OCCASION

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Making it Green

DEPARTMENT OF ENVIRONMENT

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
PART ONE: WHO WE HELP ......................................................... 08

CHAPTER ONE: GREENING LIVES ........................................... 10

01 GRAFTING HELPED ME GROW (MEXICO) ......................................................... 11
02 TURNING TRASH INTO OPPORTUNITY (GUINEA) ........................................... 12
03 CALLING ALL ECOSUPERHEROES (PHILIPPINES) ........................................ 13
04 A COMPANY REACHES OUT RESPONSIBLY (MYANMAR) ............................... 14
05 TRANSFORMING INTO A GREEN BUSINESS (THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA) ................................................................. 15

PART TWO: WHO WE ARE ...................................................... 38

CHAPTER FOUR: GREENING THE FUTURE ............................... 40

Meet UNIDO’s Department of Environment ......................................................... 46
Crossword: Work In Words .................................................................................. 48
Mandala: Make Me Green! Or Red! Or Yellow! .................................................... 49
Timeline: We Make It Green ................................................................................. 50
In UNIDO’s environment department, we’re not so used to tooting our own horn. But our organization’s 50th birthday is worth celebrating. And, as you’ll see in the following pages, we have a lot to share about who we are, how far we’ve come and where we’re going.

In Part One, Who We Help, you will meet extraordinary people in fascinating places around the world, as you hear directly from beneficiaries of 26 of our projects. Those beneficiaries include individuals such as an agricultural worker in Mexico, businesses such as a canning factory in Laos People’s Democratic Republic and governments of countries ranging from India to Eritrea to Saint Vincent and the Grenadines. Though far-flung in location as well as scope, all these projects also share one beneficiary in common: the environment.

In Part Two, Who We Are, you’ll hear a little from us. A timeline of our history shows the twists and turns of UNIDO’s environment portfolio, which just last year led to the establishment of the Environment Department as it exists today, with divisions dedicated to the Montreal Protocol (ozone depleting substances), the Stockholm Convention (persistent organic pollutants), industrial resource efficiency and emerging compliance regimes. On other pages, we give you a window into who we are as a team—from the number of languages we speak to our caffeinated drink preferences.

Our team also shares a common vision. Its iterations have taken on many names over the years, but recently we’ve grown partial to the moniker “circular economy”. This economic model has been taking the world by storm, and we think we have something unique to add: the ability to help bring the circular economy’s benefits to developing countries. You’ll read a little about that vision in these pages, and we plan to share more through various channels in the months to come.

These pages also contain a few surprises: a crossword puzzle, a mandala for coloring and a photo challenge. These are offered in the spirit of dialogue: We don’t want to talk at you, but engage with you—whether you are a partner, a funder, a beneficiary or a member of the public. We hope this booklet will contribute to a larger conversation that will continue in meeting rooms and cafes, in waiting rooms and on airplanes, on Facebook, Twitter and WhatsApp...and even around all of our family dinner tables.

These pages represent our best summary of how we—as a department, as an organization, and as a global community—can “make it green”. We’re looking forward to our next 50 years, and we hope you will join us for the ride.

Stephan Sicars
Director, Department of Environment
OUR ENVIRONMENTAL WORK HAS BEEN BACKED BY HUNDREDS OF FUNDERS OVER THE PAST FIVE DECADES.

THOSE LISTED BELOW HAVE SUPPORTED PROJECTS THAT WE HAVE UNDERTAKEN IN THE PAST FIVE YEARS.

- AUSTRIA: DEVELOPMENT BANK OF AUSTRIA; FEDERAL MINISTRY OF AGRICULTURE, FORESTRY, ENVIRONMENT AND WATER MANAGEMENT
- BELGIUM
- CANADA
- CHINA: MINISTRY OF COMMERCE (MOFCOM); CHINA INTERNATIONAL CENTER FOR ECONOMIC AND TECHNICAL EXCHANGES (CICETE)
- COMMON FUND FOR COMMODITIES (CFC)
- CZECH REPUBLIC
- EUROPEAN UNION
- FINLAND
- FRANCE: FRENCH DEVELOPMENT AGENCY (AFD)
- GERMANY: GERMAN FEDERAL MINISTRY OF THE ENVIRONMENT, NATURE CONSERVATION, BUILDING AND NUCLEAR SAFETY
- GLOBAL ENVIRONMENT FACILITY (GEF)
- GLOBAL GREEN GROWTH INSTITUTE
- HEINEKEN INTERNATIONAL B.V.
- INDIA
- INTERNATIONAL LABOUR ORGANIZATION (ILO)
- IRANIAN FUEL CONSERVATION ORGANIZATION
- ISREAL
- ITALY: MINISTRY FOR THE ENVIRONMENT AND THE PROTECTION OF LAND AND SEA
- JAPAN
- REPUBLIC OF KOREA: KOREA INTERNATIONAL COOPERATION AGENCY
- MONGOLIA
- MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL
- NIGERIA
- NORWAY: THE ROYAL NORWEGIAN EMBASSY, KHARTOUM
- ONE UN FUND
- ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD)
- REGIONAL NETWORK ON PESTICIDE FOR ASIA AND THE PACIFIC MEMBER COUNTRIES (RENPAP)
- RUSSIAN FEDERATION
- SLOVENIA
- SPAIN: SPAIN MILLENIUM DEVELOPMENT GOALS ACHIEVEMENT FUND
- SWEDEN
- SWITZERLAND: FEDERAL OFFICE FOR THE ENVIRONMENT; STATE SECRETARIAT FOR ECONOMIC AFFAIRS (SECO)
- TRUST FUND FOR LATIN AMERICA AND THE CARIBBEAN
- UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)
- UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)
- UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO)
- UN PEACEBUILDING FUND
- WORLD HEALTH ORGANIZATION (WHO)

AND MANY THANKS TO ALL OF OUR PROJECT PARTNERS AROUND THE WORLD WHO HELP US MAKE IT GREEN.

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Chapter One is all about greening lives: As you’ll see, we partner with businesses and community leaders to make sure that industries provide services and make products that don’t put workers, local communities or consumers at risk for exposure to toxic chemicals, as well as to generate new green jobs that help young people and women enter the workforce.

Chapter Two spotlights how we make businesses green—which to us means guarding the environment as well as the bottom line. Small and medium-sized businesses make up more than 90 percent of businesses worldwide, so the new methods and technologies we help demonstrate for them have the potential to resonate at a truly global scale.

Finally, Chapter Three illustrates how we help countries go green by sharing know-how that helps governments comply with the international environmental agreements that they make to reduce or eliminate harmful substances. For governments who want to take sustainable industrial development a step further, we advise them on their journey to adopt new overarching policies and strategies.

SUCCESS PLUS SUSTAINABILITY: THAT’S WHAT IT MEANS TO “MAKE IT GREEN”. IN PART I, WE’VE LET THOSE THAT WE HAVE HELPED TO ACHIEVE THESE DUAL GOALS DO THE TALKING.
Grafting makes the plant stronger so if we do it well, more plants will survive and produce fruits and vegetables. Grafting is good for Mexico, too, because it helps to create sufficient jobs for people here. When there is enough work, our lands, our families and our children will all benefit. Grafting has changed my life in many aspects.

Because grafting is specialized work, my salary has improved a lot. Before, when buying a newspaper, I was worried if there would still be light at home, if there would be water. So I said, I will not buy this. Now, I am no longer stressed, thinking, Oh, I will end up in the gutter! I can buy basic things, and I can keep extra money I earn for the future, for my son, for when someone falls ill.

In grafting, you are not outside in the sun all day. Many workers here work on the fields or along the assembly line. Now I work inside the sheltered greenhouse for eight hours a day, and earn more money. People treat me well here; they give me one hour of lunch time.

Working as a grafted made me grow as a person. Even at my young age—I am 18 years old—I am taking care of my own needs, of my house, of my family. I grow in my career, too. I started as a grafted here at Malichita. I had been working here for the longest amount of time and learned quickly how to graft well, so now I work as a supervisor of the other grafters and I train them as well.

Now I see a future that will only get better each day. If I want to study, this job will help me to pay for it. Same goes for my son, when he goes to school.

Because I like grafting, I want to become a qualified trainer in grafting—an agrochemical engineer.
I n Guinea, UNIDO trained more than 4,000 young people and women in solid waste management, including waste collection and sorting, sanitation and the integrated management of public spaces. Many of them subsequently found employment in waste collection centres or took advantage of UNIDO support to start their own businesses. The project offers a hopeful model for addressing West Africa’s most pressing environmental, economic and social problems.

Guinea is also a country where there are problems with handling waste. Where I live, in Labé, the main marketplace was overrun by trash bags. Public places were dirty and unhealthy. As Labé is the second largest city in the country, this was a real problem.

To solve all these problems at the same time, UNIDO brought together women’s and youth organizations to form a composting company where women and young people could work. This eventually led to the Association of Women’s and Youth Organizations for Composting in Labé, Guinea, of which I am now the head. UNIDO experts trained me and many women and other youth in semi-industrial composting techniques and work safety, and also instructed us in how to run a company. They gave us the equipment to compost waste in a safe and hygienic way.

The municipality of Labé helped us as well and gave us a plot of land near the city’s garbage main marketplace. This piece of land that we primarily use to test the quality of the compost, but we also harvest many potatoes from it. Besides composting, we also started to recover and sell plastic to Sodiaplast, a company in Conakry. This gave market value to waste, which helped to clean up the Labé marketplace and provided new jobs along the supply chain of recycling and value creation of organic and plastic waste in Labé area. There are more jobs now and public spaces are cleaner, which helped to improve the social climate in the city.

Personally, the project has given me hope, because I feel useful within my society.

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I remember April 22, 2008—Earth Day—very well. That day, we launched a pioneering environmental clean-up project in the Philippines. Its goal was to address the country’s stockpiles of polychlorinated biphenyls (PCBs), which the Stockholm Convention lists as among the most dangerous pollutants for both human health and the environment.

Specifically, we would build a PCB disposal facility in the province of Bataan. It would use a non-combustion technology—that is, it would not burn the waste but instead destroy it with chemicals.

But in the following months, my excitement turned to worry. We had a problem: The local governor in Bataan had concerns about allowing a PCB storage facility in his municipality. We weren’t sure he would give the approval.

Our partners, including UNIDO and the Department of Environment and Natural Resources, turned to us, the EcoWaste Coalition, to help overcome this problem. We are a public interest network of community, church, school, environmental and health groups pursuing sustainable solutions. We take on issues related to waste, climate change and toxic chemicals.

As part of our responsibilities, we arranged a dialogue between the local governor and representatives from UNIDO and the national government. As a result, the governor gave us clearance to undertake a public awareness campaign, which included participants from the local communities, as well as academicians, fisherfolk and local government officials.

One aspect of this campaign was the introduction of a new superhero, the PCB Eliminator, who was the mascot of the PCB-free Philippines campaign. We also helped with environmental monitoring, including demonstrations of the environmental safety of the non-combustion PCB disposal technology. With help from people in the local communities, including local fisherfolk, we took baseline samples of air, water and soil.

Thanks to these efforts, we gained support from the local communities adjacent to the park where the facility would be located. Ultimately, that support helped overcome the local governor’s objections so that we could get what we needed for the facility: an approved Environmental Impact Assessment Study and local government permits.

Today, the facility stands inside a petrochemical industrial park. However, due to delays, it is not yet fully operational. With many tons of PCB-containing equipment and waste awaiting safe destruction at this facility, we will continue to encourage and support the government to fulfill its commitment to get it up and running soon.

UNIDO works with countries to create comprehensive national plans to dispose of persistent organic pollutants. In the Philippines and other countries, this often means establishing new disposal facilities, which requires the coordination of experts, government officials and local communities.

So, are you up for the challenge? Do you want to help clean up your community? Do you want to be part of the solution? Call us at the EcoWaste Coalition.

I am Mamady M’Baram, President of the Groupement des Femmes pour le Compostage de Labé en Guinée (GFCL). We’re calling all sick of what you’re seeing and smelling—and want to use your passion to make a difference. Together, we can turn trash into opportunity.

MAMADOU DIOULDÉ
DIONFO DIALLO
President of the Groupement des Femmes pour le Compostage de Labé en Guinée (GFCL)

MANNY C. CALONZO
President Officer of the EcoWaste Coalition

CALLING ALL ECOSUPERHEROES

“There are more jobs now and public spaces are cleaner.”

Support from the local communities ... helped overcome the local government’s objections.”

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More than ever, consumers are pressuring companies to operate responsibly. UNIDO’s Corporate Social Responsibility (CSR) projects follow a three-pronged strategy aimed at increasing awareness of the CSR business case, improving understanding of CSR practices and challenges and fostering usage of CSR practices and methods. The overall objective is to improve in an integrated, comprehensive and inclusive manner the social, environmental and economic performance of businesses.

A COMPANY REACHES OUT RESPONSIBLY

Citic Construction Co., Ltd. is the flagship enterprise of Citic Group, specializing in international project contracting. Some 97 per cent of its business is international, so its leadership is naturally concerned with guarding the reputation of Chinese enterprises abroad.

One way to do that is by incorporating CSR into business models. According to the World Business Council for Sustainable Development, “corporate social responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large.”

In 2014, when UNIDO and the China Construction Industry Association jointly launched the CSR Project, Citic Group signed on as a member of the steering committee. After training provided by our certification center, with the support of UNIDO experts on responsible business and the domestic version of the ISO 26000 social responsibility guidance standard, the Citic Group leadership decided to pursue an initiative to improve the conditions in remote villages in Myanmar by donating a $1.5 million fund to 50 villages. Each village had a fund committee elected by the villagers. It managed the fund and provided low-interest micro-loans to qualified villagers.

On 4 February 2015, Yuan Shaobin, the Vice Chairman of Citic Construction kicked off the donation ceremony in the Myanmar capital, and directly transferred the funds to the government of Myanmar.

Ma Chuanfu, the Vice General Manager of Citic Construction, led the CITC-Chayan Pokhand training team, which trained more than 300 fund committee members from the 50 villages. The training team explained how to elect a fund management committee, operate the fund and approve and recover loans. CITC arranged for 500 fund management committee representatives to go to Thailand, where they could study the models of established and successful community funds.

By September 2015, the committees had issued $1.5 million in loans to 8,496 qualified villagers. The villagers used the loans to buy poultry, fishing equipment, areca palm seedlings, vegetable crops and livestock forage, among other things. Some of them opened small shops. Borrowers were able to repay their loans on time, and the funds were then disbursed to other approved applicants.

“EACH VILLAGE HAD A FUND COMMITTEE ELECTED BY THE VILLAGERS.”

TRANSFORMING INTO A GREEN BUSINESS

The former Yugoslav Republic of Macedonia faced significant hurdles when it came to managing polychlorinated biphenyls (PCBs). It lacked effective regulations, legislation, expertise and data, not to mention the disposal facilities themselves. But with the help of a multi-pronged project with UNIDO, the country is now well on its way to eliminating the threats that these harmful pollutants pose to human health and the environment.

Our company maintains transformers. Transformers are the boxes that often sit at the top of electric poles. They shift the voltage of the electronic current running through the wires to a level that people can use in their homes and businesses. For many years, our industry used chemicals called PCBs in the transformer oil to eliminate the heat and sparks generated in the transformer, and therefore prevent fires and explosions.

Unfortunately, PCBs turned out to be harmful to human health and the environment. Our maintenance workers, in particular, faced danger through direct contact with the PCB oil and other contaminated transformer parts. As a matter of corporate responsibility, we wanted to eliminate the exposure of the workers to these chemicals and to prevent further contamination. So, in consultation with the technical experts at UNIDO as well as the Macedonian Ministry of Environment and Physical Planning, we decided to participate in a project to build a proper facility with the technology to deal with the PCB-contaminated transformers.

In addition to the environmental and human health aspects, the project had a business aspect for us. The Balkan region lacked PCB treatment facilities, despite large quantities of PCB-contaminated transformers. Faced with a period of recession and unstable economic conditions, our managerial team decided that it was the right moment to invest in a new potential source of income in order to be able to maintain the financial condition of the company.

Since the installation of the treatment technology, which is both state-of-the-art and reliable, we have made considerable progress with decontamination. So far we have successfully treated 510 tons of PCB-containing transformers.

Moreover, our company now provides a higher level of service than before: When regional businesses send us transformers, not only can we offer diagnosis and repair of standard problems, but we can also identify contaminated transformers, treat them and return them back into the production process.

Our goal is to create a good climate for the next generations, both in an environmental and an economic sense. Just as the appearance of a ray of sunshine through storm clouds can give us hope that the weather will improve, our facility gives us hope that we can eliminate the threat of PCBs to the environment. That’s why we decided to call this facility Eco Ray on the Balkans.

“Our Goal is to Create a Good Climate for the Next Generations, Both in an Environmental and an Economic Sense.”

CHINA

MYANMAR

HAISHAN WANG
Director of the Beijing Zhongguan Certification Centre Co., Ltd.

ACE ANTEVSKI
General Manager of Rade Končar
Fish constitute the main source of animal proteins in our country’s diet, in particular in the south. There, a quarter of fishing products are subjected to treatments such as smoking. Smoking is done for the main part with traditional ovens. Unfortunately, the incomplete combustion of plant fuels in these ovens generates certain persistent organic pollutants that can injure workers and contaminate food. These are carcinogenic and also affect the liver and the immune, nervous and endocrine systems. Indeed, on a visit to Djeffa Beach, a woman who smoked fish for sale complained to our team: “Because of the smoke, I was coughing and I frequently had pain in my eyes.”

Our department is conducting a pilot project with UNIDO to replace several traditional ovens with a new technology using the FAO-Thiaroye Processing Technique. Developed in Thiaroye, Senegal, by a collaboration including the Food and Agriculture Organization of the United Nations, the technique minimizes the production of the pollutants through specialized accesso- ries such as a furnace and filter that can be manufactured locally for less than $60.

In the pilot project, 30 women of Djeffa Beach and 12 women of the market of Gbégaméy are getting these new ovens. As it turns out, women are traditionally responsible for activities that increase the value of fishing products, so the project contributes not only to women’s health, but also to women’s economic empowerment. Other local businesses also benefit. Building the new ovens requires the expertise of local artisans. And the ovens enable the collection of fat as a by-product, which can be used in soap manufacturing.

What’s more, the ovens are environmentally friendly: They require about 50 per cent less fuel and make use of other businesses’ waste. The women of Gbégaméy market, for example, use firewood, manioc peels and sugar cane waste for smoking. Significantly for the women who use them, the new ovens have a bigger capacity than traditional ovens and also generate better quality products. “To sell our delicious smoked fish is really easy,” the sellers of Djeffa Beach proudly told our team. “Because of the smoke, I was coughing and I frequently had pain in my eyes.”

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Refrihogar is a small family enterprise dedicated to refrigeration and air conditioning that started its business in Oaxaca City 24 years ago.

About seven years ago, we started preparing for the switch to new refrigerants as a result of Mexico’s obligations under the Montreal Protocol. We called the National Ozone Protection Unit to request information about a training course on good practices in refrigeration and air conditioning. Later we received an invitation to apply to become a recovery and recycling centre. These centres assist technicians in carrying out good practices, particularly in the recovery and recycling of refrigerants. We were fortunate to be chosen.

Immediately after our selection, we received training, including how to operate the new equipment that we received. We worked for and found a suitable place for our centre in the municipality of San Francisco Lachigoló, some 53 km away from the city of Oaxaca. In Lachigoló people speak Zapotec, one of 18 languages and dialects spoken in the state. In this language, “lach” means flat and “goloo” means large or first. We worked to integrate ourselves and our business into the new community. The construction of our centre began with the submission of our requests for permits to the municipality. In Lachigoló, officials are elected through a traditional form of governance based on indigenous customs and serve on a volunteer basis. They open the municipal offices at 8 a.m. after they have finished with their daytime activities.

It was difficult to get the permits, since many people had concerns about handling refrigerant gases and hazardous waste. We invited those people to our facilities and showed them what we were doing. We explained in multiple visits to the municipality that there was nothing unsafe about what we were doing. On the contrary, our work was to protect the environment.

Finally, we were able to convince the officials, which allowed us to get federal authorization as well. Now we are part of Lachigoló, and our recovery and recycling centre is as well. Lots of our time and effort have gone into opening the centre, but we know that it will bring results. Personally I am very satisfied that I could gain more knowledge in the field that I have dedicated myself to, particularly in that as a woman I am working in a field where traditionally men are employed.

When old refrigerators aren’t disposed of correctly, they can emit gases that deplete the ozone layer. That’s a big problem in Mexico, where small recycling centers often don’t follow proper procedures. UNIDO has addressed this problem by training thousands of technicians, as well as helping to open state-of-the-art recovery and recycling centres throughout the country.

Even the smallest businesses can produce large emissions. That’s true in West African countries like Benin, where individual fish smokers in marketplaces, on the beach and by the roadside unintentionally generate substances that can harm their communities. However, a UNIDO pilot project is showing that change is possible.

WOMEN NET BENEFITS WITH CLEANER FISH SMOKING

A GREEN BUSINESS FINDS A HOME

“THE NEW OVENS HAVE A BIGGER CAPACITY THAN TRADITIONAL OVENS AND ALSO GENERATE BETTER QUALITY PRODUCTS.”

EULOGE LIMA
Biologist/environmental scientist in the Direction Générale de l’Environnement

MARINA PÉREZ
Co-owner of Refrihogar, a refrigeration and air conditioning business in Oaxaca

Refrihogar is a small family enterprise dedicated to refrigeration and air condition-

CLeaner fish smoking

lots of our time and effort have gone into opening the centre, but we know that it will bring results.”

It is important to us to create jobs for local people, to share the training given to us with our workers and to implement good practices in the handling of refrigerants. We know that every activity we conduct contributes to the protection of the environment.

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Our company, located in Songbai town, Hunan Province, is one of the largest state-owned enterprises for metal mining, ore dressing, smelting, processing, and associated trades. Employing over 10,000 workers, we operate some of the biggest mines, including zinc mines. We produce 80,000 tons of zinc annually. In zinc smelting, the heavy metal mercury can enter the environment via exhaust gas and wastewater. The World Health Organization considers mercury to be one of the top ten chemicals of major public health concern. Mercury emissions deposited in watersheds contaminate aquatic environments.

October 2011 marked the beginning of our company’s commitment to preventing mercury pollution. That’s when we signed a letter of intent to join the UNIDO project on reducing mercury emissions in zinc smelting. At that time, our plant was emitting 340 kg of mercury in exhaust gas and 15 kg in wastewater annually.

We adopted best available practices and installed cost-effective technologies to reduce mercury emissions. To reduce mercury emissions in exhaust gas, we invested in mercury-removal equipment in the smelter. To lower mercury concentration in wastewater, we installed special filters to sieves some of the mercury from the water discharged to the wastewater treatment station. In addition, we installed an acidic wastewater circulation system to further recycle mercury from the wastewater. Project activities reduced the amount of mercury released into the environment and the potential risks for surrounding communities. Specifically, we reduced mercury emissions in exhaust gas by half and almost all the mercury in our wastewater. In total, we have reduced mercury emissions by 185 kg annually.

Mercury pollution prevention is a priority for our company. Since the removal rate in the exhaust gas is still relatively low, we hope for an even higher investment in the research, development, and promotion of mercury-reduction technologies. We also believe that there should be efforts to train more managers throughout the sector, as well as to incentivize industries to voluntarily establish a central mercury collection system in order to prevent mercury pollution.

Next to the town of Kedougou, the village of Bantaco is an artisanal and small-scale gold mining community. In our region, gold mining families, as well as people not involved in mining activities, are affected by the health impacts of the use of mercury. Men and women make and burn the gold-mercury amalgam with no safety precautions. Children are often nearby.

UNIDO projects are offering alternatives to this toxic and dangerous process.

UNIDO also installed new equipment that enables gold extraction without using mercury. The extracted rocks are first crushed in a jaw-crusher, then milled in a wet process to avoid dust generation before discharging on sluice boxes. The recovered minerals are then poured on a shaking table. Since gold is a heavy element, shaking naturally separates gold particles from lighter particles. Gold miners were trained to operate and maintain the equipment. This resulted in a higher gold recovery rate and the elimination of the use of mercury in gold mining activities in Bantaco.

Some challenges remain: There is for the time being a lack of data about the quantity of gold that can be extracted through the new equipment; therefore, we are not able to quantify the benefits of the equipment yet. On the other hand, we have no information on the potential quantity of gold that can be extracted from the site. Hence, we would like to see the integration of a weighing device in the existing equipment, as well as a wide dissemination of the equipment across the Kedougou region, as well as in Senegal and West Africa in general. We also have to continue our efforts to formalize our operations and that includes working on health, safety, and gender.

We are happy. As a result of this project, many miners have eliminated the use of mercury in their activities. Therefore, the people of our community are now less exposed to mercury.
S since 2014, when UNIDO’s Resource Efficient and Cleaner Production (RECP) demonstration project was launched in Belarus, the project has helped more than 30 companies to see for themselves how they can cut their production-related costs and at the same time reduce their adverse environmental impacts.

SWEETENING THE DEAL

In recent years, our confectionery factory has been increasing the output and assortment of our sweets and chocolates. We have been renovating production lines and using state-of-the-art equipment. This has enabled us to take the leading position in the industry in our country and to export our products. Due to increasing prices for raw materials and energy, we have been drawing the factory employees’ attention to the necessity to reduce energy and water consumption, as well as waste and effluents generation.

Having been invited to take part in UNIDO’s RECP demonstration project, we eagerly took up the idea, since this approach corresponds to our desire to make the factory’s production more sustainable. UNIDO’s team of experts drew our attention to the huge quantity of “sweet” wastewater we generate. Several tons of such water are generated at the factory every day. This is washover water that is left over after washing production equipment, connection lines, cooking equipment—and it contains various percentages of sweet ingredients. Previously, this water used to be flushed down the sewage line.

UNIDO’s experts asked us if we wanted to try making marmalade filling for chocolate sweets from this water. The simplicity of this suggestion struck us. What used to be a problem and led to expenditures could turn beneficial! Having taken samples of this sweet wastewater, we first produced “sweet water” marmalade in laboratory conditions and then actually started using this water for manufacturing fillings.

At present, our company produces marmalade and other useful by-products from washover water that is left over after the first washing round of containers and connection lines. On average, 3,000 litres of this sweet water are used per shift. This figure includes 300 litres of washover water, of which 15 per cent is actually dry substances that are used in the candy shop. Sweet water left over after the subsequent rounds of washing is now used by another company that purchases it from our factory.

Taking part in UNIDO’s demonstration project showed us the huge resource- and energy-saving potential our company has. We sought UNIDO experts’ assistance and literally opened every door for them so that they could perform a comprehensive audit, using special measuring equipment, to find out our weak points where we are currently losing money. The result was quick. We received a pack of interesting assessments and suggestions that are now being converted into new business plans. We are setting brave and ambitious goals, because we know what we should work on. The joint work of the company’s specialists and UNIDO’s experts helped motivate the personnel to create plans and programmes aimed at RECP.

Ivan Danchanka
Managing Director of JV JSc kommunarka confectionery factory in Minsk

“UNIDO’S TEAM OF EXPERTS DREW OUR ATTENTION TO THE HUGE QUANTITY OF ‘SWEET’ WASTEWATER WE GENERATE.”
I n the 1990s, UNIDO and the United Nations Environment Programme established the first National Cleaner Production Centres (NCPC). Over the next two decades, these evolved into a global network of more than 200 companies, promoting Resource Efficient and Cleaner Production practices in many industrial sectors in developing and transition economies. The NCPC in Serbia, established in 2007, is a particularly strong player in implementing sustainable chemicals solutions in the country, including the promotion of new business models such as Chemical Leasing, by providing technical assistance to industry stakeholders.

DRIVING A SUSTAINABLE AND INNOVATIVE BUSINESS MODEL

We are a manufacturer of metal parts for agricultural machines, business vehicles, mining equipment, transportation equipment and other products on the global market. Specifically, we specialize in bearings and Cardan shafts. Bearings constrain motion and reduce friction. Cardan shafts—which themselves contain bearings—connect components of the drive train, delivering power to wheels.

We pride ourselves in our modern plant, which allows us to produce products that are tailor-made for our customers. But, several years ago, we were not satisfied in one particular area: we were using large amounts of perchloroethylene (PERC), a chlorinated solvent so that it would not escape.

In 2010 we agreed to start the preparatory phase of a Chemical Leasing project with the partners SAFECHEM Europe (a subsidiary of The Dow Chemical Company), Ravago Chemicals (a local supplier of chemicals) and PERO AG (a technical equipment provider from Germany). In 2012 we signed the Chemical Leasing contract for five years, and operations began in 2013.

The project dramatically changed the way we use solvent in our factory. In consultation with SAFECHEM Europe, we altered the composition of the solvent we used to one that would be less corrosive. We installed a distillation unit for recovering wasted solvent on site. And we changed how we stored and transported the solvent so that it would not escape.

We saw benefits almost immediately. Due to these measures, which increased the lifetime of the solvent, we reduced our consumption from 30 tons to 5 tons per year. Additionally, we reduced the amount of hazardous waste we generated from 25 tons to 1.5 tons per year. Remarkably, we no longer emit any solvent at all into the environment or into the working environment.

These changes save us about $100,000 per year, most of it in hazardous waste disposal costs. On top of that we see increased productivity and lowered maintenance costs. And our cleaning costs are now more predictable than they were before. Instead of paying SAFECHEM Europe for solvent, we pay a monthly fee for the number of operating hours.

Our confederation was keen that national development should not come at the cost of the environment. We wanted to develop a comprehensive evaluation mechanism to assess how green a company was and also suggest the way forward. In 2011, with the help of various national and international stakeholding interested by UNIDO, we took a step towards this direction with the launch of the GreenCo rating system—the first of its kind in the world. Since then, the GreenCo rating system has been working an excellent response from Indian industry.

GreenCo is a robust evaluation process that rates the environmental performance of a service or manufacturing company. It awards points to companies based on broad performance parameters, including energy, waste and water management, as well as their supply chains, product stewardship, product life cycles and relationship to their environment. Companies with sufficient points get certification; above that, companies can earn bronze, silver, gold and platinum recognition.

As of June 2014, more than 200 companies are working on the implementation of the GreenCo guidelines. As of August 2016, 78 companies have been certified through the GreenCo rating and the first 27 GreenCo-certified companies have achieved recurring savings of Rs 1.2 million (about $18 million) per year. Following the GreenCo implementation, companies have reported 352 megawatts of renewable energy capacity installed, 44 million kilowatt-hours of energy savings per year, 15 million m³ of rainwater harvested per year and 440,000 tons of carbon dioxide emissions saved per year.

Primarily, the GreenCo rating enables a company to assess where it stands in terms of environmental management. This in turn provides a realistic framework on how to raise the bar of environmental performance and encourages setting a roadmap for source conservation and improved profitability in the long run. It also equips the company to meet future environmental compliance norms.

In addition, the GreenCo rating has facilitated the introduction of newer concepts such as green supply chains, product stewardship and life-cycle assessment. This, in turn, leads to increased efficiency in production and better quality of products. These improvements, in turn, help companies to increase their market share and improve the firm’s overall profitability. In the long run, it helps companies to develop better technological practices and open up new opportunities for growth. This, in turn, helps companies to develop better technological practices and open up new opportunities for growth.

In 2010, the Serbian National Cleaner Production Centre told us about a new business model—a particularly strong player in implementing sustainable chemicals solutions in the country, including the promotion of new business models such as Chemical Leasing, by providing technical assistance to industry stakeholders.
Local solutions are often the most creative as well as the most successful. That’s one reason why, since 1994, UNIDO and UNEP have been working together to build local capacity in Resource Efficient and Cleaner Production (RECP) methodologies in developing countries such as Kenya. National RECP centres established by UNIDO and UNEP around the world provide awareness-raising workshops, training programmes, in-house assessments, technical assistance and policy advice.

**GIVING OUR TEA BUSINESS A LIFT**

We are a member of the James Finlay Group, an international company with a 250-year old history and a focus on tea production. In Kenya, the use of diesel-fueled trucks to transport green tea leaves from our estate to our factory resulted in emissions of greenhouse gases, as well as dust on the all-weather road around the tea fields. This exposed workers in the fields and members of the community to increased air pollution with possible health problems.

In 2010, we received a training on the RECP methodology for the tea sector organized by the Kenya National Cleaner Production Centre (KNCPC). Following that, we implemented a number of measures to better manage energy, water, raw materials and waste. To solve the problem with our diesel-fueled trucks, we decided, with the technical assistance of the KNCPC, to construct a ropeway between the estate and the factory.

This had immediate environmental benefits. Between 2010 and 2011, our carbon intensity went down by 10 per cent. With the planned expansion of feeder streams to the main aerial conveyor line, we will be able to replace even more motor vehicles.

Our community’s economy also benefitted. This project created new jobs, as additional technical and non-technical workers have been employed to operate the system. At the moment, the ropeway provides further direct employment for at least 40 people. Plus, the ropeway has increased employment opportunities for the field workers, who are mostly women, since more green tea leaves can be plucked and transported on time through the system.

From a health perspective, field workers and community members now face less air pollution, as well as a reduction in traffic hazards. As for our bottom line, a cost-benefit analysis of the project between the months of December 2010 to August 2011 showed a net benefit of KES 37,674,739 (some $270,000) per month.

The total capital we invested was KES 60,000,000 ($685,000); therefore, the payback period was just two years. This is a huge financial benefit, and better returns are anticipated in the future as we construct more feeder streams to the main supply aerial conveyor line. What’s more, future ropeways will have even better returns, as they will serve larger production areas and could be loaded closer to their full capacity.

With improved savings both in terms of leaf transportation, reduced fuel consumption and road maintenance costs, our company was able to inject some of the profits into the community in which we work. We funded facility construction and improvement for several schools within the estate, sponsored children of employees and from neighboring districts to attend tertiary education and upgraded the facilities of a health center within the estate, which supports employees, their dependents and also neighboring communities.

Several other players in Kenya are now interested in employing the ropeway system. We have shared information on it through exchange visits with other companies, and regulatory bodies have also helped to disseminate the positive impacts of the project. This innovation has revolutionized the tea industry.

**OUR COMPANY GETS A FRESH PERSPECTIVE**

The Dawlance Group is the biggest home appliance manufacturer in the country. Established in 1991, we are a locally owned enterprise that makes more than 550,000 refrigerators and freezers each year on three assembly lines in two locations. Until recently, like many manufacturers, we were using HFC-134a to blow foam for insulation in these appliances. Unfortunately, HFCs deplete the ozone layer and contribute to global warming, so we wanted to replace it with cyclopentane, which is a natural substance.

The project took 30 months to complete and involved making changes to foam dispensers, storage tanks, safety equipment and other parts. As we progressed, we realized that, although the project seemed to have a limited scope, it would have far-reaching implications on the way we were doing business. It provided an opportunity to revamp our operations to meet growing demand for products and train our workforce on converting our factories to green operations.

As a result, we were inspired to take additional steps to make further improvements. In our factory, for example, we decreased our electricity use and improved our productivity through changing our factory layout. Through better insulation and improved circuitry design, we found we could reduce the power consumption of our refrigerators by 15 per cent. In doing so, we not only helped customers by way of lower electricity bills, but we also helped to mitigate the energy crisis in our country. Not satisfied just to phase out HFCs, we also made plans to replace our refrigerants with cleaner ones. In fact, we made the highest contribution of any company in our country to reducing substances of concern for global warming and the ozone layer.

Importantly, we gained the valuable experience of handling a complex project, which involved the extensive movement of engineers, technicians and experts between two factories some 160 km apart. There were 13 local and international contractors working at two sites, as well as frequent expert visitors from machinery suppliers, consultants and auditors from China, Europe and Iran. Despite the complexities, it all went off without major hiccup.

This project was challenging. But, in the end, it completely changed our perception of global warming and ozone depletion, and we enhanced our image as a green company.
Indurama Ecuador is a company dedicated to the environmentally friendly production of home appliances, especially freezers, fridges, stoves and ovens. One of our main concerns is keeping up with continuous changes in legal requirements, as well as best practices, in refrigeration. In 2010 we conducted a study of new technological solutions and saw that a change was on the horizon: a substance we imported for our appliances (HCFC-141b) would be phased out. Because of its effects on the ozone layer and on global climate.

"We were able to make all of the changes without any loss of product, any long downtimes and with personalized training to our technicians." This technological conversion led Indurama to a new work culture in our facilities regarding safety and risk management, and at the same time helped to increase exports and extend markets. However, the most remarkable thing was that, through the expertise of UNIDO’s supplier companies and consultants, we were able to pick the right equipment for our plant and for the needs of our national and international markets. These changes improved the quality of our products, enabled them to meet high environmental standards and reduced factory downtime.

The project helped us become the company that we want to be, in full compliance with national regulations and standards, acting responsibly toward our local and global communities, and with outstanding fulfillment of our policies on product quality and the environment.

As our company philosophy states: "We believe that every effort made today to optimize the use of natural resources will contribute to the quality of life that the future generations will have."

"To make every single product, we need steam." This is why making more of these products, including those called disins, under the Stockholm Convention.

The Ministry of Natural Resources and Environment approached us about being a pilot demonstration facility for a project with UNIDO that would both help our country meet its Stockholm Convention obligations and reduce climate impacts. It was a good business opportunity for us, too. After an initial assessment, we decided that it would be better to install a new boiler than retrofit the old one. We would invest in new infrastructure, including the boiler housing, and they would provide the boiler.

We've had the new boiler since March this year. I feel great. I am saving money. What's more, the old boiler made 2 to 3 tons per hour of steam; the new one makes 5 tons per hour of steam, and the steam is steadier, which improves our efficiency.

We are taking advantage of the savings and increased capacity to invest in new products, such as pineapple juice for export. We are also able to lower the price of our products, making them more competitive with those from other countries like Thailand and Vietnam. More than 70 per cent of our population makes a living from agriculture, so boosting agricultural exports could have a big effect on our country’s prosperity. What’s more, as we grow, our company is committed to employing more members of the local community in our factory. It’s nice to have the opportunity to show to the world that, even though ours is a small country, we’re capable of producing this kind of agricultural product for the international market.

From 2010 to 2016 UNIDO showed six Southeast Asian countries how to minimize pollution and climate effects by replacing and retrofitting old boilers. In Lao People’s Democratic Republic and other countries, new boiler regulations, inspired by the project, ensure that the benefits will continue.
**Home Appliances Go Eco**

In 1994, a workshop in Xi’an of all of China’s domestic refrigeration companies kicked off its association’s cooperation with UNIDO. The sector had recently then started to replace chlorofluorocarbons (CFCs), both as refrigerants in the appliances and as foaming agents used to make the insulation for the appliances. At the workshop, UNIDO experts helped educate the companies’ engineers by presenting new developments in alternatives to CFCs. After the workshop, we started work with compressor companies. Converting compressors to work with new refrigerants is complicated but necessary for phasing out CFCs. In 1996, UNIDO became the International Implementation Agency for all of the enterprise conversion projects in the domestic refrigeration and compressor sector in China. Throughout the late 1990s and early 2000s, UNIDO experts provided specialized knowledge and constructive suggestions to every conversion project. Indeed, UNIDO foresightedly recommended a natural gas as a substitute for CFCs in the domestic refrigeration sector, which since has become the main alternative in the rest of the world. Then, in the early 2000s, UNIDO helped us develop a plan to phase out the remaining CFCs in the entire domestic refrigeration sector. During the implementation, UNIDO provided technical and safety trainings in the use of the replacement substances. By 2002, CFCs were successfully phased out in the sector. It was a big achievement.

At that time, the focus of the Montreal Protocol shifted from CFCs to hydrochlorofluorocarbons (HCFCs), and thus the cooperation between UNIDO and our association shifted from the domestic refrigeration sector to the air-conditioning sector. We are now working together to limit the use of HCFC-22 in air conditioners in order to fulfill China’s international commitments. Since 2009, we have also developed demonstration projects for air conditioners and compressors using environmentally friendly R-290 technology. In order to promote R-290 in air conditioners, we released an eco-label in collaboration with many government and international agencies including UNIDO. The launch event took place at the Appliance & Electronics World Expo in Shanghai in 2015. Major manufacturers from the industry— Gree, Midea, Haier, TCL, Hisense, Changhong, Yangzi and Chunlan—showcased their air conditioners using R-290 refrigerants with the R-290 logo on the machine. This launch event is the culmination of many years’ work on alternative refrigerants. We expect the logo to be widespread within the next three years.

**“Converting Compressors to Work with New Refrigerants is Complicated but Necessary for Phasing Out CFCs.”**

Will boost the market for R-290 air-conditioning units in China. To enable the sharing of information and experiences, we, along with related international agencies including UNIDO, have organized an annual international workshop on alternative technologies in room air conditioners since 2008. The reduction of HCFC-22 is going smoothly, and the fruitful cooperation between UNIDO and our association continues.

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**Thinking Outside the Bin**

I have been working with Green Target for over 15 years now as a consultant to various types of industries in Israel such as the metal, polymer, chemical and electronics sectors, mainly in establishing and introducing environmental management. We started as a small company but today we are 38 people, managed by me and my partner.

When Israel became a member of the Organization for Economic Cooperation and Development (OECD) in 2010, the government decided to raise our environmental requirements to the standards of other OECD governments. As a result, the regulation has become stricter and consequently raised the demand from companies for our help in meeting the environmental requirements.

Over time, some organizations have realized that the way to handle the more stringent regulation requirements is related to proper environmental management, and there are some companies that feel that they need to do it even better. Resource efficiency is better environmental management. Making wise decisions regarding the root cause of emissions, where in the plant they are generated and how we can prevent them in the first place, is good environmental management. The concept of MED TEST II, introducing the connection between energy efficiency, material efficiency and pollution reduction, is not necessarily new. But it offers a practical approach.

That is what is special about this project. I feel that I look at things differently now, not only in the projects that I do for MED TEST II, but also with other customers. For example, while working with one of our clients in the chemical industry, one of our consultants was dealing with a point-source air emission issue. His first approach was to suggest a scrubber as an end-of-pipe solution. But I challenged him to find a more resource-efficient process. As a result, the consultant managed to come up with an alternate technology, which reduced the company’s use of the emitted substance.

When consulting for one of the companies in the MED TEST II project, we tried to understand the production process and identify cost-saving measures out of a TEST perspective. We did a so-called Material Flow Cost Accounting to see where they lose their money. As we were doing an early walk-through of the factory, I noticed that a lot of the products lying under the machine on the floor eventually ended up as scrap, only used for recycling. My suggestion was to start measuring the quantity by putting everything that fell on the floor into big bins.

A couple of weeks later I asked if they had the numbers from the bins. In fact, the bins were nearly empty because the production people had observed the quantity of the waste and had promptly fixed the production line, preventing products from falling on the floor. When you show the people the numbers—for example, to buy this raw material costs you a certain number of euros per ton, and you get one-tenth of that value back when you recycle it—then it clicks. The dollar value grabs the attention of top managers. If they exceed pollution limits in the wastewater because some raw materials end up going into the wastewater, it bothers them, since they may have to pay a fine, but it bothers them even more when they realize how much money they are wasting by losing that raw material they purchased.

As consultants we help people to look differently at the problems they face with new tools of strategic thinking. That is better environmental management.
The Montreal Protocol successfully banned the refrigerants called chlorofluorocarbons (CFCs), substances that deplete the ozone layer. Unfortunately, their most common replacements, hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), are potent greenhouse gases, and can contribute to climate change, which is why those are now also on the chopping block in many climate-conscious countries, including St. Vincent and the Grenadines.

When I was appointed as National Ozone Officer in 2004, we were not in compliance with the Montreal Protocol, and I had just a few months before my appointment gone to the Executive Committee of the Ozone Secretariat with an action plan to return to compliance. In a few short months we were able to fulfill our obligations and went on to completely phase out CFCs three years ahead of our target and started to focus our attention on introducing energy-efficient, climate-friendly and ozone-friendly alternatives such as hydrocarbons.

Our country has a good reason to be ambitious about climate policy. We are a 32-island nation in the Eastern Caribbean that is vulnerable to climate-related natural disasters, such as floods, landslides and drought. We have lost a lot of our beach area over the years to sea-level rise and storm surges. Nonetheless, we feel fortunate: we often joke that God has to be Vincentian, since most hurricanes in our vicinity do not directly impact us.

We like to think beyond what is in front of us, so when it was time to develop our HCFC Phase-Out Management Plan we could not see the point of moving from CFCs to HCFCs and then HFCs, which are also greenhouse gases that many in the international community were discussing a ban on. We did a local market assessment and noticed that most of the appliance suppliers were already bringing in appliances that use hydrocarbons. We thought, why not go for an accelerated phase-out, and use hydrocarbons as our alternative? This would enable us to skip a second phase-out later—just cut out the middle, and go as close to the end as possible.

With UNIDO as our Technical Implementing Agency, we submitted our plan to the Executive Committee of the Ozone Secretariat. We said we’d go beyond the 35 per cent mandated HCFC phase-down by 2020, and we proposed a 100 per cent phase-out by 2025. They thought it was a bit ambitious, but I thought I know my market well enough, and I know my technicians. The committee approved it, and we went home and started implementing it right away. As it happens, we have already met our 2018 target two years ahead of schedule.

Training our technicians was essential. They were not familiar with hydrocarbons, so initially when they serviced appliances with hydrocarbons, most would replace the hydrcarbons with HFCs. Of the five main servicing companies in our country, three of them have sent all their technicians to our training. A few of the other companies’ technicians take their own initiative to attend. We have also partnered with other government and private-sector agencies to deliver training to their technicians over the years. Because of the small scale of the industry, a lot of our technicians do one-off servicing. They come to us asking for our recommendation on certain jobs. Even if we are not getting full support from all of the companies, the individual technicians are doing their part.

We need to improve the supply of hydrocarbons. We have the equipment on the market, but sometimes no refirgerant to service it. We are also heading in the direction of technician certification, so that if you’re not certified you can’t legally purchase or use the refrigerant. The National Ozone Unit now tests all refrigerants that enter at the port. UNIDO, our Implementation Agency under our HPMP, assisted with the provision of the equipment. We have had a few attempts at illegal imports. I hope that more countries will try for an accelerated phase-down of HCFCs. If we can do it, other countries can do it, too.
Thanks to the new studies and strategic planning we did as part of this project, national authorities will be able to make more informed decisions regarding POPs in order to protect human health and the environment.

This project will benefit the Honduran population in general. What’s more, since POPs disproportionately affect society’s most vulnerable groups, such as children, the project worked closely with participants from organizations related to early childhood, such as the Secretariat of Health and the Pan American Health Organization, in information gathering and strategic planning.

Most importantly, we have goals for the future: among them, to strengthen our institutional regulatory capacity, human resources and finances, to adopt international best environmental practices and best available techniques for industrial POPs and to deal with unintentional POPs generation through the integrated management of solid waste.

This project has been recognized for its transparency, as well as its ability to adapt to the challenges of a changing national context. As we are the first in our region to comply with our commitment to review and update our National Implementation Plan, we hope we can be a model for other countries in Latin America.
UNIDO and UNEP cooperate in assisting 25 countries in the sub-Saharan African region with the phasing out of hydrochlorofluorocarbons (HCFCs), which are substances that can contribute to ozone depletion and global warming. In Chad, the implementation has been particularly successful thanks to a well-established refrigeration association, as well as a strong cooperation between the stakeholders—the Ozone Unit, the refrigeration association and the training institutions.

For our HCFC phase-out, UNIDO’s task was to provide the needed equipment, as well as the training on its use. After delivery of the equipment, UNIDO sent experts, who trained 25 trainers on its use. Subsequently, those trainers did further technician trainings in the provinces.

After the training, we had meetings with the refrigeration association, which has 1,200 members, and the customs department to discuss the distribution of the equipment that was provided by UNIDO. Some equipment went to six Centres of Excellence, which are hosted in technical education institutions. At those centres, 450 professional refrigeration technicians were trained, including in recycling, recovery and reuse of refrigerants. In addition, since the equipment is at technical educational institutions, 500 students were also trained as part of their education.

As new students enroll, they also get trained. In addition, some equipment was given to the refrigeration association and to customs.

Customs got the identifiers, which are the tools that can say what gas is in the containers that are being imported—that is, whether the containers are correctly labeled, or whether they contain counterfeit refrigerants. One hundred and twenty-five customs officers were trained on the use of those identifiers so that they can control the imports.

Sometimes we have trouble when equipment breaks. Spare parts are often not available locally. In some cases, spare parts came with the equipment, but it’s not always enough. Plus, we lack technicians with expertise to repair some sophisticated equipment.

It’s important to keep the equipment in order because we continue to use it to train technicians and customs officers, as well as for the recovery, recycling and reuse of refrigerants, in order to avoid venting those substances into the open.

Our government has been undertaking commendable work to effectively phase out ozone-depleting substances and the equipment that uses them. We have published the regulations in the Gazette of Eritrean Laws (which makes them legally binding) and trained customs officers and legal officers to implement the regulations, and we continue to collect data at entry points to ensure that the regulations are strictly followed and actual importation matches quotas. We have established training centers for the refrigeration and air-conditioning sector and distributed tools and equipment to that sector, and we conduct ongoing training and regular monitoring of technicians. We also promote public awareness.

As Eritrea closed in on the complete phase-out of the ozone-depleting substances called chlorofluorocarbons (CFCs), one of our main problems was the availability and trade of fake refrigerants. Often, these are mixtures of different types of refrigerants, such as recovered refrigerants originating from other countries. It is also a common practice to hide low-cost refrigerant under the trademark of more expensive and widely used coolant. Fake refrigerants cause equipment failures, and as a result, the refrigerant may be vented, leading to the emission of ozone-depleting substances. UNIDO provided tools and training to help us deal with the problem of fake refrigerants. This included equipment called ultima ID Pro, which can identify the contents of refrigerant cylinders.

The equipment was distributed to customs of the main ports, as well as the National Ozone Unit (NOU) office in Asmara and other cities. The NOU provides refrigerant identification services to all stakeholders, including service technicians and importers. Based on test results, the refrigerant is either seized or allowed for trade and use. Through this service several bottles of fake refrigerant have been found and seized by the authorities.

In one particular case, we examined a bottle labelled R-134a. Using the new equipment, we identified the origin of the refrigerant as contaminated R-22. It was composed of 90 per cent R-22 and 10 per cent R-410a. We have encountered similar problems on other occasions. This practice is now being eliminated.
Les Vergers Du Mekong—which means the orchards of the Mekong River—was founded in 2000 by a French health-food specialist. Our factory is in an industrial park in Can Tho, in the heart of the richest orchards of Viet Nam. Thanks to this proximity, we commit to build trust with local farmers through long-term relationships.

We produce small-batch coffee, organic single-strength and artisan-created jams, directly collected from farms in the Mekong delta and the central highlands. Concern for the environment was one of the company’s founding philosophies and is a fundamental founding principle. The company is an audit VoIsIn managed by Jean-Luc Voisin. The company’s mission is to be sustainable and competitive in both domestic and foreign markets.

In order to be competitive in both domestic and foreign markets, we have also worked to reduce our costs. In August 2015, we received an invitation to an informative workshop of the UNIDO Eco-Industrial Park (EIP) Project. They proposed to bring us technologies, knowledge and methods that help minimize wastewater and chemical waste through cross-industry resource efficiency. Similar projects are underway in Indonesia, China, India, South Africa, Colombia and Peru.

During the project phase, we identified other important improvements that would better protect the environment and especially reduce water consumption, including a cooling system incorporating a chilled-water plant, a tunnel to recycle the water and process our own chilled water and a fruit-washing machine. None of those investments would improve the efficiency or the profitability of the production. They are purely environmentally oriented. What’s more, those investments would cost about $200,000, which is quite consequential for a business of our size. That’s why, in the long run, UNIDO’s support for the next investment phase towards a sustainable development is crucial.

We hope other companies in our industrial park will follow this eco-friendly path with the support of the UNIDO EIP Viet Nam Project. To increase productivity and competitiveness, reduce costs and waste, increasing efficiency and decreasing the negative impact of the production process on the environment.

AN AUDIT BEARS FRUIT

CLEANING UP LEATHER

The leather sector is one of the most important economic sectors in Tunisia. However, the industrial process involved in leather production uses high quantities of water and chemicals and is, next to the oil industry, one of the most polluting production sectors in the world. For us in Tunisia, it is important not only to decrease pollution and improve the environment, but it is also equally vital to strengthen the competitiveness of the leather production sector and to create new opportunities for green jobs. At the Centre National du Cuir et de la Chaussure (CNCC), we work together with UNIDO to improve the production standards of the Tunisian leather industry when it comes to the environment and resource efficiency. Together with UNIDO, we demonstrated in the MED TEST project, which ran from 2009 to 2013, that the transfer of environmentally sound technologies (TEST) not only reduces costs for the producer but also reduces pollution from leather production. For instance, one of these solutions is the installation of an anaerobic filter to valorize the waste from leather production. A major part of this waste is made of the lower layer of the skin and the underlying fatty tissue. Instead of flushing this into the water system, we established a process where it gets turned into resources for making soap and fertilizer. The circular economy model, where we increasingly recover the materials and energy from used products, is becoming more and more important in the international development agenda and also for us in Tunisia. We consider this a pioneering and thrilling concept, which could solve some of the global environmental, social and economic challenges that existing economic models fail to address.

Following the successes of the MED TEST project, MED TEST II gives us the chance to raise awareness among companies by implementing Resource Efficient and Cleaner Production tools to help them to simultaneously improve their economic performance in terms of productivity and competitiveness, reduce their environmental footprint through measures related to the effective use of resources (water, energy and raw materials) and prevent pollution at source. This approach will create green job opportunities through the establishment of a sustainable industrial waste exchange that links industrial waste generators, potential users and waste recyclers in order to improve cross-industry resource efficiency. For example, the leather plant that began recovering waste in the framework of the MED TEST project created more than four jobs, including one engineer, two technicians and one worker.

Our expectation is that MED TEST II will help us to develop the sector for local Tunisian TEST experts, who will give advice to Tunisian production facilities on how to meet environmental standards that will lead to better products, a cleaner environment and improved competitiveness of the Tunisian leather industry on the global market. This will lead to new export markets for Tunisian products and services and could attract more foreign investors in Tunisia. The circular economy model, where we increasingly recover the materials and energy from used products, is becoming more and more important in the international development agenda and also for us in Tunisia. We consider this a pioneering and thrilling concept, which could solve some of the global environmental, social and economic challenges that existing economic models fail to address.

In recent years, rapidly developing industrial zones have brought about socioeconomic development in countries such as Viet Nam, but there have also been environmental downsides, as many of these parks don’t have waste-appropriate management and wastewater treatment systems. Since 2014, a UNIDO project has aimed to convert these zones into eco-industrial parks, where companies work together to reduce waste and increase resource efficiency. Similar projects are underway in Indonesia, China, India, South Africa, Colombia and Peru.
In Chapter Four, we’d like to share our vision for sustainable and inclusive industrial development with you. It’s a vision that ties all our work together.

After that, we’d like to introduce ourselves. We’ve gathered facts about our team, both serious and silly. Because our projects are diverse, we must be, too. Then, if you’re ready for a little fun and relaxation, try your hand at solving the crossword puzzle and coloring the sustainable-development-themed mandala we made.

Finally, we close these pages with a timeline that touches on many of the big themes that are in these pages. The Department of Environment was established in its current form just last year, but you’ll see that our portfolio has been a long time in the making.

If you’d like to get to know us even better, you can join us on our website, YouTube and social media pages, which are listed on the back cover. We hope to see you soon!
WHAT WOULD TRULY SUSTAINABLE INDUSTRY LOOK LIKE?

IN OUR DEPARTMENT, THAT’S A QUESTION WE THINK ABOUT EVERY DAY, WHETHER WE’RE HELPING A LOCAL SRI LANKAN COCONUT MILL REDUCE EMISSIONS AND REUSE ITS WASTE PRODUCTS, OR ADVISING THE GOVERNMENT OF PERU ON THE DEVELOPMENT OF A COUNTRY-WIDE, MULTIDISCIPLINARY, TECHNICAL COOPERATION PROGRAMME TO UNDERPIN ITS FUTURE DEVELOPMENT STRATEGY.

Over time, one approach to sustainable development has gained traction among economists, policymakers and business people, and has also caught our attention. It’s called the circular economy. Although there are many conceptions of the circular economy, they all describe a new way of creating value, and ultimately prosperity, through extending product lifespan and re-locating waste from the end of the supply chain to the beginning—in effect, using resources more efficiently by using them over and over, not only once.

By and large, today’s manufacturing takes raw materials from the environment and turns them into new products, which are then disposed into the environment after use. It’s a linear process with a beginning and an end. In this system, limited raw materials eventually run out. Waste accumulates, either incuring expenses related to dis-posal or else polluting—indeed, a 2012 World Bank report estimates that municipal waste generation will double over the next 20 years in low-income countries. On top of that, manufacturing processes are often them-selves inefficient, leading to further waste of natural resources.

In a circular economy, however, materials for new prod-ucts come from old products. As much as possible, ev-erything is reused, remanufactured or, as a last resort, recycled back into a raw material or used as a source of energy.

EMBRACING THE CIRCULAR ECONOMY

Governments are encouraging—and, in some cases, requiring—the adoption of circular economy principles that would lead to more resource efficiency and less waste. At the global level, the Sustainable Development Goals, adopted by the United Nations Member States in 2015, include many related ambitions.

At the country and regional level, in 2008 China was among the first to adopt a circular economy law pro-moting the recovery of resources from waste. In that same year, the G8 environment ministers agreed on an action plan for the 3Rs: reduce, reuse and recycle. It mentioned the Japanese concept of “mottainai”, which expresses that it is a shame for something to go to waste without having made use of its potential in full—something that happens with regularity in a linear economy. Following on that, the 2015 G7 Sum-mit Leaders’ Declaration underscored the need for “sustainable supply chains” that protect workers and the environment.

Then, in late 2015, the European Union adopted an ambitious Circular Economy Package, including goals for food, water and plastics reuse. “The message is that while you are pro-ecting the environment you can boost your economic develop-ment and provide new growth and new jobs,” said then European Commissioner for Environment Janez Potočnik in support of the EU Circular Economy Package in 2014. This package not only sets ambitious and prioritizes approaches, but also facilitates national and international exchanges, for example by defining standards for the exchange of goods other than pure resources and new products.

Indeed, there is a strong business case to be made for the circular economy. For example, Dutch technology company Philips refurbishes medical equipment such as MRI systems, and Chilean pump technology company Neptune Pumps remanufac-tures energy-efficient pumps from reused and recycled pump material. Mexican brewer Guahtemoc Moctezuma Heineken Mexico and American computer company Dell, as well as smaller companies such as Serbian rolling-element bearing manufacturer FNL Toment (see page 22) are also leaders in adopting circular economy principles.

By designing products with resource recovery in mind, they can protect themselves from price changes in the raw-materials market by creating another source of raw materials, as well as maintain longer-lasting relationships with consumers by ensur-ing contact throughout a product’s life cycle.

There are also efficiency gains: According to the Ellen MacArthur Foundation, by 2050 about $1 trillion per year of materials cost savings could be generated from circular-business models. National economies, entrepreneurs and employees will benefit, as they form new businesses and create new jobs to fill niches created by the circular economy, such as resource recovery and remanufacturing.

UNIDO’S MANDATE: INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

• Advancing Economic Competitiveness: Advancing rapid economic and industrial growth by fostering entrepre-neurship, building trade capacities, ensuring all coun-tries benefit from global trade and technological prog-ress, applying modern policies, standards and norms
• Creating Shared Prosperity: Advancing poverty erad-ication and inclusiveness by building productive capacities, increasing opportunities for all women and men across social groups
• Safeguarding the Environment: Advancing environmen-tally sustainable growth by greening industries through cleaner production technologies and resource efficien- cy, creating green industries including via waste man-agement and recycling, supporting energy transitions, implementing multilateral environmental agreements

GREENING THE FUTURE

CHAPTER FOUR
We find this vision of the future compelling, but we also recognize that, while the circular economy has the potential to improve resource productivity and reduce environmental impacts, it may face particular challenges in developing countries—especially least developed countries—due to limited access to knowledge and new technologies.

As we think back 50 years of environmental work at UNIDO, we see how companies and individuals have come together to address environmental challenges. Today, these have grown into a global network, called the UNIDO-RECPNet, with over 70 members specialized in providing resource efficiency services and receiving targeted RECP training. The network has helped generate synergies yielding over $10 million in savings and an over $16 million revenue increase, as well as 11,700,000 tons of reduced landfill. Other ongoing UNIDO projects—in China, Colombia, Ethiopia, India, Indonesia, Morocco, Peru, Senegal, South Africa and Vietnam—will showcase the potential of the eco-industrial park model. Eco-industrial parks could make important contributions in the move towards the circular economy, both in industrialized and developing countries. (See page 36.)

A crucial component of resource efficiency is, of course, energy efficiency. In promoting RECP, our programmes advise companies on means to increase energy efficiency. Projects replacing or retrofitting equipment such as industrial boilers not only reduce the emissions of hazardous pollutants such as dioxins, but also frequently improve energy efficiency. (See page 22.) In UNIDO’s Department of Energy, our colleagues go beyond simply acquiring energy-efficient equipment by optimizing energy systems in industries and developing international energy management standards and by bringing clean and sustainable energy solutions to industries, helping to reduce reliance on non-renewable natural resources.

Our colleagues in UNIDO’s Department of Agri-Business Development are working to increase the proportion of produce consumed to what is actually being harvested, currently under 50 percent in many countries. Innovations include optimizing of storage and cold chain, but also waste reduction through improving technology, optimizing processes and making use of by-products.

**Better Products with Longer Lives**

We aim not only to eliminate toxic substances from products as early as during their design phase, but to also find them contaminated, we also treat them post-production at the same time expanding their lifespans and enabling easier recycling and reuse.

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Most simply, perhaps, we can also increase a product’s lifespan by designing it for longer life, as well as making sure that quality technicians are available to repair it. That’s why we encourage companies to take the opportunity to improve their products’ overall quality at the same time that they convert their production lines away from ozone-depleting substances. We’ve also set up regional training centres and facilitated large-scale technician and student trainings in the refrigeration and air-conditioning sector. This ensures that the appliances will work as well as they should for as long as they can. (See pages 31 and 34.)

In China, we are just beginning with a project that will redesign products to make them easier to reuse, remanufacture and recycle, a concept called “cradle-to-cradle”. We are co-operating with industries that are looking into the requirements and process of remanufacture, disassembly and recycling. After establishing this know-how, they will redesign products to simplify disassembly and recycling, and to prolong the useful life of the product.

**GIVING WASTE NEW LIFE**

Products contain valuable resources, which usually go unused once the product reaches the end of its life. This is particularly true for electric and electronic products, which are rich in copper and many other scarce metals and materials that can also pose some environmental and health risks. According to a study conducted by the United Nations University, more than 40 million tons of e-waste was generated globally in 2014, and very little of that is collected in an environmentally sound manner, or treated. New industries that provide e-waste services will protect the environment from contaminants such as mercury and cadmium, recover raw materials, provide affordable refurbished products and create new green jobs. We are supporting electric and electronic waste recycling industries in developing countries such as Cambodia, Ethiopia, Uganda and the United Republic of Tanzania, and are working to extend our projects throughout the Economic Community of West African States (ECOWAS) and the Southern African Development Community (SADC), as well as regionally in 13 countries in Latin America. Similarly, we have projects that create solid-waste management industries in places where none existed, such as Labé, Guinea. These industries bring health to the whole community, as well as jobs—in this case, largely to youth and women. In order to create more value from the waste they collect, the workers compost organic waste and sell plastic waste to recyclers. (See page 12.)

And returning to our cradle-to-cradle project in China: It does not only aim to change product design for longer life and better recycling, but also more generally to learn how to design good products without using what might become later hazardous substances, as well as how to use more bio-degradable plastics. Both changes in the product design will help to reduce risks that any remaining waste poses to the environment.

**OUTSIDE THE CIRCLE**

Although the circular economy would ultimately dramatically reduce the need to extract non-renewable resources, at least some extraction will no doubt continue for many years to come. That’s why some of our focus must remain on making those existing extraction industries safer and cleaner for the people who work in them and live around them. Take artisanal and small-scale gold mining, which is responsible for approximately 37 per cent of global anthropogenic mercury emissions. According to UNIDO estimates, practically 100 per cent of the mercury used to extract gold is released into the environment, putting miners, communities and nature at risk. Fortunately, we are not only bringing mercury-free technologies to often-informal gold mining communities; we are also working to develop these into more formal, higher-income small-scale industries, ensuring their long-term viability. (See pages 18 and 19.)

A circular economy will drastically reduce waste, but will not eliminate it. The remaining waste becomes particularly problematic when harmful substances are present. Under the Montreal Protocol (ozone-depleting substances) and the Stockholm Convention (persistent organic pollutants) we have worked with countries to help them phase out harmful substances in products ranging from refrigerators and transformers to fish and tomatoes. (See pages 11 and 16.)

We have supported developing countries’ industries to replace ozone depleting substances—frequently having a very high global warming potential—resulting in avoiding the use and potential emission of 338 million tons of carbon dioxide-equivalent per year. According to the US Environmental Protection Agency, this equals the annual carbon dioxide emissions of 79 coal-fired plants or 71 million passenger vehicles in the United States. We have also helped countries to find ways how to destroy any of these substances that were remaining behind as waste, to ensure that they will not cause any harm in the future. (See pages 13, 32, 33 and 35.)

Our vision for a truly sustainable industry is drawn from the possibilities we see all around us in our daily work. The building blocks of a circular economy do not need to be invented; they already exist, and we have been putting them in place in industries all around the world for the last 50 years.

The case for industry to buy into the circular economy is remarkably compelling. A circular economy reduces resource dependency and resource use, thereby reigniting production costs, narrowing market exposure and limiting costs stemming from resource extraction and generation. It additionally leads to the introduction of economically viable methods of reducing pollution, and separating harmful from reusable waste material.

Beyond individual enterprises, these benefits further extend to entire industrial sectors, or even national economies. The circular economy encourages inter-company exchanges and synergy building, leading to better economic, social and environmental performance. This in turn helps raise the overall performance of national economies and opens up new markets and jobs.

On an international level, the circular economy facilitates the exchange of goods across borders by introducing standards to new raw materials that were previously considered waste. Improved product characteristics such as extended lifetime, recyclability and serviceability further help ensure that products can be used and sold on the global market. By helping overcome international trade barriers in this way, the circular economy offers new possibilities by which countries can prosper.

Countries today stand at a turning point. On the one hand, the pursuit of unsustainable, linear patterns of consumption and production threatens the well-being of future generations, while on the other hand, a restorative approach to increased prosperity is opening itself up to the world. Together with our global partners, and in service to our Member States, UNIDO will continue to advance economic competitiveness, create shared prosperity and safeguard the environment in the world’s developing and transition countries.
UNIDO’S ENVIRONMENT DEPARTMENT

**Number of projects we have undertaken in the last five years**

- **414**

**Our regional balance of projects in the last five years**

- **GLOBAL**
  - Projects: 4% | 18
- **SUB-SAHARAN AFRICA**
  - Projects: 22% | 102
- **GULF STATES**
  - Projects: 8% | 35
- **INTER-REGIONAL**
  - Projects: 9% | 41
- **THE AMERICAS**
  - Projects: 15% | 73
- **NOthern AFRICA**
  - Projects: 11% | 53
- **EUROPE**
  - Projects: 14% | 68
- **ASIA AND PACIFIC**
  - Projects: 17% | 80
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  - Projects: 8% | 35
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- **ASIA AND PACIFIC**
  - Projects: 17% | 80

**Number of colleagues working in our field offices**

- 288

**Number of us working at headquarters**

- 120

**Number of languages we speak**

- 42+

**Number of countries we are citizens of**

- 36+

**Number of languages we are learning**

- 13+

**Number of countries we visited on mission in 2015**

- 81

**Number of colleagues working in our field offices**

- 288

**Number of us working at headquarters**

- 120

**What we drink for energy at work**

- **Coffee**: 51%
- **Water**: 23%
- **Tea**: 18%
- **Soda water**: 2%
- **Soft drinks**: 2%
- **Mate**: 2%
- **Nothing**: 2%
WORK IN WORDS

1. Most successful multilateral environmental agreement
2. City after which a Convention on persistent organic pollutants was named
3. A Convention on this element was named after a city in Japan
4. A service-based business model for chemical industry
5. Number of the Sustainable Development Goal mainly promoted by UNIDO
6. Country where UNIDO’s Headquarters is located
7. Your computer or smartphone, once discarded
8. Chemical in the stratosphere protecting Earth from ultraviolet rays
9. Able to continue for a long time without completely depleting natural resources or compromising the well-being of future generations
10. Convert into reusable material
11. Everything around us
12. Use again and again
13. Produce them, release them, why not reduce them?
14. Gases that contribute to climate change
15. Age of UNIDO in 2016

MAKE ME GREEN! OR RED! OR YELLOW!

CHECK YOUR SOLUTION AT HTTPS://WWW.FACEBOOK.COM/ENVIRONMENTDEPARTMENTUNIDO
WE MAKE IT GREEN
KEY MOMENTS FOR UNIDO’S DEPARTMENT OF ENVIRONMENT

1966
UNIDO is established to promote and encourage international cooperation in industrial development.

1974
UNIDO and the United Nations Environment Programme (UNEP) agree to form the UNIDO-UNEP joint programme.

1975
Following successful demonstrations in developing and transition countries, India, India, India, India, India.

1979
The United Nations Conference on Trade and Development (UNCTAD) adopts India, India, India, India.

1981
The United Nations Industrial Development Organization (UNIDO) is established as an autonomous specialized agency.

1985
The Stockholm Convention on Persistent Organic Pollutants (POP) is adopted, India, India, India, India.

1988
The Vienna Convention for the Protection of the Ozone Layer is adopted, India, India, India, India.

1991
The Ramsar Convention on Wetlands is adopted, India, India, India, India.

1992
The United Nations Conference on Environment and Development (Rio Earth Summit) is adopted, India, India, India, India.

1995
The Kyoto Protocol to the United Nations Framework Convention on Climate Change is adopted, India, India, India, India.

1997
The Montreal Protocol on Substances that Deplete the Ozone Layer is adopted, India, India, India, India.

2000
The International Labour Organization (ILO) adopts India, India, India, India.

2001
The World Trade Organization (WTO) India, India, India, India.

2005
The Millennium Development Goals (MDGs) are adopted, India, India, India, India.

2010
A global financial crisis hits, India, India, India, India.

2012
A new policy on gender and women’s empowerment is adopted, India, India, India, India.

2014
The Lima Declaration, which sets new targets for industrialized countries, is adopted, India, India, India, India.

2015
The New York Declaration on Forests is adopted, India, India, India, India.

2016
The Paris Agreement is adopted, India, India, India, India.
SHOW US WHAT SUSTAINABLE INDUSTRIAL DEVELOPMENT LOOKS LIKE — AND WE’LL SHARE IT WITH THE WORLD

For this booklet, we spent a long time searching for images that embody the values of UNIDO’s Environment Department: inclusive and sustainable industrial development, circular economy, green industry and gender mainstreaming. But we want even more! Send us your original images—and we’ll share the ones we like on our Facebook page, alongside your name, of course. Who knows? Yours could go viral!*

PHOTO CHALLENGE

GET IN TOUCH

EMAIL US:
environment@unido.org

FOLLOW US ON FACEBOOK:
https://www.facebook.com/
EnvironmentDepartmentUNIDO

TWEET AT OUR DIRECTOR:
@SicarsUNIDO

HASHTAGS WE LOVE:
#UNIDO50, #MontrealProtocol,
#StockholmConvention, #REEP

WATCH THE ENVIRONMENT DEPARTMENT’S TOP 10 VIDEOS ON THE UNIDO YOUTUBE CHANNEL:
https://www.youtube.com/UNIDObeta

1. Chile: Helping farmers, protecting the ozone layer
2. Protecting the environment and securing palm dates industry in Tunisia
3. Montreal Protocol and ODS Destruction Project in Mexico
4. UNIDO-Slovenia protecting a World Heritage Site of Montenegro
5. A journey towards responsible gold in West Africa
6. HEINEKEN and UNIDO Partnership, Tackling Worldwide Water Scarcity
7. UNIDO helps Tunisian enterprises apply a resource efficiency and cleaner production
8. Empowering females agribusiness workers in Mexico
9. UNIDO POEP Programme - 3 projects funded by GEF
10. Chemical Leasing
11. NEW for UNIDO’s 50th birthday! My Mum is My Hero

WE’RE CELEBRATING IN VIENNA

What: UNIDO 50th Anniversary EXPO
Where: Vienna International Centre
When: 21-25 November 2016
FIND OUT MORE: http://50.unido.org

*Conditions:
1. Email your original image to environment@unido.org. Include your name, country and a suggested caption (about 25-50 words) describing the image and its relevance to the themes of inclusive and sustainable industrial development, circular economy, green industry and gender mainstreaming. Use the subject line “photo challenge.” 2. By submitting an image for consideration you attest that it is an original image made by you, that you hold all rights in the image and that you allow UNIDO to post the image, the caption (which may be edited by UNIDO) and your name and country to its web pages, Facebook page(s) and other social media platforms (including those of staff members), as well as in promotional and publicity items about UNIDO. Copyright remains with the image owner and does not transfer to UNIDO or its staff members. 3. Images will be selected for posting by UNIDO Environment Department staff based on quality and relevance to the themes. There is no limit to the number of submitted images that UNIDO may post, but UNIDO may refuse to post images for any reason. 4. UNIDO staff cannot commit to responding to questions about the challenge or selected photos. 5. Neither UNIDO nor its Member States assume any responsibility for consequences which may arise from this challenge or the use of submitted material. 6. This challenge is not a contest and therefore will have no winner(s); owners of selected images will not receive any prizes, awards or payments. 7. This challenge will run until June 2017, but UNIDO reserves the right to extend or end this challenge at any time without notice. 8. UNIDO staff, their immediate family members and staff of institutions sponsoring or associated with the challenge are eligible to participate in the challenge!