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SUCCESS STORY

Sahab Factory Improves Production, Saves Resources, and Investigates Solar Initiative

Changes in production settings and investment in new equipment cut maintenance costs.

Improved maintenance of the HVAC system achieved savings.

"This USAID pollution prevention assistance opened our eyes to available opportunities to improve our old production lines, enhance our operation and all the while reduce consumption of resources and maintenance costs," concluded the Managing Director at ACPC.

The Arab Center for Pharmaceutical and Chemicals Industries (ACPC) facility in Jordan's King Abdullah II Industrial Park in Sahab has reduced its energy and water consumption by acting on USAID-recommended improvements. The Managing Director of the 25-worker facility estimates that renovation of two old production lines and adjustments to operating settings have reduced maintenance costs by 40% while boosting the production rate by 17%.

ACPC made the investment to implement these improvements and will adopt the same configurations for dipping and cutting settings on two new production machines to be installed soon.

ACPC achieved additional significant savings in electricity consumption and water usage by installing energy-efficient lighting, purchasing energy efficient chillers, implementing improved maintenance of boilers, steam lines, and compressed air networks, and installing water-saving devices in restrooms and production areas.

The company is also investigating financial options to install a solar thermal system to pre-heat make-up water for its steam boiler system used in certain stages of the process, as well as for product drying. The use of a solar thermal system would reduce diesel consumption by an estimated 11,300 liters per year, which is equivalent to a reduction of CO_2 emissions by over 30,000 kilograms per year.

The Arab Center for Pharmaceutical and Chemicals Industries (ACPC) facility in Jordan's King Abdullah II Industrial Park in Sahab is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

Water Conservation Measures Save Resources and Reduce Costs for ADFICO

New water meters pinpointed inefficiencies.

With USAID assistance, this production line was reactivated.

Eng. Marwan Abed Salam, ADFICO Plant Manager, said: "With USAID's assistance, we controlled water and material consumption, thus improving our competitiveness in the market."

Arabian Development for Food Industries Co. (ADFICO) expects to save money, reduce its carbon footprint, and use less fuel by making operational changes suggested in a USAID-funded pollution prevention assessment. The main changes were to add sub-metering for water and wastewater lines and to upgrade thermal insulation for boilers.

Located in the Amman-Zarqa Free Zone in Jordan, ADFICO produces canned food products such as tomato paste and juice. Its operations include mixing, processing, pasteurization, filling, and packing. Water and energy are major resources.

Providing sub-meters for the water and wastewater lines allowed the company to pinpoint inefficiencies. By sub-metering only certain connections on the main production line, the facility was able to make adjustments that saved materials and workers' time.

Eng. Marwan Abed Salam, ADFICO's Plant Manager, estimates that the savings in resources could translate into 36,000 JOD/year during full operation. The number of lab tests needed to control the batches' specifications has also been reduced.

Other changes include outsourcing boiler maintenance and calibration and installing the proper thermal insulation to reduce the dissipated heat of the steam valves. As a result, ADFICO has been able to reduce its consumption of diesel fuel by around 5,500 liters annually, which reduces CO_2-equivalent emissions by an estimated 14,800 kg/yr.

ADFICO is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for options were also analyzed.

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SUCCESS STORY

Al-Baha Chlorine Plant Shows Environmental Investments Boost Economic Performance

Multiple initiatives reduce environmental impact while increasing profits.

Al-Baha's new line converts liquid sodium hydroxide into solid flakes.

Al-Baha's new boiler runs on hydrogen gas.

The Al-Baha Company for Caustic Chlorine facility in Jordan's Al Hallabat Industrial Park is saving 293,000 JOD each year by cutting its water, fuel and energy consumption. The company has made multiple investments to improve environmental performance and reduce its carbon footprint:

- New equipment to create sodium hydroxide flakes uses 36,000 m^3 less water per year, saving 46,800 JOD annually
- New hydrogen boiler uses 400 metric tons less heavy fuel oil per year, saving 250,000 JOD annually
- Installing variable frequency drives cut electricity consumption by 75,600 kWh/year, and is saving 7,000 JOD in the first year alone
- Materials handling improvements reduced the risk of chemical spills and generated a profit of 40,000 JOD

Sodium hydroxide flakes. Encouraged by USAID's Water Reuse and Environmental Conservation Project, company management made a significant investment in a new line for converting liquid sodium hydroxide product into solid flakes, which saved about 40% of the water previously wasted with the product – water that can now be used for other operations. This improvement was largely responsible for reducing water usage by 36,000 m^3 per year, which translates into 46,800 JOD cash savings in the first year alone.

Hydrogen boiler. The facility installed a new hydrogen combustion boiler, which reduces heavy fuel oil use by 400 metric tons per year and reduces annual CO2 emissions by over 1.2 million kg. The boiler uses gas previously vented as a waste product from the facility's chlorine production line, reducing greenhouse gas emissions.

Plant Manager Dr. Al-Janabi commented: "We thought we could improve our systems, but it's hard to make a business case for change until you have the hard data to back up your hunch. With assistance from USAID, we were able to cost the installation of a new hydrogen boiler and estimate savings of 250,000 JOD per year due to reduced fuel and maintenance costs. We saw how to change our steam heating system in ways that improve performance, both environmental and economic."

Plant staff examine new VFDs for cooling towers.

The new storage system at the Al-Baha warehouse reduces risk of spills.

Variable frequency drives. Electricity usage is also down following management's decision to invest in variable frequency drives (VFDs) on large cooling fans. The company projects that the drives will cut its annual electricity consumption by approximately 75,600 kWh, which equates to a reduction of about 40,000 kg per year in CO_2-equivalent emissions.

"We expect to save approximately 7,000 JOD in electricity costs for the first year," says Eng. Ravinder Arora, the facility's Deputy General Manager. Furthermore, he notes that these savings will likely increase over time. "When the electricity tariff increases in 2015, the savings will be closer to 12,000 JOD for the year."

Sub-metering. Management's decision to install numerous water sub-meters throughout the plant defined and located water use more specifically within any given process and this identified further water-saving options.

Dr. Khazal Al-Janabi noted that the meters had opened up "many opportunities for water saving and better water management practices. Water balance is better established at the facility, to track water-in-product and wastewater quantities for each process."

Materials handling. Finally, applying best practices in materials handling proved to be a relatively easy and cost-effective improvement. A new computer-based system stores and tracks inventory items. Only items to be used are stored, so 40,000 JOD revenue was generated through the sale of unwanted spare parts, and future waste generation from this area is expected to be minimal. The reorganization also helped reduce the risk of chemical spills and the consequent need for cleanups.

The Al-Baha Company for Caustic Chlorine in Jordan's Hallabat Industrial Park is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

Al-Baha Chlorine Plant Improves Energy Efficiency with Variable Frequency Drives

Industrial facility reduces electricity costs for cooling tower operations.

Plant staff examine new VFDs for cooling towers.

Eng. Ravinder Arora (the facility's Deputy General Manager) notes that his company already knew it could improve facility systems, but found it hard to quantify expected benefits.

"With the project's assistance," he continues, "we were able to see the benefits (both financially and environmentally) of installing VFDs and make an informed decision to move forward."

The Al-Baha Company for Caustic Chlorine facility in Jordan's Al Hallabat Industrial Park has reduced both its energy costs and its carbon footprint by installing variable frequency drives (VFDs) on cooling fans, as suggested in a USAID-sponsored assessment.

The assessment recommended a variety of options for saving water and energy. Installing VFDs on the cooling tower fans stood out as having a relatively short payback period and generating significant long-term savings.

Al-Baha invested in two VFDs for two large fans (15kW each) for the on-site cooling towers. Each VFD cost 8,000 JOD. The price included a control unit and feedback thermo-sensor. The company projects that it will reduce its annual electricity consumption by approximately 75,600 kWh, which equates to a reduction of about 39,000 kg per year in CO_2-equivalent emissions.

"We expect to save approximately 7,000 JOD in electricity costs for the first year," says Eng. Ravinder Arora, the facility's Deputy General Manager. Furthermore, he notes that these savings will likely increase over time. "When the electricity tariff increases in 2015, the savings will be closer to 12,000 JOD for the year."

Eng. Arora concludes: "Now that the installation is complete for the cooling tower fan motors and we are realizing actual savings, we are considering the installation of VFDs on other equipment as well."

The Al-Baha Company for Caustic Chlorine in Jordan's Hallabat Industrial Park is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

Al-Baha Chlorine Plant Installs Hydrogen Combustion Boiler – First in Jordan!

Installing hydrogen boiler reduces heavy fuel oil consumption and CO_2 emissions.

Al-Baha's new boiler runs on hydrogen gas.

Eng. Mofeed Al-Gaood, CEO of Al-Baha Company, says that USAID assistance helped Al-Baha take a waste by-product from the chlorine manufacturing process and use it as a fuel: "Our old steam boiler was oversized, costly, and inefficient. Now, we have a steam production system using modern, highly efficient equipment."

By using hydrogen gas by-product as a fuel source on site, the Al-Baha Company for Caustic Chlorine facility in Jordan is reducing its consumption of heavy fuel oil by 400 metric tons a year. This will both save money and reduce carbon dioxide (CO_2) equivalent emissions by over 1 million kg/yr.

Al-Baha has acted on several pollution prevention suggestions made in a recent USAID-sponsored assessment. This one in particular will pay back the investment quickly. Installation of a new hydrogen combustion boiler (the first in Jordan) will significantly reduce usage of an older, over-sized fuel oil boiler and thus reduce overall consumption of heavy fuel oil by almost 400 metric tons per year. This will cut CO_2 equivalent emissions by an estimated 1,267,000 kg/yr. Additional environmental benefits will also achieved by reducing diesel fuel emissions, since there will be less transportation of water to the site via tankers.

The new boiler runs on hydrogen gas, previously vented to the atmosphere as a waste by-product from the facility's chlorine production line. This new use of the hydrogen thus reduces greenhouse gas emissions.

Plant Manager Dr. Khazal Al-Janabi, who manages the approximately 150 workers at the facility, says: "We thought we could improve our systems, but it's hard to make a business case for change until you have the hard data to back up your hunch. With assistance from USAID, we were able to cost the installation of a new hydrogen boiler and estimate savings of 250,000 JOD per year due to reduced fuel and maintenance costs. We saw how to change our steam heating system in ways that improve performance, both environmental and economic."

Al-Baha, located in Jordan's Hallabat Industrial Park, is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for options were also analyzed.

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SUCCESS STORY

Improved Materials Handling Reaps Multiple Benefits for Al-Baha Chlorine Plant

Industrial facility stores and tracks supplies more efficiently.

The new storage system at the Al-Baha warehouse reduces risk of spills.

Eng. Mofeed Al-Gaood, the CEO of Al-Baha Company, is happy that valuable space has been freed up and that unwanted parts and equipment have been sold for a profit.

Applying best practices in materials handling proved to be a relatively easy and cost-effective improvement for the Al-Baha Company for Caustic Chlorine in Jordan's Hallabat Industrial Park. Aside from generating revenue through the sale of unwanted spare parts, the reorganization helped reduce the risk of chemical spills and the consequent need for cleanups.

Eng. Ravinder Arora, the Deputy General Technical Manager who supervises approximately 150 workers at the facility, notes: "We knew we could improve our systems, but it's hard to prioritize the possible actions to take. With assistance from USAID's Water Reuse and Environmental Conservation Project, we were able to see the benefits of re-organizing our storage area. In the end, we not only improved our efficiency and housekeeping, but also made a profit of 40,000 JOD along the way."

The Al-Baha Company's material storage system now uses a new computer-based system to store and track inventory items. Only items to be used are stored, so future waste generation from this area is expected to be minimal.

"We organized the storage area according to the type of material and logged the items and their locations into the computer. Through this better management of the chemicals stored on site, we also reduced the risk of chemical spills and cleanups," concluded Eng. Arora.

Al-Baha is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

Al-Baha Chlorine Plant Conserves Water in Production of Sodium Hydroxide

Industrial facility reduces water consumption by dewatering NaOH

Al-Baha's new line converts liquid sodium hydroxide into solid flakes.

Eng. Mofeed Al-Gaood, CEO of Al-Baha Company, says that USAID assistance helped the facility look at ways to reduce water consumption and improve operations at the same time.

"By removing the water from the sodium hydroxide product, we not only saved money, but also improved operations and added 25 new jobs!"

The investment in equipment to dewater sodium hydroxide (NaOH) was significant, but it has allowed the Al-Baha Company for Caustic Chlorine plant in Jordan to cut its on-site water use by 40% (36,000 m^3 per year) and to generate 40% less wastewater (a reduction of 4,000 m^3 per year).

The facility had already made several other less costly improvements recommended by a USAID-sponsored assessment. Eng. Ravinder Arora, the Deputy General Technical Manager, says: "We saw the savings and pollution prevention results from other improvements recommended by the USAID team, so it helped us move forward on this water-saving change."

The company developed a new line for converting a liquid sodium hydroxide product into solid flakes. This reduced the required storage area and transportation problem. Moreover, it saved 40% of the water that was previously wasted with the product, which can now be reused for other operations.

Eng. Arora manages the approximately 150 workers at the facility. He notes that the change represents a significant investment. "However," he adds, "we expect to save about 46,800 JOD in the first year from this one improvement. In the end, we reduce our environmental impact, we make more money, and consumers benefit."

The Al- Baha Company in Jordan's Al Hallabat Industrial Park is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

Al-Baha Chlorine Plant Significantly Reduces Water Usage and Costs

Modest investment in water sub-meters helps pinpoint areas of greatest potential savings.

Sub-meters were installed throughout the plant.

The facility will cut its use of water by almost 40% (equal to approximately 36,000 m^3 per year, based on 2012 water consumption rates) and significantly reduce wastewater generation.

The Al-Baha Company for Caustic Chlorine Industry facility, located in Jordan's Al Hallabat Industrial Park, made a fairly small initial investment that has yielded great results. Installing 10 water meters throughout the plant allowed Al-Baha to tell how much water is used in different parts of the manufacturing process and thus identify water-saving options with particularly high potential for savings.

The sub-metered areas are monitored by the quality department and the information is recorded regularly. These meters cost about 3,000 JOD, including parts and installation, as well as operations' stop-time cost. Manager Dr. Khazal Al-Janabi noted that the meters had opened up "many opportunities for water saving and better water management practices. Water balance is better established at the facility, to track water-in-product and wastewater quantities for each process."

For example, the sub-meters revealed that the facility was consuming a significant amount of water in the daily washing down of equipment. This daily washing was necessary because the water brought in via tankers was of poor quality. The facility management team therefore decided to install a reverse osmosis (RO) system at the facility-owned water well. The higher quality water from the RO system could then be used for all the facility's industrial water needs, so flushing and washing were required only weekly or biweekly rather than daily.

Additional environmental benefits were also achieved by reducing diesel fuel emissions, since there was less need to transport water to the site via tankers.

Al-Baha Company for Caustic Chlorine Industry is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

Al-Thuraiya Reduces Water and Energy Use Through Operational Improvements

Pollution prevention yields 630,000 JOD in annual savings for poultry facility.

Dr. Wisam tests treated water at the facility.

Dr. Wisam (R&D Manager) of Al-Thuraiya commented, "The changes made with USAID's assistance have helped us to reduce our environmental impact and costs, while providing excellent products that can be sold at an affordable price."

By making operational improvements suggested in a USAID assessment, the Al-Thuraiya Poultry facility in Mafraq, Jordan, expects to save 630,000 JOD annually.

The plant employs 244 workers and produces whole chickens, cut-up parts, and other poultry products. The products are sold locally and exported to regional markets.

Al-Thuraiya has significantly reduced its water consumption by optimizing operational and maintenance processes. These improvements to the reverse osmosis (RO) system will cut fresh water use by 198,000 m^3/year, which will reduce wastewater processing by nearly one-third. Expected savings from these water improvements total 405,000 JOD/year.

Energy-saving measures were also implemented at the facility, reducing electricity use by nearly one-third (i.e., 2,770,000 kWh/year) and diesel consumption by 6,700 liters/year:

- Increased production speed to reduce the average kWh needed to process each bird
- Increased Power Factor (added new panels)
- Installed harmonics filters for inverters
- Trained operators on refrigeration plant efficiencies
- Improved insulation on cooling system doors/pipes
- Installed controls for internal and external lighting

Expected savings from these energy improvements total 225,000 JOD/year.

Research and Development Manager Dr. Wisam expects these environmentally friendly changes to increase the facility's competitive edge in the local and regional markets. "We can increase the money we make," he said, "and provide a greater benefit to customers."

The Al-Thuraiya Poultry facility is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for options were also analyzed.

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SUCCESS STORY

Arab Aluminum Industries Co. Ltd (ARAL) Conserves Water and Energy

Facility reduces wastewater treatment costs by 30%.

Boiler pipes are now insulated.

ARAL Plant Manager Eng. Ramzi Abu Surour said, "USAID's assistance helped us use less diesel fuel and less water, thus reducing wastewater treatment costs. We are thrilled to see the substantial impacts to our bottom line!"

By investing in pollution prevention improvements, Arab Aluminum Industries Co. Ltd (ARAL) in Ein Al Basha, Amman achieved a 30% reduction in both diesel consumption and wastewater treatment costs.

Established in 1976 and employing approximately 270 workers, the facility produces aluminum profiles. Its operations include extrusion, anodizing, powder coating and decoration. Water and energy are major resources.

ARAL had worked with USAID to prepare a pollution prevention plan. One suggestion was to service and/or replace the facility's three steam boilers, to increase efficiency. ARAL replaced two 3.2-ton steam boilers with two 1.5-ton steam boilers and removed a third boiler from service. Annual consumption of diesel fuel has fallen by more than 249,000 liters.

Other suggested changes to the management and use of chemicals in the factory's process (including reducing drag-out) will save 5 m^3 of water for each ton of product produced. This in turn reduces the amount of sludge waste generated and reduces wastewater treatment costs by 30%.

ARAL plans to follow up these improvements with a monitoring process, looking at water balances and water demand management in its facility. With detailed unit-specific usage data, the facility will be able to target areas where the most significant improvement and savings can be gained. Plant Manager Eng. Ramzi Abu Surour concludes: "With USAID's assistance, we have achieved the drive and momentum to renovate and improve our operations and the units used in our processes."

Arab Aluminum Industries Co. Ltd (ARAL) in Ein Al Basha, Amman, is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for options were also analyzed.

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SUCCESS STORY

Hijazi & Ghosheh Gains Competitive Edge by Reducing Environmental Impact

Facility reduces material losses and uses less water.

Using a water gun during cleaning reduced water consumption.

ENG. Mohammed Taysir, H&G's Quality Manager, comments: "The changes made with USAID's assistance have reduced both our environmental impact and our costs. We can increase the money we make and provide a greater benefit to consumers."

The Hijazi & Ghosheh (H&G) facility in Amman, Jordan, has reduced its water, diesel, and electricity bills by making pollution prevention improvements. The changes will save nearly 15,000 JOD/year.

Established in 1991, the plant employs 250 workers. Its meat products and pastries are sold locally and exported to regional and international markets.

USAID Water Reuse and Environmental Conservation Project showed how H&G could reduce losses of raw materials by improving equipment maintenance. H&G went a step further by purchasing new machines (using clean technology) worth 300,000 JOD. The company estimates that this investment will be paid back in 24 months. The new machines also reduced demand for operators' time by 50%, allowing for reallocation of staff to other parts of the facility.

H&G has also significantly reduced water consumption by optimizing cleaning and maintenance processes (including steam network repairs and cooling tower maintenance) and reducing the amount of water used in some process areas. These changes will save about 10,000 m^3 of fresh water as well as 7,000 liters of diesel fuel and 96,000 kWh/year of electricity, resulting in a potential savings of nearly 15,000 JOD/year. Such changes are expected to increase the facility's competitive edge in both local and regional markets.

Eng. Mohammed Taysir, QAQC manager at H&G, noted that the company had always tried to be environmentally responsible, but "with USAID's assistance, we found new ways to manage our resource and materials use."

The Hijazi & Ghosheh (H&G) facility in Marka Al Shamalieh, Amman, is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for options were also analyzed.

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SUCCESS STORY

ISBCO Credits Teamwork for Savings in Water, Energy, and Materials

Changes in energy consumption, water use, and material handling save ISBCO 125,000 JOD/year.

Eng. Elyas Elnajmeh with a compression gas analyzer to measure emissions of CO_2.

Eng. Elyas Elnajmeh (pictured above with a newly purchased portable combustion and emissions analyzer), oversees 120 workers at the facility. "Together as a team," he says, "we have accomplished huge savings."

The International Storage Battery Company (ISBCO) facility, in Jordan's Abdullah II Ibn Al-Hussein Industrial Estate at Sahab, made several improvements recommended in a USAID pollution prevention assessment. As a result, ISBCO:

- Reduced electricity consumption by 1.2 million kWh/year for a savings of 82,000 JOD
- Reduced carbon dioxide (CO_2) equivalent emissions by 650,000 kg/year
- Reduced water consumption by 22 m^3 each working day
- Saves a total of 125,000 JOD/year

The electricity consumption was reduced by means of energy efficiency and systems upgrading measures, which in turn reduced the carbon dioxide (CO_2) equivalent emissions.

ISBCO implemented a water conservation measure that the USAID assessment showed would have a payback period of less than a year. ISBCO now saves approximately 9,500 JOD/year in water use and wastewater discharge costs.

ISBCO was able to save another 37,000 JOD/year by improving their handling of materials, including both raw material and production waste. They improved the ways they handle lead resources, dross and dust piles, and the pasted grids used to manufacture batteries. They also improved the lead oxidation process and reduced indoor air emissions.

Eng. Elyas Elnajmeh, the Factory Director, appreciated the way that USAID assistance helped ISBCO look closely at energy, water, material handling and waste management. "With assistance from USAID's Water Reuse and Environmental Conservation Project," he says, "we saved water, energy and material resources at our facility."

The ISBCO facility is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

Jordan Potato & Corn Chips Co. Improves Production, Reduces Environmental Impact

Operational changes reduce waste and conserve resources.

Replacing 400W light fixtures with 250W fixtures saved energy.

Eng. Imad Haddad, Engineering & Technical Manager of Jordan Potato & Corn Chips Co., says that the USAID program stimulated the factory to take a more focused look at pollution prevention: "After working with USAID, our improved Pollution Prevention Program has made our factory more oriented towards energy, water and raw materials savings, and helped us with our production benchmarking."

Jordan Potato & Corn Chips Co., which owns the "Mr. Chips" brand, has lowered its consumption of electricity, water, and diesel fuel and reduced the amount of waste it generates.

Changes made at the company's facility in Al Zarqa include:

- Insulating steam lines
- Cleaning and calibrating boilers
- Installing more energy-efficient equipment
- Managing equipment settings to achieve more efficient operations
- Improving procedures to minimize water use
- Improving procedures to generate less solid waste and waste water
- Installing guards and equipment to minimize product losses

Eng. Tareq Abu Jaber, Plant Manager, oversees more than 300 workers operating several different production lines at the facility. He comments: "Encouraged by discussions with USAID's Water Reuse and Environmental Conservation Project, we were able to adjust our operating settings and enhance performance. The measures have lowered electrical consumption by 8%, diesel consumption by 3%, and water consumption by 4%, while at the same time reducing waste by 7%."

Jordan Potato & Corn Chips Co. is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

Water and Energy Conservation Reduce Costs for Kemapco®

Energy and water changes alone saved 180,000 JOD per year

Ion exchange unit at KEMAPCO has been improved to reduce water consumption.

Once Kemapco started thinking of ways to reduce waste, the operational expertise of the facility staff allowed them to identify more and more opportunities. Even small reductions in overall use of a given fuel or resource had considerable financial impacts – and helped improve the environment.

Arab Fertilizers & Chemicals Industries Ltd. (Kemapco®) has made several operational changes that lower energy consumption and prevent pollution at its fertilizer and animal feed additive production facility in the South Industrial Zone in Aqaba, Jordan. As a result, the company achieved the following reductions in 2014:

- Electricity consumption: 1,250,000 kWh
- Heavy Fuel Oil consumption: 13 metric tons
- Water consumption: 48,000 m^3

The financial and environmental impacts are significant, with annual savings amounting to approximately 180,000 JOD.

The 126,000 m^2 plant has 230 employees and produces Potassium Nitrate (NOP) fertilizer and Dicalcium Phosphate (DCP) animal feed additive. It also produces Nitric Acid for its own consumption.

Eng. Ramzi Sinnokrot, Technical Sector Manager, appreciated the way that the USAID Water Reuse and Environmental Conservation Project motivated Kemapco® to look closely at energy, water, material handling, and waste management. He commented: "The pollution prevention program with USAID has helped us to focus more on the available opportunities and save more of our resources."

Kemapco® is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

MOBEDCO Finds Conservation Measures Increase Profitability

Pollution prevention measures reduce water use, odors, and emissions .

Improved maintenance on this boiler saved energy.

Dr. Mohammad Owais, General Manager of MOBEDCO commented, "Working with the USAID program has helped us to reduce our environmental impact and costs, and become more competitive in the market."

The Arab Pesticides and Veterinary Drugs Mfg Co. (MOBEDCO) produces agricultural pesticides and veterinary medicines in its facility at the Al Hassan Industrial Estate in Irbid, Jordan. MOBEDCO has achieved great results by implementing pollution prevention measures suggested by a USAID project – and by developing some of its own.

The company has saved more than 12,600 JOD in the first year alone from:

- Retrofitting lights to LED
- Installing a power factor correction unit (PFCU)
- Optimizing the compressed air and chilled water networks on site

Water consumption was also reduced by:

- Installing sub-meters at some units to calculate the water balance
- Installing water-saving faucets
- Re-using reject water from the deionized (DI) water system

MOBEDCO also made significant reductions in materials consumption by:

- Upgrading its storage system
- Providing awareness training for its workers

These changes not only saved the company money, but also reduced odors, air pollutant emissions, and the risk of spills, fires, and contamination.

MOBEDCO is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.

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SUCCESS STORY

National Chlorine Plant Improves Production with Membrane Technology and VFDs

Industrial facility installs energy-efficient equipment.

Energy-efficient membrane technology reduced costs.

In addition to saving energy, NCI is reducing its risk of environmental exposure; lowering fuel oil consumption by 58,000 liters per year; and reducing water consumption by 120 cubic meters per year.

Eng. Yosef Bader, Quality Manager, says: "It is very satisfying to tell my children our company is being environmentally responsible, helping Jordan's environment by reducing our electricity, fuel and water usage."

National Chlorine Industries (NCI) in Almowaqqar, Jordan, has made operational improvements that reduce its energy consumption and its carbon footprint – while increasing production.

Encouraged by discussions about reducing waste with the staff of USAID's Water Reuse and Environmental Conservation Project, NCI management embarked on a comprehensive internal audit of the facility. They determined that two improvements stood out in terms of combining environmental benefits and speedy payback of investment:

- Using energy-efficient production equipment, including new membrane technology
- Installing variable frequency drives (VFDs) and temperature sensors on cooling tower fans

By investing in these improvements, the NCI facility has increased its production and is reducing its consumption of electricity by approximately 9 megawatts per year. The majority of the savings are associated with the new membrane technology. However, the installation of VFDs and temperature sensors also reduced the energy consumption of the cooling towers by about 20%. Overall, these improvements reduce carbon dioxide (CO_2) equivalent emissions by an estimated 4,700 metric tons per year.

Maintenance Section Head Eng. Farid Talal says: "We have always tried to be environmentally responsible, and now we will be able to reduce our electricity consumption by 20% and achieve expected savings of 630,000 JOD per year." With the increase in the electricity tariff for 2015, the expected savings will be closer to 720,000 JOD.

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SUCCESS STORY

OMCE-Jordan Improves Safety and Saves Money by Reducing Hazardous Chemicals Use

Drum manufacturing plant reduces use of harmful solvents and improves operations.

Painting oven at OMCE-Jordan.

Dr. David Manneh, OMCE-Jordan Plant Manager, said, "With USAID's assistance, we accelerated the process of replacing solvent-based paint with water-based paint in our processes. USAID helped our facility make operational changes that significantly reduce gaseous emissions and protect workers' health."

By using a 50/50 water/solvent-based paint rather than solvent-based paint in its manufacturing process, OMCE-Jordan reduced gaseous emissions and achieved an annual savings of 23,000 JOD. Other operational changes have reduced the risk of human health exposure, environmental contamination, and fire.

Located in the Al-Hashimiyeh Industrial Zone in Zarqa, Jordan, OMCE-Jordan produces cylindrical drums, tapered drums and metal rings. Operations include metal cutting, rolling, welding, flanging, beading, seaming, painting, curing and marking.

In addition to the paint substitution, OMCE-Jordan has made several other changes recommended in a USAID-funded pollution prevention assessment of the factory's operations:

- Modified pressure settings on air compressor
- Repaired leaks from air compressor lines
- Improved the handling of paints and solvents in paint mixing room

The air compressor and compressor line changes will save an estimated 7,500 kWh/yr in electricity (approximately 500 JOD), which is equivalent to 4,000 kg of CO2 emissions. The handling modifications have reduced emissions, odors, and potential chemical exposure to workers, as well as the risk of fire and related environmental and human health consequences.

Cost savings from using the less expensive 50/50 water/solvent-based paint will increase if OMCE-Jordan begins producing water-based paint internally instead of purchasing it from suppliers.

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SUCCESS STORY

Air Compressor Replacement/Repair Saves Energy and Money for White Plastic

Facility makes operational changes that reduce costs.

Improved maintenance of air compressor and air system saves electricity.

Mr. Majed Al-Baghdadi, White Plastic Co. General Manager, commented, "Working with the USAID program has helped us to reduce raw material usage and cut down our bills."

By replacing two old air compressors with a new larger model with automatic operation, White Plastic Co. reduced its energy use significantly. This reduction is expected to save the company approximately 36,000 JOD in the first year alone.

White Plastic's electricity consumption is being reduced by approximately 500,000 kWh/year. This is equivalent to eliminating over 260,000 kilograms of CO_2 emissions.

Other changes included repairing leaks in the compressed air network. The facility also began collecting its used cartons and cardboard, and offered them for free to paper collection companies for recycling.

The changes had been recommended in a USAID-sponsored pollution prevention and environmental management assessment.

Established in 1973 in Amman, Jordan, the White Plastic Co. facility in Amman makes plastic cups, containers, trays and bowls, such as those used for yogurt, ice cream, soft drinks, and hot drinks. It employs 40 workers.

General Manager Mr. Majed Al-Baghdadi said, "Through USAID's program, we have gained additional knowledge that helped us to cut down our costs and reduce our usage of raw materials."

White Plastic Co. is one of 30 industrial partners working with USAID to reduce industrial pollution and conserve scarce water and energy resources – in ways that benefit the bottom line. The Water Reuse and Environmental Conservation Project examined water and energy use, material and waste flow, production processes, quality control, and other aspects of each facility's operations. The assessments suggested options for minimizing pollution and saving water, energy, and money. Costs and payback periods for various options were also analyzed.