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United States Ultrapure Water Treatment Systems Market: Power Generation, Pharmaceutical, and Microelectronics Industries

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The U.S. ultrapure water (UPW) treatment systems market for the power generation, pharmaceutical, and microelectronics industries is a highly saturated and mature market. The market is dominated by a few players holding a significant market share. The top four companies made up more than 65.0 percent of the overall market share by revenue in 2019. The market has witnessed a great deal of consolidation over the last few years, which has strengthened the ability of companies to offer multiple technologies and comprehensive solutions.

The market drivers include diverse value-added services, market consolidation and alliances, marketing efforts by companies, growth of end-user segments, technological advances to increase system reliability uptime, and cost effectiveness. This market study includes UPW treatment systems used in power generation, microelectronics, and pharmaceutical industries.

The base year for the study is 2019 and the forecast period is from 2019 until 2026.

This market report captures the following information on the United States Ultrapure Water Treatment Systems Market Power Generation, Pharmaceutical, and Microelectronics Industries:

- Market size, growth rate, revenue forecasts (2019-2026)
- Growth drivers and restraints
- Market data
- Market share analysis
- Market trends
- Quotes by key industry participants



- **UPW:** Water that has been purified to the highest standards and is free of contaminants such as organic and inorganic compounds, dissolved and particulate matter, volatile and non-volatile, reactive and inert, hydrophilic and hydrophobic, and dissolved gases.*
- **Water purity:** Water purity is defined by characteristics of resistivity (measured in ohm-cm) or conductivity (measured in $\mu\text{S}/\text{cm}$), which reveals inorganic impurities. Type I water is further defined by its total organic compounds (TOC), purity, measured in parts per billion.****
- **UPW water standards and regulations:**
 - The American Society for Testing and Materials International (ASTM), National Committee for Clinical Laboratory Standards (NCCLS), and International Organization for Standardization (ISO 3696) classify purified water as Type I, Type II, or Type III, with Type III being the least purified water and Type I being the purest water. These organizations have similar parameters for classifying purified water into these three types.**
 - **Power generation industry:** The International Association for the Properties of Water and Steam (IAPWS) is an international non-profit association of national organizations which specifies properties of water and steam, particularly thermophysical properties and other aspects of high-temperature steam, water, and aqueous mixtures.
 - **Microelectronics industry:** The International Roadmap for Devices and Semiconductors, Semiconductor Equipment and Materials International (SEMI), and ASTM present recommendations for water quality for various product types. ASTM D5127-99 is an example of a standard guide for UPW used in the electronics and semiconductor industry.
 - **Pharmaceutical industry:** The United States has a rigorous set of standards for pharmaceutical water purification and quality standards. These standards are governed by the United States Pharmacopoeia-National Formulary (USP-NF) publications and current Good Manufacturing Practice (cGMP) as required legally by the U.S. Food and Drug Administration (FDA). ***

UPW in the power generation industry:

Water quality is a crucial factor for avoiding corrosion and scaling of turbines, boilers, and pipes in power plants. Particles in the boiler feed water and steam shorten the lifetime of the turbines, leading to costly repairs or even replacement. Water quality specifications are provided by the turbine manufacturers.**

Treatment processes:

Water treatment plants are generally designed based on the incoming water quality, the required effluent quality, the project's reliability, maintenance, and operational criteria. There are significant differences in the quality and criteria of UPW for pharmaceutical, microelectronics, and power generation industries. UPW for the microelectronics industry has a resistivity between 16 and 18 Mohm-cm and a TOC of 30 ppb or less.

UPW in the pharmaceutical industry:

High-purity water is used as a product component and within the production processes. Water for injection (WFI) is used in the pharmaceutical industry to formulate medicinal products and cleaning in place (CIP) processes. WFI water is typically produced using distillation or reverse osmosis. Biopharma operators are primarily concerned with microbial, chemical, and endo-toxin contaminants that may compromise standards of safety, efficacy, strength, purity, and quality of a drug.***

Pressure-driven membrane water treatment technologies include:

- Microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and reverse Osmosis (RO).
- MF and UF membranes are used to remove particulate contaminants from a water stream.
- NF and RO membranes are used to remove dissolved contaminants from a water stream.

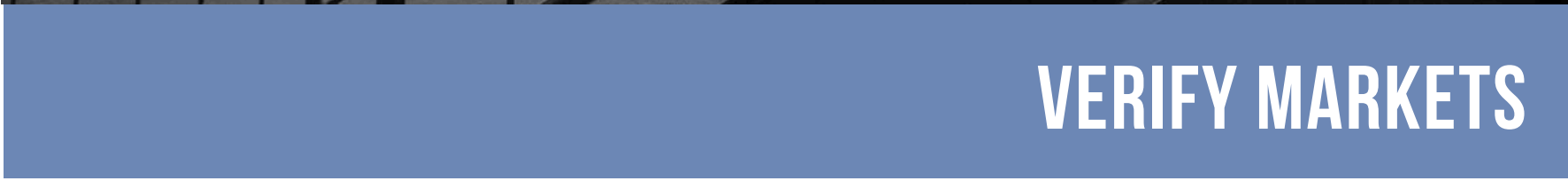
UPW in the microelectronics industry:

UPW is used in the microelectronics industry as a cleaning and rinsing agent during the various phases involved in the component manufacturing. The microelectronics industry has more stringent ultrapure water limits as well as process-specific requirements as compared to pharmaceutical and power generation industries.** Quality parameters are discretionary by the owner and are not regulated. Each manufacturing plant develops internal quality specifications based upon processing requirements with benchmarking ASTM, SEMI, and other industry sources.*** Microchip fabricators are concerned with particulate, ionic, and organic contamination detrimental to the integrity of microchip circuitry.***

About Verify Markets

Verify Markets is a Research Firm specializing in Industrial, Environmental, Energy, Consumer Products and Water markets. Our Research & Consulting practice provides global industry analysis, custom engagements, end-user analysis, strategy consulting, strategic market intelligence, and forecasts that are designed to facilitate strategic decision-making. Our team of consultants, industry experts and analysts continually monitor and evaluate information to create insights for your business needs. We are comprised of a group of analysts that have been tracking their respective markets for a number of years.

Our goal is to help you reach yours.



METHODOLOGY

The methodology when formulating market trend projection is outlined below. Historical trends were determined through secondary research and Verify Markets in-house database.

- Secondary research was conducted. A list of key industry participants was put together.
- Telephonic interviews were conducted. Most of the leading participants across China were contacted.
- Bottom up methodology was used to calculate the market size.
- Market drivers and restraints were built into the forecasting model to estimate the revenue growth and market size figures.

METHODOLOGY

Profiles of Interviewees: Vice President, Marketing Manager, Business Development Manager, Brand Manager, CEO (for smaller companies).

Most of the primary interview data was captured through telephonic interviews. Pictures, company contacts, preliminary data was captured through secondary research. Images are derived from company websites and other web sources.

Despite Verify Markets' best efforts, certain challenges were encountered and certain assumptions had to be made. The extremely competitive nature of the UPW treatment systems market often results in an increased reluctance on the part of several competitors to discuss their market position, future plans, or market trends. Verify Markets used its skills and experience to extract the relevant data in order to complete the analysis.



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Verify Markets is not responsible for any incorrect information supplied to us by companies during our primary research process.

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**ANY QUESTIONS?
CONTACT US AND SET UP A TIME TO
SPEAK WITH OUR ANALYSTS.**



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