator reduces the overall energy requirements of ZLD wastewater treatment by 75%.



CAPEX ROI's of 3-7 years are common for systems of 100 m³/hr or less vs any other approach.

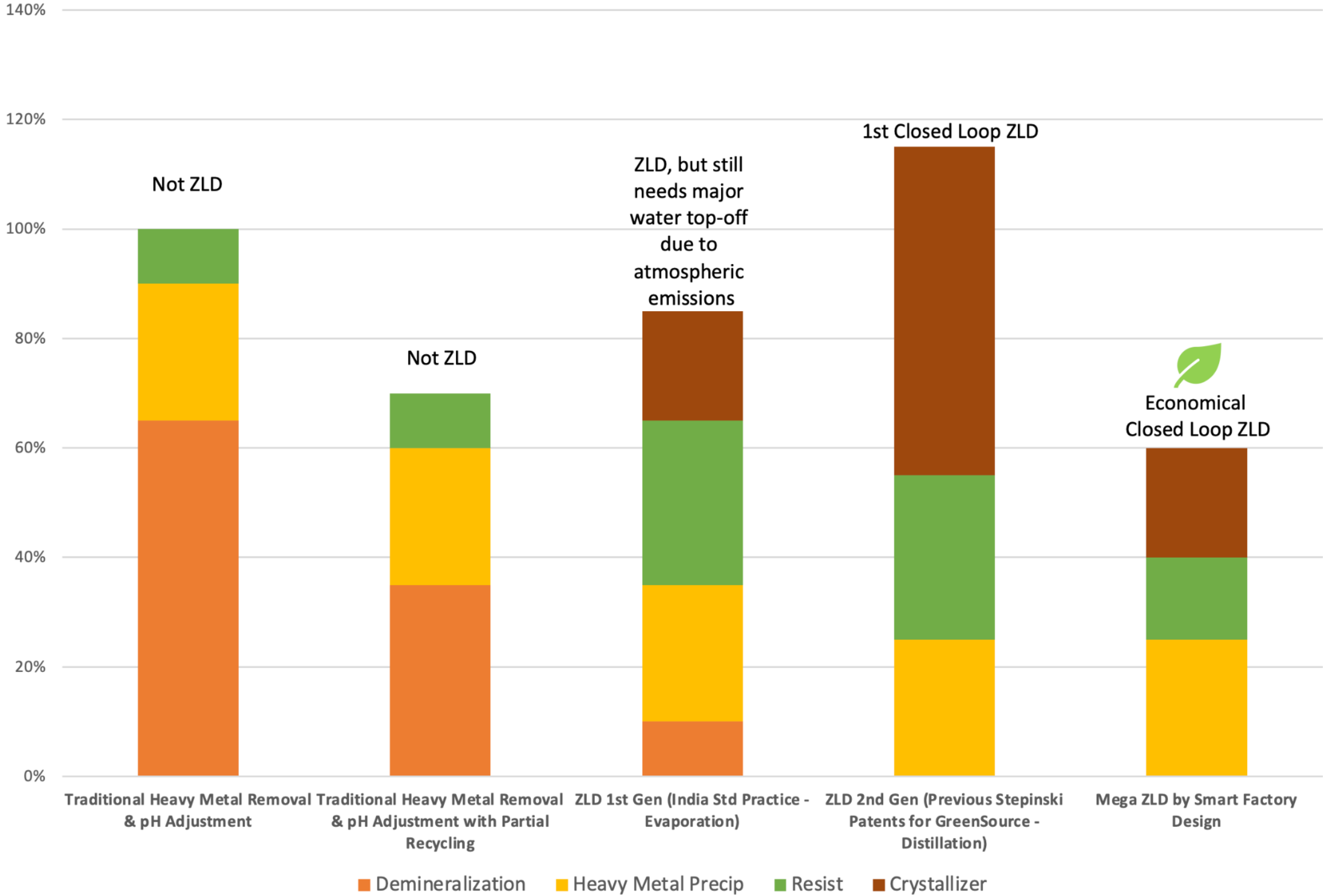
The design has strong economies of scale and systems > 100 m³/hr in volume have CAPEX ROI's of <1 year up to 3 years. The ROI is generated by the OPEX savings from the new system, coupled with the free DI water generation, and elimination of full-time labor requirements.



Smart Factory Design systems are fully automated and Industry 4.0 compliant.



Solid Waste Generation Relative Volume by Treatment Methods



- Our latest ZLD system has the lowest sludge generation volume of any other system in the market, with the exception of traditional systems with limited recycling.
- The partial recycling systems, however, only have this benefit because they discharge a highly concentrated and poisonous brine to the sewer instead of removing it as a sludge for responsible disposal.



**CONTACT US TODAY TO LEARN HOW SMART FACTORY
DESIGN CAN FUTUREPROOF YOUR FACTORY.**

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