

Environmental Technologies

Top Export Market Rankings



INTERNATIONAL
TRADE
ADMINISTRATION

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Explore the interactive tool at -

trade.gov/report/top-export-market-rankings-environmental-technologies

Included Products

This top export market ranking tool focuses on the environmental technologies goods and services industry. ITA defines environmental technologies goods and services as those that prevent or mitigate pollution, generate compliance with environmental regulations, manage or reduce waste streams, remediate contaminated sites, develop and operate environmental infrastructure, allow the provision of environmental resources, and/or foster environmental protection and resource efficiency. ITA categorizes environmental technologies into three sectors: air pollution monitoring and control, waste management and recycling, and water and wastewater treatment. The environmental technologies industry also includes monitoring and instrumentation equipment and services, as well as environmental consulting and engineering, which cut across all three environmental technology sectors.

Environmental technologies are not captured precisely through unique Harmonized System codes (HS codes) - the codes used for categorizing and tracking U.S. exports. Most environmental technologies are represented by HS codes that encompass a variety of products, including some unrelated to the environmental technologies sector. This tool uses 99 HS codes as a proxy to represent the environmental technologies sector, including air pollution monitoring and control, water and wastewater treatment, waste management and recycling, and monitoring and instrumentation technologies and equipment. These codes provide an acceptable representation of trade in environmental technologies, recognizing that key elements of the sector, such as environmental consulting and engineering services, cannot be captured with tangible merchandise trade data. General data on services, including consulting services, is found in the Bureau of Economic Analysis' International Services data. U.S.-based consulting firms working in environmental technologies are encouraged to also consider ITA's Consulting Services Top Export Market Ranking, which evaluates the best prospective markets for consulting exports.



Air Pollution Monitoring and Control

This sector includes air pollution monitoring and control technologies for both stationary and mobile pollution sources. Stationary sources include emissions from thermal energy generation and industrial facilities. Mobile sources include automobiles, heavy duty vehicles, and ships, among other sources. Monitoring and instrumentation technology and software has been included within this sector, as it makes up a substantial segment of the air pollution monitoring and control industry. While testing equipment can also be used to monitor water and soil quality, it is not possible to distinguish equipment by application through HS codes. Therefore, we included all HS codes related to monitoring and instrumentation in the air pollution monitoring and control sector.

HS Code	Product Description
8421320000	Catalytic converters or particulate filters
8421390105	Dust collection and air purification equipment for machine tools
8421390115	Dust collection and air purification equipment - other industrial gas cleaning equipment
8421390120	Dust collection and air purification equipment - electrostatic precipitators
8421390130	Dust collection and air purification equipment - other electrostatic precipitators
8421390190	Dust collection and air purification equipment - other gas separation equipment
9014800000	Other Instruments and Appliances - direction finding compasses; other
8421390140	Gas separation equipment
9027100000	Gas or smoke analysis apparatus
9027202000	Gas chromatographs
9027205030	Electrophoresis instruments
9027206050	Liquid chromatographs
90272090	Other liquid chromatographs and electrophoresis instruments
9027304040	Spectrophotometers
9027304080	Other spectrophotometers and spectrographs, electrical
9027308020	Spectroscopes
9027308080	Other spectrometers and spectrographs, except electrical
9027504050	Photometers
9027810000	Mass spectrometers
9027892500	Nuclear magnetic resonance instruments
9027905430	Parts and accessories f articles of Schedule B numbers 9027.30.4040 (spectrophotometers) and 9027.30.4080 (other spectrophotometers and spectrographs, electrical)

Water and Wastewater Treatment

This sector encompasses municipal drinking water delivery and treatment, municipal wastewater conveyance and treatment, ground and surface water remediation, industrial process water treatment, and industrial wastewater treatment.

HS Code	Product Description
3925100000	Catalytic converters or particulate filters
4009420050	Tubes, pipes and hoses, of vulcanized rubber other than hard rubber
4016930000	Gaskets, washers and other seals
7307193000	Ductile fittings - Other - Cast Fittings - Tube or pipe fittings
7307923030	Of alloy steel (except stainless steel) - Sleeves (couplings) - Tube or pipe fittings (for example couplings, elbows, sleeves), of iron or steel.
7315120000	Articulated link chain and parts thereof
7326908695	Other articles of iron or steel
8413190000	Other - Pumps fitted or designed to be fitted with a measuring device
8413500050	Diaphragm pumps - Other reciprocating positive displacement pumps
8413600090	Other rotary positive displacement pumps - Pumps for liquids
8413702004	Submersible pumps - Other - Other centrifugal pumps
8413702005	Other centrifugal pumps
8413702015	With discharge outlet 5.08 cm (2 in.) or over in diameter - Single-stage, single-suction, close-coupled - Other centrifugal pumps
8413702022	With discharge outlet under 7.6 cm (3 in.) in diameter - Single-stage, single-suction, frame-mounted - Other centrifugal pumps
8413702025	With discharge outlet 7.6 cm (3 in.) or over in diameter - Single-stage, single-suction, frame-mounted - Other - Other - Other centrifugal pumps
8413702030	Single-stage, double-suction - Other centrifugal pumps
8413702040	Multi-stage, single- or double-suction - Other centrifugal pumps
8413810020	Turbine pumps
8413810040	Other - Pumps - Other pumps; liquid elevators
8413910000	Parts of pumps for liquids
8421210000	Filtering or purifying machinery and apparatus for filtering or purifying water
8421990140	Parts for machinery and apparatus for filtering or purifying water
8421990180	Parts for machinery and apparatus for filtering or purifying water - other
8481100090	Other - Pressure-reducing valves - Taps, cocks, valves and similar appliances
8481309000	Other - check (nonreturn) valves - Taps, cocks, valves and similar appliances
8481803025	Ball Type - Of Iron - Hand Operated - Other Appliances
8481909000	Other - Parts - Taps, cocks, valves and similar appliances for pipes
8482105028	Angular contact bearings - Ball or roller bearings, and parts thereof

Water and Wastewater Treatment - Continued

HS Code	Product Description
8482200060	Cup and cone assemblies entered as a set - Tapered roller bearings, including cone and tapered roller assemblies - Ball or roller bearings, and parts thereof
8483105000	Other transmission shafts and cranks
8483608000	Clutches and shaft couplings (including universal joints)
8484200000	Mechanical seals - Gaskets and similar joints of metal sheeting
8501106040	Motors of an output not exceeding 37.5 W - Electric motors and generators
8501324000	Other - Motors - Of an output exceeding 750 W but not exceeding 75 kW
8501332000	Exceeding 75 kW (100 hp) but under 149.2 kW (200 hp) - Motors
8501402020	Gear motors - Of an output exceeding 37.5 W (1/20 hp) but not exceeding 74.6 W (1/10 hp)
8501402040	Of an output exceeding 37.5 W (1/20 hp) but not exceeding 74.6 W (1/10 hp) - Other AC motors, single-phase
8501403000	Gear motors of an output exceeding 74.6 W (1/10 hp) but under 746 W (1 hp)
8501406040	Other AC Motors, single-phase
8501512040	Exceeding 37.5 W (1/20 hp) but not exceeding 74.6 W (1/10 hp) - Of an output not exceeding 750 W - Other AC motors, multi-phase
8501524000	Exceeding 750 W (1.005 hp) but not exceeding 14.92 kW (20 hp) - Of an output exceeding 750 W but not exceeding 75 kW - Other AC motors
8501536000	149.2 kW (200 hp) or more but not exceeding 150 kW (201 hp) - Of an output exceeding 75 kW - Other AC motors, multi-phase
8501536000	Exceeding 150 kW (201 hp) but not exceeding 373 kW (500 hp) - Other - Of an output exceeding 75 kW - Other AC motors, multi-phase
8531800030	Horns - Other Apparatus
8532250020	300 V or greater but less than 600 V - Alternating current (AC) service
8541290080	Transistors, other than photosensitive transistors - Semiconductor devices
8544420000	Other electric conductors, for a voltage not exceeding 1,000 V
9026105000	Flow meters - For measuring or checking the flow or level of liquids
9026800000	Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases
9026900000	Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases
9027505000	Chemical analysis instruments and apparatus
9027509000	Other instruments and apparatus using optical radiations
9027893100	Electrochemical instruments and apparatus
9028900080	Parts and accessories - Gas, liquid or electricity supply or production meters, including calibrating meters thereof; parts and accessories thereof
9030820000	Other instruments and apparatus - Oscilloscopes, spectrum analyzers and other instruments and apparatus for measuring or checking electrical quantities
9032896060	Flow and liquid level control instruments

Waste Management and Recycling

This sector includes solid and hazardous waste management, recycling and resource recovery, and soil pollution prevention and remediation technologies.

HS Code	Product Description
3923900000	Other - Articles for the conveyance or packing of goods
5910000000	Transmission or conveyor belts or belting, of textile material
8203300000	Metal-cutting shears and similar tools, and parts thereof
8421290005	Refrigerant recovery and recycling units
8428390000	Other continuous-action elevators and conveyors, for goods or materials
8428900390	Other machinery - Other lifting, handling, loading or unloading machinery
8429595060	Other - Mechanical shovels, excavators and shovel loaders
8431390010	Elevators and conveyors
8474100000	Sorting, screening, separating, or washing machines
8474200000	Crushing or grinding machines
8474900020	Crushing or grinding machines - parts
8479820080	Mixing, kneading, crushing, grinding, screening, sifting, homogenizing, emulsifying, or stirring machines - other
8479895500	Trash compactor
8479899900	Other machines and mechanical appliances
8479909665	With discharge outlet 7.6 cm (3 in.) or over in diameter - Single-stage, single-suction, frame-mounted - Other - Other - Other centrifugal pumps Machines or mechanical appliances for treating metal
8505000000	Electromagnets; permanent magnets and articles intended to become permanent magnets after magnetization
8548001000	Electrical parts of machinery or apparatus, other
9030100000	Instruments and apparatus for measuring or detecting ionizing radiation
8479820040	Mixing, kneading, crushing, grinding, screening, sifting, homogenizing, emulsifying or stirring machines

Top Markets



#1 Market Canada

The United States and Canada enjoy a robust economic relationship supported by proximity, the USMCA free trade agreement, and formal cooperation in combatting climate change.

#2 Market Mexico

Mexico's manufacturing-intensive economy and near-shoring trends supported by free trade agreements present ample opportunities for U.S. environmental technology suppliers.

#3 Market China

Seeing China – the world's largest emitter – achieve rapid decarbonization is critical for limiting global warming to 1.5 degrees Celsius. This global goal presents opportunities for environmental technology exporters, albeit with some notable risk.

#4 Market Germany

Germany's ambitious environmental protection and emissions reduction targets create a fertile ground for U.S. exports, offering a strong but competitive market.

#5 Market Japan

Japan's commitment to environmental protection and history of investing in environmental technologies creates opportunities for cutting-edge solutions.

#6 Market France

In 2021, France committed €30 billion to promote a green economy, creating opportunities for U.S. environmental technology companies to help French industry become more sustainable.

#7 Market United Kingdom

Since leaving the European Union in 2020, the United Kingdom is no longer committed to EU environmental policies, and has since enacted its own national environmental policy -- the Environment Act 2021.

#1 Bonus Market Brazil (B1)

The United States and Brazil are cooperating on climate change initiatives, with the United States supporting the Amazon Fund and facilitating a green trade mission to Brazil to promote forest, land use, and renewable energy investments.

#2 Bonus Market India (B2)

India's rapid population growth and urbanization creates an increasing need for environmental technologies to address environmental and public health concerns such as poor air quality, water and soil pollution, and climate change.

#3 Bonus Market Indonesia (B3)

Indonesia faces considerable environmental challenges including pollution from the mining, industrial, and agricultural sectors and a need to expand basic water supply, sanitation, and solid waste management infrastructure and services.

#1 Market Canada



The United States and Canada enjoy a robust economic relationship supported by proximity, the USMCA free trade agreement, and formal cooperation in combatting climate change.



This tool considers any market classified as “high income” in the World Bank’s Country Income Classification Level as “mature.” For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,846 or more.

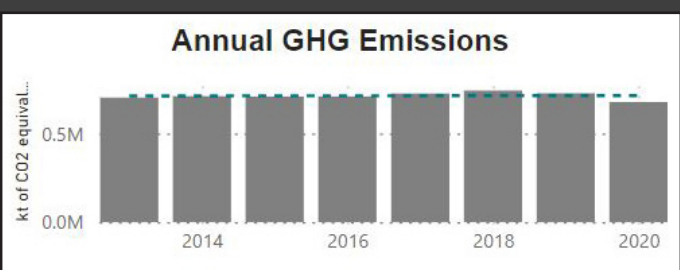
Market Development Status: Mature



Top Indicators and Why They Are Important



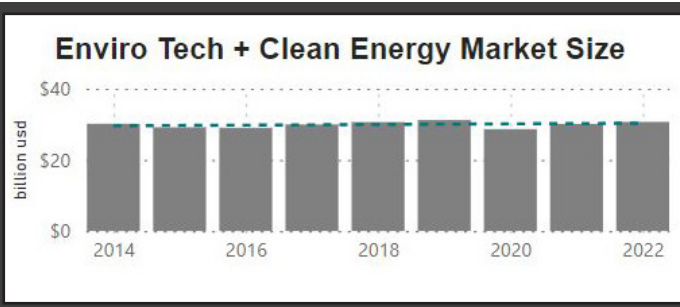
The EPI Environmental Health Score indicates a market’s openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country’s average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.



The Annual GHG Emissions Indicates a market’s need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.



The average Environmental Technologies Tariffs indicate a market’s openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country’s average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.



The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

Canada's environmental technologies and clean energy markets generated a combined \$30.66 billion in 2022. The United States exported \$8.6 billion in environmental technologies goods to Canada in 2022, representing 43% of Canada's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to Canada, followed by waste management and recycling and air pollution monitoring and control.

The United States and Canada share in a free trade agreement through the [United-States-Mexico-Canada Agreement](#). In February 2021, the United States and Canada announced the Roadmap for a Renewed [U.S.-Canada Partnership](#), establishing a blueprint for expanded cooperation in vital sectors, including promoting economic growth, pandemic recovery, combatting climate change, and addressing global issues.

U.S. exporters benefit from ease of doing business in Canada. The two countries share the world's longest border, and most of Canada's commercial and industrial hubs are situated close to the border, increasing the already strong geographical advantages. Additionally, both countries use English as an official language, host highly developed market economies, and have similar consumer preferences and spending power.

Canada ranks ninth out of 180 economies on Yale's Environmental Performance Index for Environmental Health, signifying its strong performance in addressing air, water, and soil quality issues, as well as implementing robust sanitation and waste management measures. According to [Canada's 2022-2023 Departmental Plan on the Environment and Climate Change](#), several key environmental initiatives have been proposed or are currently undergoing implementation in Canada. These initiatives span various areas such as nature conservation, protection of species at risk, climate change mitigation, and enhancement of weather and environmental services. One top initiative is the [National Climate Solutions Fund](#), which established a funding stream called the Nature Smart Climate Solutions Fund, investing \$460.19 million USD over ten years to restore and enhance wetlands, peatlands, and grasslands that store and capture CO₂. Additionally, through the Investing in Canada Infrastructure Program, the Canadian Government is providing long-term funding to help communities reduce air and water pollution, provide clean water, increase resilience to climate change and create a clean-growth economy. In 2022, the Government of Canada invested CAN \$58 million in the Climate Action and Awareness Fund to support 24 projects that will advance Canada's goal of net-zero greenhouse gas emissions by 2050.





Market Opportunities

Air Pollution Monitoring and Control

Ambient Air Quality Monitoring: Canada invests in research and development initiatives to address air quality challenges including air quality modeling, measurement, mobile source emissions, and forecasting. As part of the [Climate Action and Awareness Fund](#), the Canadian Government has awarded CAN \$475,500 for a continuous methane mapping project in Western Canada, CAN \$2.97 million to measure wildfire emissions, and over CAN \$4 million to measure and monitor city and municipal level greenhouse gas emissions. The United States leads in cutting-edge research and technology development in the air pollution monitoring and control space, and there is potential for collaboration with Canadian research institutions and government agencies.

Key technologies and services in demand include:

- Ambient air quality monitoring equipment
- Continuous emissions monitoring systems
- Source emissions measurement technologies
- Analytical and laboratory testing goods and services

Methane Abatement: In 2021, Canada joined 110 countries in committing to the [Global Methane Pledge](#), which commits countries to take economy-wide action to reduce total methane by at least 30% by 2030. In December 2023, Canada announced updated draft methane regulations eliminating routine venting and flaring, enhancing leak detection and repair, and addressing other potentially large methane release issues. Canada is on track to meet its 2025 methane reduction target of 40 to 45% below 2012 levels. To achieve this, the Canadian government has made a commitment to invest up to USD \$546.97 million to reduce emissions in the oil and gas sector, with a focus on methane.

Key technologies and services in demand include:

- Remote sensing technologies
- Flue gas desulfurization equipment
- Filtering or purifying machinery and apparatus for gases
- Air quality data analytics software
- Methane leak detection and repair
- Analytical and laboratory testing goods and services

Air Pollution Monitoring & Control

Sector Rank

1

Imports from U.S.



Carbon Management: Canada is home to four large-scale carbon capture and storage (CCS) projects: the Alberta Carbon Trunk Line, The Boundary Dam Carbon Project, the Quest Carbon Capture and Storage Project, and the IEAGHG Weyburn-Midale CO₂ Monitoring and Storage project. Western Canada has multiple types of storage options for CCS, including within oil and gas reservoirs, un-mineable coal, and saline aquifers. The Government of Canada introduced the refundable Carbon Capture, Utilization, and Storage (CCUS) Investment Tax Credit, valued at CAN \$3.1 billion over the first five years for investments into carbon management projects between 2022 to 2040, with rates decreasing after 2030 to incentivize early investment.

The credit rates are 60% for direct air capture; 50% for capture equipment in all other projects; and 37.5% for transportation, storage, and utilization. Furthermore, Canada's Growth Fund provides CAN \$15 billion to catalyze private investment to support the rapid deployment of carbon management projects. The Federal Government also released a proposal to introduce carbon contracts for difference, which essentially provides insurance against potential policy shifts and guarantees a future price of carbon.

The Alberta province is well suited for CCS with an established regulatory process and geological formations to store CO₂. In addition to the six sequestration hub agreements announced in the second quarter of 2022, 19 further hubs have been awarded through the provincial [Technology Innovation and Emissions Reduction Regulation \(TIER\) Regulation](#). These hubs present opportunities for oil sands and other industries looking to execute decarbonization plans including power, clean hydrogen, petrochemicals, cement, steel, fertilizer, biodiesel production, and gas processing. The Glacier Gas Plan CCS Project in Alberta is a first-of-its-kind application that captures and sequesters CO₂ from natural gas-fired emission sources' exhaust.

Key technologies and services in demand include:

- Carbon capture, including direct air capture, technologies
- CO₂ transportation pipelines and infrastructure
- Combustion systems
- Flue gas treatment systems
- CO₂ utilization and removal technologies
- Compression systems
- Membrane separation technologies
- Geological storage technologies
- Engineering, procurement, and construction of carbon management projects
- Environmental impact assessment consultancies



Waste Management and Recycling

Canada ranks as a the top market in the report for U.S. export opportunities in solid waste management and recycling. Putting the challenge of solid waste in context, Canada was ranked eighth of 38 countries considered by the [Organization for Economic Co-operation and Development](#) in its [Global Waste Index](#). This means that Canada ranked eighth in terms of per capita waste generated and waste processed.

Canada throws away around three million tons of plastic waste each year and only has a nine percent recycling rate, which highlights the waste management issues the country faces. Landfills are the primary method for disposal, with 97% of waste sent to landfills. The remaining three percent of waste is sent to incineration facilities for disposal.

Canada offers an enticing opportunity for U.S. companies due to its ambitious environmental policies and need to address solid waste challenges.

Key technologies and services in demand include:

- Waste collection technologies
- Landfill design and engineering
- Organic waste collection
- Composting and anaerobic digestion technologies
- Gasification, pyrolysis, and incineration technologies

Plastics Waste: In 2018, Canada introduced the [Ocean Plastics Charter](#) through the Group of Seven (G7) with the stated goal of taking concrete and ambitious action to address marine plastic litter and improve circular economy practices. That same year, Canada also adopted a the national [Strategy on Zero Plastic Waste](#), providing a framework to take action on the principles outlined in the Oceans Plastics Charter. Subsequently, Canada released the [Canada-wide Action Plan on Zero Plastic Waste: Phase 1](#) and [Canada-wide Action Plan on Zero Plastic Waste: Phase 2](#). In 2020, Canada committed to achieve zero plastic waste by 2030. In 2018, the Canadian government also announced the Canadian Plastics Innovative Challenges (CPIC) to address solid waste challenges. Established in 2018, CPIC provides up to 150,000 CAD to Canadian small and medium size companies to develop novel solutions to address plastics-related challenges, including mitigating the release of microplastics from tire wear, exploring alternatives to single-use plastic products and packaging, and enhancing textile recycling.

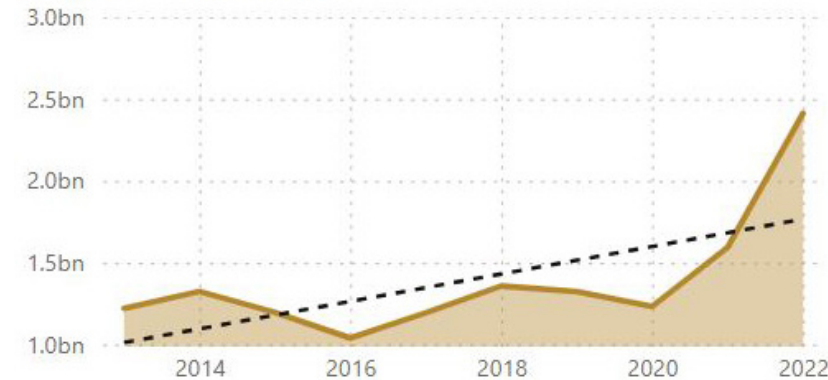
Key technologies and services in demand include:

- Sorting machines
- Chemical recycling
- Advanced waste handling equipment, such as waste robotics and artificial intelligence

Waste Management & Recycling

Sector Rank
1

Imports from U.S.



Water and Wastewater Treatment

Canada is often considered to have a plentiful water supply, but parts of the country - including the Prairies, where 80% of Canada's agricultural produce is grown - experience water scarcity. In the face of a changing climate, the Government of Canada has made freshwater protection a priority. Canada's 2023 Federal Budget includes unprecedented investments for protecting freshwater, including a commitment to implement a stronger Freshwater Action Plan and establish the Canada Water Agency. The Canada Water Agency will be a new national water agency headquartered in Winnipeg, with a mandate to improve freshwater management in Canada by providing leadership, effective federal collaboration, and improved coordination and collaboration with provinces, territories, and indigenous peoples to proactively address national and regional transboundary freshwater challenges.

Municipal Water Treatment and Infrastructure: The Canadian government is investing in per- and polyfluoroalkyl (PFAS) research and monitoring, and potential regulations to address PFAS may lead to opportunities for PFAS destruction solutions. In April 2021, Canada released a Notice of Intent to address the broad class of PFAS, including PFAS used to replace regulated perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and long-chain perfluorocarboxylic acids (LC-PFCAs) that may be associated with health and environmental impacts.

Canada also committed to publishing a State of PFAS Report within two years, and the [draft was released in May 2023](#) for public comment. Additionally, Canada is working to address lead contamination in its drinking water. The government strengthened [guidelines for mitigating lead contamination](#) in 2019, creating opportunities for the removal and replacement of lead service lines and the deployment of corrosion control measures. Canada is also working to address clean drinking water challenges and end long-term water advisories in First Nations communities.

Water & Wastewater Treatment

Sector Rank

1

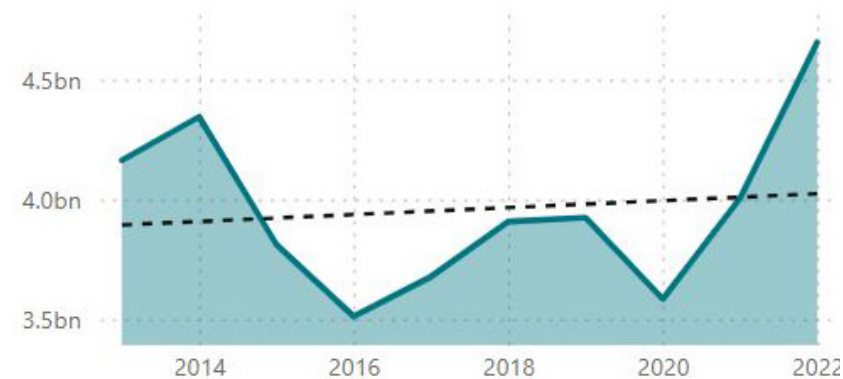
Key technologies and services in demand include:

- PFAS detection, removal, and destruction technologies
- Smart water technologies, including smart sensors, data analytics, Internet of Things (IoT) solutions for water quality monitoring, leak detection, and infrastructure management
- Point-of-use ion exchange and reverse osmosis for residential-scale systems
- Engineering, procurement, and construction services for upgrading and building new water treatment facilities and distribution systems

Wastewater Treatment and Sanitation Services: Over 150 billion liters of untreated and undertreated wastewater is dumped in Canadian waterways annually, creating environmental, health, and economic harm. Wastewater treatment facilities must meet mandatory minimum effluent quality standards according to the Wastewater Systems Effluent Regulations, which are established under the Fisheries Act. There are [reporting deadlines](#) in place for complying with the regulations. According to a 2020 survey, 14.7% of Canadian public organizations needed to upgrade their wastewater systems to meet the standards required by the Wastewater Systems Effluent Regulations, though this is an improvement from the 16.6% in 2018. Infrastructure conditions vary across the country by region and type, with many

sewer and storm water pipes in poor or unknown condition as of 2020. Nationwide, just 38.8% of wastewater treatment plants were in good condition. Spending on infrastructure has been increasing in order to address these issues. In 2020, capital expenditures on sewer infrastructure reached \$4.2 billion, a 49.7% growth from 2016.

Imports from U.S.



Key technologies and services in demand include:

- Wastewater treatment and reuse solutions, including biological treatment, advanced filtration, membrane technology, and advanced oxidation processes
- Industrial water treatment solutions, including technologies for industrial water purification, process water treatment, zero liquid discharge, and wastewater management tailored to specific industries
- Engineering, procurement, and construction services for upgrading and building new wastewater treatment systems and facilities

Water and Resource Recovery (WRR): There is growing interest in water and resource recovery (WRR) projects in Canada. While there have been WRR projects for industrial and agricultural applications, WRR, also known as water reuse, is largely not happening at the municipal level. Reuse of water for irrigation has occurred in arid parts of Canada since the 1980s, and there are a range of different guidelines produced at different levels of government. The [federal guideline](#) from Health Canada pertains only to on-site household reclamation of water. Due to a lack of regulation and the absence of a national policy for WRR, individual projects are very specific to location and approved on a case-by-case basis.

Examples of provincial guidelines include the [Reclaimed Water Guideline](#) from British Columbia, the [Alberta Guidelines for Residential Rainwater Harvesting Systems](#), and the [Ontario Guidelines for Residential Rainwater Harvesting Systems](#). While the lack of comprehensive policies and guidelines as well as unclear approval processes are a barrier to the widespread deployment of WWR solutions, the transition should be easier in jurisdictions like Ontario that treat wastewater to a high standard. Water shortages also provide an incentive to recycle water where practicable and economical.

Key technologies and services in demand include:

- Water reuse engineered solutions
- Water reuse system training and maintenance services
- Water loss prevention solutions
- Rainwater collection systems
- Energy efficient physical treatment
- Monitoring equipment



Market Challenges

Homegrown Competition: The Canadian market is mature and is dominated by large domestic and foreign firms, attributed to the longstanding and robust trading relationship held with the United States. Aligning products and services with local demands and industry standards is crucial for gaining acceptance and building a competitive edge. This process involves understanding the unique preferences, cultural nuances, and regulatory requirements of the Canadian consumer and business landscape.

Bilingualism and Cultural Differences: Canada is a bilingual country with English and French as its official languages. Canada's regulations require bilingual product labeling and packaging. Networking and relationship-building play an important role in Canadian business culture. Face-to-face meetings, follow-up communications, and a genuine interest in establishing long-term partnerships are highly valued. Canada is geographically vast and cultural nuances can vary from one province or territory to another.

Regulatory and Certification Differences: Canada and the United States have different regulatory frameworks in the environmental sector. However, they share in having multiple levels of regulations at the federal, municipal, and provincial levels. U.S. companies exporting environmental technologies will need to navigate and comply with Canadian regulations, which can be different from what they are accustomed to in the United States. Moreover, differences in certification requirements and product standards can pose challenges. Engaging with federal certification and regulatory agencies early in the market entry process is advisable. Seeking guidance and clarification on specific requirements can help companies proactively address compliance issues.

Customs and Border Protection: Navigating customs and border procedures can be a challenging and complex process for U.S. companies exporting to Canada. It is recommended that U.S. companies work with a customs broker, as they are best positioned to ensure that all the paperwork is in place to ensure goods and services get across the border. They play a crucial role in preparing and submitting documentation such as invoices and certificates of origin. Furthermore, they monitor changes in trade laws, tariffs, and import/export restrictions, helping U.S. companies navigate the evolving regulatory landscape.



Learn More

ITA Resources

Canada Specific

- [Canada Country Commercial Guide](#)
- [U.S. Commercial Service in Canada](#)
- [Canada Business Service Providers](#)
- [Roadmap for a Renewed U.S.-Canada Partnership](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

U.S. Government Resources

- [United-States-Mexico-Canada Agreement \(USMCA\)](#)

Canadian Government Resources

Environmental regulations and a functional system of enforcement are important drivers of demand for environmental technologies, incentivizing the investment in solutions to address environmental challenges in order to avoid the cost of non-compliance. Environmental oversight in Canada involves various ministries and regulators at both the federal and provincial/territorial levels that work together to regulate, promote, and support the development of and implementation of environmentally friendly technologies across Canada.

Key entities and regulations for U.S. exporters to note include:

- [Environment and Climate Change Canada](#)
- [Canadian Environmental Assessment Agency](#)
- [Natural Resources Canada](#)
- [Innovation, Science, and Economic Development Canada](#)
- [Canadian Council of Ministers of the Environment](#)

#2 Market Mexico



Mexico's manufacturing-intensive economy and nearshoring trends supported by free trade agreements present ample opportunities for U.S. environmental technology suppliers.



This tool considers any market classified as "upper middle income," lower middle income," or "low income" in the World Bank's Country Income Classification Level as "emerging." For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,845 or less.

Market Development Status: Emerging



Top Indicators and Why They Are Important

EPI Environmental Health Score

40.9

The EPI Environmental Health Score indicates a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Annual GHG Emissions

kt of CO2 equival...

The Annual GHG Emissions Indicates a market's need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Average Tariff on Enviro Tech Goods

0.00%

Global Avg
4.43%

The average Environmental Technologies Tariffs indicate a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Enviro Tech + Clean Energy Market Size

billion usd

The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

Mexico is the second largest overall trading partner of the United States (after Canada) and the largest goods export market for U.S. companies overall. Mexico's environmental technologies and clean energy markets generated a combined USD \$18.5 billion in revenue in 2022. The United States exported \$7.8 billion in environmental technologies goods to Mexico in 2022, representing 27% of Mexico's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to Mexico, followed by air pollution monitoring and control and waste management and recycling.

The United States and Mexico share in a free trade agreement through the [United-States-Mexico-Canada Agreement](#). The two countries also cooperate through the [U.S.-Mexico High-Level Economic Dialogue](#), which aims to advance shared strategic and economic priorities. The HLED was re-launched in 2021 and the third meeting was held in September 2023.

In recent years, Mexico's environmental standards have ebbed and flowed with compliance consistently remaining a challenge. The federal government published a [General Law on Climate Change](#) in 2012 and updated it often. However, in 2021, the Obrador administration dissolved the National Institute for Climate Change and reallocated over 70% of the climate mitigation and adaptation budget to transportation infrastructure fueled by fossil gas. The [Climate Action Tracker](#) rates Mexico as "critically insufficient" because the country's 2022 NDC update removes its target to peak emissions in 2026 and does not mention any net zero or long-term targets. Mexico's emissions from the energy sector increased by 34% between 1990 and 2019, and emissions from the transportation sector are projected to continue increasing to nearly a third of the country's total greenhouse gas emissions by 2030. Current government policies prioritize increasing efficiency of fossil fuel-fired power plants over renewable energy and reducing emissions, decelerating the country's progress on climate change commitments.

U.S. environmental products and services are considered competitive in the Mexican market due to quality, post-sale services, and guarantees offered by U.S. companies. Mexico ranks 73 out of 180 economies on Yale's Environmental Performance Index for Environmental Health, an increase of over 12% in the past 10 years showing the nation's improvement on addressing air, water, and soil quality issues. Despite progress, there are still challenges related to sanitation drinking water, criteria air pollutant exposures (SO₂, NO_x, CO, VOCs), and recycling.



Market Opportunities

Air Pollution Monitoring and Control

Air Pollution and Mobile Source Emission Control: Annual average air pollution concentrations in Mexico are double the levels recommended by the World Health Organization. In 1990, the federal government initiated the Comprehensive Program Against Air Pollution (PICCA), which required new vehicles to include catalytic converters, introduced unleaded gasoline, and established vehicle emissions standards. In 1995, PICCA became the Program to Improve Air Quality, or [ProAire](#). The [Secretariat of Environment and Natural Resources](#) (SEMARNAT) is responsible for managing ProAire with the goal of preventing and correcting the deterioration of air quality in major cities in Mexico. SEMARNAT developed a National Emissions Registry (RENE) to compile information on emissions from specific industries including the energy, manufacturing, transportation, agricultural, waste, business, and services sectors, which contribute directly and indirectly to emissions of greenhouse gases or compounds. Requiring industry to report on emissions creates an opportunity for U.S. technologies to help stakeholders reduce their carbon footprint.

There are 29 [ProAire programs](#) that cover 27 federal entities and serve a population of 105,246,207 inhabitants. Many of these programs began in 2018 and have timelines to run through 2027-2030.

The goals of these programs are to:

- (1) foster collaboration between industry, government, academia, and civil society to explore solutions to air pollution challenges,
- (2) conduct a research study on the causes of poor air quality,
- (3) identify the main sources of emissions, and
- (4) determine the measures and actions needed to focus on reducing emissions, strengthening institutions, protecting public health, and improving communication and environmental education.

Key technologies and services in demand include:

- Air pollution control equipment
- Source emissions measurement technologies
- Analytical and laboratory testing goods and services
- Fuel vapor control systems
- Odor control equipment
- Thermal oxidizers
- Selective Catalytic Reduction
- Catalytic converters
- Electrostatic precipitators
- Scrubbers

Smart Monitoring: In 2017, Mexico City unveiled a new tool to forecast high levels of air pollution. The city is surrounded by mountains, putting it at a disadvantage for removing dangerous pollutants from the air. Accurate and real-time forecasting for air quality can accurately predict high rates of pollution, informing the population on safety measures to take to protect their health. Air quality monitoring is conducted by SEMARNAT, which tenders openly to U.S. businesses. The Climate Change Strategy's Program for the Strengthening of the Environment of States provides funding for projects at the municipal, state, and federal levels for compliance with environmental roles. This should increase opportunities for U.S. companies as local governments maximize their monitoring efforts.

Key technologies and services in demand include:

- Air pollution control equipment
- Continuous emissions monitoring systems
- Ambient air quality monitoring equipment
- Air quality forecasting, especially for Mexico City
- Source emissions measurement technologies
- In-line monitors and software



Imports from U.S.



Waste Management and Recycling

Solid Waste Management: Many of the opportunities in Mexico's solid waste management sector are centered around building out core infrastructure and services. Waste collection equipment is often in poor condition, making source-separated waste a challenge. Due to insufficient waste management infrastructure, there is significant opportunity for U.S. businesses to contribute to the enhancement of Mexico's solid waste management capabilities.

In Mexico, the federal government is responsible for formulating, conducting, and evaluating the national policy on waste. The [General Law for Prevention and Integral Management of Residues](#), Mexico's main legislation for solid waste management, was reformed in 2023. It tasked states and municipalities to introduce their own laws to address local solid waste management issues. Additional recent policies include the [General Law for the Prevention and Comprehensive Management of Solid Waste Management](#) (known as PNPGIR and updated in 2015) and the [2022 - 2024 National Program for the Prevention and Comprehensive Management of Special Handling Waste](#) (known as PNPGIRME). These recent policies and legislative updates underscore Mexico's regulatory efforts to provide opportunities to improve its solid waste management. Due to the country's recent regulatory efforts and the growing need for waste management infrastructure, Mexico is an optimal country for the solid waste management sector.

Key technologies and services in demand include:

- Sanitary landfill systems
- Garbage trucks with compactors
- Incineration equipment and facilities
- Composting and anaerobic digestion technologies
- Bio-gas capture technologies
- Sorting machines
- Waste handling equipment
- Crushing and grinding machines

Recycling: Many of the recycling centers are not financially self-sufficient and rely on government subsidies to remain in operation. Mexico's recycling industry utilizes roughly 5,000 waste pickers, a relatively low number compared to other countries in Latin America. Nevertheless, this fact highlights a hurdle which Mexico faces in terms of simple waste management infrastructure. Mexico has one of the lowest recycling rates in the world - five percent. Improvement of Mexico's solid waste management infrastructure would greatly improve this rate. The largest sources of solid waste in Mexico are urban waste from cities and waste from health services, followed by agricultural and biomass waste.



Key technologies and services in demand include:

- Garbage trucks with compactors
- Separators
- Sorting machines
- Recycling equipment and facilities
- Protective equipment for separating lines
- Waste handling equipment
- Crushing and grinding machines

Water and Wastewater Treatment

Mexico faces numerous water challenges as it struggles to meet the water demands of its population of 139 million people, including dry conditions in northern Mexico that increase the stress on water resources. Complicating matters is the fact that water in Mexico is less available where its population densities are higher. Mexico must upgrade its water infrastructure, expand access to drinking water and sanitation, and address the over-exploitation and contamination of resources.

The guiding framework for national water policy in Mexico is the [National Water Plan](#), which in its current iteration runs from 2020 to 2024. The Program is focused on increasing the percentage of people with access to sufficient and equitable water and sanitation services, with an emphasis on vulnerable populations including rural and indigenous communities.

Municipal Water Treatment and Infrastructure: Approximately 57% of Mexican households lack access to safely managed drinking water sources. Water scarcity in Mexico is exacerbated by inefficient use by the agricultural sector, which uses 77% of available water (the largest use by any sector), and by the loss of 40% of water as non-revenue water. In 2022, an unprecedented drought in northern Mexico resulted in local governments having to ration water. Mexico's national water authority, the National Water Commission or [CONAGUA](#) is responsible for managing water resources at the federal level, including through granting concessions, while municipalities provide water services to communities through decentralized water utilities. CONAGUA received a budget of USD \$7.1 billion for 2024, which is intended for improvements to drinking water and municipal infrastructure, dams, and aqueducts, as well as desalination plants that will be developed as public-private partnerships (PPPs) to address water scarcity issues and provide water for industrial uses. Desalination-related infrastructure will require an estimated \$250 million in private sector investment.

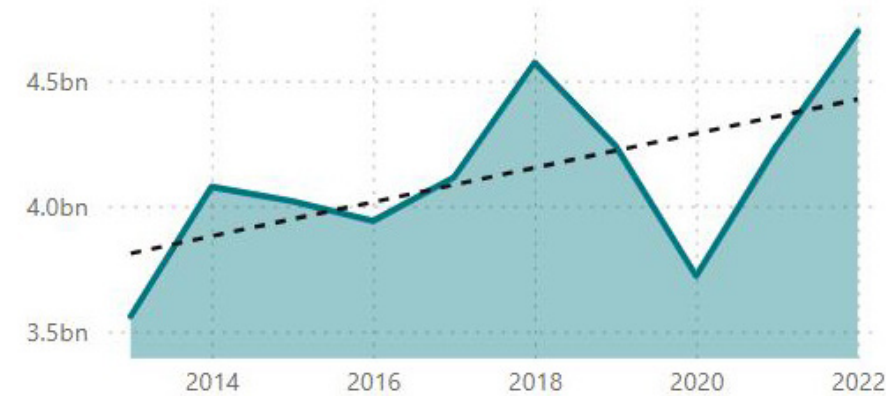
Key technologies and services in demand include:

- Engineering, Procurement, and Construction Services
- Disinfection and oxidation technologies
- Reverse osmosis treatment
- Water pumps, valves, aerators, actuators, calibrators, pipes and fittings
- Water quality test equipment
- Desalination technologies
- Digital solutions for water management, including leak detection software, smart meters, and loss prevention technologies

Water & Wastewater Treatment

Sector Rank
4

Imports from U.S.



Wastewater Treatment and Sanitation Services: In 2024, Mexico will continue to upgrade existing municipal wastewater treatment plants in over 1,400 municipalities. Of its population of nearly 130 million, 11 million people in Mexico are not connected to sewage lines, and the [National Water Plan](#) seeks to address this lack of access through public-private investments in municipal wastewater treatment plants including priority projects in the states of Queretaro, Jalisco, Hidalgo, Coahuila, Chihuahua, Baja California, and Baja California Sur.

Key technologies and services in demand include:

- Engineering, Procurement, and Construction Services for new or upgraded water treatment facilities
- Suspended solids removal
- Biological treatment
- Odor control equipment



Market Challenges

Access to Finance: The banking system in Mexico shows signs of growth after years of stagnation, but interest rates remain comparatively high. Small- and medium-sized enterprises find it difficult to obtain financing at affordable rates, despite the government's efforts to increase access to capital for these businesses. U.S. companies should conduct thorough due diligence on potential partners before extending credit and be aware of potential payment delays. U.S. companies can help Mexican buyers explore financing options, including through the Export-Import Bank of the United States (EXIM).

Regulatory and Standard Complexities: Mexico's customs regulations, product standards, and labor laws may present challenges for U.S. companies. There are no tariffs for products made in the United States that meet rules of origin requirements under USMCA. However, there are several [exceptions and caveats](#) that can impact the overall pricing of U.S. exports including antidumping duties and countervailing duty measures. It's recommended that U.S. companies bringing samples, equipment, displays, or other items into Mexico on a temporary basis use an ATA Carnet. Mexico signed onto the international carnet system in 2014, and some foreign companies have had temporary imported goods impounded by Mexican customs when goods were not accompanied with an [ATA Carnet](#). Additionally, many U.S. manufacturing companies opt to partner with local entities that have the expertise and support needed to navigate the intricacies of Mexican labor law, which mitigates the risk of fines and legal complications.

Inconsistent Federal Funding for Environmental Protection: [GWI](#) reports that Mexico's federal budget for water and wastewater infrastructure has been cut in recent years, with fewer water projects financed by BANOBRAS, Mexico's development infrastructure bank. Water utilities are increasingly interested in digital solutions including leakage reduction but are limited by their reliance on shrinking federal budgets. Additionally, the reliance on federal budgets makes the utilities dependent on political cycles, which hampers their ability to plan long-term investments.

Security Concerns and Commercial Disputes: Continued violence involving criminal groups has created heightened insecurity in some parts of Mexico, including border areas. The State Department provides additional information on the security situation including a security assessment of every state in Mexico through its [Mexico Travel Advisory](#). Additionally, U.S. companies have increasingly reported the introduction of criminal cases against their companies' staff stemming from allegations of fraud as part of contractor or other commercial disputes. U.S. companies should familiarize themselves with Mexican laws and procedures to understand when criminal cases can proceed as part of commercial disputes.



Learn More

ITA Resources

Mexico Specific

- [Mexico Country Commercial Guide](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

U.S. Government Resources

- [United-States-Mexico-Canada Agreement \(USMCA\)](#)

Mexican Government Resources

Environmental regulations and a functional system of enforcement are important drivers of demand for environmental technologies, incentivizing the investment in solutions to address environmental challenges in order to avoid the cost of non-compliance. Mexico has a comprehensive legal framework for environmental protection including the Federal Law for the Prevention and Control of Environment Pollution, which governs primarily air pollution, water pollution, and chemical agents.

Key entities and regulations for U.S. exporters to note include:

- [Ministry of Environment and Natural Resources \(SEMARNAT\)](#)
- [National Water Commission \(CONAGUA\)](#)
- [National Water Program](#)
- [National Institute of Ecology and Climate Change \(INECC\)](#)

#3 Market China



Seeing China – the world’s largest emitter – achieve rapid decarbonization is critical for limiting global warming to 1.5 degrees Celsius. This global goal presents opportunities for environmental technology exporters, albeit with some notable risk.



This tool considers any market classified as “upper middle income,” “lower middle income,” or “low income” in the World Bank’s Country Income Classification Level as “emerging.” For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,845 or less.

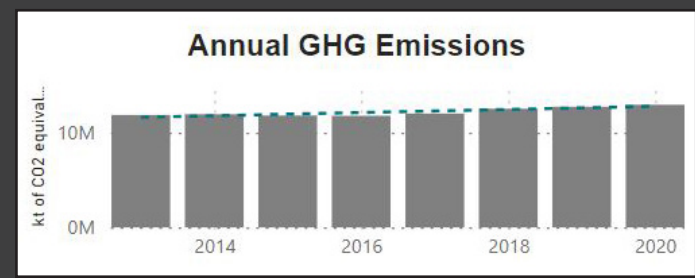
Market Development Status: Emerging



Top Indicators and Why They Are Important



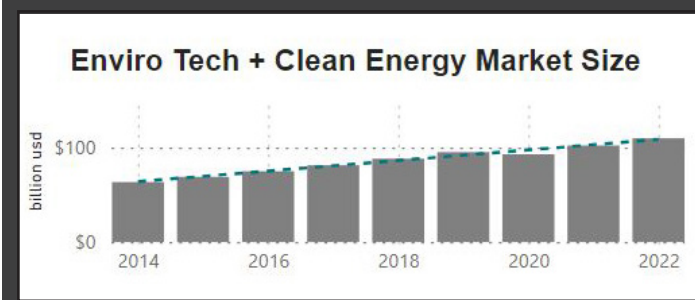
The EPI Environmental Health Score indicates a market’s openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country’s average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.



The Annual GHG Emissions Indicates a market’s need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.



The average Environmental Technologies Tariffs indicate a market’s openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country’s average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.



The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

With the world's largest population and GDP, China is an important export destination for U.S. exports. China's environmental technologies and clean energy markets generated a combined USD \$110 billion in revenues in 2022. The United States exported \$4.18 billion in environmental technology goods in 2022, representing six percent of China's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports in China, followed by air pollution monitoring and control and waste management and recycling.

The United States and China do not currently share a free trade agreement. However, trade between the two countries – the two largest global economies – is substantial. In 2022, China was the third largest purchaser of overall U.S. goods, importing at \$154 billion in U.S. goods.

Yale University's [Environmental Performance Index](#) (EPI) ranks China as 107 out of 180 countries for Environmental Health, with low performance on measures related to air quality and heavy metals/soil contamination. The EPI ranking highlights the scope of the environmental challenges facing the country and the growing need for environmental solutions.

China is taking important steps to deliver on its commitments to reduce greenhouse gas emissions since ratifying the [Paris Climate Agreement](#) in 2016, but it still has a long way to go. In 2020, China announced dual climate goals to (1) peak emissions by 2030 and (2) achieve carbon neutrality by 2060. As outlined in its [2021 Nationally Determined Contribution](#), China aims to lower carbon emissions per unit of GDP by over 65% from the 2005 level, increase the share of non-fossil fuels in primary energy consumption to 25%, and bring total installed capacity of wind and solar power to over 1.2 billion kilowatts. In 2021, the [U.S.-China Joint Glasgow Declaration](#) was announced, and in November 2023, China released a [National Action Plan](#) to control and measure methane emissions.

As of the latest update in November 2023, the [Climate Action Tracker](#) rates China as highly insufficient on climate action, both for its policies and its NDC target. This assessment determines that China's climate and energy policies are currently not strong enough to drive down emissions in a substantial manner during the 2020s and it notes that rapid decarbonization by China – the largest emitter – is critical for limiting global warming to 1.5 degrees Celsius.

Beyond climate, China is pursuing stricter enforcement of environmental controls, including the introduction of new disclosure and reporting requirements for environmental companies and their customers. In 2023, the Ministry of Ecology and Environment issued revised [Administrative Punishment Measures for the Ecological Environment](#), which strengthened inspection requirements and created a more detailed system of fines and punishments.

While political tensions exist between the United States and China, the volume of trade has remained high, and the two countries have underscored the importance of working together to tackle the climate crisis, including at a November 2023 meeting between President Biden and President Xi Jinping. Through the China Special Envoy for Climate Change, Xie Zhenhua, and U.S. Special Presidential Envoy for Climate, John Kerry, the two governments reaffirmed the sustained implementation of the April 2021 [U.S.-China Joint Statement on Addressing the Climate Crisis](#) and the November 2021 [U.S.-China Joint Glasgow Declaration on Enhancing Climate Action in the 2020s](#).



Market Opportunities

Air Pollution Monitoring and Control

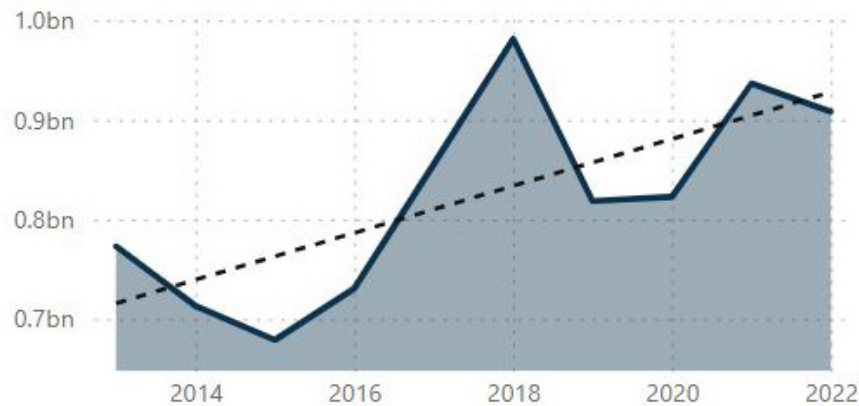
Industrial Air Pollution Reduction: China’s longstanding struggle with smog and air pollution, largely due to its coal-powered cement and steel industries, is well known. The steel and cement industries constitute nearly 70% of China’s overall industrial emissions. Large amounts of air pollutants, including sulfur dioxide (SO₂), nitrogen oxides (NO_x), and fine particulate matter (PM) are emitted during the iron and steel production processes. Since 2019, China’s iron and steel industries have implemented ultra-low emission transformation in the steel production, process, effectively reducing emissions. In 2021, the Ministry of Industry and Information Technology (MIIT) published its [14th Five-Year Plan for Industrial Green Development](#). The plan outlines China’s ultra-low emission transformation for 530 million metric tons (mt) of steel capacity and the clean production transformation for 460 million mt of coking capacity by 2025.

**Air Pollution
Monitoring & Control**

Sector Rank

3

Imports from U.S.



Key technologies and services in demand include:

- Advanced sensors and monitoring devices for real-time air quality data
- Flue gas desulfurization equipment
- Ambient air monitoring equipment
- Fuel vapor control systems
- Leak detection equipment
- Data analytics and AI to process pollution data
- Continuous emissions monitoring systems
- Particulate matter control systems
- Wet and dry scrubbers to remove multiple pollutants
- Remote sensing technologies
- Selective catalytic and non-catalytic reduction controls
- Dry sorbent injection technologies
- Environmental services and consulting, specifically for engineering and plant design

Methane Abatement: China is the world’s largest producer of hydrofluorocarbons (HFCs) and is responsible for 10% of all human-caused methane emissions. About 40% of China’s methane emissions are gasses that escape during the coal mining process and another roughly 40% stem from the agriculture industry.

According to Yale's Environmental Performance Index, China ranks in the top 10 worst countries for criteria pollutants such as nitrogen oxides and sulfur dioxide, presenting an opportunity for U.S. firms and technologies to help improve the country's air quality. However, in November 2023, China's Ministry of Ecology and Environment and ten other Chinese ministries released its [Methane Action Plan](#), which includes 20 key tasks related to emissions monitoring, technological innovation, development of policy frameworks, and global cooperation. The five-year plan period (2026-2030) will significantly enhance monitoring and accounting of methane emissions. China's methane plan does not include specific targets for reducing methane emissions. However, it does strive to curb flaring at oil and gas wells, outlines plans to reuse the captured emissions as fuel, and targets methane leak detection and reduction at coal mines.

Key technologies and services in demand include:

- Advanced sensors and monitoring devices for real-time air quality data
- Ambient air monitoring equipment
- Fuel vapor control systems
- Data analytics and AI to process pollution data
- Continuous emissions monitoring systems
- Remote sensing technologies
- Inspection, adjustment, maintenance, and repair services
- Methane Leak Detection and Repair (LDAR)

Air Pollution Monitoring and Instrumentation: Over the past decade, the Chinese government has implemented numerous nationwide pollution standards and control measures including the [Air Pollution Prevention and Control Action Plan](#) from 2013 to 2017 and the [Three-Year Action Plan to Win the Battle for a Blue Sky](#) from 2018 to 2020. These plans require the development of a series of ambient air monitoring networks and should yield opportunities for U.S. air pollution monitoring and instrumentation companies. China's National Environmental Monitoring Centre, a public institution directly affiliated with the state's Ministry of Ecology and Environment, functions to help monitor the national environment, develop environmental monitoring technology, disseminate monitoring information, and inform reports and technical support for national environmental management and decision-making.

Key technologies and services in demand include:

- Advanced sensors and monitoring devices for real-time air quality data
- Ambient air monitoring equipment
- Data analytics and AI to process pollution data
- Continuous emissions monitoring systems
- Remote sensing technologies
- Inspection, adjustment, maintenance, and repair services

Carbon Capture and Storage: To achieve its dual carbon goal, China launched an [Action Plan for Synergizing the Reduction of Pollution and Carbon Emissions](#) in June 2022, which emphasizes the importance of controlling fossil fuels and source pollution. Additionally, the Chinese government helped stand up three commercial carbon capture and storage facilities (CCS), including Asia's largest coal-power plant CCS facility, the first offshore CO2 storage facility, and a carbon capture facility at an oil refinery. China currently hosts 11 operating carbon capture facilities and its first commercial scale, 109 km long CO2 transport pipeline.

In January 2022, China launched the world's largest carbon trading market, which presents significant opportunities for U.S. companies involved in carbon trading and emissions reduction.

Key technologies and services in demand include:

- Carbon capture technologies for hard-to-abate emissions
- CO2 transportation pipelines and infrastructure
- Emission reduction technologies
- Combustion systems
- Flue gas treatment systems
- CO2 utilization and removal technologies
- Compression equipment
- Geological storage technologies
- Engineering, procurement, and construction of carbon management projects
- Membrane separation technologies
- Carbon data and analytics
- Carbon trading services
- Carbon credit aggregators – companies that aggregate carbon credits from multiple sources and facilitate their sale on the market. The People's Bank of China provides support through the carbon emission reduction facility (CERF), and has a targeting re-lending quota for the clean, efficient use of coal. The CERF is not capped, while the re-lending quota is currently USD \$42 billion. The CERF supports clean energy, energy conservation, and environmental protection projects, as well as carbon reduction technology.



Waste Management and Recycling

Municipal Waste Disposal: China's rapid urbanization over the past four decades has led to a significant increase in the production of municipal solid waste and related growth in demand for disposal services. The output of municipal solid waste reached 242 million tons in 2020, an increase from a reported 8.17 million tons in 2008. Municipal waste disposal has become an increasingly severe challenge and China has heavily relied on incineration to help combat the increasing production of solid waste. The majority of new trash incineration plants have been built in wealthy coastal provinces where China's urban population is concentrated, so future opportunities for interior and rural waste disposal remain. The pace of expansion in trash incineration has exceeded the domestic industry's ability to safely and effectively handle the byproducts of trash incineration such as fly ash, furnace slag, and other toxic pollutants.

Key technologies and services in demand include:

- Construction waste utilization
- In-situ mine tailings and coal gangue filling
- Fly ash disposal and utilization
- Phosphogypsum and red mud disposal
- Smelt metal residue and chemicals residue storage infrastructure and transportation

Hazardous Waste Management: China's overall hazardous waste output has exponentially increased in recent years, with Sichuan University projecting that China will reach 157.89 million tons per year by 2023, which is a 43% increase from 2017 levels. The past few years have seen increased attention from both the public and the government to address hazardous waste issues, as disposal capacity has yet to catch up to output. Since the Chinese government revised its [Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes](#) in 2020, the government has stepped-up reporting on and enforcement of hazardous waste management violations.

Key technologies and services in demand include:

- Hazardous waste disposal technologies



Recycling Management: China has had limited success expanding recycling of municipal waste. Despite trash sorting campaigns launched by the government beginning in 2017, the level of public awareness remains low, and post-sorting recombination remains a significant problem. In 2018, China introduced the [Operational National Sword Policy](#) in order to reduce the volume and contamination rates of recyclable materials that China imports for reprocessing. As a result, China has greatly reduced its waste imports by as much as 92% in some waste categories. For U.S. environmental technologies, the introduction of the National Sword Policy highlights the massive opportunity and domestic need for China to increase its recycling infrastructure and divert waste from landfills.

Key technologies and services in demand include:

- Metal and paper waste sorting, processing, and recycling
- Inter-company and inter-industry closed circuit recycling

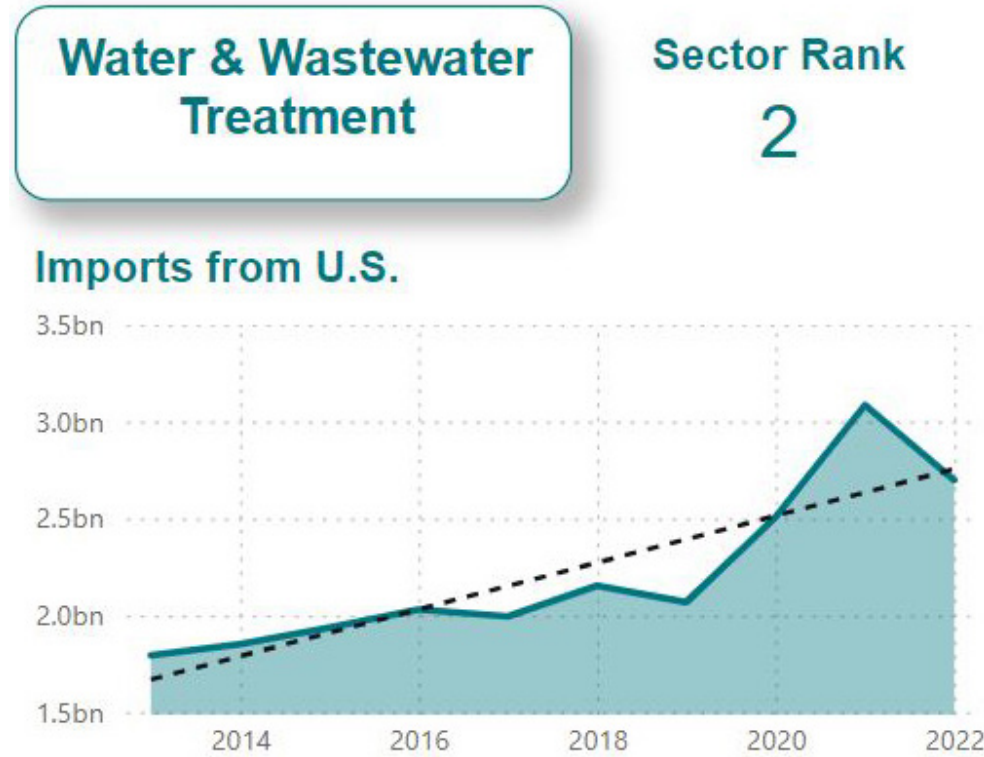
Water and Wastewater Treatment

Municipal Water Treatment and Infrastructure: China hosts nearly 20% of the world’s population but possesses less than six percent of the world’s total water resources. What water it does have is unevenly distributed, with northern China being more arid and prone to water shortages.

Rapid urbanization and industrialization further challenge water quality and availability. China is working to address these challenges, including through the [14th edition of its Five-Year Plan](#), which commits to reduce water consumption per unit of GDP by 16%, outlines efforts to pursue water-use efficiency in agricultural, industrial, and urban settings, and sets targets of reaching 25% water reuse for cities facing water scarcity. In 2023, the Government of China allocated \$3.6 billion in special funds to address water pollution.

Wastewater Treatment and Sanitation Services: As of 2022, China’s wastewater treatment plants treated wastewater for 98% of municipalities and 45% of rural areas, indicating a need to build out wastewater treatment infrastructure outside of major cities. China’s [14th edition of its Five-Year-Plan](#) sets targets of treating 90% of urban sludge for cities at prefecture level (an administrative division ranking below a province and above a county) and above.

China plans to build or renovate 80,000 km of sewage collection pipeline networks in the next few years, in addition to building out wastewater treatment facilities.



Key technologies and services in demand include:

- Smart water technologies including smart sensors, data analytics, solutions for water quality monitoring, leak detection, and infrastructure management.
- Point-of-use ion exchange and reverse osmosis for residential-scale systems
- Municipal wastewater treatment solutions
- Sewage pipeline maintenance
- Black and odorous water bodies treatment
- Sludge treatment: technologies for reducing water content in sludge, environment-friendly chemicals, high automation blending and injection equipment, and cost-effective and energy-efficient incineration technologies
- Engineering, procurement, and construction services (especially for wastewater treatment infrastructure in third- and second-tier cities)

Industrial Wastewater Treatment: In 2022, China's national sewage discharge was estimated at nearly 63 billion cubic meters. Industrial wastewater is a significant source of wastewater in China, estimated at 20-25 billion tons per year. Based on [data collected from European research firm Statista](#), approximately 3.77 billion yuan was invested in China in 2022 to treat wastewater pollution caused by industrial production. China's [14th edition of its Five-Year-Plan](#) requires key industrial sectors – such as the petrochemicals, iron, and steel industries – to increase wastewater resource recovery rates and reduce the amount of water consumed for production purposes by 2025. China also considers industrial wastewater recycling as a key part of promoting increased use of “unconventional” water sources to address water security and supply issues in China.

Key technologies and services in demand include:

- Industrial wastewater treatment solutions for heavy-polluting industries, including textiles, printing, steel production, oil and gas extraction, coal mining, and pharmaceutical production
- Innovative solutions for treating mixed wastewater streams in industrial parks
- Solutions for zero-liquid discharge
- Reverse osmosis, electrochemical technologies, ion exchange resins, advanced oxidation processes, and brine concentration solutions

Water Efficiency and Reuse: China is also prioritizing water conservation and working to improve water reuse rates. In 2022, China launched pilot projects across 19 cities to send treated sewage wastewater to purify in artificial wetlands before being reused in other applications, such as fish farming. From 2020-2025, China's newly built, renovated, and expanded reclaimed water production capacity should reach at least 15 million cubic meters per day. Further demonstrating the level of importance the Chinese government places on improving water quality and reuse, China's Ministry of Ecology and Environment allocated approximately USD \$2.6 billion in funding for special water pollution control projects in 2022, also encouraging financial institutions to provide more support for these types of projects. China has also recognized that it needs to reduce water loss from leakages in its water supply infrastructure, and is seeking smart water systems to monitor and detect leaks in pipes. Sensors are also important for monitoring water quality in rivers and other sources and for detecting illegal industrial sewage discharge.

Key Technologies and services in demand include:

- Wastewater reclamation and reuse solutions, including innovative solutions to treat mixed wastewater streams at industrial parks
- Solutions for water efficiency and water conservation
- Smart water monitoring, including for reducing water loss and leakages from pipes



Market Challenges

Intellectual Property Protection: While it has made some progress in improving intellectual property (IP) laws and regulations, China remains a difficult market for protecting and enforcing IP rights. Some companies experience pressure to share trade secrets, specific technology, or sensitive data. U.S. small- and medium-sized enterprises, in particular, should be aware that a U.S. trademark or patent registration is not sufficient to protect their IP in China. For companies entering the Chinese market, it is essential to have an effective IP protection strategy in place. See the STOPFakes China IPR Toolkit for additional information and guidance.

Legal Barriers and Regulatory Complexity: Multiple administrative bodies at all levels of government can issue orders to enforce regulations in China. The lack of regulatory clarity has undermined business confidence in legal compliance. As a result, U.S. exporters must invest significant time and financial resources to track and interpret all regulatory documents to ensure compliance. Data analytics and artificial intelligence to process pollution data is sensitive in China.

Political Tensions: China has a goal of achieving leadership in various emerging technology fields by 2030 and seeks to acquire and use technology to advance its national goals, including through technology transfers and intelligence gathering. Tensions between the United States and China have resulted in tariffs, sanctions, and lowered business confidence among U.S. companies operating in China, deterring some U.S. companies from doing business in China. However, recent high-level U.S. government visits to China – including Secretary Blinken, Secretary Yellen, and Secretary Raimondo – led to increased bilateral communications and culminated in a November 2023 summit between President Biden and President Xi, which focused on better managing competition and stabilizing overall U.S.-China relations.

Localization Policies: China is striving to realize economic self-reliance and promote indigenous innovation. Programs to reach this objective include [Made in China 2025](#) (published in 2015) and the [14th edition of the Five-Year Plan](#) (published in 2021). These policies aim to replace foreign technologies, products, and services in China with local products and solutions. This trend is already impacting China's environmental technologies sector, with domestic products becoming more sophisticated and competitive due to subsidies and other incentives. U.S. exporters often need to offer specific products for niche markets to compete effectively in this more challenging environment.

Importance of Trusted Local Partners: U.S. exporters need to invest time and resources to understand the needs and complexities of the local Chinese market and offer appropriate solutions. For U.S. businesses, it is very important to find suitable partners to set up pilot or demonstration projects in China to demonstrate viable offerings. An increased presence at trade shows and various workshops and seminars increases the credibility of U.S. exporters in China and can significantly aid efforts to find appropriate partners.



Learn More

ITA Resources

China Specific

- [China Country Commercial Guide](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

Other

- [Intellectual Property Rights Information & Assistance \(STOPFakes\)¹](#)

Chinese Government Resources

- [Ministry of Ecology and Environment](#)
- [Ministry of Water Resources](#)
- [National Development and Reform Commission](#)
- [National Energy Administration](#)

#4 Market Germany



Germany's ambitious greenhouse gas emissions reduction targets provide ample opportunity for U.S. exports of carbon capture technologies, among other environmental technology opportunities.



This tool considers any market classified as "high income" in the World Bank's Country Income Classification Level as "mature." For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,846 or more.

Market Development Status: Mature



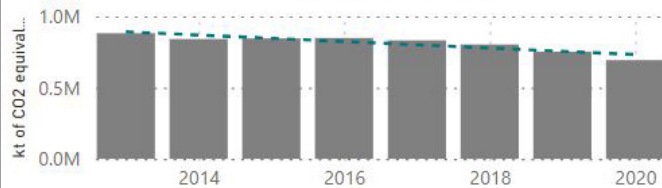
Top Indicators and Why They Are Important

EPI Environmental Health Score



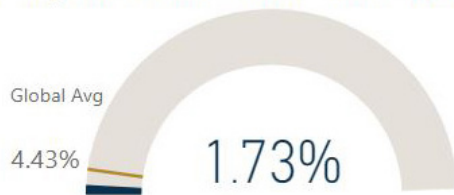
The EPI Environmental Health Score indicates a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Annual GHG Emissions



The Annual GHG Emissions Indicates a market's need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Average Tariff on Enviro Tech Goods



The average Environmental Technologies Tariffs indicate a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Enviro Tech + Clean Energy Market Size



The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

Germany has a large, sophisticated, and competitive market for environmental technologies, underpinned by a strong commitment to environmental protection and enforcement of regulations. Germany's environmental technologies and clean energy markets generated a combined \$96.3 billion in 2022. The United States exported \$2.2 billion in environmental technology goods in 2022, representing four percent of Germany's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to Germany, followed by air pollution monitoring and control and waste management and recycling.

The United States and the European Union do not currently enjoy a free trade agreement. However, the United States is the European Union's largest trade and investment partner and Germany, and the United States have a robust trade relationship. In 2022, U.S. goods exports to Germany totaled \$72.5 billion.

Germany follows environmental quality standards set by the EU. In May 2021, the European Commission adopted the [EU Action Plan: Towards Zero Pollution for Air, Water, and Soil](#), a key deliverable of the European Green Deal. The action plan envisions zero pollution by 2050, where air, water, and soil pollution are reduced to levels no longer considered harmful to health and natural ecosystems. The plan includes specific targets for improving air and water quality, reducing plastic litter and microplastics, improving soil quality and reducing pesticide use, and reducing waste generation.

Germany set legally-binding [2030 climate targets](#), including a binding 65% reduction in greenhouse gas emissions by 2030 as set out in the [Climate Action Programme 2030](#) and the [Climate Change Act](#) (Klimaschutzgesetz). In 2016, Germany released the [Climate Action Plan 2050](#) which sets targets by each economic sector with the main goal of Germany becoming carbon neutral by 2050. Germany's ambitious emissions reduction targets provide ample opportunity for carbon capture technologies. As of January 2024, [Climate Action Tracker](#) ranks Germany's policies and action on climate change as "almost sufficient" to be consistent with limited global warming to 1.5 degrees Celsius, and its 2045 net zero target as "average." While it notes that the current German government is accelerating domestic climate policy implementation, divergent approaches are delaying action or may be counterproductive to climate efforts.

Recently, the German government reduced or ended environmental and climate subsidies such as the rollout of heat pumps and private electric vehicles purchases due to budget shortfalls. U.S. companies should take note in case budget cuts expand to other sectors.

Yale University's [Environmental Performance Index](#) ranks Germany as 16 out of 180 countries for Environmental Health, reflecting strong performance in measures including air quality, access to sanitation and drinking water, mitigation of soil contamination, and waste management. Germany has a well-established local environmental technologies industry, supported through its robust environmental regulatory regime and commitment to addressing environmental issues. U.S. companies that can provide specialized and niche solutions have a greater opportunity for success in the German market.



Market Opportunities

Air Pollution Monitoring and Control

Mobile Source Emissions Control: Germany has strict emission control regulations for industrial facilities and vehicles to limit the release of pollutants into the air. Through the [EU Action Plan: Towards Zero Pollution for Air, Water, and Soil](#), Germany and other EU member states have set a 2030 goal to reduce the number of premature deaths caused by air pollution by at least 55%. The government has four strategies for air pollution control including setting environmental quality standards, emission reduction requirements according to the best available technology, production regulations, and establishing emission ceilings. In May 2019, Germany passed its own [National Air Pollution Control Programme](#), which introduces mandatory reductions to national emissions by 2030 including fine particulate matter and black carbon. This was part of an overarching EU directive, Article 6 and 10.

Key technologies and services in demand include:

- Continuous emissions monitoring systems
- Emissions reduction technologies
- Satellite technologies
- Fuel vapor control systems
- Flue gas desulfurization equipment
- Selective catalytic reduction
- Exhaust gas recirculation

Emissions Monitoring: Germany has a network of air quality monitoring stations across the country. These stations measure pollutants such as particulate matter (PM10, PM 2.5), nitrogen dioxide (NO), sulfur dioxide (SO), and ozone. The Federal Environment Agency maintains a database of operational and discontinued air monitoring stations in Germany.

Key technologies and services in demand include:

- Data analytics and integration platforms
- Engineering, procurement, and construction services
- Environmental consulting services

Air Pollution Monitoring & Control

Sector Rank

4

Imports from U.S.



Industrial Air Pollution Reduction: In 2016, Germany released its longer-term [Climate Action Plan 2050](#) which sets targets by each economic sector with the main goal of Germany becoming carbon neutral by 2050. While inclusive of all industries, the 2050 plan establishes a heightened focus on reducing greenhouse gas emissions from the heating of buildings and transportation sectors. Germany's ambitious emissions reduction targets provide ample opportunity for carbon capture technologies.

In June of 2023, Germany announced plans to launch the [Carbon Contracts for Difference program](#) which will provide €50 billion over the next fifteen years to incentivize decarbonization in the steel, cement, paper, and chemical industries. These funding opportunities may provide opportunities for U.S. environmental technology firms providing solutions to decarbonize heavy industry sectors.

Key technologies and services in demand include:

- Scrubbers
- Catalytic converters
- Particulate control devices
- Flue gas desulfurization
- VOC control equipment
- Industrial automation and process optimization services

Carbon Management: Germany's [Climate Action Program 2030](#) sets legally binding climate targets that must be achieved by 2030. Together with the [Climate Change Act](#) these policies place a major focus on cutting greenhouse gas emissions. For instance, Germany must reduce its emissions levels (excluding power production, energy-intensive industries, and civil aviation) by 65% from 2005 levels by 2030. In 2022, the Germany Federal Ministry of Economic Affairs and Climate Action (BMWK) published an [Evaluation Report](#) on the country's CO2 storage law (SpG), highlighting that although carbon capture, transportation, and storage technology is mature, Germany's legal framework prevents its ability to scale. BMWK is currently working on a political framework for the deployment of carbon capture, removal, and storage technologies in Germany. This Carbon Management Strategy is critical for the country to reach its goal of climate neutrality by 2045.

Several EU climate policy amendments have entered into force, such as [Fit for 55 ETS-changes](#), which are a set of proposals to revise and update EU legislation that would make reaching the EU's climate goals of reducing emissions by at least 55% by 2030 a legal obligation. As a result, many industrial countries are under pressure to reduce their emissions and meet their NDCs. Major CO2 infrastructure projects are underway in Germany, including Open Grid Europe's [CO2 Net](#), which would deliver a nationwide CO2 pipelinenetwork. This pipeline network would also enable Germany's industrial emitters to transport CO2 abroad, including through a planned project known as the Delta Rhyne Corridor which would transport CO2 to Rotterdam, where it would be stored offshore. Germany has not yet ratified a London Protocol amendment that would allow for the export of CO2 for offshore storage abroad.

Key technologies and services in demand include:

- Carbon capture, including direct air capture, technologies
- CO2 transportation pipelines and infrastructure
- Combustion systems
- Flue gas treatment system
- CO2 utilization and removal technologies
- Compression systems
- Geological storage technologies
- Engineering, procurement, and construction of carbon management projects
- Environmental Impact Assessment consultancies

Waste Management and Recycling

Germany has one of the most ambitious waste management agendas in the world. In 2017, Germany's recycling rate rose to 67%, surpassing the [EU Waste Framework Directive's](#) 65% goal. Much of Germany's success lies in its localized and efficient waste infrastructure and the short distance traveled for waste. In addition, the availability of waste-to-energy and advanced sorting and treatment facilities reduce the need to export waste.

Hazardous Waste Management: While waste infrastructure tends to be Germany's area of strength, hazardous waste still poses a challenge for the country. Currently most of Germany's hazardous waste ends up in dry landfills and Germany's current solution is bailing and wrapping the waste before it goes to landfill.

Key technologies and services in demand include:

- Hazardous waste disposal technologies

Automation: Increasing labor costs and employee safety are the primary concern for Germany's solid waste management sector, creating opportunities for automation solutions that could greatly reduce costs and increase efficiencies.

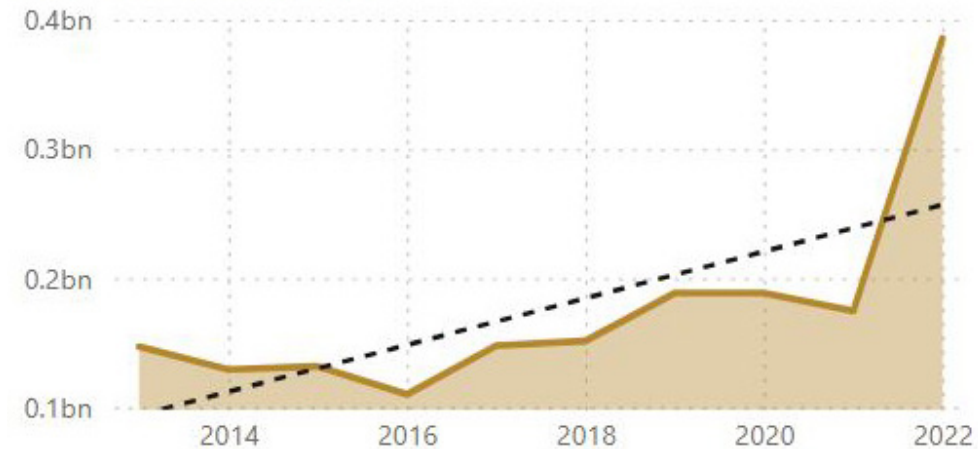
Key technologies and services in demand include:

- Sorting machinery
- Advanced waste handling equipment (waste robotics and artificial intelligence)

Waste Management & Recycling

Sector Rank
4

Imports from U.S.



Advanced Recycling: Critics of Germany's high recycling rate suggest that the amount that is recycled is quite small relative to the waste that cannot be reused. Technologies focused in expanding the range of recyclable materials, like chemical recycling, can be used to support Germany's circular economy ambitions.

Key technologies and services in demand include:

- Chemical recycling

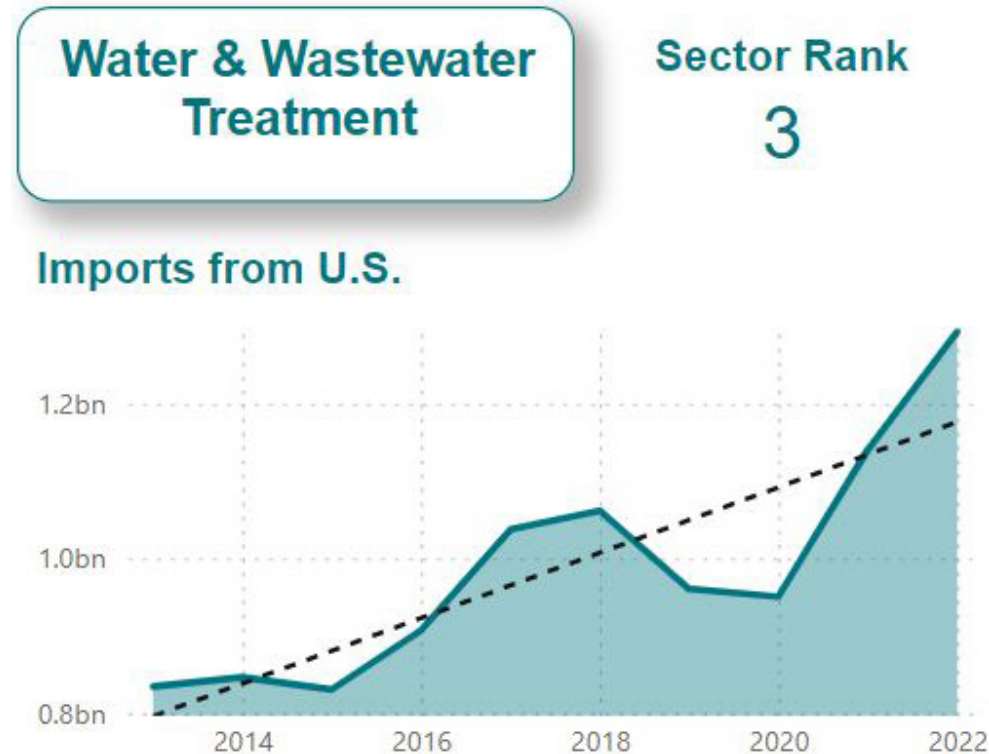
Water and Wastewater Treatment

Municipal Water Treatment and Infrastructure: The [EU Drinking Water Directive](#) entered into force in January 2023, setting out updated water quality standards for Member States and addressing emerging pollutants including microplastics. The directive applies to water intended for drinking and domestic purposes and includes increased monitoring and reporting requirements for Member States. Germany's [revised Drinking Water Ordinance](#) transposes relevant requirements of the EU Drinking Water Directive into German law and became effective in June 2023.

In March 2023, the Government of Germany adopted the [National Water Strategy](#) in order to protect the country's water resources, prevent scarcity, avoid conflicts of use, tackle a backlog in modernizing the water infrastructure, and improve the status of water bodies and water quality. The Strategy outlines water management and water protection goals through 2050 and names 78 measures that are to be implemented until 2030. The Strategy will support a transformation to water-smart cities and aims to address water pollution from nitrogen, phosphorus, microplastics, and other substances.

Key technologies and services in demand include:

- Smart water technologies, including smart sensors, data analytics, Internet of Things (IoT) solutions for water quality monitoring, leak detection, and infrastructure management
- Solutions to prevent and reduce groundwater pollution
- Technologies and services for updating water supply infrastructure
- Engineering, procurement, and construction services for upgrading water treatment and supply infrastructure and incorporating climate adaptation and resiliency objectives



Water Efficiency and Reuse: Germany is typically a water-rich country, but it has been facing climate challenges including droughts and heat waves, which have caused water shortages in several locations and have negatively impacted agricultural production. Western Germany was also hit hard by deadly flash flooding in July 2021. Germany's new [National Water Strategy](#) will help the country cope with these climate challenges while strengthening water security. For example, the Strategy mandates the development of guidelines to regulate water distribution in the case of regional shortages. There will also be a new registry system for local and federal governments to track available water quantities.

German utilities are also seeking to become more resilient in the face of droughts, floods, and other extreme weather events, including by improving stormwater management. Water reuse for irrigation is also expected to grow due to the [Water Reuse Regulation](#), an EU regulation that will take effect as of June 23, 2023 and aims to encourage and facilitate water reuse.

Key technologies and services in demand include:

- Stormwater management solutions, including automation of drainage systems guided by meteorological data
- Water reuse solutions for irrigation
- Smart water technologies including for monitoring leakages

Municipal Wastewater Treatment and Sanitation Services: According to Global Water Intelligence (GWI) reporting, the state governments of Baden-Württemberg and North-Rhine Westphalia have strongly incentivized “fourth-stage treatment” upgrades to wastewater treatment plants, intended to remove micropollutants. It remains to be seen whether there will be federal or state regulations requiring upgrades to wastewater treatment plants, but the federal government has prioritized the reduction of micropollutant emissions at the source. This could create opportunities for U.S. solutions providers of advanced detection and treatment technologies.

GWI reports that Germany will experience changes in the sludge treatment market due to a reform of the [Sewage Sludge Ordinance](#) in 2017, which made phosphorous recovery mandatory for all wastewater treatment plants larger than 50,000 population equivalent (PE). Depending on plant size, compliance deadlines fall between 2029 and 2032, but utilities are required to submit compliance plans by 2023. As a result, there are opportunities for suppliers of economical incineration and sludge digestion solutions.

Key technologies and services in demand include:

- Advanced treatment solutions for removing micropollutants from wastewater, including pharmaceuticals, hormones, and cosmetics, as well as microplastics
- Resiliency solutions for utilities, including through digitization and deployment of smart meters
- Sludge treatment technologies, including economical incineration and sludge digestion solutions





Market Challenges

Regulation and Bureaucratic Procedures: As part of the EU, U.S. exporters must contend with EU regulations when doing business in Germany. The EU does have some policies in place that may be discouraging for U.S. environmental technology companies. In addition, German regulations and bureaucratic procedures can create challenges for U.S. companies. For example, exporters can face barriers due to enhanced safety standards and certification procedures for products.

Subsidies: Subsidies continue to present a challenge for U.S. companies competing in the German market, although in some cases they may be reduced as a result of rising energy prices and the Ukraine war. German state subsidies for clean energy will face a €12 billion cutback from the original 67 billion euros scheduled for 2024. Remaining subsidies still present a hurdle, especially for waste-to-energy or other related environmental technologies. The German government also recently reduced, suspended, or ended environmental and climate subsidies such as the rollout of heat pumps and private electric vehicles purchases due to budget shortfalls. U.S. companies should take note in case budget cuts expand to other sectors.



Learn More

ITA Resources

German Specific

- [U.S. Commercial Service in Germany](#)
- [Germany Business Service Providers](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

U.S. Government Resources

The U.S. – German Treaty of Friendship, Commerce, and Navigation allows U.S. investors to receive national treatment and free movement of capital between the United States and Germany and avoids double taxation of U.S. firms operating within Germany.

German Government Resources

Environmental regulations and a functional system of enforcement are important drivers of demand for environmental technologies, incentivizing the investment in solutions to address environmental challenges in order to avoid the cost of non-compliance.

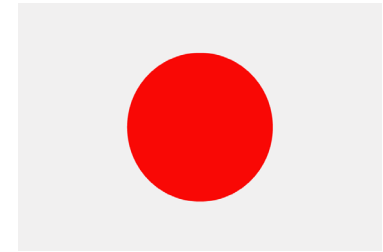
Key entities for U.S. exporters to note include:

- [Ministry for the Environment, Nature Conservation, Nuclear Safety, and Consumer Protection](#), the central federal authority for setting national environmental policy in Germany and handling environmental and climate issues.
- [National Water Strategy](#)
- [Sewage Sludge Ordinance](#)
- [Federal Ministry of Health](#)
- [Drinking Water Ordinance](#)
- The [Environment Agency](#) supports the Ministry in matters relating to emissions control, soil conservation, waste management, water resources management, and health-related environmental issues.
- [Germany Trade & Invest](#) the economic development agency of the Federal Republic of Germany.

Other Important Resources

- [German Association for Waste Management](#)
- [German Association for Water, Wastewater and Waste](#)
- [Association for Air-Handling Technology](#)

#5 Market Japan



Japan has a long history of investing in environmental technologies after experiencing high levels of water and air pollution in the middle of the twentieth century.



This tool considers any market classified as “high income” in the World Bank’s Country Income Classification Level as “mature.” For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,846 or more.

Market Development Status: Mature



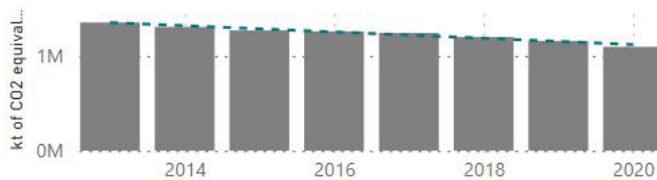
Top Indicators and Why They Are Important

EPI Environmental Health Score



The EPI Environmental Health Score indicates a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Annual GHG Emissions



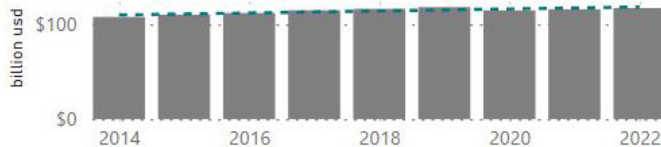
The Annual GHG Emissions Indicates a market's need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Average Tariff on Enviro Tech Goods



The average Environmental Technologies Tariffs indicate a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Enviro Tech + Clean Energy Market Size



The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

Japan's commitment to environmental protection, robust environmental regulatory regime, and mature local environmental technologies market presents a strong but competitive export market for U.S. goods and services. Japan's environmental technologies and clean energy markets generated a combined \$117 billion in 2022. The United States exported \$1.53 billion in environmental technology goods in 2022, representing eight percent of Japan's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to Japan, followed by air pollution monitoring and control and waste management and recycling.

The United States and Japan have a strong trade relationship and in 2019 signed the [U.S.-Japan Trade Agreement](#) and the [U.S.-Japan Digital Trade Agreement](#) to eliminate or reduce tariffs on certain agricultural and industrial products and set high-standard rules for digital trade. Japan is the fourth largest purchaser of U.S. goods, importing \$80.2 billion in U.S. goods in 2022.

Japan's [Roadmap to "Beyond-Zero" Carbon](#) seeks to advance carbon emissions reductions through technology innovation. The roadmap also promotes green finance and supports greater international cooperation to incentivize business-led adoption of innovative green technologies. Under the United Nation's [Paris Agreement](#) and as detailed in the [October 2021 NDC update](#), Japan aims to reduce its greenhouse gas emissions by 46% from 2013 levels by 2030, in alignment with its greater goal of reaching net-zero emissions by 2050. As of January 2024, Climate Action Tracker rates Japan's policies and action on climate change as "insufficient" to be consistent with limited global warming to 1.5 degrees Celsius, and its 2050 net zero target as "poor." It notes that Japan's [Green Transformation Basic Policy](#), adopted in February 2023, places more emphasis on economic growth and energy security than on prioritizing ambitious decarbonization activities.

Japan's [environmental priorities](#) more broadly include realizing a "green society," protecting oceans from plastic waste, and creating a circular economy. Yale University's [2022 Environmental Performance Index](#) ranked Japan 15 out of 180 countries for Environmental Health. Japan scored well on access to sanitation and drinking water and mitigation of pollutants such as particulate matter, but struggled with lower performance on nitrogen oxide and sulfur dioxide exposure, recycling, and ocean plastics, suggesting opportunities for solutions in those areas are more ripe.



Market Opportunities

Air Pollution Monitoring and Control

Industrial Air Pollution Reduction: Air pollution increased rapidly during Japan's rapid economic growth from the 1960s through the 1980s, and became a problem, especially in large metropolitan areas. Although it has improved in recent years, air pollution still contributes to over 40,000 deaths per year in Japan, sparking the Japanese Government to employ a comprehensive approach to prevent and control air pollution through addressing both industrial and urban sources. The leading causes of air pollution are vehicle emissions, industrial production, and transboundary sources, all resulting from fossil fuel combustion. The Japan government is undertaking various strategies to address air pollution including stringent regulations on air quality and emissions, technology upgradation, transportation policies, monitoring and data sharing, and public awareness and education initiatives. The Ministry of Environment conducts monitoring and publishes measurement results annually.

Industrial production through factories and power plants continues to emit pollutants such as sulfur oxides and nitrogen oxides. These pollutants are regulated under the [Air Pollution Control Act](#) and companies are required to have a dust collector installed that separates and removes particulate matter in gas, and smoke exhausts that remove sulfur oxides and elementary oxides in the exhaust gas. Further reductions are sought after to reduce criteria pollutants by using desulphurization and fuel gas denitrification. The Ministry of the Environment promotes emission control measures from factories and business establishments.

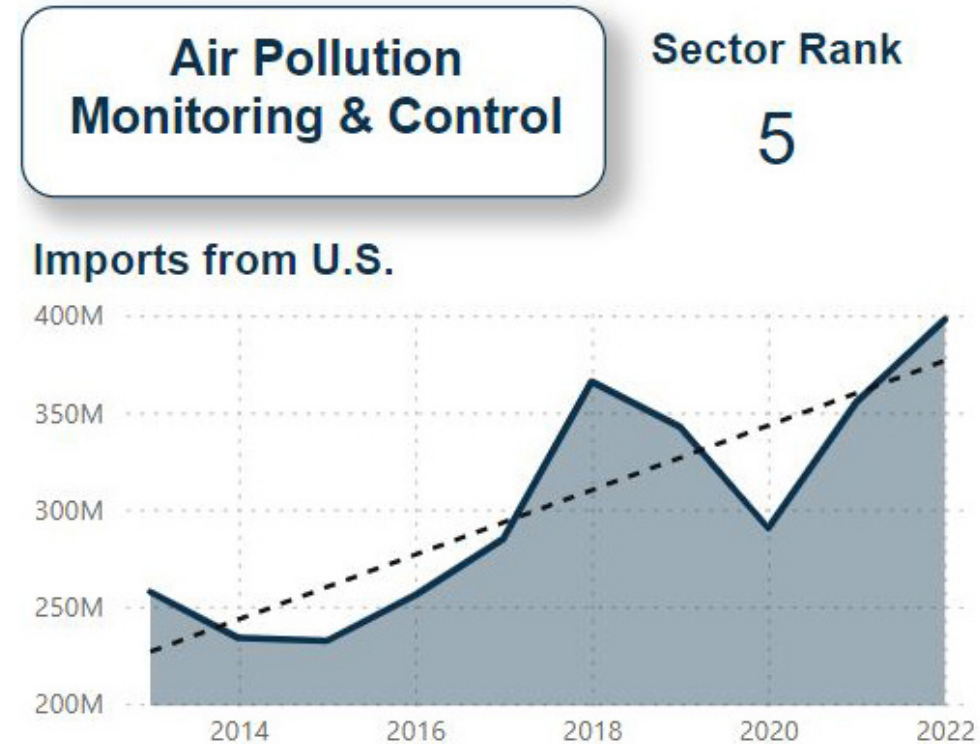
Key technologies and services in demand include:

- Air filters and purifiers
- Advanced air quality monitoring sensors
- Air monitoring and control data analysis and visualization
- Emission control technologies
- Ventilation systems
- Flue gas desulphurization equipment
- Drones for air quality surveys

Carbon Management: In January 2023, Japan's Ministry of Economy, Trade, and Industry (METI) released its [CCS Long-Term Roadmap](#), which aims to boost deployment of carbon capture, utilization, and storage (CCUS) technologies by targeting commercial deployment by 2030. In November 2019, Japan launched its first large-scale CCUS pilot project in Tomakomai, Hokkaido in northern Japan. In June 2023, Japan selected the country's first seven CCUS projects to store 13 million mt/year of CO₂ in Japan and abroad by 2030 to meet its carbon neutrality by 2050 goal. The government also has started to fund research and development for suitable geological storage locations, finding reservoirs in 11 locations that can store 16 billion mt of CO₂. Japan has been an advocate for enhancing public acceptance of CCUS and promoting projects overseas. In June 2023, METI presented a set of draft rules for the common governance of CCUS with Australia and Southeast Asia at the Asia Zero Emission Community (AZEC) meeting in Indonesia. The adoption of these shared rules aims to lower the cost of CCUS and shorten construction timelines. Japan is also a member of the [Asia CCUS Network](#), which was established in 2021 as part of the Asia Energy Transition Initiative to share knowledge and promote adoption of CCUS across Asia. Japan's momentum on CCUS and government subsidies create an opportunity for U.S. CCUS technologies and project developers in the region.

Key technologies and services in demand include:

- Carbon capture, including direct air capture, technologies
- CO₂ transportation pipelines and infrastructure
- Combustion systems
- Flue gas treatment systems
- CO₂ utilization and removal technologies
- Compression systems
- Membrane separation technologies
- Geological storage technologies
- Engineering, procurement, and construction services
- Environmental Impact Assessment consultancies



Waste Management and Recycling

The [2000 Basic Act for Establishing a Sound Material-Cycle Society](#) established the backbone of solid waste management regulation in Japan. It clarifies definitions and the responsibilities of state and local governments, businesses, and citizens. The promotion of cyclical use for products and reduction of resource consumption are all critical elements of Japan's approach to solid waste management. From 1994 to 2014, Japan increased the ratio of total material inputs (goods that are used in making other products) into the economy and amount recycled from 8.2% to 15.8%, and the country seeks to continue this trend.

Waste to Energy: Japan's most widely used method for solid waste disposal is incineration; however, materials left over from incineration must go to landfills. There are over 1,699 landfills across the country, and landfill space is limited. As of 2017, there were 1,200 incineration facilities in Japan, at least 358 of these facilities were waste-to-energy. The necessity of incineration to deal with Japan's solid waste presents an opportunity for niche incineration technologies. Although Japan is a world leader in incineration technologies, U.S. companies should look for specific sections of the incineration market where they can be competitive.

Key technologies and services in demand include:

- Incineration, gasification, pyrolysis technologies

Plastic Recycling: Japan's environmental priorities include realizing a "green society," protecting oceans from plastic waste, and creating a circular economy. Japan ranks second in the world in per capita plastic container and packaging disposal after the United States, and more than 8.5 million tons of plastic are disposed every year. Japan has increased the ratio of total material inputs (goods that are used in making other products) into the economy and amount recycled from 8.2% in 1994 to 15.8% in 2014. The recycling rate of plastic in Japan is at 84% which is the highest in the world, and Japan hosts highly advanced plastics recycling facilities. However, only 27% of collected plastic is reprocessed into usable material. In June 2021, Japan promulgated [Plastic Resource Circulation Act](#), with enforcement beginning in April 2022. There are over 1,699 landfills across the country, and landfill space is limited.

Key technologies and services in demand include:

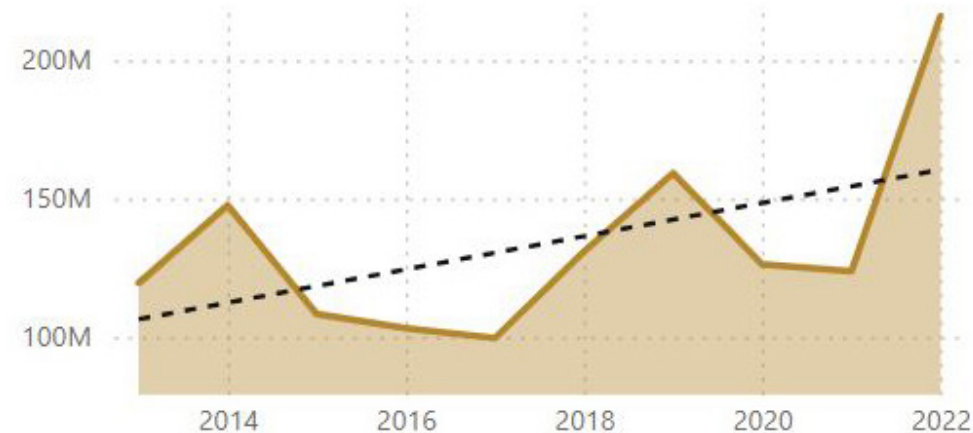
- Plastic packaging reduction technologies
- Chemical recycling

E-waste Recycling: There are opportunities for U.S. solutions aimed at increasing Japan's ability to recycle a wider range of solid waste materials. E-waste continues to be an issue for Japan and Japan issued a Law for the Recycling of Specific Kinds of Home Appliances where the policy sets minimum recycle rates for items such as air conditioners (80%), plasma TVs (74%), and refrigerators (70%). Since Japan is the third largest producer of e-waste, there is opportunity for U.S. companies providing e-waste recycling solutions.

Waste Management & Recycling

Sector Rank
5

Imports from U.S.



Key technologies and services in demand include:

- Advanced sorting and separation technology for e-waste

Water and Wastewater Treatment

Japan is considered a leader in water treatment and has strict standards in place for water quality. Japan has a long history of managing its water quality having introduced the [Drinking Water Quality Standards](#) in 1958. Updated several times since then, including a substantial amendment in 1992, Japan's standards were last revised in 2003 after the World Health Organization amended its Guidelines for Drinking Water Quality. According to a 2023 report by Astute Analytica, Japan's water treatment market was valued at \$8.71 billion and is expected to grow to \$18.74 billion by 2031. The report notes that Japan has invested \$500 million annually in research and development for water treatment technologies, has embraced desalination, and has a water recycling rate of 75%.

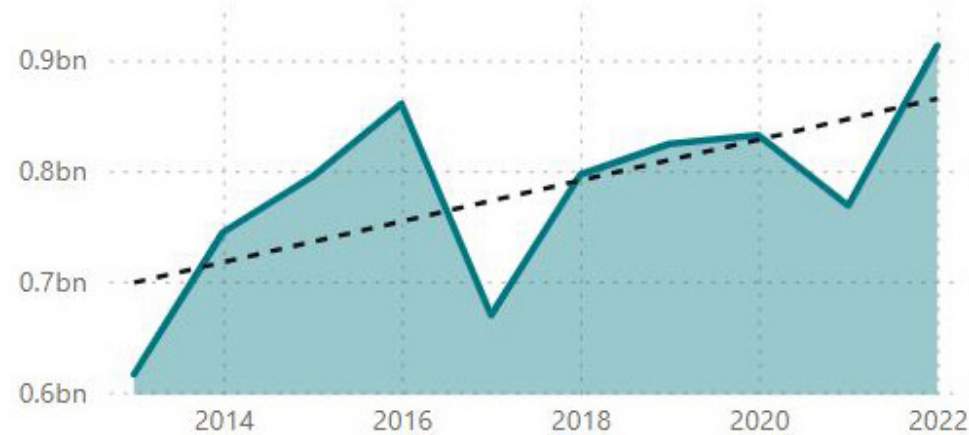
Water Infrastructure Maintenance & Modernization: Rapid economic growth after World War II led to the quick construction of water facilities in Japan to address heightened water demand, and many of those facilities have exceeded their expected lifespan. Aging infrastructure has created business opportunities for updating buildings as well as monitoring, inspection, maintenance, and repair services. In reporting from 2021, it was estimated that it would take 140 years to replace all the pipes needed at the current pace, and the Japanese Government estimated in 2018 that 17.6% of pipes were over 40 years old.



Water & Wastewater Treatment

Sector Rank
5

Imports from U.S.



from a 2013 baseline in its sewage sector by 2030 equivalent to 2.08 million tons of CO₂ annually. The [Ministry of Land, Infrastructure, Transport and Tourism](#) also released a [roadmap to guide the effort](#). Japan plans to address the wastewater sector's carbon footprint through energy efficiency and recovery programs and by upgrading sludge incineration processes while increasing reliance on renewable energy. Energy saving equipment in use so far includes improved aerators and pumps.

Key technologies and services in demand include:

- Wastewater decarbonization solutions, including for energy recovery and energy efficiency
- Systems for harnessing energy from sludge, including biogas generation and heat from sludge incineration
- Technologies to improve resiliency of water and sewerage infrastructure especially regarding seismic activity
- Non-chemical wastewater treatment agents

While maintenance has become increasingly important as infrastructure ages, Japan has experienced a shrinking of the necessary workforce, causing particular problems in rural municipalities. Another barrier to upgrading systems is a lack of finance, as drinking water supply is mostly run by municipalities and a shrinking population has led to declining revenues. Earthquakes have caused old, corroded pipes to burst and local governments have struggled to afford replacements. In response to these challenges, there are efforts to integrate water supply operations between municipalities and increase efficiency. The Government is seeking to increase cooperation between the public and private sectors, and in 2018 amended the [Water Supply Act](#) to include measures to facilitate public-private partnerships (PPPs). The Act allows local governments to sell the rights to manage water supply services for periods of up to 20 years.

Key technologies and services in demand include:

- Digitization and other solutions to identify leakages, improve operational efficiency and lower costs
- In-pipe inspection cameras, in-pipe monitoring machines, and other equipment for monitoring pipelines
- Services for monitoring, maintaining, and repairing pipelines and other infrastructure
- Desalination technologies

Decarbonization of Wastewater: As part of the [Global Warming Countermeasures Plan](#), approved in 2021, Japan committed to reduce CO₂ emissions by 46% from a 2013 baseline in its sewage sector by 2030 equivalent to 2.08 million tons of CO₂ annually. The [Ministry of Land, Infrastructure, Transport and Tourism](#) also released a [roadmap to guide the effort](#). Japan plans to address the wastewater sector's carbon footprint through energy efficiency and recovery programs and by upgrading sludge incineration processes while increasing reliance on renewable energy. Energy saving equipment in use so far includes improved aerators and pumps.



Market Challenges

Highly Competitive Market: Japan has a highly mature domestic environmental technologies sector, bolstered by Japan's strong environmental regulatory framework and commitment to green initiatives. Japan manufactures competitive, cutting-edge technologies both for the local market and export, and exports more than it imports in this sector. U.S. companies are offering niche, high-quality, specialized products that are not already offered in the market are more likely to be successful.

Regulatory Environment: U.S. companies are encouraged to become familiar with Japanese laws and policies which govern the environmental technologies sector. Many of the opportunities in the sector are regulated and managed by both federal and local governments and can be challenging for U.S. companies to navigate. Furthermore, environment-related products (especially electrical appliances) often require re-testing and approval before being introduced into the Japanese market, even if they already conform to U.S. or international standards.

Business Culture: Building personal relationships with potential business partners is extremely important to doing business in Japan and can be challenging given the supplier relationships already in place and reluctance to modify existing business arrangements. Industry associations in Japan have limited membership and often exercise strong market influence. Advisory councils and other government-commissioned study groups can play a significant role in the development of regulations and policies, and lead to concerns about lack of transparency and meaningful opportunities for all interested parties to engage on policy issues.



Learn More

ITA Resources

Japan Specific

- [U.S. Commercial Service in Germany](#)
- [Japan Country Commercial Guide](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

U.S. Government Resources

- [U.S.-Japan Trade Agreement](#)
- [U.S.-Japan Digital Trade Agreement](#)

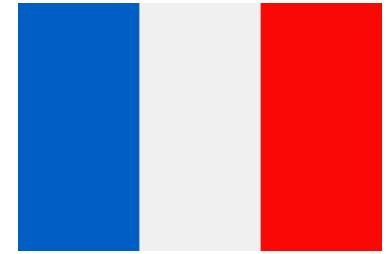
Japanese Government Resources

Environmental regulations and a functional system of enforcement are important drivers of demand for environmental technologies, incentivizing the investment in solutions to address environmental challenges in order to avoid the cost of non-compliance. The Basic Environment Law – enacted in 1967 and amended in 1993 – serves as the foundation of Japan's environmental policies.

Key regulations and entities for U.S. exporters to note include:

- [Ministry of Environment](#), responsible for water and air pollution control, waste management, nature conservation, global environment, and nuclear regulation.
- [Ministry of Land, Infrastructure, Transport and Tourism](#)
- [Air Pollution Control Act](#)
- [Ministry of Economy, Trade, and Industry](#)
- [Basic Act for Establishing a Sound Material-Cycle Society](#), establishing the backbone of solid waste management regulation in Japan.

#6 Market France



In 2021, France committed €30 billion to promote a green economy, creating opportunities for U.S. environmental technology companies to help French industry become more sustainable.



This tool considers any market classified as “high income” in the World Bank’s Country Income Classification Level as “mature.” For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,846 or more.

Market Development Status: Mature



Top Indicators and Why They Are Important

EPI Environmental Health Score

83.9

The EPI Environmental Health Score indicates a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Annual GHG Emissions

kt of CO2 equival...

The Annual GHG Emissions Indicates a market's need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Average Tariff on Enviro Tech Goods

Global Avg

4.43%

1.73%

The average Environmental Technologies Tariffs indicate a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Enviro Tech + Clean Energy Market Size

billion USD

The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

With a nominal GDP of \$2.78 trillion in 2022, France is the world's sixth largest goods importer and exporter and a significant trading partner for the United States. France's environmental technologies and clean energy markets generated a combined \$48.4 billion in 2022. The United States exported \$974.5 million in environmental technology goods in 2022, representing 4.4% of France's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to France, followed by air pollution monitoring and control and waste management and recycling.

The United States and the European Union do not currently enjoy a free trade agreement. However, the United States is the European Union's largest trade and investment partner and France and the United States have a robust trade relationship. In 2022, U.S. goods exports to France totaled \$46.02 billion.

France's recent environmental efforts focus on emissions reductions due to it being the 21st highest global emitter of greenhouse gasses as of 2020. France updated its Nationally Determined Contribution (NDC) in December of 2020, establishing a 37% greenhouse gas emissions reduction target by 2030, in alignment with broader European Union goals. France also aims to reach net-zero greenhouse gas emissions by 2050. France has produced a variety of policies designed to advance climate goals, such as the [Climate and Resilience Law](#) passed in 2021, which aims to incorporate ecology into all aspects of French society through education, urban planning, travel, and public services. France also passed the [Green Industry Act](#) in October 2023, increasing funding for the country's green transition with the aims to make France a leader in green technologies and to decarbonize existing industries. French manufacturing accounts for 18% of annual national greenhouse gas emissions. The law aims to encourage industries and companies to "go green" and bring "industries of the future" back to the French regions that have suffered from deindustrialization.

Since 2010, France has routinely failed to comply with the European Commission's air quality standards. Passed in September 1996, France's [Air and the Rational Use of Energy law](#) (a French law, separate from the EU's Ambient Air Quality Directives) aims to protect each person's right to breathe clean air, and includes measures to monitor air quality, forecasting and planning tools, fiscal and financial provisions, controls, and penalties. On a local level, the law requires towns with more than 250,000 inhabitants to establish atmosphere protection plans detailing measures to improve air quality over five-year periods.

Beginning in 2010, France launched four investment programs to support testing and demonstration for emerging green energy and circular economy projects. In 2021, France also committed €35 billion under the [France 2030 investment program](#) to promote a green economy. Some of the sectors for emphasis under this investment program include health, inputs essential to industry, electronics, agrifood, and industrial 5G applications. Bpifrance—a state backed investment bank—supports French companies by providing subsidies to help them transition to a greener business model. These government investments and subsidies may provide a pathway for U.S. environmental technology companies to help French companies become more sustainable and/or access other French market opportunities.

As of January 2024, Yale University's [Environmental Performance Index](#) ranks France as 12 out of 180 countries for Environmental Health. France has a strong ranking in terms of overall air quality (with key exceptions including nitrogen oxide and sulfur dioxide exposure), sanitation and drinking water, and solid waste management. Ocean plastics remains an area of concern.



Market Opportunities

Air Pollution Monitoring and Control

Mobile Source Emissions Control: As part of the [European Green Deal's Zero Pollution Action Plan](#) – an European Union directorate which set a 2030 goal of reducing the number of premature deaths caused by fine particulate matter (PM 2.5) by at least 55% compared with 2005 levels -- the French government published a national air pollutant emission reduction plan outlining four priority areas for emission reduction in accordance with its four largest emitting sectors: road transportation, industrial production, residential heating, and agriculture.

The [Ambient Air Quality Directives](#) established by the EU regulate acceptable levels of 12 pollutants: sulfur dioxide, nitrogen dioxide, nitrogen oxides, ozone, benzene, particulate matter, carbon monoxide, lead, arsenic, cadmium, nickel, mercury and polycyclic aromatic hydrocarbons. Of the pollutants subject to regulatory thresholds for the protection of human health at national and European Union levels, four continue to exceed these thresholds in France: ozone, nitrogen dioxide, particulate matter 10 micrometers or less in diameter, and nickel. In 2022, France's top administrative court ordered it to pay a €10 million fine due to its failure to reduce air pollution in two major cities (Paris and Lyons) and meet the acceptable pollutant levels. This is the third fine assessed for this failure – France already paid 30 million euros in fines since 2021.

Key technologies and services in demand:

- Continuous emissions monitoring systems
- Source emissions measurement technologies
- Ambient air quality monitoring equipment
- Emissions control technologies
- Flue gas desulfurization equipment
- Fuel vapor control systems
- Analytical and laboratory testing goods and services

Air Pollution Monitoring & Control

Sector Rank

6

Imports from U.S.



Air Quality Monitoring: France went through several episodes of high levels of air pollution during the previous years. As such, pollutants not regulated at European level are subject to specific monitoring in France. The need for reliable, sensitive, and reproducibly ergonomic microsensors is growing rapidly, particularly for internal analysis. High-resolution modeling tools are also in high demand. There is an increasing demand to produce and have access to air quality data and U.S. companies are among the largest equipment manufacturers of analyzing units in France.

In addition, France is gradually developing a permanent monitoring network for: soot carbon, particulate matter 1 micrometer or less in diameter, ultrafine particles, pesticides, pollens, and pollutants resulting from the decomposition of algae.

Key technologies and services in demand:

- Advanced technologies for air quality monitoring
- Real-time air monitoring analysis, forecasting, and pollution warning systems
- Indoor air quality monitoring system
- Advanced Indoor air filters
- Drones with on-board, remotely monitored analyses systems
 - Flue-gas desulfurization equipment

Carbon Management: In July 2023, France released its [Carbon Capture, Storage, and the Utilization strategy](#) to reach carbon neutrality by 2050. The strategy outlines that carbon capture, utilization, and storage (CCUS) has potential to capture and store between 4-8.5 million tons of CO₂ emissions per year by 2030, and asserts development of a framework for CO₂ transport. Geological storage sites will undergo pilot testing from 2024 to 2025. The country will focus its CCUS deployment on industrial zones, such as Dunkerque, Le Havre, Fos-sur-Mer, Lacq/Sud-Ouest, LoireEstuaire and Grand Est. France's 2030 Plan pledges €5.6 billion to support decarbonization projects for industrial sites.

Key technologies and services in demand:

- Carbon capture technologies
- CO₂ transportation pipelines and infrastructure
- Combustion systems
- Flue gas treatment system
- CO₂ utilization and removal technologies
- Membrane separation technologies
- Compression systems
- Geological storage technologies
- Engineering, procurement, and construction of carbon management projects
- Environmental Impact Assessment consultancies



Waste Management and Recycling

In response to considerable growth in solid waste, France passed a solid waste law in 2016. At that time, average annual waste produced per person was 4.6 tons. Thirty-eight percent of municipal solid waste is incinerated. As of 2017, France operated more than 126 incineration plants. In 2016, €630 million of unsold products were destroyed, generating 20 times more emissions than reuse. Therefore, in 2020 France passed its [Anti-Waste Circular Economy Act](#) which aims to eliminate waste and pollution across the supply chain by 2040. It also encouraged businesses to use more circular practices and methods.

Plastic Recycling: Plastic pollution is also a growing concern, given France's low rate of plastic recycling and estimates that the Mediterranean Sea – of which France shares roughly 600 kilometers of coastline -- receives nearly 11,000 tons of plastic from France every year. Plastic packaging is of specific issue for France, as the rate of plastic packaging recycling has remained stagnant at 59.1% for the past five years. After France's plastic pollution of the Mediterranean Sea peaked in 2016, concerns surrounding circularity have grown. France's [Anti-Waste Circular Economy Act](#) aims to address these concerns and encourage businesses to use more circular practices and methods.

France also has an incineration and landfill tax which will gradually increase in future years, creating opportunities for U.S. businesses to provide recycling equipment and solutions, especially with advanced separation technologies that can handle increased plastic sorting and textiles.

Key technologies and services in demand include:

- Advanced separation and sorting technologies
- Plastic packaging reduction and recycling technologies
- E-waste deconstruction



Water and Wastewater Treatment

Recent droughts in France focus some climate adaptation policies on protecting existing water resources and reducing water demand. Water management in France is handled by six water agencies which are responsible for improving water quality to meet the [EU Water Framework Directive of 2000](#). However, GWI reports that the French market is becoming more open to new players due to a reduction in the length of private sector contracts. There is also a growing trend to incorporate performance-based criteria in contracts. Performance results will be published in a national database to increase transparency of publicly-run water services.

Policies in France aim to protect existing water resources and encourage reduced demand.

Water Efficiency and Reuse: According to GWI, utilities in France are prioritizing the reduction of water leakages and the modernization of legacy network assets. Local authorities are working to better understand the condition of these assets and the central government has allocated \$7.4 billion in assistance for network modernization between 2019 and 2024. The government is putting \$57 million towards grants for rural municipalities to produce a comprehensive diagnosis of their networks.

GWI also reports that the French market, so far dominated by a handful of large companies, is becoming more open to new players due to a reduction in the length of private sector contracts. There is also a growing trend to incorporate performance-based criteria in contracts. Performance results will be published in a national database to increase transparency of publicly-run water services.

The French Government in 2019 announced a goal of tripling the volume of reuse from “non-conventional waters” - including wastewater, grey water from households, and rainwater - by 2025. In March 2023, President Macron [announced a water crisis plan](#) that seeks to conserve water threatened by droughts. The announcement came as a response to the worst drought on record, which caused reservoirs to fall 80% below their normal levels.

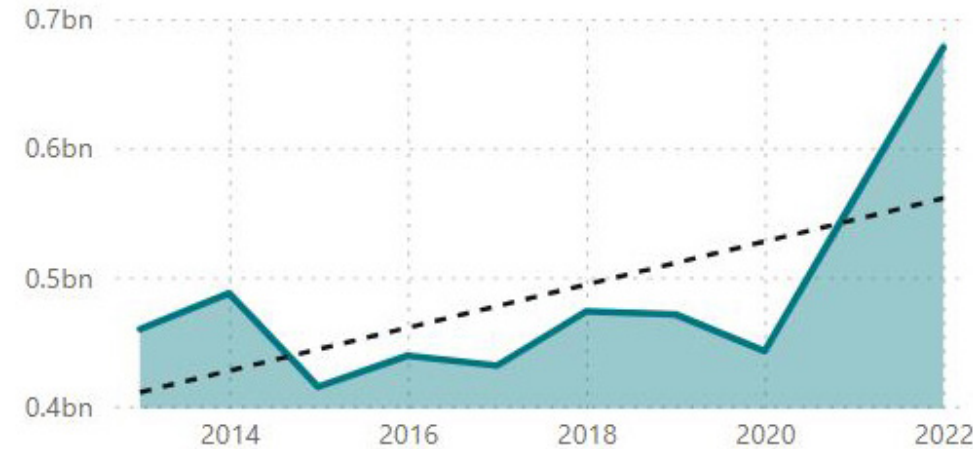
Key technologies and services in demand include:

- Diagnostics solutions for assessing the condition of water infrastructure
- Asset management solutions
- Leakage reduction solutions
- Solutions for managing water consumption and demand, including smart meters
- Water reuse solutions, particularly for municipal wastewater

Water & Wastewater Treatment

Sector Rank
6

Imports from U.S.





Market Challenges

Regulatory and Bureaucratic Procedures: U.S. exporters must contend with European Union (EU) regulations when doing business in France. France interprets EU regulations more stringently than other member states and proactively regulates areas where EU regulations do not yet exist. French regulations and bureaucratic procedures, including labor laws and higher cost of employment, remain a challenge. Exporters can also face barriers due to enhanced safety standards and conformity assessment procedures for products. For example, U.S. exports must demonstrate compliance with EU harmonized legislation during all stages of manufacturing, from the design phase to final production.

Domestic Manufacturing Subsidies: The French government, through OSEO - the state-backed company that provides financial support to innovative small- and medium-sized enterprises - provides reimbursable advances to assist French manufacturers. OSEO also backs Bpifrance which is the conduit for many of France's green subsidies programs. Although this provides ample opportunity for U.S. business to help assist French industry transition to more sustainable practices, it also provides a barrier in the form of domestic competition within France.





Learn More

ITA Resources

France Specific

- [U.S. Commercial Service in France](#)
- [France Country Commercial Guide](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

French Government Resources

Environmental regulations and a functional system of enforcement are important drivers of demand for environmental technologies, incentivizing the investment in solutions to address environmental challenges in order to avoid the cost of non-compliance. France's environmental laws are sourced mainly from its constitution and the European Union. The [Charter for the Environment](#) was created in 2005 as part of the French Constitution and includes embedded goals and responsibility to protect and preserve the environment to its citizens and government. In recent years, international environmental law has also played a role in France's environmental objectives, particularly the [Paris Agreement](#).

- [French National Research Agency](#)- funding CCUS projects via specific research and development programs or generic programs
- [Ministry of the Environment, Energy and the Sea](#)
- [Ministry of Ecological Transition](#) - enforces environmental policies
- [Air and the Rational Use of Energy law](#)

Other Important Resources

- [Bpifrance](#) - a state backed investment bank

#7 Market United Kingdom

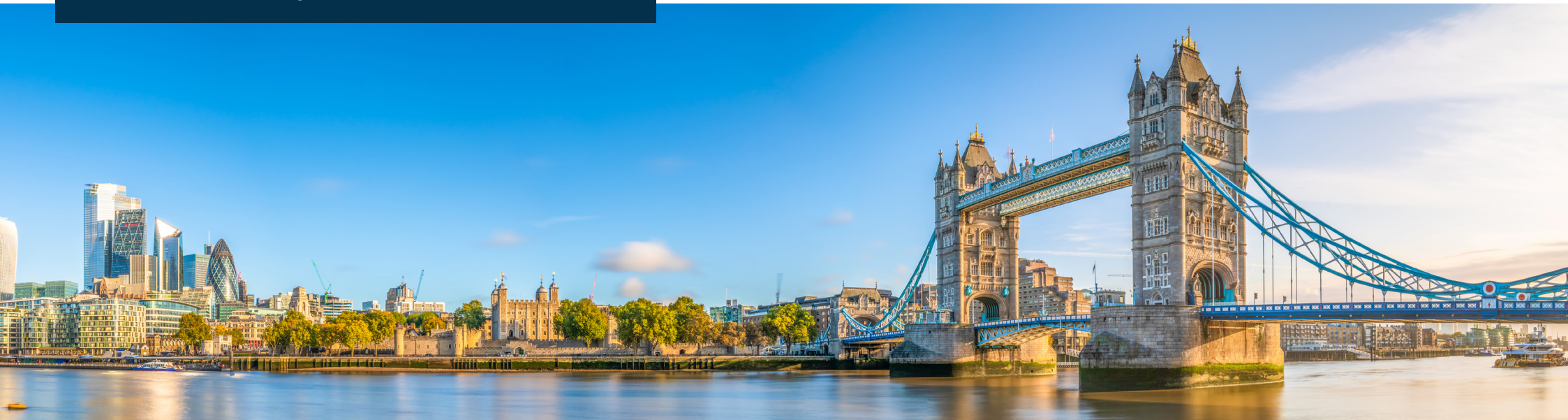


Since leaving the European Union in 2020, the United Kingdom is no longer committed to EU environmental policies and has since enacted its own national environmental policy -- the Environment Act 2021.



This tool considers any market classified as “high income” in the World Bank’s Country Income Classification Level as “mature.” For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,846 or more.

Market Development Status: Mature



Top Indicators and Why They Are Important

EPI Environmental Health Score



83.9

Average Tariff on Enviro Tech Goods

The EPI Environmental Health Score indicates a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Annual GHG Emissions



The Annual GHG Emissions Indicates a market's need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Average Tariff on Enviro Tech Goods



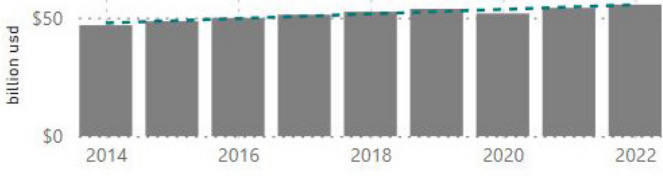
0.82%

Global Avg

4.43%

The average Environmental Technologies Tariffs indicate a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Enviro Tech + Clean Energy Market Size



The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

The United Kingdom's environmental technologies and clean energy markets generated a combined \$55 billion in 2022. The United States exported \$1.38 billion in environmental technology goods in 2022, representing seven percent of the UK's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to the United Kingdom, followed by air pollution monitoring and control and waste management and recycling.

While the United States and the United Kingdom do not have a free trade agreement, the trade relationship between the two countries is nonetheless robust. In 2022, the United Kingdom was among the top five importers of U.S. goods, purchasing \$76.2 billion in goods and \$82 billion in services. In 2023, the United States and the United Kingdom both published the [Atlantic Declaration](#), which focused on strengthening economic ties between the two countries to further economic, technological, and national security.

As a result of the United Kingdom's 2020 exit from the European Union (EU), it is no longer obligated to follow EU environmental policies. Therefore, the United Kingdom enacted its own environmental policy -- the [Environment Act 2021](#). The act highlights several overarching goals including achieving net zero carbon emissions by 2050 and outlining four key priority areas: air quality, biodiversity, water, and waste management. Among other things, the act mandates that companies must reduce adverse impacts of discharges from storm water overflows, gives the Secretary of State authority to recall products that do not comply with environmental standards, and requires producers to pay the full net costs of managing proper disposal of their products at "end of life."

In November 2020, the United Kingdom released a [Ten Point Plan for a Green Industrial Revolution](#) which lays out the government's approach to building out infrastructure, supporting green jobs, and accelerating action on net zero emissions targets. More recently, in 2023 the United Kingdom updated its [25 Year Environmental Plan](#) (25YEP), first created in 2018. The 25YEP established ten goals, including updating infrastructure and banning the supply of single-use plastics. The United Kingdom's [2023 Green Finance Strategy](#) provides a roadmap for how the country will mobilize and direct financial flows to strengthen environmental sectors and net zero goals. The plan considers the commercial maturity of various sectors to meet net zero and environmental commitments and the type of support required.

As of January 2024, Yale University's [Environmental Performance Index](#) ranks the United Kingdom as 12 of 180 countries for Environmental Health. The United Kingdom scores high on most environmental health indicators, including air quality, sanitation and drinking water access, addressing heavy metals contamination, and waste management. There is room for improvement in its rankings related to nitrogen oxide exposure (158th) and ocean plastics management (99th).

As of January 2024, [Climate Action Tracker](#) ranks the United Kingdom's policies and action on climate change as "insufficient" to be consistent with limited global warming of 1.5 degrees Celsius, and its net zero target as "acceptable." It notes that there are major policy gaps in UK climate policy, and highlights that in June 2023 the UK's Climate Change Committee found that credible policies exist for only 20% of the emissions reductions required to meet the country's Sixth Carbon Budget for 2035.



Market Opportunities

Air Pollution Monitoring and Control

Air Quality Monitoring: Poor air quality is considered the United Kingdom's largest environmental risk to public health. International agreements, European Union legislation, and national legislation all played recent roles in helping the country improve its air quality. In February 2023, the United Kingdom published a [Revised UK National Air Pollution Control Programme](#) to meet national emissions ceiling legislation requirements. This program outlines how the United Kingdom can meet legally binding 2030 emission reduction commitments for five pollutants: nitrogen oxides, ammonia, non-methane volatile organic compounds, particulate matter, and sulfur dioxide. In April 2023, the United Kingdom published an updated [Air Quality Strategy: Framework for Local Authority Delivery](#) with long-term goals aiming to reduce fine particulate matter. The UK's efforts to reduce the burning of coal and improve emission standards for transport and industrial processes enabled levels of PM2.5 to decrease significantly. However, in recent years, emissions from wood burning and solid fuel burning by industry have increased, indicating a need for solutions in this area. The [2023 Environment Improvement Plan](#) monetizes the support of clean air and includes commitments to reducing ammonia emissions and tackling hotspots by equipping local authorities with guidance, funding, and tools. The United Kingdom has a large automatic air quality monitoring station network called the [Automatic Urban and Rural Network](#) that measures NOx, SO2, O2 and particles PM1 and PM2.5). This tool can help U.S. industry and firms decipher where their technologies and services would be most beneficial.

Key technologies and services in demand include:

- Air filters and purification systems
- Air quality monitors
- Sensor networks
- Remote sensing
- Flue-gas desulfurization equipment

Methane Abatement: Internationally, the United Kingdom is active in cooperative efforts related to reducing greenhouse gas emissions. The United Kingdom joined the [Global Methane Pledge](#) at COP 26 in 2021 and is a member of the United Nation's [Oil and Gas Methane Partnership 2.0 Steering Group](#), which has committed to the [World Bank's Zero Routine Flaring by 2030 initiative](#). The United Kingdom has been a global leader in reducing methane emissions since 1990 and as of 2020, methane emissions from the energy sector decreased by 84% compared to 1990 levels. This continues to be an area of opportunity for U.S. exporters.

Air Pollution Monitoring & Control

Sector Rank

7

Imports from U.S.



Key technologies and services in demand include:

- Advanced sensors and monitoring devices for real-time air quality data
- Ambient air monitoring equipment
- Fuel vapor control systems
- Data analytics and artificial intelligence to process pollution data
- Continuous emissions monitoring systems
- Remote sensing technologies
- Inspection, adjustment, maintenance, and repair services
- Methane leak detection and repair

Carbon Management: The United Kingdom's [Green Recovery plan](#), released in 2020, included hydrogen and carbon capture technologies in its carbon-neutral energy roadmap to address the climate crisis. The plan outlined a £1 billion public investment into carbon capture, utilization, and storage (CCUS) by 2025 to support net-zero goals. In 2021 the United Kingdom announced a USD \$211.6 million cash injection to support green technologies and domestic jobs in the environmental field, including USD \$48 million towards development of greenhouse gas removal technologies and USD \$25 million to support research for the next generation carbon capture, utilization, and storage technologies. In March 2023, the United Kingdom doubled down on CCUS, announcing a £20 billion investment to scale CCUS projects across the United Kingdom over the next 20 years. The government's CCUS efforts are part of its broader climate agenda to reach net-zero by 2050. Chancellor Jeremy Hunt affirmed that the government aims to capture 20-30 mt of CO annually through CCS by 2030 and expects nearly 50,000 jobs supported through the CCUS investment.

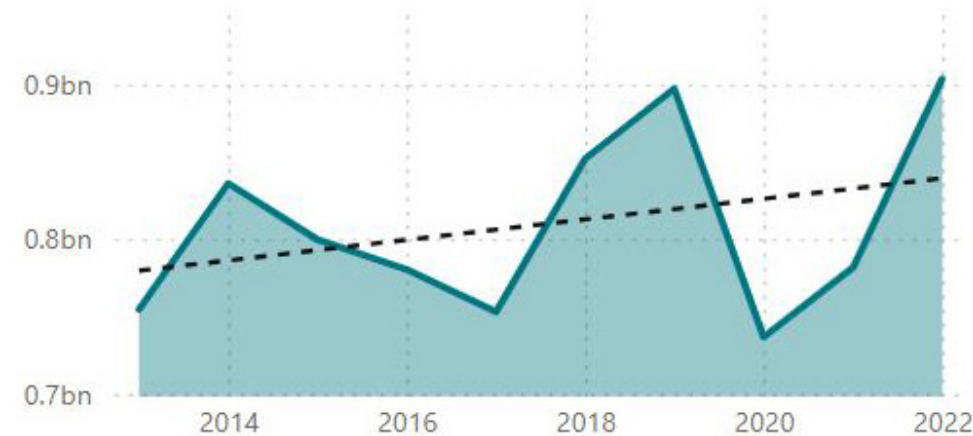
Key technologies and services in demand include:

- Carbon capture technologies
- Combustion systems
- Flue gas treatment systems
- CO utilization and removal technologies
- Membrane separation technologies
- Compression systems
- Engineering, procurement, and construction of carbon management projects
- Environmental impact assessment consultancies

**Water & Wastewater
Treatment**

Sector Rank
7

Imports from U.S.



Carbon Storage: The United Kingdom plans to leverage its access to the North Sea to store carbon emissions from hard-to-abate sectors under the seabed. The country also plans to establish two industrial CCUS clusters by the mid-2020s and two more by 2030, capturing up to 10 metric tonnes of CO₂ per year. As part of the [Ten Point Plan for a Green Industrial Revolution](#), an energy security bill to help scale hydrogen and CCUS industrial business models, the Secretary of State has authority to incur expenditures and provide financial assistance to help scale CCUS and low carbon hydrogen production through a contractual mechanism. In 2022, the North Sea Transition Authority (NSTA) launched the United Kingdom's first ever carbon storage licensing round in 2022, which received 26 bids for 13 areas offered. In May 2023, the NSTA offered 20 carbon storage licenses to 12 different companies. The government's support of CCUS projects through financing, policy, and regulations demonstrates an enabling environment for private investment, including the deployment of U.S. technologies and services.

Key technologies and services in demand include:

- CO₂ transportation pipelines and infrastructure
- Engineering, procurement, and construction of carbon management projects
- Environmental impact assessment consultancies

Waste Management and Recycling

The United Kingdom is looking to build its waste management capacity in two main areas – recycling and waste-to-energy using incineration. In 2020, the United Kingdom collectively generated 40.4 million tons of commercial and industrial waste, of which 84% came from England.

Incineration: In 2020 there were at least 90 incinerators in the United Kingdom, with more than 50 additional incinerators proposed or in development. In England alone, incineration rates have doubled between 2012 and 2018. The emissions from waste management do pertain to the United Kingdom's legally binding emission targets, creating a growing need to reduce overall waste. As such, the United Kingdom has goals to reduce the amount of municipal waste landfilled by 10% of the total amount of municipal waste generated by 2035. For England specifically, emissions from overall waste management decreased by 69% from 1990 to 2018, but further reduction will continue to be a focus for environmental efforts.

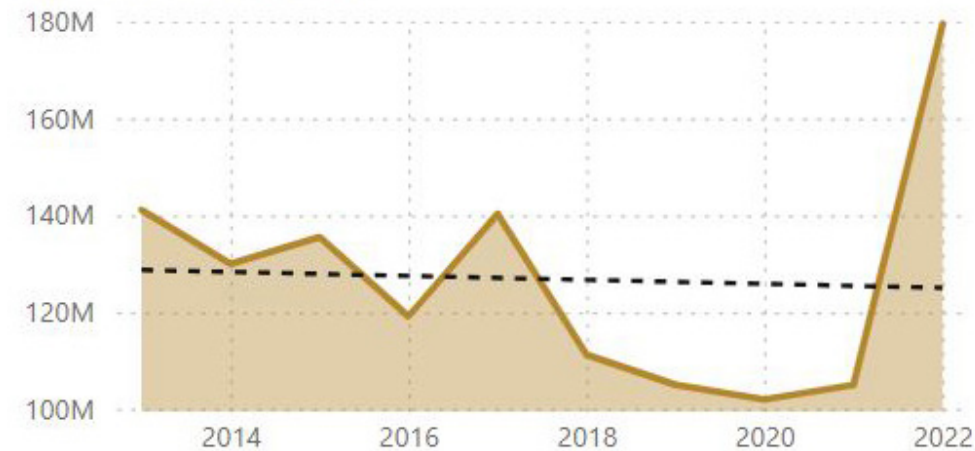
Key technologies and services in demand include:

- Incineration infrastructure
- Waste to energy technologies

Waste Management & Recycling

Sector Rank
6

Imports from U.S.



Composting: Biodegradable municipal waste sent to landfills increased from 6.1 million tons in 2020 to 6.8 million tons in 2021. In effort to eliminate food waste entering landfills, countries within the United Kingdom are setting food waste reduction goals such as Scotland which hopes to reduce food waste by 33% by 2025, therefore enhancing demand for efficient composting technologies.

Key technologies and services in demand include:

- Composting and anaerobic digestion technologies

Recycling Infrastructure: As part of the 2023 updates to the [25 Year Environmental Plan](#), the United Kingdom set goals is to double resource productivity by 2050 and recycle 65% of municipal waste by 2035. In 2021, the recycling rate for household waste was 44.6%. To help achieve this goal, the [Second National Infrastructure Assessment](#) (October 2023), recommended creating stronger incentives for investment in recycling infrastructure. Industrial recycling infrastructure is also in demand; in response to the [Ten Point Plan for a Green Industrial Revolution](#), funding was earmarked specifically to reduce and repurpose textile waste.

Key technologies and services in demand include:

- Recycling infrastructure
- Sorting technology

Water and Wastewater Treatment

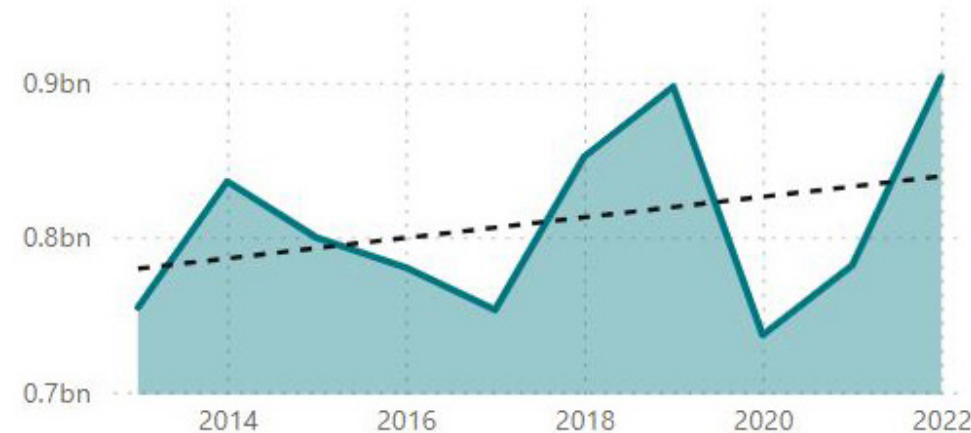
The regulatory structure for the water sector varies across the United Kingdom. In England and Wales privatized the water and sewerage industry in 1989, allowing companies to invest more than GBP £130 billion in maintaining and improving assets and services. The economic regulator for England and Wales is known as Ofwat. In Scotland and Northern Ireland, the water service providers are government-owned.

Water & Wastewater Treatment

Sector Rank

7

Imports from U.S.



Wastewater Treatment and Sanitation Services: The United Kingdom's sprawling, Victorian-era sewage network presents challenges for the country and opportunities for U.S. exporters. Through the [Environment Act 2021](#), the government set legally binding targets for reducing water pollution and committed to publish an updated [Environmental Improvement Plan](#), which was released in January 2023. In April 2023, the United Kingdom announced a new [Plan for Water](#) to better protect the country's water supplies by responding to problems the country faces on sewerage, including recent allegations of the illegal discharge of raw sewage into rivers and seas. The Plan for Water applies a systematic, local, catchment-based approach and relies on nature-based solutions and investment in infrastructure. The plan includes USD \$2 billion of water infrastructure investment through 2025, and fines from performance failures will feed into the Water Restoration Fund. A 2023 update to the [25 Year Environmental Plan](#) reaffirms this priority, calling for the upgrade of 160 wastewater treatment plants by 2027 to reduce nutrient pollution.

Key technologies and services in demand include:

- Storm water management solutions
- Engineering and design services for upgrading wastewater treatment plants

Water Efficiency and Reuse: The United Kingdom is working to reduce sewage spills, mitigate pollution entering rivers, and advance net zero targets while also securing water supplies challenged by climate change and a growing population. Leakage reduction is a priority for this decade, and demand is expected to grow for leakage detection systems, smart metering and associated analytics, and smart sewer systems. In 2021-2022, water firms in England and Wales were losing more than 2,900 million litres of water per day, on average. In 2019, the English water companies committed to triple the rate of sector-wide leakage reduction by 2030, and the water sector took up a National Infrastructure Commission challenge by committing to halving leakage from 2018 levels by 2050. In England, Ofwat has planned for the accelerated installation of 462,000 smart meters.

As of 2023, just 14% of households in England use smart meters, though 60% are metered. The water companies' draft plans are to achieve 40% smart metering of English households by 2030, 63% by 2040, and 65% by 2050. For businesses, an estimated five percent are smart metered, and the water companies plan to increase smart metering in non-household properties to 22% by 2030, 32% by 2040, and 35% by 2050.

Key technologies and services in demand include:

- Smart metering and advanced analytics
- Meter data management systems
- Leakage detection and repair solutions
- Smart sewer systems
- Advanced analytics to reduce repair and maintenance waiting times, facilitate easier bill payments and resolve customer complaints faster

Water Supply Management: The United Kingdom's National Infrastructure Commission released its [Second National Infrastructure Assessment](#) in October 2023, providing a 30-year view of infrastructure needs for the water and wastewater, among other sectors. Core recommendations include delivering additional water supply infrastructure and reducing water leakages and demand.

Key technologies and services in demand include:

- Digital solutions to improve efficiency of water service, including digital leakage detection methods
- Engineering and design services for new and upgraded water supply infrastructure



Market Challenges

Customs Barriers and Trade Facilitation: The United Kingdom plans to implement new border control measures for imported goods in January 2024 under the [Border Target Operating Model](#) (BTOM). Despite efforts to improve the import process to date, there have been concerns from industry regarding delays at the border mostly due to infrastructure and staffing constraints from the United Kingdom's side. The BTOM will increase security controls for all imports into the UK and apply sanitary controls for animal and plant-based products with the goal of simplifying the import process for the United Kingdom customs regulators and its trade partners. While the United Kingdom does not expect the new operational model to create a logistical burden, the changes nevertheless present a new system that U.S. exporters will need to adapt to.

Procurement and Delivery Challenges for Water: GWI reports that the water sector in the United Kingdom faces challenges in realizing the increased investment planned for 2025-2030. There have been complaints from contractors about the unclear procurement process of the water and sewerage companies in England and Wales, which GWI reports may be causing some tier 1 general contractors to leave the industry. However, there may also be new opportunities for smaller tier 2 or 3 subcontractors to work on smaller projects.



Learn More

ITA Resources

United Kingdom Specific

- [U.S. Commercial Service in United Kingdom](#)
- [France Country Commercial Guide](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

U.K. Government Resources

- [Border Target Operating Model](#)
- [UK Government Statistics on Waste](#)
- [UK Department for Environment, Food & Rural Affairs](#) – sets the overall water and sewerage policy framework in England
- [UK Environment Agency](#) – the environmental regulator of the water sewerage sector in England
- [Natural Resources Wales](#) – the regulatory body responsible for managing water resources in Wales
- [Ofwat](#) - Privatized Water Services Regulation Authority in England and Wales
- [Water Strategy for Wales](#)
- [Scottish Water](#) – the publicly-owned water supplier in Scotland
 - [About the water industry in Scotland](#)
- [Northern Ireland Water](#) – government-owned company that provides water and sewerage services in Northern Ireland
- [Water UK: A Leakage Routemap to 2050](#)
- [2021 Waste Management Plan for England](#)

Other Important Resources

- [Overview of the Structure of the UK Water Industry](#)
- [British Water: Water Sector Overview](#)
- [Memorandum of Understanding with U.S. States](#)
- [UK Critical Imports and Supply Chains Strategy](#)

Bonus Market #1 Brazil

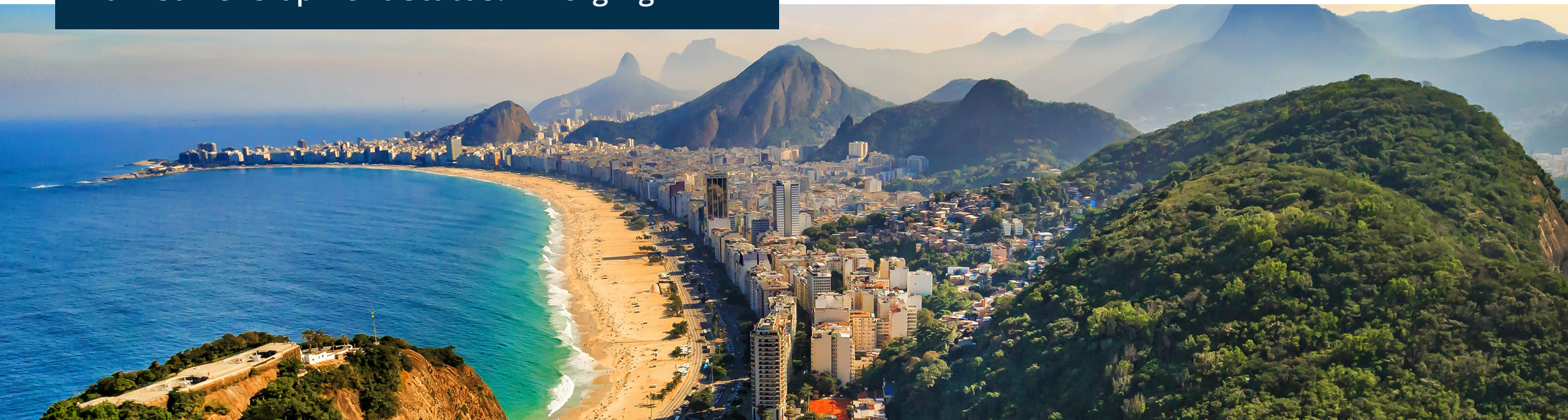


The United States and Brazil are cooperating on climate change initiatives, with the United States supporting the Amazon Fund and facilitating a green trade mission to Brazil to promote forest, land use, and renewable energy investments.



This tool considers any market classified as “upper middle income,” “lower middle income,” or “low income” in the World Bank’s Country Income Classification Level as “mature.” For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,845 or less.

Market Development Status: Emerging



Top Indicators and Why They Are Important

EPI Environmental Health Score



46.0

The EPI Environmental Health Score indicates a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Annual GHG Emissions



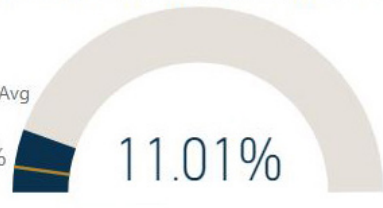
kt of CO2 equival...

1M
0M

2014 2016 2018 2020

The Annual GHG Emissions Indicates a market's need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Average Tariff on Enviro Tech Goods



11.01%

Global Avg
4.43%

The average Environmental Technologies Tariffs indicate a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Enviro Tech + Clean Energy Market Size



billion usd

\$40
\$20
\$0

2014 2016 2018 2020 2022

The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

As the largest consumer market with the highest GDP in South America, Brazil presents as a strong market for experienced U.S. exporters to tap into its diversified economy. Brazil's environmental technologies and clean energy markets generated a combined \$30.44 billion in 2022. The United States exported \$780 million in environmental technology goods in 2022, representing a 11% of Brazil's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to Brazil, followed by air pollution monitoring and control, then waste management and recycling. The [U.S.-Brazil Protocol Relating to Trade Rules and Transparency](#) entered into force in 2022, modernizing the 2011 [Agreement on Trade and Economic Cooperation](#) by adding new commitments on trade facilitation, good regulatory practices, and a [Joint Statement on Support for the Brazilian Ecological Transformation Plan](#). There is no free trade agreement between the two countries. In 2022, Brazil was the ninth largest export market for U.S. products and services, purchasing \$53.8 billion in U.S. goods exports and \$21.6 billion in U.S. services exports.

On August 11th, Brazil's Ministry of Finance announced its new [Ecological Transition Plan](#), which has six priority areas: sustainable finance, circular economy, technological densification, bioeconomy, energy transition, and infrastructure and adaptation to climate change—all aimed at combating the climate crisis with social justice, sustainability, job creation and increased productivity. Under the Ecological Transition Plan, Brazil hopes to create a regulated carbon market, an emissions trading system, a national sustainable taxonomy, and a national bioeconomy strategy, plus issue sustainable sovereign bonds, work on forest recovery/restoration and forest concessions, and publish a decree on reverse logistics for plastics, among other actions related to the circular economy.

At the 28th Conference of the Parties (COP28) in December 2023, Brazil's Finance Minister Fernando Haddad and the U.S. Special Presidential Envoy for Climate John Kerry announced the intention to cooperate bilaterally, and with other partners, to advance implementation of the Ecological Transition Plan by enhancing the flows of financing and support and assembling a coalition of actors in the technology sector to explore how technology can accelerate regulatory frameworks and enhance relevant forest monitoring systems.

Brazil's Ministry of Finance launched a Sustainable Taxonomy of Brazil action at COP28 in December 2023. The [Brazilian Sustainable Taxonomy](#) defines sustainable economic activities in the country and aims to create conditions to attract public and private investments. The legislation is aligned with various international taxonomies, including the European Union's, and is scheduled to be implemented in January 2026. It will define rules for agriculture, livestock, forest production, fishing, and aquaculture; extractive industries; transformation industries; electricity and gas; water, wastewater, waste management, decontamination; construction; transportation, storage, and shipping; and social services for quality of life.

Brazil ranks 81st out of 180 countries on Yale's Environmental Performance Index for Environmental Health, a score influenced by poor measures related to air quality, sanitation, drinking water, recycling, and climate change mitigation efforts. The Climate Action Tracker rates Brazil's climate targets and policies as insufficient, indicating substantial improvements are required to meet the Paris Agreement's 1.5-degree target.

Brazil will host several international environmental fora in the coming years, including the [15th Clean Energy Ministerial](#) in 2024, the [G20 Presidency](#) in 2024, and the [30th United Nations Climate Change Conference](#) in 2025. In July 2023, U.S. Secretary of Energy Jennifer Granholm and Brazil's Minister of Mines and Energy Alexandre Silveira announced their commitment on joint energy cooperation to drive private sector-led approaches on clean energy topics including carbon and methane management through the [Clean Energy Industry Dialogue](#).



Market Opportunities

Air Pollution Monitoring and Control

Mobile Source Emissions Control: Brazil created the [Programa de Controle da Poluição do Ar por Veículos Automotores](#) (Proconve) a program to control vehicle emissions. Proconve aims to reduce emissions from automotive vehicles, define air quality patterns for urban centers, and create vehicle inspection and maintenance programs, among other objectives. Early phases of pollutant emissions reduction goals set in the program have been completed and Brazil is currently in the L7 phase, which aims to reduce gasoline and other toxic fuel vapors in the atmosphere. Effective January 2025, the L8 phase will bring more limits for emissions for light commercial and light passenger road vehicles and is equivalent to the [Euro VI legislation](#). When implemented, this new standard is expected to reduce particulate matter and nitrogen oxide emissions and have an overall positive impact on human health. It will also increase demand for equipment and technology to capture pollutants in the vehicle system, and for particle identification and measurement instruments for use in vehicle inspections.

Key technologies and services in demand include:

- Continuous emissions monitoring systems
- Air quality monitoring stations
- Source emissions measurement technologies
- Ambient air quality monitoring equipment
- Emissions control technologies
- Particulate Matter (PM) control devices
- Flue-gas desulfurization equipment
- Fuel vapor control systems
- Analytical and laboratory testing goods and services

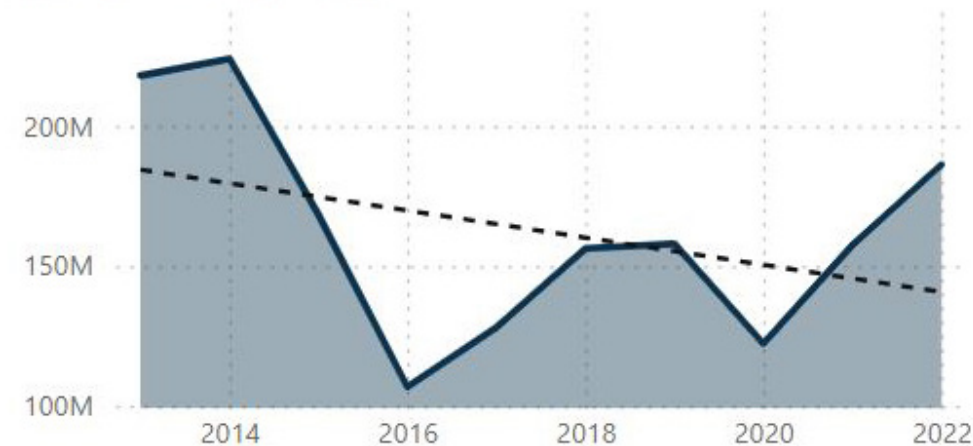
Air Quality Monitoring: Brazil continues to grapple with air quality management challenges, exceeding recommended air pollution limits set by the World Health Organization. Information regarding specific air quality and pollution sources is limited. In 2018, Brazil's the National Environment Council passed Resolution 491, set air quality standards and defining an enforcement network of state and district-level environmental agencies to implement its policies. These air quality standards create opportunities for U.S. air quality monitoring technologies and services.

Air Pollution Monitoring & Control

Sector Rank

8

Imports from U.S.



Key technologies and services in demand include:

- Air quality monitoring systems
- Continued emissions monitoring systems
- Fenceline monitoring equipment
- Ambient air quality monitoring equipment
- Source emission measurement technologies
- Air purifiers and filters
- Data analysis and visualization software
- Consulting Services

Carbon Capture from Industrial Emissions: Brazil is a global leader in offshore carbon capture and sequestration. Brazil is home to the world's largest operating carbon capture, utilization, and storage (CCUS) project in the oil and gas industry, the [Petrobras Santos Basin Pre-Salt Oil Fields](#) (Petrobras). More than 20 floating production storage and offloading with CCUS technology operate in over 2,000 meters depth and capture over 10.6 Metric tons of CO₂ per year, and re-injects the CO₂ for enhanced oil recovery. In 2022, Petrobras cumulatively reinjected 40.8 MtCO₂, exceeding its initial target, and now aims to reinject 80 MtCO₂ by 2025. The Brazilian National Oil and Gas Regulator (ANP) has recently made CO₂ capture a new area of focus for research and development. Petrobras is preparing a pilot project for CCS from industrial emissions and seeking partnerships for a full-scale CCS hub. This pilot project aims to test developing geological aspects of CCS in a saline aquifer environment and will provide more technical data on storage sealing. Its findings will inform legislators and regulators on how to best build out a policy framework for such activities.

Key technologies and services in demand include:

- Carbon capture technologies
- Combustion systems
- Flue gas treatment systems
- CO utilization and removal technologies
- Membrane separation technologies
- Compression systems

Carbon Storage: In August 2023, Brazil's Senate passed [bill PL 1.425/2022](#), which would establish a legal framework for CCUS in Brazil if enacted. As of December 2023, the bill is pending final approval from the Chamber of Deputies, and would progress to the President for sanction if it clears the Chamber. The bill outlines fundamental definitions and regulations for CO₂ storage in Brazilian sedimentary basins, including initial terms for storage and long-term responsibility for CO₂ storage over time. If it passes, it will reduce greenhouse gas emissions by setting limits for specific industries, creating opportunities for U.S. carbon management technologies in those industries.

Key technologies and services in demand include:

- CO transportation pipelines and infrastructure
- Engineering, procurement, and construction of carbon management projects
- Environmental impact assessment consultancies

Waste Management and Recycling

Landfills & Waste Collection: In 2022, the amount of urban solid waste generated in Brazil was approximately 81.8 million tons, of which approximately 93% was collected. Sixty-one percent of urban waste went to landfills and 39% went to open dumpsites in 2022. Three quarters of Brazilian municipalities – primarily those comprising wealthy states in the south and southeast regions -- had selective waste collection initiatives; however many did not reach the regions’ entire populations. In April 2022, the Brazilian government enacted the [National Solid Waste Plan](#) (Decree No. 11.043), establishing goals and mechanisms to modernize solid waste management in Brazil over the next 20 years.

Key technologies and services in demand include:

- Landfill design and engineering
- Bio-gas capture technologies
- Waste collection technologies

Recycling Infrastructure: Nearly 13.5% of the total urban solid waste generated in Brazil is made up of plastic particles, ranking Brazil as the fourth largest plastic waste producer in the world. Only 145,000 tons (1.28%) of this plastic is recycled. The [New Credit Certificates for Environmental Reverse Logistics Compliance](#) offers credit certificates to increase private investment in recycling. Additionally, the [National Solid Waste Plan](#) (Decree No. 11.043) set goals to increase recycling rates throughout Brazil by 48% by 2040, and foresees that half of the waste generated will be recovered through recycling, composting, bio digestion, and energy recovery – including energy resources such as biogas and biomethane. As a result, there will be a high demand for waste disposal and sorting units, as well as innovative methods to improve selective waste disposal and collection.

Key technologies and services in demand include:

- Recycling facilities and infrastructure
- Sorting machines



Water and Wastewater Treatment

Municipal Water and Wastewater Treatment: Brazil's sanitation regulatory framework, Law 14.026/2020, states that 99% of the population must have access to clean water and 90% to sewage treatment by 2033. Brazil manages water across 12 hydrographic regions, with the Amazon basin being the largest. Providing water and sanitation services is primarily the responsibility of Brazil's 26 states and 5,570 municipalities. Law 14.026/2020 created a requirement for each Brazilian state to group its cities into regions for water and wastewater service provision. It is expected that this regionalization will enable states and cities to access federal financing resources and will make smaller municipalities more financially attractive for investment in network expansion. Since this new law was enacted in 2020, more than 20 water and wastewater municipal services were awarded to the private sector – in the form of concessions or public-private partnerships – resulting in more than \$20 billion in investments. These investments are expected to increase access to potable water to 91% and wastewater service to 68% by 2033. This includes five projects for water and wastewater concessions scheduled to happen by 2025. According to the Brazilian government, more than USD \$119.6 billion needs to be invested to reach the 2020 law target by 2033 – mostly in the civil construction industry, followed by network infrastructure, equipment and machinery, among others.

Brazil is one of three countries selected by [UN Water for the 2023 Country Acceleration Case Studies](#) that recognize progress made toward the achievement of SDG 6 targets under the SDG 6 Global Acceleration Framework, an initiative that aims to deliver fast results and an increased scale towards the goal of ensuring the availability and sustainable management of water and sanitation for all by 2030.

Through the innovation accelerator, the framework intends for new, smart practices and technologies to improve water and sanitation resources management and service delivery. U.S. exporters of such technologies should find demand in the Brazilian market.

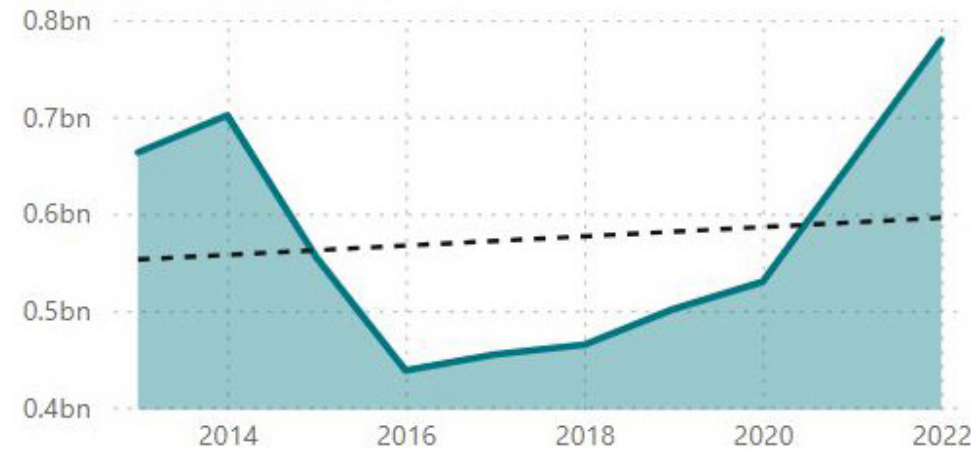
Key technologies and services in demand include:

- Automation and digitization solutions as well as artificial intelligence and Internet of Things systems to identify water leakages
- Smart water meters as well as sensors and monitoring technologies
- Equipment for sludge management, removal and treatment, lifters, systems for sewage and effluent treatment, systems for odor control, measurement and control equipment for color, chlorine, turbidity
- Wastewater treatment systems that can be installed in remote communities
- Pumps, pipes, and valves

Water & Wastewater Treatment

Sector Rank
8

Imports from U.S.



Water Efficiency and Reuse: Municipalities in Brazil have a high amount of nonrevenue water, with 40.3% of the water produced lost before it reaches faucets due to leaks, measurement errors, and unauthorized consumption. The total volume of lost water in 2021 was 1.9 trillion gallons, enough to fill 8,000 Olympic-sized swimming pools. In March 2023, the Brazilian Senate approved an amendment to existing legislation obliging water concessionaires to embrace non-potable water reuse, rainwater collection, and leakage reduction. The amendment requires concessionaires to identify and repair leaks and to conduct network inspections to curb illegal connections. It also encourages the use of rainwater and grey water reuse for non-potable uses.

Key technologies and services in demand include:

- Industrial and urban water reuse solutions
- Automation and digitization solutions as well as artificial intelligence and Internet of Things systems to identify water leakages
- Smart water meters as well as sensors and monitoring technologies



Market Challenges

Tariffs: U.S. companies should be aware of the direct and indirect costs of doing business in Brazil, often referred to in Portuguese as the “Custo Brasil” (“Brazil Cost”). Brazil imposes relatively high tariffs across a wide range of imported goods and services. While Brazil’s Most-Favored Nation applied tariff rate was 13.3% in 2021, its average bound tariff rate in the World Trade Organization is significantly higher at 31.4%, with a maximum bound tariff rate for non-agricultural products of 35%. The large disparity in bound and applied rates mean that U.S. exporters face uncertainty in the market and are susceptible to frequent changes in tariff rates. Brazil is a founding member of the Southern Common Market (MERCOSUR). Any good imported into Brazil (not including from free trade zones) is subject to payment of the MERCOSUR’s Common External Tariff (CET), which ranges from zero to 35% *ad valorem*.

Taxation: Companies exporting to Brazil are often subject to a number of federal and state taxes and charges on imports that can effectively double the actual cost of imported products in Brazil. U.S. companies may face difficulties navigating Brazil’s complex tax system, which includes multiple cascading taxes. In December 2023, Brazil’s Congress approved a [tax reform bill](#) that aims to improve the efficiency, fairness, and simplicity of the country’s tax system by consolidating multiple taxes into a single value-added tax. Reducing corporate income tax rates is intended to attract more investment and stimulate economic growth. The tax reform, once implemented in 2033, is expected to make it easier and more cost-effective for U.S. exporters to do business in Brazil.

Import Licensing and Import Bans: Brazil has both automatic and non-automatic import license requirements and procedures. There is a lack of clarity and transparency on the requirements which can create additional burdens for U.S. exporters. Brazil also restricts the importation of certain types of remanufactured goods (such as earthmoving equipment).

Regulatory and Standard Differences: Despite strong local demand for U.S. brands and products, the complex Brazilian regulatory may present challenges to exporters and there is not adequate and effective intellectual property protection enforcement. Additionally, Brazil's unique standards often hold little to no recognition or certification by the international standards commonly used in the United States. Having in-depth knowledge of local market trends and regulations is critical to successfully export to Brazil.

Competing Demands for Water: While parts of Brazil have plentiful freshwater, other areas experience water stress, including in the north. In drought conditions, competing demands for water from municipalities and hydropower, which generates three-quarters of Brazil's electricity.



Learn More

ITA Resources

Brazil Specific

- [U.S. Commercial Service in Brazil](#)
- [Brazil Country Commercial Guide](#)
- [Brazil Environmental Technologies Commercial Resource Guide](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
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Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

Brazilian Government Resources

Environmental regulations and a functional system of enforcement are important drivers of demand for environmental technologies, incentivizing the investment in solutions to address environmental challenges in order to avoid the cost of non-compliance. In Brazil, the Ministry of the Environment sets national environmental policies and coordinates actions among various agencies.

Key entities and programs for U.S. exporters to note include:

- [Ministry of the Environment](#) - sets national environmental policies and coordinates actions among various agencies
- [Brazil's Institute of the Environment and Renewable Natural Resources](#) - responsible for enforcing environmental laws
- [National Health Regulatory Agency](#) (Anvisa) - responsible for air and water quality
- [National Environment Council](#) - develops key air pollution legislation
- [The National Water and Sanitation Agency](#) (ANA) - the main federal agency that implements the National Water Resources Policy. Supervised by the Ministry of the Environment and Climate Change, ANA defines standards for basic sanitation services.
- [Amazon Fund](#)

Other Important Resources

- [Brazilian Association of Waste and Environment](#)

Bonus Market #2

India



India's rapid population growth and urbanization created an increasing need for environmental technologies to address environmental and public health concerns such as poor air quality, water and soil pollution, and climate change.



This tool considers any market classified as "upper middle income," "lower middle income," or "low income" in the World Bank's Country Income Classification Level as "mature." For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,845 or less.

Market Development Status: Emerging



Top Indicators and Why They Are Important

EPI Environmental Health Score

12.5

The EPI Environmental Health Score indicates a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Annual GHG Emissions

kt of CO₂ equivalent

The Annual GHG Emissions Indicates a market's need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Average Tariff on Enviro Tech Goods

8.69%

Global Avg
4.43%

The average Environmental Technologies Tariffs indicate a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Enviro Tech + Clean Energy Market Size

billion USD

The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

The Indian market presents a large and growing market opportunity for U.S. environmental technologies exports due to rapid population growth and urbanization, resulting in increasing need for environmental technologies to address environmental and public health issues such as poor air quality, water and soil pollution, and climate change. India's environmental technologies and clean energy markets generated a combined \$27 billion in 2022. The United States exported \$700 million in environmental technology goods to India in 2022, representing five percent of India's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to India, followed by air pollution monitoring and control and waste management and recycling. While the United States and India do not currently enjoy a free trade agreement, the trade relationship between the two countries is nonetheless robust. In 2022, the United States exported \$47.2 billion in goods and \$73 billion in services to India.

Over the past several years, India rolled out several national initiatives aimed at expanding basic infrastructure and addressing environmental and public health challenges, including increasing access to drinking water ([Jal Jeevan Mission](#)), mitigating air pollution ([National Clean Air Program](#)), and promoting universal sanitation including solid waste management and recycling ([Swachh Bharat Mission](#)). In 2022, India updated its Nationally Determined Contribution under the Paris Agreement outlining its commitment to reduce the emissions intensity of its GDP by 45% of its 2005 level by 2030 and to reach net zero greenhouse gas emissions by 2070. The same year, India submitted a long-term [Strategy for Low Carbon Development](#), outlining key target areas for emissions reductions, including the energy, industrial, transportation, building and construction, and urban infrastructure sectors. Clear policy guidance on how India intends to achieve emissions reductions is still needed, and as of January 2024, Climate Action Tracker ranked India's net zero target as poor. As of January 2024, Yale University's [Environmental Performance Index](#) ranks India as 178 out of 180 countries for Environmental Health, with poor performance on measures related to air quality, drinking water, sanitation, waste management, and heavy metals/soil contamination. This highlights the scope of the environmental challenges facing the country and the growing need for environmental solutions.



Market Opportunities

Air Pollution Monitoring and Control

Air Pollution Monitoring and Control Equipment: Air pollution levels in India are among the highest in the world, threatening the country's economy and health. The major sources include thermal power generation, vehicle emissions, industrial emissions, and fuelwood and biomass burning for cooking and heating. As home to several of the world's most polluted cities, air pollution monitoring and control equipment is in high demand. India is the largest emitter of sulfur oxides in the world, accounting for 15% of anthropogenic emissions.

In 2019, the Ministry of Environment, Forest and Climate Change launched the [National Clean Air Program](#) (NCAP) to reduce air pollution levels 20-30% from a 2017 baseline by 2024 in the over 100 cities that exceed India's [National Ambient Air Quality Standards](#). The NCAP calls for the reduction of emissions, expansion of air monitoring networks, capacity building for pollution management, and increased public awareness. Under the NCAP, procurement of Continuous Ambient Air Quality Monitoring Systems creates export opportunities for U.S. suppliers.

Additionally, some Indian smart cities have established Integrated Command and Control Centers, which are also connected to Air Quality Monitors for effective monitoring. Data collected from Continuous Ambient Air Quality Monitoring Systems is used as input to create Air Quality Index evaluations for Indian cities. This provides an opportunity for U.S. consultancy services to analyze the collected data, identify pollution sources, and recommend appropriate actions for pollution abatement.

Key technologies and services in demand include:

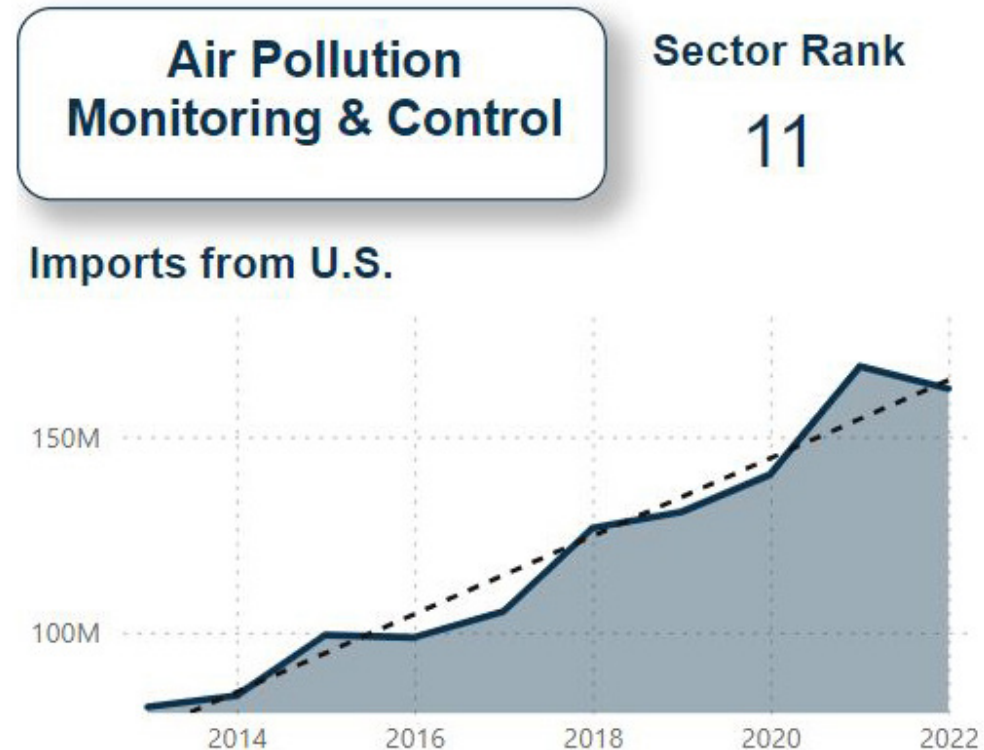
- Air quality monitoring systems
- Continued emissions monitoring systems
- Fenceline monitoring equipment
- Ambient air quality monitoring equipment
- Source emission measurement technologies
- Air purifiers and filters
- Data analysis and visualization and software
- Consulting Services

Decarbonization of Heavy Industry: In September 2023, India announced it would set carbon emission reduction targets for fossil-fuel dependent sectors such as petrochemicals, iron and steel, cement, and pulp and paper to align with the country's greenhouse gas emission reduction targets.

Key technologies and services in demand include:

- Flue gas desulphurization equipment
- Selective catalytic reduction technologies
- Selective non-catalytic reduction controls
- Wet and dry scrubbers
- Dry sorbent injection technology
- Inspection, adjustment, maintenance, and repair services

Carbon Management: In December 2022, the Indian Parliament passed the [Energy Conservation Amendment Bill](#) that proposes the creation of a carbon market. Companies from fossil fuel-dependent industries are likely to be among the first movers in the carbon market, buying and selling carbon credits to meet their greenhouse gas emissions reduction goals starting in April 2025. Although still in the early stages, Indian planning body NITI Aayog has proposed a carbon capture, utilization, and storage ([CCUS](#)) policy involving clusters, a business model, and financial incentives to help its adoption on a commercial scale, with the potential for India to reach a CCUS capacity 750 million metric tons per year by 2050. Additionally, India is considering a variety of opportunities to convert the CO₂ to different value-added products like building materials (concrete and aggregates), chemicals (methanol and ethanol), polymers, and enhanced oil recovery. India's Ministry of Science and Technology is a member of the [Asia CCUS Network](#), which is committed to successfully developing and deploying CCUS throughout the Asia region. U.S. providers working with other member countries of the Asia CCUS Network may have an advantage in introducing technologies and approaches in India.



Key technologies and services in demand include:

- Carbon capture technologies
- Combustion systems
- Flue gas treatment systems
- CO2 utilization and removal technologies
- Membrane separation technologies
- Compression systems
- CO2 transportation pipelines and infrastructure
- Engineering, procurement, and construction of carbon management projects
- Environmental impact assessment consultancies

Waste Management and Recycling

Waste Collection & Infrastructure: India's increasing urbanization driven by rapid population growth has created a rise in solid waste generation. The Government of India estimates 62 million tons of waste is generated annually, with 5.6 million tons of plastic waste and 170,000 tons of biomedical waste. Of that, 43 million tons is collected, 11.9 million tons is treated, and 31 million tons is dumped in landfills.

Half of all waste produced in India goes to landfills and only 22-28% is processed and treated. The remaining waste goes to open dumpsites or landfills. At this current dump rate, India needs 1,240 hectares of land per year for trash disposal, with a projected generation of 165 million tons of waste by 2031. India's [Solid Waste Management Rules](#) of 2016 attempt to stem the growing problem of solid waste by mandating channels for waste, the integration of waste pickers formally into the governmental system at the state and local level, and various requirements for businesses to manage and dispose of their waste. The rules set a baseline for waste management but the need for better basic infrastructure is evident. There are opportunities to support basic infrastructure build-out across the waste management sector value chain in India, including in the areas of collection, transportation, treatment, and disposal.

Key technologies and services in demand include:

- Waste collection and transportation
- Waste treatment technologies
- Incineration, gasification, pyrolysis technologies
- Landfill design and engineering
- Sorting technology



Water and Wastewater Treatment

India has a long history of challenges providing clean water and sanitation across its large population. With 18% of the world's population but only four percent of the world's water sources, India grapples with water scarcity in many regions.

Groundwater Management: India is the largest groundwater user in the world, using a quarter of global resources. Groundwater provides water to 60% of irrigated agriculture, 85% of rural drinking water supplies, and over 50% of urban drinking water supplies. In an effort to address water stress, India seeks to implement community-led groundwater management. In 2019, India launched [Atal Bhujal Yojana](#), a central sector scheme focused on community participation and demand-side interventions for sustainable groundwater management in water-stressed areas.

Key technologies and services in demand include:

- Hydrological mapping services
- Monitoring equipment
- Groundwater recharge technology

Municipal Water Treatment and Infrastructure: Through the [Jal Jeevan Mission](#), previously known as the National Rural Drinking Water Programme, India is working to get safe and adequate drinking water via functional household tap connections to all rural households by 2024 with a service level of 55 litres per capita per day. The [Jal Jeevan Mission website](#) tracks its progress and indicates that as of December 2023, 72.4% of households have a tap water connection compared to 16.8% of households in August 2019. However, reporting in the Hindu Times indicates these figures may not tell the full story; locals report lower figures, limited water supplies, and households pipe connections without actual water delivery or with water delivery occurring only one or two hours per day.

Key technologies and services in demand include:

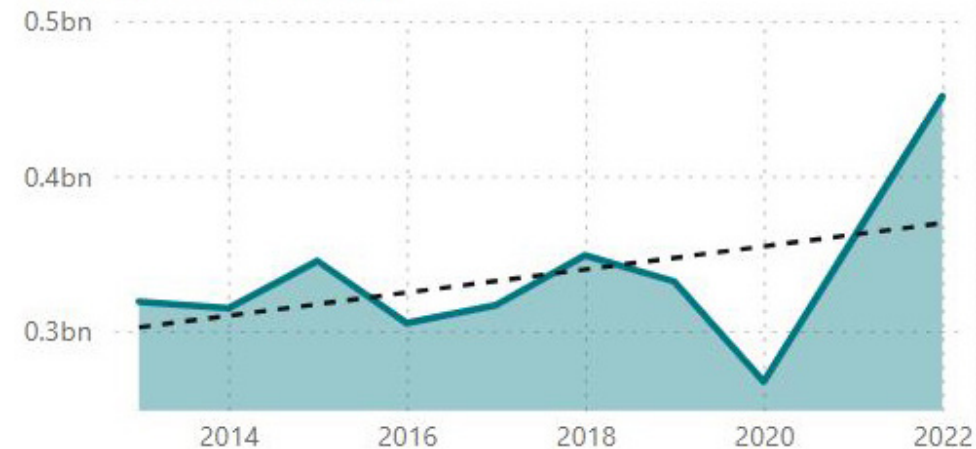
- Monitoring technology
- Leak detection technology
- Leak resistant transmission systems

Wastewater Treatment and Sanitation Services: Through the "Clean Ganga" project, India is working to address severe water pollution in the River Ganga, which flows through multiple states and several major cities (Lucknow, Allahabad, Patna, Kanpur, Kolkata, and Varanasi). Industrial waste from over 700 industries, including chemicals, tanneries, textiles, pulp and paper, are a major cause of pollution in the river.

Water & Wastewater Treatment

Sector Rank
14

Imports from U.S.



The project has created opportunities for technologies such as Zero Liquid Discharge (ZLD), a strategy that eliminates any liquid waste from leaving a plant or facility boundary, with the majority of water being recovered for reuse. Deployment of ZLD has been limited due to its intensive energy use and high cost, but interest in ZLD has increased in recent years. India has imposed stricter regulations on wastewater discharge through the Clean Ganga project, and in 2012 the ZLD market was valued at \$39 million and expected to grow. ZLD can be applied in the textile, brewing and distilling, power, and petrochemical industries.

Key technologies and services in demand include:

- Engineering and construction services
- UV disinfection
- Water reuse equipment and services (process specific)
- Anaerobic digestion
- Advanced filtration
- Nitrification
- Membrane filtration
- Biological denitrification
- Reverse osmosis
- Membrane bioreactor systems
- Forward osmosis
- Zero liquid discharge technologies



Market Challenges

High Tariffs and Protectionist Policies: India maintains high applied tariffs on a range of goods and has the highest average applied tariff rate of any major world economy, at 14.9% for non-agricultural goods. Tariff rates are subject to change without sufficient notice or public consultation. The Indian government promotes protectionist programs including “Make in India” and “Self-Reliant India” (Atmanirbhar Bharat), both with the goal of boosting domestic production and reducing reliance on foreign suppliers. These policies can create significant tariff and non-tariff barriers for U.S. exporters.

Regulatory Transparency and Predictability: U.S. exporters often encounter non-transparent and unpredictable regulatory policies in India, including the introduction of new and proposed laws and regulations. Inadequate public notice and comment periods and inconsistent notification of measures can hinder industry’s ability to adjust to new requirements. Government decision-making in India is highly decentralized and significant differences at the state level in terms of political leadership, quality of governance, and regulations add to the complexity of doing business.

Intellectual Property Rights Protection and Enforcement: Protecting intellectual property in India can be challenging for U.S. companies, including those in the environmental technology sector. India remains on the Office of the United States Trade Representative’s Priority Watch List as per the [2023 Special 301 report](#) due to a range of long-standing intellectual property protection and enforcement concerns.



Learn More

ITA Resources

India Specific

- [U.S. Commercial Service in India](#)
- [India Country Commercial Guide](#)
- [ITA Market Intelligence on India's Water and Wastewater Treatment Industry \(October 2022\)](#)
- [ITA Market Intelligence on India's Sludge Management and Treatment Industry \(October 2023\)](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

Other

- [Intellectual Property Rights Information & Assistance \(STOPFakes\)](#)



Indian Government Resources

Environmental regulations and a functional system of enforcement are important drivers of demand for environmental technologies, incentivizing the investment in solutions to address environmental challenges in order to avoid the cost of non-compliance. India's environmental regulatory regime is underpinned by several key pieces of legislation including the [Environment \(Protection\) Act](#), the [Water \(Prevention and Control of Pollution\) Act](#), the [Air \(Prevention and Control of Pollution\) Act](#), and subsequent amendments, and is governed by various entities at the federal, state, and local level.

Key entities for U.S. exporters to note include:

- The [Ministry of Environment, Forest, and Climate Change](#) - the main national body responsible for implementation and oversight of environmental laws in India
- [Central Pollution Control Board](#)- in charge of implementation and enforcement and oversight of state pollution control boards
- [Ministry of Power](#)- regulatory authority over thermal power plant emissions
- [Ministry of Housing and Urban Affairs](#)
- [Ministry of Science and Technology](#)

Bonus Market #3 Indonesia



Indonesia faces considerable environmental challenges including pollution from the mining, industrial, and agricultural sectors and a need to expand basic water supply, sanitation, and solid waste management infrastructure and services.



This tool considers any market classified as “high income” in the World Bank’s Country Income Classification Level as “mature.” For the 2024 fiscal year, this is any economy with a gross national income per capita of \$13,846 or more.

Market Development Status: Mature



Top Indicators and Why They Are Important

EPI Environmental Health Score

25.3

The EPI Environmental Health Score indicates a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Annual GHG Emissions

kt of CO2 equivalent...

1M
0M

2014 2016 2018 2020

The Annual GHG Emissions Indicates a market's need to deploy decarbonization technologies, which may signify opportunities for U.S. environmental technologies exports. Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Average Tariff on Enviro Tech Goods

6.11%

Global Avg
4.43%

The average Environmental Technologies Tariffs indicate a market's openness to environmental technologies imports. Higher tariffs on environmental technology goods indicates a less conducive market for U.S. environmental tech exports. Country's average tariff rate is compared against global average applied tariff rate (4.43%) as estimated by the World Trade Organization. Global average applied tariffs on environmental technology goods for low-income countries (as designed by the World Bank country classification) is 7.3%, for middle-income countries is 4.5%, and for high-income countries is 1.5%.

Enviro Tech + Clean Energy Market Size

billion usd

\$10
\$5
\$0

2014 2016 2018 2020 2022

The EBI Market Size indicates the approximate size of the environmental technologies and clean energy markets within the country, as measured by revenue of companies in that market segment.



Market Overview

Indonesia has the fourth largest population in the world, a growing economy, and is facing numerous environmental challenges which make it an emerging market for U.S. environmental technology exports. Indonesia's environmental technologies and clean energy markets generated a combined \$9.78 billion in revenues in 2022. The United States exported \$177 million in environmental technology goods to Indonesia in 2022, representing a 2.1% of Indonesia's environmental technology imports that year. Water and wastewater treatment is the largest environmental technology sector for U.S. exports to Indonesia, followed by waste management and recycling and air pollution monitoring and control. The United States and Indonesia do not currently have a Free Trade Agreement, but are working to enhance trade and investment ties through the [U.S.-Indonesia Trade and Investment Framework Agreement](#). The overall trade relationship remains robust, and in 2022, the United States exported \$9.8 billion in goods and \$2.3 billion in services to Indonesia.

Indonesia faces considerable environmental challenges due to rapid growth and industrialization, including pollution from the mining, industrial, and agricultural sectors, as well as a need to expand basic infrastructure and services such as water supply, sanitation, and solid waste management. Indonesia also continues to face deforestation and peatland burning, which are major sources of greenhouse gas emissions. As of January 2024, Yale University's [Environmental Performance Index](#) ranks Indonesia as 164th out of 180 countries for Environmental Health, reflecting challenges with air quality, sanitation and drinking water, heavy metals contamination, and waste management. This indicates that Indonesia has significant room to grow in terms of addressing environmental issues and a growing need for related solutions.

Indonesia's government committed to reducing its greenhouse gas emissions by 31.89% from 2010 levels by 2030 and achieving net-zero emissions by 2060. However, newly operating coal plants in Indonesia caused a growth in emissions of 21% in 2022. As of January 2024, [Climate Action Tracker](#) rates Indonesia's policies and actions and its conditional NDC target as critically insufficient. Indonesia has significant room to grow in terms of addressing environmental issues, and a growing need for related solutions.

Indonesia's [National Medium Term Development Plan 2020-2024](#) sets out several environmental goals, including reducing deforestation, promoting disaster resilience and sustainability in city planning, eradicating illegal logging, illegal fishing, and illegal mining, and improving natural resources management. The plan also seeks to reduce greenhouse gas emissions from priority sectors including forestry and peatlands, agriculture, energy, transportation, heavy industry, and waste.



Market Opportunities

Air Pollution Monitoring and Control

Indonesia has one of the highest air pollution levels in the world, with capital city Jakarta routinely ranked as one of the most polluted cities across the globe. Main pollution sources are factories, coal-fired power plants, and vehicle exhaust.



Emissions Monitoring Systems: Emissions from factories include small and medium-sized businesses, which are often harder to monitor and lack the funding required to implement air pollution control measures. In 2019, a group of residents launched a civil lawsuit against the government for failing to act on air pollution prevention and control measures and ensuring the population's right to clean air. In 2021, the Central Jakarta District Court ruled in the residents' favor declaring that the government had violated the country's environment protection laws and requiring top officials to establish a national ambient air quality standard along with other measures. In response, the Ministry of Environment and Forestry issued [Regulation No. 13 of 2021](#), requiring all iron and steel smelting, pulp and paper, synthetic fiber, carbon black, oil and gas, mining, thermal waste treatment, cement, thermal power generation, and fertilizer and ammonium nitrate businesses or activities use the Continuous Emissions Monitoring System to integrate their data into the Information on Continuous Industrial Emission Monitoring System no later than January 1, 2023.

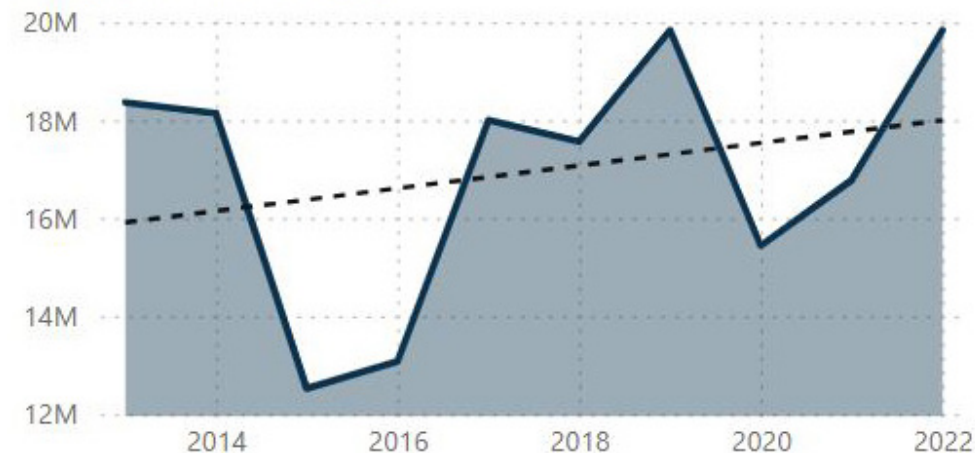
Key technologies and services in demand include:

- Continuous emissions monitoring systems
- Dry sorbent injection technologies
- Electrostatic precipitators
- Industrial filters and scrubbers
- Vehicle emission controls like catalytic converters
- Automatic air quality monitoring stations
- Flue-gas desulfurization equipment
- Satellite Monitoring
- Urea to ammonia reagent systems
- Selective non-catalytic reduction controls
- Inspection, adjustment, maintenance, and repair services

Carbon Management: In November 2023, Indonesia began work on its first carbon capture, utilization, and storage (CCUS) project -- a BP-operated project located in the West Papua province expected to store up to 1.8 Gt of CO. There are currently [15 more CCUS projects](#) in development in Indonesia, with a combined investment of nearly USD \$8 billion. The Government of Indonesia is eager to be a leader in carbon management and has the geological storage capabilities for countries with the propensity to finance these projects. On January 30, 2024, President Jokowi signed a Presidential Regulation on carbon capture and storage activities, which will allow CCUS operators to set aside 30% of their storage capacity for imported carbon dioxide. ExxonMobil reports this development will help them move forward with their \$15 billion project in Sunda-Asri basin. Indonesia's Ministry of Energy and Mineral Resources is a member of the Asia CCUS Network and is committed to working with other ASEAN countries to develop and deploy CCUS across the region. Additionally, Indonesia's vast geothermal resources present an opportunity for U.S. direct air capture companies looking to generate their technology with renewable energy.



Imports from U.S.



Key technologies and services in demand include:

- Carbon capture technologies
- Combustion systems
- Flue gas treatment systems
- CO utilization and removal technologies
- Membrane separation technologies
- Compression systems
- Geological storage technologies
- CO transportation pipelines and infrastructure
- Engineering, procurement, and construction of carbon management projects
- Environmental impact assessment consultancies

Waste Management and Recycling

Due to the rapid population growth and urbanization, the gap between urban development and basic services such as solid waste management is widening. Many Indonesian solid waste laws are not enforced; therefore, policy effectiveness is limited. Still, the goals and earnest efforts of the Indonesian government highlight the existing need for basic infrastructure to address the growing production of waste.

Plastic Recycling: Plastic pollution is a significant challenge in Indonesia. In 2017, waste generation reached 65.8 million tons, with 3.22 million tons unmanaged plastic waste. It was found by researchers in various U.S. universities that 1.29 million tons found its way to the ocean, representing ten percent of global ocean debris. The National Plan of Action on Marine Plastic Debris, published in 2018, provided USD \$1 billion to help reduce plastic and marine waste by 70% before 2025. As of December 2022, Indonesia has reported a 35.56% reduction in marine plastic debris.

Key technologies and services in demand include:

- Recycling facilities and sorting technology



Waste Infrastructure: Indonesia passed the [Rubbish Management law](#) in 2008 with the goal of closing all open-dump sites by 2013. This goal was not achieved, and as of 2018 167 recorded open-dump sites remained. Additionally, only 60% of the population have access to waste collection services. Since 2008, Indonesia has produced various solid waste management laws that set waste management targets. This includes the National Plan of Action on Marine Plastic Debris in 2018, which provided \$1 billion USD to help reduce plastic and marine waste by 70% before 2025. It included 58 activities (assignments to each Ministry) which demonstrates the government's intention on addressing its waste problem. U.S. industry can find various opportunities through current regulation to help build out Indonesia's waste management infrastructure. The World Bank reported that as of December 2022, Indonesia reported a 35.56% reduction in marine plastic debris which is an encouraging sign about its efforts.

Key technologies and services in demand include:

- Waste collection and transportation
- Waste treatment technologies
- Landfill design and engineering

Water and Wastewater Treatment

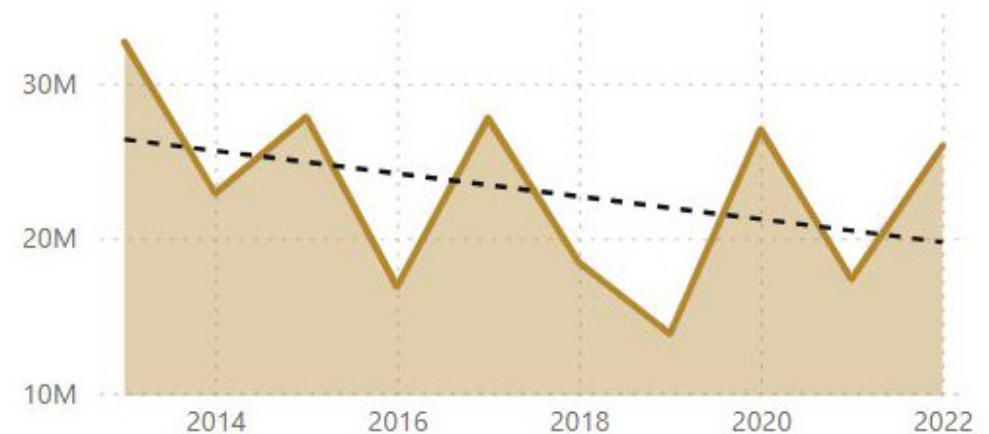
As a country with uneven water distribution, Indonesia is increasingly experiencing water scarcity. [Indonesia Vision 2045: Toward Water Security](#), published by the World Bank in 2021, found that half of the country's GDP is produced in river basins that suffer "high" or "severe" water stress in the dry season. Meanwhile, water demand is expected to increase by 31% between 2015 and 2045. Key cities have become more vulnerable to flooding due to subsidence caused by the over-pumping of groundwater. The report also noted that all island groups in Indonesia have heavily polluted surface water, and Java, Bali, East Nusa Tenggara (NTT), and Kalimantan are the most impacted. Java and Sumatra are the locations for most of the country's rice production and Java is the most water stressed island group. The World Bank report also found that over half of the country's rivers are heavily polluted, but three-quarters of its population live in areas where water quality is not monitored.

Municipal Water Treatment and Infrastructure: Indonesia requires basic buildout of water supply infrastructure, as well as to address issues with water quality and reducing non-revenue water as a result of leakages. The government's National Medium-Term Plan for 2020-2024 sets a goal of 100% of dwellings having access to adequate drinking water (including safe access 15%), 30% of households having access to piped water, and 90% having access to adequate sanitation (including safe access 15%).

Waste Management & Recycling

Sector Rank
16

Imports from U.S.



As of 2021, about 23% of Indonesians have access to piped water and 11.9% have access to “safe water,” defined as water samples below the safety thresholds for total dissolved solids, E-Coli, pH, Nitrate, and Nitrite. About 18 million people lack access to safe water and 20 million lack access to improved sanitation. A [new government regulation](#) coming into force in 2019 requires that local governments meet minimum provision standards for water supply, and the central government has channeled Special Allocation Funds (DAK) for this purpose. The government has also focused on rolling out water supply projects through the national PPP program, with Bandar Lampung and West Semarang being recent examples. Drinking water quality is also a concern in Indonesia, driving demand for Point-of-Use technologies to purify drinking water. GWI reports Indonesia requires an estimated USD \$17.4 billion in investment to meet the 2020-2024 drinking water targets.

Challenges for the water sector have included poor project development, a difficult legal environment, and poor coordination between government bodies, but GWI reports that a more favorable business climate may be developing. Projects being developed include upstream water supply facilities and downstream water distribution networks.

Key technologies and services in demand include:

- Engineering, procurement, and construction services
- Operations services
- Pumps, pipes, and valves
- Advanced filtration
- Membrane filtration
- Monitoring equipment
- Testing equipment
- Point-of-Use devices

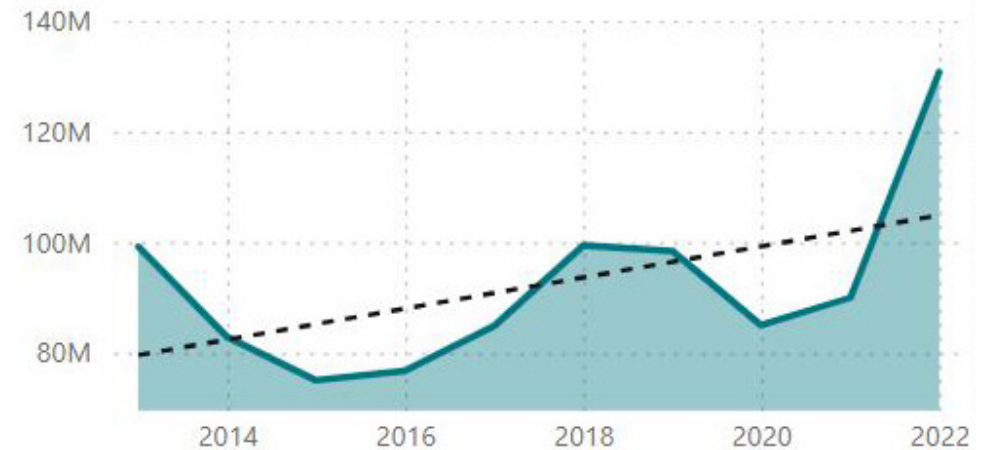
Wastewater Treatment and Sanitation Services: According to the World Bank’s *Vision 2045* report, about 70% of Indonesia’s groundwater pollution is caused by leaking septic tanks and septage disposed into waterways. Most households use on-site sanitation systems such as septic tanks, leach pit latrines, and lined pit latrines. Sewage connections are only available to about two percent of the population.

Other sources of pollution include agriculture, mining, aquaculture, and emergent industrial pollutants such as chemicals and heavy metals. Because Indonesia is the world’s largest producer of palm oil and nickel as well as a major source of copper, bauxite, and tin, there is a need for industrial wastewater treatment. Indonesia also has a robust oil and gas sector and a growing presence of international oil companies, creating additional opportunities for process-based water treatment.

Water & Wastewater Treatment

Sector Rank
15

Imports from U.S.



Key technologies and services in demand include:

- Engineering, procurement, and construction services
- Operations services
- Advanced filtration
- Membrane filtration
- Sludge dewatering equipment
- Anaerobic digestion
- Nitrification
- Biological denitrification
- Monitoring equipment
- Testing equipment
- Purification equipment
- Petrochemical and mining effluent treatment systems





Market Challenges

Local Content Requirements: U.S. companies note that local content requirements are one of the most challenging issues in doing business in Indonesia. While originally focused on the oil and gas sector, in recent years requirements expanded to a broader range of sectors, including environmental technology. Foreign companies can face requirements to source more than 75% of project inputs locally, a significant challenge in a market with limited advanced manufacturing.

Intellectual Property Rights Protection and Enforcement: Protection and enforcement of intellectual property rights is a key challenge in Indonesia, which remained on the United States Trade Representative Priority Watch List in the [2023 Special 301 Report](#). Indonesia maintains widespread issues with copyright piracy, trademark counterfeiting, and lack of enforcement. Indonesia's [2016 Patent Law](#) is also an area of concern, specifically in terms of provisions related to the patentability criteria for incremental innovations, local manufacturing and use requirements, procedures for issuing compulsory licenses, and disclosure requirements for inventions related to traditional knowledge and genetic resources.

Testing and Certification Requirements: U.S. exporters should be aware of additional requirements for testing and certification imposed on a wide range of products. In many cases, U.S. companies must pay for an Indonesian laboratory or certification body to conduct testing for individual shipments.

International Trade Administration (ITA) staff assessed 21 potential indicators as explanatory variables for predicting U.S. environmental technologies export potential by country. ITA gathered indicators that covered a range of macroeconomic, trade, and environmental variables that may impact U.S. exports to foreign markets. ITA staff conducted several types of modeling analysis, including a LASSO model and gravity model analysis. Due to inherent limitations of available environmental data, many of the indicators were found to be statistically insignificant in the model, and ITA staff ultimately reduced the list of indicators to ten key indicators deemed to have the highest correlation with the potential success for U.S. environmental technology exports to a given market. ITA staff ran calculations on the indicators as outlined below and the resulting values were normalized through the min-max normalization process. Weights were then applied to the indicators based on their projected impact on prospective U.S. environmental technology exports.

Note: Min-Max normalization is heavily affected by the presence of outliers. Several indicators – including GDP, U.S. average exports, and average greenhouse gas emissions – contained extreme outlying values. For this reason, ITA used a bucketing approach for those indicators, providing a tiered scoring system to mitigate the impact of extreme values.



Learn More

ITA Resources

Indonesia Specific

- [U.S. Commercial Service in Indonesia](#)
- [Indonesia Country Commercial Guide](#)
- [Contact Us](#)

Environmental Technologies Industry

- [Environmental Technologies Industry Homepage](#)
- [Climate and Clean Technology Solutions](#)
- [Climate and Clean Technology Exporter Directory](#)
- [Contact ITA's Environmental Technologies Industry Team](#)

Energy Industry

- [Energy Industry Homepage](#)
- [U.S. Energy Trade Dashboard](#)
- [Contact ITA's Energy Industry Team](#)

Indonesian Government Resources

Environmental regulations and a functional system of enforcement are important drivers of demand for environmental technologies, incentivizing the investment in solutions to address environmental challenges in order to avoid the cost of non-compliance. [Law Number 32 of 2009 on Environmental Protection and Management](#), and [Government Regulation Number 22 of 2021 on Implementation of Environmental Protection and Management](#), form the basis of Indonesia's environmental regulations. These laws empower the main federal government authority, the Ministry of Environment and Forestry, and regional governments with protecting the environment and enforcing environmental policies.

Key entities for U.S. exporters to note include:

- [Ministry of Environment and Forestry](#) - the main federal government authority overseeing protection of the environment and enforcing environmental policies.
- [National Water Resources Agency](#) - responsible for water resource management
- [Ministry of Energy and Mineral Resources](#)

Other

- [Intellectual Property Rights Information & Assistance \(STOPFakes\)](#)

Our Methodology

The Indicators

Macroeconomic Indicators

Indicator	Measure	Why It's Important	Data Source
GDP	Five-year average, bucketed into ranges to address extreme outliers.	Gross Domestic Product (GDP) is an important measure of a country's economic activity and potential to spend, and therefore high GDP indicates greater potential to purchase U.S. exports.	The World Bank 2023 GDP (Current US\$) License: CC BY-NC 4.0
GDP Growth	Five-year average.	GDP growth is a measure of economic growth and a predictor of growth opportunities for U.S. exports.	The World Bank 2023 GDP (Current US\$) License: CC BY-NC 4.0
Operational Risk	Annual score in the latest year.	Operational risk is a broad metric that evaluates the health of a country's business environment. Countries with strong economies and consistent regulatory frameworks provide better opportunities for U.S. exports. The index measures operating risk based on 70 indicators including macroeconomic factors, financial and tax policy, labor market, existing infrastructure, legal and regulatory factors, foreign trade and payments, government effectiveness, political stability, and security risks.	Economist Intelligence Unit 2023 Operational Risk Model Permissions: Data reused with permission of the Economist Intelligence Unit
Population-Weighted Distance	Distance between the United States and the foreign market measured in kilometers.	Proximity to a market is frequently cited as a defining variable for trade flows between countries. Population-weighted distance serves as a proxy for transportation and related costs and is a predictor of U.S. export volume to a given country.	United States International Trade Commission 2022 Dynamic Gravity Dataset License: CC BY-NC 4.0

Trade Indicators

Indicator	Measure	Why It's Important	Data Source
U.S. Average Exports	Five-year average of U.S. exports, bucketed into ranges to address extreme outliers.	This indicator serves as a primary measure of a country's current openness to and demand for U.S. environmental technology exports. This illustrates where U.S. environmental technology firms are already successful in exporting.	International Trade Administration Proprietary
U.S. Average Export Growth	Five-year average U.S. export growth.	This indicator measures a country's demand trajectory for U.S. environmental technology exports and market saturation. Higher growth rates suggest demand for U.S. exports are increasing, while a lack of growth suggests the country has already reached saturation and there may be established competition for U.S. exports.	International Trade Administration Proprietary
Tariffs on Environmental Technologies	Average import-weighted applied tariff for environmental technologies goods for the latest available year.	Import-weighted applied tariffs on environmental technology goods indicate a market's openness to environmental technology imports.	International Trade Administration Proprietary

Environmental Policy Indicators

Indicator	Measure	Why It's Important	Data Source
Stringency of Environmental Policies	2017 score of environmental stringency.	EBI-OECD index based on a 2017 World Economic Forum Executive Opinion Survey measuring the stringency of a market's environmental regulations. Countries were rated from 1 to 7 with 1 as "very lax" and 7 as "among the world's most stringent." Strong environmental regulations can increase demand for environmental technologies for compliance purposes.	Environment Business International Global Environmental Market Data Set Permissions: Data reused with permission of EBI.
Average Greenhouse Gas Emissions	Five-year average greenhouse gas emissions in kt of CO ₂ equivalent, bucketed into ranges to address extreme outliers.	Greenhouse gas emissions are an important indicator of a country's need to decarbonize and a proxy for the environmental and climate challenges that accompany economic growth and industrialization. High average greenhouse gas emissions indicate a country's need to adopt environmental solutions.	The World Bank 2023 Total greenhouse gas emissions (kt of CO2 equivalent) License: CC BY-NC 4.0

Indicator	Measure	Why It's Important	Data Source
Climate and Environmental Laws	0-1 scoring system based on the strength of countries' environmental policies and laws. Countries were given a 0.25 for environmental resolution, vision, or similar measure; 0.5 for a framework, action plan, or similar measure; 0.75 for an act, regulation, rules, directive, or similar measure; or 1 for a constitutional amendment.	This indicator measures a country's commitment and action in addressing climate and environmental challenges. Countries with more robust environmental and climate policies and laws will likely have higher demand for environmental technologies.	Graham Research Institute on Climate Change and the Environment 2023 Climate Change Laws of the World (climate-laws.org) License: CC BY-NC 4.0

Additional Data

Additional data incorporated to provide context.

Visualization	Data Source
2022 Environmental Performance Index, Environmental Health Score	Yale Center for Environmental Law & Policy epi.yale.edu
Trade Preference	United States Trade Representative's Office
Development Status	The World Bank 2023 current classification by income in XLSX format License: CC BY-NC 4.0

