TI Corporate Citizenship

Topic Brief

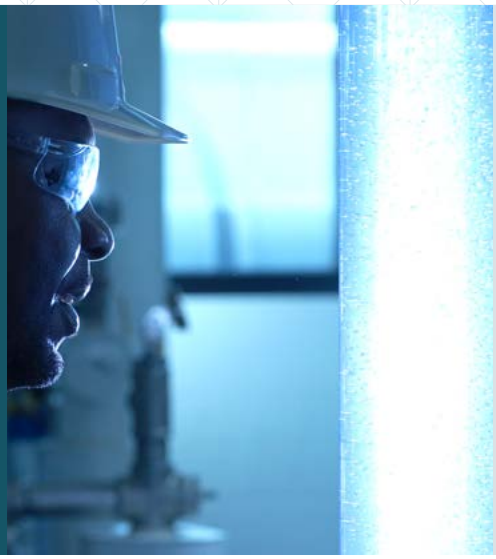
Water and wastewater

Texas Instruments

Water and wastewater

Why it matters

Water is an essential part of manufacturing semiconductors. We use it to create deionized water – a critical component in our production process. Because water is so important to our operations and to the communities where we operate, we take great care to use it responsibly and efficiently. Conserving water also enables us to reduce costs, ensure long-term availability and preserve this natural resource.



Since 2014, TI has implemented 448 conservation projects that saved $12 million and ~1.9 billion gallons of water – enough to fill 2,874 Olympic-sized pools.

Water sources

Our water sources include surface water, primarily from local municipal supplies, collected rainwater and groundwater. We use ultra-purified water during the fabrication processes and for rinse baths after chemically processing wafers.

Three types of water constitute our water footprint:

- Nonmanufacturing – used in restrooms, irrigation, drinking fountains and cafeterias
- Manufacturing – used in rinse-bath fills and other processes
- Manufacturing support – used in exhaust abatement and cooling systems

Goals

All of TI's main manufacturing and assembly/test facilities set annual reduction goals based on planned projects they identify; these are unrelated to public policy or areas of water stress. Collectively, these site goals have resulted in a combined overall reduction goal of about 4 percent in recent years. We report combined results in our annual Corporate Citizenship Report. For wastewater, our compliance goal is to have zero violations.

Oversight

We have dedicated water teams and champions at our corporate office and sites around the world who monitor consumption, maintain compliance and drive efficiencies. This information is shared monthly with our environmental, health and safety (ESH) leadership.

Water Process System team

- Comprised of TIers who are system experts from around the world
- Manages water protection and conservation efforts
- Troubleshoots issues
- Ensures that our sites track water use, implement best practices, conduct assessments, mitigate risks and maintain compliance

Site water champions

- Gathers/shares water use data with Water Process System team
- Promotes conservation and shares best practices
- Ensures that our sites track water use and maintain compliance

Water and wastewater

Management programs

Our water management standard establishes minimum expectations for water, wastewater and storm water management. This standard applies to all TI sites around the world that perform water treatment, including manufacturing, assembly/test and design and sales sites. Our standard often exceeds applicable regulatory requirements.

As a requirement of our ESH management system, which is certified to International Standards Organization 14001, each site incorporates water in its annual site risk assessment. Any identified risks are reviewed by our vice president of worldwide ESH, who oversees the company's water strategy. We also continually monitor local and country water restrictions, water stress and conservation measures.

Because water is so important to our operations and our communities, we work to use it responsibly and efficiently through:

See Environment, safety and health to learn about TI's:
– Management system
– Environmental policies
– Grievance mechanisms
– Governance and accountability

We monitor and manage water at sites we financially control and that are larger than 50,000 square feet. Smaller facilities are typically design or sales facilities that use relatively little water and have little impact.

Water	Wastewater
- Investing in projects to reduce, recycle and reuse water - Requiring all sites and suppliers to adhere to our ESH policies and principles, which holistically ensure that we conserve resources - Educating our workforce on how to reduce the size of our water footprint - Encouraging TIers to report leaks and avoid running water unnecessarily - Developing site-specific water management plans that consider local climate and hydrogeology, water availability and existing controls	- Segregating chemicals that have the potential to impact water quality and restricting or banning the use of some chemicals - Ensuring water quality complies with regulatory limits before discharging - Upgrading wastewater systems to maintain compliance, as well as our processes to ensure water quality - Assessing industrial wastewater treatment plants annually and hiring trained or certified operators

Availability

While we cannot control regions facing drought, we monitor future water availability issues for all operations, specifically those in North America and Asia. When necessary, we also work with country, regional and local agencies, suppliers and local water utility management and operations teams to discuss emerging risks and possible mitigation plans.

At our Texas sites, which make up the largest concentration of our operations, we engage with the Texas Water Development Board and monitor its water use survey activities. This enables us to help shape the community's water supply into the future and prepare our own operations. Currently, neither TI nor our supply chain is experiencing any issues with water supply.

Quality

All TI wastewater treatment plants have strict standards and operations that are based on regulatory requirements and ensure that discharges meet local, state and/or country-level requirements. These vary by site, but each complies with rules and implements controls to reduce environmental and runoff impacts. Priority substances of concern are based on regulated parameters and prohibited discharges. We also have internal standards, programs and procedures in place to ensure that naturally occurring runoff complies with local and national requirements during normal operations and construction activities.

Most of the wastewater generated by TI is treated on-site and we segregate solvents, concentrated metals and some acid solutions. We then neutralize the wastewater before discharging to a publicly owned treatment works or municipal water authority. There, it is further treated before being discharged to surface waters. We conduct periodic monitoring to ensure we are operating significantly below discharge limits, which take into consideration the profile of the receiving water body.

We take additional precautions at sites in Malaysia, Philippines and Japan because treated wastewater is discharged directly into a body of water instead of a municipal treatment facility.

Reuse and recycling

We reuse water in other processes where possible and pump water through cooling towers to reject waste heat from the manufacturing process. Water that does not evaporate during this process is treated and released back to municipal systems. We reclaim and recycle about a quarter of the water used in manufacturing worldwide, and direct it back into our system for reuse in cooling towers, scrubbers or manufacturing.

TI also reclaims and reuses some wastewater. Some chemical waste streams that are segregated from wastewater are collected and reused by external organizations.

Some of our site water conservation projects include:

- Installing water recirculation units on thermal processing equipment to reduce use of city water
- Reducing water alkalinity (pH) in cooling towers to prevent calcium buildup and scaling – this saves money and uses less water to flush mineral-concentrated water
- Implementing tool optimization and water purification plant projects to conserve millions of gallons of water annually
- Maximizing the amount of condensate and microfiltration water directed to cooling towers
- Reusing reverse-osmosis reject water for toilet flushing and reusing water in our central utility plant cooling towers

Reporting and measurement

Each year, we voluntarily report our water footprint to the CDP (formerly known as the Carbon Disclosure Project) and in our annual Corporate Citizenship Report. This data is compiled from billed quantities from municipal suppliers as well as our production metrics. We also measure effluent rates and volumes, and analyze industrial wastewater and storm water samples using standard methodologies set by the U.S. Environmental Protection Agency.

Evaluating our progress

To assess the effectiveness of our water management strategies, we conduct comparative assessments of tools and processes, benchmark against peers and share best practices. We also track actual water usage at each site as well as projects that were completed to reduce consumption. Site managers review results and compare them to their site's specific water-reduction goals.

For wastewater, we conduct routine audits and inspections and take samples. We also evaluate our industrial wastewater treatment plants annually and hire trained or certified operators as required. Local teams monitor and ensure compliance with regulatory and company standards, and communicate regularly with our worldwide ESH management team.

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