



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



GLOBAL ENVIRONMENT FACILITY  
INVESTING IN OUR PLANET

# Mobilizing Industry for Environmental Action



INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

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# Forewords



**Together with the GEF, we are building synergies between industrialization and environmental protection that can drive forward inclusive and sustainable industrial development.**

Environmental and climate challenges are transforming the way the world supplies, processes and uses natural

resources. Flood events and extreme drought are becoming more frequent, causing widespread destruction and crop failures, adding to the burden on the most vulnerable communities. The increasingly evident effects of climate change urgently demand industrial processes to minimise harmful CO<sub>2</sub> emissions, while allowing for legitimate growth aspirations in all countries. Only a combined global effort to overcome these issues can lead to a sustainable future for all.

We are proud to look back on our evolving partnership with the GEF and our shared journey toward improving the environmental performance of industries, while also producing co-benefits such as improved human health, new jobs and shared prosperity. Since UNIDO's initial involvement as an Executing Agency of the GEF, the solid foundation of the

UNIDO-GEF partnership has continuously expanded. Today, UNIDO is implementing projects and programmes supported by the GEF in almost 80 countries across the world with a primary focus on industrial energy and resource efficiency, renewable energy for productive uses, and chemicals and waste management. As the global community continues its pursuit of the Sustainable Development Goals (SDGs), joint efforts such as those undertaken by UNIDO and the GEF are essential.

In our pursuit of inclusive and sustainable industrial development, UNIDO looks forward to furthering this strategic alliance with the GEF, as well as other agencies of the extended GEF partnership, under the 7th replenishment cycle. The GEF's emphasis on transforming key economic systems through integrated solutions is the required next step for countries' transitions to sustainable development paths. I am convinced that with the support of the GEF and UNIDO, the industrial sector can be a major driving force behind this transition.

LI Yong  
United Nations Industrial Development Organization  
Director General



**Safeguarding the environment, while also fostering economic development, requires the cooperation of both the public and private sector. UNIDO has enhanced the GEF portfolio by engaging industries and promoting green growth across the developing world.**

Since 2006, UNIDO has been an implementing agency and a strong partner of the GEF in its efforts to put in place the regulatory, institutional and financial frameworks required to achieve transformational change in the areas of climate change mitigation and adaptation, chemicals and waste, and international waters. The GEF is funding over 200 ongoing projects implemented by UNIDO to safeguard the environment, and under GEF-6, UNIDO has been an integral part of the Integrated Approach Pilots on Sustainable Cities and Food Security.

UNIDO can engage both large-scale industry that has a significant impact on the environment, and small and medium enterprises (SMEs) and clean technology entrepreneurs that have the potential to shift industries onto a sustainable development path. Its unique mandate to target industry directly supports the GEF's strategy for private sector

engagement and enables us to reach those enterprises that form the backbone of developing and emerging economies.

To get on the right path to a better, safer future, we need to work together on common and systemic solutions, and to address the drivers of environmental degradation. We need to change the systems that support how we live, how we eat, how we move and how we produce and consume.

Under GEF-7, the GEF looks forward to UNIDO utilizing its extensive networks and specialized services to support four revolutionary shifts in social and economic life: transforming cities, re-thinking food and agriculture, decarbonizing energy systems, and investing in the circular economy.

A continued strong partnership between UNIDO and the GEF is vital. Building on the solid foundation of the past, I look forward to continue working with UNIDO to meet the challenges of the future.

Naoko Ishii  
Global Environment Facility  
Chief Executive Officer and Chairperson

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# Introduction

## Safeguarding the environment towards sustainable industrialization

While economic development is increasingly challenged by natural resource limitations and rapid population growth, extreme weather events and chemical contamination further threaten the livelihoods of millions of people. In order to mitigate and reverse global trends of climate change and pollution, the Global Environment Facility (GEF) was established in 1991. Since then, the strategic and catalytic investments of the GEF have significantly assisted its partners, including UNIDO, to take on the planet's greatest environmental issues.

The strategic partnership between UNIDO and the GEF has led to a widespread impact and growing compliance with multilateral environmental agreements. Their cooperation has brought technical and financial assistance to countries, which previously had no access to GEF funding.

Within its unique mandate for inclusive and sustainable industrial development (ISID), UNIDO specifically targets industrial activities, which constitute both the drivers of economic growth and often the biggest polluters. Utilizing its expertise in promoting clean, low-carbon production technologies and processes in large and small industrial enterprises, UNIDO has been directly implementing GEF projects since 2006. Up to that point, UNIDO had already played a leading role in reducing toxic chemical contamination in strong partnership with its sister agencies.

The UNIDO-GEF partnership dates back to the 1990s and has steadily grown since then. Today, UNIDO's portfolio spans over 200 GEF-funded projects in almost 80 countries and continues to grow in size and diversity of approach. "The Global Environment Facility has, for many years, been a valuable partner of UNIDO", UNIDO Director-General LI Yong expressed. "It supported us in implementing essential and impactful projects in the fields of climate change mitigation and adaptation, chemicals and waste, land degradation and international waters." Through increased partnerships with other GEF Implementing Agencies, UNIDO is also operating in multifocal areas and new Integrated Approach Pilots (IAPs) for sustainable cities and food security.

This publication showcases how the UNIDO-GEF cooperation applies innovative solutions to achieve economic goals with environmental sustainability and reflects the substantive value addition that the partnership has delivered to the work of both organizations. It also introduces a variety of case studies that illustrate this joint action across the thematic focal areas of the GEF and sheds light on how UNIDO and the GEF can continue to expand this partnership in the future.

# Introducing UNIDO and the GEF



UNITED NATIONS  
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## UNIDO

The United Nations Industrial Development Organization (UNIDO) is a specialized agency of the United Nations that works to promote and accelerate sustainable industrialization in developing countries and economies in transition. The mandate of the Organization is to eradicate poverty through inclusive and sustainable industrial development (ISID), attuned to the new global development agenda and manifested in the 2013 Lima Declaration. The importance of ISID is underscored in Goal 9 of the Sustainable Development Goals (SDGs), which calls to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

UNIDO focuses on three thematic priorities to support countries in their efforts to achieve ISID, namely poverty reduction, advancing economic competitiveness, and safeguarding the environment. This is carried out by UNIDO's specialized technical departments and widespread field presence.

The UN General Assembly established UNIDO as an autonomous body in 1966, converted to a "specialized agency" in 1985. In the subsequent decades, UNIDO was geared towards private sector development and refined its expertise and unique positioning in driving forward sustainable industrialization. Today, 50 years since its creation, UNIDO remains fully committed to using its technical expertise to assist countries in growing their industrial potential in order to eradicate poverty and decouple economic growth from environmental degradation.



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## The GEF

The Global Environment Facility (GEF) was established on the eve of the 1992 Rio Earth Summit to help tackle our planet's most pressing environmental problems. Since then, the GEF has provided over \$17 billion in grants and mobilized an additional \$88 billion in financing for more than 4000 projects in 170 countries. Today, the GEF is an international partnership of 183 countries, international institutions, civil society organizations and the private sector that addresses global environmental issues.

The GEF is...

- A **UNIQUE PARTNERSHIP** of 18 agencies — including United Nations agencies, multilateral development banks, national entities and international NGOs — working with 183 countries to address the world's most challenging environmental issues. The GEF has a large network of civil society organizations, works closely with the private sector around the world, and receives continuous inputs from an independent evaluation office and a world-class scientific panel.
- A **FINANCIAL MECHANISM** for 5 major international environmental conventions: the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention on Biological Diversity (UNCBD), the Stockholm Convention on Persistent Organic Pollutants (POPs), the United Nations Convention to Combat Desertification (UNCCD), and the Minamata Convention on Mercury.
- AN **INNOVATOR AND CATALYST** that supports multi-stakeholder alliances to preserve threatened ecosystems on land and in the oceans, build greener cities, boost food security and promote clean energy for a more prosperous, climate-resilient world; leveraging \$5.2 in additional financing for every \$1 invested.

# Over the years: Building the UNIDO – GEF partnership



## UNIDO is established

In 1966, UNIDO is established as an autonomous body within the UN. UNIDO begins to regularly contribute to the execution of GEF projects in 1999.

1966



1992

## The GEF is established

On the eve of the Rio Earth Summit, the GEF is established as a permanent, independently operating multilateral financial organization.



## MoU for action on POPs

UNIDO and the GEF sign a Memorandum of Understanding to provide for expedited project preparation and Enabling Activity Grants related to the 2001 Stockholm Convention on persistent organic pollutants (POPs). Still today, the GEF provides the primary budget to UNIDO's POPs-related efforts.

2001



2006

## UNIDO – an Implementing Agency

The GEF Council grants UNIDO the status of an "Implementing Agency", thus providing direct access to the GEF Trust Fund resources for projects related to climate change, biodiversity, international waters, chemicals, and ozone-depleting substances.



## Funds for climate change adaptation

UNIDO gains access to the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) targeted at climate change adaptation.

2014



2015

## Programme for Country Partnerships

UNIDO launches its Programme for Country Partnership (PCP). This approach is based on collective development and broad-based ISID efforts with stronger country ownership to leverage greater impact. This is realized within the GEF framework through the IAPs on Sustainable Cities and Food Security.



## Full compliance with all GEF Standards

The GEF Council confirms UNIDO as fully compliant with the GEF's policies on Environmental and Social Safeguards, Gender and Fiduciary Standards.

2015 (May)



2015 (Sept)

## Sustainable Development Goals

The UN Member States adopt the post-2015 Agenda for Sustainable Development in a set of 17 SDGs. SDG-9 strengthens UNIDO's mandate to foster sustainable industrial development.



## The Paris Agreement

COP21 negotiates the Paris Agreement setting the goal to limit global warming to below 2 degrees Celsius.

2015 (Dec)



2016

## Two anniversaries

After two decades of rapidly intensifying collaboration, UNIDO celebrates its 50th anniversary in the same year that the GEF celebrates 25 years since its creation.

This marks a point to reflect on past joint efforts to preserve the natural resources of this Earth and to embark on a new course for the future.

## Looking Forward

Under the GEF-7 replenishment cycle, UNIDO and the GEF will continue to target drivers of environmental challenges and safeguard the global commons. UNIDO stands ready to engage in innovative approaches under GEF-7 to enhance synergies and deliver multiple benefits. This entails an acceleration of disruptive energy system shifts, building livable cities of tomorrow, sustainable food systems and revolutionizing production processes.

2018 – 2022



# 2

# Mobilizing Industry for Environmental Action

## UNIDO's Unique Contribution

Industries are recognized as key stimulators of innovation, job creation and equitable growth, accounting for nearly 30% of global GDP. Simultaneously, manufacturing releases around 10 million tonnes of toxic chemicals annually into the environment and consumes one-third of global primary energy generation, thus accounting for immense greenhouse gas (GHG) emissions. Consistently, projections suggest that the potential to reduce global GHG emissions and pollution by targeting industries is equally remarkable. Recognizing this, UNIDO works with industry to develop economically feasible business models that incentivize investment in low-emission and climate resilient technologies and processes and are easily replicable in other sectors and geographic regions.

UNIDO's mandate for inclusive and sustainable industrial development provides the Organization with the unique ability to bring industry, and its significant financial resources, technical know-how and innovation, to the table. Since its creation, UNIDO has acquired a widely recognized expertise in supporting developing countries and economies in transition to achieve sustainable industrialization. Over the past

UNIDO is the only UN organization with the mandate to specifically target industrial development.

decades, UNIDO's specialized Departments have planned and conducted technical interventions to promote sustainable industrialization to decouple economic development from climate change and pollution.

Industries can only flourish in a sustainable way with assured supply of affordable and clean energy, maximum resource efficiency and sound waste management. Through its technical assistance services, the Organization has decarbonized energy systems, increased industrial energy efficiency, and expanded climate-friendly agriculture as well as resilient food value chains.

UNIDO has been able to largely phase out several POPs and ODS, and significantly reduce mercury use in industrial production. By transforming conventional “take-make-waste” practices through sustainable resource use processes and technologies, UNIDO has accelerated the realization of a circular economy for higher living quality in the cities of tomorrow. Through policy action and technology dissemination, UNIDO has delivered a strong contribution to the success of multilateral environmental agreements, most notably the Stockholm Convention, the Minamata Convention and the Montreal Protocol.

In all of its interventions, UNIDO has combined clean and climate-friendly technology transfer with capacity building measures, facilitated innovation, entrepreneurship with a strong engagement of public and private stakeholders. Together with its partners, the Organization expands productive practices that conserve land, water bodies, air quality and our climate. UNIDO’s programmes and projects thus contribute to the preservation of the global commons, a vital component for achieving inclusive and sustainable industrial development. Recognizing the link between gender equality and safeguarding the environment, UNIDO mainstreams gender in all programmes, projects and organizational practices, promotes female investors and entrepreneurs and empowers women through targeted technical cooperation activities.

## **UNIDO’s Organizational Engagement with the GEF**

Over the past decades, UNIDO’s unique approach has introduced a diverse set of industrial interventions to the GEF’s portfolio. Among a total global workforce of more

than 2,000 experts in industrial development, three UNIDO Departments are providing highly specialized technical assistance services to GEF programmes and projects.

Utilizing its technical capacity in climate change mitigation, UNIDO focuses on expanding renewable energy supply for productive uses and industrial energy efficiency for both large and small scale enterprises. In support of energy access for all, activities under the energy portfolio also include renewable energy solutions to accelerate access to off-grid communities. The introduction of efficient and low-carbon technologies reduces fossil fuel-dependency and leads to an increase in productivity and profitability of industries.

UNIDO expertise also assists industries and value chains in enhancing resilience to the impacts of climate change, focusing on communities that already suffer from severe impacts. Measures to reduce post-harvest losses and generate value added through diversification of agricultural end-products are central to UNIDO’s approach to climate change adaptation. Through their interconnectedness, these specialized activities also target food security and contribute to the control of land degradation, as well as the preservation of biodiversity.

Technical and capacity building support in cleaner production, management and disposal of Persistent Organic Pollutants (POPs), as well as mercury contamination reduction, is also provided by UNIDO experts and their technical expertise. Through these services, UNIDO supports countries in their compliance with a multitude of international conventions, such as the Stockholm Convention on POPs and the Minamata Convention on Mercury. The efforts to contain polluting effluents include large-scale flagship interventions in the International Waters focal area of the GEF. Further, over the

## Working with all members of an industrial landscape leads to maximum impact.

last 15 years, the Multilateral Fund for the Implementation of the Montreal Protocol has recognized UNIDO thirteen times as the best implementing agency contributing to the phase out of ozone-depleting substances.

The growing size and complexity of the UNIDO-GEF project portfolio is managed by UNIDO's GEF Coordination and the Managing Director of Programme Development and Technical Cooperation, who acts as the UNIDO focal point to the GEF Secretariat. Their close communication and consultations ensure a consistent flow of information and provide reports and feedback to UNIDO's management and technical Departments. The Coordination staff is also engaged in project cycle management and quality assurance of GEF proposals through project review and analyses sessions.

### **UNIDO adapts its models to fit all scales of industrial production...**

UNIDO distinguishes itself by operating with industries of all sizes, from market leaders and large industrial facilities to micro-scale producers. Small and medium-sized enterprises (SMEs) form the backbone of industries in developing countries, but often lack the financial and educational capacity to use modern technologies. UNIDO

integrates them into common infrastructure services and global value chains so they can reach economies of scale and gain access to knowledge and technology-sharing for more environmentally-friendly production. Meanwhile, targeting larger industrial facilities produces large-scale environmental gains, augmented by a demonstration effect that can result in sectoral transformation. The integration of all members of an industrial landscape leads to maximum impact.

### **... and operates with an extensive field presence.**

Besides its expertise in delivering technical services to a variety of industries, UNIDO maintains a similar versatility in targeting the individual needs and industrial conditions of its beneficiary countries. UNIDO's project portfolio spans Least-Developed Countries (LDCs), including Landlocked Developing Countries (LLDCs), Middle-Income Countries (MICs) and Small Island Developing States (SIDS) likewise. The Organization has a particularly strong presence in the rapidly growing economies of the BRICS countries, where UNIDO is helping to overcome the detrimental impacts caused by a high density of heavily polluting industries.

### **UNIDO builds broad-based partnerships for integrated solutions...**

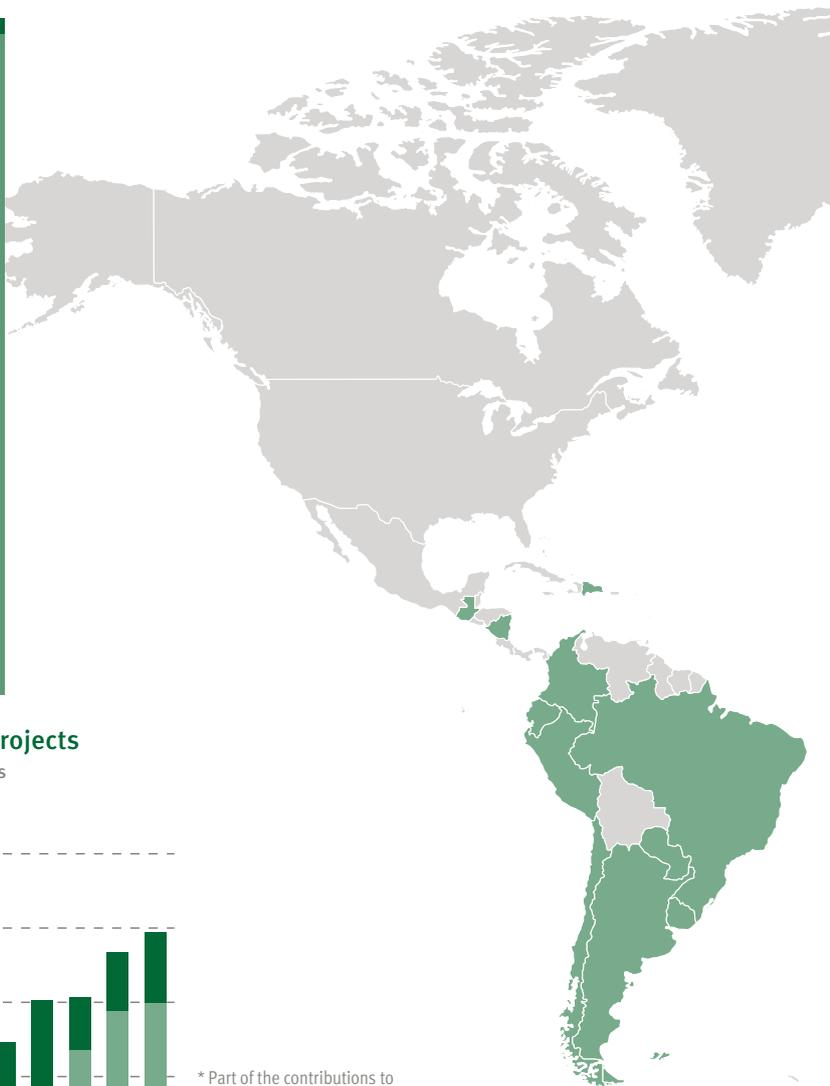
As a key priority, UNIDO has developed a strong partnerships network, which extends its outreach and intensifies its relationship with public and private stakeholders. The collaboration between national entities, NGOs, media, regional convention centres, international organizations, Development Finance Institutions (DFIs), and the private

# UNIDO-GEF Cooperation Worldwide

## The GEF replenishment cycles

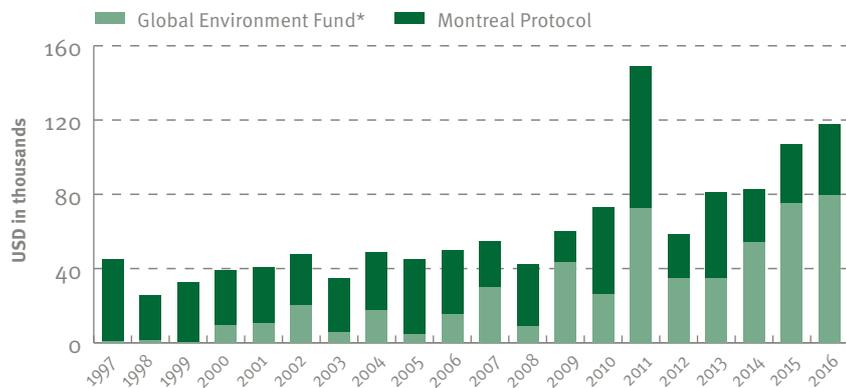
The GEF operates in replenishment cycles of four years. The GEF-1 funding cycle (1994-1998) replaced the GEF's Pilot Phase with doubled funding at USD 2 billion. The GEF Council ended GEF-2 (1998-2002) with USD 2.75 billion, followed by GEF-3 (2002-2006) with USD 3 billion, topped again by GEF-4 (2006-2010) with USD 3.13 billion. GEF-5 (2010-2014) allocated USD 4.34 billion in funds to the achievement of its focal areas objectives. The current GEF-6 cycle (2014-2018) received even higher pledges.

The first GEF-backed UNIDO projects were implemented within GEF-3, focusing on POPs and other chemicals-related issues. GEF-4 extended UNIDO's scope of action to climate change mitigation. As of 2014, UNIDO additionally works in the focal area of climate change adaptation and the GEF's multi-focal approach through the Integrated Approach Pilots (IAPs). Under GEF-7, UNIDO looks forward to further expanding the partnership.

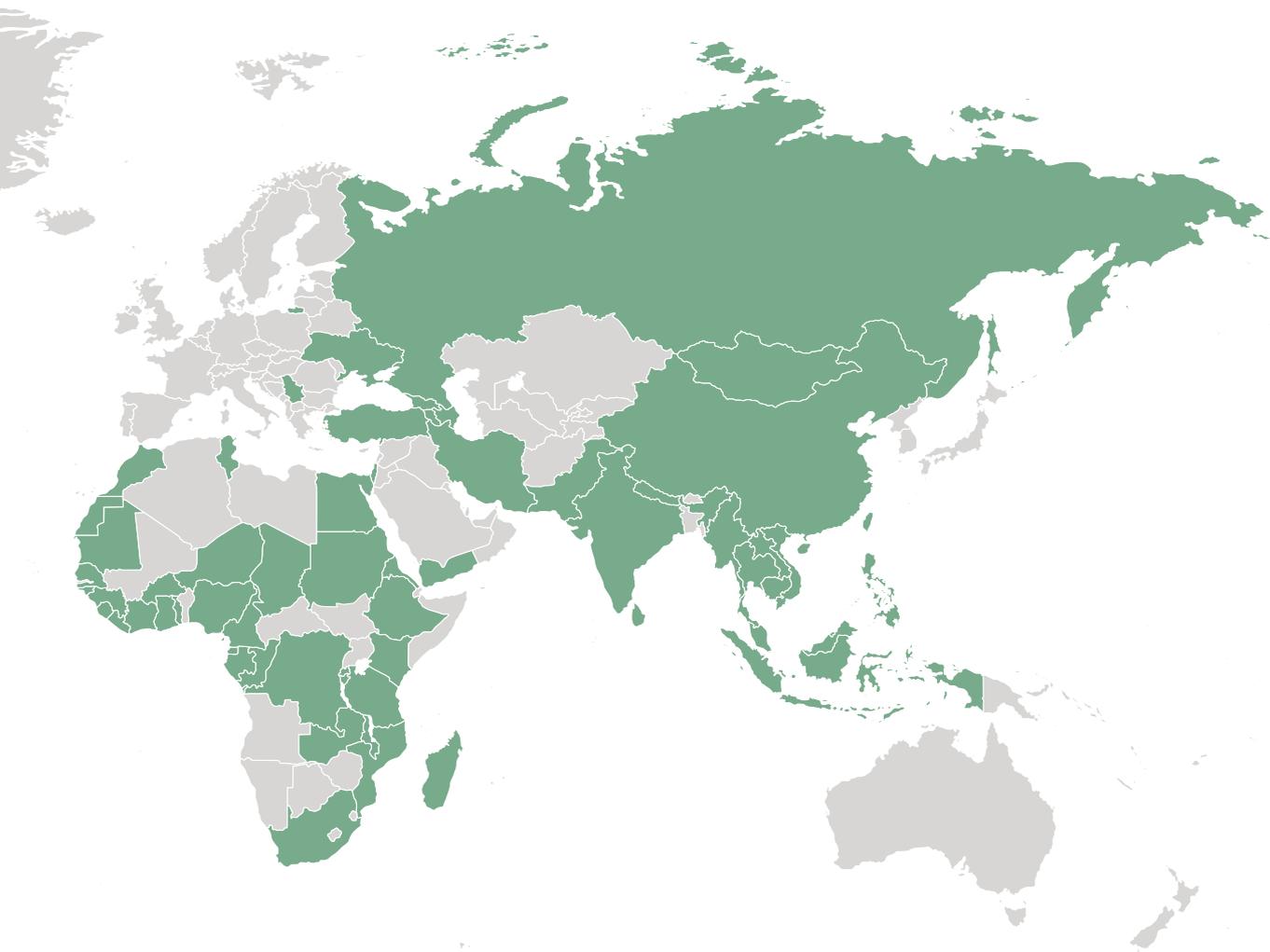


**FIGURE 1 Net approvals and delivery (expenditure) of GEF projects**

Source: Net Approvals: UNIDO Database 2016; Expenditure: UNIDO Annual Reports



\* Part of the contributions to the Global Environment Fund were reported under UNDP in previous years.



 Countries with GEF-financed UNIDO projects

sector enables UNIDO to support larger flows of resources and achieve broad-based and lasting development results.

## **Partnerships with the private sector...**

Partnerships with the private sector are an integral part of UNIDO's wide reaching network. By engaging the private sector, UNIDO can tackle the economic drivers of environmental degradation and climate change and encourage "crowding-in" of private sector investment where it is most needed. This approach is inherent to UNIDO's Global Cleantech Innovation Programme (GCIP) that supports innovative and entrepreneurial SMEs to develop their business skills and technologies and attract the required investment capital to enter the global markets. Based on its business model, UNIDO is ready to collaborate with private sector investors and other GEF Implementing Agencies to combine UNIDO's technical assistance with investment components.

The inherent promotion of country ownership enables closer alignment with the needs of a country's industrial landscape for increased and sustained impact. This approach is being institutionalized by UNIDO's flagship Programme for Country Partnerships (PCP). Strong national leadership through the PCP builds synergies with ongoing government and partner interventions and leverages additional public and private investment towards the development of industrial sectors with high growth potential. By creating a synergy between UNIDO's PCP and the GEF's Integrated Approach Pilots (IAP), UNIDO and the GEF have incorporated a mutual vision on a programming level. This has brought forth several joint projects with a strong partnerships scheme. One such example is Senegal, where UNIDO's PCP will support and

## **As a key priority, UNIDO has developed a strong global network of public and private stakeholders.**

facilitate two GEF IAPs, namely Sustainable Cities and Food Security in the country. This paves the way for meaningful private sector engagement and close coordination with other GEF Implementing Agencies participating in the IAPs.

## **...and coordinates a global network of regional technical centres.**

UNIDO has established, and continues to coordinate a host of regional technical centres and networks specialized in cleaner, climate-friendly and climate-resilient industries. The technical centres and networks work through two main channels: they provide technical support services to academic, public, NGO, and private sector entities at the request of developing countries and leverage investment in their respective thematic specializations. The network's members play a catalytic role in driving forward technical innovations by drawing on local sources of knowledge technologies, while contributing to South-South and North-South Cooperation.

Their regional distribution around the world enables close collaboration with regional economic communities and organizations all the way down to local governments and businesses, bridging the gap between global initiatives and local execution. The technical centres provide services

for business promotion and investment, technology dissemination and knowledge management, policymaking and monitoring, as well as stakeholder communication and public awareness.

The climate focus includes the Climate Technology Centre and Network (CTCN) and the Private Financing Advisory Network (PFAN). The CTCN is the operational arm of the UNFCCC Technology Mechanism, co-hosted by UNIDO and UNEP. A consortium of academia, civil society, finance institutions, producers and public sector entities as well as 140+ CTCN national representatives provides free-of-charge technical assistance in climate change adaptation and mitigation. PFAN is administered by UNIDO and the Renewable Energy and Energy Efficiency Partnership (REEEP) and has leveraged over US\$ 1.2 billion of investment for clean energy projects through a public-private partnership. This mechanism has the potential for significant upscaling, notably in developing bundling and securitization approaches, with the catalytic support of UNIDO and REEEP's technical competence and existing partnerships with the private sector and multilateral development banks.

Directly coordinated by UNIDO with funding from the Austrian and Spanish governments, the Global Network of Regional Sustainable Energy Centres ensures the coherence of donor and national activities in the regional renewable energy and energy efficiency sectors, provides reliable investment and market data, assists in developing business plans and mobilizes access to financing. The Global Network has established regional centres in the Economic Community for West African States (ECOWAS), the East African Community (EAC), the Southern African Development Community (SADC), as well as in the Arab region, the Caribbean and the Pacific region.



The International Centre on Small Hydro Power (ICSHP) is a public and non-profit institution established by UNIDO and the Chinese government with co-sponsorship of UNDP, with the mission to promote SHP development worldwide. Since its establishment in 1994, ICSHP has provided technical consultations and services to over 50 developing countries. ICSHP has established four pilot bases on SHP across China and UNIDO SHP centres in India, Nigeria and Columbia. They specifically facilitate the design of cost effective, locally manufactured renewable energy systems and SHP development with support of their national and provincial governments.

With the aim to improve resource productivity and cleaner production of businesses, UNIDO and UNEP set up National Cleaner Production Centres (NCPCs) under the umbrella of the Resource Efficient and Cleaner Production Network (RECPnet). The 74 member organizations, regional leaders in RECP services, develop their knowledge and skills base through peer-learning and access to sector-specific data. In return, they disseminate best available techniques (BAT) and innovation in RECP in close collaboration with countries, local businesses and financial institutions.

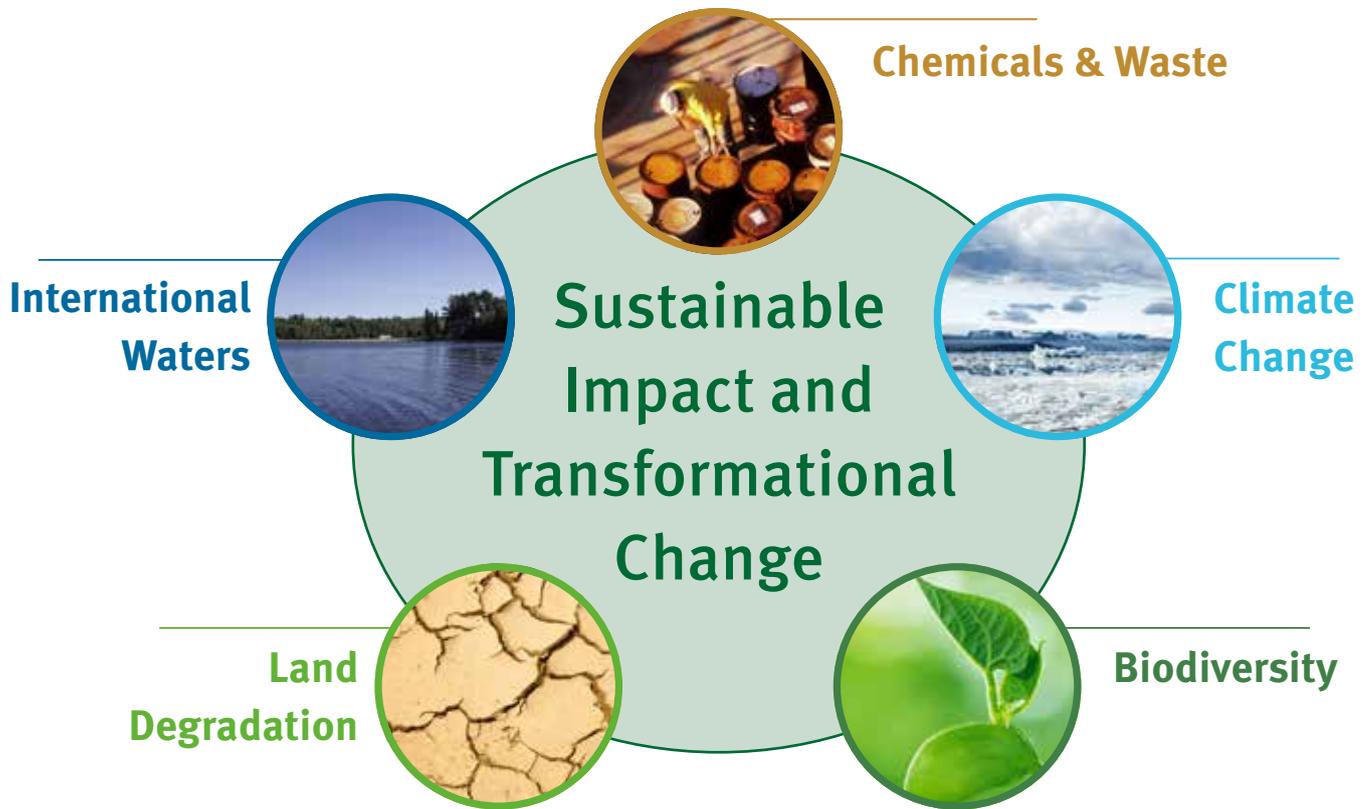
# 3

## Innovative Interventions and Integrated Solutions

The pressure on resources is set to rise in the coming decades, caused by three global megatrends: By 2050, the global population will increase by 2 billion, accompanied by a rise of the global middle class by 3 billion and rapid urbanization. In line with the SDGs and the GEF 2020 Strategy to tackle these driving forces, UNIDO continues to develop a project portfolio to counteract the detrimental effects of these trends.

UNIDO has built up longstanding experience in implementing GEF-funded projects, particularly within the GEF's thematic focal areas of Climate Change, with 81 ongoing projects, 124 ongoing projects under the Chemicals and Waste focal area, four under International Waters and five that take a multifocal approach.

In addition, UNIDO is now also engaged in biodiversity and land degradation, applying the industrial value chain approach to new areas. UNIDO has further developed its engagement by implementing child projects under the GEF-6 Integrated Approach Pilots (IAPs), namely four Sustainable Cities IAPs and one Food Security IAP. The IAPs are characterized by close collaboration with other GEF Implementing Agencies to bring about structural change. UNIDO stands ready to further upscale this approach through the proposed programmatic and partner-based approaches of GEF-7 that hold significant potential to tackle a series of urgent environmental issues around the globe.





# Climate Change

*“UNIDO sees its role in the ... climate change field as a catalyst for scaling up investments in clean energy solutions, strengthening policy frameworks to create an enabling environment and to secure funding for increased market penetration of renewable energy, energy efficient and low carbon technologies ... .” –*

**UNIDO Director General LI Yong**

The potential to reduce anthropogenic GHG emissions through targeting industries is substantial, particularly due to the high share of fossil fuel combustion within industrial primary energy supply. Today, according to the World Energy Outlook 2016, industries account for 20% of global energy-related CO<sub>2</sub> emissions, and source nearly three-quarters of their energy directly from fossil fuels. Recognizing the role of industry for global climate action, UNIDO and the GEF have developed their cooperation around the cross-cutting areas of SDG-7 on sustainable energy, SDG-9 on industrial development, infrastructure and innovation, and SDG-13 on climate action. Climate action involves both mitigation, preventing further impacts of climate change, and adaptation, helping communities adapt their livelihoods to unavoidable changes.

UNIDO engages in climate action in three ways:

» *Firstly*, the potential of clean technologies is captured through technology transfer and capacity building

measures. This includes setting up climate resilient industries and value chains that can withstand the consequences of global warming.

» *Secondly*, facilitating innovation and entrepreneurship allows for increased income generation whilst safeguarding the environment. SMEs in particular profit from support in identifying business and funding opportunities for resource-efficient production. Their performance improvement further accelerates innovation and the adoption of modern management practices.

» *Thirdly*, UNIDO reinforces cooperation for climate control and resilience as it facilitates international partnerships amongst public and private stakeholders, as well as civil society. This way, project developers and national stakeholders can tap into diverse sources of expertise.

# Climate Change Mitigation

**In order to reduce the environmental footprint of industry, the UNIDO-GEF partnership supports sectoral innovation and the transfer of best available technologies to mitigate climate change through its programmes and projects.**

With support from the GEF, UNIDO is currently implementing 84 climate change mitigation projects with a total GEF contribution of more than US\$ 256 million. These projects, primarily supporting countries in Africa and Asia, increase

energy efficiency and access to renewable energy for productive uses, building low-carbon industrial value chains. Besides curbing GHG emissions, these measures also reduce operational costs and make industries more competitive. UNIDO has designed a number of integrated GEF projects that combine renewable energy and efficiency interventions for industries in developing countries. UNIDO's clean energy initiatives introduce best practices and best available technology for sustainable industrialization and urbanization.



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## Renewable Energy for Productive Uses

GEF-backed UNIDO projects to reduce carbon emissions include the development of policies and regulatory frameworks that facilitate renewable energy installations, generate technical innovation and foster the dissemination of technology and know-how. Promotion of private sector investments and entrepreneurship for energy access and mini grids for productive activities is key to such interventions. Industrial applications of renewable energy, such as fuel switching in heating and cooling applications using locally available renewable energy resources including wastes, are equally central to UNIDO's path to limit CO<sub>2</sub> emissions into the atmosphere.

## Renewable Energy Sources



Technologies for renewable electricity generation utilize resources that are naturally replenished. Renewables include solar photovoltaic, solar thermal, hydroelectricity, wind power, biomass and geothermal resources. Biofuels are used for transportation. All of these energy sources produce no carbon emissions, except for biomass and biofuels, which are considered carbon-neutral.

### Mini-grids based on Small Hydropower (SHP) sources to augment rural electrification in Tanzania

The GEF-4 project stimulates sustainable industrial productivity with a two-fold approach based on new SHP installations and building local technical capacity. UNIDO is providing clean electricity for productive purposes, while also developing an associated local workforce in the manufacturing and technology development of hydro turbines.

As a result of the project, one 10 kW, two 50 kW and one 80 kW locally manufactured cross-flow turbines are already operating in Tanzania. Another 8 SHP plants with a cumulative capacity of 5 MW using different business models are at various stages of execution. The first facility alone directly prevents emissions of 6,300 t CO<sub>2</sub>e each year.

UNIDO established a Small Hydropower (SHP) Technical Centre at the College of Engineering and Technology of the University of Dar es Salaam. It provides technical and advisory services on SHP nationwide, trains local skills, and grants scholarships to students specializing in SHP. So far, local fabrication has created 20 permanent and over 60 temporary jobs. In addition, existing financing options of the Rural Energy Agency (REA) were streamlined to benefit local investors and project developers interested in SHP. This partnership and the new skilled workforce promise a self-propagating dynamic for SHP across the country.

## Promoting PV-powered mini grids for productive uses in rural Côte d'Ivoire

The UNIDO-GEF project, in partnership with the EU, installed 7 pilot solar PV power stations and 1,750 new grid connections in rural Côte d'Ivoire, thereby providing clean, reliable and affordable electricity to previously off-grid villages. Some 8,800 persons are now able to use electricity for domestic and productive uses.

The new possibility for refrigeration extended the shelf life of food stuffs and enabled the villagers to earn more by selling their produce at the market. According to a local fisherwoman, she is now earning CFA 20,000 (USD 35.00) to CFA 30,000 (USD 50.00), representing a 300-400% rise since the introduction of electricity. By working after

sunset, the local businesses can increase their income and children can study in the evenings. Local clinics can offer better service, street lights make it safer to walk at night and all villagers are saving money on batteries for flashlights. The project serves as a pilot for replication in Burkina Faso, Mali and Niger, where ecological conditions are the same.

In cooperation with government institutions, UNIDO also developed the Strategic Framework for Renewable Energy, which is now ready for adoption, and completed trainings of local financial service providers to facilitate new clean energy grid connections on local initiatives.



## Industrial Energy Efficiency

Industrial energy consumption amounts to nearly 30% of the overall use by all sectors. But energy efficiency measures such as wide-scale upgrading and the deployment of best available technologies could cut industrial energy intensity by a quarter. The most energy-intensive sub-sectors such as iron and steel, cement, petrochemicals, as well as pulp and paper production, bear the largest technical potential for energy savings at 10-40%.

With highly fluctuating energy prices, both the economic and environmental gains from efficient use of energy are enormous. This is especially true for developing nations and countries with economies in transition, where industries are in their early stages, or rapidly growing.

### **Over 7,000 GWh saved through Energy Management Systems**

*– a UNIDO-GEF initiative*

In order to mainstream energy into existing management systems of industries, UNIDO and the International Organization for Standardization (ISO) developed a standard for Energy Management Systems in 2011. EnMS-ISO 50001 provides guidelines for the better management of energy usage and how to upgrade production processes for greater industrial energy savings. ISO 50001 is the only management standard that requires continuous performance improvement. Therefore, certified businesses must install robust performance monitoring schemes.

Adoption of the standard is being promoted by UNIDO through operational projects in 17 countries, with an additional 10 planned. More than 350 enterprises have been certified to ISO 50001, which has already led to more than 7,000 GWh in cumulative primary energy savings.

## Strategic Programmes for Sector-wide Impact

The UNIDO-GEF cooperation for energy-related climate change abatement spans a host of projects and strategic partnerships for a more systematic approach. One example is UNIDO's leading role in coordinating the energy component of the GEF Strategic Programme for West Africa (SPWA) while implementing projects for renewables and energy efficiency in participating countries.

Another is the Global Cleantech Innovation Programme (GCIP) for SMEs, which provides a business development ecosystem that supports small-scale entrepreneurs to operationalize their innovative business ideas and attract investment capital from the public and private sectors. SMEs represent 90% of the world's enterprises; therefore, upgrading their production processes and facilitating access to global markets brings substantial impact to global emission reductions, in addition to large socio-economic benefits.



## Industrial energy efficiency in Vietnam

Through the GEF-funded project, 77 enterprises adopted energy management systems (EnMS) in line with ISO 50001 and 139 enterprises implemented system optimization. These measures far exceeded original targets for efficiency increases, achieving cumulative annual energy savings of 22,000 toe (target 4,000 toe), or 106,000 tCO<sub>2</sub>e (target 35,000 tCO<sub>2</sub>e).

The UNIDO project created an enabling environment for the widespread adoption of energy management and system optimization practices in industrial enterprises countrywide, and the ISO 50001 energy management standard was issued nationally. 54 trained national

experts and industrial engineers have been providing services on Energy Management Systems (EnMS), Steam System Optimization (SSO) and Compressed Air System Optimization (CASO) to industries that have delivered energy efficiency improvements.

Another 434 representatives of local industrial enterprises and 28 equipment suppliers trained on EnMS and SO are ready to provide technical services. The project has catalyzed changes in behavior through the introduction of new approaches and the implementation of demonstration projects, which are being replicated successfully in additional companies in Vietnam.

## The power of local entrepreneurship: **The Global Cleantech Innovation Programme (GCIP) for SMEs**

The GCIP is implemented by UNIDO in partnership with the Cleantech Open, financed by the GEF. Through competitive calls for innovative clean energy technologies in 8 countries so far, the GCIP identifies a pool of promising entrepreneurs and supports them with continuous mentoring and webinars to grow their innovative concepts into full-fledged products ready for the national and global markets. Networking events connect the most promising SMEs and startups with potential investors, customers and business partners. These incubator services ensure their lasting success.

One of the selected winners in 2014 was the innovative enterprise Free the Seed. The Malaysian start-up converts stockpiles of rice husks and rice straw into biodegradable packaging, using patented bio-enzymatic technology. Using this technology, Free the Seed expects to avoid GHG emissions of 0.6 tCO<sub>2e</sub> each year.

## UNIDO takes the lead: **The GEF Strategic Programme for West Africa (SPWA)**

The GEF SPWA covers 18 West African countries, including the ECOWAS region as well as Burundi, Chad and Mauritania. The GEF-funded initiative takes a programmatic approach to promote renewable energy and energy efficiency at the national and regional level in this region. Its objective is to create coherence and synergies in the formulation and implementation of projects across the region.

The GEF designated UNIDO as the lead agency responsible for the coordination of the energy component, in addition to implementing projects in the region. So far, UNIDO has implemented renewable-powered mini-grids in 9 countries – Burkina Faso, Chad, Côte d'Ivoire, Cape Verde, Gambia, Guinea, Liberia, Nigeria and Sierra Leone. The creation of the ECOWAS Centre of Renewable Energy and Energy Efficiency (ECREEE), with support from the Austrian and Spanish governments, strengthened regional-level energy cooperation among ECOWAS countries and reduces risk associated with investments in new technologies. The energy component of the SPWA has become a successful best practice model for regional coherence to combat energy poverty and climate change through harmonized policies and public-private partnerships.

# Climate Change Adaptation

## Taking the value chain approach, UNIDO implements GEF projects to build climate-resilient industries and communities.

Global warming has already increased risks to the lives and livelihoods of millions worldwide. The poor are least able to cope, but they are hit the hardest by changing weather patterns. Climate change is affecting water availability, food security, energy supply and human health. Therefore, policymakers are increasingly recognizing the growing need to integrate strategies for climate-resilient infrastructure and industries into long-term development programmes. “Fit-for-the-future” technologies are needed to develop the adaptive capacity of industries.

The adaptation framework of the GEF consists of the Least Developed Countries Fund (LDCF) and the Special Climate

Change Fund (SCCF). The LDCF focuses on reducing the vulnerability of sectors and resources that are central to human and national development, as prioritized in National Adaptation Programmes of Action (NAPAs). The SCCF finances adaptation activities that are complementary to the Climate Change Focal Area of the GEF Trust Fund.



## Adaptation in Pakistan: The Sialkot Tannery Zone

Pakistan is particularly susceptible to extreme floods and droughts, which have already created large scale destruction. Insufficient wastewater management in the Sialkot tannery placed additional stress on surrounding farmers and health hazards on the local population. Untreated effluent discharge from the tannery caused large-scale clean water shortages and polluted crops.

In partnership with the GEF, UNIDO responded by assisting with the planning and design of the Sialkot Tannery Zone

to make it more resilient to flooding events and reduce industrial pollution. The project introduced improved water management and measures for improved water conservation, renewable energy use, cleaner production methods such as effluent treatment, as well as resource efficiency. Additionally, UNIDO took action to raise awareness among public and private stakeholders as well as civil society. This included involving them in planting 50,000 trees around the industrial Zone to retain water and reduce the impact of flooding events.

## Building a resilient banana sector in Western Uganda

Bananas are a staple food in Uganda. They are consumed for breakfast, lunch and dinner. The livelihoods of 24% of Ugandan farmers, some 935,000 households, are based on banana production. However, farmers in Western Uganda are increasingly suffering from the impacts of climate change as higher temperatures cause fruits to over-ripen before they can be harvested. This deteriorates the quality of fruit sold at the markets. The livelihoods of the farmers, predominantly SMEs, are at risk as buyers are paying less for their produce.

As this has raised the need for new methods of food preservation and value addition, UNIDO is applying its industrial value chain approach in Uganda with support from the GEF. This includes the introduction of improved food processing techniques to produce banana juice, banana wine, dried fruits and vacuum-packed fresh bananas. The project also supports the production and use of tissue cultures for disease-free banana planting materials, as well as the use of waste-to-compost as a cheap fertilizer to increase productivity.



UNIDO's approach is to make industrial value chains resistant to damage from rising sea levels, salinization of agricultural land and groundwater, ocean acidification, climate variability and extreme weather events. Therein, the Organization is focusing on various entry points of commodity value and supply chains, such as production and harvest

and processing, water use efficiency, and intermediate transportation. By improving the resilience of industrial value chains, UNIDO also tackles security concerns related to food and nutrition through the creation of sustainable income generating activities.



# Chemicals and Waste

**UNIDO develops and implements national and sector-wide phase-out plans for POPs, mercury and ODS, and promotes the adoption of sustainable technologies in industrial production lines of all sizes.**

Toxic chemicals can be found in virtually all ecosystems on Earth, causing serious damage to agricultural production, water resources and human health. Many chemicals, such as persistent organic pollutants (POPs) and mercury, can travel long distances by air, migratory species and water ways, and have even been found in high concentrations in the Arctic, far away from their point of origin.

Increased use of chemicals goes hand in hand with increased economic opportunities, but poses serious risks to human health, ecosystems and biodiversity. Over the past three decades, governments have set up a global regime to contain harmful chemicals and waste with several

Multilateral Environmental Agreements (MEAs). Due to their significant influence on human and environmental wellbeing, sound chemicals management is essential to achieve the Sustainable Development Goals (SDGs).

In partnership with the GEF, UNIDO promotes the principles of circular economy through sustainable production patterns and waste management that create jobs, while also safeguarding the environment. This includes the diffusion of resource-efficient and cleaner production techniques, as well as support to governments to set up national strategies and policies that facilitate the phase-out of controlled substances and their environmentally sound, and permanent, disposal.

# Persistent Organic Pollutants (POPs)

With its projects and strategic programmes, UNIDO has played a leading role in implementing the Stockholm Convention since it opened for signature in 2001.

UNIDO's Stockholm Convention Division helps optimize production processes to avoid POPs emissions in power utilities, textile and metallurgical industries, pesticide manufacturers, recycling, pulp and paper, leather and food industries, while also managing the cleanup of old stock-piles. The Division sets up new facilities and retrofits existing production lines to employ POPs alternatives. It also installs equipment for the safe management of POPs-containing material and works to establish waste management infrastructure that minimizes the generation and release of POPs.

## What are POPs?



POPs are chemicals that remain intact in the environment for long periods, are transported globally, bioaccumulate in the fatty tissues of living organisms and are toxic to humans and wildlife. Some POPs remain in the body for more than 50 years.

POPs enter the environment and the food chain from a wide range of sources. Some are used as pesticides and flame retardants, while others are unwanted byproducts of the chemical industry, or of combustion in the presence of chlorine.

The Stockholm Convention on POPs, effective since 2004, aims to eliminate, or restrict the production and use of POPs, including unintentionally produced POPs (uPOPs), with 30 listed substances.

UNIDO's approach is to demonstrate economically viable and socially acceptable alternatives to the industrial use and recycling of POPs. The diffusion of best available techniques (BAT) and best environmental practices (BEP) have led to a large-scale reduction of POPs stocks. To ensure sustainability, the Organization provides policy and legislation guidance, detailed inventories, baseline financing and long-term financing schemes with a close involvement of the local private sector.

## Environmentally sound disposal of obsolete POPs pesticides and other POPs wastes in China

The UNIDO-GEF project cleaned up more than 10,000 tonnes of POPs pesticide wastes, amounting to 97% of total stockpiles of obsolete POPs pesticides identified nationwide. More than 6,300 tonnes have already been dismantled in the ongoing process. The large-scale site remediation of 105 former POPs pesticide plants through Chinese firms, with technical guidance of UNIDO, has helped to avoid substantial releases into water bodies and the atmosphere.

The project supported the government in issuing a five-year programme (2011-2015) with the target to safely dispose of identified POPs pesticide wastes and report newly discovered caches of obsolete POPs pesticides as well as incidences of pollution caused by them. Over 700 people from environmental authorities and affiliated agencies and over 1,000 employees of hazardous waste management enterprises have been trained.



## Policies for POPs Management

UNIDO engages in regulatory and policy guidance to ensure lasting progress in the effective phase-out of POPs. Supportive framework conditions are necessary to enable public and private entities to comply with countries' National Implementation Plans (NIPs) under the Stockholm Convention.

Preparatory to larger interventions involving technology transfer, UNIDO has assisted 41 countries with Enabling Activities to prepare their initial NIP and helped 48 countries to review and update their NIP as required upon the addition of new chemicals to the Convention's list of controlled substances. These countries were otherwise unable to do so due to insufficient resources and technical capacity.

### Development of the Guidelines to update National Implementation Plans (NIPs)

Based on its technical specialization and experience gained over time, UNIDO put together a set of guidance documents in order to develop inventories of and management plans for POPs, including the new POPs. Pilot projects served to test the quality of the guidelines and to add value to processes underway. The guidelines were deemed qualitative and useful by the stakeholders, and accelerated the process of developing solid NIPs with action plans to reduce the use, generation and production of new POPs.



## Reduction of Unintentionally Produced POPs (uPOPs)

UNIDO-GEF projects continue to equip priority source industries and recycling facilities with BAT/BEP to contain uPOPs emissions, such as dioxins, produced by open burning of solid municipal waste. Through the application of appropriate technologies, processes and fuels, UNIDO's interventions have succeeded to simultaneously reduce the release of uPOPs and increase energy efficiency.

## PCB Management

UNIDO proactively supports countries' compliance with Stockholm obligations related to polychlorinated biphenyls (PCBs). The projects set up robust regulatory and legislative infrastructure and strengthen institutions from national to local levels for the sound disposal of PCB-containing equipment and wastes. This includes building local laboratories for PCB sampling and analysis, the transfer of technology and know-how to local staff, as well as inspections of PCB-contaminated sites. Public awareness raising and information are major components of UNIDO's PCB projects.

## E-waste partnership

E-waste contains a host of hazardous substances and its management is a transboundary concern due to stark differences among national e-waste regulations. In the course of a project for the sound management of e-waste in Latin American countries, UNIDO has developed a large partnership with research institutions from Switzerland and Austria, the US-EPA, WHO, ILO, the International Solid Waste Association, Ericsson, Microsoft, the International Telecommunication Union, Ernest & Young, and Dell. The partnership represents the first global e-waste monitor, which reports on the current status of e-waste management in Latin American countries. It also provides a platform for multi-stakeholder discussions and a guide for decision-makers on the sound management of e-waste worldwide.

## Manufacturing and Recycling Chains without POPs Formation

In efforts to support industries to introduce alternatives in industrial processes and manufactured end products, UNIDO has engaged in the phase-out of dichlorodiphenyl-trichloroethane (DDT) production in India, while also spreading alternatives to polybrominated diphenyl ether (PBDE) flame retardants in auto part manufacturing in China. There is a high risk associated with forming or recycling of POPs, especially when dealing with electronic waste (e-waste) and PBDE-containing plastics. To avoid this, UNIDO assists in establishing sound monitoring and collection schemes so that valuable materials are recovered and linked to downstream markets, while POPs fractions are safely removed.

# Mercury

**Together with its partners, UNIDO's Mercury Programme is leading the introduction of clean technologies and policy reforms to minimize, and where feasible eliminate, the use and discharges of mercury.**

Through GEF-financed projects implemented by UNIDO, over 10 mining communities and hundreds of miners and their families in 6 countries are now producing more gold, with less mercury and better health.

As one of its endeavors to phase out mercury from industrial processes, UNIDO has been promoting environmentally sound management of mercury in the artisanal and small-scale gold mining (ASGM) sector for over 20 years. Based on its experience, the Organization was designated as the co-lead agency of the ASGM sector under the Global Mercury Partnership, founded by UNEP in 2008. This is an important coordination mechanism and technical advisory group to the Minamata Convention for the delivery of immediate actions on mercury.

## **The Minamata Convention on Mercury**

The 2013 Minamata Convention on Mercury – a global and legally binding treaty – regulates anthropogenic emissions and releases of mercury and its compounds. UNIDO continues its action under the Convention in the ASGM sector, which accounts for almost 40% of the global anthropogenic mercury emissions and is the largest source of air and water mercury pollution. UNIDO estimates that nearly 100% of mercury used in ASGM is released into the environment. Low prices, easy use, high accessibility and lack of knowledge about associated risks are the main reasons ASGM continues to use mercury to separate gold from other metals.

## **What is mercury?**



Mercury is a silvery white and naturally occurring heavy metal usually found in the form of a mercuric sulfide ore. It is the only metal to remain liquid at ambient conditions and is used in many industrial processes and products. It evaporates easily into the air and is seen as a chemical of global concern due to its long-range transport.

The notorious heavy metal is known to be a potent poison of the human nervous system. Exposure to mercury through inhalation or ingestion may cause brain and neurological damages, memory loss, skin rashes, emotional changes, tremors, kidney, heart, vision and respiratory problems, deformation of fetus and even death. As a persisting substance, it can bioaccumulate in living organisms.

Since participating actively in the negotiations of the Convention's text, UNIDO has assisted developing countries and economies in transition to comply with its provisions. UNIDO's GEF-financed projects involve planning Minamata Initial Assessments (MIAs) in Latin America, Central and Eastern Europe, Africa and Asia to expedite the ratification in signatory countries. The programme also includes the development of National Action Plans for the ASGM sector (NAPs), as well as assessing and evaluating sound interim storage and final disposal options for mercury waste, which is becoming one of the elements most critical to the success of the Convention.

As of August 2017, 128 countries have signed and an additional 74 nations have ratified the Minamata Convention on Mercury. The multilateral environmental agreement entered into force on 16 August 2017.

## Minimizing mercury releases from ASGM in Ecuador and Peru

In 2013, around 3,500 tonnes of mercury were discharged annually in the mining district of Portovelo-Zaruma, Ecuador's oldest and most established mining community. According to a monitoring study of the river basin conducted by UNIDO, an estimated 68% of used mercury was recycled. The rest made its way via nearby rivers, spreading as far as the Tumbes River in Peru.

Outlawed by the government of Ecuador, mercury use fell by 60% in the Portovelo-Zaruma region until the second study in 2015. Based on these assessments, UNIDO will now start working on the Minamata Convention Initial Assessments (MIAs) supporting the governments of Ecuador and Peru.

Several training workshops with local authorities were held to support the formalization of miners and to establish the use of safe and affordable mercury-free methods to extract the gold. Small-scale miners were encouraged to adopt cyanidation and flotation. Artisanal miners were trained in direct smelting. Through training and awareness raising, miners were also shown the value of analyzing the ore to identify optimal mining techniques.



The chlor-alkali switch from mercury cell technology to a more efficient membrane technology removes old catalytic processes and ensures adequate management of recovered waste stocks, besides also generating energy savings. Active private sector engagement facilitates financial support for this relatively expensive transition.

UNIDO's comprehensive action on mercury pollution also includes the remediation of contaminated sites. In collaboration with the government, UNIDO's GEF-5 project in Macedonia (FYROM) is rehabilitating a lindane and mercury contaminated site. As mercury cannot be degraded, UNIDO is working to identify and promote safe and permanent, economically viable solutions for its storage, carefully aligned to the specific conditions of local industries.

# Ozone-depleting substances (ODS)

UNIDO offers institutional support and technical assistance to companies for the complete elimination of ODS use from industrial production.

UNIDO's Montreal Protocol Division plans, develops and implements national and sector-wide ODS phase-out plans in developing countries and, with support of the GEF, in economies in transition, to ensure their compliance with the Montreal Protocol. Since 1992, UNIDO has helped 1,650 firms in 75 countries to phase out what amounts to over one-third of ODS used in developing and emerging economies.

Interventions target the foam, refrigeration, air conditioning, aerosol, solvent and healthcare sectors, as well as fire protection and agricultural industries. In all areas, the introduction of new ozone-friendly technology and equipment is combined with training for government and business representatives, as well as technicians, on technology use and safety.

UNIDO also supports the development of strategies, policies and legislation for the regulation of ODS production and consumption as well as their import and export. Its interventions also assist governmental institutions in monitoring ODS flows.

## HCFC Phase-out

After large-scale success with chlorofluorocarbons (CFCs), HCFCs are one of the last ODS in common use. In their action on ODS, most countries have targeted their foam

## What are ODS?



The ozone layer is the Earth's natural sunscreen. It filters out ultraviolet (UV) rays from the sun, which are harmful to humans and other organisms. Ozone-depleting substances (ODS) damage the ozone layer, which takes many years to recover.

Through global action, most notably under the Montreal Protocol, chlorofluorocarbons (CFCs), methyl bromide and halons have been completely phased-out. Today, hydrochlorofluorocarbons (HCFCs) pose the greatest challenge as they are widely used in refrigeration, air conditioning and insulation foams.

manufacturing sector or individual foam production lines for refrigeration facilities. To complement these plans, individual investment projects have also been developed in manufacturing sectors.

HCFCs have a high global warming potential (GWP), so their elimination from foam, refrigeration and air conditioning not only protects the ozone layer, but also the climate.

## Some 340 million tonnes of CO<sub>2</sub>e avoided annually through cross-cutting effects

Most of the chemicals listed as controlled substances under the Montreal Protocol are also very potent GHGs. The aim to completely phase out the production and use of ODS has led to the double-benefit of reducing the emission of gases that both deplete the ozone layer and contribute to climate

## Climate change abatement by reducing ODS emissions from industrial refrigeration in Vietnam

In cooperation with the Ministry of Natural Resources and Environment (MONRE) of Vietnam and with co-funding from the GEF, the project is eliminating the industrial use of refrigerant gases with a high global warming potential (GWP), such as HCFC. The ODS are replaced by low-GWP refrigerants, thus contributing to climate change abatement with the simultaneous benefit of ODS emissions reduction.

Sustainable, efficient and affordable cold storage systems are installed in selected demonstration sites. The Vietnam Environment Protection Fund (VEPF) and international partners such as Zanotti and Shecco are providing soft loans for companies undertaking the technological conversion. To upscale the impact, UNIDO is providing policy and regulatory support, bringing together national public and private stakeholders.

change. Additionally, projects that target service practices and refrigeration have reduced energy consumption in these sectors, for instance through the Vietnam cold chain project.

In combination with energy efficiency measures, UNIDO's Montreal Protocol Division has helped avoid the use and potential emission of approximately 340 million tonnes of CO<sub>2</sub>e per year, using 1990 as a baseline. This is equivalent to the 2020 targets of Germany, France and the United Kingdom combined, or 71 million passenger cars driven for a year.

## HCFCs phase-out in the Russian Federation

The project assisted the largest Russian manufacturers of polyurethane foam and refrigeration equipment to install ODS-free technologies and processes. This resulted in the direct phase-out of 600 tonnes of HCFCs and enabled the Russian Federation to meet its 2015 Montreal Protocol target for HCFC use.

Further, the project helped to set up two pilot facilities for the destruction of accumulated obsolete ODS, namely CFCs, and assisted in the elaboration of a cost-effective ODS destruction strategy aimed at the reduction of ODS stocks in the country.

The project assisted the Russian Government and various federal bodies in drafting regulatory documents as well as action plans for ODS reduction, including controls of ODS import, export and use. Conferences, workshops, technical trainings, publications, websites and outreach via mass media helped to spread information and raise public awareness for the national programme to completely phase-out ODS.



# Green Chemistry

**In order to take legal, organizational and technological changes even further, UNIDO and its partners are building synergies for integrated sound chemical management and sustainable chemistry.**

Over time, the GEF has moved towards more integrated approaches to chemicals and waste by combining action on POPs, ODS, mercury and other toxic chemicals in a single focal area. UNIDO has strongly promoted this angle by initiating the global multi-stakeholder Green Chemistry project, drawing on its success with the Chemical Leasing programme.

In a similar approach, UNIDO has supported countries' compliance with the Basel and Rotterdam Conventions, which require their parties to build synergies and target several controlled toxic substances by acting on transboundary chemicals trade and waste management.



## Global multi-stakeholder guidance development for Green Chemistry

This year, UNIDO initiated a global multi-stakeholder project that acts as a forum for the exchange and publication of research and technology know-how, with a specific focus on products and processes that do not use or generate hazardous substances. This GEF-funded project is the first global public-private partnership to bridge the gap between science-based innovation and real-world application of Green Chemistry in developing countries and economies in transition.

The project partnership comprises a large research consortium led by Yale University, Braskem – the largest thermoplastic resins producer in the Americas, the German Federal Environmental Foundation, as well as National

Cleaner Production Centres in Brazil, Colombia, Egypt, Sri Lanka and Serbia.

Based on the expertise of its members, the global public-private partnership is developing a guidance document on Green Chemistry, a body of knowledge and university curricula. It aims to address the challenges posed by hazardous chemicals through holistic, wide-ranging actions and preventive management of chemicals and waste. Additionally, the partners will actively support the awareness raising campaign for Green Chemistry. UNIDO and Braskem will develop a pilot to produce bio-based high and low-density polyethylene (HDPE and LDPE) and linear LDPE using new catalytic processes.



# International Waters

**UNIDO assists governments and productive sectors to increase water productivity and protect aquatic ecosystems through technical and regulatory upgrades.**

UNIDO's interventions to protect transboundary water bodies support public and private sectors to contain industrial pollution and resource depletion. This involves the reduction of industrial water withdrawals, an increase of water reuse and recycling, and the minimization of pollution via untreated effluent discharges. UNIDO also works to secure safe drinking water supply by introducing technologies to remove metals, and organic and toxic substances from water for domestic use.

Currently, Ecuador, Peru, Mexico and Vietnam are hosting ongoing UNIDO-GEF projects for integrated coastal area management against land degradation, industrial fisheries management and restoration of stocks, as well as abatement and removal of contaminants from industrial activities. The preservation of transboundary water bodies also includes the

improvement of ASGM activities to reduce mercury discharge and restore ecosystems. Through interventions in key mining sites within the UNIDO-GEF Global Mercury Project, the Amazon, Mekong, Nile and Zambezi Rivers, as well as the Java Sea and Lake Victoria have benefited from significantly reduced mercury pollution.

While capacity building is at the centre of UNIDO's work under this GEF focal area, the Organization complements the technical know-how transferred to GEF recipient countries with pilot demonstrations and technical assistance on policy and regulatory issues to ensure lasting project benefits. Given its experience and leading role in addressing industrial water pollution, UN-Water appointed UNIDO as lead agency in the preparation of the Fifth World Water Development Report, which focused on the water-energy nexus.

# Reducing Ocean Hypoxia

**UNIDO's efforts to reduce ocean hypoxia are focusing on the prevention of land-based pollution affecting the marine environment.**

Industries are often located along river systems, close to the water resources needed for production. The cumulative discharge of industrial effluents into river systems leads to excessive nutrient loads downstream, which are carried to the seas, where they create hypoxia zones.

## Transfer of Environmentally Sound Technologies (TEST) to protect International Waters



UNIDO's TEST projects apply measures for improved resource efficiency and waste minimization as well as water recycling and reuse in water-intensive industrial facilities. Hazardous substances for production purposes are replaced by more environmentally-friendly substances.

The cross-cutting intervention addresses water, food, energy, and ecosystem security, while also helping to reduce ocean hypoxia. It combines the transfer of water management technologies with the introduction of management tools, such as Corporate Social Responsibility (CSR), Environmental Management Systems and Environmental Accounting Systems – thus addressing all key aspects of a company's operations. At the river basin level, UNIDO has applied its TEST approach in countries in Africa, Asia, Eastern Europe and Latin America.

To limit nutrient discharges of individual industrial plants, UNIDO builds the necessary capacity and provides technical assistance for more efficient resource use, which spans water, energy and raw materials. More efficient energy use additionally brings climate benefits, while less raw material inputs reduce solid waste. Process optimization also lowers operational costs and increases the competitiveness of enterprises.

## Transfer of environmentally sound technologies in the South Mediterranean region (MED-TEST)

The MED-TEST project was designed to address pollution from activities on land identified as industrial pollution hot spots in the Strategic Action Plan (SAP) of the Mediterranean Sea. Three countries, Egypt, Morocco and Tunisia, hosted applications of the TEST integrated approach in 43 participating companies. Measures included the adoption of BAT, cleaner production, and appropriate environmental management systems (ISO 14001 and ISO 14004).

The UNIDO-GEF project achieved an operational cost reduction of USD 17 million per year, through water savings of 9.7 m<sup>3</sup> per year and annual energy savings of 263 GWh. The three main interventions were institutional capacity building, industrial demonstrations of technology transfer, as well as national and regional dissemination of best practices for the preparation of replication roadmaps to upgrade further production lines.

# Large Marine Ecosystems

UNIDO's interventions follow an ecosystem-based approach to stem the tide of degradation and depletion of oceanic resources through industries.

UNIDO works to protect Large Marine Ecosystems (LMEs) by targeting SMEs and communities situated close to river systems, as well as countries sharing LMEs. UNIDO has partnered with the GEF to work on projects in the Gulf of Guinea, where UNIDO assisted 16 West African countries, and is currently developing a project in the Gulf of Mexico. Both projects are pursuing the long-term goals of recovering depleted fisheries, restoring degraded coastal areas, and reducing industrial land and ship-based pollution through regional capacity building.



## Combating living resource depletion and coastal area degradation in the Guinea Current LME

Financed by the GEF, UNIDO conducted a Transboundary Diagnostic Analysis (TDA) and devised a Strategic Action Programme for the Guinea Current Large Marine Ecosystem (GCLME) with 16 riparian countries. To provide institutional support, the project established an Interim Guinea Current Commission. UNIDO finalized 6 national, and 3 regional demonstration projects, among them a study to find a low-cost, socially acceptable and environmentally-friendly solution for the transboundary water pollution caused by a phosphate processing factory in Togo.

The partnerships approach remains a key element throughout UNIDO's projects under the GEF's International Waters focal area. One noteworthy example is the partnership with the United States National Oceanic and Atmospheric Association (NOAA) and the Secretariat of Environment and Natural Resources of Mexico (SEMARNAT), the lead government agencies in Mexico and the US in charge of environmental protection and sustainable development of the Gulf of Mexico LME. Both have endorsed the Strategic Action Plan initiated by UNIDO. This initiative represents a successful example of North-South cooperation for sustainable development in mutual spheres of influence.



# Complex Problems & Integrated Solutions

The UNIDO-GEF partnership is targeting drivers of environmental degradation in an integrated way, through scalable activities and cross-cutting programmes for environmentally-friendly urbanization and food security.

Amid rapidly growing populations and economic development, demand for manufactured goods and energy supply is rising at an exponential rate. The intensification of industrial production on all ends is severely stressing the environmental carrying capacity and requests cross-cutting solutions that combine efficient resource use, clean energy supply and pollution control to attain greater impact. For this purpose, UNIDO and the GEF have built broad coalitions of committed public and private stakeholders that are actively supporting the turn towards a scalable, multi-focal approach.

The UNIDO-GEF partnership has also brought forth flagship programmes associated with the Water-Energy-Food Nexus, as well as Eco-Industrial Parks, where UNIDO is applying its sustainable industrialization approach to new integrated areas.

## Nexus Solutions for Sustainability: A research initiative

This flagship programme unites UNIDO, the GEF and the International Institute for Applied Systems Analysis (IIASA) in the aim to identify integrated solutions to energy, water, food, and ecosystem security in selected regions of the world. The research initiative specifically targets regions that are facing multiple energy and land use challenges, as well as rapid demographic and economic changes, while coping with a strong impact from increasing climate variability.

The research focus directly responds to questions of how the SDGs can be jointly addressed, particularly SDG-7, 9, 11 and 13, the costs of inaction, and how problems in one area may exacerbate or mitigate problems in other areas.

While nexus thinking is common at the micro levels of human organization, such as family, community groups and even small municipalities, resource planning at larger scales is defined by “silos”, with policies developed along sectoral lines. But in a world of growing resource scarcities, planning considerations cannot address shortages in isolation. Policymakers, infrastructure planners and supply chain managers are increasingly recognizing cross-cutting effects across the productive sectors, municipalities and the environment. Making the connection helps to identify solutions that minimize tradeoffs and benefit multiple sectors.

Within the nexus approach, the interventions of UNIDO and the GEF connect high and low levels of organization and involve action at both the local level of eco-industrial parks and the global level through scientific research to examine how water, energy and food systems interact.

## Eco-Industrial Park Initiative in Vietnam

The eco-industrial park (EIP) management system significantly reduces GHG emissions, water consumption and pollution, POPs, and other toxic chemicals through innovative clean and low-carbon technologies in industries. As the largest EIP project in the UNIDO-GEF portfolio, it assumes an important demonstrative role and provides a pilot model for regulatory policymaking on EIP development.

Besides trainings for government officials and companies, UNIDO has facilitated Resource Efficiency and Cleaner Production (RECP) Audits for the participant companies. Based on these audits, experts recommend immediate ways to cut down energy and material consumption. Only by implementing simple suggested solutions to enhance productive efficiencies, a fruit juice, jam and coffee producer saved an immediate amount of VND 48 million (USD 2,000) without investment.

# Sustainable Urban Industrialization

**UNIDO's technical assistance, innovation, industrialization and climate action are turning cities into economic power houses with higher quality of life.**

More than half of today's global population lives in cities, and this level is expected to surge by two-thirds by 2050. Accelerated urbanization provides lively economic activity in cities, but exerts pressures on public infrastructure to rapidly expand the supply of resources, particularly energy, water, food, and waste management. Developing and emerging economies are experiencing the fastest changes as 80% of all urban growth in the next 20 years will take place in Africa and Asia.

Industries located in or near cities are key sources of pollution and GHG emissions, but also represent the key engine of job generation. Through the GEF's Sustainable Cities IAP, UNIDO strategically involves industries in urban planning, while providing them with efficient and

sustainable city services. These goals are advocated by SDG-11 to "make cities and human settlements inclusive, safe, resilient and sustainable." Launched in 2015, the Sustainable Cities flagship programme of the GEF covers 23 pilot cities in 11 countries, with projects implemented by eight GEF Agencies, including UNIDO.

In this new area, UNIDO's interventions follow three thematic streams:

- » Climate resilient industries: industrial energy efficiency and renewable energy, eco-industrial parks and disaster risk reduction
- » Climate smart city service delivery: EnMS ISO 50001, efficient and low-carbon waterworks, transport, and buildings, smart waste-to-energy and smart grids
- » Value chain development for sustainable cities: sustainable building materials, clean fuels, new energy vehicles and climate-smart peri-urban agriculture.





UNIDO's services include analytical assessments for well-founded enabling policy and institutional mechanisms, clean technology transfer and demonstration, private sector investments and strong country ownership, as well as knowledge management. So far, UNIDO has developed strong partnerships with city governments in Senegal, Malaysia, India and Côte d'Ivoire, aimed to become best practices of sub-national climate action.

## Sustainable-City Development in Malaysia

According to the World Bank, 75% of the Malaysian population lived in urban areas in 2015. With a population growth rate of almost 1.5%, this severely challenges urban planning. UNIDO and the GEF are supporting the Melaka City government to integrate climate risks in urban planning, to improve national strategic policies and to develop incentive schemes and institutional capacity for climate-friendly and resilient urban development.

The impact is scaled up through policy coordination at the national level, which involves awareness raising events for policy-makers, industry and consumers. UNIDO is also deploying electric vehicles in public services and industries, accompanied by new charging facilities, smart grids and IT applications. New energy efficiency and renewable energy applications in commercial and government buildings are further amplifying the demonstration effect.

# Agricultural Value Chains Support

UNIDO works to empower smallholder farmers and contain land degradation for sustainable and resilient food value chains.



Humans are already consuming at a faster rate than the Earth can replenish. Yet, demand for food is expected to increase by 70% until mid-century. Meanwhile, over-intensive agricultural production continues to decimate fertile land in many parts of the world and this trend is further exacerbated by a growing world population and climate change-induced land degradation.

In response to these global challenges, the GEF recently launched the flagship programme “Fostering Sustainability and Resilience for Food Security in Sub-Saharan Africa”

with the aim to provide integrated solutions to complex environmental issues. The Food Security IAP focuses on safeguarding land, water, soils, trees and genetic resources – the natural resources that underpin food and nutrition security – to ensure long-term sustainability and resilience of food production systems. UNIDO and the International Fund for Agricultural Development (IFAD) have already developed a joint project under the Food Security IAP, which will be launched in Senegal in 2017.

## Agricultural Value Chains Support in Senegal

UNIDO and IFAD are implementing the IAP in Senegal to disseminate modern technologies among smallholder farmers and upgrade industrial food value chains. This focuses on creating synergies between food and fibre production as well as providing regulatory and service support regarding pollination, water use and genetic diversity to ensure long-term conservation of biodiversity and nutritious food production. UNIDO and IFAD are also tracking impacts on ecosystem services and food security in agricultural production systems at target locations.

The GEF-financed project will reach out to around 52,500 people and over 5,000 households that constitute some of communities most vulnerable to the impacts of climate change, and agriculture-induced land degradation.



# Outlook

Based on its comparative advantage, UNIDO has steadily increased the scope of its interventions within the financing framework of the GEF. Through its ability to adapt the industrial value chain approach to all scales and sectors of industrial production, the Organization has succeeded in expanding productive practices that decouple economic development from climate change and pollution. This progress has been accelerated through UNIDO's extensive network of public and private stakeholders that connects strategic programmes of UNIDO and the GEF to their impact in industries all over the world.

## Contributing to global efforts to safeguard the environment...

In response to climate change, the depletion of natural resources and the ozone layer, and the pollution of habitats and livelihoods, the world has seen significant global policy breakthroughs in recent years. In September 2015, the UN Member States adopted the 2030 Development Agenda with a set of 17 SDGs. In December 2015, 195 countries signed the Paris Agreement – the first universal, legally binding deal on climate change. In October 2016, the 197 parties of the Montreal Protocol agreed upon the Kigali Amendment to eliminate hydrofluorocarbons (HFCs), ODS recognized as the world's fastest growing climate gases.

These global policy instruments are shaping the way forward, characterized by mutually reinforcing solutions to environmental, economic and societal threats. By targeting the drivers of environmental challenges, UNIDO's future initiatives will foster synergies between the programmatic approaches of UNIDO and the GEF to deliver benefits at multiple levels. Recognizing the importance of cohesive interventions at the regional level, the UN General Assembly proclaimed the period

2016-2025 as the Third Industrial Development Decade for Africa. This will provide a vehicle for UNIDO to explore improved partnerships and synergies for climate-smart, environmentally-friendly industrialization, which will irrevocably place Africa on the acceleration lane to ISID and lasting prosperity.

## ... by mobilizing the potential of the industrial sector.

The partnership approaches of UNIDO and the GEF follow the principle that industries serve as providers of solutions and must be integrated into the formulation of strategic plans for the deployment of clean technologies and processes. Innovative market mechanisms and financing solutions, such as revolving funds and incentive schemes, can serve to de-risk investments and encourage green financing. Building on its experience from the PCPs, UNIDO will increasingly intensify the integration of industries and private sector service providers, DFIs, as well as other key actors within the multilateral finance architecture, such as the Green Climate Fund (GCF).

In addressing climate change, UNIDO will provide local partners with the required knowledge and tools to support the early prediction of climate-induced risks and offer industrial and community-level solutions for mitigation and adaptation. Leveraged by the momentum of the new Kigali Amendment and its clear signal to global markets, UNIDO will direct its interventions under the Montreal Protocol towards increased action on HFCs, which are widely used in the air conditioning and refrigeration industries.

## **UNIDO works with partners to create sustainable rural and urban systems...**

The global population rise to nine billion by 2050 is considered to be the greatest non-climate driver of environmental degradation. A larger population translates into increased demand for food, energy and manufactured goods, leading to intensive and “dirty” production methods. In response, UNIDO will upscale its interventions to reduce post-harvest losses, improve resource management and energy efficiency in industrial production, and develop integrated solutions for food security and sustainable value chains. This approach could be mainstreamed through the GEP’s synergetic approach to food systems and agricultural commodity supply chains to leverage on regional opportunities for cooperation and encourage awareness of the linkages between industry and food security.

UNIDO’s sustainable urban industrialization initiatives will continue to alleviate the impact of rapid population growth and urbanization. In the coming years, UNIDO aims to extend its current urban planning interventions into the energy-intensive transportation sector, thereby accelerating the transformation of both energy and urban systems. As a largely neglected contributor to climate change, transportation has lagged behind in the transition to renewable energy. Improved transportation linkages among cities and industrial hubs can yield significant efficiency gains by reducing transaction costs.

Through its close relations with industry, UNIDO will accelerate the realization of circular economies through improved product design, more efficient industrial processes and use of resources, and innovative waste management. Such efforts will contribute to the GEP’s investments in Circular Economy and provide a unique vehicle for upscaling through the development of collaborative platforms and innovative business models.

In order to accelerate the phase-out or safe handling of harmful chemicals, UNIDO will continue to bridge the gap between innovations and their application by industries. The Green Chemistry project places UNIDO at the forefront of cutting-edge research, producing a rich knowledge base that will help UNIDO and its partners strengthen the global sustainable chemicals agenda and create tangible change. As a growing priority, UNIDO is exploring the scope of interventions in the chlor-alkali sector, which is responsible for a large quantity of mercury emissions due to the use of mercury-cell production processes. A reduction of mercury release from this sector would significantly contribute to countries’ compliance with the Minamata Convention.

## **...utilizing cutting-edge technology and innovative business models**

Anthropogenic activity is continuing to transform the chemical composition of the world’s oceans and the planet’s nitrogen cycle faster and greater than ever before. The planetary boundaries are reaching their limits, endangering the global commons that make the world habitable. With the technical capabilities of specialists and its unique mandate, UNIDO complements the actions of its sister agencies to keep growth within the Earth’s carrying capacity. As an international organization with strong field presence, backed by an extensive and diverse partnerships network, UNIDO has the capacity to act globally while applying technical solutions that are replicable across sectors and country boundaries.

The continued partnership between UNIDO and the GEF will allow both organizations to balance the pursuit of shared prosperity and environmental stewardship to accomplish inclusive and sustainable industrial development, realize the GEF 2020 Strategy, and contribute to the Sustainable Development Goals.

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