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enviro news

Environmental Protection Department



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Environmental Protection Department

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Enviro Snaps 39



a message from

Omar S. Abdulhamid, EPD Manager

Saudi Aramco continues in its quest to reduce its environmental footprint by as much as possible, and this issue of *enviro news* provides a snapshot into some of our most recent success stories.

In this edition of the magazine, learn what you can do to protect coral reefs, and how Abqaiq Plants Operations Department utilizes automated tank cleaning processes to clean oil tanks instead of traditional manual methods. These methods allow the department to more efficiently clean tanks in a safe and cost-saving manner while recovering oil in the process.

Also, in this edition of *enviro news*, learn more about how the tools the Environmental Protection Department (EPD) uses to trace the source of foods entering our communities. Food safety is always a top concern. Outbreaks of disease in animals that

could be transmitted to humans, or the presence of chemicals above acceptable limits in feed and food, can threaten both the quality and safety of products. Food traceability is a risk-management tool that allows food business operators or authorities to withdraw or recall products that have been identified as unsafe.

To keep the lines of communication open and ensure seamless messaging, take a look at an article on EPD's Communities of Practice. Also learn more about indoor air quality and what our department does to ensure a healthy workplace.

Back in your home, find out if the honey you purchase has been doctored to cut costs. A simple test conducted in the kitchen can help you determine if your honey has been altered. Honey adulteration is the practice of mixing cane sugar or corn syrup into honey to make it cheaper

to produce. Some fraudulent honeys may contain glucose, dextrose, molasses, sugar syrup, invert sugar, flour, corn syrup, starch, or similar products other than floral nectar.

Also in this issue, EPD will inform readers of the importance of both protecting and enhancing biodiversity as well as the latest in waste management best practices and technology.

So it is my pleasure to share with you the latest issue of *enviro news*. As always, EPD wants to hear from you. If you wish to highlight your success, don't hesitate to contact us. EPD is eager to publish more items from proponents to share with the world steps taken to protect the environment and community health.

In the meantime, enjoy this issue of *enviro news*.



horizons

Where's the reef?

The Third International Year of the Reef invites you to protect a marine treasure: the coral reef



Diego Lozano-Cortés, EPD

Coral reefs are colorful underwater ecosystems that support a great variety of organisms (e.g., fish, corals, plants, etc.). They provide the world with seafood and economical resources from tourism venues like diving, thus providing a livelihood to many people around the world.

However, these brilliant-yet-fragile habitats have been disappearing across the globe due to climate change and constant impacts related to human activities such as trawling fishing and dredging. Trawlers use heavy-duty nets that are dragged over the seafloor while destroying the corals and the habitat they provide for other marine organisms. Similarly, coastal developments involving digging navigation channels often result in sediment suspension that ends up covering and burying the corals, which are unable to withstand the aftermath of dredging and die rapidly.

To face these threats to coral reefs and similar ecosystems such as mangroves and seagrasses, the International Coral Reef Initiative (ICRI), an informal partnership between governments and

organizations that strives to preserve coral reefs and related ecosystems around the world, launched the First International Year of the Reef (IYOR) in 1997.

That first IYOR was an extensive campaign aiming to increase awareness of the value of coral reefs and to support conservation efforts worldwide. During that first IYOR, more than 225 organizations in 50 countries participated, and over 700 articles in scientific journals and magazines were generated to raise public knowledge.

Ten years later, acknowledging that there was still a critical need to expand the understanding of coral reefs and stress the need to manage these endangered ecosystems, the ICRI designated 2008 as the Second International Year of the Reef.

This time around, the campaign saw initiatives from 65 countries aiming to motivate everyday citizens to take steps to protect coral reefs. Over 630 events were organized during this year, and diverse material published in several languages, including educational videos and children's books. As part of the IYOR 2008, the United Nations Environmental

Programme's (UNEP) Coral Reef Unit hosted an event during its Ninth Global Meeting of the Regional Seas Conventions and Action Plans in Jiddah, Saudi Arabia. This event highlighted the importance of coral reefs as source of food in the region as well as income and jobs for half a billion people around the world who make their living in seafood industries. As a result, on September 7, 2008, the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) used a cleanup event through its "Regional Marine Litter Programme" to create awareness within the Saudi Arabian diving community. Desert-Sea-Divers, a local diving center in Jiddah, organized the event in collaboration with the Professional Association of Diving Instructors' Project AWARE.

The Latest

Following a 2014-2016 coral global bleaching event¹, which was the most severe ever recorded to date, and in alignment with the Convention on Biological Diversity's² Aichi Target 1, which states that "by 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it

sustainably,” the International Coral Reef Initiative has declared 2018 as the Third International Year of the Reef.

According to the ICRI, degradation has escalated to the point that nowadays, coral reefs are considered to be one of the most threatened ecosystems on earth, and awareness of this serious matter among the general public and even the public sector is still insufficient to implement required policies. For these reasons, IYOR 2018 is aiming to³:

- Strengthen awareness globally about the value of, and threats to, coral reefs and associated ecosystems;
- Promote partnerships between governments, the private sector, academia, and civil society on the management of coral reefs;
- Identify and implement effective management strategies for conservation, increased resiliency, and sustainable use of these ecosystems and promoting best practices; and
- Share information on best practices in relation to sustainable coral reef management.

Saudi Arabia is a country blessed with coral reefs as well as mangroves and seagrass ecosystems along its Arabian Gulf and Red Sea coasts, and either as Saudi citizens or expats living in the Kingdom, it is your responsibility to protect these reefs and share your knowledge with your friends and family. To learn more, see the infographic below⁴:

 10 ways to protect Coral Reefs		 Educate yourself about coral reefs & the creatures they support. When you further your own education, you can help others understand the fragility and value of the world's coral reefs.
 Corals are already a gift. Don't give them as presents. It takes corals decades or longer to create reef structures, so leave them on the reef.	 Long-lasting light bulbs are a BRIGHT IDEA Energy efficient light bulbs reduce greenhouse gas emissions. Climate change is one of the leading threats to coral reef	 Be a marine debris crusader. In addition to picking up your own trash, carry away the trash that others have left behind.
 Choose sustainable seafood. Learn how to make smart seafood choices at: www.fishwatch.gov.	 If you dive Don't TOUCH. Coral reefs are alive. Stirred-up sediment can smother corals.	 Don't send chemicals into our waterways. Nutrients from excess fertilizer increases algae growth that blocks sunlight to corals.
 Conserve water The less water you use, the less runoff and wastewater that eventually find their ways back into the ocean.	 Volunteer! Volunteer in local beach or reef cleanups. If you don't live near the coast, get involved in protecting your watershed.	 Practice safe boating. Anchor in sandy areas away from coral and sea grasses so that the anchor and chain do not drag on nearby corals.

¹When corals are stressed by changes in conditions (especially temperature) they expel the symbiotic algae living in their tissues, causing them to turn completely white.

² The Convention on Biological Diversity is a multilateral treaty spun out of UNEP programs that aims cultivate national-level conservation and biodiversity protection strategies. (<https://www.cbd.int/>)

³ Source: <https://www.icriforum.org/about-icri/iyor>

⁴ Source: National Oceanic and Atmospheric Administration (<https://oceanservice.noaa.gov/facts/thingsyoucando.html>)

Efficiency lesson

How Abqaiq Plants cuts cost with automatic tank cleaning



Figure 1. Overview of T-2041 and ATC custom equipment. (Photo Source: Saudi Aramco)

Abdulla G. Alhamed and Othman K. Alarfaj, Abqaiq Plants Operations Department

Abqaiq Plants contains 13 floating roof crude oil tanks at Tank Farms ATF-1 and ATF-2. The main purpose of these tanks is to provide storage volume in case any limitations arise in downstream facilities. The crude oils stored in these tanks vary in composition, and physical properties are based on their crude types: Gas

Condensate, Arab Light, and Arab Extra Light. These tanks have a capacity of 180,000 bbl, with each operating at atmospheric conditions. Abqaiq Plants manages a program to maintain the integrity of these tanks by performing Testing and Inspection (T&I) every 10 years. However, due to the nature of crude oil, oily sludge

accumulates in tank bottoms over the years. Oily sludge generated from tank bottoms is one of the major waste management issues in the petroleum industry. Current practice is for the T&I team to move the sludge manually to land farms safely prior to starting inspection and fixing the tank's internal parts. This

Table 1. Advantages and disadvantages of traditional cleaning methods and ATC.

Traditional Manual Method		Automatic Tank Cleaning Method	
Benefits	Disadvantages	Benefits	Disadvantages
Low contract cost	Long duration of operations	Shortened duration of operations	High contract cost
Low skill level required	High risk to personal safety	Low risk to personal safety	
	Loss of valuable hydrocarbons	More than 95% of hydrocarbons recovered for resale	
	High cost for waste disposal	Reduced cost of residue disposal	
	Additional costs for waste transportation	Low environmental impact	
	High impact on the environment		



Figure 2. Air compressor Unit

method creates issues in terms of hazards, poses health and environmental issues, and results in loss of high hydrocarbons.

To address these matters, Abqaiq Plants recently utilized Automated Tank Cleaning (ATC) technology on tank T-2041 to clean oily sludge inside the tanks instead of the traditional manual method. ATC relies on advanced technology that can recover up to 95% of oil from the hydrocarbon sludge with zero hazardous material disposal. ATC is considered to be an effective solution when it comes to safety, economical, and environmental aspects. In term of safety, ATC does not require entry into the tank, which in return reduces risks involved in having personnel enter confined spaces in the presence of hydrocarbons.

ATC technology: How it works

The Automatic Tank Cleaning (ATC) is based on a closed loop principle utilizing clean oil from a secondary tank. Fresh oil from the delivery tank is heated via the ATC system to approximately 60° C and introduced at a pressure of around 90 psig via specially designed jet-washer nozzles into the tank via the roof legs, manhole covers, or other suitable openings. This oil under pressure agitates, fluidizes, dissolves and mixes the sludge into the oil, which is then recovered and pumped into the secondary adjacent tank, ensuring that maximum-valuable hydrocarbons are recovered and returned to the Company for reuse or resale, while water is discharged into the oily water sump for further processing. Afterwards, the tank is washed with hot water for further cleaning. As seen in Table 1, the benefits outweigh the disadvantages.

Cleaning methods comparison

Abqaiq Plants worked proactively to evaluate ATC technology performance by collecting required samples during different stages of process implementation. Mainly these samples were analyzed to identify the chemical properties in oily sludge as well as hydrocarbon compositions. These samples can support the judgment of the process's performance as well as recovered oily-sludge quality. Furthermore, sampling is necessary in each stage to protect Abqaiq Plants from receiving non-spec fluids. In addition, the exact transferring quantity is recorded through flow transmitters during lending and recovery. These quantities were recorded to measure the supplied oil from the Abqaiq Plants tank as well as the recovered oil to the tank. As per the results, the hydrocarbon content at the oily sludge fell from 85% to 4%. That means the ATC can claim success by extracting 81% of hydrocarbons from the sludge.

Table 2. Cost Comparison

	Manual Tank cleaning	ATC Technology
Cost of cleaning	\$ 193,000	\$ 450,000
Cost of disposal of waste outside plant	\$ 67,000 **	\$ 0
Down time	8 weeks	3 weeks
Revenue from oil recovered	0	\$ 227,171*
Net cost to Abqaiq	*\$ 260,000	*\$ 223,000

* Oil barrel (\$50.46).
** Based on T&I results from T-2050.



Figure 3: Inside T-2041 after completing the process

Cleaning/recovered oil transferring

The main part of the ATC process is utilizing clean crude oil in dissolving the oil sludge. Transferring quantities from T-2051 to T-2041 and vice versa are recorded with aid of connected flow meters. The total recovered oil from the oily sludge is 4,350 bbl.

Furthermore, the oily water is transferred to the 3-Phase Plant by utilizing a vacuum tanker. The total transferred amount is 200 m³. In the 3-Phase Plant, the recovered oil from oily water is sent back to Abqaiq Tank Farm. The total recovered oil in the 3-Phase Plant comes to 167.8 BBL. Moreover, by discharging the oily water into the 3-Phase Plant the environment is protected from any hydrocarbon impacting.



Oily sludge cleaning results

After completing the whole process, the tank manways were opened to complete the remaining T&I scope. In alignment to previous results, tank conditions were clean with no signs of sludge. (Figure 3.)

This means the technology succeeded in achieving Abqaiq’s aim to see no hazardous material removed after applying the ATC technology. It’s also important to mention the gas test conducted inside the tank T-2041 upon opening the manways found 0 for H₂S and LEL.

Cost Evaluation

Abqaiq Plants evaluated ATC's cost by comparing it with manual cleaning prior to deploying the technology. After the sludge-cleaning process was completed and when the recovered oily sludge was calculated, total revenue was assessed. A comparison run between the two cleaning methods pointed to obvious results favoring ATC technology, especially considering that ATC technology resulted in recovered oil that can be sold in the market. The recovered oil came to 4,502 bbl from a total of 5,300 bbl oily sludge. As a cost compression, the ATC is saving Abqaiq Plants \$37,000 per tank.

ATC technology cost

ATC technology cost Abqaiq Plants \$450,000 for deployment on tank T-2041. However, this cost should fall once a long-form contractor is established and signs on as an ATC technology vendor. The calculated revenue should total \$227,171. This can be compromised with initial ATC technology cost to end up with \$223,000.

Manual tank cleaning

The conventional manual tank cleaning previously cost Abqaiq Plants \$193,000 for T-2050 sludge cleaning. Also, the cost of disposing the oily sludge was \$67,000 with base of \$30/m³. This was due to disposing 2,300 m³ of oily sludge out of Abqaiq Plants. In total, the manual tank cleaning method cost Abqaiq Plants \$260,000. See Table 2 for a cost-benefit analysis.



Figure 4. Safety signs and process diagram in T-2041 entrance



Figure 5. Electrical Generator



Figure 6. APS-8 operator verify process parameters with contractor operator

Without a trace

Tracking food sources to keep you safe

Fawaz Al-Wohaib and Tom Hullock, EPD

Today we can eat foods out of season, and we can enjoy exotic dishes and ingredients that our parents and grandparents would never have thought possible. In the 21st Century, globalization means that the food supply chain is now a massive industry, generating an estimated revenue of \$5.3 trillion in 2017, according to the World Health Organization. But with this massive scope comes a risk. In the same year, food fraud was estimated to have cost the global economy around \$40 billion in lost revenue due to illnesses caused by contaminated food. The World Health Organization estimates that almost 1 in 10 people become ill every year from eating contaminated food while the U.S. Centers for Disease Control and Prevention alone estimates that 48 million Americans get sick from consuming contaminated food every year.

The global population now exceeds 7 billion. Food scarcity and food security is a stark reality for the governments of many emerging economies. With the global population expected to exceed 10 billion by the end of the century, the global food supply chain will become increasingly important.

With increasing demands on the

global food supply chains and pressures to produce affordable food, there are numerous opportunities for the supply chain to fail, be it through accidental contamination or through premeditated acts such as adulteration or fraud. One recent high-profile food supply chain scandal, for example, involved the European horsemeat scandal in 2017, when horsemeat was substituted for beef in the lasagna of a well-known U.K. food manufacturer. Another was the Maggi food fraud scandal in India, where counterfeit Maggi noodles entered the supply chain, costing parent company Nestle significant reputational damage and a reported \$1.6 million in lost revenue.

To safeguard the population from preventable illnesses caused by contaminated food, understanding the source of our food is vitally important and is known as traceability. Often described as “Farm to Fork” food traceability, this practice aims to track a food from its point of production through to point of consumption.

Following these principles, food traceability allows food business operators, regulatory authorities, and the consumer to understand

the lifecycle of a product, thus empowering the consumer to make informed choices about the food they eat and for food businesses and regulatory authorities to withdraw or recall products that have been identified as unsafe at any point in the supply chain.

Most recently, EPD has required proponents to request their food service contractors to carry out supply chain verifications on all of their suppliers, which ensures the traceability of ingredients used in food production at dining facilities and food purchased from commissaries. In addition, EPD continues to scan worldwide food alerts from a variety of sources to ensure that proponents and their suppliers are alerted at the earliest opportunity about potential problems in the food supply chain.

Fawaz al Wohaib and Tom Hullock are Environmental Scientists in EPD's Environmental Health Unit

References:

https://ec.europa.eu/food/sites/food/files/safety/docs/gfl_req_factsheet_traceability_2007_en.pdf

<https://www.foodsafetymagazine.com/enewsletter/benefits-of-food-traceability/>





A large pile of avocados, some green and some dark purple, with a white label in the upper left corner. The label contains a barcode, lot numbers, and product information.

(01) 00816631010338 (10) 00000001314

Avocado/Florida

1 Bu **USCOM** **Pack Date**
Jan 13

Product of USA

New Limeco LLC Princeton FL

USDA-FL-3-131*010LOTG/Beta **98 59**

816631 1314CL10000563

(Photo Source: Shutterstock)

Practice makes perfect

A look at EPD’s communities of practice

Karim Hussain and Hamza Aref, EPD

The Environmental Protection Department’s (EPD) management adopted CoPs (Communities of Practice) two years ago to help fulfill a strategic goal of becoming a learning organization. A CoP is a modern virtual platform for sharing knowledge, where groups of subject matter experts and professionals share an interest in particular topics, discussions, or technologies, among other common interests. Through CoPs, people exchange best practices, lessons learned, and enterprise success stories.

EPD started with an Environmental Protection CoP, then added three more: one for Health Protection, one for Water Management, and another for Environmental Awareness. Table 1 below outlines URLs and descriptions of EPD’s four CoPs:



Table 1. EPD’s Four Communities of Practice

#	CoP Name	URL	Topics include ...
1	Environmental Protection	https://sharek.aramco.com.sa/cop/EMS	air quality, environmental compliance and management systems, marine protection, meteorology
2	Workplace Health Protection	https://sharek.aramco.com.sa/cop/ih	contractor camp inspection program, environmental health, food safety, industrial hygiene, pest control, radiation protection
3	Water Management	https://sharek.aramco.com.sa/cop/Water-Conservation/ layouts/15/start.aspx#/SitePages/Community%20Home.aspx	groundwater protection, wastewater management, water conservation, water treatment
4	Environmental Awareness	https://sharek.aramco.com.sa/cop/eksv	stewardship initiatives, climate change, community and corporate events, environmental GIS/IT applications, training, education, organizations

www.sharek.aramco.com.sa

Search Everything



ShareK communities



Request new community

ShareK info center



ShareK organizations



Request new organization

Communities of Practice (CoPs)

Establishing a CoP, however, won't guarantee success. Far from it. To succeed, the department must generate interest and build momentum. To do just that, EPD's Knowledge Management Team (KMT) followed seven elements:

- Identified and chartered CoPs with explicit business objectives. The department has set a goal to establish four CoPs to cover all environmental domains and enhance communication with proponents.
- Recognized community leaders and defined their roles as critical factors of success. EPD has assigned a knowledge-advisor (community leader) to monitor and manage the health of each community domain.
- Understood the importance of a 'core team' to the overall success of the process and strategies adopted by leading practitioners. EPD assigned members from all units and groups to the KMT to lead the program's implementation and keep enhancing it to meet planned expectations/requirements.
- Used various methods to encourage participation in CoPs. EPD assigned "knowledge-sharing" as a PMP goal for all employees, and developed an incentive program to recognize top contributors to it. It also integrated CoP participation as a new measure in the annual Environmental Excellence CEO award. So far, EPD CoPs have over 2,000 monthly visitors, 1,700 active members, and 1,100 active discussions.
- Adapted CoPs to the virtual world by creatively replacing face-to-face communication. EPD utilized CoPs to reduce emails and telephone communication with proponents.
- Created a common look and feel for the CoPs websites or home pages. EPD designed a user-friendly interface consisting of sub-CoPs, categories, discussion boards, and CoP statistics.
- Supported the used of health and effectiveness indicators with success stories to demonstrate CoPs value. EPD is monitoring designated KPIs for CoPs, which regularly measures the quality and quantity of the submitted content.

Finally, EPD wants to hear from you and invites you to visit its CoPs to exchange information, ideas, and of course knowledge!

Working well

A look at monitoring and improving indoor air quality



Figure 1. Industrial hygienists take Indoor Air Quality (IAQ) measurements such as relative humidity, temperature, carbon dioxide, carbon monoxide, and other readings to ensure a healthy Saudi Aramco workplace. (Photo Source: Saudi Aramco)

By Yousef M. Reshaidan, EPD

Indoor air quality (IAQ) in the workplace is the subject of much attention these days, and for good reason. Good IAQ in buildings is an important component of a healthy indoor environment. It contributes to a favorable and productive environment for building occupants, giving them a sense of comfort, health, and well-being. Research studies have shown significant increases in worker productivity have also been demonstrated when the air quality was adequate. Research has also shown that workers in buildings with adequate air quality have reduced rates of symptoms related to poor air quality.

The Industrial Hygiene Unit (IHU)

of the Environmental Protection Department (EPD) is staffed with experienced industrial hygienists with the expertise and equipment to properly evaluate indoor environments. Based on these evaluations, they can also provide recommendations, if deemed warranted, to improve working conditions.

Research and studies have demonstrated that the implementation of the following recommendations can improve work conditions:

- Routine maintenance of HVAC systems including periodic cleaning or replacement of filters.
- Replacement of water-stained

ceiling tiles and carpeting.

- Providing designated smoking areas located at least 25 feet (7.5 meters) from all entries.
- Venting contaminant source emissions to the outdoors.
- Storage and use of paints, adhesives, solvents, and pesticides in well-ventilated areas, and use of these materials during periods of non-occupancy.
- Allowing time for building materials in new or remodeled areas to off-gas before occupancy.
- Increasing ventilation rates and air distribution.
- Education and communication



Figure 2. An industrial hygienist conducting an air quality survey. (Photo Source: Saudi Aramco)

with building occupants.

Currently there are no regulations or requirements specific to Saudi Aramco or the Kingdom for IAQ in buildings. However, EPD regularly conducts qualitative and quantitative IAQ assessments in buildings and responds to building occupants' IAQ complaints. IAQ measurements are currently compared to applicable international best practice standards and guidelines. Additionally, EPD has completed a study that includes

IAQ assessments in different types of buildings. The results of these assessments will be utilized as a proactive measure and a benchmark to prevent any potential IAQ issues within Saudi Aramco buildings. Some of the indoor air quality parameters that were addressed included (but were not limited to) relative humidity, temperature, carbon dioxide, carbon monoxide, formaldehyde, volatile organic compounds, biological aerosols, particulate matters, and selected chemicals. The ultimate

goal of this comprehensive study is to develop an IAQ Saudi Aramco Engineering Standard, which will act as a reference to prevent poor indoor air quality, mitigate indoor air quality problems, maintain healthy and comfortable environments, and be of use during the design of new buildings or modifications of existing buildings.

Sweet nothings

A look at fraudulent honey products and how you can avoid them

James White, EPD



(Photo Source: Shutterstock)

People worldwide love their honey, but probably most are unaware that some may be pushing fraudulent products onto the global market.

Take honey adulteration, for example. Honey adulteration is the practice of mixing cane sugar or corn syrup into honey to make it cheaper to produce. Some fraudulent honeys may contain glucose, dextrose, molasses, sugar syrup, invert sugar, flour, corn syrup, starch, or similar products other than floral nectar, according to mybeeline.com.

On a parallel note, mislabeling the country of origin can increase the price of honey. Both adulteration and mislabeling deceive the customer, but there are tools to protect him or her. Processors, retailers, and governments can rely on laboratory tests to ensure the authenticity of honey. Consumers can rely on home tests to ensure they are not being misled. But first, a look at honey.

Honey: the sweet facts

Honey is a natural, sweet substance produced by the western or European honey bee (*Apis mellifera*). These bees collect nectar or plant honeydew and transform these natural substances into honey by combining what they take in with specific substances of their own. They then deposit, dehydrate and store this substance in honeycombs to ripen and mature in beehives. After some time, it becomes honey. The color and flavor of honeys differ depending on plant source, age and storage conditions. The only treatment that should occur when processing honey is filtering to remove any wax or foreign objects from the honeycombs.

Honey bees fly about 55,000 miles

(89,000 km) to make just one pound of honey — that's 2.2 times around the world with the average hive producing 25 lb (11 kg) and up to 60 lb (27 kg) or more in a good season.

China is the largest producer of honey in the world with other major countries including Turkey, Mexico, Ukraine, the United States, Romania, Spain, and Germany. Locally produced and imported honeys in the Saudi Arabian market must meet Saudi Arabian Standards Organization (SASO) specifications, which includes sugar content, hygiene, and labelling.

Honey: the not-so-sweet facts

In 2015, 30 European countries participated in an investigation into the extent of honey adulterated with sugars and mislabeled honeys with regard to their pollen source or country of origin. Scientists collected and tested 2,264 samples of honey at different stages of the supply network. Forty-five percent (45%) were sampled from retailers.

All honey samples were tested for aroma and pollen type. Compliant samples were then tested for sugar analysis. Those samples that were suspicious for added sugars were sent to the European Commission's Joint Research Centre (JRC) in Brussels, Belgium to test for sugar adulteration.

Not all samples passed the taste test. The first test failures were mostly related to the declaration of the pollen source (7%) and the addition of sugar (6%). Non-compliance for the declaration of the geographical origin was reported as less frequent (2%) and was probably unintentional as a result of bees visiting a variety of

plant species.

A total of 893 honey samples that were found to be noncompliant or suspicious during the initial tests were sent to the JRC for carbon analysis using Isotope Ratio Mass Spectrometry (IRMS) to detect added cane sugar and corn syrup. The JRC found that 14% of the samples they tested contained added sugar. This was further broken down according to country of origin, point of collection (i.e., producer, packager, or retailer) and type of honey. Overall, the results from the honey adulteration investigation indicated that the fraudulent practice of adding sugars to honey was occurring both inside and outside the EU.

So what can you do to ensure your honey is legit?

The water test can help you determine if your honey is pure. (Figure 1).

- Fill a small container (i.e., Pyrex or glass) with water
- Then, add a tablespoon of honey into the container
- Adulterated honey will dissolve in the water
- Adversely, pure honey will settle at the bottom



Figure 1. Pure honey has settled on the left, and adulterated honey has dissolved on the right. (Photo Source: Saudi Aramco)



in depth

National treasures

The benefits of protecting and enhancing biodiversity



Figure 1: Providing stewardship to plants and animals is a tenet of Islam. Saudi Aramco is increasing its efforts to protect biodiversity on Company reservation areas, such as this beautiful golden male Ruepell's Weaver, which occurs at Abha SSSP. Photo: Jem Babbington

Dr. Chris Boland, EPD.

"Why should I care? Why should I care that plants and animals are going extinct?" This question is one that many people ask themselves when they are told about the biodiversity conservation crisis

affecting the planet. Throughout the world, species are becoming extinct at an alarming rate, about 1,000 times greater than the natural rate of extinction. But why should I care? This article will answer that question

by discussing a range of reasons why people should care for biodiversity, ranging from spiritual reasons to economic reasons.



Figure 2: Biodiversity protection on Company land helps to reduce sand movement and dust storms, which in turn enhances human health and reduces the costs of sand management in Company operating areas. Photo: Abdullah Alsuhaybany.

Islam and conservation

At an individual level, many people find spiritual reasons for protecting biodiversity. For example, stewardship of plants and animals is compatible with the tenets of Islam. The Qur'an states that: 'there is not an animal on the earth, nor any being that wings its flight, but is a people like unto you.' [6:38]. This is usually interpreted to mean that all animals and birds on earth deserve our respect and

protection. The Prophet Muhammad (peace be upon him) declared: "The world is beautiful and verdant, and verily God, be He exalted, has made you stewards in it, and He sees how you acquit yourselves" (Saheeh Muslim: 2742). The world is full of life and one of our purposes on earth is to be stewards that protect and care for living creatures.

The Prophet Muhammad (peace be

upon him) clearly respected plants and animals. It was mentioned in a hadith that the prophet forbade that one needlessly and wrongfully cut down a tree that provides shelter to humans or animals in the desert. (Abu-Dawud: 5239). Likewise he once ordered a man who had taken the nestlings of a bird to return them to where he got them, to their mother that was trying to protect them' (Abu-Dawud: 2675).



Figure 3: Not only do the Abqaiq Wetlands help purify surface water before it enters the groundwater reserves, they provide habitat for over 200 species of birds, mammals and reptiles, and they create a calming place for people to relax and stay healthy. Photo: Abdullah Alsuhailany.

Aligning with international priorities

Protecting biodiversity on Company reservation areas helps align Saudi Aramco with priorities established by the United Nations. The UN has four conventions aimed at protecting biodiversity that are of relevance to the Company: (i) Convention on Biological Diversity, (ii) Convention on Combatting Desertification, (iii) Convention on the Conservation of Migratory Species, and (iv) Convention on Wetlands. These conventions all support the protection of biodiversity and important habitats, such as jebels, wadis, wetlands, forests, and other patches of native vegetation.

The UN Convention on Biological Diversity recognizes that “private companies, landowners, fishermen, and farmers take most of the actions that affect biodiversity” and that “it is particularly important for

such sectors as forestry, agriculture, fisheries, energy, transportation, and urban planning ... to develop and integrate broad plans for biodiversity.”

The UN has identified that two of the greatest challenges to sustainable development are desertification and biodiversity loss. Desertification is the process of unintentionally creating lifeless desert habitat in arid or semi-arid areas that once contained grasslands or low shrubs. This occurs through land clearing, off-road driving, excessive firewood collection, and so on. By protecting areas of biodiversity we create seedbanks that can help restore surrounding habitat and address the systemic problems of desertification. By protecting and restoring biodiversity we help to promote sustainable development.

Aligning with Company priorities

The protection of biodiversity is receiving increasing attention within Saudi Aramco as per the Company's corporate objective to ‘Intensify the focus on safety and protection of the environment.’ Accordingly, in November 2011 the Company Board of Directors endorsed the commitment to large-scale biodiversity protection efforts, such as establishing Shaybah Wildlife Sanctuary, protecting islands in the Arabian Gulf, and providing stewardship over Abu Ali Island and Tarout Bay. In October 2014 Saudi Aramco updated its Environmental Protection Policy (INT-05) and explicitly stated that: ‘The Company will work toward promoting the conservation of natural biodiversity within its reservations.’ Thus by reducing impacts on biodiversity and by designating biodiversity protection areas on Company land, proponents are aligning with key Saudi Aramco objectives.



Figure 4: Surely everyone feels a little bit happier whenever they see a Hud Hud. Medical studies have shown that spending time in nature improves human health and wellness in countless ways, such as reducing stress and confusion and increasing happiness and focus. Photo: Jem Babbington.



Figure 5: Plants and animals benefit us in more ways than we realize. For millennia Bedouin people used plants for traditional medicine, cosmetics, food, grazing. Plants such as this Nodding Onion (photographed in the jebels at Dhahran) were used to help treat toothache. Photo: Irene Linning.

The business case for biodiversity protection

Protecting biodiversity on Company land helps to underscore Saudi Aramco's 'social license to operate.' That is, society expects Saudi Aramco to provide oil and gas reliably and efficiently, and it expects us to do so in a way that supports sustainable environmental protection. Biodiversity loss is an area of increasing concern within society, nationally and globally. The general public wants and expects Saudi Aramco to undertake concerted actions to help protect and restore habitat. Thus major company initiatives such as planting two million mangrove trees in the Arabian Gulf, reintroducing regionally extinct animals into Shaybah Wildlife Sanctuary, or establishing biodiversity protection areas on Company land, help to ensure Saudi Aramco's support from its stakeholders.

Benefitting from services provided by the ecosystem

Another reason for protecting biodiversity is that it directly benefits us humans. Biodiversity provides 'ecosystem services' that humans

need to survive. A functioning ecosystem provides food, water, and shelter. It helps to stabilize sand and reduce dust storms, which in turn benefits our health. Wadis and wetlands are like the kidneys of the earth, helping to filter out impurities and keep our groundwater reserves clean.

We also receive ecosystem services from biodiversity in more subtle ways. For example, most of us are unaware that one-third of all of Saudi Arabia's mammals are bats. These tiny mammals fly silently overhead catching literally millions of insects above us in Dhahran, Abqaiq, Yanbu', Riyadh, Haradh, and any indeed every one of Saudi Aramco's communities and operating areas. These microbats protect us from biting insects every night of the year, without using any chemicals, absolutely for free. If we had to pay for this insect control, it would cost millions of dollars. Indeed many places around the world are now placing an economic value on the ecosystem services provided by biodiversity to underscore the unexpected costs of losing our precious plants and animals.

Health and wellness benefits

Finally, another reason for protecting biodiversity is that ecosystems provide us with a surprising array of health benefits simply by being there. For instance, countless medical trials have demonstrated that spending time in nature significantly reduces stress, depression, tension, anxiety, and blood pressure. It increases concentration, happiness, and self-esteem, and improves sleep, productivity, and childbirth. Astonishingly spending time in nature helps to reduce healing time after injuries or medical treatment, and causes our bodies to produce 'Natural Killer Cells', a type of white blood cell that attacks viruses and cancer cells.

How much money would we spend to live and work in a place where people are happier, calmer, healthier, and more productive? We can achieve this and obtain numerous other benefits by protecting and restoring biodiversity in the areas around us.

The right choice

D&WO Services Department's efficient and cost-effective drilling waste management practices

Salem Bin Mashni, D&WO



(Photo Source: Shutterstock)



(Photo Source: Shutterstock)

Drilling & Workover Services Department (D&WOSD) makes use of several strategies to manage drilling waste generated by Company rigs operating across the Kingdom of Saudi Arabia. Around 30 million m³ of drillings waste per year results from different well locations. The drilling waste streams consist of cuttings from Water-Based Mud (WBM) fluids and more Hazardous Oil-Based mud (OBM) fluids.

D&WOSD makes every effort to find environmentally responsible solutions to manage all types of drilling waste. One of the department's primary focus is meeting the Environmental Protection Department's (EPD) requirements in an economical manner. There are a variety of solutions on the market, but many either lack the ability to meet EPD requirements or are prohibitively expensive.

Treatment of drilling waste is a method that is used when other methods such as prevention, minimization, reuse, and recycling processes have been exhausted.

D&WOSD has tested many types of treatment with various technologies to determine the best options that can protect the environment while remaining cost effective.

In 2014 D&WOSD attempted a dry location concept, in which the well is drilled without local waste disposal and drilling fluid waste was transferred to centralized thermal waste treatment facilities.

The dry location concept was first trial tested for three locations before building the centralized thermal waste treatment facility. The trial succeeded but carried high transportation costs. After this trial, it was determined that the target should be for all treatment to be on site.

From 2015 to 2018, several different on-site treatment technologies were tested with third-party vendors. Tested technologies included cutting stabilization, thermal treatments, dewatering, evaporation machines, sloping treatments, and mechanical treatments.

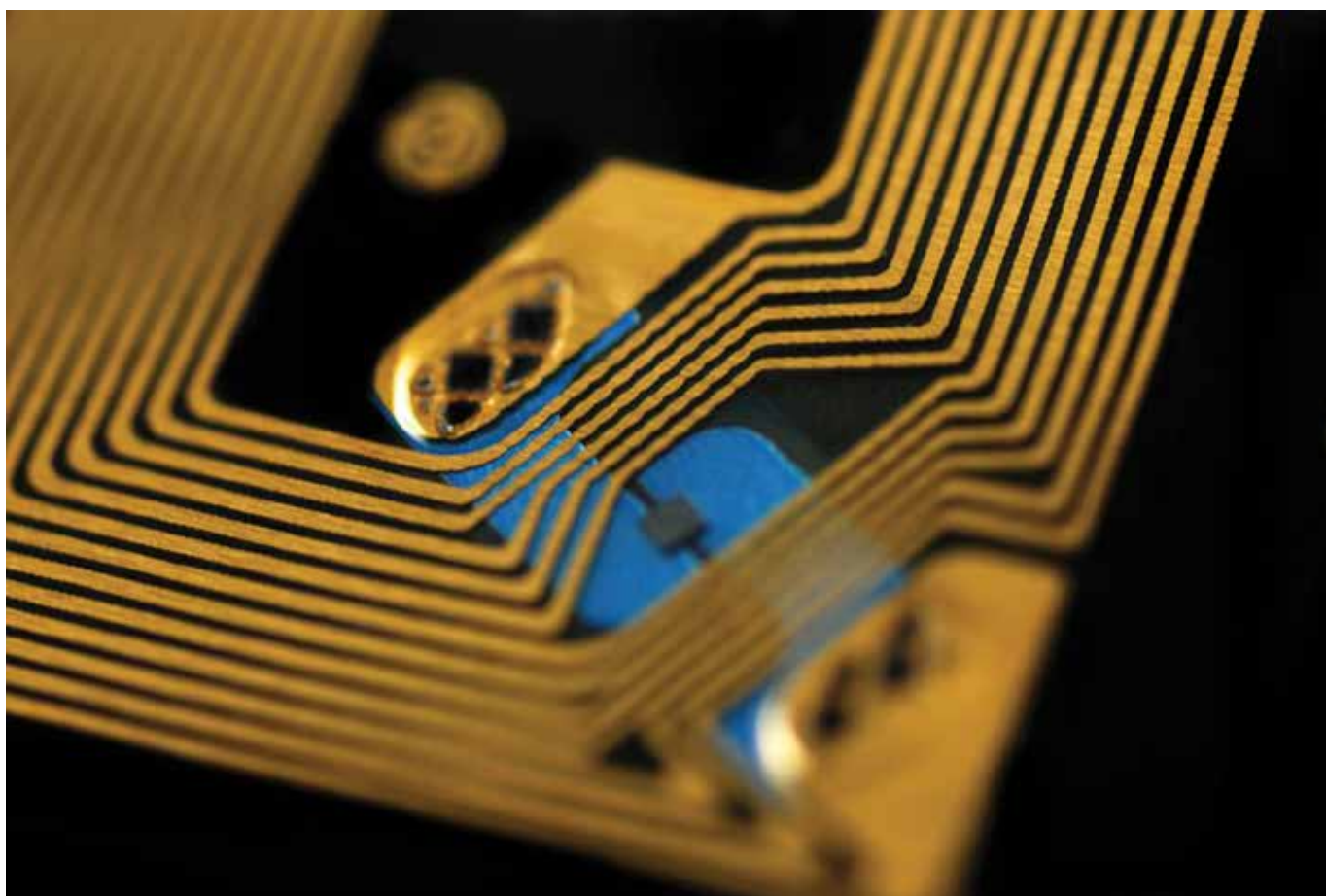
During trials for cutting stabilization, hydrocarbon content in OBM cuttings dropped from 7% to 3%, passing the toxicity test. Thermal cutting treatment can drop the total petroleum hydrocarbons to be less than 1% and can recover oil for recycling, but it can be very expensive compared with other types of treatment.

Dewatering treatments and slop mechanical treatments are better than mechanical evaporation due to water conservation. Mechanical evaporation is better than hauling fluids to centralized waste facilities and allows for reuse the water in drilling operations or waste management.

It is clear that there is much more that can be done to address drilling waste management. D&WOSD is at the forefront of tackling these issues and continues to show commitment to environmental stewardship and preserving Saudi Aramco assets and natural resources.

From the cradle to the grave

Tracking waste management - systems and technologies



(Photo Source: Shutterstock)

Abdullah Al-Duaiji and Tamim Al-Buraikan, EPD

Overview

Think the waste a city, a community, a neighborhood, or even a household generates ends up disposed in a landfill or an incinerator in a simple fashion?

Think again.

The journey that waste takes from your trash can to generators and

receiver facilities can be fraught with environmentally and monetarily costly pitfalls if essential practices such as real-time tracking and instantaneous-weight measurements that ensure compliance are overlooked or even ignored.

Failure to manage waste responsibly via not fully relying on all the tools available contributes to problems like illegal dumping when waste fails to

arrive at proper destinations, which can lead to many different types of serious environmental issues that go beyond unsightliness, odor, and pests.

One significant solution to the aforementioned problems involves the use of waste-tracking technologies that have proven to improve waste-management process conditions. Waste-tracking

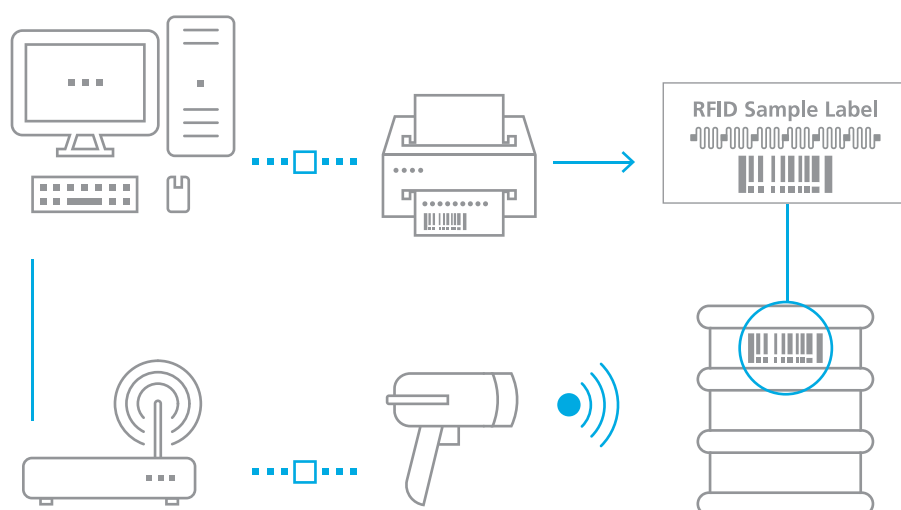
a.



b.



c.

Figure 1: RFID Components ³

technologies nowadays offer sophisticated systems with many tracking features unlike conventional tracking systems, which were marked largely by real-time location tracking only. These technologies add value by providing comprehensive and useful data to both waste generators and regulators.

Let's look at some examples, including those used at Saudi Aramco.

Radio-Frequency Identification (RFID) tracking technology

Waste-tracking technologies vary in complexity depending mainly

on the level of monitoring details required and their adaptability to different processes. Radio-Frequency Identification (RFID) technology, for example, is one of the easiest types of tracking technologies that can be implemented without causing process interferences or disturbances. The technology has many applications including tracking. RFID technology is composed mainly of three components: Tags, Readers, and Operational software system (Figure 1). The tags can be easily attached to the waste drums or waste transportation vehicles. Different types of data can be stored in the tags (e.g., types of waste, quantity, storing, and generation dates, etc.). These data can be read

or entered through a reader device. The operational software system can control the data-flow processing and displays statistics and useful information¹.

RFID technology does have limitations in terms of providing real-time tracking of waste. Nevertheless, this gap can be bridged by integrating RFID technology with GPS systems². Implementing RFID technology can be a powerful tool to improve the waste management practices.

Integrated tracking systems: E-manifesting and tracking dashboards

Other types of technologies offer sophisticated, comprehensive, and more integrated solutions. These technologies are mainly composed of integrated waste management systems that can track, monitor, and control waste from the point of generation to the final receiving facilities. These types of tracking systems consist of e-manifesting and tracking dashboards. E-manifest technology enables waste generators to create, edit, and sign manifests online and also easily links waste generators with transporters and final receivers (i.e., transporters and final receivers will be able to verify and acknowledge waste shipments online)⁴. The dashboard provides real-time tracking of the waste transportation fleet, through GPS for example, and instantaneous waste-weight measures utilizing equipped scales linked to the dashboard (Figure 2). Moreover, the dashboard sends notifications to waste generators in case of any suspicious activities like illegal dumping. The abovementioned solution has been implemented in Abu Dhabi Center of Waste Management (TADWEER). Adopting such technology has helped in preventing illegal dumping in the city



(Photo Source: Shutterstock)



Figure 2: Waste Vehicle Equipped Tracking devices 5 (Photo Source: Shutterstock)

of Abu Dhabi and accordingly has raised environmental efficiency and performance.

Waste management and recycling systems

Saudi Aramco has been proactive in deploying electronic manifesting. Currently, there are two online manifesting systems, online hazardous waste manifesting and online material recycling manifesting systems. Both systems can be easily accessed through the Company's SAP EHSM/Waste Management module in the Myhome portal.

The online hazardous waste manifesting system has been in use since 2006 and has continually been enhanced since that time. The system was developed to track all of Saudi Aramco's hazardous waste sent to approved waste management contractors for disposal. One of the new features that has significantly enhanced the tracking of hazardous waste has involved linking the creation of manifest with Industrial Security's material gate pass system.

Another system now in use tracks all materials recycled either internally within Saudi Aramco facilities or externally through private recyclers. This solution aligns with the Environmental Protection Department's strategy and vision to enhance performance and foster stewardship. The system minimizes the Company's environmental footprint, conserves resources, supports our environmental corporate image, and enhances Saudi Aramco's database for better decision-making and knowledge about waste streams whereabouts. In early implementation stages, \$3.3 million of waste management cost avoidance and/or revenue were realized by different Saudi Aramco organizations thanks to reliance on online manifesting systems.

Conclusion

Integrating all waste management systems under one umbrella is important to Saudi Aramco in the long run. Doing so will provide Saudi Aramco with useful and efficient information regarding waste

generation. Moreover, it will bridge gaps related to illegal dumping, incomplete hazardous waste data, and data reliability issues all while significantly minimizing the adverse effects on human health and the environment.

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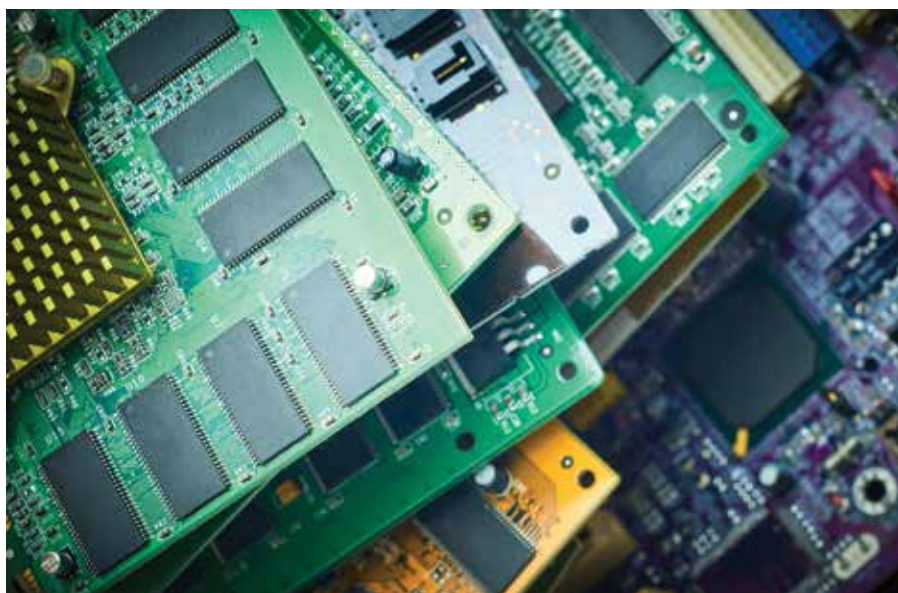
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Sign of the times

An overview of e-waste management

By Ibrahim Al-Shayqi, EPD



(Photo Source: Shutterstock)

Due to the rapid development in technologies and the ever faster growth of the electronics industry, the lifespans of many electronic products and parts have shortened, thus resulting in huge quantities of electronic waste (e-waste). Significant quantities of e-waste end up in landfills. Landfilling e-waste is not the most environmentally favored option, as many of the discarded electronic products contain hazardous substances such as heavy metals like cadmium, lead, copper, and chromium, which will have the potential to leach and contaminate soil and groundwater. In 2015, a study conducted to measure the level of contamination stemming from an abandoned and unauthorized e-waste recycling site showed that the soil and the water bodies in the vicinity of the facility had high

concentrations — beyond the acceptable limits — of cadmium and chromium [1]. The study also indicated that heavy metals leached to the groundwater but in relatively lower concentrations.

In addition, burning e-waste in a typical municipal incinerator can generate toxic emissions and affect human health. According to the World Health Organization (WHO), if e-waste was mismanaged and recycled through older techniques, it may cause serious health risks to the workers and the community living nearby as a result of direct exposure to the indicated heavy metals through inhalation of toxic fumes or ingestion of contaminated water and food. For example, the direct exposure to lead might influence the nervous system, blood circulation, and also adversely impact the kidneys and immune system. Another

example is mercury. Largely found in mobile phone parts, mercury may have toxic effects on the nervous, digestive and immune systems as well as on lungs, kidneys, skin, and eyes.

e-waste is one of the fastest growing waste streams in the world. According to the United Nations in 2007, the amount of e-waste generated in the EU was estimated between 5 to 7 million tons annually. In the United States, about 4.8 million tons of e-waste were generated in 2010 [2]. In a recent report published by the United Nations University in 2017, the world's total e-waste generation came to 44.7 million metric tons, while Saudi Arabia and Kuwait were considered the highest generators of e-waste in the Middle East (approximately 15.9 kg/inhabitant/year), which is equivalent to 524,000 thousand metric tons. Globally, the quantity of e-waste is expected to increase annually as projected in Figure 1 [3].

Consequently, environmentally sound solutions must be employed to manage the generated e-waste. e-waste is different than typical household and industrial waste, yet still the waste management hierarchy applies here. The hierarchy indicates the most to the least preferable options to manage any type of waste (figure 2). In general e-waste management is considered to be a relatively new field, and the existing technologies and policies to address e-waste are at their early stages of development.

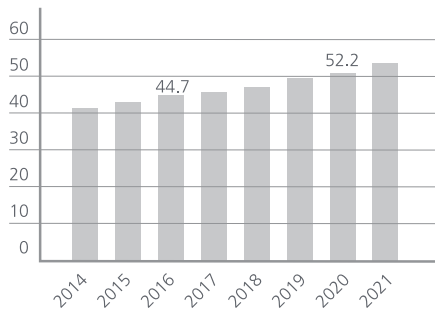


Figure 1: Annual quantity of e-waste generation

According to the waste management hierarchy, waste recycling and recovery are the more preferable methods of disposal. Proper recycling of e-waste can generate financial revenue, as the electronic products contain recoverable precious metals like gold, silver, platinum, and palladium. Figure 3 shows the Life Cycle Stages of electronic products.



Figure 2: Waste Management Hierarchy [4]

Environmental regulations for e-waste

Regulation is developing and under implementation to resolve e-waste concerns. European Union countries, for example, have passed e-waste directive/legislation:

- To set targets for the reuse/recycle of e-waste at the national level,
- To restrict the use of hazardous substance in the electronic products.

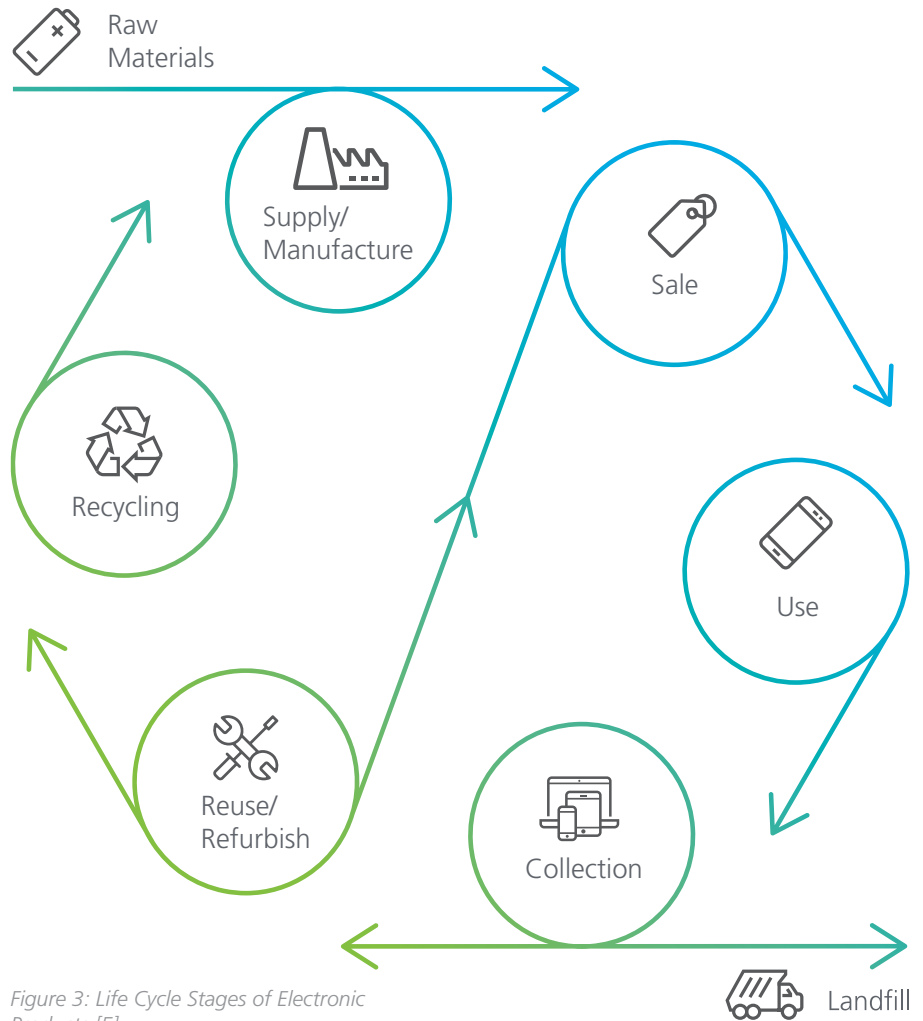


Figure 3: Life Cycle Stages of Electronic Products [5]

Moreover, under the "extended producer responsibility (EPR)" concept, manufacturers are mandated to bear a financial responsibility to manage, recycle, and dispose of their products [6].

In Saudi Arabia, waste management environmental regulations are mainly intended to manage municipal and industrial hazardous and non-hazardous solid waste. However, there are no specific requirements in the regulations that govern the management of e-waste.

E-waste recycling process

If e-waste can't be reused, the ultimate solution is to minimize the

quantity that goes to the landfill through proper recycling. After collection and the segregation, e-waste should be manually dismantled to separate intact homogenous materials, mainly metal and plastics that can be sent to smelters and plastic scrap recycling plants. The manual dismantling should be conducted with caution as some equipment contains hazardous materials. Then, the e-waste should go through mechanical shredding, grinding, and crushing for size reduction. Once the volume is reduced, typical sorting processes will take place such as screening, magnetic separation for ferrous parts followed by eddy current separation, which uses a powerful



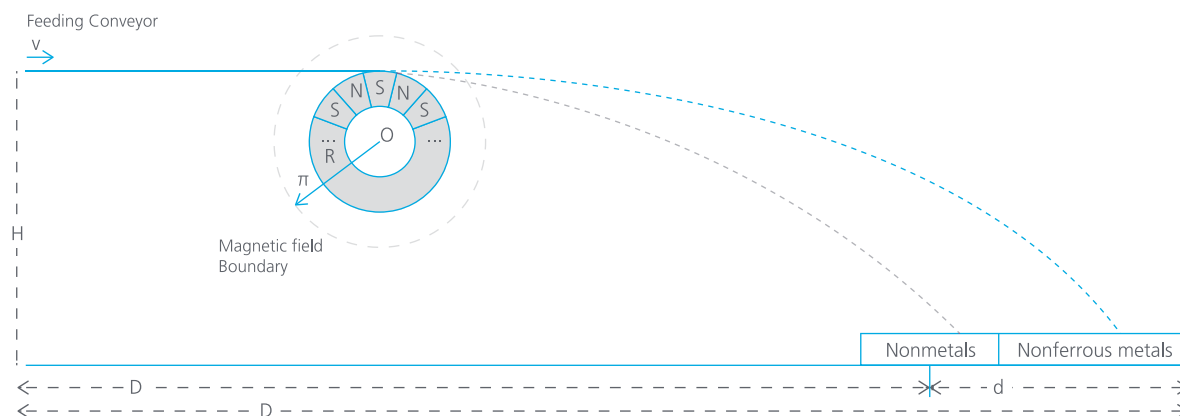


Figure 4: Eddy Current Separator ^[9]

magnetic field separates non-ferrous metals from inert waste (Figure 4). In addition, applying water/air flow separates remaining plastic. However, before selecting any of these sorting methods, sample tests should be made to determine the physical characteristics of the shredded materials, which include size, weight, size, shape density, and electrical magnetic characteristics [7][8].

The crucial and final step of the e-waste recycling is metal extraction, which can be accomplished mainly through Pyro-metallurgical and Hydrometallurgical processes [7,8]:

- The pyro-metallurgical process includes burning the crushed scrap in a furnace or molten metal bath at a temperature around 1,250 °C to remove the remaining plastics. At the same time metals such as iron, lead, and zinc are converted into oxides that will become fixed within a silica-based slag. The melt is now mainly copper and in small fractions silver, gold, palladium, nickel, selenium, tellurium, and zinc. Afterward, the melt is refined in an anode furnace whereby it is cast into anodes with copper content around 99.1%. The remaining precious metals (0.9%) can be recovered through electro-refining process.

- Hydrometallurgical processing consist of a series of acid or caustic leaches of solid material. Leaching solvents that are utilized in this process include cyanide, thiourea, thiosulfate, and sodium hydroxide and acids such as sulfuric acid, nitric acid, and hydrochloric acid. From the solutions, the metals of interest are then isolated and concentrated via processes such as solvent extraction, precipitation, cementation, adsorption, ion exchange, filtration and distillation.

More attention should be paid to e-waste management issues and the economic opportunities through e-waste recycling in Saudi Arabia. New regulations should be developed and enforced to manage e-waste. The regulations should address the responsibilities of the manufacturers of electronic products with regards to the generated e-waste. For example, mandating the manufactures to implement take-back policy which require them to collect, recycle, and dispose of their products at end of its life. Furthermore, government incentives should be established to promote e-waste reuse and recycle.

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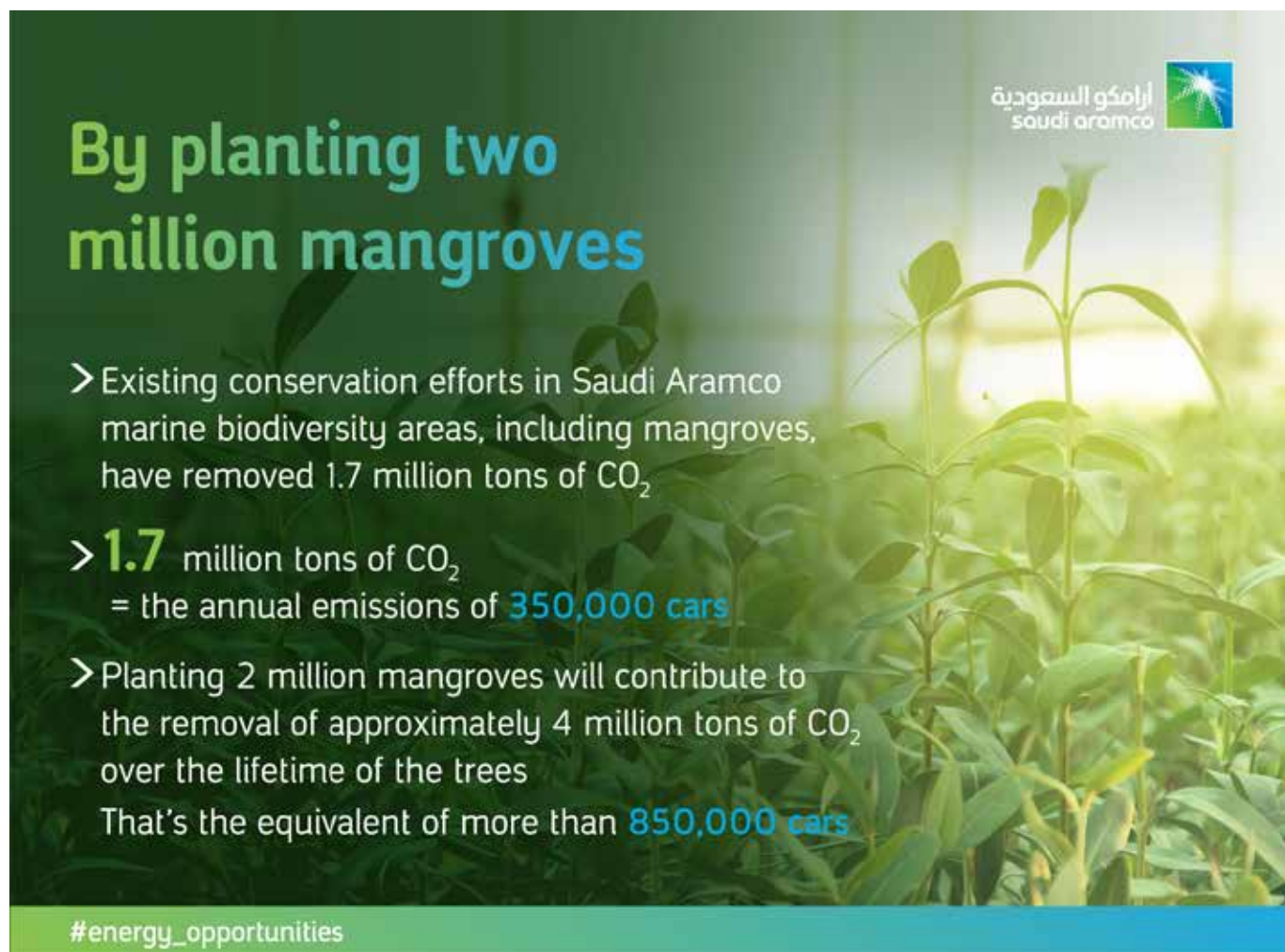
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in focus



By planting two million mangroves

- Existing conservation efforts in Saudi Aramco marine biodiversity areas, including mangroves, have removed 1.7 million tons of CO₂
- **1.7** million tons of CO₂
= the annual emissions of **350,000 cars**
- Planting 2 million mangroves will contribute to the removal of approximately 4 million tons of CO₂ over the lifetime of the trees
That's the equivalent of more than **850,000 cars**

#energy_opportunities

A tweet illustrated to the world earlier this year of the impact that Saudi Aramco's mangrove plantings have on the environment. (Source: Saudi Aramco)

EPD relies on social media to carry World Environment Day message to Saudi Aramco and beyond

As part of its strategy to extend the reach and richness of its environmental awareness messaging while cutting costs at the same time, the Environmental Protection Department (EPD) delivered its 2018 World Environment Day content via high-quality videos posted to Twitter. On June 5, World Environment Day, tweets ran in both English and Arabic on Saudi Aramco's Twitter page, each with 1-minute, high-quality

videos underscoring Saudi Aramco's many efforts protecting biodiversity. In addition to companywide announcements, print versions of the message also ran in The Arabian Sun, Al Qafilah, and even in the national press: Al-Riyadh newspaper ran a version of the story under the aptly named title (translated) "Saudi Aramco: Finding Time to Conserve Biodiversity." The digital platform approach, which replaces costly

one-location exhibitions in shopping malls, demonstrated how utilizing resources more efficiently can have lasting and broader-reaching impacts and also resulted this year in cost avoidance of \$200,000. Furthermore, the campaign demonstrated the effectiveness of ongoing collaboration and people conversations between EPD and Corporate Affairs.



EPD visited the King Abdullah Petroleum Studies and Research Center (KAPSARC), seen here, to discuss building on working relationships. (Photo Source: KAPSARC)

EPD explores Saudi Aramco synergies with KAPSARC leadership

The Environmental Protection Department (EPD) met with Mr. Adam Sieminski, President of the King Abdullah Petroleum Studies and Research Center (KAPSARC), and his team in Riyadh recently to explore the center's activities with regard to the environment and climate change as well as to establish future long-term collaborations. Mr. Sieminski shared with EPD his vision about the center's engagements in local and global climate and environmental arenas. Additionally, the KAPSARC team presented an overview of its current programs, projects, studies, and capabilities including: GHG & climate change, low-carbon technology pathways, decarbonization of oil using CO₂-based enhanced oil recovery (CO₂-EOR), oil demand forecasting and market strategies to decarbonize upstream oil. The EPD Manager delivered

a high-level briefing about Saudi Aramco's environmental and climate programs and related industrial engagements. It was agreed to form a team from Saudi Aramco and KAPSARC to further discuss Carbon Capture Utilization & Storage (CCUS) with relevant organizations. KAPSARC expressed great interest in collaborating with Saudi Aramco on other mutual areas of interest including International Maritime Organization (IMO) regulations and hosting Saudi Aramco employees as interns.

EPD Participates In RRD International Environmental Day Event

Under the patronage of Abdulrahman Fadhel, Riyadh Refinery Department (RRD) Manager, and in collaboration with the High Commission for Development of Riyadh, the Environmental Protection Department (EPD) participated in RRD's International Environmental Day Event at Albukjairi Square on June 5-7. Some 15 government authorities specializing in environmental matters

attended. The event sought to raise awareness while coinciding with World Environmental Day, which is observed globally. EPD participated by manning Saudi Aramco's environmental booth and also provided awareness messages highlighting efforts in enhancing biodiversity, water conservation, saving energy, and protecting artificial reefs, among others. EPD booths featured digital platforms that paid particular attention to work protecting biodiversity. More than 1,000 visitors, including families, attended the campaign.

Environmental Coordinators complete development training



An Environmental Coordinators (EC) workshop underway in Dhahran. EPD recently completed its latest EC training class, with a heavy focus on air quality. (Photo Source: Saudi Aramco)

The Environmental Protection Department (EPD) completed classroom delivery of an in-house Environmental Coordinators Development Training workshop. The 3-week training program, which was developed in collaboration with the Professional Engineering Development Division (PEDD), includes an air quality and meteorology module covering emission inventory development, LDAR, stack testing, ambient air quality monitoring as well as reporting and regulatory

requirements. The training aims to expose Environmental Coordinators to the field-level air quality management and provide them with better skills to deliver coordinated support to EPD and the company as a whole.

World's first industrial Blue Carbon paper published



Mangrove seedlings await planting at a nursery near Ras Tanura. Saudi Aramco's mangrove-planting are producing forests that absorb carbon from the atmosphere, and EPD in collaboration with KAUST and KFUPM have published the first industrial Blue Carbon study in the world. (Photo Source: Saudi Aramco)

The Environmental Protection Department (EPD) in collaboration with King Abdullah University of Science and Technology (KAUST) and King Fahd University of Petroleum and Minerals (KFUPM) recently published the world's first industrial Blue Carbon study. Despite Saudi Arabia's arid climate and high temperatures, mangroves, seagrass, and saltmarshes in the Arabian Gulf store significant

carbon stocks comparable to the global average. Due to rapid man-made driven coastal developments in the Arabian Gulf, 90% of mangrove stands have been lost over the last century, while the remaining 10% mainly exist in Saudi Aramco's biodiversity areas in the Ras Tanura Eco-Park and Abu Ali Island. The study highlights the importance of carbon stored under Saudi Aramco's protection.

EPD participates in Bureau of Experts Meeting on International Maritime Organization (IMO) Convention

Based on a request from H.E., the Head of Saudi Arabian Bureau of Experts, a representative from Saudi Aramco's Environmental Protection Department (EPD) attended a meeting held on August 7, 2018, at the Royal Court in Riyadh and provided input on how to implement

an IMO convention to best serve both national and Company interests. The meeting gathered representatives from several ministries and sought to implement changes to national environmental legislation that would serve the objectives and allow for implementation that does not negatively impact Saudi Aramco's business.

EPD receives Water Safety Plans for review

In continuation of Saudi Aramco efforts prioritizing water safety and conservation, 12 departments have now submitted Water Safety Plans to the Environmental Protection Department (EPD) for review.

WSPs adhere to new government requirements, and proponents must have WSPs developed and implemented going forward. In an effort to support proponents in meeting this requirement, EPD has developed a WSP toolkit, delivered workshops, and hosted several WSP forums. Proponents who successfully implement WSPs will not only reduce health risks at their facilities, but they will also benefit from additional points toward the President's Award for Environmental Excellence.

EPD Conducts Train-The-Trainer Workshop For Hazardous Materials Communication Program (HAZCOM)

The Environmental Protection Department (EPD) conducted its second 4-day HAZCOM Chemical Hazard Awareness Training "Train-The-Trainer" (CHAT-TTT) course. The improved course has undergone an implementation of a number



Numerous Saudi entities, including Saudi Aramco, participate at Abu Dhabi Sustainability Week. (Photo Source: Saudi Aramco)

of enhancements such as the registration through the Professional Engineering Development Division (PEDD), reforming of classroom setup, adding more facilitating activities and exercises as well as computerizing the final exam. The course will enable attendees to provide specific CHAT training to their home department employees and upon successfully passing the course, attendees will be certified by EPD as CHAT Trainers.

Saudi Aramco leads the Kingdom's participation at the Abu Dhabi Sustainability Week 2018

Saudi Aramco joined 13 other high-profile Saudi entities to participate

in Abu Dhabi Sustainability Week 2018, which took place in the UAE in January of 2018. The Ministry of Energy, Industry, and Mineral Resources led the Saudi delegation in showcasing economic and environmental sustainability-related initiatives and technologies under the auspices of the Saudi Vision 2030 and the National Transformation Program.

Saudi Aramco participated with other national entities in a joint pavilion consisting of interactive displays and models, showcasing efforts in the field of energy, water resources, and waste management. The Company also shared its experiences and solutions in wastewater treatment and reuse and general water conservation.

In addition to the exhibition, the Saudi Pavilion hosted a number of

side event presentations and panel discussions about various topics including the Saudi National Atomic Energy Project, renewable energy, future of clean energy, energy efficiency, sustainable development, recycling and waste management, water resources, the electricity sector, solar energy and its value chain, and research and development for sustainability.

Saudi Aramco speakers discussed, Emissions-to-Value, energy efficiency, and sustainability experience.

Abu Dhabi Sustainability Week is one of the largest gatherings of its kind in the world. Last year, it attracted more than 38,000 attendees, 200 speakers, 800 exhibitors from 45 countries, with more than 170 countries represented.



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The sea turtle: the oldest surviving reptile on the planet

Abdullah Alsuhaibany

Marine turtles are some of the oldest surviving reptiles on the planet, having inhabited tropical seas and oceans for more than 200 million years. Those aren't faraway bodies of water either — sea turtles are our neighbours in that there are five species of sea turtle recorded in the Red Sea and Arabian Gulf, two of which breed here. Both appear on the International Union for Conservation of Nature's Threatened Species List (Green Turtle and Hawksbill Turtle).

Little is known about the secret lives of sea turtles, but we do know they act as flagship species for conservation programs, and because the conservation of turtles and their habitats addresses vast and diverse marine areas, they indirectly protect the complex and interconnected world on which humans depend. Turtle habitats have a tangible value to society, in that they also support commercial fish and invertebrates (seagrass beds, open oceans, and coral reefs, among others), which are highly valued



The life cycles of sea turtles (Source: <http://www.srilankaseaturtles.com/varieties.html>)

