

From Water Stressed to Water Secure: Lessons from Israel's Water Reuse Approach



2022 U.S. DELEGATION SUMMARY

March 2023



Message from EPA's National Program Leader for Water Reuse, Sharon Nappier

"Recently, I was part of a U.S. delegation to Israel that included 39 water leaders from utilities, state agencies, federal agencies, and other areas of the water sector. We had the pleasure of visiting Israel to learn first-hand about the innovative approaches the country is taking to ensure adequate and resilient water supplies, despite their arid climate and growing population. The sites we visited included the Sorek Water Desalination Plant, one of the world's largest reverse osmosis desalination facilities, and the Emek Hefer Water Reclamation Project, which supplies treated wastewater for agricultural irrigation.

My colleagues and I left Israel with a myriad of takeaways and technological insights to bring back to our communities and workplaces. Examples include how Israel continues to mitigate the potential long-term impacts of reuse water on crop and soil quality, approaches for tightening non-revenue water losses, and Israel's ability to quickly adapt to changing needs. This trip report provides a summary of our experiences and lessons learned.

We are grateful for the continued partnership between our hosts and co-organizers: the WaterReuse Association, U.S. Department of Agriculture (USDA), U.S. Food and Drug Administration (FDA), Ministry of Environmental Protection, Ministry of Economy and Industry, Water Authority, Ministry of Agriculture and Rural Development, Agricultural Research Organization, Ministry of Health, Israel Export Institute, and WaterEdge.IL."



From left: Sharon Nappier (EPA) and Pat Sinicropi (WaterReuse Association) at Intel semiconductor plant; Emek Hefer Water Reclamation Project; Delegation Group at the Ein Gedi date plantation, which irrigates with reuse water from the Ein Bokek Wastewater Treatment Plant. Photo credits (left to right): EPA, EPA, and Israel Ministry of Economy and Industry

WRAP ACTION PARTNERS

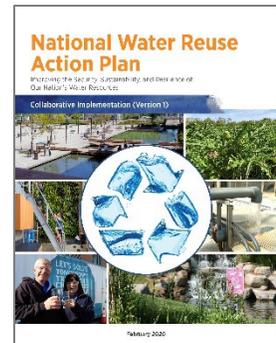
United States: EPA, WaterReuse Association, USDA, FDA

Israel: Ministry of Environmental Protection, Ministry of Economy and Industry, Water Authority, Ministry of Agriculture and Rural Development, Agricultural Research Organization, Ministry of Health, Israel Export Institute, WaterEdge.IL



Background/Purpose

After drastic infrastructure, regulatory, and institutional reform, Israel transformed from one of the world’s most water-stressed countries to a water-secure country, becoming a global leader in agricultural water reuse. Today, nearly 90 percent of Israel’s treated wastewater is reused for irrigation purposes. While the United States currently reuses a much smaller fraction of the nation’s wastewater, communities in different states are increasingly implementing various water reuse approaches for agriculture, industry, and even for augmenting potable supplies. In recent years, the United States has brought increased focus on water reuse as a tool for water resilience through its [National Water Reuse Action Plan](#) (WRAP), which is a growing collaboration between more than 130 organizations. The goal of the collaborative is to make water reuse more accessible to states and communities and ultimately increase the amount of water reused nationally to meet increasing demands.



National Water Reuse Action Plan cover.

Water reuse is of mutual interest and benefit to both Israel and the United States. In 2022, Israel hosted a delegation of government participants and water sector leaders from the United States to promote bilateral exchange of scientific, technological, and policy information and share examples of real-world implementation. The trip to Israel, originally planned to occur in 2020, was delayed due to the COVID-19 pandemic. In 2021, during continued delays, planners organized a series of [virtual tours](#) on water reuse in Israel covering the science, technologies, and policies needed to further agricultural reuse. The delegation was made possible through an existing Memorandum of Understanding (MOU)¹ between Israel and the United States to “improve institutional capacity through technical cooperation on environmental management” and is associated with WRAP [Action 11.1](#).

This report provides a summary of the delegation’s activities, key observations, and other insights to share with interested parties throughout the United States. Insights and quotes from participants are presented in insets throughout this report without attribution.

“Israel’s experience **gives me hope** about what can be accomplished through state and regional cooperation.”

—Delegate from a wastewater utility in the United States

¹ To promote bilateral cooperation on environmental issues, EPA and the Israeli Ministry of Environmental Protection renewed their [Memorandum of Understanding](#) (MOU) in 2018 to “improve institutional capacity through technical cooperation on environmental management.”



Delegation Activities and Site Visits

Thirty-nine representatives from the U.S. water sector, including utilities, industry, states, EPA, and USDA, traveled to Israel as part of the delegation from October 30 to November 3, 2022.² The delegation had two key objectives for the trip:

- Increase U.S.-Israel practical collaboration (on the federal and state level) on water reuse policies, scientific research, methods and technologies, and implementation.
- Increase the sustainability, security, and resilience of the United States' water resources by sharing knowledge and information about policies, practices, and technologies.

During the trip, the U.S. delegation engaged with Israeli water counterparts through informal networking discussions; technical presentations; and site visits to water treatment, research, and other facilities in Israel to learn about many aspects of Israel's approach to water management overall and water reuse specifically. Participants also had the opportunity to meet with water technology providers seeking to fill various supply needs, including water storage and distribution, data management and analytics, and cyber security. During site visits and facility tours, participants were able to see emerging and established treatment technologies in use and ask questions about real-world performance in relation to their own projects.

Main Discussion Forums and Participating Israeli Organizations

Water Policy and Strategy

Israel's overall approach to water reuse and coordination efforts between the different ministries and departments in Israel.

Israeli Water Authority, Ministry of Environmental Protection, Ministry of Health, the Water Authority Council (coordinated with Ministry of Health)

Water Reuse in Agriculture

Scientific background for water reuse in agriculture and the implementation of best practices and lessons learned.

Ministry of Agriculture and Rural Development, Volcani Institute for Agricultural Research Organization

Water Technologies and Implementation

Discussions with technology providers on topics such as sewer networks, decentralized systems (industrial, agricultural, municipal), effluent distribution systems, water analytics and cybersecurity, and wastewater treatment technologies.

Multiple leading Israeli water technology providers hosted by Ministry of Economy and Industry, Israel Export Institute, and WaterEdge.IL at the Peres Center for Peace and Innovation; visit to Shafdan hosted by Mekorot; visit to an Intel Corporation facility hosted by Intel

² The agenda and list of participants are included as Attachments 1 and 2, respectively.



Treatment Facility Tours Given by Israeli Colleagues

Sorek Wastewater Treatment Plant

Located near Jerusalem, the Sorek plant is the third largest wastewater treatment plant (WWTP) in Israel. Treated water flows into the Sorek seasonal creek, where it is then used for irrigation.

View of treatment units at the Sorek WWTP.
Photo: EPA.



Sorek Desalination Plant

One of the largest reverse osmosis desalination plants in the world, the Sorek Desalination Plant utilizes unique vertical installation for a space-efficient footprint. The plant provides potable water for over 1.5 million people.

View of vertical reverse osmosis cylinders at the Sorek Desalination Plant.
Photo: EPA.



Emek Hefer Water Reclamation Project

An agricultural cooperative association that provides treated wastewater effluent for irrigating agricultural crops through an integrated regional distribution system.

View of a distribution facility and water storage associated with the Emek Hefer Water Reclamation Project.
Photo: Emek Hefer Water Reclamation Project.



Ein Shemer/I'ron WWTP

Treats wastewater from several rural towns and villages in the Menashe Regional Council. Tertiary treatment includes membrane bioreactors (MBRs) and chlorination. The high level of treatment allows water to be used to irrigate various crops. Sludge is treated to create class-A compost fertilizer.

View of clarifiers at the I'ron WWTP.
Photo: EPA.



Shafdan Water Recycling Facility

The largest water recycling facility in Israel and a key water reuse research and development center. It is a model of extensive tertiary treatment, including saturated aquifer treatment, and an example of cooperation between localities which enabled the infrastructure for wastewater treatment and transmission up to 90 miles.

View of soil aquifer treatment at the Shafdan Water Recycling Facility. *Photo: EPA.*



Meniv Rishon Utility Facility

The hands-on facility tour of Meniv Rishon, a large and innovative water utility corporation, spanned the core functions of water regulation, budgeting, and security.

Delegates at the Meniv Rishon Utility Facility tour. *Photo: Meniv Rishon.*



Intel Semiconductors Plant

One of the leading exporters in Israel's high-tech industry, Intel presented information on water use and reuse as part of the manufacturing process, overall water management methodology, and sustainability goals.

Tour at the Intel Semiconductors Plant. *Photo: Israel Ministry of Economy and Industry.*



Ein Bokek Hotels Treatment and Reuse Facilities

Ein Bokek, a secluded hotel complex located next to the Dead Sea, has a dedicated WWTP to produce effluent for two different systems—one for irrigating public gardens at the Dead Sea recreational area and one for irrigating a palm grove on Kibbutz Ein Gedi.

View of the clarifier at the Ein Bokek treatment and reuse facilities. *Photo: EPA.*



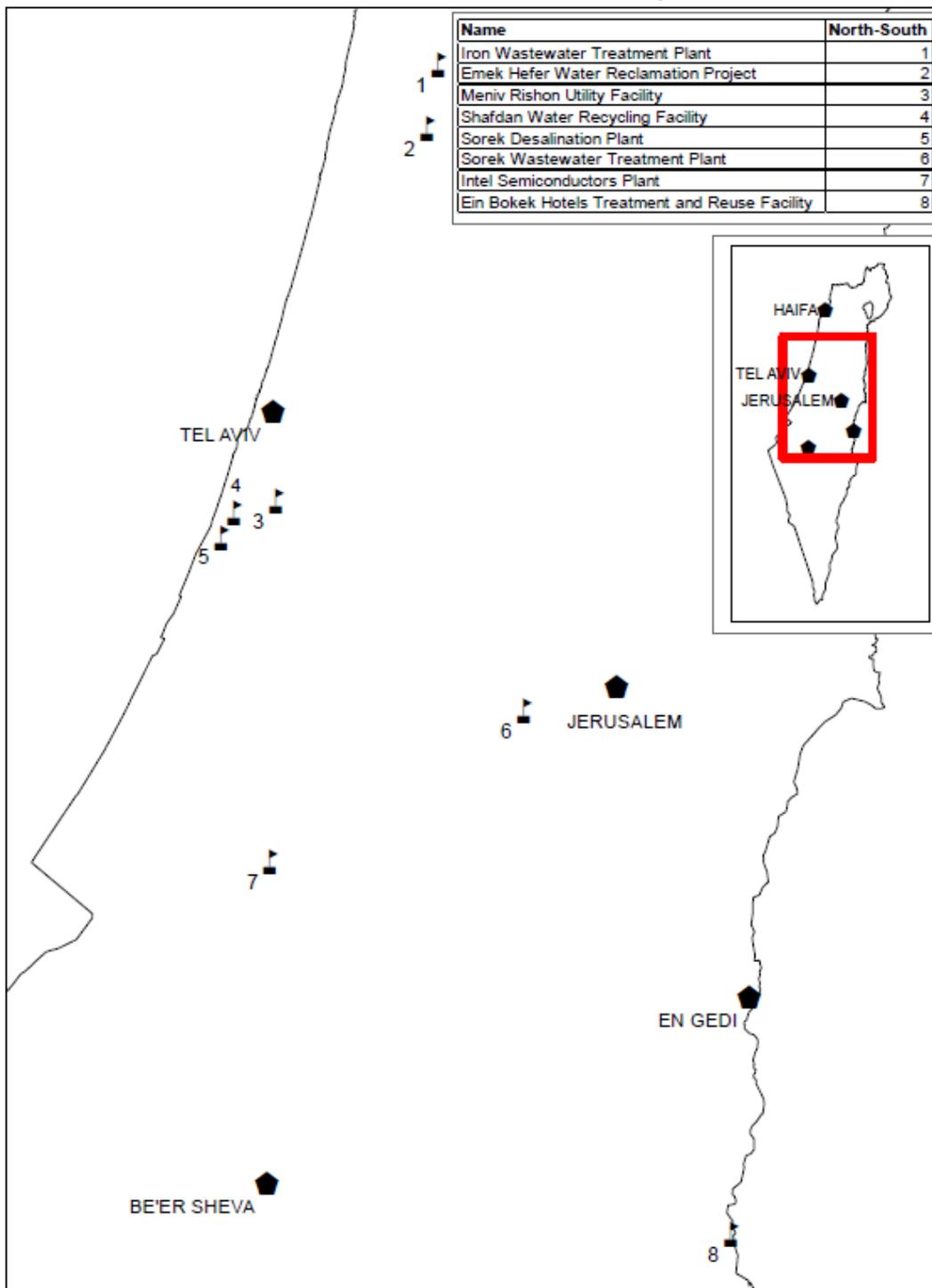


Figure 1. Locations of facilities visited.

Source: Ministry of Environmental Protection, International Relation Division.



Key Observations from the Delegation

During the trip, members of the Israeli team provided insights into Israel's overall water resources management strategy, including the key drivers, history, mindsets, research, and future goals. The following sections summarize some of this information and highlight observations from the delegation about successful Israeli water reuse strategies.

Overview of Israel's Approach to Water Management

Israel experiences an arid to semi-arid climate, and effective water management has been a central focus since its establishment of statehood in 1948.³ In 1959, Israel's Water Law established government control over water resources and prohibited private ownership of all water resources, including water beneath privately owned land. In the 1990s and 2000s, water supply crises caused by droughts drove Israel to develop both seawater and treated wastewater as viable, alternative freshwater sources to ensure ample water supplies and resilience to drought. In 2007, the Israel Water Authority and the Water Authority Council consolidated into one autonomous government agency, combining water planning, allocation, and regulatory responsibilities to ensure robust oversight of Israel's water supply system as the population and economy continued to flourish.

"There is great energy around the water sector in Israel. There is a clear understanding from the citizens of the importance of water and the fact that **water is life.**"

—Delegate from the U.S. private sector

Israel is bordered by the Mediterranean Sea to the west and the Jordan River to the east. Because most precipitation typically falls in the northern part of Israel, in the past, a primary water supply method was to use the National Water Carrier aqueduct to transport water from north to south. Israel's water supply originally comprised surface water and groundwater, though desalinated seawater now makes up approximately 90 percent of Israel's domestic freshwater supply.⁴ The production of desalinated water has enabled more of Israel's water supply to be transported from the western, coastal part of the country to other parts of Israel. As the country's population continues to grow and water consumption rises, more desalination facilities will be built to meet the demand. In addition, Israel has dedicated its treated municipal wastewater to agricultural use, allowing for higher nitrogen and biological oxygen demand levels. This level of quality fits the crops' needs and reduces the cost of raw water production. These systems employ additional treatments to ensure the water is suitable for agriculture uses. For example, the desalination plants add an additional reverse osmosis step to remove salts, total dissolved solids, and boron.

"If there is a will, there is a way. Israel wants to grow their population and one key component of that growth is adequate water supply. **Israeli motto: if you need water, we will make more.** They have a very ambitious goal of providing all their drinking water from ocean desalination plants in the future."

—Delegate from a wastewater utility in the United States

³ One source of information on this history of Israel's water management is the 2015 book, *Let There Be Water: Israel's Solution for a Water-Starved World*, by Seth M. Siegel.

⁴ Figure 2 on the following page provides an overview of the changes in Israel's water supply since the late 1990s.



Several key factors have led to Israel’s successful expansion of water reuse for agricultural purposes, many of which cannot be easily replicated everywhere in the United States. First, because of its size and governance structure, Israel has a coordinated national approach to water management with less fragmentation among regulatory agencies than in the United States. Second, water rights are not assigned to individuals, as in parts of the western United States; rather, as mentioned earlier, no one person or entity can possess private ownership over water in Israel. In many parts of the western United States, many farmers and other entities (including local governments) hold water rights, which often disincentivizes the use of recycled water. Third, many farms and other agricultural lands in Israel are proximate to urban centers, which is less typical in the United States. Finally, in Israel, use of recycled water for food crop irrigation is widely accepted by both farmers and the public and subsidized by the government, resulting in a much cheaper cost structure for reused water and an abundant, nutrient-rich water supply that ensures a full growing season. While reuse is becoming more common in the United States, its acceptance and implementation varies by application.

“Israel has approached attaining a **more sustainable and resilient water supply** through a combination of conservation, non-potable reuse, and desalination.”

—Delegate from a U.S. nonprofit association

In addition, the level of collaboration between the main parts of the water sector in Israel—the national water company, water utilities and providers, regulators, municipalities, water technology providers, and agricultural producers—is quite high. Israel’s approach to solving water problems embraces holistic thinking and engagement which enables a true integrated approach to water management.

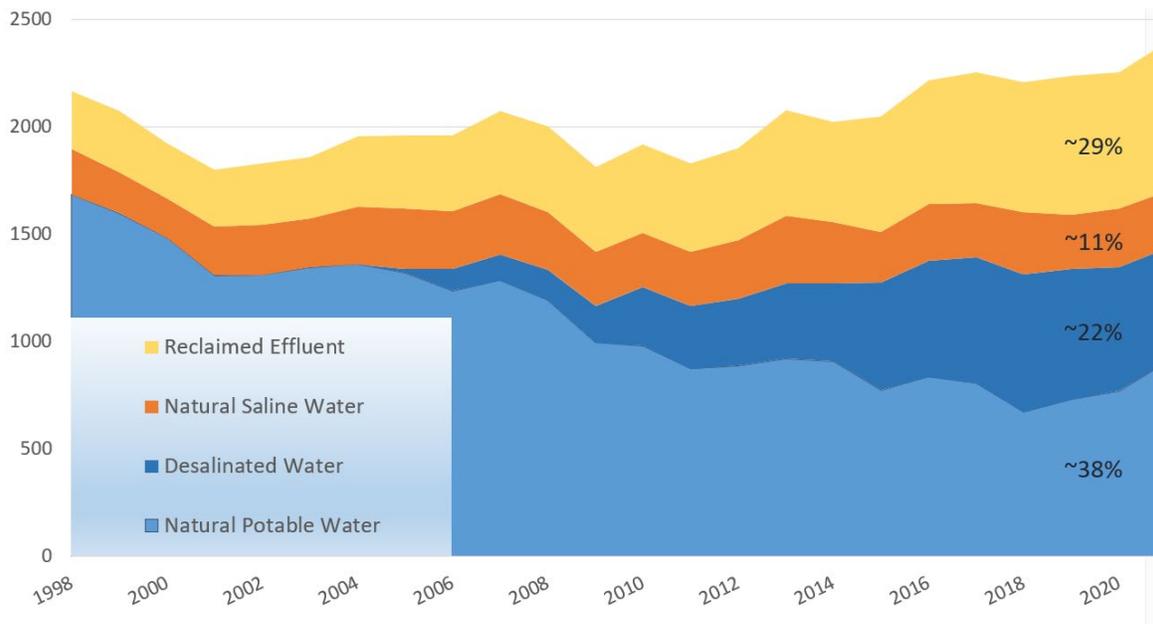


Figure 2. Graph showing changes in Israel’s water supply, in million cubic meters.
Source: Israel Water Authority.



Successful Israeli Water Management Strategies

Regulations and Relationships

- The regulations, policies, and formal collaborations that the State of Israel has in place form the foundation upon which it has built a successful, innovative approach to managing its water resources.
- Israeli regulators and the regulated community have built trust among recycled water users and apply adaptive management approaches to build projects with successful outcomes.
- Israel has established national water quality standards for the reuse of treated municipal wastewater. These standards consider important aspects such as public health, plant health (including vegetables for human consumption), long-term soil health, and aquifer sustainability.
- Israel has several research institutes that work to improve treatment technologies to reduce energy use, improve effluent quality and soil health, and the lower the cost of treatment. For example, agricultural scientists at the Volcani Center are continuing research efforts to better understand and address any adverse impacts of long-term use of recycled water on soil and plant health.

“One of the ‘building blocks’ to reducing demand is the public’s understanding and acceptance and raising the motivation for action. In recent decades, **Israel invested in public education**, leading to behavioral change and significant water savings.”

—Delegate from an Israeli regulatory agency



Purple pipes for reuse transmission at the Emek Hefer Water Reclamation Project facility.
Photo: EPA.

Treatment Approaches and Technologies

- Desalinated seawater makes up more than 90 percent of Israel’s domestic water supply. In Israel, desalination has a positive impact on integrated water management, as reflected by the reduction in wastewater salinity and resulting improved water quality for agricultural reuse.
- Israel’s “fit for purpose” treatment approaches ensure water treatment is designed to the appropriate level for the intended application or product, which can reduce the need for additional unit treatments and associated energy, operations, and maintenance costs.
 - In general, wastewater used for irrigation in Israel should receive tertiary treatment, but there are cases where a lower level of treatment is allowed, even for food crops. For example, secondary biological treatment can be used when the water is not expected to directly touch the food crop (e.g., for the irrigation of dates in the Dead Sea area).
- Technologies used in Israel of particular interest to the U.S. delegates included those that increase product water recovery

“We need to further **support innovation, try new things, and embrace the challenges as opportunities**. Utilities are inherently risk adverse. How can we change that mindset and get leadership/public buy-in to advance water/wastewater technology?”

—Delegate from a wastewater utility in the United States



efficiencies with lower energy requirements, such as membrane bioreactors (MBR), microfiltration, ultrafiltration, and reverse osmosis. Of note:

- The Sorek desalination plant uses 16-inch membranes instead of 8-inch membranes, and these membranes are set up vertically (pictured right). This configuration has reduced the plant's footprint, reduced energy consumption, and made maintenance easier.
- The Intel semiconductor plant employs MBR and reverse osmosis to achieve high-quality water for reuse onsite.
- The Emek Hefer Water Reclamation Project uses floating solar panels and biogas from wastewater sludge to produce energy onsite. The solar panels also reduce evaporation losses and thus improve water quality.
- Thermal imaging of agricultural lands is used to evaluate water usage/need.



Vertical reverse osmosis technology is a space-efficient treatment option in use at the Sorek Desalination Plant.
Photo: EPA.

Water Loss Reduction

- Though not specific to water reuse, Israel views the reduction of water losses as a critical part of its overall water resources management strategy. Water losses and non-revenue water can be caused by water leakages; old or inaccurate meters; and using water at a higher pressure than necessary, which could lead to pipeline breaks. Reducing the loss of non-revenue water (water that no one paid for) can help avoid or delay major expenditures for a new water supply, such as another desalination plant.
- Israel identifies and mitigates water losses and gaps by measuring the recorded water usage by consumers versus the total supply. In some areas, Israel has successfully decreased non-revenue water losses to less than 5 percent. Israel has realized that it can be more cost-effective and energy-efficient to tackle non-revenue water before investing in new infrastructure.
- Israel has found the accuracy of measuring equipment (e.g., flow meters) deteriorates with time and frequent replacement of measuring equipment can address revenue losses caused by inaccurate data. For example, Meniv Rishon Water Corporation calibrates and, if necessary, replaces water meters every five to six years (a shorter life cycle than most U.S. regulatory standards require).

U.S. Delegate Feedback on Potential Collaboration Opportunities

The value of collaboration and partnerships emerged as a key theme throughout the visit, with Israeli speakers highlighting the importance of coordination between water providers, technology providers, regulators, municipal water corporations, researchers, and the agricultural community. Conversely, U.S.-based participants noted that working in isolation stymies adoption of integrated water management approaches, including water reuse, and they were inspired to identify strategies for fostering a more productive and collaborative relationship among key stakeholders (e.g., utilities, the public, end users,



regulators, vendors). Below are a few examples of ideas delegates shared for potential future collaborations.

- The 2018 [MOU](#) between the U.S. EPA and the Israeli Ministry of Environment Protection is in place until October 2023.
- Several U.S. utilities invited Israeli experts to visit them and advise on ways to increase agricultural reuse in their regions.
- Israel expressed interest in evaluating potable reuse opportunities and in sending a delegation to the United States as more domestic experience is established.
- Data generated from Israel's long-term use of treated wastewater for agricultural applications provides potentially useful information that could help inform future risk assessments.
- State delegates were interested in how Israel integrated emergency water supply planning and equipment to better prepare for and respond to a water supply disruption. For example, Meniv Rishon Water Corporation's emergency reserve includes equipment and procedures for rapid regional distribution of fresh water from the supplier to nearly 300,000 residents. Equipment includes large-volume portable containers (2,000 and 5,000 liters) for regional allocation of water and one-gallon containers for end users. Under a detailed procedure, a water distribution station can be set up within 20 minutes, and one small warehouse can store equipment supplying about 80 distribution stations.



From left: State representatives from Texas, Oklahoma, and Maryland with EPA at the Sorek Desalination Plant.
Photo: Delegation member.

Closing Thoughts

Over five days, the U.S. delegation of 39 water leaders met with more than 150 Israeli experts and visited some of the premier sites illustrating Israel's water history and continuing journey. The delegation gathered valuable knowledge to bring back to the United States and forged stronger relationships within the delegation and with Israeli counterparts. As a direct result of the delegation, there is now an active online network of delegates and Israeli experts to continue the conversation and promote collaborative approaches to tackling future water and food security challenges in the US and abroad. Finally, Israel and the United States are now proposing a regional mission under the auspices of the Negev Forum Working Group on Food and Water Security.



Attachment 1: Israel Delegation Agenda

Saturday (October 29)

- Arrive in Tel Aviv.
- Delegates' introductory meeting.

Sunday (October 30; Jerusalem)

Welcome Remarks

Jerusalem, Generi Building

- Ministry of Environmental Protection
- Ministry of Economy and Industry
- Israeli Water Authority
- U.S. Environmental Protection Agency
- WaterReuse Association

Water Policy and Strategy

Meetings with:

- Israeli Water Authority: the use of effluent and treated water within the Integrated Water Resources Management national strategy.
- Ministry of Environmental Protection: environmental aspects of the use of effluent and treated water.
- Ministry of Health: sanitary and health aspects of the use of effluent and treated water.

Jerusalem: Old City Tour

Site Visit: Sorek WWTP

Sorek WWTP uses an activated sludge method to treat 100,000 cubic meters of wastewater from the western drainage basin of Jerusalem daily. Due to its unique location in a narrow stream and the treated water discharging into the river (i.e., not directly to the agricultural supply systems), the facility demonstrates technological, planning, and operational challenges.

The site visit will include the following topics: the municipal wastewater collection system, the effluent treatment system, economics of wastewater treatment, the effect of social characteristics on the design and operation of wastewater collection systems (e.g., before weekends and on holidays), examination and use of advanced technologies in wastewater treatment, and upgrading and expanding infrastructures while maintaining operation.

Monday (October 31; Beit Dagan, Rishon LeZion, Tel Aviv)

Ministry of Agriculture and Rural Development

Agricultural Research Organization (ARO) Volcani Institute for Agricultural Research, Extension Service



Topics: scientific background for water reuse in agriculture; implementation of best practices of treated water in agriculture.

- Welcome notes from the Ministry of Agriculture and Rural Development's deputy director general, Ms. Irena Etinger Wainshtein.
- Introduction to the Volcani Center: Prof Uri Yermiyahu.
- Uses of marginal water for irrigation in Israel (e.g., saline water, effluent): Dr. Alon Ben-Gal.
- Scientific insights from the use of treated wastewater for irrigation: Dr. Shmuel Assouline.
- Precision agriculture and artificial intelligence: Dr. Victor Alchanatis.
- Questions, discussion, opportunities for cooperation, and summary.

Site Visit: Sorek Desalination Plant

The Sorek Desalination Plant is one of the largest desalination plants of its kind (reverse osmosis) in the world. It provides clean, potable water for over 1.5 million people (capacity: 624,000 cubic meters per day), comprising 20 percent of the municipal water demand in Israel.

The production is characterized by low salt concentration, which allows the plant, after municipal use, to treat and reuse the water for agriculture.

The facility was established using the build-operate-transfer project delivery method for a period of 25 years.

The Peres Center for Peace and Innovation

- The Israeli Innovation Center.
- Meetings with leading Israeli water technology providers (e.g., Israel Export Institute, WaterEdge.IL community); break out to group discussions regarding the following:
 - Digital water technologies and cybersecurity.
 - Decentralized systems: industrial, agriculture, municipal.
 - Advanced effluent treatment, distribution, and reuse.

Tuesday (November 1; Emek Hefer, Maayan Zvi)

Site Visit: Emek Hefer Water Reclamation Project

The Emek Hefer effluent plant is an agricultural cooperative association that provides effluent for irrigating agricultural crops. The effluent is discharged from the WWTP into a regional reservoir system that allows for balance between the rate of production at the WWTP and agricultural irrigation demands.

In addition to supplying effluent for agricultural irrigation, the facility also incorporates additional water sources, such as groundwater contaminated with nitrates and flood waters.

The Emek Hefer system is integrated with a regional system that can receive and transfer effluent to neighboring facilities to maximize the benefits of the effluent.



The discussion will focus on the engineering, organizational and general structure, water quality issues and regulations, interactions with neighboring regional systems, and integration of water systems and green energy generation systems.

Ein Shemer/I'ron WWTP

The Ein Shemer/I'ron WWTP treats wastewater from several rural towns and villages in the Menashe Regional Council. Tertiary treatment includes MBR and chlorination. The high level of treatment allows the water to be used to irrigate various crops.

In addition, sludge is mixed with clippings and goes through a process to neutralize pathogens, turning it into class-A compost fertilizer.

Pilot research and development (presentation):

- Demonstration of full-scale membrane active biofilm reactor (MABR) modules that provide high-quality secondary effluents with minimal energy requirements.
- Demonstration of pilot-scale and mesocosm reservoir configurations for removal of bacterial pathogens and antibiotic resistance genes from the MABR effluent.
- Demonstration of onsite lysimeters to evaluate the impact of treated wastewater irrigation on microbial and chemical parameters in soil, roots, and produce.

Quality monitoring (presentation):

- Demonstration of a wastewater intelligence solution that supports public health and the environment using wastewater data analysis.

Meetings with Water Technology Providers

Wednesday (November 2; Rishon Lezion, Kiryat Gat)

Site Visit: Shafdan Water Recycling Facility, the largest water recycling plant in Israel

- Aerated activated sludge and saturated aquifer treatment (SAT) as a model for extensive tertiary treatment for high-quality effluent.
- Aspects of managing insertion basins in the SAT method.
- Dealing with the utilization of the capacity of the SAT system and alternatives that will ensure similar quality.
- Transferring treated water and irrigating remote arid areas.
- Issues in sludge treatment and its suitability for use as a fertilizer and agricultural soil improver.
- Cooperation between local authorities to establish infrastructure for wastewater transmission and treatment.
- National wastewater reuse research and development center, selected technologies presentations.



Site Visit: Meniv Rishon, Rishon Lezion Water Corporation

The many facets of Meniv Rishon's water management: A hands-on tour spanning the core functions of water regulation, budgeting, and security; innovative, elegant water solutions for irrigation and recreation; and agile management in emergency scenarios.

Meniv Rishon is one of Israel's largest and most innovative water utility corporations. It has achieved the highest water self-sufficiency in Israel (approximately 50 percent), maintains a record-low 5 percent annual water loss rate, and has scored high on Israel Water Authority's crisis readiness assessment.

Site Visit: Intel Semiconductors Plant

Intel is one of the leading exporters in Israel's high-tech industry. The company began its operations in Israel in 1974 as the first research and development Intel site outside the United States, and in 1985 Intel opened its first manufacturing site outside the United States in Israel.

The semiconductor manufacturing process requires significant amounts of water for different uses. Intel views water as a critical component and invests effort in reducing and improving the water technologies used to treat the incoming water and its wastewater. During the visit to the Intel Lachish site in Kiryat Gat, we will present an overview of the manufacturing of semiconductors and the water and wastewater related aspects. The following topics will be addressed:

- Intel Israel and its vision regarding water use, water management methodology, and sustainability.
- Water use on site and innovation of water modeling.
- Water and chemical reduction projects.
- Wastewater treatment and recovery (MBR wastewater treatment and reverse osmosis system).
- Onsite (cooling towers, scrubbers, soft water) and offsite (agriculture) reuse of effluents.
- Piloting of new technologies to reduce the water consumption.

Summary Meeting

Thursday (November 3; Dead Sea and Its Surroundings)

Site Visits: Water Reuse for Agriculture and Gardening in an Arid Climate

Ein Bokek hotels WWTP and water reuse facilities and Ein Gedi date plantation

Ein Bokek is a secluded hotel complex located next to the Dead Sea. There is a dedicated WWTP for the complex; it deals with seasonality as the amount of wastewater treated correlates with the demand in hotels. The WWTP creates effluents of different qualities for two different systems. One is for irrigating the public garden in the hotel complex, and the other is an agricultural system of Kibbutz Ein Gedi for irrigating a palm grove on the Dead Sea shore.

Masada National Park tour

Closing Meeting

Monica Medina, U.S. Department of State Assistant Secretary of Bureau of Oceans and International Environmental and Scientific Affairs and Tamar Zandberg, Israeli Environmental Protection Minister.



Attachment 2: U.S. Participant List

- Brad Coffey, Group Manager, Water Resource Management, Metropolitan Water District of South Carolina
- Charles Bott, Director of Water Technology and Research, Hampton Roads Sanitation District
- Clinton Williams, Soil Physics/Soil Chemistry, USDA
- David Pedersen, General Manager, Las Virgenes Municipal Water District
- Erika Crespo, Assistant Deputy Director, Water Quality Division, Texas Commission on Environmental Quality
- Erin Messner, Program Manager, American Water Works Association
- Eva Steinle-Darling, Water Reuse Technical Practice Director, Carollo Engineers
- Getachew Melsew, Senior Manager, Planning, DC Water
- Gloria Gray, Chairwoman, Metropolitan Water District of Southern California
- Heather Dyer, Chief Executive Officer (CEO) and General Manager, San Bernadino Valley Municipal Water District
- Hunter Adams, Environmental Laboratory Supervisor, City of Wichita Falls, Cypress Environmental Laboratory
- James Dobrowolski, National Program Leader at USDA National Institute of Food and Agriculture
- Jamie Safulko, Deputy Director, Engineering, South Platte Renew
- Jay Garland, Senior Research Scientist, U.S. EPA Office of Research and Development, Center for Environmental Solutions and Emergency Response
- Jay Lewitt, Board President, Las Virgenes Municipal Water District
- John Kmiec, Director, Tuscon Water, City of Tucson
- Jonathan Leiman, Maryland Department of the Environment Water Quality Modeling Division/Water & Science Administration
- Ken Ashford, Principal Public Affairs Representative, Metropolitan Water District of Southern California
- Kobe Nagar, CEO, 374 Water
- Marc Battle, Chief Legal and Ethics Officer and EVP, Government and Legal Affairs, DC Water
- Mark Kasman, Director, U.S. EPA Office of International Affairs, Office of International and Tribal Affairs
- Matthew Sigler, PMG Executive Director, International Code Council
- May Wu, Principal Environmental System Scientist, U.S. Department of Energy, Argonne National Laboratory
- Michael Boso, Chief Building and Zoning Official, Grove City Division of Building



- Nancy Sutley, Senior Assistant General Manager of External and Regulatory Affairs and Chief Sustainability Officer, Los Angeles Department of Water and Power
- Patricia Sinicropi, Executive Director, WateReuse Association
- Paulina Martinez-Perez, Director, Sweetwater Authority
- Pinar Balci, Assistant Commissioner, Bureau of Sustainability, New York City Department of Environmental Protection
- Professor Daniel Yeh, Department of Civil and Environmental Engineering, University of South Florida
- Raj Chavan, Vice President, Senior Product Director for Water and Technical Solutions, Atkins Global
- Randy Lee, Director of Operations and Maintenance, Inland Empire Utilities Agency
- Rodney Snyder, Senior Agriculture Advisor to the Administrator, U.S. EPA Office of the Administrator
- Salvador Lopez Cordova, Chief Environmental Officer, North American Development Bank
- Sharon Nappier, National Program Leader for Water Reuse, U.S. EPA Office of Water
- Shellie Chard, Director, Water Quality Division, Oklahoma Department of Environmental Quality
- Stephen Katz, Market Development Manager, Veolia Water Technologies & Solutions
- Steven Bieber, Water Resources Program Director, Metropolitan Washington Council of Governments
- Terry Merrell, Chief Financial Officer, Merrell Bros. Inc.
- Timeyin Dafeta, Hyperion Executive Plant Manager, LA Sanitation and Environment



Attachment 3: Israeli Organizers and Hosts

Organizing Partners and Points of Contact

- Ministry of Economy and Industry, Foreign Trade Administration, Embassy of Israel to the United States: Omer Bab, Director of Trade and Regulatory Policy
- Ministry of Environmental Protection: Adam Schalimtzek, Head of the International Relations Division
- Israel Water Authority: Danny Greenwald, Senior Deputy Director General for Regulation
- Ministry of Agriculture and Rural Development: Smadar Moisa, Director of Projects at the Center for Foreign Trade and International Cooperation
- Agricultural Research Organization (ARO): Professor Uri Yermiyahu, Interim Head of ARO Volcani Institute; Dr. Shmuel Assouline, Senior Researcher in the Department of Environmental Physics and Irrigation, Institute of Soil, Water and Environmental Sciences; Dr. Eddie Cytryn, Environmental Microbiologist, Institute for Soil, Water, and Environmental Sciences
- Ministry of Health, Environmental Health Department: David Weinberg, National Planning and Treated Effluent Reuse Manager
- Israel Export Institute: Raphaële Moog, Head of Water Sector
- WaterEdge.IL: Ravid Levi, Senior Director

Additional Site Visit Hosts and Points of Contact

- Sorek WWTP: Amos Kalagy, CEO, Jerusalem Wastewater Purification Enterprises Company (Mavti)
- Sorek Desalination Plant: Semion Brover, CEO, Sorek Operation and Maintenance Company; Uri Schor, Head of Education and Information, Israel Water Authority
- Emek Hefer Water Reclamation Project: Tzvika Garber, CEO
- I'ron WWTP: Ezra Sidransky, CEO, the Economical Company for the Development of M.A. Menashe
- Shafdan Water Recycling Facility: Hadas (Raanan) Raanan Kiperwas, Researcher, Effluent Treatment and Reuse, Mekorot, Israel's National Water Company
- Meniv Rishon Water Corporation: Sally Levy, CEO
- Intel Semiconductors Plant: Yotvat Bar-El, Environmental Engineering and Site Infrastructure Lead, F28, Intel; Galit Levy, Regulation and Policy Manager, Government Affairs, Intel Israel
- Ein Bokek hotels WWTP and Water Reuse: Shimon Lavi; Tal Yogev; Zohar Schwartzman; Uria Yeshurun
- Ein Gedi date plantation: Yehuda Roth; Alon Shahal
- Masada National Park: Simon Nemtzov, Head of International Relations, Israel Nature and Parks Authority

